Perform Maintenance on Waste Retrieval Remote Monitoring Camera Systems

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for maintenance on Waste Retrieval Remote Monitoring Cameras (WRRMCAM) 2nd and 3rd generation only:
- 2nd generation is camera units #1 through #5
- 3rd generation is camera units #6 through #9.

1.2 Scope

This procedure applies to the WRRMCAM (i.e. RCRA surveillance cameras) that provide remote in-farm surveillance.

2.0 INFORMATION

2.1 Terms and Definitions

2.2 General Information

WRRMCAM is a trailer mounted camera system providing real-time surveillance of the farms and farm boundaries while being powered from solar panels or land power.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

WARNING - Batteries contain sulfuric acid. Failure to don the proper PPE while working on batteries that show evidence of leaking or rupture can cause burns, eye injury, and other serious injuries.

WARNING - Hydrogen gas is generated while charging lead-acid batteries and presents an Explosion Hazard if exposed to flames, sparks or electrical arcs.

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

NOTE - Steps 3.1.2 and 3.1.3 are covered under the GHA as “Rotating/Moving Equipment or Pinch Points.

3.1.2 Moving and positioning WRRMCAM equipment may result in pinch points. Failure to wear leather gloves, or equivalent, may result in personnel injury.

3.1.3 Personnel should be located a safe distance from equipment while raising and lowering the camera tower in order to prevent injury to personnel.
3.2 Equipment Safety

CAUTION - To minimize arcing when removing and placing leads on battery post, the negative lead should be disconnected first and reconnected last.

CAUTION - Failure to lay-out cables may result in a slack hoist cable and cause birds nesting of cable.

CAUTION - Failure to observe tower electrical cables for obstructions while extending the tower mast could cause cable damage.

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 Protection

If any hazardous waste is generated during performance of this procedure, consult Facility/Plant/Area Hazardous Waste coordinator as applicable for specific instructions to ensure compliance with all environmental standards for disposal.
4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies may be needed to perform this procedure:

- WRRMCA Toolbox
- Brush (for dirt removal)
- GHS-SDS and/or MSDS
- Battery brush
- Torque Wrench (capable of torqueing up to 50 inch pounds)
- Winch control
- DMM - Volt/ohmmeter
- Conductive lubricant (NO-OX-ID A Special), or equivalent
- Replacement camera cover
- Replacement door seals with adhesive
- Flashlight, light stand/plant, temporary lighting
- 1/4” to 3/4” end wrenches (non-conductive or insulated), non-conductive barrier
- Cleaning cloths
- Knee pads or kneeling mat
- Water (for washing camera cover)
- Replacement fan filter
- Replacement vent filter
- Replacement equipment door filter
- Leather gloves or equivalent
- Goggles
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.
4.2 Performance Documents

The following documents may be needed to perform this procedure:
- TO-100-052, Perform Waste Generation, Segregation, Accumulation and Clean-up
- DOE-0336, Hanford Site Lockout/Tagout Procedure.
- 2-MISC-049, Bolt Torqueing Guidelines

4.3 Field Preparation

4.3.1 **CHECK** portable eyewash station is located in the area of work and is operable.

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

Special Instructions

While replacing winch cable on the tower engage the tower latching bracket, or use an equivalent clamp, to prevent tower from traveling.

NOTE - Activities within sections 5.2, 5.3 and 5.4 may be performed in any logical order, in parallel, or independently to complete individual task(s) when directed by FWS and recorded in applicable comments section of Data Sheet.

- Minor repairs/replacements are allowed during performance of this procedure as long as no additional hazards are created.

5.1 Outrigger and Battery Box Inspection

CAUTION

Failure to lay-out cables may result in a slack hoist cable and cause birds nesting of cable.

CAUTION

Failure to observe the tower electrical cables for obstructions while extending the tower mast could cause cable damage.

5.1.1 IF tower is in the raised position, DISINGAGE tower locking device AND LOWER the camera tower.

5.1.2 IF connected to 120V land power, DISCONNECT power.

Check Outriggers

5.1.3 IF the front and rear Outriggers are not in place, DEPLOY them in the front and rear receiver tubes respectively.

5.1.4 CHECK outriggers for the following:

- Broken or cracked welds and seams
- Excessive bowing
- T-Bolts securely in place.

5.1.5 RECORD results on Data Sheet [Item 1].
5.1 Outrigger and Battery Box Inspection (Cont.)

Check Battery Box Door Seals

Special Instructions

To prevent trailer from tipping, the Primary (outside) outriggers must be deployed when sliding battery rack(s) to the outward position.

5.1.6 ENSURE the Primary (outside) outriggers are in place.

5.1.7 IF the Secondary (inside) outriggers are in place, (on 2nd generation units only) REMOVE the outrigger immediately to the left of battery box door to allow door to be fully opened and allowing battery racks to be pulled outward).

5.1.8 OPEN Battery Box door AND

CHECK door seals for the following (see Figure 1):

- Water leakage
- Dry rot.

5.1.9 RECORD results on Data Sheet [Item 2].

5.1.10 IF door seal is showing signs of water leakage or dry rot, PERFORM the following:

5.1.10.1 IF door seal is in stock, REPLACE the door seal.

5.1.10.2 RECORD the condition/actions taken in comments section of Data Sheet [Item 2].

Check Battery Box

5.1.11 IF at any time leaking or ruptured batteries are discovered, STOP work AND IMMEDIATELY NOTIFY FWS to initiate corrective work package.

WARNING

Batteries contain sulfuric acid. Failure to don the proper PPE while working on batteries that show evidence of leaking or rupture can cause burns, eye injury, and other serious injuries.

5.1.12 DON appropriate PPE (e.g. goggles, safety glasses).
5.1 Outrigger and Battery Box Inspection (Cont.)

Check Battery Box (Cont.)

5.1.13 IF personnel come in contact with sulfuric acid during performance of this inspection, THOROUGHLY FLUSH eye’s or effected areas with water AND IMMEDIATELY SECURE medical attention.

WARNING

Hydrogen gas is generated while charging lead-acid batteries and presents an Explosion Hazard if exposed to flames, sparks or electrical arcs.

5.1.14 TO PREVENT potential explosive conditions or damaging arcing, PERFORM the following:

5.1.14.1 REMOVE personal metal items such as rings, bracelets, necklaces and watches that may cause a short circuit and severe burns when working with batteries.

5.1.14.2 USE non-conductive/insulated wrenches or non-conductive barrier.

5.1.15 ENSURE outriggers are deployed before pulling out battery racks.

5.1.16 RELEASE locking clip on Upper battery rack AND SLIDE rack out to allow access for inspection/cleaning (see Figure 1).

5.1.17 REMOVE accumulated dirt from battery box.

5.1.18 CHECK battery box for corrosion AND IF corrosion is present, CLEAN off corrosion.

5.1.19 RECORD results on Data Sheet [Item 3].
5.1 Outrigger and Battery Box Inspection (Cont.)

Check Batteries and Wiring

5.1.20 CHECK for the following:
- Visible damage to wiring and/or batteries
- INSPECT battery terminal connections AND apply conductive lube if necessary
- TORQUE terminal connections per chart specs provided in package AND RECORD in Data Sheet.
- Visible corrosion.

5.1.21 RECORD results on Data Sheet [Item 4].

5.1.22 SLIDE Upper Rack back into place AND ENSURE locking clip engages.

5.1.23 REPEAT Steps 5.1.15 through 5.1.22 for the Lower battery rack.
5.2 **Perform Front Enclosure Box Maintenance**

5.2.1 **RECORD** N/A for *Item 5* on the Data Sheet. *Item 5* will not be performed at this time.

5.2.2 **REFER** to Figure 2 – Electronics/Communications Box Layout as needed.

**Check TriStar Solar Controller Figure 2 (A)**

5.2.3 **CHECK** for the following:
- Wiring is securely connected to terminals of TriStar Solar Controller
- Visible damage.

5.2.4 **IF** wiring is not securely connected, **SECURE** wiring to terminals.

5.2.5 **RECORD** results on Data Sheet [*Item 6*].

**Check Barionet Universal Network Enable Automation Interface (MGATE) Figure 2 (B)**

5.2.6 **CHECK** for the following:
- Wiring is securely connected
- Visible damage.

5.2.6.1 **IF** wiring is not connected securely, **SECURE** wiring to terminals.

5.2.7 **RECORD** results on Data Sheet [*Item 7*].

**Check Cisco Aironet Access Point Figure 2 – Right Panel Door (C)**

5.2.8 **CHECK** for the following:
- Wiring is securely connected
- Visible damage.

5.2.8.1 **IF** wiring is not securely connected, **SECURE** wiring to terminals.

5.2.9 **RECORD** results on Data Sheet [*Item 8*].
5.2 Perform Front Enclosure Box Maintenance (Cont.)

Check Circuit Breakers, fuses and all termination/connection points Figure 2 (D)

5.2.10 RECORD circuit breakers As-Found positions on Data Sheet [Item 9] AND CHECK for the following:
- Wiring is securely connected
- Visible damage.
- CHECK fuses

5.2.10.1 IF wiring is not securely connected, SECURE wiring to terminals.

5.2.11 EXERCISE circuit breakers AND LEAVE in As-Found position.

5.2.12 RECORD results on Data Sheet [Item 9].

Check Miniature Five-Port Ethernet Switch Figure 2 (E)

5.2.13 CHECK for the following:
- Wiring is securely connected
- Visible damage.

5.2.13.1 IF wiring is not securely connected, SECURE wiring to terminals.

5.2.14 RECORD results on Data Sheet [Item 10].

Check DC/AC Sure Sine Inverter Figure 2 (F)

5.2.15 CHECK for the following:
- Wiring is securely connected
- Visible damage.

5.2.15.1 IF wiring is not securely connected, SECURE wiring to terminals.

5.2.16 RECORD results on Data Sheet [Item 11].
5.2 Perform Front Enclosure Box Maintenance (Cont.)

Check Open Core and Coil Industrial Control Transformer and Terminal Strip
Figure 2 (G)

5.2.17 CHECK for the following:
- Wiring is securely connected
- CHECK fuses
- Visible damage.

5.2.17.1 IF wiring is not securely connected, SECURE wiring to terminals AND replace fuses if blown

5.2.18 RECORD results on Data Sheet [Item 12].
5.3 Perform Rear Enclosure Box Maintenance

**Check Battery Charger and Maintainer**

5.3.1 **CHECK** for the following:
- Wiring is securely connected to terminals
- Visible damage.

5.3.1.1 **IF** wiring is not securely connected, **SECURE** wiring to terminals.

5.3.1.2 **RECORD** results on Data Sheet [Item 13].

5.3.2 **CHECK** box door seals for the following:
- Leakage
- Dry rot.

5.3.2.1 **RECORD** results on Data Sheet [Item 13].

5.3.3 **IF** the box door seal is showing signs of water leakage or dry rot, **PERFORM** the following:

5.3.3.1 **IF** door seal is in stock, **REPLACE** the door seal,

5.3.3.2 **RECORD** the condition/actions taken in comments section of Data Sheet [Item 13].

5.3.4 **IF** present, **REMOVE** accumulated dirt from box **AND**

**RECORD** on the Data Sheet [Item 13].

5.3.5 **CHECK** enclosure for corrosion.

5.3.5.1 **IF** corrosion is present, **CLEAN** off corrosion **AND**

**RECORD** results on Data Sheet [Item 13].

5.3.6 **CHECK** the following:
- Battery Charger
- Main Disconnect switch
- Circuit Breakers
- Winch
- K1 relays
- Shore power receptacle
- All electrical connections.
5.4 Perform Tower Maintenance

**Check WRRMCAM Tower Structure**

5.4.1 **CHECK** Tower Structure for visible damage AND **RECORD** results on Data Sheet [*Item 14]*.

**Check WRRMCAM External Cables**

5.4.2 **CHECK** External Cables for visible damage AND **CHECK** tower enclosure for loose wires and connections.

5.4.3 **SECURE** loose wires and connections if needed. AND **RECORD** results on Data Sheet [*Item 15]*.

**Check WRRMCAM Grounding Connection**

5.4.4 **CHECK** grounding connection is secure.

5.4.5 **IF** grounding connection is not secure, **SECURE** grounding connection

5.4.6 **REPLACE** grounding connection if necessary AND **RECORD** results on Data Sheet [*Item 16]*.

**Check Solar Panels Matrix Solar PW 750 Power Modules**

5.4.7 **IF** Solar Panels are dirty, **CLEAN** Solar Panels.

5.4.8 **CHECK** for the following:

- Solar Panel fasteners are secure
- Visible damage
- Bolts are secure.

5.4.8.1 **IF** Solar Panel fasteners are not securely fastened, **SECURE** fasteners AND **RECORD** results on Data Sheet [*Item 17]*.
5.4 Perform Tower Maintenance (Cont.)

Check Tower Camera Cover And Spot Light

5.4.9  CLEAN spot light and check wiring
5.4.10 CLEAN the camera cover with damp cloth AND
5.4.11 CHECK the camera cover for clarity.
5.4.12 RECORD results on Data Sheet [Item 18].
5.4.13 IF the camera cover has become pitted, cloudy or hazy and needs replacement, REPLACE camera cover.

5.4.14 CHECK AND INSPECT all wiring in tower camera
5.4.15 RECORD results on Data Sheet [Item 18].
5.4.16 Check Tower Enclosure

5.4.17 CHECK enclosure for the following:
   - Securely mounted
   - Internal electrical wiring is securely connected
   - External electrical cables are secure
   - Visible damage.

   5.4.17.1 IF enclosure mounting fasteners are loose, SECURE fasteners.
   5.4.17.2 IF internal electrical wiring is not securely connected, SECURE wiring to terminals.
   5.4.17.3 IF external electrical cables are not secure, SECURE electrical cables.
   5.4.17.4 IF visible damage is present, REPAIR OR NOTIFY FWS for resolution.
   5.4.17.5 CLEAN the enclosure interior and exterior.
   5.4.17.6 RECORD results on Data Sheet [Item 19].
5.4 Perform Tower Maintenance (Cont.)

**Check Hoist**

5.4.18 **CHECK** hoist for the following:
- Securely mounted
- Wiring is securely connected
- Visible damage.

5.4.18.1 **IF** wiring is not securely connected, **SECURE** wiring to terminals. **RECORD** results on Data Sheet [Item 20]

5.4.19 **IF** hoist replacement is required, **PERFORM** the following:

5.4.19.1 **DIAGRAM** the routing path of hoist cable.
5.4.19.2 **NOTIFY** FWS of pending equipment replacement.
5.4.19.3 **FWS NOTIFY** Shift Manager and contact planning for BOM.
5.4.19.4 **CREATE** a work package to replace Hoist.

**Check Winch**

5.4.20 **CHECK** Winch for the following:
- Securely mounted
- Wiring is securely connected
- Visible damage.

5.4.20.1 **IF** wiring is not securely connected, **SECURE** wiring to terminals.

5.4.21 **RECORD** results on Data Sheet [Item 21].

5.4.22 **IF** winch replacement is required, **PERFORM** the following:

5.4.22.1 **DIAGRAM** the routing path of winch cable.
5.4.22.2 **NOTIFY** FWS of pending equipment replacement.
5.4.22.3 **FWS NOTIFY** Shift Manager and contact planning for BOM.
5.4.22.4 **CREATE** a work package to replace Winch.
5.4 Perform Tower Maintenance (Cont.)

5.4.23 REMOVE Lock & Tag in accordance with DOE-0336, Hanford Site Lockout/Tagout Procedure.

**Check Hoist Cable**

5.4.24 CHECK hoist cable for damage including twists and frays.

5.4.25 RECORD results on Data Sheet [Item 22].

5.4.26 IF hoist cable replacement is required, PERFORM the following:

5.4.26.1 DIAGRAM the routing path of hoist cable.

5.4.26.2 NOTIFY FWS of pending equipment replacement.

5.4.26.3 FWS NOTIFY Shift Manager and contact planning for BOM.

5.4.26.4 CREATE a work package to replace Hoist Cable.

**Check Winch Cable**

5.4.27 CHECK winch cable for damage including twists and frays.

5.4.28 RECORD results on Data Sheet [Item 23].

5.4.29 IF winch cable replacement is required, PERFORM the following:

5.4.29.1 DIAGRAM the routing path of winch cable.

5.4.29.2 NOTIFY FWS of pending equipment replacement.

5.4.29.3 FWS NOTIFY Shift Manager and contact planning for BOM.

5.4.29.4 CREATE a work package to replace Winch Cable.
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5.4 Perform Tower Maintenance (Cont.)

Return WRRMCAM To Service

5.4.30 ENSURE outriggers are deployed.

5.4.31 CONNECT WRRMCAM to 120VAC land power.

CAUTION
Failure to lay-out cables may result in a slack hoist cable and cause birds nesting of cable.

CAUTION
Failure to observe the tower electrical cables for obstructions while extending the tower mast could cause cable damage.

5.4.32 RAISE tower AND

ENSURE mechanical locking device is engaged.

5.4.33 ENSURE Ethernet communication is functioning.

5.4.33.1 ENSURE blue light located on the front of Front Enclosure Box is ON.

5.4.33.2 ENSURE blue light located on the bottom of the Cisco Ethernet unit located on the inside of the Front Enclosure Box is ON.

Using Local Computer

Note Steps 5.4.33.3 and 5.4.33.4 cannot be complete until camera is deployed or stationed in an area of service.

5.4.33.3 CHECK spot light on tower for operation by using the computer to “Pan” and “Tilt” the light and turn it on and off.

5.4.33.4 USING (local) computer, CHECK the camera for proper operation.

5.4.34 RECORD results on Data Sheet [Item 24].
5.5 Restoration

5.5.1 IF any problems were encountered performing maintenance, INFORM FWS.

5.5.2 IF not already removed, REMOVE the test equipment.

5.5.3 RECORD the Test Equipment information on applicable Data Sheet.

5.5.4 CHECK equipment restoration by observing indications are consistent with expected conditions.

5.5.5 NOTIFY Operations that maintenance is complete and system may be returned to desired configuration.

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 applicable Data Sheet.

5.7 Review

5.7.1 INFORM FWS test is complete.

5.7.2 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 applicable Data Sheet.

5.8 Records

The performance of this procedure generates no records. However, PM 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 Retention and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
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Figure 1 – Battery Box Layout

Battery Rack Release Latch
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Figure 2 – Electronics/Communications Box Layout