

PLANTPROFILE

By Clare Pierson

Water in the Wilderness

Efficient and economic technology provides sustainability

NAME:

The Tonto Apache Wastewater Treatment Plant

LOCATION:

Tonto Apache Indian Reservation
Payson, Ariz.

PLANT SIZE:

80,000 gpd/300m³/d capacity

INFRASTRUCTURE:

Headworks/mechanical screens, equalization tank, anoxic compartments, USBF filters, aerators, clarifiers, effluent tank, sand filters and UV disinfection



The \$2-million project was completed in 24 months. The new facility was necessary to accommodate a large volume flux that was imminent due to a massive hotel, casino and convention space expansion.



Because the plant would be built very close to the casino/resort area, the goal was to make the facility odorless, noiseless and as unobtrusive as possible.



The completed, decentralized plant has been online since June 2009; it emits no odor, runs on very little power and only requires a staff of one operator, two hours per week.

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The Tonto Apache Indian Reservation spans 87 acres in the Mazatzal wilderness about 75 miles north of Phoenix in Payson, Ariz.—but it sits around several thousand feet higher in elevation than Phoenix, and thus has a much cooler temperature.

In 2006, the Tonto Apache tribe decided to expand its popular casino to include a 101-room hotel, along with convention space and banquet and dining operations. This expansion required them to look into a dependable wastewater treatment system to match the high volume of water that would be consumed and produce high-quality effluent that could be reclaimed.

The tribe, along with design and architectural firm Architectural Alliance, looked into a few different treatment options, including a conventional system, sequencing batch reactor, membrane bioreactor and the chosen upflow sludge blanket filtration (USBF) biological treatment technology from ECOfluid Systems, Inc. The main factors in the tribe's decision-making were the desire to have a low impact on the environment and having a straightforward, easy-to-operate system.

"[The term] 'green' is thrown around quite a bit now, and when we got started in 2006, it wasn't a buzzword, but the tribe wanted to be respectful of the environment, use less chemicals, consume less and wanted something simple to operate," said Mike Munninger, principal at Architectural Alliance. "When you prioritize all these factors, the USBF system came out ahead of the other technologies."

Self-Regulating Technology

According to Karel Galland, president and CEO of ECOfluid Systems, operation of a USBF plant is simple and self-regulating. Wastewater enters the anoxic compartment of the bioreactor, where it is mixed with activated sludge recycled from the bottom of the sludge filter. The mixed liquor flows into the bioreactor's aerobic compartment and from there, the mixture of microbial cells and water enters the sludge filter at the bottom. As it rises, upward velocity decreases until the flocs of cells become stationary and form a filtering media. As the flocs become large and heavy by impact agglomeration, they descend to the bottom of the sludge filter and subsequently are recycled back into the anoxic zone. Filtered effluent overflows into a collection trough and is discharged from the system.

"Superior hydraulic flexibility is one of the most beneficial features of the USBF process," Galland said. "The sludge blanket filter accommodates high peak flows and flow swings in a self-regulating manner—the higher the flow, the higher the sludge blanket rises and the larger the filtration area becomes. This, along with reduced count of mechanical equipment and overall simplicity of the system, allows for reduced O&M requirements."

"The system is designed to operate the same no

matter what the flux; it's the same under all circumstances," Munninger said. "If the volume drops or increases, it doesn't matter. The process does not change and this means O&M stays the same. The very nature of this application—flux dropping and rising dramatically between weekends and weekdays—means a conventional system would need more staff and would be more expensive to operate."

Simple Operation

Construction of the plant began in May 2007 and on June 30, 2009, it went online. Estimated initial flow for the first few months is 12,000 gal per day.

The \$2-million plant was also equipped with a SCADA system—allowing for remote supervision and operation—microfiltration, sand filtration, ultraviolet disinfection, an office, a lab and an emergency generator.

The plant, which was constructed into the side of a hill and is thus unobtrusive, is also odor-free, which is especially important considering it sits adjacent to the resort's main restaurant.

"Noiseless, odorless and visually unobtrusive were three very important design objectives," Galland said. "These were successfully met, and many people in the immediate vicinity of the plant will most likely not be aware of its presence."

Staying true to the tribe's creed of sustainability, the treated wastewater is reclaimed and reused purposefully. Some is sold to nearby construction sites and some is flowed to a storage tank for possible future recreational and commercial development in the works, but much is used for the reservation's fire suppression system and for local irrigation.

Surpassing Expectations

The tribe now has a sustainable, efficient, low-cost, self-regulating wastewater treatment system that emits no odor and can handle wide variations in flux. The plant runs on 120 amps of power (less than most houses), uses no chemicals and requires little staff—one technician two hours per week.

Initial high levels of 12 mg/L of nitrite/nitrate and 14.8 mg/L total nitrogen are now down to 3 mg/L and 3 mg/L, respectively. The tribe also gets to reuse the end product to benefit the environment and position itself for future growth.

"There were a few raised eyebrows at first because what we were claiming could be done seemed too good to be true," Munninger said. "But now that we have test results, the tribe is extremely satisfied and the county is pleasantly surprised." **WWD**

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