

Spring Creek Plant Finds Operational Efficiency with SCADA and the YSI IQ SensorNet System



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YSI IQ SensorNet Wastewater Monitoring & Control Application Note A624

The Springfield (Illinois) Metro Sanitary District was formed in 1924 to address the challenges of a growing community where raw sewage flowed into streams and ditches, threatening the drinking water supply and creating unpleasant conditions.

The district's first action was to build the Spring Creek Wastewater Treatment Plant, which came online in 1928 to serve Springfield and surrounding towns. As the population grew and the Spring Creek plant reached capacity, the district commissioned the Sugar Creek Wastewater Treatment Plant in 1973.

The two plants now serve more than 150,000 people, and the district has invested heavily in upgrades to bring both facilities up to current standards and technology. The upgrades include technology that automates sampling and analysis, and enables the treatment system process to respond quickly and automatically to changing conditions.

Times Have Changed

The Spring Creek plant was built as a conventional activated sludge (CAS) facility. In 2012, it was converted to a vertical-loop reactor (VLR), essentially an oxidation ditch turned on its side. The process consists of a series of VLR reactors operated in aerobic, anoxic and anaerobic conditions to facilitate and optimize the removal of organics and nutrients.

At the original facility, plant operators and support staff manually pulled samples for laboratory analysis from the various treatment stages numerous times a day to confirm that the plant was performing in accordance with its permit. The lab measurements also enabled operators to monitor process efficiency and make needed adjustments. The process

was effective but labor-intensive and based on methods developed decades ago when treatment requirements were less stringent.



Aerial view of Spring Creek Wastewater Treatment Plant
PHOTO: Courtesy of Terry Farmer Photography



Employees reviewing data on the YSI 2020 XT Controller

In the early 2000s, the district began planning the upgrade and renovation of the Spring Creek plant to address increased demand and meet new regulatory guidelines for phosphorus and nitrogen. Along the way, the staff looked at new automated technology that could accurately measure dissolved oxygen (DO), oxidation-reduction potential (ORP) and pH, and would easily integrate with the new plant's SCADA system.

To SCADA and Beyond

Ultimately, the team selected the IQ SensorNet (IQSN) monitoring and control system from YSI, a Xylem brand. This modular, plug-and-play system has an innovative network configuration that facilitates simple extension. It provides real-time, continuous monitoring anywhere in the process for up to 20 wastewater parameters.

Today, the system continuously monitors DO, pH and ORP at various process stages to maintain optimum conditions for nitrification, denitrification and biological phosphorus removal. The sensors are connected into the monitoring system through an IQSN 2020 XT controller which can monitor up to 20 parameters per network, reducing hardware requirements.

The Spring Creek team found the most value in the system's ability to communicate with the SCADA system over Profibus. It was important to monitor the parameters necessary to meet the new permit limits, but tying the data back into the SCADA for ultimate control brought the renovated plant to a new level of efficiency and effectiveness.

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Monitoring and Control

For Brian Tucker, SMSD operations supervisor, the automation and efficiency that the YSI IQSN provided, and the ease with which it is installed and implemented, meant a level of monitoring and control that wasn't possible earlier in his career. "The IQSN system provides a whole new world of treatment capabilities compared to the traditional manual process," says Tucker. "And that's just for monitoring."

"In the past, the control component would typically be based on trend data instead of actual, real-time measurements. That requires a fair amount of educated guesses as to what was actually happening in the basins and throughout the plant. The IQSN changes all that." Tucker and his team can now set the required parameter levels at the various locations throughout the facility. Tying that data back into SCADA, the system can turn mixing equipment on or off, open and close control valves, and increase or decrease return rates on the fly, responding in real time to what is happening in the process.

Being able to fine-tune the entire process, from influent through the final discharge into Spring Creek, means significant cost savings, mostly in energy reduction.

Blowers and motors run only when needed, at specific levels and speeds. Mixing equipment can mostly shut down overnight, when nutrient levels are down and flows are lowest. As the sensors monitor DO at the cascade post-aeration basin, the SCADA system can increase or decrease blower power. Optimized use of the blowers further enhances efficiency.

Around the Clock Control

The IQ SensorNet system monitors the plant and controls the process with precision around the clock, every day of the year. During daytime hours, the system allows Tucker and his staff to address other duties in and around the plant, saving them significant costs that were previously tied up in manual sampling and analysis. "For a plant of our size (32 mgd), it would take two to three full-time staff members to perform a regimen of sampling and analysis to maintain compliance," says Tucker. "It's a comprehensive process that is very labor-intensive."

The system enables Tucker to maintain a skeleton crew on the second shift and unattended during the third shift. The system has built-in alarms that notify staff to any condition that falls outside the set parameters. Team members have remote access to system dashboards via smartphone, tablet or PC. "This system is a big part of my second shift and is really my third shift, the night watchman of today," says Tucker.

Tucker is in the early stages of the renovations at Sugar Creek. This 17.5 mgd plant will get a \$54.4 million upgrade that includes an IQ SensorNet monitoring and control system, tied into SCADA. In the end, both Springfield plants will have up-to-date technology to carry them well into the 21st century.

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