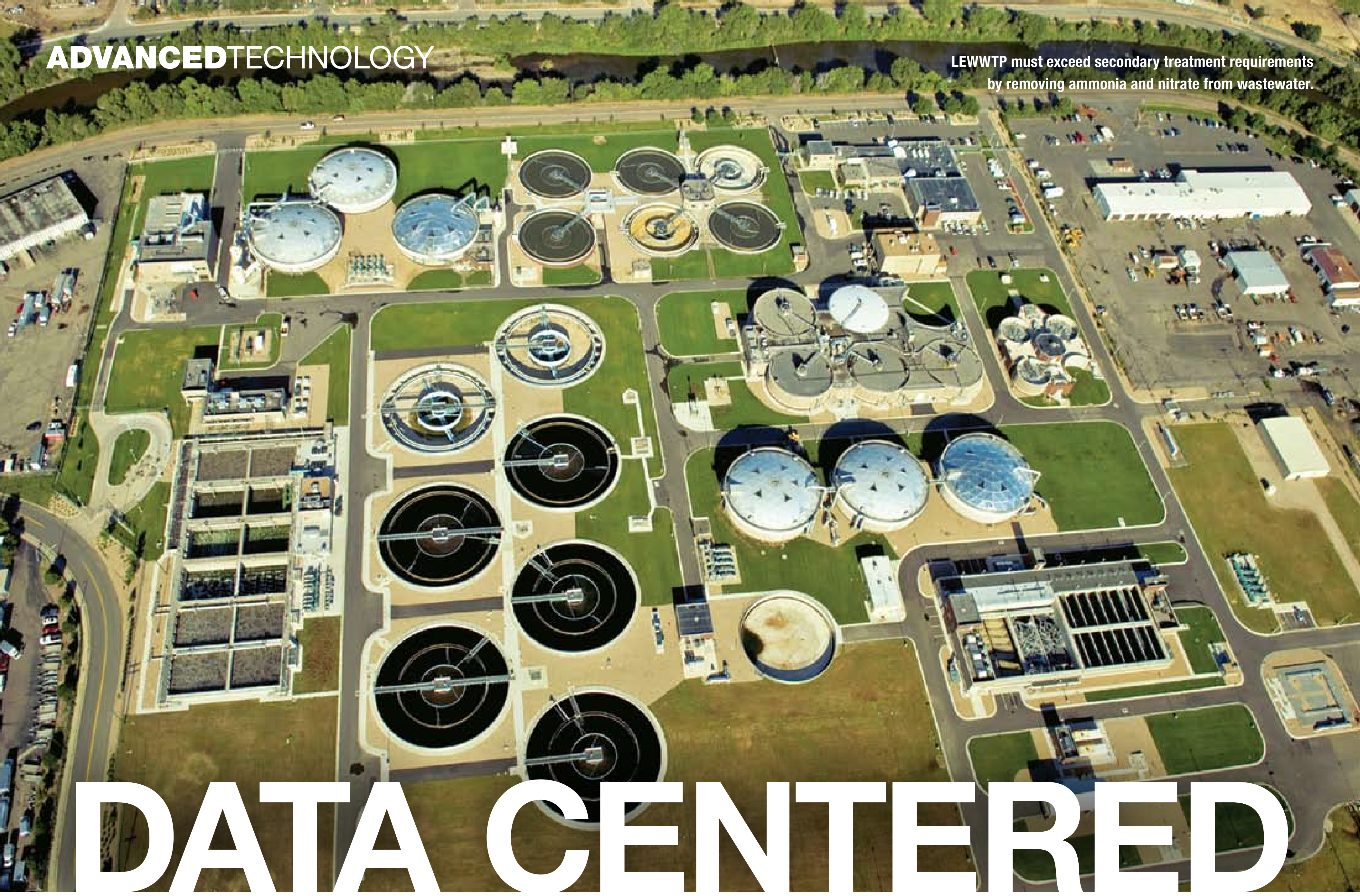


LEWWTP must exceed secondary treatment requirements by removing ammonia and nitrate from wastewater.

DATA CENTERED

Large Colorado WWTP reduces operating costs with automated data control system

By Gabi Miles

The Littleton/Englewood Wastewater Treatment Plant (LEWWTP) is the third-largest publicly owned treatment works (POTW) in the state of Colorado. LEWWTP is rated at nearly 50 million gal per day (mgd) and currently runs at about 22 mgd. The large plant, positioned along the South Platte River near Denver, is required to exceed secondary treatment requirements by removing ammonia and nitrate from wastewater.

In 2003, LEWWTP was managing all of its plant data with a manual paper process. Various technicians would fill in reports that were ported into larger reporting spreadsheets. Those larger sheets were then compiled by analysts and entered into a database through custom-developed Excel sheets. This process resulted in inconsistent and inaccurate data spread out over five different locations. Virtually no graphing capability existed for looking at data over long periods of time.

While manual data collection was a critical time drain, a more distressing issue was the inability to use the data. The information collected across the plant consisted of lab-generated data; it did not include any operations or field data, such as flow indications or pump status. Data was used only to generate regulatory reports, without much time to interrogate the data for excursions. As a result, during the 1990s, LEWWTP averaged two permit violations per year. The manual system did not have the data reporting tools to help troubleshoot the causes of the violations and was, therefore, limited in its ability to prevent them. Tired of the costly permit violations, LEWWTP needed to find a solution.

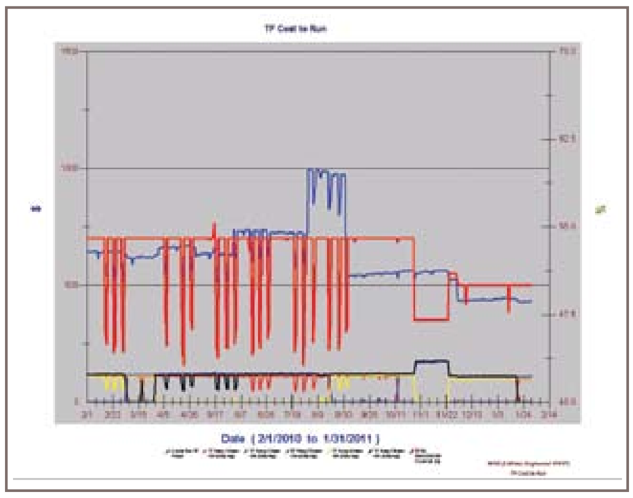
"If we could make permit we were happy. ... It didn't matter what it cost," said Greg Farmer, process control administrator for LEWWTP.

A Viable Solution

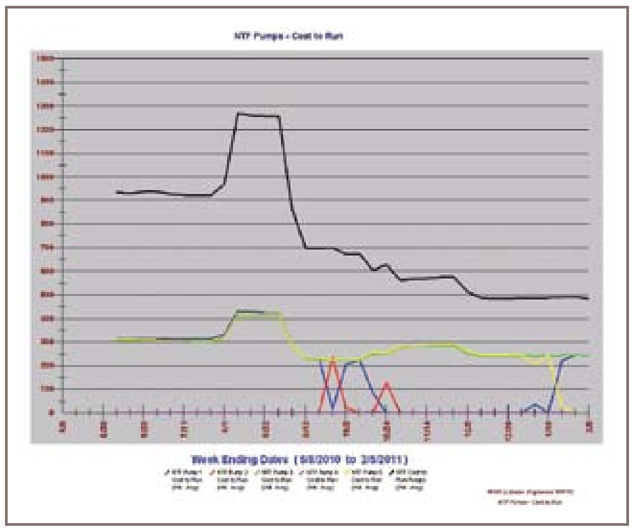
LEWWTP hoped to have everything it needed to make process and operating decisions in one centralized location. A collaborative team consisting of the database analyst, process specialist, IT department, SCADA administrator, LIMS administrator, business service administrator and technology consultant selected Hach WIMS to manage data control as information is transferred from the SCADA system, portable solutions in the field, LIMS and laboratory field data. Data is stored in a central database designed specifically for water and wastewater facilities.

The simple-to-use dashboard allows a single user to access information quickly whenever it is needed. With WIMS, data automatically is transferred from existing systems or it is entered manually just one time. The positive ripple effect that LEWWTP would experience from accurate and easily accessible data through WIMS was unexpected and changed the way the plant was run.

WIMS main dashboard showing process area information.



TF cost-to-run analysis.



NTF pumps cost-to-run analysis.

Advantages leading to LEWWTP's purchase of the product included:

- One location for all information to reside;
- Consistency across the operation;
- Automatic data inputs;
- Data accuracy;
- Cost-effectiveness; and
- Accuracy and accessibility of information.

Using WIMS, LEWWTP can check the accuracy of data quickly by pulling up correlating information to compare how data points relate to each other. This allows the user to determine the impact of one process over another. For example, one could examine the effect of energy usage on pump usage. Additionally, the incoming data check can help recognize data points that are outside of specified limits, identifying a potential issue. When the company's engineering firm asked for the water flow data from the past five years for a plant expansion project, LEWWTP noticed some potential outliers. By pulling up the log information on the wet-well level, staff could see that the water flow was providing erroneous data because of a backup.

The most difficult part of the process was identifying which variables to compare in order to clarify. The entire process took 30 minutes, compared to what used to take two to three days. Additionally, rather than completing a plant expansion to accommodate a maximum flow of 75 mgd, the data indicated that the plant needed to build to accommodate only 50 mgd, which saved a considerable amount on construction costs.

Engineering firms typically ask for 10 years worth of data. "Before, I don't even think we could have done that," Farmer said. "Now we just click a few buttons and e-mail it off to them."

WIMS quickly reduced data entry among several employees by 32 hours a week, allowing LEWWTP to refocus those employees on more strategic initiatives. Then, in 2004, the plant underwent an ambitious Phase II upgrade to increase its capacity flow and denitrification. The construction project increased the plant's number of analyzing processes to 12, each with many different data collection points. This resulted in 10 times the amount of data: from 500 points to 5,488.

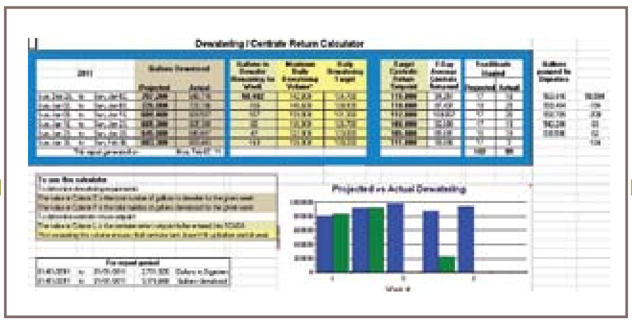
Because data entry is automated, no additional time was required to compile the additional data points. Today, LEWWTP is able to spend 25% of its time on strategic analysis by looking for opportunities to increase cost savings, which is something it did not have time to do with the manual process.

Optimizing Operations

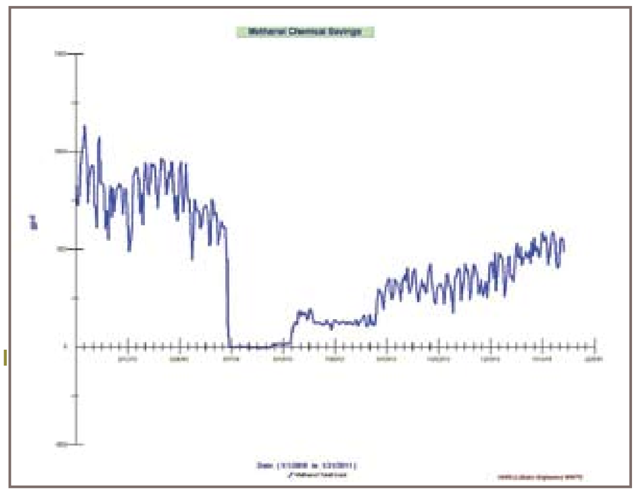
Energy conservation is very important to LEWWTP. Diving into the electrical usage through the WIMS dashboard, Farmer started turning pumps on and off to monitor the kilowatt draw. By systematically testing the operations and configurations, he was able to optimize equipment usage and immediately wrote it into the plant's standard operating procedure.

"Just in the last three to four months, we've made changes that save $70,000 annually," Farmer said.

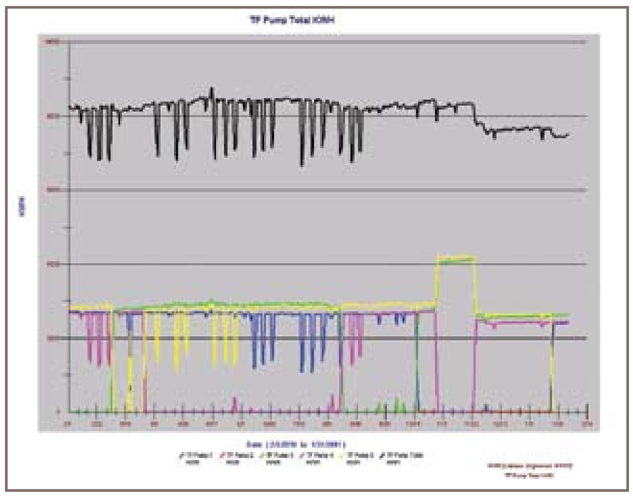
In a past power-optimization project, LEWWTP found that tweaking the pumps on the nitrifying trickle filters and turning one pump off reduced the plant area electrical pull from 10,500 to 8,500 kWh in that section of the plant, saving it approximately 2,000 kWh per day at a total average electrical cost of $0.71 per kilowatt hour, which totals $142 per day in savings. This adds up to $52,000 worth of savings annually, while maintaining the same level of treatment.



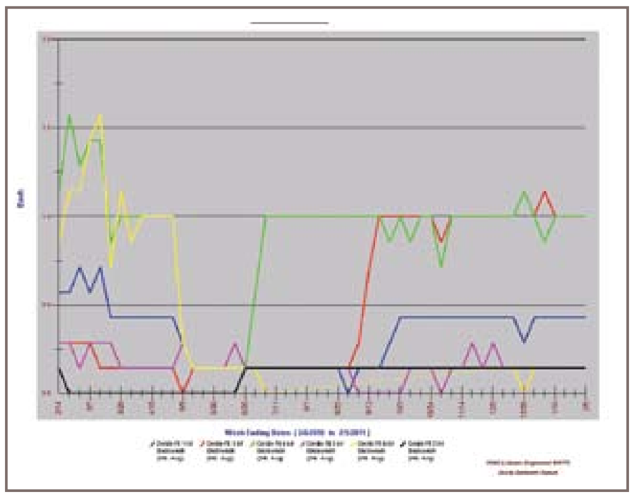
Dewatering-centrate return calculator.



Graph showing methanol chemical savings.



Graph showing kWh savings.



Denite backwash report.

LEWWTP now includes a denitrification process that uses methanol. The plant had been running at nearly 900 gal of methanol a day in order to perform the task. Using data from WIMS, the plant was able to adjust the process. By monitoring the results with WIMS, LEWWTP found it could operate on 500 gal per day and achieve the same output results. This resulted in savings of $300 a day in methanol, or $176,000 annually.

"I couldn't do that without WIMS," Farmer said. "You wouldn't have anything to base it on."

Streamlined Reporting

For a large plant like LEWWTP, discharge monitoring reports are vital. Before WIMS, the task required two to three days of gathering data and filling out reports. Today this process takes about half an hour, according to Farmer.

Operators can spend a few minutes looking over the numbers, and if any concerns arise, they immediately can dive into the audit trail created through WIMS. The audit trail identifies where the numbers came from, which location in the plant the number came from, the operator who entered the data and the supervisor who approved it.

WIMS offers easy report and business information sharing, which keeps employees up to speed on critical data within the plant. This not only has increased confidence that the reported information is accurate, but it also has made internal communications more efficient and effective.

During the 1990s, LEWWTP averaged two permit violations a year. The plant's manual system did not possess the data reporting tools to help troubleshoot the causes of the violations and was, therefore, limited in its ability to prevent them. When asked how often the plant deals with compliance issues today, the data analyst said, "It just doesn't happen."

The ease of sharing reports and business information with others at the plant and the confidence that the information being shared was accurate made communications more efficient.

Results ensued as follows:

- Data entry savings of at least 32 hours per week;
- Report filing time decreased from two to three days to 30 minutes;
- Ten times more data and at least 10 more hours per week available for analysis;
- Energy savings of $122,000 per year;
- Methanol savings of $176,000 per year;
- Tighter construction specifications saving "overbuilding" costs; and
- Zero permit violations. WWD

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