



PROCESS INSTRUMENTATION

City of Decatur Implements Siemens

SITRANS store IQ for Operational Transparency

Digitalization Application Case Study

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Customer Operational Challenges

The City of Decatur Wastewater Treatment plant includes a polishing pond and effluent discharge basin both of which can be overcome with algae growth depending on weather and environmental conditions throughout the year. At times, the algae overgrowth would plug areas of these systems and restrict or block the flow from the polishing pond and effluent basin, which sit approximately 300 yards from each other. The 12 inch diameter line from the polishing pond to the effluent basin is buried and not easily accessible. This and the effluent basin's discharge V-Notch Weir are both subject to this plugging. The line also includes a shut off valve, which is another point of clogging that may cause the polishing pond to back-up and potentially overflow. This valve is also used for testing and to ensure proper zero level during annual inspection and calibration of instrumentation per TCEQ (Texas Commission on Environmental Quality) requirements.



Figure 1. Pump truck clearing the discharge line from the Polishing Pond to the Effluent Discharge Basin



Figure 2. Effluent Discharge Basin and inlet underground valve handle located in line from the Polishing Pond

City of Decatur was already using a HydroRanger 200 with Echomax transducer to monitor the effluent flow from the Wastewater Treatment plant and record the Effluent Basin level. The HydroRanger data was recorded so the staff would be aware of any changes that could indicate the potential of a blockage or loss of flow. It's also worth noting that the HydroRanger 200 was not connected to any SCADA and as such required a physical visit to manually read the totalizer and other process information from this instrument. These values were read daily for reporting purposes.

If the effluent flow head measured by the HydroRanger 200 dropped below 5 inches, the staff would typically review the system for the potential of algae blockage in the line from the polishing basin to the effluent discharge basin. Reduction of normal flow from the polishing pond to the effluent basin is over time typically results in the polishing pond to back up and possibly cause a spill within the confines of the treatment plant facility. In addition, the head level in the effluent basin was also monitored, and if the HydroRanger 200 indicated a high level, the staff would check the V-Notch Weir for blockage. High levels in the effluent discharge basin could also cause spills into the environment.

The challenge to the City of Decatur's operation, included the fact that the WWTP does not have 24 hr manned coverage. If either of these issues arise whether the facility is manned or unmanned, the possible spills from either the polishing pond or the effluent basin can damage equipment. In addition, there are possible fines from the TCEQ governing body if not found and responded to quickly.

Siemens Digital Solution – SITRANS store IQ

Siemens presented the possible benefits that could be achieved if a digital application such as SITRANS store IQ was implemented for continuous remote monitoring. SITRANS store IQ works with any manufacturers instrumentation and allows operators to monitor key data that normally requires physical visits by personnel. Siemens offered a system that could connect, monitor and transmit data to enable more efficient operations. In this case it would allow the manual data gathering process which included taking readings from the HydroRanger 200 every day at 0800 and gather that information automatically. This information is critical as it is reported to the Regulatory Agency each month.

So, rather than continue with this manual data collection process, Siemens' local Account Manager worked with the customer and the Siemens Engineered Instrumentation Solutions (EIS) Team to

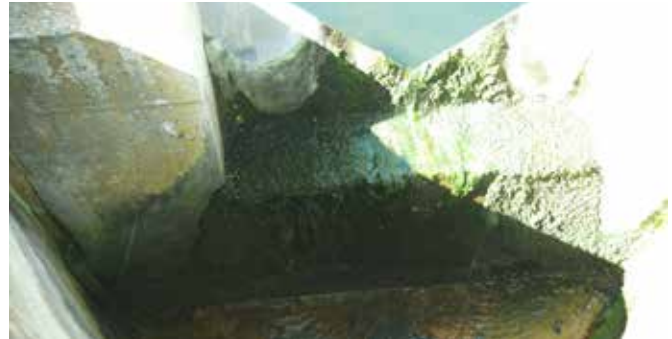


Figure 3.a.b.c. Effluent Discharge Basin V-Notch Weir for discharge flow measurement and Echomax Transducer for level measurement notice the algae build up

deploy SITRANS store IQ. Deploying this digital application included the development of a comprehensive solution to provide remote monitoring of the instruments and equipment at the customer's site and in accordance with their specific needs. The customer had located the HydroRanger 200 20 – 30 yards from the effluent treatment basin, and this included the availability of 120Vac. The mounting position of the HydroRanger200 was perfect for the installation of the SITRANS store IQ solution.

A new hardware system developed by Siemens EIS, utilized the HydroRanger 200 RS485 MODBUS RTU port and transmitted the data via the Siemens MindSphere Cloud platform to the web enabled Siemens SITRANS store IQ App. The application was configured to extract specific holding registers and meet the remote monitoring requirements of the customer. The entire system included the following items.

- Siemens SITRANS store IQ enclosure 16"x12"x8"
- Siemens 24 VDC Power Supply
- SIMATIC S7-1200 Controller
- RS485 MODBUS Communication Module
- Siemens IOT2040 MindConnect Gateway
- Siemens Scalance M876-4 Mobile Wireless Router
- AT&T Sim Package Data Plan



Figure 4.a.b HydroRanger 200 mounting stand and StoreIQ remote monitoring solution

The addition of the Siemens SITRANS store IQ hardware solution and App allows the City of Decatur immediate access to the flow rate, totalizer and head measurement on their smart phone, tablet or from their computer. Alarms alert the customer when the head value falls below a specified alarm level, warning them if there is a problem upstream of the effluent basin and high-level alarms if the head value rises above a specified alarm level. This provides peace of mind that the plant is monitored, and personnel can respond to emergencies when they happen even if not at the plant.

Customer Feedback on SITRANS store IQ

In addition to SITRANS store IQ ability to remotely monitor, it offers the added resiliency gained through the parallel data stream associated with the monitoring by this digital application.

"On October 20, 2019, we received very heavy thunderstorms in the Decatur area. There were direct lightning strikes all around the city and one or two happened at the WWTP. One of the strikes knocked out our in-office chart recorders for both the influent and effluent flows. However, due to us being setup on the SITRANS store IQ monitoring system in conjunction with the HydroRanger, we were able to still monitor our flows for the effluent for permit purposes. It has been a real help for us to remain connected to the trends and flow totals." - Mr. Roddy Boston, WWTP Superintendent, City of Decatur

This added benefit of the SITRANS store IQ solution allows easy capture of required data to report to the regulatory authority (TCEQ) monthly. The new solution will take place of a manual process and allow for a more consistent and accurate report.

Another benefit of SITRANS store IQ is its flexibility and the ability to customize the application and as a digital solution. It is highly scalable allowing deployment to other equipment and instruments as needed.

"I really like the fact that I can formulate the alarms to give me gallons instead of inches of head. That tells me so much more about my flows. It has alarmed every time we have back-washed and have received both text and email updates on all instances." - Mr. Roddy Boston, WWTP Superintendent, City of Decatur

"I will be taking a look at the stored flow data this week. We have started talks of a possible expansion of the plant facilities and I will see if the info will give us what the engineers need in order to help facilitate this process." - Mr. Roddy Boston, WWTP Superintendent, City of Decatur.

Summary

The addition, of the Siemens SITRANS store IQ hardware solution and App allows the City of Decatur immediate access to the flow rate, totalizer and head measurement on their smart phone, tablet or from their computer. It has taken a formerly manual process and allowed access to the information and alerts in case of upset conditions to be provided immediately to operators regardless of their location.

In addition it serves as a backup record keeping methodology to allow continued gathering of critical information that is required for local governing bodies.

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Order No.: PICS-00160-0223