Tank Farm Maintenance Procedure
Effluent Treatment Facility

USQ Not Required – ETF is a <Hazard Category 3 Radiological Facility

<table>
<thead>
<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
<th>Justification</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>07/25/2016</td>
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</tr>
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<td>11/10/2015</td>
<td>Conversion to WRPS Format</td>
<td>New Procedure; Supersedes ETF-PRO-MN-51428 (EL18065)</td>
</tr>
</tbody>
</table>

Table of Contents

1.0 PURPOSE AND SCOPE ............................................................................................................ 3
  1.1 Purpose ................................................................................................................................. 3
  1.2 Scope ....................................................................................................................................... 3

2.0 INFORMATION ...................................................................................................................... 3
  2.1 General Information .............................................................................................................. 3

3.0 PRECAUTIONS AND LIMITATIONS .................................................................................. 3
  3.1 Equipment Safety ................................................................................................................. 3
  3.2 Radiation and Contamination Control ................................................................................... 3
  3.3 Environmental Compliance ................................................................................................... 3

4.0 PREREQUISITES .................................................................................................................. 4
  4.1 Special Tools, Equipment, and Supplies ................................................................................ 4

5.0 PROCEDURE ......................................................................................................................... 5
  5.1 Analog Meter Calibration ........................................................................................................ 5
  5.2 Verification of Setpoint Setting ............................................................................................ 7
  5.3 Front Panel Verification of Indicator Lamps and Alarm Calibration ...................................... 8
  5.4 Restoration ........................................................................................................................... 10
  5.5 Acceptance Criteria .............................................................................................................. 10
  5.6 Review ................................................................................................................................... 10
  5.7 Records .................................................................................................................................. 11

Figure 1 - 760-A Aquaswitch .................................................................................................... 12
Figure 2 - 760-A Control Board & Power Module ................................................................... 13
Figure 3 - R3, R5, and R6 Decade Resistance Box Connections .................................................. 14
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for a safe, uniform method of calibration for Myron L® Company, Model 760-A Aquaswitch™.

1.2 Scope

This procedure applies to the calibration of Myron L Company, Model 760-A Aquaswitch.

2.0 INFORMATION

2.1 General Information

2.1.1 Figure 1 depicts front view of 760-A Aquaswitch.

2.1.2 Figure 2 depicts 760-A Control Board.

2.1.3 Figure 3 provides information for connecting Decade Boxes to obtain desired test range for 20 megohms, 2 megohms, or 200 kohms.

2.1.4 Figure 4 depicts Logic Module, Purge Cycle Trim pot R2.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Equipment Safety

CAUTION - Straining the cables on the front panel could cause the equipment to short out.

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-ESH-RP_RWP-C-03.

3.3 Environmental Compliance

3.3.1 In the event of a spill/leak/release, notify the SOM/FWS and respond per ETF-ERP-85B-003, Emergency Spill or Release at ETF.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

NOTE - Measuring and Test Equipment used to collect acceptance criteria data during performance of this procedure shall meet the following requirements:

- Be within its current calibration cycle as evidenced by an affixed calibration label
- Be capable of desired range
- Accuracy is equal to or greater than M&TE tolerance specified on PM/S data sheet or is at least four times greater than specified device tolerance.

The following supplies may be needed to perform this procedure:

- Three decade resistance boxes with an accuracy of 0.1% and a power dissipation of at least $\frac{1}{4}$ watt:
  - Range of 0 through 10 kohms
  - Range of 0 through 100 kohms
  - Range of 0 through 1 megohms

  OR

  - Fixed resistors of suitable resistance.

- CMD, with accuracy of $(0.001 \text{ volt} + 1 \text{ count})$ on DC volts and $(0.03 \text{ mA} + 1 \text{ count})$ on 0 to 20 mA range.
5.0  PROCEDURE

5.1  Analog Meter Calibration

5.1.1  TURN Aquaswitch AC power OFF.

5.1.2  RECORD analog meter ZERO indication in as-found column of PM/S data sheet.

CAUTION
Straining the cables on the front panel could cause the equipment to short out.

5.1.3  UNFASTEN AND REMOVE front panel, being careful not to excessively strain cables.

5.1.4  REMOVE AND LABEL all five resistivity cell wires from 760-A control board, terminal TB3.

5.1.5  CONNECT three decade resistance boxes to simulate resistivity cell R4, R5, and R6 inputs to 760-A control board, terminal TB3 connectors.

5.1.6  SET decade resistance box (simulating R4 input) to 5.49 kohms.

5.1.7  SET decade resistance box (simulating R6 input) to 100 kohms.

5.1.8  TURN Aquaswitch AC power ON.

5.1.9  ADJUST decade resistance box output (simulating R5 input) to values specified on PM/S data sheet AND RECORD analog meter indications in as-found column of data sheet.
5.1 Analog Meter Calibration (Cont.)

5.1.10 IF as-found values are not within specified tolerance per data sheet, GO TO Step 5.1.11,

OR

IF as-found values are within specified tolerance, but deemed marginal and optimization is desired, GO TO Step 5.1.11,

OR

IF as-found indications are within tolerance as specified on PM/S data sheet and no adjustments are required, RECORD as-found values in as-left column(s) of data sheet AND

GO TO Section 5.2.

5.1.11 IF analog meter Zero indication needs adjustment, PERFORM the following:

5.1.11.1 TURN Aquaswitch AC power OFF.

5.1.11.2 REMOVE Zero adjustment plug.

5.1.11.3 ADJUST Zero adjustment screw to obtain Zero indication.

5.1.11.4 REINSTALL Zero adjustment plug.

5.1.12 TURN Aquaswitch AC power ON.

5.1.13 IF analog meter full scale indication needs adjustment, PERFORM the following:

5.1.13.1 ADJUST decade resistance box output (simulating R5 input) to full scale value specified on PM/S data sheet.

5.1.13.2 ADJUST control board calibration trim pot R8 adjustment screw to obtain within tolerance Span indication.

5.1.14 REPEAT Steps 5.1.11 through 5.1.13 to achieve within tolerance Zero and Span indication.

5.1.15 ADJUST decade resistance box output (simulating R5 input) to input values specified by PM/S data sheet AND

RECORD analog meter indications in as-left column of data sheet.
5.2 Verification of Setpoint Setting

NOTE - If external alarm is not connected, alarm condition can be monitored by connecting CMD (set on ohms) across power module terminals TB3-2 and TB3-3 (see Figure 2 for power module).

5.2.1 IF GOOD water quality lamp is not illuminated, ADJUST decade resistance box output (simulating R5 input) to value above setpoint value specified on data sheet (indicated by GOOD water quality lamp illuminating).

5.2.2 SILENCE any alarm.

5.2.3 SLOWLY DECREASE decade resistance box output (simulating R5 input) to cause water quality to approach then pass through setpoint value specified on PM/S data sheet AND RECORD resistance value and analog meter indication at which setpoint was reached in as-found section of data sheet (indicated by GOOD water quality lamp just extinguishing and POOR water quality lamp just illuminating).

5.2.4 SLOWLY INCREASE decade resistance box output (simulating R5 input) to cause water quality to approach then pass back through setpoint value specified on PM/S data sheet AND RECORD resistance value and analog meter indication at which reset point was reached in as-found section of data sheet per the following:

- Reset point indicated by POOR water quality lamp just extinguishing
- GOOD water quality lamp just illuminating.

5.2.5 IF as-found indications are within tolerance as specified on data sheet and no adjustments are required, RECORD as-found values in as-left column of data sheet AND GO TO Section 5.3.

5.2.6 SLOWLY DECREASE decade resistance box output (simulating R5 input) to setpoint value specified on PM/S data sheet.

5.2.7 SLOWLY ADJUST controller setpoint trim pot R31 to cause the following:

- GOOD water quality lamp to just extinguish
- POOR water quality lamp to just illuminate.
5.2 Verification of Setpoint Setting (Cont.)

5.2.8 SLOWLY VARY decade resistance box output (simulating R5 input) to approach then pass back and forth through setpoint value specified on PM/S data sheet.

5.2.9 IF setpoint operation is within tolerance as specified on PM/S data sheet, RECORD resistance value and analog meter indication at which setpoint and reset point is indicated in as-left section of data sheet.

5.3 Front Panel Verification of Indicator Lamps and Alarm Calibration

5.3.1 DECREASE decade resistance box output (simulating R5 input) to cause POOR water quality lamp to illuminate.

5.3.2 SILENCE any alarm.

5.3.3 MARK position of Purge Cycle trim pot R2 adjustment screw AND ROTATE adjustment screw fully clockwise (approximate one minute purge).

5.3.4 SLOWLY INCREASE decade resistance box output (simulating R5 input) to cause water quality to approach then pass through setpoint specified on PM/S data sheet.

5.3.5 PRESS BANK SWITCH several times AND CONFIRM the following:

- IN USE indicator lamp switches from illuminated to extinguished between BANK A and BANK B each time BANK SWITCH is pressed
- Both Banks A/B GOOD water quality lamps remain illuminated
- BLEED lamps remain extinguished.

5.3.6 LEAVE BANK A ON for Step 5.3.7.

5.3.6.1 IF prompted, PUSH ALARM RESET to reset alarm.

5.3.7 SLOWLY DECREASE decade resistance box output (simulating R5 input) to cause water quality to approach then pass back through setpoint value specified on PM/S data sheet.
5.3 Front Panel Verification of Indicator Lamps and Alarm Calibration (Cont.)

5.3.8 CONFIRM the following:
- BANK A water quality indicates POOR water quality
- Yellow BLEED lamp illuminates and water is purged from system for approximately one minute
- After approximately one minute, BANK A lamp extinguishes and BANK B illuminates and indicates POOR water quality
- After approximately one minute, BANK B lamp extinguishes; BLEED lamp extinguishes and alarm should activate.

5.3.9 SLOWLY INCREASE decade resistance box output (simulating R5 input) to cause the following:
- POOR water quality lamp to just extinguish
- GOOD water quality lamp to just illuminate.

5.3.10 PRESS BANK SWITCH AND

CONFIRM the following:
- BANK A IN USE lamp is illuminated
- GOOD water quality lamp is illuminated.

5.3.11 PRESS BANK SWITCH again AND

CONFIRM the following:
- BANK B IN USE lamp is illuminated
- GOOD water quality lamp is illuminated.

5.3.12 RE-PRESS BANK SWITCH to select desired bank in use status.

5.3.13 ROTATE Purge Cycle trim pot R2 adjustment screw to line up with mark placed on pot.
5.4 Restoration

5.4.1 TURN Aquaswitch AC power OFF.

5.4.2 DISCONNECT decade resistance boxes.

5.4.3 RECONNECT all five wires to 760-A control board, terminal TB3.

CAUTION
Straining the cables on the front panel could cause the equipment to short out.

5.4.4 INSTALL front panel, being careful not to excessively strain cables.

5.4.5 TURN Aquaswitch AC power ON.

5.4.6 ENSURE alarms are cleared.

5.4.7 INFORM SOM test is complete and instrument/equipment/system may be returned to service.

5.5 Acceptance Criteria

Acceptance criteria has been met when steps in this procedure have been satisfactorily performed and results are recorded on the data sheet(s).

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.
5.7 Records

The performance of this procedure generates no records. However, PM/S data sheets associated with the procedure are records and are maintained in the work package as record material.

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.
Figure 1 - 760-A Aquaswitch
Figure 2 - 760-A Control Board & Power Module

Myron L® Company, Model 760A Aquaswitch™

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Page: 13 of 15
Figure 3 - R3, R5, and R6 Decade Resistance Box Connections

760-A CONTROL BOARD

NOTE

Connect Decade Boxes to obtain desired test range for either 20 Megohms, 2 Megaohms, or 200 Kilohms:

1. Use following R5 resistances to simulate range of 20 Megohms:
   a. Use 1 Megohms of resistance to simulate full scale indication,
   b. Use 750 kilohms of resistance to simulate 3/4 scale indication,
   c. Use 500 kilohms of resistance to simulate 1/2 scale indication,
   d. Use 250 kilohms of resistance to simulate 1/4 scale indication,

2. Use following R5 resistances to simulate range of 2 Megohms:
   a. Use 100 kilohms of resistance to simulate full scale indication,
   b. Use 75 kilohms of resistance to simulate 3/4 scale indication,
   c. Use 50 kilohms of resistance to simulate 1/2 scale indication,
   d. Use 25 kilohms of resistance to simulate 1/4 scale indication,

3. Use following R5 resistances to simulate range of 200 Kilohms:
   a. Use 10.0 kilohms of resistance to simulate full scale indication,
   b. Use 7.5 kilohms of resistance to simulate 3/4 scale indication,
   c. Use 5.0 kilohms of resistance to simulate 1/2 scale indication,
   d. Use 2.5 kilohms of resistance to simulate 1/4 scale indication,
Figure 4 - 760-A Analog Meter & Logic Module

760-A 4 1/2" ANALOG METER

CONNECTS TO MONITOR CONTROL BOARD

ABOVE

SET POINT CHECK SWITCH

BROWN WIRE CONNECTS TO (-) METER TERMINAL

METER

RED WIRE CONNECTS TO (+) METER TERMINAL

BELOW

LOGIC MODULE

STANDARD ALARM RESET ENABLE JUMPER

CABLE CONNECTS TO MAIN MODULE JE

PURGE CYCLE TRIMMER ADJUSTMENT SCREW

E1

J1

H1

H2

E2

H2

H2

H2