Cathodic Protection System Individual Anode Output

Tank Farm Plant Maintenance Procedure

MAINTENANCE

USQ # N/A-4

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1.0 PURPOSE AND SCOPE

1.1 Purpose
This procedure provides instruction for measuring individual anode output using a multimeter. The multimeter will be used to measure each anode feeder or loop cable leaving the rectifier and individual anodes in the anode distribution box.

1.2 Scope
This procedure applies to all anode distribution boxes on the active Tank Farms Cathodic Protection systems and 222-S Laboratories.

Individual anode output readings are required to establish the potential for stray current interference with the DSTs, to establish the remaining useful life of the anodes, and to evaluate the operational status of the Cathodic Protection System.

2.0 INFORMATION

2.1 General Information
2.1.1 For clarification purposes identified during Verification/Validation of the procedure, the letter A or (A) (used throughout this Procedure) following the phrase “Multimeter Reading” or “Multimeter Measurement” refers to the unit of electric current, “Amp”, “Amps” or “Amperage” and was utilized in the tables to save space.

2.2 Terms and Definitions
• ADB – Anode Distribution Box
• Anode Loop/Feeder Cable – Main incoming or outgoing cable in an anode distribution or junction box
• Anode Lead Cable – Cable that originates in the anode distribution box and terminates at a specific anode.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 When it is necessary to perform work on or in the vicinity of energized equipment, follow electrical safety practices as outlined in DOE-0359, Hanford Site Electrical Safety Program.

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.

3.2 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 ALARA work planning procedure TFC-ESHQ-RP-RWP-C-03.

3.2.2 Documented radiological surveys are required when opening or accessing previously unexposed surfaces.

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

4.1.1 The following testing equipment and supplies may be needed to perform this procedure to obtain individual anode output data:

- Multi-Meter DC
- Digital camera
- DC Current Clamp
- Tools as required for opening anode distribution or anode junction boxes (e.g., screwdriver, etc.).
4.2 Performance Documents

4.2.1 The following documents may be required during the performance of this individual anode output measurement procedure:

- TO-100-052, Perform Waste Generation, Segregation and Accumulation

4.3 Field Preparation

The following conditions must be met before the procedure steps may commence:

4.3.1 RECORD multimeter equipment/M&TE number on each Data Sheet to be filled out.

4.3.2 CHECK approved work authorization/work package or other facility required documentation is in place prior to commencing.

4.3.3 Engineering IDENTIFY the anode distribution boxes and AJB to be measured. (Measurements can be performed in any logical order within each Data Sheet at the discretion of the FWS and/or Engineer. Additional blank Data Sheets are provided for data collection.)

4.3.4 Engineering IDENTIFY rectifiers to be measured. (Measurements can be performed in any logical order within each Data Sheet at the discretion of the FWS and/or Engineer. Additional blank Data Sheets are provided for data collection.)
5.0 PROCEDURE

5.1 Instructions for Individual Anode Output Measurement

5.1.1 IF units of the recorded measurements differ from what is indicated on Data Sheet, RECORD units used for that measurement (i.e. milli-amps) on Data Sheet.

5.1.2 IF using a multimeter to take current readings, ENSURE the meter is set to the DC amps setting on prior to taking the readings.

5.1.3 IF reading is 400 milli-amps or less, SWITCH multimeter to the DC milli-amp setting AND RETAKE the measurement.

5.1.4 LOCATE anode distribution box(es) as identified on the Data Sheet for the rectifier selected.

5.1.5 ONCE anode cable measurements have begun for an anode distribution box, COMPLETE all measurements for the box. (Data Sheets are arranged by rectifiers and farm areas.)

5.1.6 IF anode distribution box cannot be located, DOCUMENT in COMMENTS section of applicable data sheet and proceed to next activity.

5.1.7 IF directed by Engineering or FWS, OPEN anode distribution box AND PHOTOGRAPH the existing configuration ensuring that all tags are readable.

5.1.8 IF anode distribution box contains rodent(s) and/or rodent nests and/or rodent feces, PERFORM the following:

5.1.8.1 CLOSE anode distribution box AND NOTIFY FWS and/or Engineer for resolution, OR CLEAN per Procedure TO-100-052.

5.1.9 ENSURE the current measuring device is set to take DC current reading prior to performing the following step AND CHECK that anode lead cable labels/numbers for the Anode Distribution Box (ADB) are the same as shown on the Data Sheet.

5.1.10 RECORD any discrepancies on the Data Sheet.
5.1 Instructions for Individual Anode Output Measurement (Cont.)

5.1.11 PERFORM the following:

5.1.11.1 LIFT one anode lead and place the multimeter in a series configuration.

5.1.11.2 ENSURE positive lead is connected to terminal bus.

5.1.11.3 MEASURE AND RECORD the individual anode DC current output (amps or milli-amps) on applicable Data Sheet (noting + or -).

5.1.11.4 REMOVE multimeter and LAND the anode lead cable.

5.1.11.5 REPEAT Step 5.1.11 for each anode in the anode distribution box.

5.1.12 CLOSE anode distribution or anode junction box.

5.1.13 REPEAT Steps 5.1.9 through 5.1.11.5 for each anode distribution box indicated on the Data Sheet.
5.2 Instructions for Cathodic Protection Rectifier Current Readings

5.2.1 CHECK that each anode feeder or loop cable label/number for the rectifier are the same as shown on Data Sheet AND RECORD and Discrepancies on the Data Sheet.

5.2.2 PERFORM the following:

5.2.2.1 USING a DC Current Clamp, MEASURE anode feeder or loop cable DC current output (amps or milli-amps).

5.2.2.2 RECORD output on applicable Data Sheet for each anode feeder loop or cable in the rectifier (noting + or -).

5.2.3 CLOSE rectifier enclosure.

5.2.4 REPEAT Steps 5.2.1 through 5.2.3 for each rectifier indicated on the Data Sheets.
5.3 Restoration

5.3.1 IF any problems were encountered during performance of this work, INFORM FWS.

5.3.2 REMOVE all Test Equipment.

5.3.3 RECORD the Test Equipment information on applicable Data Sheet(s).

5.3.4 NOTIFY FWS that Cathodic System Testing is complete.

5.4 Review

5.4.1 INFORM FWS testing is complete.

5.4.2 FWS REVIEW AND ENSURE the following:

- Data Sheets are fully completed
- Comments sections are filled out appropriately
- A copy of all Data Sheets is forwarded to the Cathodic Protection System Engineer
- All originals of the Data Sheets are in the Work Package
- Electronic photograph files are forwarded to the Cathodic Protection System Engineer
- Work requests needed as a result of this procedure are identified and generated (i.e. rodent infestation clean-up)
- 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 Sheets, as applicable
- Environmental has been notified of failed test, or incomplete testing.

5.5 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.