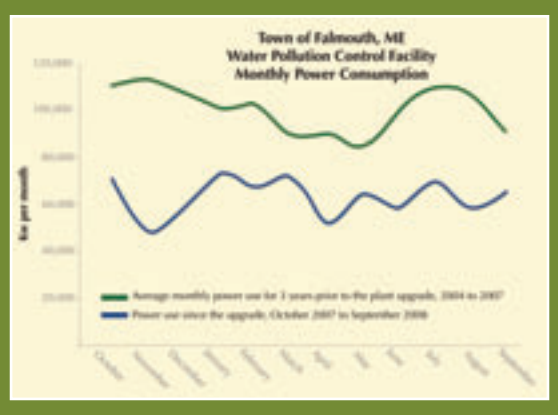
NAME:
Falmouth Water Pollution Control Facility

LOCATION:
Falmouth, Maine

PLANT SIZE:
1.56 million gal per day

INFRASTRUCTURE:
New influent screening systems, biological aeration tanks, aeration system, secondary clarifiers, return and waste-activated sludge pumping system, chlorine contact tanks and chemical facilities, sludge storage tank and electrical distribution system and emergency generator.

A site-specific construction plan allowed a retrofit of the facility's existing infrastructure, while maintaining treatment to meet discharge permitting standards.



This graph shows the power consumption, measured by kilowatts per month, of the facility prior to the upgrade (green line) and after the upgrade (blue line).

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By Clare Pierson

What's Old is New Again

A team effort leads to an innovative retrofit and surprising energy savings

The Falmouth water pollution control facility in Maine serves approximately 8,600 people in the towns of Falmouth and Cumberland. Because the facility discharges into the Casco Bay, a large watershed that is designated an "Estuary of National Significance" by the U.S. Environmental Protection Agency, Falmouth staff is always mindful of the state's Department of Environmental Protection (DEP) regulations and how to better meet them.

Around 2003, Falmouth staff decided that an upgrade to their facility was imperative.

"There wasn't any single factor that prompted the upgrade. The plant dates to 1970 and the service area had grown considerably since that time," said Pete Clark, superintendent of the Falmouth facility. "Managing peak seasonal flow was sometimes a challenge, and the overall age of the facility and equipment were factors. The town continues to grow, regulatory requirements have increasingly required better treatment levels and a modernization to address hydraulic and treatment capacity into the future was well justified."

Combining New & Old

The existing infrastructure in place before the upgrade consisted of two package treatment units—each containing an aeration tank, secondary clarifier and sludge storage.

Because the facility is surrounded on three sides by coastal wetlands, project leaders had to get creative with the little amount of space with which they were working. The package treatment units were turned into secondary clarifiers. An existing small chlorine contact tank was converted into a sludge pump and disinfection station, and a new, larger chlorine tank was built.

The plan also called for a biological selector to be added into the activated sludge process, which has since reduced both biological oxygen demand (BOD5) and total suspended solids to around 5 mg/L.

A "site-specific construction sequencing plan" had to be developed in order to convert the existing infrastructure into something new, while still operating and maintaining the same levels of water treatment throughout the construction period.

The main problem-causing nutrient for the facility was nitrogen. At the time, there were no regulations in place for nitrogen, but key players in the upgrade set a goal of decreasing nitrogen levels to 8 mg/L and phosphorus levels to 1 mg/L.

An anaerobic-anoxic-oxic (A2O) process was chosen for the new nutrient removal process. According to Paul Birkel, senior vice president for Wright-Pierce, the process "produced exceptional settling characteristics in the activated sludge and thus, high-quality effluent; reduced effluent total nitrogen (TN) to 8 mg/L, consistent with our expectations for what a TN limit might be in a future discharge permit from the state of Maine; reduced phosphorus to 1 mg/L or less in the effluent; and [gave] the ability to achieve treatment in a non-aerated zone, thereby reducing energy consumption."

Energy Savings & More Success

Not only has the new equipment and process, which went online in March 2008, reduced pollutant levels in discharge by 40%, the facility has seen 40% less energy consumption since the upgrade as well.

"Many processes in the facility were using antiquated and less electrically efficient equipment," Birkel said. "Our retrofit replaced this equipment with higher-efficiency equipment, incorporated efficient motors and the use of variable speed drives and employed the use of automation to better match treatment needs and efficient energy consumption. Many of the buildings on site [received] new building insulation and HVAC systems."

Another factor in the energy decrease was the new A2O process, which removes a portion of the BOD5 without the use of supplemental oxygen—significantly reducing the amount of power required to meet the wastewater's oxygen demand.

Other notable achievements from this project include the fact that the two-year, $8.14-million project came slightly under budget due to "well-conceived design which paid particular attention to constructability and construction sequencing and a team approach where everyone stayed on schedule," Birkel said.

Since the upgrade, the Maine DEP has begun to try and establish nutrient removal criteria for Casco Bay; the Falmouth facility was prepared for this and is now equipped for it.

"We are very satisfied, not only with the final results, but also with the great people that contributed to the project," Clark said. WWD

Clare Pierson is managing editor of *Water & Wastes Digest*. Pierson can be reached at 847.391.1012 or by e-mail at cpierson@sgcmail.com.

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