

## SOLIDS HANDLING IMPROVEMENTS AT BEAVER CREEK WWTP

Many older wastewater treatment facilities must undergo extensive facility upgrades due to increasingly strict water quality standards and increasing population and treatment requirements. These upgrades, while costly, result in plants handling much higher flow rates with more efficiency and cost effectiveness.

Processing and disposal of solids generated at facilities is one of the more costly items at treatment plants. The cost to pump, mix, aerate, thicken, dewater, haul and dispose of solids including labor and polymer is substantial. However, a wastewater treatment plant can realize cost-saving through improvements to their solids handling processes.

The Hallsdale-Powell Utility District owns and operates the 9 MGD capacity Beaver Creek Wastewater Treatment Plant in Knoxville, TN. Although liquid handling expansion and improvements were completed in 2011, solids handling improvements were not fully implemented to match the plant's hydraulic capacity.

In 2014, they recruited the help of CTI Engineers to improve their solids handling to match the upgrades they had done to the rest of the plant. Many of the implemented features in the updated solids handling process have resulted in cost-saving efficiencies at the Beaver Creek plant.



*By increasing the volume of sludge in the aerobic digester and adding digester capacity, the detention time for volatile solids destruction increased*

WITH CTI'S RECOMMENDATION, THE FOLLOWING UPGRADES WERE IMPLEMENTED TO IMPROVE SOLIDS HANDLING CAPABILITIES:

1. Adding waste activated sludge (WAS) equalization using existing tankage
2. Adding a mechanical (rotary drum) thickener
3. Adding additional aerobic digester tankage through conversion of existing tanks
4. Changing the digester aeration from surface rotors (brushes) to jet aeration
5. Changing from belt filter press to centrifuges
6. Constructing a new dewatering building with covered sludge cake storage pad and semi-truck load-out bay

When used, sludge thickening increases the solid content and reduces the amount of water in sludge, therefore increasing the effectiveness of digesters and shortening run-times of downstream dewatering processes. Prior to these improvements, the plant was not using any sludge thickening procedures and therefore would waste sludge from the final clarifiers to the aerobic digesters at less than 1% solids.

Due to the relatively short detention time in the digesters, little volatile solids destruction occurred, and the same volume of sludge wasted to the digesters would be sent to the belt filter press for dewatering. The belt press ran most weekdays for up to eight-hours at a time, producing a sludge cake of 14 to 15% solids.

After adding a thickening procedure, the concentration of WAS going to the aerobic digesters increased from less than 1% to 2% solids, reducing the volume of sludge going to the aerobic digester to one third. This, combined with additional digester

tank capacity, substantially increased the amount of detention time for volatile solids destruction.

The reduction in sludge volume going to the digesters and the destruction of additional volatile solids within the digesters greatly reduced the required run-times of the solids dewatering processes.

By changing from a belt filter press to centrifuges, additional benefits were realized since operating the dewatering process five (5) days a week for up to eight (8) hours a day is no longer necessary. The centrifuges do not need to be constantly watched for changing conditions, there is no water spray, and odors are substantially reduced, making for a much cleaner operation overall. In addition, changing the sludge dewatering process from belt filter press to centrifuges results in increased cake solids from 15% to approximately 25 to 27%, reducing the landfill hauling and disposal fees.



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*The covered sludge pad is designed to store sludge for a 60-day period while also providing a storage site for equipment*