Xenia, Ohio

Waste Water Treatment Facility Uses Automatic Cell Phone Reporting to Ensure Regulatory Compliance

Smallest SCADA display ever! Status of the Xenia waste water treatment facility can be checked on the cell phones of duty personnel who are off-site.

- Remote notification ensure continuous regulatory compliance and eliminates the possibility of human error in forwarding notification of alarm conditions
- Alarms can be configured even during runtime with delays that eliminate wasted time in responding to false alerts
- Payback was nearly immediate, because cost of system was less than the fine for a single violation of clean water regulations

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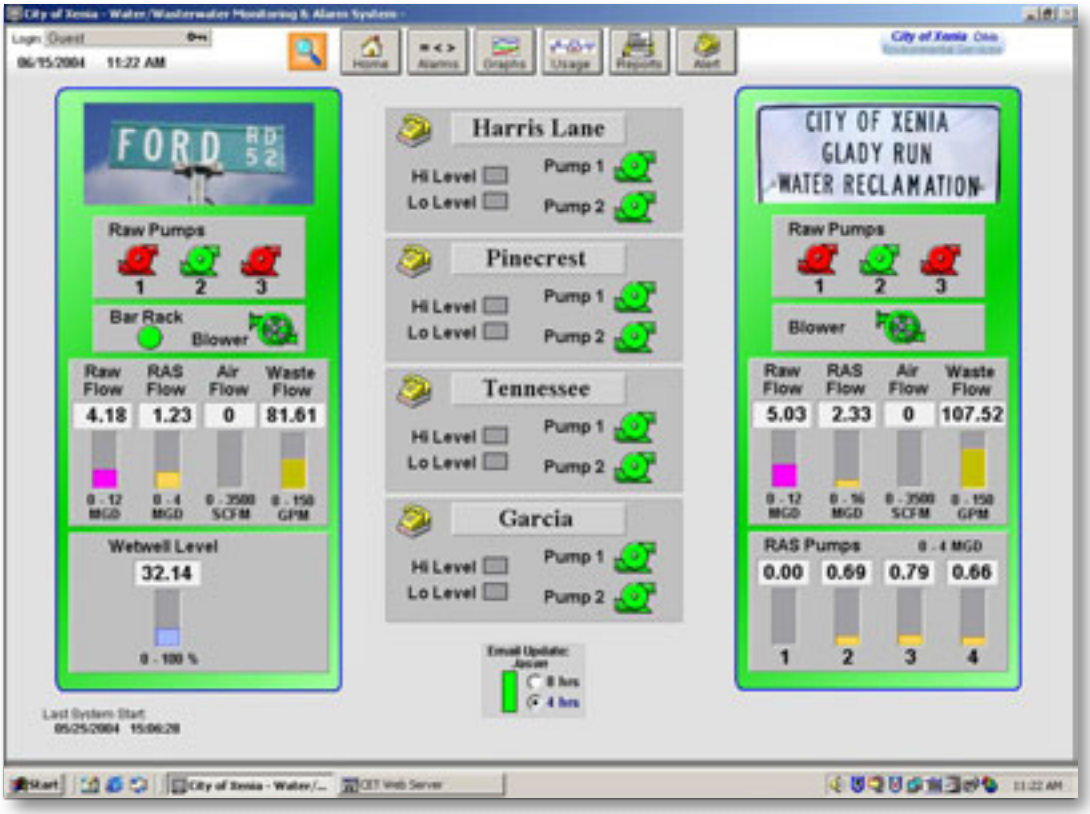
Background

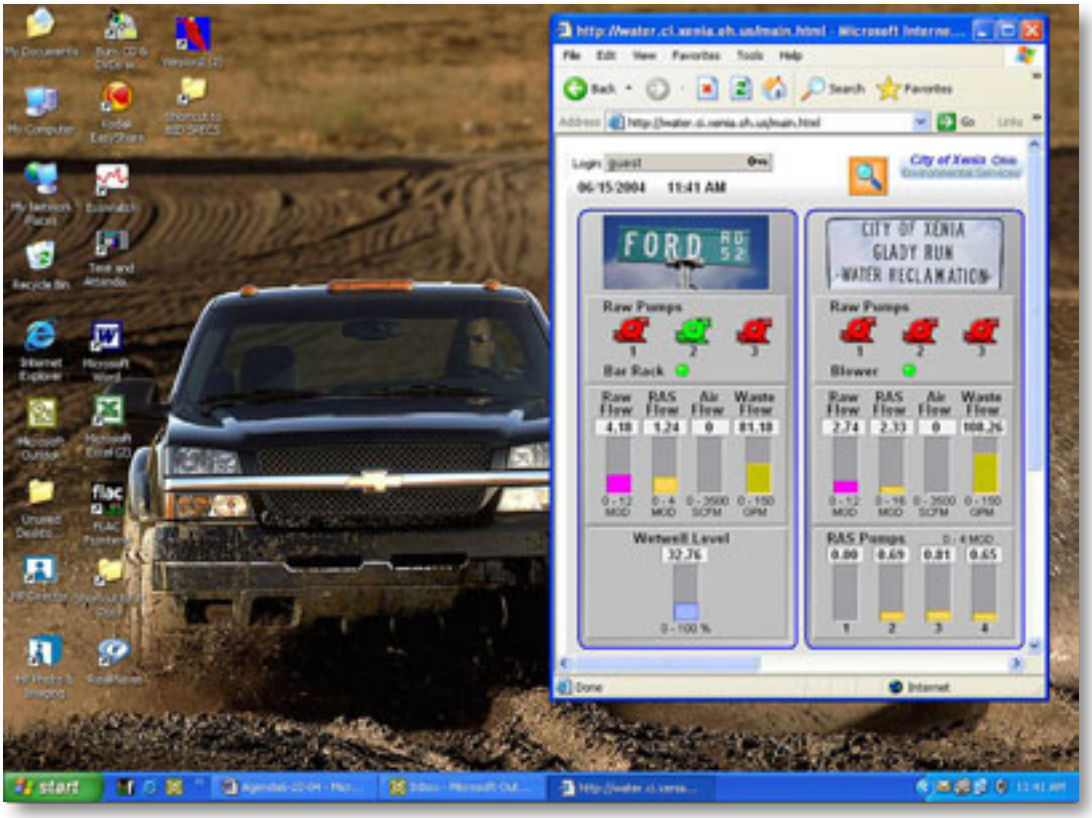
Xenia is a municipality of 25,000 people located in the heart of southern Ohio, halfway between Columbus and Cincinnati. The community is interlaced with bicycle trails and prides itself on being known as the bicycle capital of the American Midwest.

Xenia is unusual for a city of its size in that it boasts two separate wastewater treatment plants, one at Ford Road and the other at Glady Run. These use an activated sludge process for wastewater treatment. In this method microbes convert carbon into cell tissue and oxidized end products that include carbon dioxide and water. In addition, a limited number of microorganisms in activated sludge obtain energy by oxidizing ammonia nitrogen to nitrate nitrogen in the process known as nitrification. The success of the activated-sludge process is dependent upon maintaining a mixed community of microorganisms that remove and consume organic waste material, that aggregate and adhere in a process known as bioflocculation, and that settle in such a manner as to produce a concentrated sludge (return activated sludge, or RAS) for recycling. During successful operation, there should be no interference with the compaction and settling rates of the activated sludge prior to its recycling.

The Challenge: "Stuff Was Being Missed"

The Xenia Water Reclamation division, consisting of ten people, operates from 7:30 am to 4 pm. Be





Top left:
A single unified display shows that status of key indicators at both plants: input of raw wasterwater, RAS flow, air flow and output ("waste flow").

Bottom left:
Browser-based web clients add local operator access at a fraction of the cost of an additional seat with traditional SCADA software solutions.

Top right:
Status of alarms conditions at both treatment plants can be monitored from a single display.

Bottom right:
Graphic displays show both long term, 24-hour trends and more detailed 8-hour trends for key variables.

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this project, operators used local indicators to check process status. The only part of the operation that ran on computers was an automated billing process.

An external alarm system indicated only the existence of an alarm condition and gave no indication of the nature of the condition causing the alarm. After hours, the department had to rely upon the local police dispatcher to notify off duty personnel of alarm conditions at the plants. This introduced the problem of human error, and in one case an alarm was overlooked for more than ten hours. This raises the issue of violating regulatory compliance. The EPA fines for violations can run up to $15,000 each, with multiple violations possible for each incident. In addition the department can be forced to pay for fish kills and damages to residents along waterways impacted by a violation incident.

In short, as one manager said: "Stuff was getting missed."

In addition to complying with environmental regulations, a new solution had to meet these requirements:

- System improvements had to be absolutely cost-justified because the municipal government maintains tight control on expenditures.
- The solution needed to avoid false alarms that might be caused by intermittent conditions such as power drops or temporary surges in waste inflow.

The Solution

The wastewater division monitors five primary values: raw flow (incoming waste water); airflow; waste flow (treated output); the return activated sludge or RAS; and wet well levels (overflow).

Management of the Xenia Water Reclamation Division determined that an appropriate solution would be to install a networked system that would provide remote electronic updates to the duty person every four hours and eliminate the need to drive in and check conditions in person. Their initial research on Ethernet-based I/O led to Sixnet, who in turn directed them to Kemper Controls.

Dean Norton of Kemper immediately recognized that he could provide the required solution using an InduSoft SCADA system with Sixnet I/O. The solution as integrated and delivered to Xenia in

volved two client PCs at each site and a server in the main control area running four web sessions.

The system was built using browser-based operator displays, and Norton calls the application "an ideal example of using InduSoft Web Studio with web clients. Instead of paying thousands for each seat, the web clients only cost Xenia a couple of hundred dollars."

Department managers can call up status displays and check status from a PC anywhere in the city.

Norton used the built-in InduSoft email functions and scripting language to create a remote reporting function that sends selected key values from 24 I/O points to the duty person's cell phone every four hours. These appear on the cell phone display as a brief text message and enable the operator to tell at a glance exactly how the plant is functioning.

Equally important, the Xenia system includes a remote alert function for times when a significant alarm condition occurs. This incorporates a delay function for each alarm setting so that intermittent conditions do not result in the duty person being called when the problem has resolved itself. These delays can be configured during runtime so that they can be modified without shutting down the system and jeopardizing control of the wastewater treatment function. Up to 15 different conditions in the system can be configured for alarms and the operator can enable, dispel and set trip points as required.

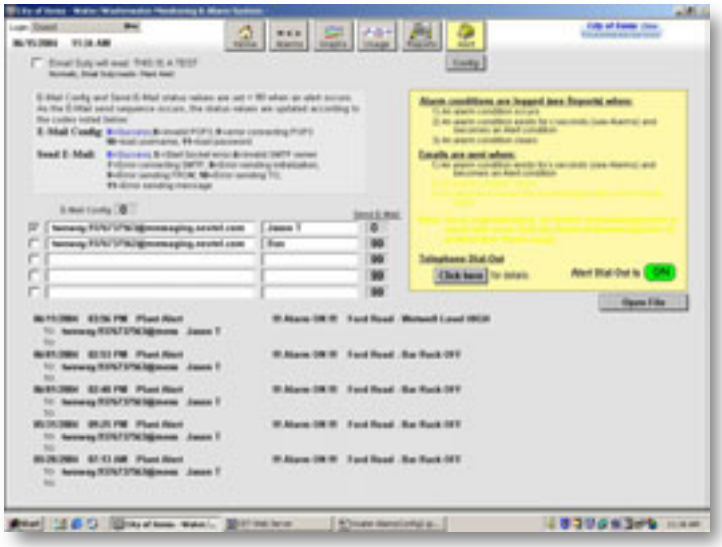
Results: "We Sleep a Lot Better at Night"

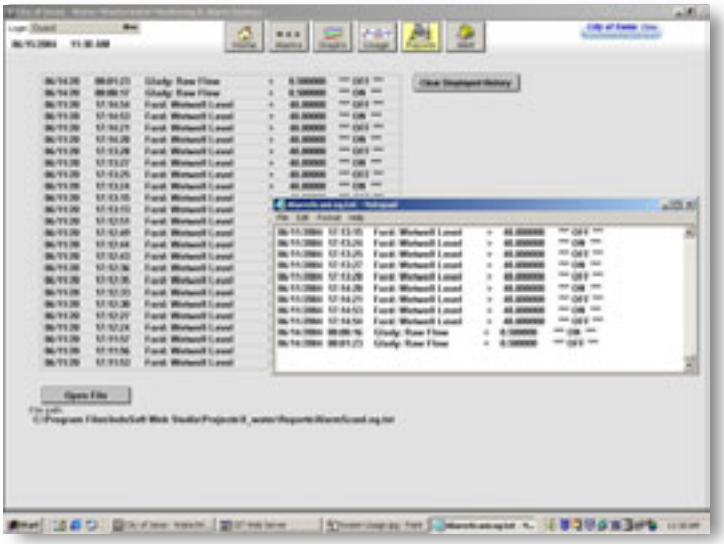
Since startup the system has virtually eliminated environmental violations. Next in line for Xenia is expansion of the system to include calculations that will enable it to pinpoint areas of the sewer system that need expansion, and installation of a similar system for the water treatment facility.

In the first year of operation Xenia experienced unusually heavy rainfall. Heavy rain events bring surges of water into the system that can result in major problems. There were no regulatory violations as a result of slow response to alarms.

Avoiding one single violation more than pays for the entire cost of the new system, and department management is delighted with the results. One of them remarks, "We all sleep a lot better at night."

In short, by eliminating the human factor in reporting alarm conditions, the Xenia Water Reclamation department improved its regulatory compliance, avoided expensive fines, reduced overtime costs, and, equally important to the personnel who work there--enabled them to sleep better through the night.





Top: Alarms can be configured during runtime with a scripted solution built by Kemper Controls.

Bottom: System reports are used to confirm the plant has remained in compliance.

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