

# Belt Press Operation and Maintenance

## ST-022

### **Purpose**

To develop a plan of operation that will allow an individual to safely and effectively process Waste Activated Sludge (WAS) for disposal to a local landfill. Key focus will be on producing a cake that meets a desired dry % solids. Parameters to track are MLSS, 30 min. ML settling, proper conditioning of WAS slurry (polymer injection) and mechanical components of the biosolids gravity belt press.

### **Overview**

To reduce the volume and mass of the waste activated sludge (WAS) and secondary scum that must be hauled off to the land disposal site. This is necessary both for economical disposal (transportation and dump fees) and to satisfy the landfill maximum moisture requirements as set by regulatory agencies.

The waste activated sludge system and the solids processing system are intended to function as a single unit. Therefore, the plant operator operates the belt press feed pumps and belt presses to maintain the proper amount of activated sludge under aeration in the oxidation ditches. Here at the Gilroy/Morgan Hill WWTP we have developed and implemented an SRT worksheet to set our daily wasting target in gallons.

The belt presses are expected to produce a cake with a solids concentration of approximately 15 to 17 % and a solids capture of greater than 90% at a feed solids concentration of 1%

### **Related Equipment and Systems**

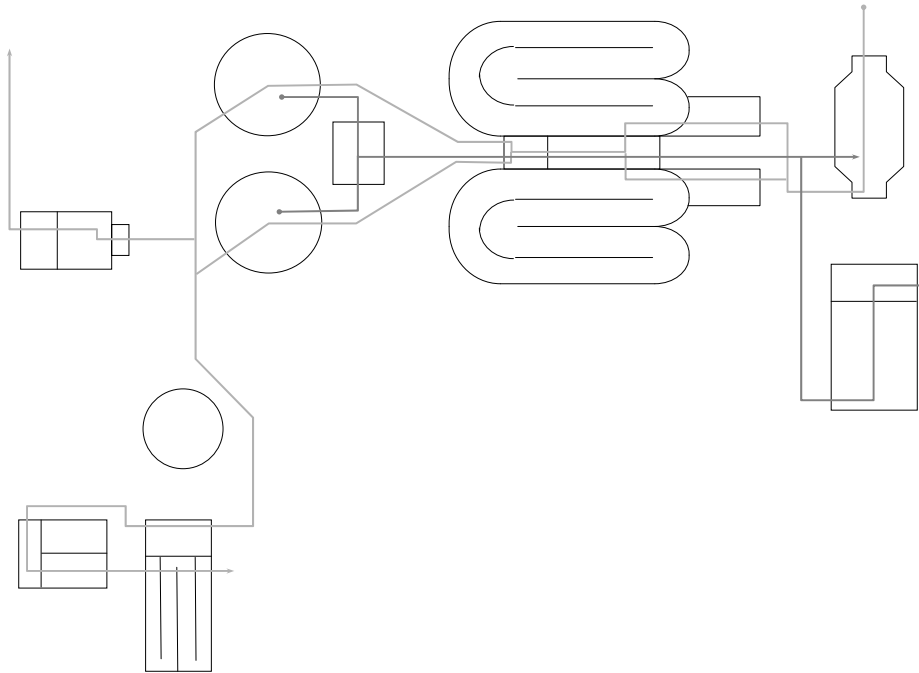
#### Piping System For Belt Press Feed

A 10-inch diameter pipeline receives the waste activated sludge (WAS) from the 42-inch diameter return activated sludge pipeline and the secondary scum via a 3-inch diameter pipeline from the RAS pump station scum pumps. The 10-inch diameter pipeline carries the combined WAS/scum flow to the suction manifold of the four belt press feed pumps, located on the first floor of the solids processing building.

The sludge transport pipe enlarges to a diameter of 12-inches as it enters the building. Just within the building, the sludge transport pipe contains an isolation

valve, three 6-inch diameter cross connections to the pump suction manifold and a 6-inch motor operated plug valve (MOV) preceded by a manual shutoff valve.

The MOV is in a pipe connection to the plant drain pipeline and when open allows the sludge to flow from the sludge transport pipeline to the plant drain pump station. When a belt press has not operated within the last 24 hours purging of the line may be done automatically or manually prior to initiating the belt press feed pump operation to remove the sludge that may have become septic since the previous period of belt press operation.



### Sludge Dewatering Process and Equipment Data

Belt Presses – 3 units, manufacture Ashbrook-Winklepress, belt width – 2 meters, feed sludge capacity 150 gpm, belt drive motors 3 hp VFD, hydraulic power pack – single stage gear pump 1.5 hp

Belt Press Sludge Feed Pumps – 4 units, manufacture Netzsch, progressive cavity pumps, capacity 250 gpm, motor size 20 hp VFD

Belt Press Wash Water Supply Pumps – 3 units, manufacture PACO, inline centrifugal pumps, capacity 100 gpm, motor size 7.5 hp

Liquid Polymer Storage Tanks – 2 units, inside diameter 8 feet, overflow invert 8.58 feet, capacity at overflow 3,226 gallons

Liquid Polymer Recirculation Pumps – 2 units, manufacture Netzsch, progressive cavity pumps, capacity 1 gpm – 1 hp

Polymer Mix-Feed Units – 4 units, manufacture Fluid Dynamics / Dynablend, liquid polymer pump – progressive cavity, capacity 10 gph – 0.5 hp

Cake Conveyor # 1 – manufacture Purac, 14-inch diameter by 80 feet long, shaftless screw, 2 motors – 7.5 hp each

Cake Conveyor # 2 – manufacture Purac, 14-inch diameter by 16.8 feet long, shaftless screw, 1 motor – 5 hp

Sludge Storage Bin – 1 unit, manufacture Thomas Conveyor, nominal volume – 742 cubic feet, 3 discharge gates with pneumatic actuators

## **PROCEDURE**

The belt press system, consisting of the belt press, the wash water pump, the conveyors, the selected sludge feed pump, and the selected polymer mix/feed unit shall normally be operated as a manual system with automatic capabilities, with the SCADA system controlling the interlocks between the various equipment. Normal startup and shutdown of the belt press system will include the following steps.

The plant operator will check system valving on the belt press feed pumps and polymer system to direct flow from each unit to the desired belt press. The plant operator will also check that the proper equipment is selected to run to proper belt press at SCADA MMI terminal in solids control room.

After confirming that valving and equipment is properly set and selected the plant operator is now ready to start the system. At the local control panel (LCP) located in the solids bldg. control room there is a hand-off-auto (HOA) switch, the plant operator will place the HOA switch to hand and start the hydraulic motor. The plant operator will then check the hydraulic power pack for proper operation and set pressure at approximately 500 lbs. (note: due to viscosity this pressure may need to be adjusted several times to maintain the 500 lb. setting). At this point once the belts have been tensioned the plant operator will need to open the wash water valves and start wash water pumps. The next step would be to start the sludge conveyors (2) by placing the local control in hand at each LCP. The next step would be to go up to second tier at belt presses and lower chicanes and check belt alignment and tension. The next step would be to start belt motor drive and

flush wash water boxes, uppers and lowers. Let belts run at a set speed for about 15 minutes to condition belts before starting feed. After belts are conditioned the plant operator is ready to start the feed system.

At the LCP in solids control room the plant operator will start the feed system by pressing the start button, this will start both the belt press sludge feed pumps and the poly mix/feed pumps. Be aware that some pumps start at minimum settings and some start at “0”, so you will need to make adjustments as needed. Let system run for a few minutes and check for proper polymer feed and dewatering of waste activated sludge (WAS). Make a note that if the system was down and is a fresh startup the WAS line will automatically purge, but if a press is run overnite as is normal, the plant operator will want to manually purge the WAS line at the LCP by pressing the start purge button. Let the WAS line purge for a few minutes and STOP purge.

After the belt presses have run for 15 to 30 minutes and all functions are stable, the plant operator will want to increase belt feed and polymer feed to meet SRT worksheet demand. Taking a look at recent belt press feed trends will give the plant operator an idea of where to set his feed rates at.

Now that the system is running and is pressing an adequate cake, the plant operator will want to check the sludge hopper and empty into one of the sludge trailers. The plant operator will want to always be sure that the sludge hopper has room for the cake that is coming off the presses to prevent a sludge hopper over fill.

Sometime after presses have been running, the plant operator will gather cake samples and belt press return (BPR) samples and deliver to lab for analysis.

## WASHDOWN

Washdown of belt presses will start by shutting off feed at LCP and letting belt empty into conveyor. The plant operator can start washing down at top or bottom, whichever the plant operator prefers, but washdown must include all of the following locations. Washdown drain panels and catches – top and bottom including underneath the gravity belt slide bed, adjusting paddles, behind doctor blades, gravity belt and supporting strips and chickanes, washdown containment area front and back and wash the area leading to and around main drain.

## SHUTDOWN

Shutdown of belt presses will start by shutting off the belt drive at LCP and then shutting off hydraulic motor at LCP. Place HOA switch at control panel to off

position. Turn off washwater pump and close discharge valve (note: only close discharge valves when reclamation usage is high). Turn off sludge conveyors (2) at local control (note: only shutdown sludge conveyor if a belt press is not running overnite).

### Belt Press and Conveyor Safety

Only persons completely familiar with the equipment and the following precautions should be permitted to operate the Belt Press and Conveyor system. The operator should thoroughly understand these instructions before attempting to use this equipment.

Failure to follow these precautions may result in serious personal injury and or damage to the equipment.

Before entering the Solids building all staff must wear hearing protection and safety glasses. If any person will need to perform any task or inspection beneath the belt press platform (belt press containment area) a hard hat must be worn.

The Belt press has many moving parts and contains biological contents that may be hazardous to one self.

Be aware of your surroundings at all times.

1. Slip and trip hazards may be common in this area:  
Water hoses should be out of the immediate path of walk ways and staged along wall to prevent trip hazard.
2. Belt containment area may become a slip hazard due to the nature of polymer and sludge combined with water. Keep your footing and balance at all times
3. Pinch points may be found along the entire structure of the belt press. Keep hands away from equipment at all times or proceed with extreme caution if needed.
4. Hydraulic system is in place to place tension on belts exercise caution when working around this equipment.
5. Guards have been installed to eliminate some but not all moving parts and fall hazards.
6. Grating deck can at times become slippery or a trip hazard walk carefully.
7. Eye wash and showers are provide in the general area if needed.
8. DO NOT place hands or feet in the Conveyor opening.
9. NEVER walk on Conveyor covers or grating.
10. DO NOT use the Conveyor for any purpose other than what it was designed for.
11. Avoid poking or prodding material in the Conveyor loading and unloading points and all safety devices.

12. ALWAYS have a clear view of Conveyor loading and unloading points and all safety devices.
13. Keep area around Conveyor, drive and control station free of debris and obstacles.
14. NEVER operate Conveyor without covers, grating guards and other safety devices in position.
15. Verify tagline and emergency stop features are in good working order on a weekly basis.
16. ALWAYS use proper lockout/tag out procedures when doing any maintenance.

### Sludge Distribution and Effect on Belt Seams

Misaligned seams indicate an uneven sludge distribution problem. Uneven sludge distribution/misaligned seams result in poor performance and may cause tracking problems. Over time this issue will damage belts (wear, seam fatigue/failure, wrinkles) and wear rollers.

#### General Guidelines

1. A seam that is straight within 4-6" is generally OK.
2. A seam with 12" or more misalignment requires action.
3. After making adjustments, it will take 1-2 hours or more to see the complete effect on the seam.
4. Good immediate indicators of sludge distribution are observations of sludge flow down the incline of the feedbox onto the gravity table and sludge buildup at the leveling gate at the end of the table.
5. Ideal distribution is slightly heavy at the edges (again, which can be observed at the leveling gate) to compensate for the edges spreading in the pressure zone.
6. Changes in press feed rate and/or sludge feed consistency may result in uneven sludge distribution that will need to be addressed through manipulation of sludge speed and/or diverting sludge at the trough.