



Glen Anderson examines the organisms in a return activated sludge sample. He can confirm the health and relative age of the solids in the plant using this method. (Photography by Jonas Grushkin)

# It's an *Investment*

THE SOUTHERN UTE TRIBE IN COLORADO MAKES WASTEWATER TREATMENT A HIGH PRIORITY. IT PAYS OFF IN SPARKLING PLANT PERFORMANCE — AND LOTS OF RECOGNITION.

By Jim Force

**THE SOUTHERN UTE INDIAN TRIBE IN SOUTHWESTERN COLORADO SEES WASTEWATER** treatment as an investment rather than an expense. That approach results in a treatment facility that not only serves local people and businesses, but wins awards, as well.

Recognized for outstanding performance, automated control, and training procedures (see sidebar), the Southern Ute Wastewater Treatment Plant won first place among small advanced treatment plants (less than 1.0 mgd) for 2007 in the U.S. EPA Clean Water Act Recognition Awards.

"The Tribe doesn't want problems associated with inadequate facilities," says wastewater superintendent Fred Robyns. He credits tribal council leadership with foresight and a willingness to make improvements on a regular basis. "They're willing to deal with issues and put together a system that works," he says.

Previously, the community used lagoons to treat wastewater, but they weren't working very well. Faced with limitations on growth because of poor treatment, the Tribe took over control of

the wastewater treatment and the collection system. In 1999, the Tribe started up a new extended aeration oxidation ditch plant to serve the 1,400 tribe members and 700 citizens of the city of Ignacio.

"In the years since," says Robyns, "the Tribe has made improvements to keep the plant up to date and avoid problems before they occur." Since 2000, Southern Ute utilities (including water and wastewater) have been managed by the Southern Ute Growth Fund, the business arm of the Tribe (see sidebar). The Growth Fund has paid dividends to the tribal community, and the treatment plant is a prime example.

## TREATING THE FLOW

The Southern Ute plant is rated at 0.8 mgd and runs at 50 percent of capacity. Pumps bring all sewage into the headworks, where it passes through a Rotamat fine screen (Huber Technology) and grit channels. Sewage then flows into the anoxic zone of the oxidation ditch, and then into the ditch "race track." Primary clarifiers are not used.

## Southern Ute Wastewater Treatment Plant

### PERMIT REQUIREMENTS

	PERMIT	ACTUAL
<b>BOD</b>	30 mg/l	< 2 mg/l
<b>TSS</b>	30 mg/l	< 2 mg/l
<b>Ammonia</b>	3 and 7 mg/l (seasonal)	< 0.05 mg/l

"We monitor our dissolved oxygen levels in real time, and we respond immediately when septage loads cause them to drop."

FRED ROBYNS

Fred Robyns, wastewater superintendent, is shown beside a stainless steel slide gate that raises or lowers the liquid level in the oxidation ditch. A higher liquid level submerges a greater portion of the aerator, increasing the available oxygen to the mixed liquor.

## profile Southern Ute Wastewater Treatment Plant, Ignacio, Colo.

<b>OWNER:</b>	Southern Ute Growth Fund
<b>SERVICE AREA:</b>	2 square miles, 2,000 population
<b>FLOWS:</b>	0.8 mgd design, 0.4 mgd average
<b>TREATMENT LEVEL:</b>	Secondary
<b>PROCESS:</b>	Oxidation ditch
<b>BIOSOLIDS:</b>	Aerobically digested, dried, windrowed, spread on fields
<b>STAFF:</b>	Fred Robyns (superintendent), Glen Anderson, Greg Jones
<b>OPERATING COSTS:</b>	Approximately \$5 per/1,000 gallons treated
<b>WEB SITE:</b>	<a href="http://www.southern-ute.nsn.us">www.southern-ute.nsn.us</a>

## "BUILD IT YOURSELF" TRAINING

As far as wastewater superintendent Fred Robyns is concerned, the old-fashioned apprentice approach is still the best way to recruit and train treatment plant operators.

"It's hard to hire certified operators," he says. "There is full employment in Colorado for qualified people. Many impending retirements will add to the difficulty of filling responsible positions."

To bring fresh talent onto his staff and fill open positions, Robyns has adopted a "build our own" approach. "We look for people who might fit and start them out as truck drivers or utility workers," he says. "Then we introduce them to collections, and eventually train them in operations."

Staff members take recruits with them on jobs and operational rounds, using a hands-on approach. "Gradually, we give them experience and responsibility, and then we involve them in education programs leading up to certification," Robyns says. It's also important that new employees have time on the job to study and prepare for certification.

The approach has been successful for both tribal members and outside hires.

The program was one of the reasons the Southern Ute plant won a 2007 U.S. EPA Clean Water Act Recognition Award in the small advanced plant category. EPA cited the Tribe for competitive pay, opportunities to grow, and training and education. "This is the way I worked my way up the ladder," says Robyns.

The oxidation ditch is a Baker Hughes Carrousel denitr system. The anoxic zone is next to and included within the greater physical structure. The anoxic zone allows for removal of ammonia through the nitrification/denitrification process.

Normal operating parameters include an MLSS of 2,000 to 3,000 mg/l, MLVSS of 70 to 85 percent, effluent temperatures of 38 to 70 degrees F, loading of 400 to 600 pounds, and SRTs of 40 to 60 days.

Mixed liquor flows from the ditch to one of two deep clarifiers rotated annually to ensure proper maintenance. An ultraviolet light system (Trojan Technologies), composed of two 10-bank four-

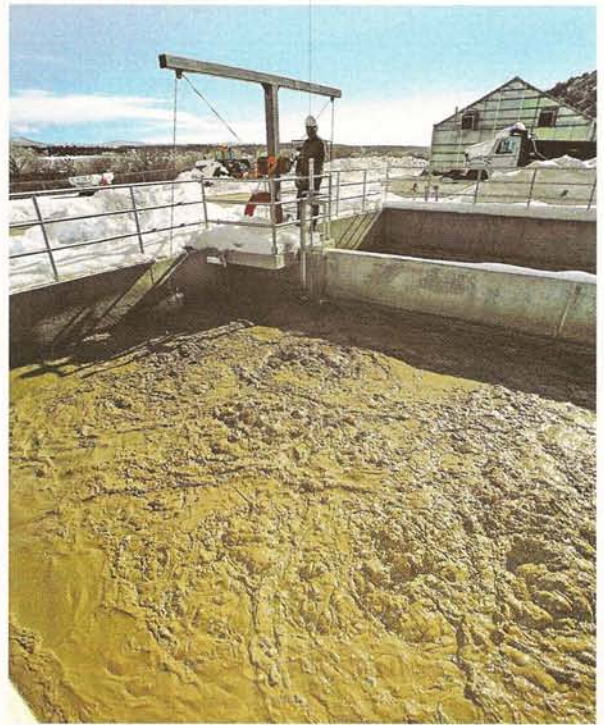
"The Tribe doesn't want problems associated with inadequate facilities. They're willing to deal with issues and put together a system that works."

### FRED ROBYNS

lamp units, disinfects the flow before discharge to Rock Creek which flows into the Pine River. One UV unit is on-line at any single time. Robyns and his operators Glen Anderson and Greg Jones change out UV bulbs about once every 30 months of continuous use.

Waste activated sludge is pumped into an open aerobic digester, where it is held long enough to meet specific oxygen uptake requirements. Digested solids are mixed with polymer and poured onto a perforated plastic bed. An underdrain takes clear liquid back to the oxidation ditch.

After a week, the solids are removed with a small Kubota tractor with squeegee bucket and spread out on a concrete pad for air-drying. A compost mixer (Brown Bear) aids in the windrow and drying process. Using manure spreaders and small dump trucks,



The 130,000 gallons of aerobic digester capacity allows 20 to 40 days of waste activated sludge detention time before dewatering and drying.

the staff applies the crumbly dried biosolids on tribal hayfields and bison pastures.

Plant performance is nearly perfect. While BOD and suspended solids permit limits are 30 mg/l, the Southern Ute plant generally puts out effluent with less than 2 mg/l BOD and TSS, for removals of 99 percent or greater. Ammonia comes in at 20 to 30 mg/l and leaves at less than 0.05 mg/l. Fecal coliforms are usually <1 geometric mean on the discharge monitoring report. Effluent turbidities are 1 to 2 NTU. In spite of snow and cold at 6,400 feet altitude, the open-air facility needs only modest adjustments to deal with seasonal conditions.

### AUTOMATION AND CONTROL

The EPA credited the Southern Ute plant for an effective automation and control system. Robyns explains that the plant is staffed 40 hours per week. An Intellution iFIX SCADA system (Kepware Technologies) enables staff to monitor performance 24 hours per day and respond to alarms from their homes. It's a secure dial-up system that enables staff to call up the plant control screen and manipulate processes on their home computers and respond to alarms via their cell phones.

The emergency power supply to the plant is automated as well. A Cummins Onan diesel generator serves as a standby and automatically kicks in to assure continuous power should the main power supply be interrupted.

The plant's SCADA system is also instrumental in helping the plant deal with septage loads that come primarily from portable toilets and septic tanks and from large-scale public events like motorcycle rallies. The plant averages one or two septage loads of 2,000 gallons each per week.

"We monitor our dissolved oxygen levels in real time," says



A Brown Bear composter is used to aerate and windrow biosolids before application on tribal agricultural lands.



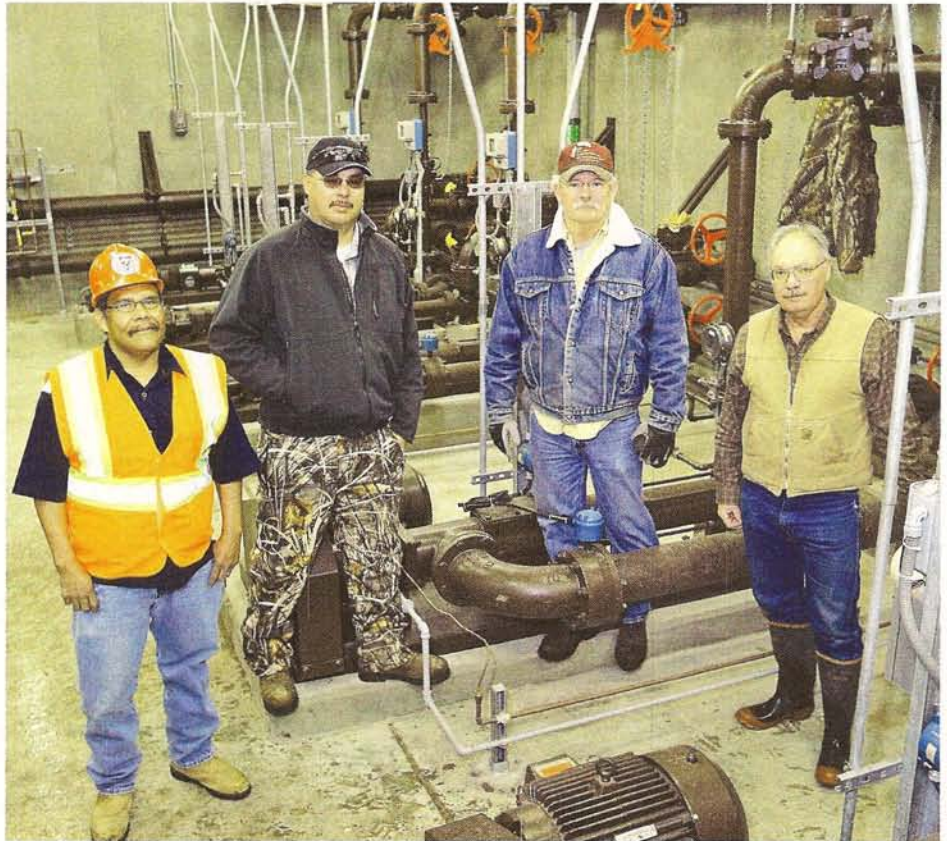
A Rotamat fine screen from Huber Technology does duty at the plant headworks. Large solids are captured on the screen, then washed off and deposited in a trash bin.

Robyns, "and we respond immediately when septage loads cause them to drop." He says the DO sag becomes evident within minutes of receiving a septage load. He can turn mixer rates higher depending on the amount of DO that needs to be regained. It's a lot more accurate than manually monitoring DO levels once or twice per day.

Robyns believes all plants accepting septage need to account for its impact in their design. "It's especially important with small plants in rural areas," he says. "It's a lot better to have the septage loading designed into the plant in the first place."

That's exactly the kind of forward-looking approach that has assured the high standard of treatment at Southern Ute, and has produced awards — not just from the EPA, but also from the Rocky Mountain Water Environment Association in 2003, 2004 and 2005.

Robyns says, "The Tribe is committed to protecting the health of the people and the environment on the reservation. The quality of its water and wastewater treatment is a direct reflection of that commitment." **tpo**



From left, Nathan Strong Elk, utility worker; Greg Jones and Glen Anderson, plant operators; and Fred Robyns, wastewater superintendent.

## SOUTHERN UTE GROWTH FUND

In a unique form of privatization, the Southern Ute Wastewater Treatment Plant is owned and managed by the business arm of the Southern Ute Indian Tribe.

Known as the Southern Ute Growth Fund, it represents a significant aggregation of businesses and investments, both on the reservation and in other states across America, and maintains direct ownership of many of the operating companies.

Major business areas include oil and gas, real estate, construction materials, and other private equity and venture capital opportunities. The fund's multibillion dollar strategy ensures that tribal business enterprises and tribal government and services are properly funded. Established in 1999, the fund is unique among Native American tribes.

### more info:

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