

## Biosolids Process



These solids (.5 % solids) in liquid form enter two common channels and flow into the RAS (Return Activated Sludge) and WAS (Waste Activated Sludge) wet well on the West side of the DAF (Dissolved Air Flotation) building. This wet well supply the DAF to thicken some of sludge and pump it to the digesters as TWAS (Thickened Waste Activated Sludge) and most of the bacteria/microorganisms, sludge is sent back to the Bioselector for further treatment called RAS (Return Activated Sludge).



Solids Handling, DAF (Dissolved Air Flotation) Building.



Mini Laboratory. The operators run various in house process control tests in the DAF (Dissolved Air Flotation) Mini Laboratory. This allows the operators to check how the plant is performing and make any necessary changes.



In the Laboratory is where samples are analyzed for all the required parameters that are on the City of Santa Fe's Wastewater Treatment Facility NPDES Permit with the Environment Protection Agency (EPA) and the Permits the facility has with the New Mexico Environment Department (NMED).



Laboratory Analyst performing analysis on wastewater samples from the treatment plant.



DAF - The City of Santa Fe uses Dissolved Air Flotation (DAF) in order to thicken biosolids (sludge). The DAF operates by pressurizing water, above atmospheric pressure, in a pressure tank, (Hydrostatic Tank).

The pressurized water is introduced to a header along with pumped sludge and a thickening agent, (polymer). The sludge, pressurized water, and polymer enter into the actual DAF tanks, which are at atmospheric pressure. The difference in pressures causes air to come out of solution as fine bubbles, which rise to the surface of the DAF tank. The sludge attaches to the fine bubbles and is floated to the surface where it is concentrated, thickened.

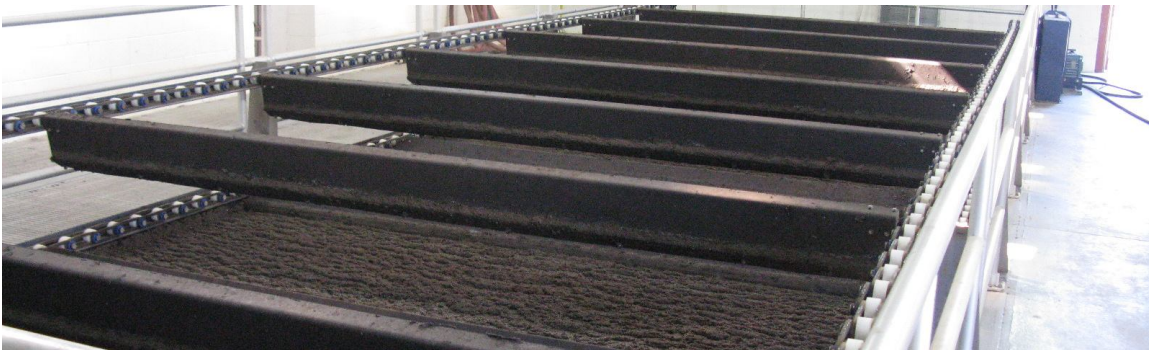




Polymer is used as an aid in thickening the biosolids.



There are three separate DAF unit. Each unit has a 32,300-gallon DAF (Dissolved Air Flotation) tank with its own individual equipment apparatus so it can operate independently for operational flexibility. Two of the DAF Units are located side by side in one building. The third DAF Unit was added in 2009 for additional solids loading and to provide equipment redundancy and is located in a separate building.



New DAF Unit.



Polymer Pumps that add polymer to help in thickening the biosolids.





There are four hydrostatic tanks. Two in the current DAF Building and Two in the new DAF Building. Each of which is supplied air by its' own air compressor. Each hydrostatic tank has its own control unit and is regulated to 40 psi by the operation of a motorized valve, (motor control unit).



Two hydrostatic tanks and two positive displacement progressive cavity pumps that pump the TWAS (Thickened Waste Activated Sludge) from the New DAF Building to the digesters.



There are four positive displacement progressive cavity pumps, two that pump the WAS (Waste Activated Sludge) to all three DAF Units and one pump that pumps the TWAS (Thickened Waste Activated Sludge) to the digesters and one pump that can alternate to pump WAS or TWAS.



There are three centrifugal pumps for the RAS (Return Activated Sludge) that pump the RAS to the head of the plant. The thickened biosolids from the DAF's are then handled in either one of two ways: Anaerobic Sludge Digestion or Lime Stabilization.



**Anaerobic Sludge Digestion** - The anaerobic digesters at the City of Santa Fe have a wide and varied history. In the past, they have served as sludge storage tanks and currently serve as digesters. A major modification and replacement project was to use existing tankage, with a new addition for the pumping and heating equipment, and use them as anaerobic digesters. The digesters further reduce the volatile sludge solids reducing the volume and the end product is stabilized to a Biosolids of Class B. Biogas (methane) is produced and can be used to heat. Carbon monoxide and water are also produced in the process. The SRT (Sludge Retention Time) is well over the 15 days. 50 percent of volatile solids reduction by the digesters is a norm. The digesters are composed of a fixed cover digester with a capacity of 462,000 gallons and a floating cover digester with a capacity of 453,000 gallons.

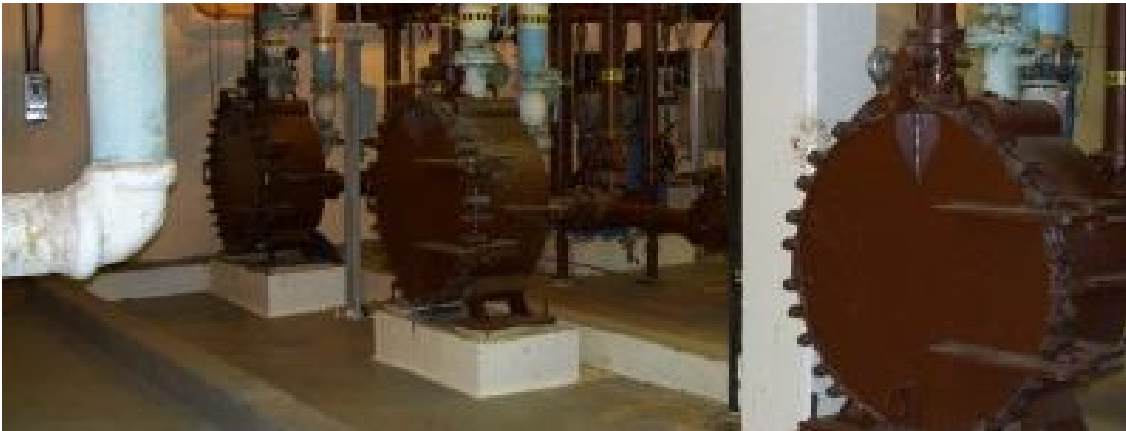


The contents of the digesters are heated by the water from two hot water boilers. The digester boilers have the ability to be fueled by either natural or digester gas (Methane).





The hot water is circulated with primary and secondary hot water pumps to the heat exchangers.



The heat being transferred by the use of spiral heat exchangers from the hot water side to the biosolids side of the heat exchangers thus raising the temperature of the contents (biosolids) in the digesters.





The digester contents are recirculated by the Rotary Lobe pumps through the heat exchangers and back to the digesters. Two Muffin Monster Grinders were added to grind larger solids before passing through the heat exchangers so plugging will not occur in the heat exchangers. The contents are also mixed by the use of digester gas, which is compressed and introduced into the mixing guns.



Excess digester gas (Methane) is burned off using a waste gas burner.

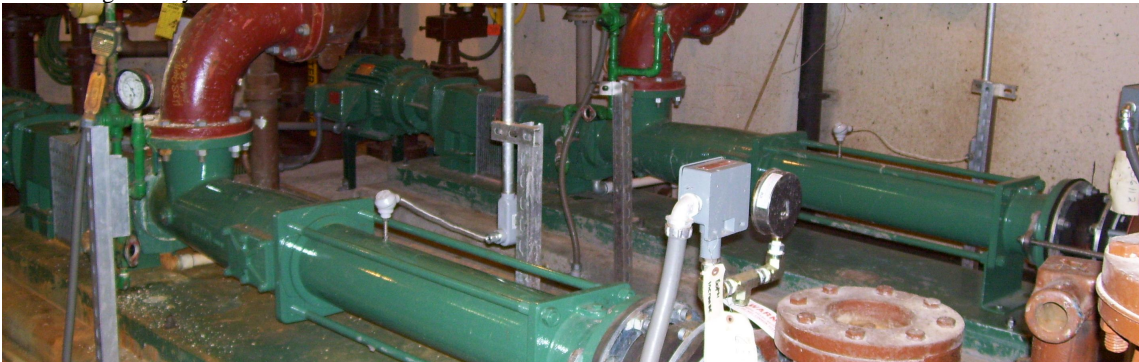


**Lime Stabilization** - The second method employed at the City of Santa Fe for biosolids treatment is Lime Stabilization. Lime stabilization is a simple, batch process, where biosolids are pumped to a holding tank and lime added to raise the pH. The pH is raised to 12.0 and above and must remain 12.0 and above for two hours. In addition, during the cold winter months the pH must not drop lower than 11.5 after another twenty-two hours has passed. Using an existing tank, the city converted a septage-receiving ramp into a holding tank. A wall was built and a pump and mixer were placed into service. Biosolids are pumped into the holding tank over a period of hours, days or months, depending on how much scum is pumped, overall DAF operation and digester feeding requirements, and at a determined level a batch of scum or sludge is stabilized. The city uses a lime slurry because of safety concerns with dry lime and also because of the ease to use a liquid form of lime. Lime is shipped by truck to a portable lime slacking unit, (Porta-Batch) where it is mixed into a slurry and used.





Sludge Storage Tanks - After the biosolids have been treated, the City's Wastewater Treatment Facility has the capability to store its' biosolids before disposing of them, either to the Sludge Injection Field or the Compost Dewatering Facility.



The sludge in the storage tanks is pumped by two positive displacement progressive cavity pumps to the Sludge Injection Field or the Compost Dewatering Facility.



The Sludge Injection Field has three areas that sludge can be injected by two injection units called Terra-gators.





Terra-gators

The storage is a great advantage to the Wastewater Treatment Facility. During the wet and warm winter months where the snow melts and the ground gets saturated making sludge injection difficult or when breakdowns at the Compost Dewatering Facility prevent the biosolids from being dewatered. The city is therefore able to store its' biosolids for later disposal during warmer weather, surface spread during cold winter months when the ground freezes or repairs are completed at the Compost Dewatering Facility.



The #1 sludge storage tank has a storage capacity of 660,000 gallons and is located adjacent to the lime stabilization ramp.



The #2 sludge storage tank is much larger with a capacity of 1,618,000 gallons.