Case Study: Alexander City, AL

December 1, 2016

Overview

In early 2014, the U.S. Environmental Protection Agency, Region 4 - Atlanta (EPA R4), and the Alabama Department of Environmental Management (ADEM) assembled a team to conduct an Energy Management Initiative (EMI) for Alabama Water and Wastewater Utilities. In August 2014, Richard Shelby, Superintendent of Wastewater Services for Alexander City, accepted the invitation to be one of the utilities to participate in the EMI.

About Alexander City

Alexander City has a population of approximately 15,000 in Tallapoosa County. Situated in east-central Alabama, it is the home of Lake Martin, one of the largest man-made lakes in the nation. Created by construction of the Lake Martin Dam, Lake Martin is known as a premier residential and tourist destination. Alex City hosts many notable events, such as City Jazz Festivals, fishing tournaments, and the Aqua-Pollooza Boating Festival. Alex City and Lake Martin are known for picturesque beauty of geological formations like Chimney Rock, bald eagle nesting sites. and other unique environmental habitats. Traditionally a hub for the textile industry, Alexander City is now poised for more diversified economic growth and development.

Sugar Creek Wastewater Plant

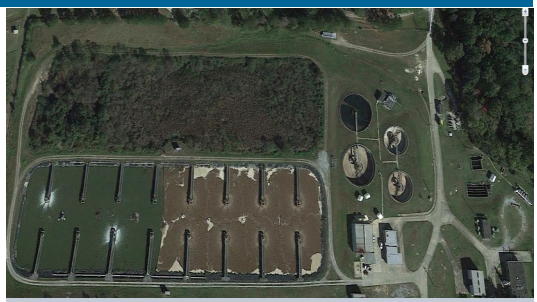
The Sugar Creek Wastewater Treatment Plant (WWTP) treats approximately 1.2 million gallons per day (mgd) of municipal wastewater with an influent $CBOD_5$ of approximately 55 mg/l. The plant uses an extended air activated sludge treatment process and is designed to treat up to 8.5 mgd at average daily flow conditions. The plant has a 14.4 million gallon (MG) aeration basin (only 8.2 MG in service) and four final clarifiers (two 100-ft dia. and two 75-ft dia.). The final effluent is discharged to the Lake Martin, an Outstanding Alabama Waterway. The monthly average summer season NPDES effluent limits for $CBOD_5$, total suspended solids, and ammonia nitrogen are 23, 30, and 1.3 mg/L, respectively. The WWTP consistently produces a high quality effluent with $CBOD_5$ values averaging 1.0 mg/l, TSS values averaging 2 mg/l, and NH3-N averaging less than 0.1 mg/L.

Optimizing Energy Savings

A plant energy savings initiative was implemented in late 2015. The plant has eight 50-hp low speed surface aerators in the operating aeration basin and two in the idle section of the aeration basin. The aeration basin also has two 25-hp mixers. All aerators and mixers were operated 24 hrs per day. The team identified that the aeration system could be optimized by employing reduced aeration in addition to implementing a denitrification process. Improved aeration efficiency was achieved by installing relay switches to inactivate half of the aerators, consecutively shutting off four aerators every two hours. This control system change was made with little capital outlay yet reduced annual plant kWh usage by 25 percent, reducing the electric bill by 29%.

Not Just Saving Energy!

Alexander City has realized savings in energy cost by changing its plant operation to optimize aerator efficiency, thus incurring significantly lower power (kWh) usage.

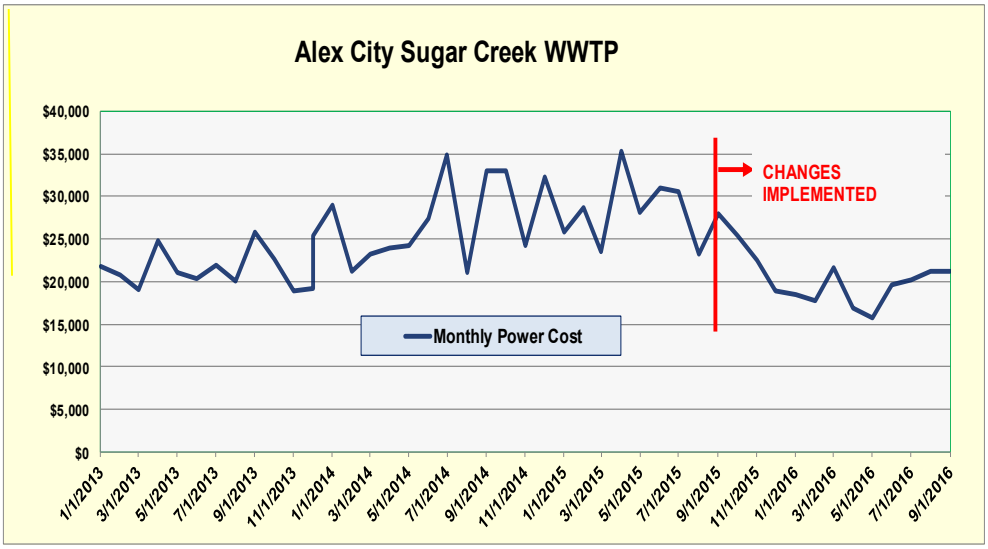


Alex City Sugar Creek WWTP

Close operator oversight was necessary to implement this energy savings initiative, and Alexander City's operators do an excellent job keeping the plant running at peak efficiency. The change in operating scheme has produced a reduction in kWh used per Million Gallons (kWh/MG) treated of 21%, and a reduction in the amount of green house gas generation by 790 tons/yr. Plant management continues to seek additional ways to implement energy savings by addressing plant lighting and it also plans to further improve plant electrical efficiency by implementing denitrification (anoxic) operation to save additional energy and costs and reduce the discharge of nitrogen.

Results Summary (achieved at nearly no implementation cost):

♦ Plant Total kWh Savings:	76,500 kWh/Mo. (25%)
♦ Annual Rate of Cost Savings:	$94,000 (29%)
♦ Cumulative CO2 Reduction:	790 Tons/year
♦ Average kWh/MG Treated:	21% Reduction



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