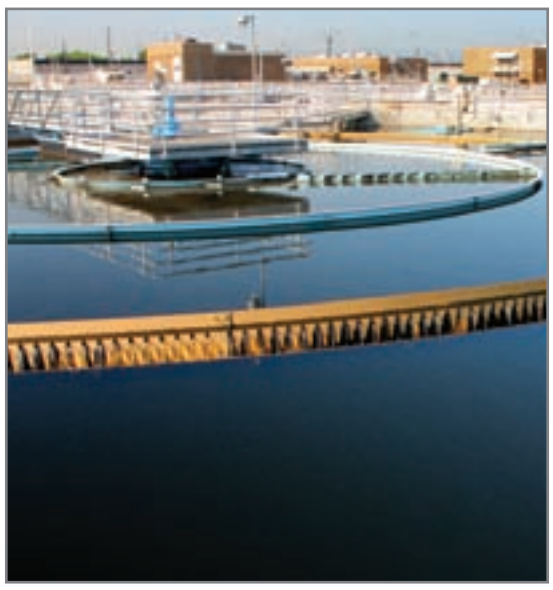
NAME:
Littleton/Englewood Wastewater Treatment Plant

LOCATION:
Littleton, Colo.

PLANT SIZE:
50 mgd

INFRASTRUCTURE:
Simultaneous denitrification and tertiary filtration occur within the process train. The nitrified effluent stream is recycled into the primary treatment process. A new SCADA system, two new secondary clarifiers and a new dewatering facility were added. Existing solids contacts tanks were retrofitted to serve as re-aeration tanks.



Two new secondary clarifiers incorporate unique flocculator and clarifier design features. The existing clarifiers were modified with Tow-Bro type mechanisms, allowing for increased return biological sludge control and treatment efficiency.

A new denitrification process removes nitrate and filters water simultaneously within the process train. The treated effluent then flows into the South Platte River.

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Related search terms from www.waterinfolink.com: clarifiers, denitrification, sludge, energy efficiency

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By Rebecca Wilhelm

Upgrade to **Innovation**

A forward-looking upgrade project positions a Colorado treatment plant well ahead of the curve

December 2008 marked the completion of an eight-year, $114-million Phase II plant upgrade at the Littleton/Englewood Wastewater Treatment Plant (L/E WWTP) in Littleton, Colo., which processes wastewater from 22 sanitation districts and serves more than 300,000 residents over a 100-sq-mile service area.

The ambitious project came in nearly $1.5 million under budget and three months ahead of the state's regulatory compliance schedule. A trio of driving factors necessitated the upgrade, explained Jim Tallent, operations division manager for the L/E WWTP:

Population growth. Faced with significant increases in flow since the late 1990s, plus increasing population projections and more stringent discharge requirements, capacity needed to be expanded from the current 36 million gal per day (mgd) to 50 mgd.

Denitrification regulations. On the regulatory side, although the facility had tertiary treatment capabilities for ammonia removal, Tallent said, new regulations regarding nitrate removal required a denitrification process be added.

Aging infrastructure. Critical infrastructure components at the plant were aging and needed repair, replacement or updating. Planning for the project began in 2000, and design was completed in 2004.

"When construction began in 2004, the Phase II upgrade was the largest project of its kind in Colorado," Tallent said. "Ninety million dollars in highly complex improvements were constructed within a 40-acre site while the facility remained in full operation."

All 11 of the existing treatment processes included operational and design upgrades, such as structural repairs; electrical system improvements; process automation; smart controls to optimize energy-efficiency; and automation and integration of the SCADA system with business and maintenance information systems.

Funding

Project funding was obtained through the state revolving loan fund, bonds issued by the Colorado Resources and Power Development Authority, STAG Grants and each city's Sewer Enterprise Fund.

The project team was able to save $2 million thanks to careful design and a construction management team that minimized change orders. Originally, $5 million was set aside for change-order contingency, Tallent said, but an incredibly low errors and omissions percentage for changes—0.1% errors, 0.4% omissions—resulted in the savings.

Highlighting Innovation

Energy efficiency and bold innovation were priorities throughout the design.

"During this project, Xcel Energy introduced an energy-efficiency rebate program, where specified equipment upgraded for efficiency could earn rebates from the electric provider," Tallent said. "The rebate program realized $88,000 to the L/E WWTP through the design."

"The denitrification process incorporates tertiary filters, allowing both filtration and denitrification to simultaneously occur," Tallent said, "which we don't believe has been done before." Another innovative design allows individual chemical feed and control to each tank, reducing chemical costs.

"The recycling of the nitrified effluent stream is truly unique and provides nearly 'free' treatment," Tallent said. By recycling up to 25 mgd of effluent back into the primary treatment process, the nitrate concentration is reduced up to 5 mg/L, saving thousands of dollars every month by minimizing the methanol added in denitrification.

An upgraded SCADA system accesses more than 2 million pieces of data, compared to about 2,500 in the facility's old system, according to Tallent.

"We were able to create a superb human-machine interface that could set a new standard for the industry," said Gary Wyse, L/E WWTP's SCADA administrator. "The depth of information we can get is unbelievable—with a design standard that requires no more than five clicks, operators can access any piece of data or diagnostic immediately."

Two new secondary clarifiers were added to the plant's secondary treatment area. Existing clarifiers were modified to allow for increased return biological sludge control. Existing solids contact tanks were retrofitted to serve as re-aeration tanks, which meant the construction of one less solids contact tank and secondary clarifier.

The new dewatering facility uses a new pumping scheme that resulted in long-term savings and a cleaner, operator-friendly facility. Additional biosolids storage constructed during Phase II reduces odor and minimizes labor.

Partnering for the Future

Major players and partners for this project included the L/E WWTP staff, responsible for plant operation in the midst of a major construction project; Brown and Caldwell, provider of design, planning and project management to coordinate contractor and facility efforts; and general contractor Western Summit Constructors, Inc.

The project's bold, innovative design offers flexibility for meeting future regulatory requirements and a growing population.

"With this challenge, there were no effluent permit violations attributed to the project, and a near-perfect—a total of three minor lost-time accidents—safety record was achieved," Tallent said. "The project was completed in December 2008 and is currently meeting all requirements and expectations." WWD

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