# Winterization/De-Winterization of Tank Farm In-Pit Heaters

## Tank Farm Maintenance Procedure

### WINTERIZATION

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<td>01/16/2019</td>
<td>Maintenance Request</td>
<td>Revised Step 5.2.3 to correct Circuit Breaker number and added step after 5.1.38: Ensure Power is restored to operational condition.</td>
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<td>A-4</td>
<td>11/20/2018</td>
<td>Maintenance Request</td>
<td>Added lock out/tagout statements and in-pit heater details.</td>
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<td>Added Lock and Tag information and removed Special Instructions in Section 5.1.</td>
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<td>Added list of circuit breakers for in-pit heaters.</td>
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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for activation and de-activation of winterization activities on In-Pit Heaters in the Tank Farms.

1.2 Scope

1.2.1 September: Restoration of In-Pit Heaters to service before the onset of winter in Valve Pits for freeze protection, recording corrective maintenance needs, and documenting results of this performance.

1.2.2 March: Service In-Pit Heaters.

2.0 INFORMATION

2.1 General Information

Implementation of winterization/freeze protection provides an additional layer of defense-in-depth against damage to equipment/structures vulnerable to freezing (e.g., piping systems, structures, isolation valves, and electrical heaters).
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Comply with DOE-0359, Hanford Site Electrical Safety Program.

3.1.2 Unless otherwise specified, cleaning and servicing of heating and cooling systems will be performed on DE-ENERGIZED equipment.

3.1.3 During the performance of this procedure, compliance with the DOE-0336, Hanford Site Lockout/Tagout Procedure is required.

3.1.4 Functional Testing of In-Pit Heaters will be performed on Energized Equipment.

3.1.5 Industrial Hygiene monitoring requirements will be specified in the Industrial Hygiene Sample Plan (IHSP).

3.1.5.1 Contact the facility Industrial Hygienist for the appropriate IHSP.

3.1.6 All known hazards and identified personal protective equipment will be addressed in the pre-job safety meeting per an approved work package.

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-ESH-QRP_RWP-C-03.

3.3 Environmental Compliance

Environmental Compliance must be notified of any spills observed as a result of this surveillance. Environmental Compliance will make the appropriate notifications of such releases per WAC 173-303.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Two Process Calibrators (NIST calibrated)
- Multimeter
- Stop Watch
- Amp Meter
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Performance Documents

- H-14-110251, Rev 0, Sht 1 – In Pit Heating Piping and Instrumentation Diagram
- H-14-110252, Rev 1, Sht 1 – In Pit Heating Wiring & Elementary Diagrams
- H-14-110252, Rev 1, Sht 2 – In Pit Heating Wiring & Elementary Diagrams
- H-14-110253, Rev 1, Sht 1 – In Pit Heating Electrical Panel Layout
- H-14-110254, Rev 1, Sht 1 – In Pit Heating Heater Top Level Assembly
5.0 PROCEDURE

5.1 Winterization of In-Pit Heaters

NOTE - Section 5.1 should only be performed in the fall of the year to prepare the In-Pit Heaters for winter weather conditions.

- Steps not required for completion of this procedure may be omitted and “N/A” recorded in the applicable space on the data sheet with an explanation in the Comments/Remarks section.

- Unless otherwise specified, cleaning and servicing of heating systems will be performed on de-energized equipment.

- In-Pit Heaters may be energized and/or de-energized per Operations direction during October through March.

5.1.1 ENSURE lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure

5.1.2 CLEAN AND SERVICE enclosures for In-Pit Heaters Listed in Data Sheet.

5.1.2.1 OPEN door AND

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

5.1.2.2 OPERATE all breakers AND

DISCONNECT manually to confirm operation.

a. LEAVE breakers in as-found condition.

5.1.3 RECORD on STEP 1 of Data Sheet and list deficiencies on the Enclosure Comments Section of the Data Sheet.
5.1 Winterization of In-Pit Heaters (Cont.)

5.1.4 CONNECT one process Calibrator in place of TE-2 AND CONNECT the other process calibrator in place of TE-3.

5.1.5 ENSURE removal of lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.1.6 For the following In-Pit Heaters, that are cord and plug connected into the MPC, CONNECT power to In-Pit Heaters by connecting heater power cord to Mini-Power-Center (MPC)

OR

FOR the following In-Pit heaters that are hard wired to MPC, CONNECT power to In-Pit Heaters by closing circuit breakers:

- For AN01A-WT-HTR-442 – CB-5 on Panel AN01A-EDS-DP-301
- For AN06A-WT-HTR-446 – CB-5 on Panel AN06A-EDS-DP-302
- For ANVPA-WT-HTR-452 – CB-5 on Panel ANVPA-EDS-DP-303
- For ANVPB-WT-HTR-453 – CB-5 on Panel ANVPB-EDS-DP-304
- For AP02A-WT-HTR-441 – CB-5 on Panel AP02D-EDS-DP-301
- For APVP-WT-HTR-454 – CB-1 on Panel APVP-EDS-DP-303
- For APVP-WT-HTR-455 – CB-5 on Panel APVP-EDS-DP-303
- For APVP-WT-HTR-456 – CB-6 on Panel APVP-EDS-DP-303
- For AW02A-WT-HTR-463 – CB-5 on Panel AW02A-EDS-DP-301
- For AWVPA-WT-HTR-459 – CB-5 on Panel AWVPA-EDS-DP-302
- For AWVPB-WT-HTR-460 – CB-5 on Panel AWVPB-EDS-DP-303
- For AY01A-WT-HTR-461 – CB-5 on Panel AY01A-EDS-DP-301
- For AZ01A-WT-HTR-464 – CB-5 on Panel AZ01A-EDS-DP-302
- For AZ02A-WT-HTR-465 – CB-5 on Panel AZ02A-EDS-DP-303
- For AZVP-WT-HTR-457 – CB-5 on Panel AZVP-EDS-DP-301
- For AZVP-WT-HTR-458 – CB-6 on Panel AZVP-EDS-DP-301.
5.1 Winterization of In-Pit Heaters (Cont.)

Functional Test Overview

NOTE - The Pit Heater assembly will be functionally tested to ensure proper operation during both normal and upset conditions. Conditions will be simulated by forcing inputs into the pit heater temperature controllers TIC-02 and TIC-03 respectively using a calibrated process calibrator to ensure proper response. The following will be verified with the functional test:

- IL-01 (Power ON Light) – Turns on when power is applied to in pit heater control panel thru HS-01 POWER SWITCH.

- IL-02 (Pit Low Temperature Light) – Turns on when pit temperature falls below programmed setpoint for TSL-02 (Waste Transfer Pit Low Temperature Switch).

- IL-04 (Fan Power Light) – On when FAN-1 is running.

- IL-03 (Thermal Cutout Light) – Turns ON immediately if temperature at TE-3 is above programmable setpoint for TSH-03 (Heater Energized with no flow condition setpoint of 150°F).

- FAN-1 (Pit Heater Circulation Fan) – Turns ON immediately if temperature at TE-2 falls below programmed setpoint for TSL-02 (Waste Transfer Pit Low Temperature switch).

Turns OFF when fan delay off timer finishes timing (Set at approximately 2 minutes and begins timing once temperature at TE-2 rises above 5°F above the operator setpoint for TSL-02).
5.1 Winterization of In-Pit Heaters (Cont.)

- HTR-1 (Pit Heater) – Turns ON immediately if temperature at TE-2 falls below programmed setpoint for TSL-02 (Waste Transfer Pit Low Temperature Switch).

  Turns OFF once temperature rises 5°F above setpoint for TSL-02.

  Turns OFF if TSH-03 (Heater Energized with No Flow Condition) is energized.

- TSL-02 is integral to TIC-02 (Waste Transfer Pit Low Temperature Switch) – Turns ON if temperature at TE-2 falls below adjustable setpoint (Can be set to a value of 55°F) Figure 1.

  Resets once temperature rises 5°F above setpoint.

- TSH-03 is integral to TIC-03 (Heater Energized with No Flow Condition) - Turns ON if temperature at TE-3 rises above adjustable setpoint (Set at 150°F) Figure 1.

  Resets once temperature at TE-3 fall below setpoint and reset button on TIC-03 is pressed from control panel.

### Functional Test of In-Pit Heaters

**NOTE** - The intent of this test is to verify the In-Pit Heaters Function Properly during normal operations and shutdown during upset conditions.

5.1.7 **RECORD** M&TE and Calibration of Process Calibrators on Data Sheet

5.1.8 **SET** Process Calibrators to Simulate 3-Wire 100ohm PL RTD, **AND**

  **SET** initial Temperature value to 60°F.
5.1 Winterization of In-Pit Heaters (Cont.)

**Power Up In-Pit Heating Control Panel:**

5.1.9 **ENSURE** Power to HS-01 is on per Step 5.1.6.

5.1.10 **ENSURE** Circuit Breaker CB-1 is in the OFF position.

5.1.11 **ENERGIZE** control panel by **TURNING** HS-01 POWER SWITCH to the ON position.

5.1.12 **CHECK** voltage at the top side of CB-1 to ensure nominal 240V is measured across P1 and P2 **AND**

5.1.13 **RECORD** Voltage in STEP 2 of Data Sheet.

5.1.14 **TURN** Circuit Breaker CB-1 to the ON position.

5.1.15 **CONFIRM** IL-01 (POWER ON indicating light) turns ON indicating power to In-Pit Heating Control Panel.

**Check Waste Transfer Pit Low Temperature Switch TSL-02:**

5.1.16 **ENSURE** setpoint for TSL-02 (Integral to TIC-2) is set to 55°F.

5.1.17 **REPEATEDLY PRESS** the down arrow on TIC-02 to **ATTEMPT TO LOWER** TSL-02 set point to a value below 50°F **AND**

**CONFIRM** set point will not go below 50°F.

5.1.18 **RESET** setpoint for TSL-02 to 55°F **AND**

**SET** process calibrator to 50°F.

5.1.19 **CONFIRM** HTR-1, Fan 1, IL-02 (Pit Low Temperature Indicator Light), and IL-04 (FAN Power Indicator Light) immediately turn ON.

5.1.20 **RECORD** Heater and Fan Amperage Readings on STEP 3 and STEP 4 of Data Sheet.

5.1.21 **SLOWLY INCREASE** the simulated temperature from the process calibrator until HTR-1, IL-02 (Pit Low Temperature Indicator Light) and TSL-02 TURN OFF.
5.1 Winterization of In-Pit Heaters (Cont.)

5.1.22 WAIT approximately 2 minutes AND CONFIRM FAN-1 and LI-04 (Fan Power Indicator Light) Turn Off.

Check High Temperature Cutout Switch:

5.1.23 SET Second Process Calibrator on TIC-3 to Simulate 3-Wire 100ohm PL RTD, AND SET temperature value to 145°F.

5.1.24 ENSURE setpoint for TSL-02 is set to 55°F.

5.1.25 Using the first process calibrator on TIC-02, SET the calibrator to 54°F.

5.1.26 CONFIRM HTR-1, FAN-1, IL-02 (Pit Low Temperature Indicator Light) and IL-04 (FAN Power Indicator Light) Immediately Turn ON.

5.1.27 Using the Second Process Calibrator on TIC-03, SLOWLY INCREASE simulated Temperature for TE-3 until TSH-03 and IL-03 (Thermal Cutout Indicator Light) turns ON.

5.1.28 CONFIRM CON-2 OPENS and HTR-1 Immediately Turns OFF. Figure 1

5.1.29 SLOWLY DECREASE simulated temperature setpoint for TE-3 below 150°F.

5.1.30 CONFIRM CON-2 remains OPEN and HTR-1 remains OFF. Figure 1

5.1.31 CONFIRM IL-03 (Thermal Cutout Indicator Light) Turns OFF once setpoint is below 150°F, and reset button on TIC-03 (located on control panel) is pressed.

5.1.32 CONFIRM HTR-1 Turns Back ON.

5.1.33 SET Simulated Temperature for TE-2 to 62°F

5.1.34 WAIT 2 minutes AND CONFIRM HTR-1, FAN-1, IL-02 (Pit Low Temperature Indicator Light), IL-04 (FAN Power Indicator Light) and IL-03 (Thermal Cutout Indicator Light) are OFF.
5.1 Winterization of In-Pit Heaters (Cont.)

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

5.1.36 **DISCONNECT** Process Calibrator for TIC-02 AND **RECONNECT** TE-2 to TIC-02

5.1.37 **DISCONNECT** Process Calibrator from TIC-03 AND **RECONNECT** TE-3 to TIC-03.

5.1.38 **ENSURE** removal of lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.1.39 **ENSURE** Power is restored to operational condition.

5.1.40 **IF** Functional Test is Satisfactory, **RECORD** in STEP 5 of Data Sheet AND **IF** Functional Test is Unsatisfactory, **CONTACT** FWS.

5.1.41 **ENSURE** setpoint for TSL-02 is set to 55°F AND **RECORD** on STEP 6 of data Sheet.
5.2  De-Winterization (April)

Special Instructions:

Section 5.2 should only be performed in the spring to prepare the facility for normal weather conditions.

Steps not required for completion of this procedure may be omitted and “N/A” recorded in the applicable space on the data sheet with an explanation in the Comments/Remarks section.

Unless otherwise specified, cleaning and servicing of heating systems will be performed on de-energized equipment.

5.2.1  ENSURE HS-01 POWER SWITCH is OFF

5.2.2  DISCONNECT POWER to In Pit Heaters AND

HANG power cord on hanger

OR

5.2.3  OPEN the Circuit Breakers for the following In-Pit Heaters that are hard-wired to the MPC:

- For AN01A-WT-HTR-442 – CB-5 on Panel AN01A-EDS-DP-301
- For AN06A-WT-HTR-446 – CB-5 on Panel AN06A-EDS-DP-302
- For ANVPA-WT-HTR-452 – CB-5 on Panel ANVPA-EDS-DP-303
- For ANVPB-WT-HTR-453 – CB-5 on Panel ANVPB-EDS-DP-304
- For AP02A-WT-HTR-441 – CB-5 on Panel AP02D-EDS-DP-301
- For APVP-WT-HTR-454 – CB-1 on Panel APVP-EDS-DP-303
- For APVP-WT-HTR-455 – CB-5 on Panel APVP-EDS-DP-303
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- For AZ02A-WT-HTR-465 – CB-5 on Panel AZ02A-EDS-DP-303
- For AZVP-WT-HTR-457 – CB-5 on Panel AZVP-EDS-DP-301
- For AZVP-WT-HTR-458 – CB-6 on Panel AZVP-EDS-DP-301.
5.2 De-Winterization (April) (Cont.)

5.2.4 TURN CB-1 located inside In-Pit Heating Control Panel to the OFF position AND RECORD on STEP 1 of Data Sheet.

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

5.2.6 CLEAN AND SERVICE enclosures for In-Pit Heaters Listed in Data Sheet.

5.2.6.1 OPEN door AND

INSPECT for the following:

- Loose connections
- Signs of moisture and corrosion
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Dust inside enclosure.

5.2.6.2 OPERATE all breakers AND DISCONNECT manually to confirm operation.

b. LEAVE breakers in as-found condition.

5.2.7 RECORD on STEP 2 of Data Sheet and list deficiencies on the Enclosure Comments Section of the Data Sheet.

5.2.8 ENSURE removal of lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.
Winterization/De-Winterization of Tank Farm In-Pit Heaters

5.3 Restoration

5.3.1 IF any problems were encountered, INFORM FWS.

5.3.2 RECORD Test Equipment information and Calibration status on Data Sheet.

5.3.3 NOTIFY Operations that testing is complete.

5.4 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.
Winterization/De-Winterization of Tank Farm In-Pit Heaters

Figure 1 – H-14-110252 Rev 1, Sheet 1

WIRING DIAGRAM
Winterization/De-Winterization of Tank Farm In-Pit Heaters

Figure 2 – H-14-110251, Rev 0, Sheet 1
Winterization/De-Winterization of Tank Farm In-Pit Heaters

Figure 3 – H-14-110253, Rev 1, Sheet 1
Winterization/De-Winterization of Tank Farm In-Pit Heaters

Figure 4 – H-14-110254, Rev 1 Sheet 1

HEATER TOP LEVEL ASSEMBLY
SCALE 1:8

TOTAL ESTIMATED WEIGHT = 420 LBS