

How One Wastewater Treatment Plant Saved Time and Money Measuring Turbidity and TSS



a xylem brand

YSI IQ SensorNet

Application Note A595

The wastewater treatment plant of a major corporation is designed for a population capacity of 6 million people and is considered a very large wastewater treatment plant. More than 120 million cubic meters (4.2 billion cubic feet) of wastewater are processed, cleaned and discharged per year.

The plant predominantly treats production wastewater from the large corporation, plus municipal wastewater from the three connected cities with an approximate population of 225,000. Due to its origin and constituents, the wastewater influent is a more difficult mixture to clean than a municipal only plant. This means the effluent limit requirements that have to be met are especially high both for plant operation and subsequently for the choice of instrumentation used to help monitor and control the process.

The facility requirements for turbidity measurements under the given conditions were stringent in order to ensure compliance and improve process efficiency.

Measuring task:

Continuous monitoring of the turbidity levels is the key indicator to determine optimum process operation. Alarm functions are critical to identify the presence of hydraulic overload and for early detection of unstable biological changes in the form of disintegration. An accurate and reliable system to monitor process stability is critical for the proper operational efficiency of this process.

Measuring location:

The selected location is the final plant effluent, after final sedimentation and mechanical sludge removal. The sensors are installed in a clearwell 19.6 feet (6 meters) deep.

Challenges:

Due to the special composition of the wastewater, a



The IQ SensorNet 2020 XT terminal mounted tank side provides continuous process monitoring and control.

biological community is prolific, which leads to the quicker development of a microbial film on otherwise smooth surfaces. This build-up, or biofouling, has a negative effect on the optical measurement windows of the ViSolid® and VisoTurb® sensors employed to monitor the process.

The lime content of the sampling location at the wastewater treatment plant provides additional measurement challenges. Along with the biofouling, coatings develop that cannot permanently be removed by mechanical wiping systems. This creates extensive maintenance work as well as inaccurate data. In practice, this means that the personnel must perform maintenance work almost

every day.

Solution:

Traditional wiping systems proved to be unreliable and caused too much maintenance. An alternative procedure to keep the sensor clean had to be found, ideally without any external mechanical parts.

The YSI turbidity (VisoTurb®) and total suspended solids (ViSolid®) sensors with an integrated ultrasonic cleaning function were tested. The integrated ultrasound source creates high frequency oscillations that significantly reduce or totally prevent the build-up on the optical windows.

- continued-



The ultrasonic cleaning capabilities of the ViSolid® and VisoTurb® prevents fouling of the optical sensors. They are installed here in a clearwell to monitor the plants effluent.

Application Note A595

Result:

For this difficult application, sensors with ultrasound cleaning systems proved to perform successfully in eliminating biofouling build up.

In direct comparison to sensors with mechanical wiping systems that often had to be cleaned daily (and systems with no cleaning), the VisoTurb® sensor (with turbidity measurement according to DIN) could measure reliably and accurately for more than four weeks. After this time, manual sensor cleaning is required due to the high fouling nature of the system.

In this special application, the ViSolid® total suspended solids sensor (measures turbidity in a more acute angle than prescribed by DIN) could measure reliably and without additional manual cleaning for longer than a six week period.

Conclusion:

Both YSI sensors, along with the continuous monitoring terminal IQ SensorNet 2020 XT, are very well suited for wastewater treatment applications. The ultrasonic cleaning feature was a significant advantage, greatly reducing the maintenance requirements which save time and money. The DIN requirement for turbidity was not necessary at this location so the existing turbidity sensors were replaced by ViSolid® sensors, which proved to be the most resistant to extreme biofouling.

Maintenance, and the associated costs, with this unique application was considerably reduced. The accuracy and reliability of the data was significantly improved.

For information including YSI instrument specifications, visit: www.ysi.com or www.ysi.com/IQSN2020.

Tel. +1 937.767.7241
US 800.897.4151
environmental@ysi.com



Optical sensors for turbidity and suspended solids measurement are ideal for wastewater applications. The VisoTurb® turbidity sensor is shown here after a 30 day continuous deployment. The top image shows the sensor with ultrasonic cleaning and the bottom image was in the same setting without the cleaning system activated.