# Tank Farm Maintenance Procedure

## USQ # Routine Maintenance

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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>E-6</td>
<td>10/23/2017</td>
<td>Engineering Request</td>
<td>Changed Section 5.1 to Inspect Sealed VFDs, Added Section 5.2 to Inspect Non Sealed VFDs, Added Limit Section and Reference to LCO 3.1 in procedure.</td>
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<tr>
<td>E-5</td>
<td>08/28/2017</td>
<td>Maintenance Request</td>
<td>Added “If accessible” to step 5.1.5.2.</td>
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<tr>
<td>E-4</td>
<td>06/29/2017</td>
<td>Maintenance Request</td>
<td>Added more information to Personal Safety section and added note below 5.1.1.</td>
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<tr>
<td>E-3</td>
<td>10/20/2016</td>
<td>Maintenance Request</td>
<td>Added Lock and Tag Step to 5.1.1, D 5.1.4</td>
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<tr>
<td>E-2</td>
<td>10/19/2016</td>
<td>Inconsequential Change</td>
<td>Changed Reference on Steps 5.1.5.3, 5.1.9, and 5.1.10</td>
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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for inspecting, cleaning and energizing Variable Frequency Drive(s). This procedure can be performed in multiple locations. A work area and/or location specific hazard analysis must be performed prior to starting the activity per TFC-ESHQ-S_SAF-C-02.

1.2 Scope

This procedure involves inspecting, cleaning and energizing Variable Frequency Drives installed in tank farms to ensure electrolytic capacitors are maintained.

2.0 INFORMATION

None

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

WARNING - Some Variable Frequency Drives have more than one source of power. Failure to comply with controls per DOE-0359, Hanford Site Electrical Safety Program can cause serious personnel injury or death from electrocution.

3.1.1 In order to prevent unknown beryllium particles from becoming airborne, pressurized air (canned air) will not be used to clean electrical distribution equipment in which favorable beryllium testing results have not been obtained. Pressurized air (canned air) shall not be utilized in a radiological area. Review SDS for In Tech 200 or In Tech QD, or equivalent.

3.2 Equipment Safety

If equipment has been out of service and not energized for > 12 months, refer to the vendor manual on reforming the Electrolytic capacitors and the recommended time period allowed between re-energization periods.

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.
3.4 Environmental Compliance

If HEPA vacuums are used in a radiological area during the performance of this procedure, they will be operated in accordance with the requirements of TFC-ESHQ-ENV_RM-P-11, Using Filter Vacuum Cleaners for Removing Radiological Surface Contamination.

3.5 Limits

LCO 3.1,DST Primary Tank Ventilation Systems

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Voltage Rated Gloves, with leather protectors.
- Vacuum cleaner, HEPA filter equipped as required, with insulated attachments
- InTech 200 or InTech QD cleaner, or equivalent
- Soft bristle brush
- Material to place a barricade
- Warning signs (as necessary) to prevent injury to unauthorized personnel
- Grounding jumper for capacitor grounding, minimum #14 AWG wire size
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Performance Documents

The following document may be needed in performance of this procedure:

- TFC-ESHQ-ENV_RM-P-11, Using Filter Vacuum Cleaners for Removing Radiological Surface Contamination
- TO-100-052, Perform Waste Generation, Segregation, Accumulation and Clean-up
- DOE-0336, Hanford Site Lockout/Tagout Procedure.
4.3 Field Preparation

4.3.1 **INSTALL** Lock and Tag in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure.

4.3.2 **INSTALL** barricades and warning signs.

4.3.3 **ENSURE** a work area and/or a location specific hazards analysis per TFC-ESHQ-S_SAF-C-02.
5.0 **PROCEDURE**

NOTE - Because the Data Sheets are tailored to individual components, Data Sheets will determine steps to be utilized during the inspection and testing sections of this procedure.

5.1 **Sealed Variable Frequency Drive Inspection**

5.1.1 **PERFORM** Safe to work check in each compartment that is opened for maintenance **AND**

INITIAL Data Sheet (*Item 1*)

NOTE - Shift Manager to begin time monitoring per applicable LCO. (LCO 3.1)

5.1.2 **IF** any step is not required for procedure completion, **RECORD** “N/A” in the applicable space(s) on the Data Sheet **AND**

DOCUMENT explanation in the Data Sheet’s Comments/Remarks section.

**WARNING**

Some Variable Frequency Drives have more than one source of power. Failure to comply with controls per DOE-0359, Hanford Site Electrical Safety Program can cause serious personnel injury or death from electrocution.

5.1.3 **IF** Power Transformer fuses are present, **REMOVE** Power Transformer fuses from instrument compartment.

5.1.4 **INSPECT** Variable Frequency Drive for the following:

- Signs of moisture
- Signs of overheating
- Condition of insulators
- Condition of grounding conductors/straps
- Loose Connectors
- Wiring for damage or deterioration
- Ribbon cables are connected and tight.

5.1.5 **INSPECT** all hardware (i.e. door interlocks, lamps, relays, and miscellaneous items associated with this equipment).
5.1 Sealed Variable Frequency Drive Inspection (Cont.)

5.1.6 PERFORM an inspection of the physical and mechanical condition of the VFD.

5.1.6.1 IF hardware requires adjusting or repair, ADJUST OR REPAIR the hardware. (ie. lamps, and miscellaneous items associated with this equipment)

5.1.7 RECORD inspection results in the comments section of the Data Sheet AND INITIAL (Item 3).

NOTE - Cleaning may be performed with a vacuum cleaner and/or soft bristle brushes. For areas with possible contamination HEPA vacuum may be used.

5.1.8 CLEAN the unit ENSURING all vent path openings are free from debris and heat surfaces are not contaminated with dust or dirt.

5.1.9 INITIAL Item 4 of the Data Sheet.

5.1.10 IF removed in Step 5.1.3, RESTORE Power Transformer fuses to instrument cubicle.

5.1.11 RECORD discrepancies in the comment section of Data Sheet.
5.2 NON-Sealed Variable Frequency Drive Inspection

5.2.1 PERFORM Safe to work check in each compartment that is opened for maintenance AND

INITIAL Data Sheet (Item 1)

NOTE - Shift Manager to begin time monitoring per applicable LCO. (LCO 3.1)

5.2.2 IF any step is not required for procedure completion, RECORD “N/A” in the applicable space(s) on the Data Sheet AND

DOCUMENT explanation in the Data Sheet’s Comments/Remarks section.

WARNING
Some Variable Frequency Drives have more than one source of power. Failure to comply with controls per DOE-0359, Hanford Site Electrical Safety Program can cause serious personnel injury or death from electrocution.

5.2.3 ENSURE capacitors are discharged to less than 50 volts.

5.2.4 IF accessible, INSTALL capacitor grounding to capacitors or DC Bus as is appropriate with grounding jumper and maintain grounding during clean and inspect work.

5.2.5 INITIAL Data Sheet (Item 2).

5.2.6 IF Power Transformer fuses are present, REMOVE Power Transformer fuses from instrument compartment.

5.2.7 INSPECT Variable Frequency Drive for the following:

- Signs of moisture
- Signs of overheating
- Condition of insulators
- Condition of grounding conductors/straps
- Loose Connectors
- Wiring for damage or deterioration.
- Ribbon cables are connected and tight

5.2.8 Verify mounting hardware is tight both on the VFD and the enclosure that houses the VFD.
5.2 **NON-Sealed Variable Frequency Drive Inspection (Cont.)**

5.2.9 **INSPECT** all hardware (i.e. door interlocks, lamps, relays, and miscellaneous items associated with this equipment). Also perform an inspection of the physical and mechanical condition of the VFD

5.2.9.1 **IF** hardware requires adjusting or repair, **ADJUST** OR

**REPAIR** the hardware. (ie. lamps, and miscellaneous items associated with this equipment)

5.2.10 **RECORD** inspection results in the comments section of the Data Sheet AND

**INITIAL (Item 3).**

**NOTE** - Cleaning may be performed with a vacuum cleaner and/or soft bristle brushes. For areas with possible contamination HEPA vacuum may be used.

5.2.11 **CLEAN** the unit ensuring all vent path openings are free from debris and that heat transfer surfaces are not contaminated with dust or dirt. AND

**INITIAL Item 4 of the Data Sheet.**

5.2.12 **IF** removed in Step 5.2.6, **RESTORE** Power Transformer fuses to instrument cubicle.

5.2.13 **REMOVE** capacitor grounding jumper(s) **AND**

**INITIAL Item 5 of the Data Sheet.**

5.2.14 **RECORD** discrepancies in the comment section of Data Sheet.
5.3 Variable Frequency Drive Testing

NOTE - Refer to the vendor manual on reforming the Electrolytic capacitors and the recommended time period allowed between re-energization periods.

5.3.1 IF equipment has been out of service and de-energized for 12 months or longer, STOP WORK AND CONTACT Engineering for resolution.

5.3.2 REMOVE Lock and Tags per DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.3.3 ENERGIZE Variable Frequency Drive using applicable breaker.

5.3.4 INSPECT Variable Frequency Drive for any abnormal conditions.

5.3.4.1 IF abnormal conditions are observed DE-ENERGIZE equipment AND NOTIFY FWS of any abnormal conditions AND DOCUMENT in the comments section.

5.3.4.2 IF the abnormal conditions require minor repairs or adjustments perform the following sub steps.

   a. OBTAIN FWS approval to perform the minor repairs or adjustments.

   b. INSTALL Lock and Tag per DOE-0336, Hanford Site Lockout/Tagout Procedure.

   c. PERFORM the minor repairs or adjustments.

   d. RETURN to step 5.3.2.
Variable Frequency Drive Inspecting, Cleaning and Energizing

5.3.5 **MAINTAIN** Variable Frequency Drive in an energized state for approximately 6 hours **AND**

**RECORD** START time in *Item 6* on the Data Sheet.

5.3.6 **IF** Variable Frequency Drive is required to remain energized and operational, **GO TO** Section 5.4.

5.3.7 **DE-ENERGIZE** Variable Frequency Drive **AND**

**RECORD** STOP time in *Item 6* on the Data Sheet.
5.4 Restoration

5.4.1 NOTIFY Shift Manager that all lock and tag devices may be restored to original configuration.

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

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

5.4.4 ENSURE HEPA vacuum is properly stored.

5.4.5 ENSURE work area is clean AND

DISPOSE of waste per TO-100-052.

5.5 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed.
5.6 Review

5.6.1 INFORM FWS test is complete.

5.6.2 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.

5.6.3 IF HEPA vacuums were used in a radiological area during the performance of this procedure, FWS or Engineering, FORWARD copies of any records to Environmental as required per TFC-ESHQ-ENV_RM-P-11.

5.6.4 PROVIDE the data sheets (originals or a copy) to the Electrical Engineer for review upon completion of the task.

5.7 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.

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.