

PROVIDING A RETURN ON WASTEWATER INVESTMENT

By Ken Komiske

This month, the city of Norman, Oklahoma, will bring its water reclamation facility to full operation after a 3-year major expansion. The facility, which was initially constructed in 1943, treats wastewater from the more than 100,000 residents of Norman and the University of Oklahoma (OU). The expansion will increase the facility's capacity from 12 million gallons per day to 17 million gallons per day. Financed through an Oklahoma Water Resources Board State Revolving Fund loan, this project was the largest single loan ever provided by the state.

Anticipated By Planning, Driven By Compliance

Adopted in 2001, Norman's Wastewater Master Plan set forth recommendations for the expansion and upgrade of its wastewater management system. It contemplated an expansion of the city's wastewater facilities to meet the growth of the city and the university. However, the catalyst for the expansion project was the fact that every 5 years, the water reclamation facility has to get a new municipal discharge permit under the Oklahoma Pollution Discharge Elimination System permit system from the Oklahoma Department of Environmental Quality (ODEQ). The new permit required us to implement new technology and procedures to remain in compliance with state regulations.

In 2013, ODEQ essentially began the facility expansion process by issuing a consent order to require Norman to use disinfection in its wastewater treatment plant and to have a higher dissolved oxygen rate in the effluent water discharged into the Canadian River, which borders the city on the west and southwest. With the facilities in use at that time, it was impossible for our facilities to meet both of those requirements.

Getting the Word Out

We first had to convince our city council that it was necessary to change wastewater rates to finance the expansion. After that, we had to obtain approval from our customers. Norman is unique in the state of Oklahoma in that it must seek ratepayer approval for any increase. The vote had to pass before we could even apply for a loan.

To that end, we developed brochures and other literature to send to all our customers to educate them and gain their support. We included information about the proposal in the envelopes containing their sewer bills, and we posted additional information on our website. Everyone was well educated about the project by the time they went to vote on it.

Our message was simple: The permit would precipitate



improvements to the environment, and to that, we had to add some facilities for treatment processes. At the same time, we were already operating at a rate of 11 million gallons per day at a plant rated for 12 million gallons per day, so we also proposed a capacity increase. The city proposed to pay for the facility upgrades with available funds and revenue bonds to be repaid by an excise tax for new construction (similar to a connection fee) and the increased wastewater rates.

In November 2013, the residents of Norman voted to approve the increase in sewer service rates to finance a \$58 million loan to fund expansion and improvement of its sewer treatment plant. More than 75 percent of our customers voted in favor of the project. It was our largest margin of passage ever for a rate increase, funding the largest loan ever taken out by the city of Norman.

Upgrading Infrastructure

We went through the conceptual design process with Garver Engineering, our engineering firm. Although state regulatory changes forced our hand to initiate this project, we realized we had an opportunity to do more than just achieve compliance—we could make upgrades to benefit the plant and our customers in the long run. Many of the components to be replaced by this project date back to at least 1980.



The Norman water reclamation facility under construction.

Running a water treatment plant 24 hours a day, 7 days a week, means these components wear and can break down. We could not ignore the opportunities to both increase plant capacity and replace aging infrastructure.

The replacement and construction program has been extensive. Norman has added two clarifiers, three new activated sludge aeration basins, a new sludge pump station and dewatering facility, a new ultraviolet (UV) facility, and a postaeration facility. We put new weirs and skimmer mechanisms in the primary clarifiers. We added a splitter box to divert the flow between the old and new sections of the plant. We also examined and cleaned out the digesters. Nearly every component of the plant was or will be upgraded.

The treatment facility had primary and secondary treatment but no disinfection element. By adding the UV facility, we have created an additional treatment step and are providing better treatment. The city already provides effluent to be used at OU's golf course. These new upgrades are the first of several steps necessary to allow the city to reuse water and establish alternative water supplies. In addition, Norman is dedicating almost \$5 million toward odor control throughout the entire plant.

Another aspect of the new permit is that the new plant was required to have some source of emergency power in case of a power failure due to severe weather. We now have five emergency generators that can keep the plant

Two new final clarifiers.



running in case of a power outage. Our customers now have the benefit of a sewer treatment plant that is meeting regulations, has a better effluent that is being put into the river, is using modern equipment, and has the capacity needed to meet all of the community's present and future needs.

Construction proceeded smoothly despite challenges. One challenge was dealing with severe weather, including rain, snow, and other persistent precipitation. We also had some problems with total suspended solids levels at times, but the state worked with us to resolve those issues. The new clarifiers, pumping equipment, and other changes required us to run new large-diameter piping through the middle of the plant, which also caused some disruptions. But we were able to work through them and continue operations. Much of the credit for the relatively smooth construction process goes to our operators. They worked very hard to keep things running despite the interruptions, and did so without a single work-related injury to themselves or contractors.

Moving Forward

The upgraded plant is substantially complete. The consent order required us to make the disinfectant component operational as part of the permit and focus on the additional capacity later. The order required the city

to have the disinfectant facility up and running by January 1, 2017, and everything else had to be operational by July 1, 2017. We concentrated on the UV and postaeration facilities, which came online at the end of November 2016. By the end of January 2017, everything else will be working, but there are still some final details to attend to, including repairing roads that were damaged by heavy equipment.

The future of Norman's water infrastructure is bright. The added capacity of the sewer plant will bolster the city's potential for future growth regardless of how quickly or slowly the community decides to expand. In addition, we are now putting out a healthier effluent stream and have newer, more efficient equipment for our operators to use.

The next phase of upgrading our water infrastructure will focus on our water treatment plant. Adding another layer of treatment and being able to use our effluent to bulk up the reservoir will take our water treatment capabilities to the next level. This will allow us to better serve the environment, the city, and our customers well into the future.

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One of the new final clarifiers in use.



The insides of a new centrifuge. This is one of two new centrifuges that will be used for thickening biosolids.