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**CONTROLLED DOCUMENT**  
EG&G - ROCKY FLATS PLANT  
ENVIRONMENTAL MANAGEMENT

**INFORMATION  
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**ROCKY FLATS ENVIRONMENTAL  
TECHNOLOGY SITE**

**EMD OPERATING  
PROCEDURES MANUAL  
VOL I: FIELD OPERATIONS**

**Manual No.: 5-21000-OPS-FO  
New Manual No.: 4-11000-ER-OPS-FO  
Procedure No.: Table of Contents, Rev 74  
Page: 1 of 3  
Effective Date: 10/07/94  
Organization: Environmental Management**

**THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:**

- VOLUME I: FIELD OPERATIONS (FO)**
- VOLUME II: GROUNDWATER (GW)**
- VOLUME III: GEOTECHNICAL (GT)**
- VOLUME IV: SURFACE WATER (SW)**
- VOLUME V: ECOLOGY (EE)**
- VOLUME VI: AIR (AP)**

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FO.03	General Equipment Decontamination	2	05/12/92
94-DMR-001021	Section FO.03 Text Addition	2	05/26/94
94-DMR-001010	LIMITED SCOPE Section FO.03 Text Modification	2	06/01/94
94-DMR-001224	Equipment Decontamination Location Adjustment	2	07/15/94
FO.04	Heavy Equipment Decontamination	2	05/12/92
94-DMR-001009	LIMITED SCOPE Section FO.04 Text Modification	2	06/01/94
FO.05	Handling of Purge and Development Water	2	05/12/92
94-DMR-000278	Groundwater Monitoring Modifications	2	02/25/94
FO.06	Handling of Personal Protective Equipment	2	05/12/92
FO.07	Handling of Decontamination Water and Wash Water	2	05/12/92
94-DMR-001175	LIMITED SCOPE - Decontamination Water Disposal Location Changes	2	06/20/94
FO.08	Handling of Drilling Fluids and Cuttings	2	05/12/92
94-DMR-001650	Procedural Clarifications	2	09/27/94

**DOCUMENT CLASSIFICATION REVIEW WAIVER  
PER R.B. HOFFMAN, CLASSIFICATION OFFICE  
JUNE 11, 1991**

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**Environmental Management**

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FO.10	Receiving, Labeling, and Handling Environmental Materials Containers	2	05/12/92
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94-DMR-000244	Drying Agent Modification	2	03/14/94
94-DMR-000558	Form Modification	2	04/15/94
94-DMR-001649	Deletion of Text Addressed in FO.08	2	09/27/94
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FO.12	Decontamination Facility Operations	2	05/12/92
FO.13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples	2	05/12/92
93-DMR-000530	Section FO.13 Modification	2	11/04/93
93-DMR-000667	Section FO.13 Modification	2	11/20/93
94-DMR-000143	Composite Sampling Clarification	2	02/11/94
94-DMR-001670	New Statement of Work	2	09/15/94
FO.14	4-B29-ER-OPS-FO.14 Field Data Management	3	09/09/94
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FO.16	Field Radiological Measurements	2	05/12/92
FO.18	Environmental Sample Radioactivity Content Screening	1	05/12/92
FO.19	Base Laboratory Work	2	05/12/92

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94-DMR-000137	Training Requirements Clarification	0	01/28/94
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94-DMR-001350	Various Text Additions and Deletions Regarding Drums and Use of SOP FO.29	0	08/16/94
FO.25	4-B11-ER-OPS-FO.25 Shipment of Radioactive Materials Samples	0	12/01/93
FO.27	4-BO1-ER-OPS-FO.27 Collection of Floor/Equipment Hot Water Rinsate Samples	0	07/26/93
FO.29	4-H46-ENV-OPS-FO.29 Disposition of Soil and Sediment Investigation-Derived Materials	0	06/24/94
94-DMR-001226	Allowance of Procedural Use for Waste Piles	0	07/15/94
•94-DMR-001741	Permission of Use of Computer-Generated Forms and Other Minor Corrections	0	10/07/94
•FO.30	4-I11-ER-OPS-FO.30 Environmental Restoration Program Division Equipment Operation	0	10/07/94
FO.32	4-I50-ENV-OPS-FO.32 Treated Effluent Discharge Operable Unit 1, Building 891	0	04/13/94

# Rocky Flats Environmental Technology Site 4-I11-ER-OPS-FO.30

REVISION 0

## ENVIRONMENTAL RESTORATION PROGRAM DIVISION EQUIPMENT OPERATION

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**1. PURPOSE**

This procedure provides instructional steps to safely operate and maintain Environmental Restoration Program Division (ERPD) equipment at the:

- Main Decontamination Facility (MDF).
- Protected Area Decontamination Facility (PADF).
- Environmental Restoration Support Yard by the Designated Subcontractor (DSC).

**2. SCOPE**

This procedure applies to EG&G Rocky Flats, Inc. (EG&G) employees, and subcontractors operating ERPD equipment.

This procedure includes operation of the skidsteers, forklifts, steam cleaners, and various liquid transferring pumps.

This procedure addresses the following topics:

- Skidsteer or forklift operations
- Pressure washer operations
- Pump operations
- Generator operations
- Maintenance scheduling and trouble shooting

Each Instructions Section is a stand alone section.

**3. OVERVIEW**

Equipment utilized at the MDF, PADF, and ERPD Support Yard is owned by the Department of Energy (DOE) and EG&G and operated by the DSC and EG&G ERPD personnel. The ERPD equipment can be utilized by Decontamination Facility Users (DFU) with approval by the Decontamination Facility (DF) Project Manager for short-term ERPD tasks. EG&G maintenance personnel maintain the unloader skidsteers and forklifts while the DSC maintains all other pumps, steam cleaners and the DFs.

**4. DEFINITIONS**

Forklift. Case, 5000 lb capacity, rough terrain, four wheel drive, for outside use.

Skidsteer. A four-wheeled utility tractor with forklift, bucket loader, and sump scoop attachments.

**5. RESPONSIBILITIES**

**5.1 Designated Subcontractor (DSC) Personnel (Operator)**

- Performs routine maintenance and minor repairs to equipment and facilities.
- Maintains and operates equipment which includes forklifts, skidsteers, pumps, generators, and steamcleaners in daily DF functions.
- Completes equipment inspections and maintenance forms.

**5.2 EG&G Personnel and Decontamination Facility Users (Operator)**

- Operates steamcleaner with ancillary equipment.
- Reports any equipment malfunctions to DSC personnel.

**5.3 ERPD EOM Project Manager or DFU**

- Ensures personnel using equipment are properly trained.

**6. TRAINING**

**ERPD EOM Project Manager or DFU**

- [1] Ensure that all personnel are appropriately trained and qualified to perform the duties, tasks, and responsibilities, of their assigned jobs.
- [2] Ensure that personnel training and qualification requirements for activities described in this procedure have been identified.
- [3] Ensure that ERPD EG&G subcontractor personnel meet the required training and qualifications specified by the responsible manager.
- [4] Ensure that documentation and verification of both ERPD-specific training and performance-based training has been documented.

**7. LIMITATIONS AND PRECAUTIONS**

**7.1 Skidsteer or Forklift Safety**

- Personnel shall review the site-specific Health and Safety Plan for Personal Protection Equipment (PPE) requirements for specific operations.

**7.1 Skidsteer or Forklift Safety (continued)**

- Operators shall be properly licensed for industrial trucks prior to operating the skidsteer and forklift.
- Personnel shall check for a charged ABC fire extinguisher mounted to the forklift or skidsteer.
- Personnel shall wear hearing protection when operating equipment.
- Personnel shall fuel equipment with the engine off and with the fuel nozzle grounded to prevent buildup of static electricity. Smoking is prohibited while operating or refueling equipment.
- Personnel shall use drip pans during all refueling operations. Overfilling the fuel tank could result in a fuel spill which requires a Hazardous Materials Team response.
- Personnel shall review and understand Powered Industrial Trucks (HSP 9.06) prior to operating industrial trucks.
- Personnel shall ensure that all operational flashing lights, seatbelts and back-up alarms are working prior to skidsteer and forklift use.
- Personnel shall visually survey their working area prior to beginning operations, checking for uneven ground and obstacles.
- Personnel shall warm equipment at least 5 min. prior to running the engine at operating speed.
- Personnel shall pick up debris that can puncture tires and shall look for holes, drop-offs, and obstacles.
- Personnel shall check for the location of underground cables, gas lines, and water and drain pipes prior to field operation of equipment.
- Personnel shall start the skidsteer/forklift engine only while sitting in the operator's seat.
- Personnel shall face the unloader when mounting or dismounting. Maintain "three-point contact" with steps and grab handles. "Three point-contact" means that three of four body limbs are in contact with the machine during mounting and dismounting.
- Personnel shall never jump on or off the equipment.

**7.1 Skidsteer or Forklift Safety (continued)**

- Personnel shall never attempt to mount or dismount while the unloader skidsteer or forklift is moving.
- Personnel shall **NOT** use the steering or control lever as a hand hold when mounting or dismounting the skidsteer or forklift.
- Personnel shall maintain appropriate clearance between the skidsteer or forklift and power lines. Clearance requirements are outlined in HSP 15.00.
- Personnel shall ensure that no one is standing within 10 ft of the skidsteer when operating due to 90-degree turn capabilities.
- Personnel shall ensure that equipment lifting capacities are **NOT** exceeded.
- Personnel shall operate controls smoothly at all times to prevent equipment accidents and spills.
- Personnel shall carry loads low and avoid sudden starts, stops, and turns.

**7.2 Pump, Generator and Steamcleaner Safety**

- Familiarize yourself with this procedure and the manufacturer's Operator's Manual prior to working on all equipment to reduce the chances of damage to equipment.
- Personnel shall wear PPE in accordance with the site-specific Health and Safety Plan.
- Personnel shall know how to stop the generator or pumps quickly in case of emergency, understand the use of generator controls, output receptacles, and connections.
- Personnel shall **NOT** misuse the generator which produces enough electric power to cause a serious shock or electrocution.
- Personnel shall keep the generator dry and upwind from decontamination operations.
- Personnel shall check the Ground Fault Circuit Interrupter (GFCI) receptacle and all other electrical components on the control panel before each use. Moisture or ice can cause an electrical component malfunction or short circuit that could result in electrocution.
- Personnel shall **NOT** connect to a building's electrical system unless an isolation switch has been installed on the generator by a qualified electrician.

**7.2 Pump, Generator and Steamcleaner Safety (continued)**

- Personnel shall keep the generator at least 3 ft away from buildings and other equipment during operation.
- Personnel shall **NOT** touch the muffler while it is hot. The engine shall be allowed to cool 10 min. before the generator is stored inside.
- Personnel shall **NOT** smoke or allow flames or sparks in the area where the generator is refueled or where gasoline is stored.
- Personnel shall refuel in a well-ventilated area with the engine stopped.
- Personnel shall provide adequate ventilation while the generator is running to prevent carbon monoxide buildup.

## 8. INSTRUCTIONS

### 8.1 Instructions - Operating Skidsteer or Forklift

#### 8.1.1 Pre-operational Checks

##### Operator

- [1] Read the manufacturer's Operator's Manual before operating the skidsteer or forklift.
- [2] Check oil level, other fluids, and fan belt prior to starting the equipment.
- [3] Walk completely around the machine and ensure that all obstructions and personnel are clear.
- [4] Ensure engine covers are in place before starting the unloader and forklift.
- [5] Verify that the Occupational Safety inspection tag is attached to the vehicle.
- [6] Verify the manufacturer's load limit placard is attached and read the placard.
- [7] Complete form HSP 9.06-1, Operator's Daily Inspection Log, in compliance with HSP 9.06, Powered Industrial Trucks.

#### 8.1.2 Operating Skidsteer or Forklift

##### Operator

- [1] Familiarize yourself with operator's controls.
- [2] Lower the seat bar and fasten seat belt. Ensure that the forklift parking brake is set and controls are in neutral or park.
- [3] Turn key switch on and ensure that the equipment gauges light up.

#### **CAUTION**

**Operating the starter more than 30 sec at one time may damage the starter.**

- [4] Start the engine.
- [5] **IF** the engine does not start within 30 sec,  
**THEN** allow the starter to cool 3 min. between starting attempts.
- [6] Turn on warning lights and test the horn and back-up alarms.

### 8.1.2 Operating Skidsteer or Forklift (continued)

#### Operator (continued)

- [7] Check the gauges and warning lights and run the engine at approximately 1,000 revolutions per minute (RPM) until the coolant temperature is warm.
- [8] Operate the control levers to move in forward and reverse.

**WARNING**

**Injury may result if controls, steering, or brakes do not operate or function correctly.**

- [9] Test the steering in both directions while moving slowly in a clear, safe area.
- [10] Attach necessary implements to the forklift or skidsteer in accordance with the manufacturer's recommendations.

### 8.1.3 Lifting and Moving Materials

#### Operator

- [1] Check that the implements are secure prior to lifting.
- [2] Approach the load slowly and squarely with fork tips straight, low and level.
- [3] Tilt the forks back to keep the load balanced.
- [4] Lift the forks approximately 1 ft off the ground.

**WARNING**

**Good vision of the area in front and beside the skidsteer is necessary to prevent accidents.**

- [5] Ensure the load is balanced and secured prior to movement to prevent spillage.
- [6] Carry the load to the destination while maintaining control of the equipment at all times.

**WARNING**

**Failure to operate the equipment in accordance with normal RFETS and state laws when on any road at RFETS could result in injury, equipment damage, or citation.**

- [7] Utilize a ground guide if necessary for safe handling of materials.

#### 8.1.4 Skidsteer or Forklift Shutdown

##### Operator

- [1] Come to a complete stop, place the controls in park, and set the parking brake.
- [2] Lower the forks to the ground.
- [3] Idle the engine for approximately 2 min. for gradual cooling.
- [4] Shut off the engine.
- [5] Cycle the hydraulic controls to eliminate residual pressure.
- [6] Block the wheels if the skidsteer or forklift is parked on uneven ground.
- [7] Perform maintenance in accordance with the manufacturer's Operator's Manual.

#### 8.2 Operation of Pressure Washer

##### 8.2.1 Pressure Washer Pre-operational Checks

###### DF Operator

- [1] Open and tie back doors to pressure washer shed for proper ventilation in accordance with the Health and Safety Practices Manual.

<b>WARNING</b>
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<b>Adequate air flow is needed to prevent carbon monoxide accumulation.</b>
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- [2] **IF** the fuel or oil levels are low,  
**THEN** notify DSC personnel to fill the tanks.
- [3] Ensure quick coupler on discharge hose is locked before using pressure washer.
- [4] Connect water supply to steamcleaner.

##### 8.2.2 Pressure Washer Operations

###### DF Operator

- [1] Don PPE according to site specific safety and radiological requirements.
- [2] Pull down face shield and check PPE prior to beginning decontamination operations.

### 8.2.2 Pressure Washer Operations (continued)

#### WARNING

The pressure washer's high pressure stream can penetrate skin and clothing causing severe burns and cuts.

#### CAUTION

Operating the pressure washer with the wand trigger in the off position for extended periods of time may damage the pump.

#### DF Operator (continued)

- [3] Pull trigger for high pressure and adjust pressure with the wand handle.
- [4] Turn on burner with electric switch and begin decontaminating equipment from the ground unless proper safety equipment is used for elevated work.

### 8.2.3 Pressure Washer Shutdown (Normal Operation)

#### DF Operator

- [1] Turn the burner off and allow the water to cool below 100 °F (approximately 5 min.) to prevent system damage.
- [2] Turn off the pressure washer key.
- [3] Pull trigger on gun to relieve pressure.
- [4] Perform maintenance in accordance with the manufacturer's Operator's Manual.
- [5] Secure equipment in the pressure washer shed.
- [6] Remove and dispose of PPE according to the site specific Health and Safety Practices Manual requirements.

#### 8.2.4 Cold Weather Operation of Pressure Washer

**WARNING**

Operating the pressure washer in cold weather may cause personnel injury due to ice buildup on walking surfaces.

**CAUTION**

Severe engine damage may occur because of loss of lubrication if pressurized starting fluid is used.

**DF or DSC Operator**

- [1] Hook up water supply from supply tank to equipment.
- [2] Turn on water and wait 5 minutes.
- [3] Don PPE according according to the site specific Health and Safety Practices Manual requirements..
- [4] Turn on pressure washer and pull trigger on wand.

**CAUTION**

Ice buildup in the lines, pump, or heater can stop water flow through the pump. Running the engine without water for long periods of time may cause damage to the pump.

- [5] **IF** no water comes out within 1 min.,  
**THEN** stop the engine.
- [6] Clean out the lines, pump, or heater with compressed air before running the pressure washer.
- [7] Operate the pressure washer during cold weather in the same manner as you would under normal conditions outlined above.
- [8] Turn the burner off to cool water below 100 °F, approximately 5 min., to prevent system damage.
- [9] Shut off the pressure washer when properly cooled.
- [10] Disconnect the water supply hose from the water tank and equipment, and drain the hose.

#### 8.2.4 Cold Weather Operation of Pressure Washer (continued)

##### DF or DSC Operator (continued)

- [11] Couple air compressor hose into water inlet of equipment (adapter may be needed).
- [12] Blow out any water left in the pressure washer. Build up pressure, pull trigger for approximately 1 min.; release the trigger, build up pressure then release quick coupling to back flush.
- [13] Roll up hoses and detach high pressure wand from quick coupler.
- [14] Remove and dispose of PPE according to the site specific Health and Safety Practices Manual requirements.

#### 8.3 Pump Operation

**NOTE** *This procedure contains instructions for the safe operation of a trash pump (Model 13D-19) and a centrifugal pump (Model 83E1-13).*

##### 8.3.1 Pre-operational Checks

##### DF Supervisor or Technician

**NOTE** *If applicable, ensure pump wheels are blocked before starting or the pump could move due to vibration.*

- [1] Check oil level and other fluid levels.
- [2] **IF** oil or other fluid level is low,  
**THEN** add as needed.
- [3] Conduct a visual inspection of connections, hoses, and valves.

### 8.3.1 Pre-operational Checks (continued)

#### WARNING

Filling the fuel tank while the engine is running or hot, can result in a fire or explosion.

#### CAUTION

1. Overfilling the fuel tank will result in a hazardous material spill.
2. Use of improper fuel may cause engine damage.
3. If a pump is operated against a closed valve for any period of time, liquid could boil, build pressure, and cause the pump to rupture or explode.
4. Operating a pump without liquid in the pump casing can create pump damage and the pump will not prime when dry.
5. Summer operation requires 10W-30W oil. Winter operations requires 5W-30W oil. Mixing oil can reduce engine performance.

#### DF Supervisor or Technician (continued)

[4] IF any of the following conditions exist:

- The pump has been drained for winterization,
- The pump is being put into service for the first time,
- The pump has not been used for a considerable length of time,
- The liquid in the housing has evaporated,

THEN add liquid for priming to the housing.

### 8.3.2 Operating Pumps (Normal Operation)

#### Operator

[1] Disengage choke completely after starting.

Partial choke position may cause excessive engine speed.

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### 8.3.2 Operating Pumps (Normal Operation) (continued)

**WARNING**

**Attempting to make repairs when system is under pressure could cause personal injury.**

**Operator (continued)**

- [2] **IF** leaks do occur, in the hoses, couplings, and valves,  
**THEN** shut down the pump and repair or replace equipment as necessary.

### 8.3.3 Cold Weather Operation of Pumps

**Operator**

- [1] Check that suction and discharge hoses are not clogged with ice.
- [2] Check suction strainer for obstructions.
- [3] Check pump casing to ensure that it is not frozen.
- [4] Fill pump casing with water just before starting to avoid freezing of pump casing.
- [5] Choke engine and pull starter cord.
- [6] Disengage choke after the engine starts.

### 8.3.4 Pump Shutdown (All Operations)

**Operator**

- [1] Turn engine switch off.
- [2] Disconnect hoses, slowly release coupling, and wait for pressure to dissipate before disconnecting completely.
- [3] Open cyclone filter valves and allow water to drain.
- [4] Drain out all hoses and pump casing if freezing potential occurs.
- [5] Turn off pump engine fuel supply valve.

### 8.3.5 Pump Maintenance

#### Operator

- [1] Shut off the engine and disconnect the spark plug wire to ensure that the pump will remain inoperative.
- [2] Allow the pump to cool.

**NOTE** *Appendix 1, Pump Troubleshooting contains information for pump troubleshooting.*

- [3] Drain the pump.
- [4] Vent the pump slowly and cautiously.
- [5] Close the suction and discharge valves.
- [6] Check the temperature before opening any covers, plates, or plugs.

### 8.4 Generator Operations

#### 8.4.1 Pre-operational Checks

#### Operator

- [1] Check the oil level and other fluid levels.

A safety feature of this equipment prevents the engine from starting with low oil level.

- [2] Check fuel level (fuel tank capacity is approximately 4.5 US gallons).

#### **CAUTION**

- 1. Poor quality gasoline may cause "spark knock" or "pinging" at a steady engine speed under normal load.**
- 2. The use of gasoline that contains more than 10 % ethanol, or gasoline that contains more than 5 % methanol will damage the engine.**

- [3] Verify that the alternating current (AC) circuit breaker is in OFF.
- [4] Start the engine.

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**8.4.1 Pre-operations Checks (continued)**

**CAUTION**

**Operating the starter more than 5 sec can damage the motor.**

**Operator (continued)**

- [5] **IF** the engine fails to start,  
**THEN** release the switch and wait 10 sec before operating the starter again.

**8.4.2 Operating Generator**

**Operator**

**NOTE** *The generator has an Auto Throttle System. With the switch in AUTO, engine speed is automatically reduced to an idle when all loads are turned off or disconnected. When appliances are turned on or reconnected, the engine resumes the rated speed. With the switch in OFF, the Auto Throttle System does not operate.*

- [1] Run the Auto Throttle System on AUTO to minimize fuel consumption when no load is applied.

The auto-throttle system will not respond to electrical loads of less than 1 ampere (A). The system is not effective for use with appliances that require only momentary power. To avoid extended warm-up periods, keep the switch in OFF until the engine reaches operating temperature.

- [2] Unplug all appliances from the receptacle if the Ground Fault Circuit Interrupter (GFCI) trips.

- [3] Press the reset button.

[A] **IF** the GFCI cannot be reset,  
**THEN** the GFCI is faulty and will be repaired.

[B] **IF** the GFCI resets properly,  
**THEN** inspect the appliance and the power cord for defects.

#### 8.4.2 Operating Generator (continued)

##### Operator (continued)

**NOTE** *The circuit breaker protects the individual circuit protectors and the 50A 120/240V receptacle. The circuit breaker will automatically switch TRIPPED if the circuit is overloaded or if the appliance plugged into the circuit is faulty.*

- [4] **IF** the main power circuit breaker is switched TRIPPED automatically, **THEN** observe that the appliance is working properly and that it does not exceed the rated load capacity of the circuit before resetting the circuit breaker to ON again.
- [5] **IF** the circuit protector switches TRIPPED automatically, **THEN** observe that the appliance is working properly and that it does not exceed the rated load capacity of the circuit before resetting the circuit protector.

#### 8.4.3 Generator Shutdown

##### Operator

- [1] Position the AC circuit breaker to OFF.
- [2] Turn the engine switch to OFF.
- [3] Perform maintenance in accordance with the manufacturer's Operator's Manual and Appendix 2, Preventive Maintenance Scheduling.
- [4] Close the propane bottle valve and disconnect the bottle.
- [5] Store the propane bottle in the storage cage.

#### 9. RECORDS

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources.

##### Operator

- [1] Ensure that the original and one copy of Form HSP 9.06-1 Operator's Daily Inspection are transmitted to the ERPD Project File Center in accordance with 3-21000-ADM-17.01, Quality Assurance Records Management.

Submission of record copies to the ERPD Project File Center will satisfy Administrative Record requirements.

There are no nonquality records generated by this procedure.

**10. REFERENCES**

Health and Safety Practices Manual, HSP-9.06, Powered Industrial Trucks.

RFPM MAT 20-005. Policies: Use and Color Coding of Drums.

1-10000-HWR RFP Hazardous Waste Requirements Manual, Main and Protected Area  
Decontamination Facilities, Health & Safety Plan

1-77000-RM-001, Records Management Guidance for Records Sources.

3-21000-ADM-17.01, Quality Assurance Records Management.

**APPENDIX 1**

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**PUMP TROUBLESHOOTING**

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
<p>PUMP FAILS TO PRIME</p>	<p>Not enough liquid in casing</p> <p>Suction check valve contaminated or damaged</p> <p>Air leak in suction line</p> <p>Lining or worn seal or pump gasket</p> <p>Discharge head too high</p> <p>Suction lift too high</p> <p>Strainer clogged</p>	<p>Add liquid to casing. See Priming.</p> <p>Clean or replace check valve.</p> <p>Correct leak.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Install bypass line.</p> <p>Measure lift w/vacuum gauge.</p> <p>Reduce lift and/or friction losses in suction line.</p> <p>Check strainer and clean if necessary.</p>
<p>PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE</p>	<p>Suction intake not submerged at proper level or sump too small</p> <p>Impeller clogged</p> <p>Impeller or other wearing parts worn or damaged</p> <p>Pump speed too slow</p> <p>Discharge throttling valve partially closed; check valve installed improperly</p> <p>Discharge head too high</p>	<p>Check installation and correct submergence as needed.</p> <p>Free impeller of debris.</p> <p>Replace worn or damaged parts.</p> <p>Check that impeller is properly centered and rotates freely.</p> <p>Check engine output; consult engine operation manual.</p> <p>Reduce head.</p> <p>Reduce head.</p>

**APPENDIX 1**

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<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>PROBABLE REMEDY</b>
PUMP REQUIRES TOO MUCH POWER	Pump speed too high Discharge head too low Liquid solution too thick	Reduce speed of power source. Adjust discharge valve. Dilute, if possible.
PUMP CLOGS FREQUENTLY	Discharge flow too slow  Strainer clogged  Liquid being pumped too thick	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed. Check strainer and clean, if necessary. Dilute liquid, if possible.
EXCESSIVE NOISE	Cavitation in pump  Pumping entrained air  Pump or drive not securely mounted  Impeller clogged or damaged	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory. Locate and eliminate source of air bubble. Secure mounting hardware.  Clean out debris. Replace damaged parts.

APPENDIX 2  
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PREVENTIVE MAINTENANCE SCHEDULE

Nomenclature	Property No. Serial No.	Calibration Due Date	Date Calibration Complete	Date Equipment Filed Tagged	Calibration Source	Preventive Maintenance Due Date/Time	FREQUENCY				Requirements Document	Remarks
							MO	QTR	BIA	ANN		
Landa Model PGHW5-3000 Washer, Hot Water, Pressure		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	
Landa Model PGHW5-3000 Washer, Hot Water, Pressure		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	
Landa Vanguard 270 HSC 8.5 HP, Model MG4-20223 Washer, Hot Water, Pressure		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	
Gorman Rupp 3" Model 13D-19 Centrifugal Pump		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	
Gorman Rupp 3" Model 13D-19 Centrifugal Pump		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	
Gorman Rupp 3" Model 13D-19 Centrifugal Pump		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	
Gorman Rupp 3" Model 13D-19 Centrifugal Pump		NA	NA		NA		X	X	X		Mfg. Manual Mfg. Manual Mfg. Manual Mfg. Manual	

MO = Monthly  
QTR = Quarterly  
BIA = Biannually  
ANN = Annually  
Refer to Manufacturer's Operators Manual for required services.

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PREVENTIVE MAINTENANCE SCHEDULE

Nomenclature	Property No. Serial No.	Calibration Due Date	Date Calibration Complete	Date Equipment Ret Tagged	Calibration Source	Preventive Maintenance Due Date/Time	FREQUENCY				Requirements Document	Remarks		
							MO	QTR	BIA	ANN				
Gorman Rupp 2" Model 83E1-13 Centrifugal Pump		NA	NA		NA		X				Mfg. Manual			
								X			Mfg. Manual			
									X		Mfg. Manual			
Gorman Rupp 2" Model 83E1-13 Centrifugal Pump		NA	NA		NA		X				Mfg. Manual			
								X			Mfg. Manual			
									X		Mfg. Manual			
Gorman Rupp 2" Model 83E1-13 Centrifugal Pump		NA	NA		NA		X				Mfg. Manual			
								X			Mfg. Manual			
									X		Mfg. Manual			
Homelite 2" Model 111DP2-1 Diaphragm Pump		NA	NA		NA		X				Mfg. Manual			
								X			Mfg. Manual			
									X		Mfg. Manual			
Coleman, Powermate, 7000, DM 45-7022, Elec. Generator		NA	NA		NA		X				Mfg. Manual			
								X			Mfg. Manual			
									X		Mfg. Manual			
Case Uniloader, Model 1845C		NA	NA		NA	Equipment Hour Meter Reading	200							
							250							
							1000							
							2000							
Case Uniloader, Model 1845C		NA	NA		NA	Hourly Inspection Requirements	50 hr.							
							250 hr.							
							1000 hr.							
							2000 hr.							
Case, Construction King Forklift Model 585E		NA	NA		NA	Equipment Hour Meter Reading	550							
							750							
							1000							
							2000							
Case, Construction King Forklift Model 585E		NA	NA		NA	Hourly Inspection Requirements	50 hr.							
							250 hr.							
							1000 hr.							
							2000 hr.							

MO = Monthly  
QTR = Quarterly  
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Refer to Manufacturer's Operators Manual for required services.