City of St. Cloud Reduces Energy Costs

Solids CONTACT CLARIFIER™ Consolidates Processes

CASE STUDY

Location: **St. Cloud, Minnesota**
Owner: **City of St. Cloud**
Engineer: **AE2S**
Contractor: **Magney Construction**

Problem

The City of St. Cloud, Minnesota, takes pride in the quality, clarity, taste, and even the softness of the clean water it provides to its 67,056 residents. Located in, and partially beneath, picturesque Hester Park – which offers grass fields, play areas, miles of walking trails, and eye-catching stonework from the Works Projects Administration era – the St. Cloud Water Treatment Facility pretreats, clarifies, softens, filters, and disinfects the drinking water the City's citizens enjoy. The City draws its drinking water from the Mississippi River, which is adjacent to its water treatment plant (WTP).

The St. Cloud Water Treatment Facility has been located in the park since the 1930s. With its 1994 expansion, the facility achieved a capacity of 16 million gallons per day (MGD) of water. Two decades later, the facility's staff found itself implementing creative solutions to maintain the capacity, efficiency, and dependability of the plant's now-aging infrastructure. This effort included installing equipment in a third water treatment train, which was built in the 1994 expansion but not equipped at the time because the additional capacity was not then needed. (The third train was built during the expansion to avoid further disturbance to the park.) Each of the City's three treatment trains differs from the others.

Aging equipment, however, was only one of the issues the plant was facing. While the facility does not simultaneously use all three of its treatment trains under regular conditions, it does run pumps, motors, and other equipment around the clock, 365 days a year. This requires a significant amount of energy, which impacts operation costs. The City was coming under increasing pressure to avoid passing rising power expenditures on to taxpayers.

The St. Cloud Water Treatment Facility's Main Entrance

The constrained area within the facility was also a challenge, as was the water source. Two-thirds of the plant lies beneath the park's grassy hills and play areas, so new equipment must come through the one-third of the plant that is visible to park visitors. As for challenges related to the water source: Waters from the Mississippi can have high contaminant levels and high turbidity during runoff events. In addition, the waters have different characteristics depending on the temperature and time of year.

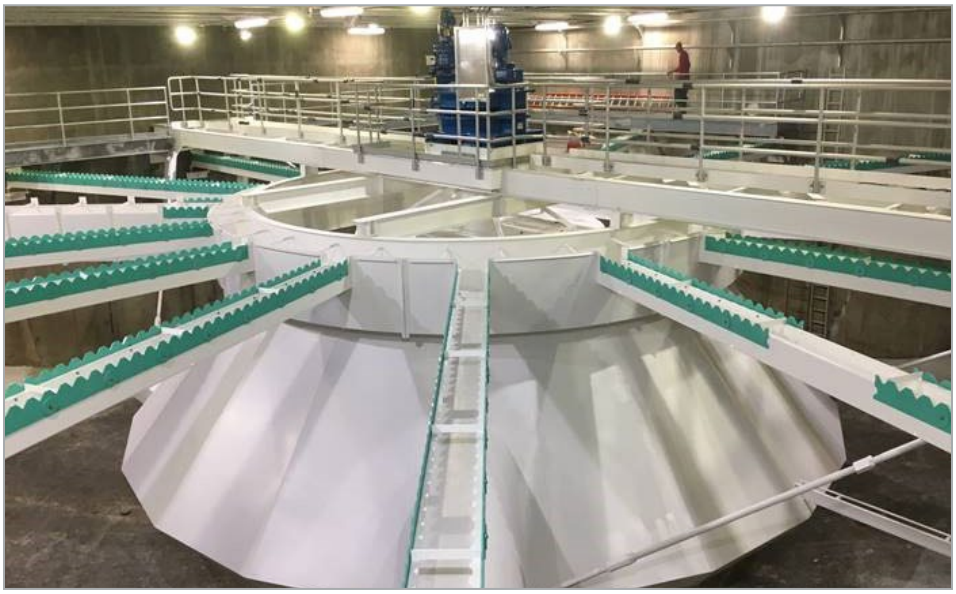
Changing Influent Characteristics

WesTech®

Swire Water

Analysis of Alternatives

After analyzing its alternatives, the facility determined that it could potentially reduce its energy costs by replacing the flocculation and sedimentation processes in the treatment train with a clarifier that combined these processes in a single step. The City then issued a request for proposal (RFP) for the clarifier.



Solids CONTACT CLARIFIER Under Construction

Recommended Solution

The facility chose the WesTech Solids CONTACT CLARIFIER™ to reduce its two-step process for clarification and softening to a one-step process.

The Solids CONTACT CLARIFIER acts as an enhanced flocculation device and a high-rate chemical precipitator. It combines mixing, internal solids recirculation, gentle flocculation, and gravity sedimentation in a single unit. With conventional systems, solids pass through the flocculation and sedimentation processes only once before settled solids are removed and sent to dewatering. By continuously recirculating previously settled solids, the Solids CONTACT CLARIFIER reduces the chemical input necessary for precipitating solids.

Implementation

The Solids CONTACT CLARIFIER uses less space than conventional flocculation and sedimentation trains, so the facility's staff was able to adapt the former tank's square space to accommodate the Solids CONTACT CLARIFIER's 75-foot-diameter round equipment. However, installing the new clarifier in the adapted space presented challenges. The available space was limited, and it was essentially underground. As previously mentioned, it was also important not to disturb the popular park that rests atop the facility. Overcoming these challenges involved designing the equipment in such a way that the implementation team could bring it into the facility via two separate 8-foot X 8-foot doors. "We had to carefully plan our equipment design before we even began fabricating," explains WesTech Applications Engineer Brett Boissevain.

Furthermore, the doors were located near the facility's ceiling, so the implementation team had to lower the equipment into the space it would occupy via a spider crane. Because the space was tight, maneuvering the equipment proved to be difficult.

The final step in the implementation process was to train the plant's staff. "We use a conventional clarifier in other parts of the plant," notes Adam Bourassa, Water Services Manager for the City of St. Cloud. The plant's staff had no experience in operating a Solids CONTACT CLARIFIER and made frequent calls to WesTech to confirm that the equipment was running properly.

The WesTech team responded promptly to these calls. "The [WesTech] staff for site visits and technical support has been spectacular," Bourassa remarks, adding that WesTech has "the best equipment reps we dealt with for our project."

Results

In addition to improving the plant's energy and operational efficiency, the City of St. Cloud wanted its new solution to help reduce the hardness of the influent by reducing the calcium carbonate ($CaC0_3$) therein from 188 mg/L to an average of less than 110 mg/L. It also wanted to reduce the plant's effluent turbidity to 5 NTU or less. The Solids CONTACT CLARIFIER met all of these goals.

Solids CONTACT CLARIFIER in Production

"The clarifier does surpass our treatment goals, and we know it will improve as we get more experience operating it," Bourassa confirms.

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