Onondaga County Water Authority Completes Improvements to Otisco Lake Water Treatment Plant

Photo by Bob Reece

Improvements have recently been completed at the Otisco Lake Water Treatment Plant under the administration of the Onondaga County Water Authority (OCWA). Located in Marcellus, New York, the plant treats up to 20 million gallons of water per day for delivery to OCWA customers throughout Onondaga County.

OCWA serves over 340,000 people through 90,000+ connections in Central New York. The Otisco Lake plant provides approximately one half of the water for those customers.

The treatment plant was originally constructed in 1985, and has produced high quality drinking water over the past 25 years. However, the rules and regulations developed by the United States Environmental Protection Agency (USEPA) and the New York State Department of Health (NYSDOH) regarding the operation of water treatment plants and the quality of the water produced have become more stringent. To comply with these regulations, as well as to be prepared for new regulations coming in the next few years, OCWA undertook this improvement project.

In addition to complying with new regulations, other goals of the improvement project were to enhance safety and security; replace aging equipment; enhance the quality of the water produced; provide for a more consistent flow of water from the facility and increase the energy efficiency of the water system operations.

Before endeavoring on the improvement project, OCWA worked with C&S Engineers and Hazen & Sawyer to conduct an evaluation and pilot study. This led to recommendations for various improvements to meet OCWA's goals.

One such recommendation was to use chlorine dioxide for zebra mussel control and pre-treatment at the Otisco Lake intake facility as a replacement for the chlorine gas system that was originally installed.
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Chlorine dioxide effectively provides the required oxidation of the water, but is safer than chlorine gas. The change to the chlorine dioxide system creates a safer environment for the employees and the public.

Additionally, chlorine gas has been replaced by liquid chlorine at the water treatment plant. The liquid chlorine provides the necessary

disinfection, but is also safer than chlorine gas.

Another recommendation that resulted from the evaluation and pilot study was rehabilitation of the filters that removes natural particulate matter from the water. Water treated at the plant flows through these filters, which contain layers of different types of media (granular activated carbon, filter sand). The rehabilitation recommendation included rebuilding the existing filters and replacing the media held within them. Construction of two new filters was also recommended. The rehabilitation and new filters would allow the facility to provide a consistent flow of high quality water.

For the actual design of the recommended improvements, OCWA selected another local firm, Stearns & Wheler GHD. The engineering firm worked with OCWA's senior engineers and water treatment plant staff to finalize the design of the plant's improvements.

Original estimates, developed during the evaluation and pilot study, were set at $18 million. Through a concerted project effort, OCWA was able to complete the project for under $15 million.

Stearns & Wheler GHD and OCWA developed an approach of using internal OCWA staff to provide valuable engineering and construction services. OCWA personnel completed Supervisory Control and Data Acquisition (SCADA) system programming, completed repairs, replacement and installation of buried water lines and valves and provided additional construction administration and operational assistance throughout the construction phase.

Bidding was well timed, allowing OCWA to get a favorable pricing from contractors on the construction of the plant improvements. The New York State Environmental Facilities Corporation (NYSEFC), which provides financing for water treatment projects like this one, provided OCWA with reduced financing costs and a 1/3 interest rate subsidy.

Because of all these savings, OCWA was also able to include several improvements that were needed but not included in the original scope of the project. This will provide future savings for OCWA because they were able to include additional work at the plant in this one large project.

Further savings in the future will result from many upgrades that were included with consideration to improving energy efficiency and sustainability at the plant.

An initiative that OCWA has undertaken has been termed the "Green Team." The "Green Team" is OCWA's commitment to sustainability through organizational and behavioral changes to protect and preserve the environment, and reduce demand on natural resources in a sustainable and measurable way. Among the ideals of the OCWA Green Team that was incorporated into the project was the development of an energy model by Stearns & Wheler GHD.

The energy model led to additional recommendations that were included in the project. Annual energy reductions in cooling costs are expected from the new white-reflective roof which will prevent the "heat island" effect that comes with dark colored roofs. Windows were replaced, and roof and wall insulation was increased to provide greater heating and cooling efficiency. The windows in the new filter area provide for passive gain and natural lighting, limiting the need for lighting during the day.

Replacement of the plant's boilers with high efficiency, low mass boilers that are better matched for the heating demands of the plant are expected to result in energy savings also. As is the installation of variable speed drives on plant water system pumps, which will improve operating efficiency of the system.

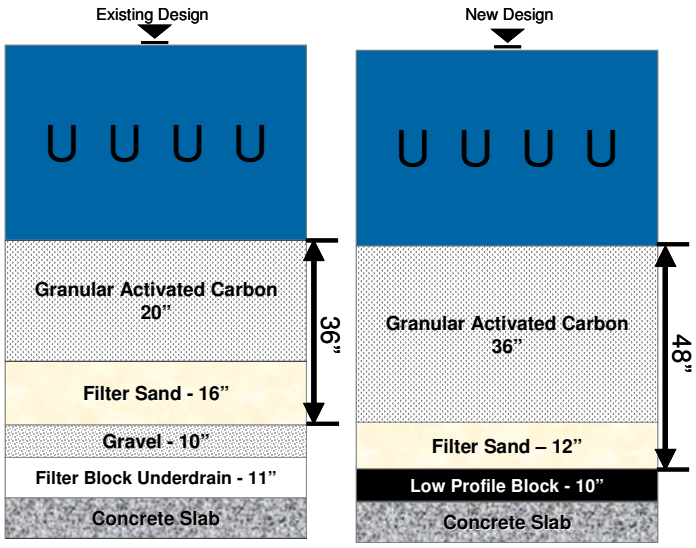
OCWA received rebates from the New York State Energy Research and Development Authority (NYSERDA) to replace all lighting in the treatment plant with new energy efficient fixtures, including replacing exit signs with low power LED lights. Occupancy sensors were installed in low traffic areas.

A new, larger and more efficient generator was installed. The generator, which is more energy efficient than the one replaced, will provide power to equipment during power outages, ensuring a reliable source of power for keeping the water flowing to OCWA's customers.

Enhancements in the water filtering process will allow the filters to operate at a consistent year round peak flow rate, in lieu of having to operate on reduced flow during periods of high turbidity and algae growth in the lake, as was the case prior to the upgrade. This allows OCWA to maximize the use of the Otisco Lake facility, which conveys water into the system via gravity verses Lake Ontario water that is required to be pumped into the system, thereby saving substantial energy.

The project was constructed by C.O. Falter Construction Company of Syracuse, with Patricia Electric as the electrical contractor and Edward Joy as the HVAC contractor. SCADATEK, Inc. provided services related to instrumentation and Supervisory and Control Data Acquisition system improvements.

The project was successfully completed in the spring of 2010. The upgrades to the plant will allow OCWA to maximize its production from Otisco Lake while maintaining complete regulatory compliance, superior water quality, and operating in an energy efficient manner.



New Filter Design

The major work completed during the project included:

- Elimination of gas chlorine and replacement with liquid chlorine (sodium hypochlorite) systems at both the Otisco Lake intake facility and the treatment plant itself
- Construction of two additional filters at the treatment plant
- Rehabilitation of the four existing filters at the treatment plant to improve water quality and filter performance
- Installation of a chlorine dioxide system for zebra mussel control and pre-treatment at the Otisco Lake intake facility
- Installation of a carbon dioxide system for pH control to assist with coagulation and sedimentation processes at the treatment plant
- Addition of air scour systems to all filters to provide more effective backwashing of the filter media
- New white-reflective roof on the water treatment plant building
- New high efficiency boilers at the treatment plant
- New more efficient, larger generator at the treatment plant
- Replacement of windows, addition of roof and wall insulation
- Improvements to the polymer feed system at the treatment plant
- Replacement of lagoon recycle pumps and controls
- Replacement of the pipe gallery dehumidifier with one that utilizes the thermal energy in the plant water itself replacing the original all electric unit
- Replacement of the original analog instrumentation and control system with a PLC-PC based Supervisory Control and Data Acquisition system
- Rehabilitation of the facility control and operators area
- Repairs to the transmission main between the intake facility and the treatment plant: pipe joint repairs, protection of a section of main from creek bank erosion, valve replacements on the transmission main, air valve repairs and replacements, creek crossing, and access to the right-of-way improvements and clearing of the right-of-way

High Efficiency Boilers

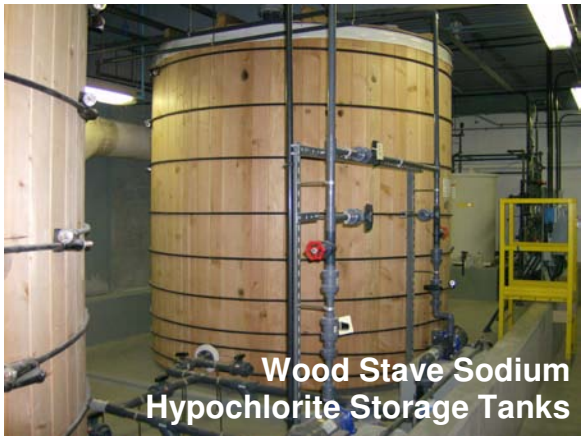
Energy Efficient Dehumidifiers

New Filters

Excavation Work for New Filters

New Filter Drain Line installed and Functional in Under 8 Hours!

Construction in Progress



Wood Stave Sodium Hypochlorite Storage Tanks

New Carbon Dioxide System

New Backup Generator

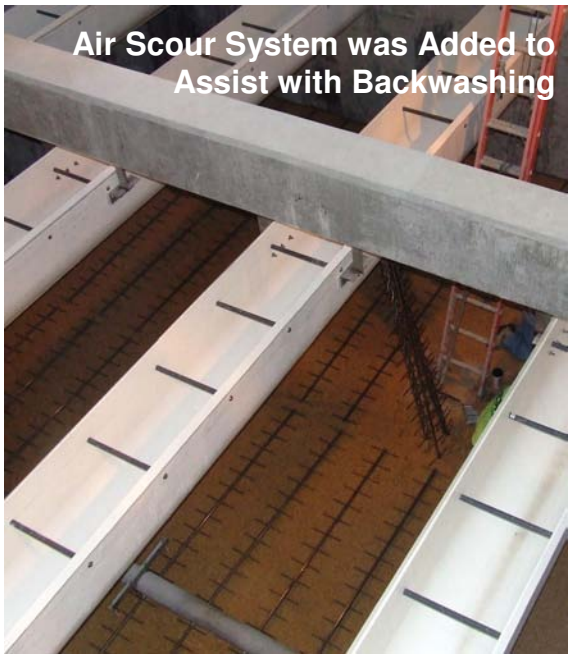
Pipe and Valves for New Filters

Digital Control System Replaces Old Analog Operations System

New Reflective White Roof

AWARD RECOGNITION

The Central New York Branch of the American Public Works Association has recognized the project as an award-winning example of public works excellence. The project received a Project of the Year Award in the Environmental – Drinking Water Category. It was also recognized in the category of Technical and Management Innovation in the design and implementation of the improvements.



Air Scour System was Added to Assist with Backwashing

OCWA

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