

# Rocky Flats Plant

## 4-B97-STP-BFP-001

### REVISION 0

## BELT FILTER PRESS OPERATION

APPROVED BY: *R. V. Morgan* / R. V. Morgan / 11/24/93  
 Manager, Waste Operations      Print Name      Date

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**1. PURPOSE**

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This procedure provides instructions for the operation of the Sewage Treatment Plant (STP) Belt Filter Press System. This procedure also delineates operational parameters for waste processing using the Belt Filter Press System.

**2. SCOPE**

This procedure applies to all EG&G Rocky Flats Inc. (EG&G) employees and subcontractors who maintain and operate the STP Belt Filter Press System at the Rocky Flats Plant (RFP).

This procedure includes instructions for the performance of the following activities:

- System startup
- Belt filter press operation
- Belt tensioning
- Belt steering
- Belt replacement
- Shutdown of Belt Filter Press System
- Alarm response
- Emergency shutdown
- Belt Filter Press System restart after emergency shutdown

**3. OVERVIEW**

The Belt Filter Press System process can be summarized as follows: Digested sewage sludge is introduced into the Belt Filter Press System in Building T974A. The belt filter press dewateres sludge, then passes it to the Sludge Drying System in Building 974 by a conveyor belt system.

#### 4. **LIMITATIONS AND PRECAUTIONS**

As is inherent with any mechanical or processing system, the Belt Filter Press System equipment presents a number of potential safety hazards, and is to be operated in accordance with the manufacturer's guidelines and RFP safety standards. Operational safety interlocks have been designed into the process control system where necessary and appropriate. These interlocks automatically prevent unsafe operational conditions during the sludge drying process.

##### 4.1 **Electrical Hazard**

- The control panel and terminal boxes are not to be opened while the equipment is electrically energized. The Main Breaker at the MCC-1-974, Motor Control Center in Building 974 is to be placed in OFF before performing any work on the control panel or terminal boxes.
- The requirements of Health and Safety Practices Manual (HSP) 2.08, Lockout/Tagout; Integrated Work Control Program ; HSP 15.00, Electrical Safety Practices; HSP 15.02, Electrical Equipment; and HSP 15.03, Safety Interlocks and Safety Limiting Devices are to be followed.

##### 4.2 **Environmental Safety**

- During operation of the belt filter press, there is a potential for the release of biodegradation gases from the sludge, specifically, hydrogen sulfide or ammonia. In higher concentrations, these gases can pose hazards as toxicants, asphyxiants, and combustibles.

##### 4.3 **Maintenance**

- All maintenance is to be performed while the belt filter press is OFF (mechanically and electrically) in accordance with HSP 2.08.
- To avoid injury to personnel and damage to equipment, proper maintenance procedures are to be followed.

**4.4 Operational Safety Analysis**

- Operational Safety Analysis (OSA) 995.002, Sewage Sludge Drying Operations identifies the following potential hazards:
  - Injuries including pinching or severe compression of hands and body parts caused by moving or rotating mechanical equipment
  - Exposure to explosive or toxic gases including hydrogen sulfide and methane
  - Inhalation of sludge dust
  - Tripping or falling

**4.5 Over-pressurization**

- The Polyblend System discharge valve is to be OPEN before operating the Polymer Preparation and Feed System (PP&FS). Operation of the PP&FS with this valve CLOSED could result in rupture of the mixing chamber due to over-pressurization.

**4.6 Qualified Personnel**

- The belt filter press is to be only operated by employees properly trained and qualified.

**4.7 Flocculent**

- The flocculent used to promote coagulation and dewatering has a moderate flammability rating. (Material Safety Data Sheets provide guidelines for use of the flocculent.)
- Floors become extremely slippery when the flocculent or dilutions are spilled. Extreme caution is to be used when working on wet surfaces in the belt filter press trailer to avoid slipping, especially when traveling from the containment area to the control room.

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**4.8 Sewage Sludge**

- Exposure to sludge from the STP is to be limited, as it is considered low-level radiological waste.

**4.9 Sludge Pump**

- Improper lineup can result in misdirection of the sludge, over-pressurization of the transfer lines, or pump overload. Proper valve lineup as specified in Appendix 1, Valve Lineup is to be achieved before starting the sludge pump.
- All protective covers are to be in place before starting the sludge pump. The sludge pump is not to be operated without protective covers and guards.

**5. PREREQUISITE ACTIONS**

**5.1 Planning and Coordination**

**Responsible Manager**

- [1] Conduct a pre-evolution briefing in accordance with 1-31000-COOP-011, Pre-evolution Briefing, authorizing performance of this procedure.
- [2] Assign an STP Operator to perform this procedure.

**Operator**

- [3] Wear the following company-supplied personal protective equipment in accordance with HSP 6.07, Radiation Work Permit; 1-62300-HSP-7.01, Eye and Face Protection Program; and HSP 7.02, Occupational Foot Protection when performing this procedure:
  - Goggles or safety glasses
  - Safety shoes
  - Company furnished coveralls
  - Hearing protection
  - Leather gloves
  - Surgeon's gloves (optional)

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## 5.2 Performance Documents

### Operator

- [1] Ensure that the Daily Operations Log is present before performing the procedure.

## 5.3 Materials and Equipment

This section provides a description of the individual units of the belt filter press, and how the units operate in the Sludge Drying System.

### Operator

- [1] Ensure that the following materials and equipment are present before performing the procedure:

- **Variable Speed Sludge Pump.** Tuthill, Model No. 3A, pump transfers digester sludge to the belt filter press, and is capable of delivering from 20 to 70 gallons of sludge per minute. The speed of the sludge pump is controlled from an Allen-Bradley 2705 REDI PANEL Keypad located in Building T974A, and is capable of pumping sludge from either digester no. 1 or digester no. 2.
- **Polymer Preparation and Feed System (PP&FS).** The PP&FS is manufactured by Stranco under the name of PolyBlend. Model PB1000-8 has been selected for the current application. The PolyBlend system performs three basic functions: 1) intake of regulated amounts of polymer and water, 2) blending for uniform dilution and activation, and 3) feeding of the activated polymer to the point of use. The liquid polymer is drawn from a bulk storage container (polymer drum) by an adjustable (stroke length and frequency), diaphragm-type metering pump. At the same time, the inflow of water from a supply source is regulated by an adjustable rotameter. The polymer and water are injected near the bottom of a mixing chamber.

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### 5.3 Materials and Equipment (continued)

An impeller blends the polymer and water in a high-energy, low-shear, fully back-mixed environment to assure complete polymer activation. The activated polymer exits at the top of the mixing chamber and is blended with secondary dilution water in a static mixing pipe. The secondary dilution water is again metered through an adjustable rotameter. The final mixture is piped from the static mixer to the point of use.

- **In-Line Static Mixer.** The in-line static mixer selected for the belt filter press operation is a 2-inch Adjustable Orifice Mixer manufactured by Roediger Pittsburgh, Inc. The mixer is installed in-line between the PP&FS and the belt filter press. Polymer is injected in-line upstream of the belt filter press in the sludge influent line. The purpose of the mixer is to blend the polymer and sludge together to assure sufficient flocculation and coagulation.
- **Belt Filter Press.** The belt filter press selected for this operation is a model TP 7.4, manufactured by Roediger Pittsburgh, Inc. The variable speed sludge pump transfers sludge from the digester to the belt filter press. The mixture then passes through an in-line static mixer to assure sufficient flocculation and coagulation. The mixture then flows to the BFP gravity dewatering zone consisting of a rotating sieve drum and section of horizontal filter belt. The rotating sieve drum allows the free water to flow through a screen which covers the drum. From the rotating sieve drum, the sludge is spread evenly onto the filter belt. The next section is the wedge zone which contains four adjustable rollers. At this point, two wedge belts converge to form a sludge cake. Once the belts have closed around the sludge, the belts continue on to the high pressure/shear zone. The high pressure/shear zone contains eight rollers where the maximum amount of pressure is applied to the sludge cake. As the cake exits this zone, two doctor blades remove the cake from the belts completing the dewatering process. Any misalignment in the belts is automatically corrected by pneumatic tracking controls. The belts proceed to a wash station where any

5.3 **Materials and Equipment (continued)**

trapped material is removed. The pneumatic pressure necessary for the tensioning and steering cylinders is supplied by an air compressor. The required air pressure is monitored and controlled by a regulator in the pneumatic control panel. The operation of the belt filter press is monitored and controlled from the control room in the belt filter press trailer. Before operation of the belt filter press, exhaust and air monitor/alarm systems in the containment trailer are to be checked to verify normal operation. Verification is to be logged in the belt filter press operations logbook.

- **Belt Filter Press Output Conveyor.** This conveyor receives the filter cake from the belt filter press and transfers it out of the trailer and into a storage hopper.
- **Air Monitoring Systems.** The atmosphere in the belt filter press trailer will be monitored for hydrogen sulfide, ammonia and combustible gases to avoid a potential hazardous build-up of these gases. The trailer ventilation system must be running in order for the Belt Filter Press system to operate.
- **Hydrogen Sulfide Monitor.** A General Monitors, Model 2180 hydrogen sulfide gas monitor has been selected for installation in the belt filter press trailer. The sensor is a solid state, continuous, diffusion type element and consists of a semiconducting metal oxide which is specific to hydrogen sulfide absorption. The resistance of the semiconductor varies with hydrogen sulfide absorption and can be directly related to hydrogen sulfide concentration in the surrounding atmosphere. There are two hydrogen sulfide monitors located in the Belt Filter Press trailer. The sensors for the monitors are mounted near the belt filter press, and the control units are mounted in the trailer control room. Set-point concentrations for alarm activation can be adjusted to satisfy RFP exposure limits for hydrogen sulfide. If the set-point concentration is exceeded, an audio alarm will be activated, an alarm message will appear at the Belt Filter Press REDI PANEL, and a LED alarm indicator will be turned on at the control panel. Similarly, the Panalarm in Building 995 will be activated.

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### 5.3 Materials and Equipment (continued)

- **Combustible Gas Monitor.** A General Monitors, Model 480 combustible gas monitor has been selected for installation in the belt filter press trailer. The sensor consists of a low-temperature catalytic bead which oxidizes any combustible material diffusing to it. The oxidation results in a resistance change in the catalytic material which is proportional to the concentration of combustible gases (expressed as % LEL at the annunciator) in the surrounding atmosphere. There are two combustible gas monitors located in the Belt Filter Press trailer. The sensors for the monitors are mounted near the belt filter press, and the control units are mounted in the trailer control room. Set-point concentrations for alarm activation can be adjusted to satisfy RFP limits for combustible gases. If the set-point concentration is exceeded, an audio alarm will be activated, an alarm message will appear at the Belt Filter Press REDI PANEL, and a LED alarm indicator will be turned on at the control panel. A duplicate alarm will be activated at the Building 995 Panalarm.
- **Ammonia Monitor.** A Sensidyne, Model 1000 ammonia gas monitor has been selected for installation in the belt filter press trailer. The sensor consists of a diffusion type sensing electrode, a counter electrode and electrolyte enclosed together behind a membrane. When an ammonia gas leak occurs, the gas molecules permeate the membrane and react with the electrolyte which is specific to ammonia gas absorption.

The resulting output signal of the sensor is directly proportional to the concentration of the gas present. An explosion-proof transmitter intended for use in hazardous areas containing explosive gases will transmit the signal back to the control unit. There are two ammonia monitors located in the Belt Filter Press trailer. The sensors for the monitors are mounted near the belt filter press, and the control unit is mounted in the trailer control room. Set-point concentrations for alarm activation can be adjusted to satisfy RFP exposure limits for ammonia. If the set-point concentration is exceeded, an audio alarm will be activated, an alarm message will appear at the Belt Filter Press REDI PANEL, and a LED alarm indicator will be turned on at the control panel. A duplicate alarm will be activated at the Building 995 Panalarm.

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5.3 Materials and Equipment (continued)

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6. INSTRUCTIONS —BELT FILTER PRESS OPERATION

6.1 Startup of Belt Filter Press

**NOTE 1** *Controls for the belt filter press operation are in the T974A control room. The Allen-Bradley (A-B) 2705 REDI PANEL keypad provides the primary Operator interface for starting and stopping of the process supply pumps and utilities as well as displaying process status and alarms. The belt filter press is also equipped with a control panel for starting and stopping of the booster pump, belt drive, and drum drive.*

**NOTE 2** *The following is a summary of the REDI PANEL keypad function keys:*

- <F1> *Index to controlled equipment*
- <F2> *Equipment start*
- <F3> *Equipment stop*
- <F4> *Sludge pump speed increase*
- <F5> *Sludge pump speed decrease*
- <F6> *Alarm acknowledge and cycle start*

**Operator**

- [1] Verify that all prerequisites in Section 5, Prerequisite Actions are complete, and document on Appendix 2, Prerequisite Verification Sheet.
- [2] Verify the proper valve lineup in accordance with Appendix 1.
- [3] Place the Building 995 process computer in the PRESS mode.
- [4] Press the AUTO pushbutton on the 800T control panel in Building 974.
- [5] **IF** the dryer blower is operating,  
**THEN** press the DRYER BLOWER STOP pushbutton on the 800T control panel in Building 974.

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6.1 Start-up of Belt Filter Press (continued)

[6] Ensure that the air monitoring alarm systems are in normal operation mode by verifying the following:

- Both AIT-143 (VOC) READY lights are LIGHTED.
- Both T974A-AIT-142-H<sub>2</sub>S MONITOR NORM lights are LIGHTED.
- Both AIT-144 (NH<sub>3</sub>) P lights are LIGHTED.

**NOTE** *The alternate air monitoring system shall be approved by Industrial Hygiene and Safety prior to use.*

[7] Verify that the installed air monitoring alarm system is functional and in current calibration or that an alternate air monitoring system is provided.

[8] Perform the following to start the trailer ventilation system:

[A] Start the trailer exhaust fan by placing the T974A-SCR MTR SPEED CTRL panel switch in ON.

[B] Ensure that the trailer exhaust fan is running.

[9] Issue the start command to the air compressor by pressing the function key <F1> on the REDI PANEL until the compressor status is displayed.

[10] Press the function key <F2> on the REDI PANEL to enable the compressor.

**NOTE** *When the air compressor has reached system pressure (greater than 40 psi), the low air pressure alarm indicator will go out.*

[11] Apply tension to the upper and lower belts by adjusting the upper and lower air pressure regulators.

[12] Close breaker MCC-1-974/1B in Building 974, to turn on the filtrate pump.

[13] Start the portable filtrate pump.

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6.1 Start-up of Belt Filter Press (continued)

- [14] Issue the start command to the wash water pump by pressing the function key <F1> on the REDI PANEL until the wash water pump status is displayed.
- [15] Press the function key <F2> on the REDI PANEL to start the wash water pump.
- [16] Start the belt filter press wash water booster pump by pressing the BOOSTER DRIVE START pushbutton on the ROEDIGER PANEL.

**CAUTION**

**The booster pump should not be start-stop-started in a rapid manner. This will prevent a water hammer from occurring in the water supply line, and prevent possible breakage of water lines.**

- [17] Start the belt filter press belt drive by pressing the BELT DRIVE START pushbutton on the belt filter press control panel.
- [18] Start the belt filter press drum drive by pressing the DRUM DRIVE START pushbutton on the belt filter press control panel.
- [19] Issue the start command to the belt filter press output conveyor by pressing the function key <F1> on the REDI PANEL until the belt filter press conveyor status is displayed.
- [20] Press the function key <F2> on the REDI PANEL to start the conveyor.
- [21] **IF** a temporary conveyor and a self dumping hopper is to be used, **THEN** perform the following to start the temporary conveyor:
  - [A] Ensure the safety lanyard and signs are installed around the temporary conveyor, as appropriate.
  - [B] Ensure the temporary conveyor is plugged into the 220 V receptacle

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6.1 Start-up of Belt Filter Press (continued)

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- [22] Issue the start command to the sludge pump in Building 995 by pressing the function key <F1> on the REDI PANEL until the sludge pump status is displayed.

**NOTE** *The speed of the sludge pump is indexed with function keys <F4> and <F5> only when in the sludge pump mode. An auto repeat function is to be enabled so that the speed will continually change while the function key is pressed. The speed of the sludge pump, from 0 to 100%, is displayed on the REDI PANEL as the Operator is making speed adjustments.*

- [23] Press the function key <F2> on the REDI PANEL to start the sludge pump.

**NOTE** *The recommended sludge pump speed is between 80 and 90%.*

- [A] Increase the sludge pump speed in 5% increments by pressing the <F4> function key, as needed.
- [B] Decrease the sludge pump speed in 5% increments by pressing the <F5> function key, as needed.

- [24] Start the PP&FS after visual confirmation that the sludge has reached the belt filter press.

- [A] Open the HV-7001, Polymer Shutoff valve.
- [B] Open the manual shut-off valve on the water supply.

**CAUTION**

**The PolyBlend unit is not to be operated without water flow to prevent damage to the pump.**

- [C] Turn the MAIN POWER switch to ON to open the solenoid valve, allowing water to flow to the PolyBlend unit.

6.1 Start-up of Belt Filter Press (continued)

[D] Slowly rotate the flow control knobs counterclockwise to achieve the desired flow rates.

The flow rate is read at the top of the indicator float.

**NOTE** *The recommended mix chamber flow rate is 2.75 GPM, and the recommended static mixer flow rate is 5.0 GPM.*

[E] Verify that the mixing chamber is completely filled with water.

[F] Inspect all connections for leaks, and tighten as necessary.

[G] Turn the MIXING CHAMBER switch to ON.

The impeller inside the mixing chamber starts rotating, and the pump begins to make a clicking sound. This sound and the green stroke indicator light on the pump show that pumping action is taking place. The water in the mixing chamber will rapidly turn milky or cloudy as the polymer is injected. The pump will require priming when changing the polymer barrels, or when excess air builds up in the polymer suction line.

**NOTE 1** *The PolyBlend unit may now be stopped and subsequently restarted by way of the MAIN POWER switch (alone), or by remote switching of the power supply. Turning the MIXING CHAMBER switch to OFF is required only in dry start-up situations, or when excess entrapped or entrained air builds up in the mixing chamber.*

**NOTE 2** *A daily check for air building up may be conducted by turning off the mixer control switch, and allowing the mixing impeller to come to a rest. If air is trapped, an empty area quickly forms at the top of the chamber and is expelled by the incoming water flow. As soon as the chamber is full, the MIXING CHAMBER switch may be reactivated and normal operation will continue.*

[H] Adjust the polymer flow up or down to obtain a proper floc, from panel located by northwest wall in T974 trailer.

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**6.1 Start-up of Belt Filter Press (continued)**

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**NOTE** *The recommended starting stroke length is 21% with a stroke frequency of 25%.*

[25] Adjust the belt drive speed so that the head box is no more than half full with conditioned sludge, and is spread over the entire effective width of the lower belt.

**NOTE** *The recommended belt drive speed is 20%, and is adjusted by turning the hand wheel on the belt drive motor.*

[26] Adjust the drum drive speed so that the conditioned sludge is not flowing over the rotating sieve drum inner vanes.

**NOTE 1** *The recommended drum drive speed is 80%, and is adjusted by turning the hand wheel on the drum drive motor.*

**NOTE 2** *The recommended starting belt tension setting is 60 psi, for the upper and lower belts.*

[27] Adjust the belt tension by varying the air pressure to the pneumatic cylinders to achieve optimum sludge conditions.  
The belt tension is adjustable from 40 to 85 psi by means of a pressure regulator for each belt.

6.2 **Belt Filter Press Operation**

**NOTE** *After startup has been initiated, the system is designed to maintain a controlled and normal operation. This has been made possible through instrumentation and control systems that have been installed into the operation. The Operator monitors the system for proper function, runaway conditions, system failure, and product quality.*

**Operator**

- [1] Periodically inspect the following items during the operation of the belt filter press process for proper operation.
- [A] Monitor the operation of all belt filter press operating equipment:
- Sludge pump
  - Wash water/Booster pump
  - Filtrate pump
  - Air compressor
  - Belt drives
  - Drum drives
  - Belt filter press output conveyor
  - Portable conveyor to hopper
  - Disperse sludge cake evenly in portable self dumping hopper, if used
- [B] Monitor the sludge volume in the digester.
- [C] Monitor the operation of the PP&FS.
- [D] Monitor the inventory of the polymer in the bulk storage container.
- [E] Monitor the operation of the air monitors in the belt filter press trailer.
- [F] Monitor the operation of the exhaust and ventilation systems in the belt filter press trailer.
- [G] Monitor the quality of the sludge floc delivered to the belt filter press.

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6.2 Belt Filter Press Operation (continued)

[H] Monitor the quality of the sludge filter cake produced by the belt filter press.

[I] Monitor the clarity of the belt wash water.

[J] Monitor the level of the cake in the storage hopper.

**NOTE** *The material being drawn from the digesters for processing through the sludge drying operation is to be sampled once per run.*

[K] Obtain a 50-ml grab sample of the digester sludge and a 25-g sample of the sludge cake for analysis.

[L] Analyze the sample for solids content using the Standard Methods for the Examination of Water and Waste Water.

[M] Record hourly readings on Belt Filter Press Datasheet.

[N] Record the value in the Daily Operations Log.

[2] Record the following information in the Daily Operations Log during belt filter press operations.

- Total feed, gal
- Polymer used, lb
- Run time, hr
- PP&FS settings
- Belt filter press settings (belt drive or drum drive speed)
- Conveyor settings
- Sludge feed rate, gal/min
- Digester start and end levels

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### 6.3 **Belt Tensioning**

**NOTE 1** *Each belt is independently controlled for tension. Tension is to be applied to the belts when operating the belt filter press, so that steering can be accomplished.*

**NOTE 2** *The tension is adjustable from 40 to 85 psi by means of a pressure regulator for each belt.*

#### **Operator**

[1] Turn the hand valves attached to the two pneumatic double cylinders clockwise to force the rollers against the top and bottom belt.

**NOTE** *Proper tensioning of the filter belts is one of the determining factors for efficient dewatering. Too much belt tension will cause squeezing of sludge out the sides of the belt, while not enough tension will produce inefficiently dewatered sludge.*

[2] Stop adjusting when the proper belt tension has been achieved.

### 6.4 **Belt Steering**

Belt steering is accomplished by a rubber coated roller that is pivoted on one end and positioned on the other end by an air-operated cylinder. The cylinder is actuated by a four-way limit valve mounted so that it senses the edge of the belt with a stainless steel paddle arm. When the belt moves against the paddle arm, the steering roller is moved upward by the air-operated cylinder, causing the belt to begin tracking away from the limit valve.

When the belt has traveled in the opposite direction far enough to shift the valve spool in the limit valve, the steering roller is moved downward by the air-operated cylinder, causing the belt to track back toward the limit valve.

#### 6.4 Belt Steering (continued)

##### Operator

- [1] Monitor the belt steering operation.

**NOTE** *When the limit valve paddle arm is pulled toward the Operator, the steering roller moves to the left and up. When the paddle arm is pushed away from the Operator, the steering roller moves to the right and down.*

- [2] Operate the belt steering limit valves by hand periodically to check for proper operation of the limit valve and steering roller.

#### 6.5 Belt Replacement

##### Operator

- [1] **WHEN** a filter belt shows signs of wear, usually in the vicinity of the seam, **THEN** contact the Maintenance Department for replacement.

#### 6.6 Shutdown of Belt Filter Press

##### Operator

- [1] Turn off the MAIN POWER switch to the PP&FS.
- [2] Flush the PP&FS mixing chamber with supply water until clean.
- [3] Turn off the supply water to PP&FS.
- [4] Close the discharge valve to PP&FS.
- [5] Issue a stop command to the sludge pump by pressing the function key <F1> on the REDI PANEL until the sludge pump status is displayed.
- [6] Press the function key <F3> on the REDI PANEL to stop the sludge pump.

**6.6 Shutdown of Belt Filter Press (continued)**

- [7] Clean the entire Belt Filter Press System including walls, floors, and equipment.
  - [A] Connect the high pressure water hose with spray nozzle to the process water line inside the belt filter press trailer.
  - [B] Spray down the belt filter press thoroughly from top to bottom while the equipment is running to remove as much sludge residue from the equipment as possible.

**CAUTION**

**Spraying sensors may detrimentally affect sensor performance.**

- [8] Do NOT directly spray the air monitoring sensors (hydrogen sulfide, ammonia, and combustible gas) near the belt filter press.
- [9] Do NOT hose down the belt filter press output conveyor if the sludge is in the hopper to avoid adding water to the sludge going to the sludge drying process.
- [10] Flush the filtrate from the collection trays.
- [11] Remove the sludge deposits from all limit switches.
- [12] Remove the sludge and fibers from the doctor blades and the paddle arms.
- [13] Clean the belt filter press spray nozzles.
- [14] Inspect the filter belts for wear or damage, and repair or replace the belts, as necessary.
- [15] Inspect the doctor blades for wear, and repair or replace the blades, as necessary.
- [16] Spray down the ceilings and walls to remove all sludge particles.

**6.6 Shutdown of Belt Filter Press (continued)**

- [17] Spray down the floors inside the trailer, washing the dirty water to the drain underneath the belt filter press drip pan.
- [18] Issue a stop command to the belt filter press output conveyor by pressing the function key <F1> on the REDI PANEL until the belt filter press conveyor status is displayed.
- [19] Press the function key <F3> on the REDI PANEL to stop the conveyor.
- [20] Turn off the Belt Filter Press System by issuing corresponding stop commands to the following:
- BOOSTER DRIVE at the ROEDIGER control panel
  - Belt wash water supply pump by pressing the function key <F1> on the REDI PANEL until the wash water pump status is displayed
- [A] Press the function key <F3> on the REDI PANEL to stop the wash water pump.
- BELT DRIVE at the the ROEDIGER control panel
- [B] Turn the air pressure regulator levers counterclockwise, located outside box, to release the upper and lower belt tension.
- DRUM DRIVE at the ROEDIGER control panel.
- NOTE** *Filtrate pump automatically turns off when the water level in the filtrate tank drops below the low-level turnoff point.*
- [C] Open breaker MCC-1-974/1B in Building 974, to stop the filtrate pump.
- [21] Stop the trailer exhaust fan by placing the T974A -SCR MTR SPEED CTRL panel switch in OFF.

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## 6.7 **Alarm Response**

This section defines the alarm codes and system parameters that are monitored for fault conditions.

**NOTE 1** *When a safety monitoring device detects a fault or alarm in the system, an audible alarm will be activated.*

**NOTE 2** *A message code (ALARM XXX) identifying the fault is displayed at the control panel to the belt filter press.*

**NOTE 3** *Operator acknowledges or silences the alarms by pressing the function key <F6> on the REDI PANEL, or by depressing the PLCO-1-T974A, PANALARM ACK pushbutton.*

### 6.7.1 **Alarm 100, Tank Overflow**

#### **Operator**

- [1] Monitor the fluid level in the drip pan.
- [2] Confirm the belt filter press shutdown.
- [3] Monitor the following:
  - Blockage in the drain pipe from the drip pan to the holding tank
  - Filtrate pump
- [4] Take the appropriate action to correct the alarm.

### **6.7.2 Alarm 200, Belt Brake Overtravel (BBOT)**

#### **Operator**

- [1] Check the two belt tracking limit switches.
- [2] Confirm the belt filter press shutdown.
- [3] Monitor the belt condition and operation.
- [4] Take the appropriate action to correct the alarm.

### **6.7.3 Alarm 300, Air Pressure Failure**

#### **Operator**

- [1] Confirm the belt filter press shutdown.
- [2] Inspect the following:
  - Pneumatic control box
  - Air lines
  - Air compressor
- [3] Take the appropriate action to correct the alarm.

### **6.7.4 Alarm 400, Sludge Pump Failure**

#### **Operator**

- [1] Monitor the sludge entering the belt filter press.
- [2] Confirm the belt filter press shutdown.
- [3] Inspect the following:
  - REDI PANEL
  - Sludge pump
- [4] Monitor the level of sludge in the digester.
- [5] Take appropriate action to correct the alarm.

**6.7.5 Alarm 500, Belt Filter Press Conveyor Failure**

**Operator**

- [1] Confirm the belt filter press shutdown.
- [2] Inspect the following:
  - REDI PANEL
  - Conveyor
- [3] Take appropriate action to correct the alarm.

**6.7.6 Alarm 600, Wash Water Pump Failure**

**Operator**

- [1] Confirm the belt filter press shutdown.
- [2] Inspect the following:
  - Wash water pump
  - Wash water supply lines
- [3] Take the appropriate action to correct the alarm.

**6.7.7 Alarm 700, Filtrate Pump Failure**

**Operator**

- [1] Monitor the condition of the filtrate pump.
- [2] Take the appropriate action to correct the alarm.

**6.7.8 Alarm 800, Air Monitoring Alarm -- H2S, NH3, LEL**

**Operator**

- [1] Evacuate the trailer leaving the doors open.
- [2] Ventilate the trailer.
- [3] Observe the air monitors.
- [4] Take the appropriate action to correct the alarm.

**6.7.9 Alarm 900, Belt Filter Press E-Stop**

**Operator**

- [1] Determine which E-Stop device triggered the alarm.
- [2] Confirm the belt filter press shutdown.
- [3] Take the appropriate action to correct the alarm.

**6.8 Belt Filter Press Emergency Shutdown**

This section provides instructions for the shutdown of the Belt Filter Press System in the event of an emergency.

**NOTE 1** *Two E-Stop pushbuttons are located in the Belt Filter Press Trailer. One E-Stop pushbutton is on the ROEDIGER panel, and the other pushbutton is on the PLCO-1-T974A, PANALARM cabinet. These pushbuttons will shut down the process, except the items listed in Note 4 before Step 6.8[1].*

**NOTE 2** *The E-Stop pushbutton in Building 995 basement will shut down everything except the belt and drum drives, and the items in Note 4 before Step 6.8[1].*

**NOTE 3** *Pulling the lanyard that encircles the belt filter press will shut down the entire process, except the items listed in Note 4 before Step 6.8[1].*

**6.8 Belt Filter Press Emergency Shutdown (continued)**

**NOTE 4** *After activating an E-Stop to the belt filter press, the air monitoring and alarm systems, the air compressor in Building 974, the filtrate pump, and the trailer exhaust system remain energized.*

**Operator**

- [1] Press one of the E-STOP pushbuttons on the control panel in the trailer control room, or pull the lanyard that encircles the belt filter press in the event of an emergency.
- [2] Immediately notify supervision.

**6.9 Belt Filter Press Restart after Emergency Shutdown**

This section provides instructions for the restart of the Belt Filter Press System following an emergency stop.

**CAUTION**

**The Belt Filter Press System must be thoroughly inspected and the E-Stop alarm corrected to prevent damage to the system before attempting a restart of the system.**

**Operator**

- [1] Acknowledge the alarm by pressing the <F6> function key on the REDI PANEL, or by pressing the PLCO-1-T974A, PANALARM pushbutton.
- [2] Correct the problem that prompted the E-Stop.
- [3] Press the <F6> function key to cycle-start the system and clear the message from the screen.
- [4] Start the system in accordance with Section 6.1, Start-up of Belt Filter Press.

**7. POST-PERFORMANCE ACTIVITY**

**7.1 Disposition**

**Responsible Manager**

- [1] Disposition the records generated by use of this procedure in accordance with 1-77000-RM-001, Records Management Guidance for Records Sources.

**8. REFERENCES**

HSP 2.08, Lockout/Tagout

HSP 6.07, Radiation Work Permit

HSP 7.02, Occupational Foot Protection

HSP 15.00, Electrical Safety Practices

HSP 15.02, Electrical Equipment

HSP 15.03, Safety Interlocks and Safety Limiting Devices

OSA 995-002, Sewage Sludge Drying Operations

Standard Methods for the Examination of Water and Waste Water, 17th edition,  
Part 2540G

1-31000-COOP-011, Pre-evolution Briefing

1-62300-HSP-7.01, Eye and Face Protection Program

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

**APPENDIX 1**

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**VALVE LINEUP**

HAND OFF AUTO switch on P304-VFD2, SLUDGE PUMP SPEED CONTROL panel is in AUTO.

Adjust the following hand valves in accordance with STP operating requirements:

HV-3004 SUPERNATE DIVERTER NORM HEADWORKS  
 HV-3007 A-BASIN NO. 2 NORM HEADWORKS  
 HV-3008 FILTRATE-SUPERNATE, TRAIN SELECTOR

Verify proper valve line-up when pumping from Digester No. 1.

<u>Valve Name</u>	<u>Description</u>	<u>Position</u>
2	Digester Access Valve	Open
3	No. 1 Digester Isolation Valve	Open
4	No. 2 Digester Isolation Valve	Closed
23	Isolation Valve	Closed
27	Top of Primazy Valve	Closed
28	Sludge Pump Inlet	Open
32	No. 1 Digester Isolation Valve (Middle)	Closed
39	Digester Isolation Valve	Closed
43	Drying Bed Valve	Open
44	Cross-Over Valve	Open
57	Polymer Valve	Closed
78	Sludge Pump Discharge	Open
	Tanker Valve (located on north side of Building 995)	Closed
	Digester Isolation Valve	Closed
	Isolation Valve for beds #1-4	Open
	Isolation Valve for beds #5-7	Closed
	Drying Bed #1 Fill Valve	Closed
	Drying Bed #2 Fill Valve	Closed
	Drying Bed #3 Fill Valve	Closed
	Drying Bed #5 Fill Valve	Closed
	Drying Bed #6 Fill Valve	Closed
	Drying Bed #7 Fill Valve	Closed
HV-4001	974 Sewage Sludge Shutoff	Open
HV-4002	Sewage Sludge Tanker Diverter	BFP

**APPENDIX 1**

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**VALVE LINE-UP (continued)**

Verify proper valve line-up when pumping from Digester No. 2

<u>Valve Name</u>	<u>Description</u>	<u>Position</u>
2	Digester Access Valve	Closed
11	Isolation Valve	Closed
17	No. 2 Digester Isolation Valve (Bottom)	Open
19	No. 1 Aeration Basin Valve	Closed
22	No. 2 Digester Cross-Over Valve	Open
23	Isolation Valve	Open
27	Top of Primazy Valve	Closed
28	Sludge Pump Inlet	Open
32	No. 1 Digester Isolation Valve (Middle)	Closed
39	Digester Isolation Valve	Open
43	Drying Bed Valve	Open
44	Cross-Over Valve	Open
57	Polymer Valve	Closed
78	Sludge Pump Discharge	Open
	Tanker Valve (located on north side of Building 995)	Closed
	Digester Isolation Valve	Closed
	Isolation Valve for Beds #1-4	Open
	Isolation Valve for Beds #5-7	Closed
	Drying Bed #1 Fill Valve	Closed
	Drying Bed #2 Fill Valve	Closed
	Drying Bed #3 Fill Valve	Closed
	Drying Bed #5 Fill Valve	Closed
	Drying Bed #6 Fill Valve	Closed
	Drying Bed #7 Fill Valve	Closed
HV-4001	974 Sewage Sludge Shutoff	Open
HV-4002	Sewage Sludge Tanker Diverter	BFP

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**APPENDIX 2**  
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**PREREQUISITE VERIFICATION SHEET**

6.1[1] All prerequisites in Section 5 are complete.

\_\_\_\_\_  
Operator

\_\_\_\_\_  
Date