GARFIELD CLEAN ENERGY Challenge!

Case Study: Rifle Wastewater Treatment Plant

By Cameron M. Burns

Rifle wastewater plant staff puts priority on energy saving with positive results

The Rifle wastewater treatment plant, the biggest energy user in the City, is now seeing energy savings of as much as 20 percent after staff members there adjusted how the plant operates.

"The biggest goal," said plant operator Devin Jameson, "is to meet state water quality standards. After that, we come in and make a few adjustments and try to save some energy."

Wastewater treatment facilities are notoriously big energy users. According to a 2003 PG&E study, energy accounts for 25 to 40 percent of operating costs for such facilities, second only to labor.

The effort to save energy at the Rifle plant treatment began in early 2013, and so far it's yielding impressive results.

According to the plant's data on Energy Navigator, electricity use dropped by roughly 107,000 kilowatt-hours for the June through November period in 2013 compared with the same months in 2012. The facility has a Siemens control and monitoring system, as well as CLEER's Energy Navigator, which together help operators keep track of when, where, and how energy is being used.

Devin Jameson of the Rifle wastewater treatment plant explains changes in the operation of the plant's clarifiers. Photos by Cameron M. Burns

Lessons Learned

- Sometimes the most effective energy fixes are extremely simple
- Monitoring energy consumption is valuable for finding alternative ways to operate a facility

According to Jameson, the biggest energy using equipment in the plant are the oxidation ditches and the clarifiers, both of which include huge tanks and equipment that pushes wastewater around while maintaining oxygen levels that keep bacteria alive. Bacteria eat biological and chemical waste in the water.

Oxidation ditches

After the water is cleaned of large objects inside the plant, it's piped outside to three large oxidation ditches, where four sets of 50-horsepower electric paddle-wheels push the water around, keeping oxygen levels up.

In the past, all four sets of paddles were running at full speed to keep the dissolved oxygen (DO) levels at 2.5 milligrams per liter. This year, plant

Left: (Most of) the crew in Rifle: Trish Manuppella, David Gallegos, Pat Lake, and Devin Jameson. Right. Jameson explores the plant's control system.

operators began experimenting with control methods, debugging software, and trying new ways of operating the plant.

They set the oxygen level to 2 milligrams per liter—there is no state requirement for DO, but Rifle's operators have found this particular plant can have problems below 2.0—and found that just two or three sets of paddles could achieve the required level of oxygen. Also, the paddles can now spin slower, sometimes at just 50 percent of full speed. The automatic control system slows down or stops the sets of paddle whenever possible, especially on cool days and at night.

Clarifying tanks

The clarifying tanks—large, round open pond-like tanks—are where additional material in the water settles out both to the bottom and the top (as it floats up). Each clarifier has several pumps and a large rotating skimmer on the surface.

In the past, all of the three clarifiers were used 24 hours a day, seven days a week.

In June 2013, Rifle's operators closed one tank for cleaning, and found two tanks could easily handle the volume of wastewater. Through experimentation and monitoring, operators subsequently learned that one clarifier could handle the entire volume of wastewater on its own. Now, they use only one clarifier and switch to a second clarifier when the first needs cleaning.

"We stopped using two of the three clarifiers completely and now only one is running," Jameson said. The third clarifier sits idle at present, partly filled with frozen water. Jameson suggested recently it might make for decent ice skating.

Interchange tanks

Interchange tanks are used to bubble air through the water as part of the treatment process. Large electric blowers push the air through the tanks.

In the past, the blowers would run for an hour at a time, several times per day, and at night, after the plant's solar panels stopped producing power. This prompted expensive "peak demand charges" from the electricity utility. Most utilities charge more if a user has big spikes in electric demand.

According to Jameson, the Rifle plant operates 100 percent on solar energy, courtesy of two huge arrays that during summer actually generate as much as 300 percent of the plant's needs. According to the plant's bills, there was a 44-kilowatt reduction in peak demand during June, July, and August of 2013 compared to June, July, and August of 2012.

Rifle's operators began to experiment with interchange tank operation and blower timing and discovered new ways to operate the interchange tanks—namely, they're run in half hour increments and whenever possible, blowers are operated when the sun is up. This reduces the plant's consumption of non-renewable energy and avoids expensive peak demand charges.

Avoiding peak demand charges typically saves a facility like Rifle's several hundred dollars a month.

"When you look at the energy use before and after we made adjustments, there's a lot of energy that can be saved," Jameson said.

The energy trimming efforts by Jameson and his fellow operators—Pat Lake, David Gallegos, Trish Manuppella, and Roger Schouten—haven't gone unnoticed. *Treatment Plant Operator* magazine ran an article ("Greening the Plant") on their efforts, and in October they won Garfield Clean Energy's Innovation Award for Active Energy Management/Facility Manager.

You could say saving energy is job number two at the Rifle wastewater treatment plant. Job number one is, of course, treating the water to meet state standards.

"Different plants operate in different ways and it is all a matter of minor adjustments followed by rigorous sampling," Jameson said.

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