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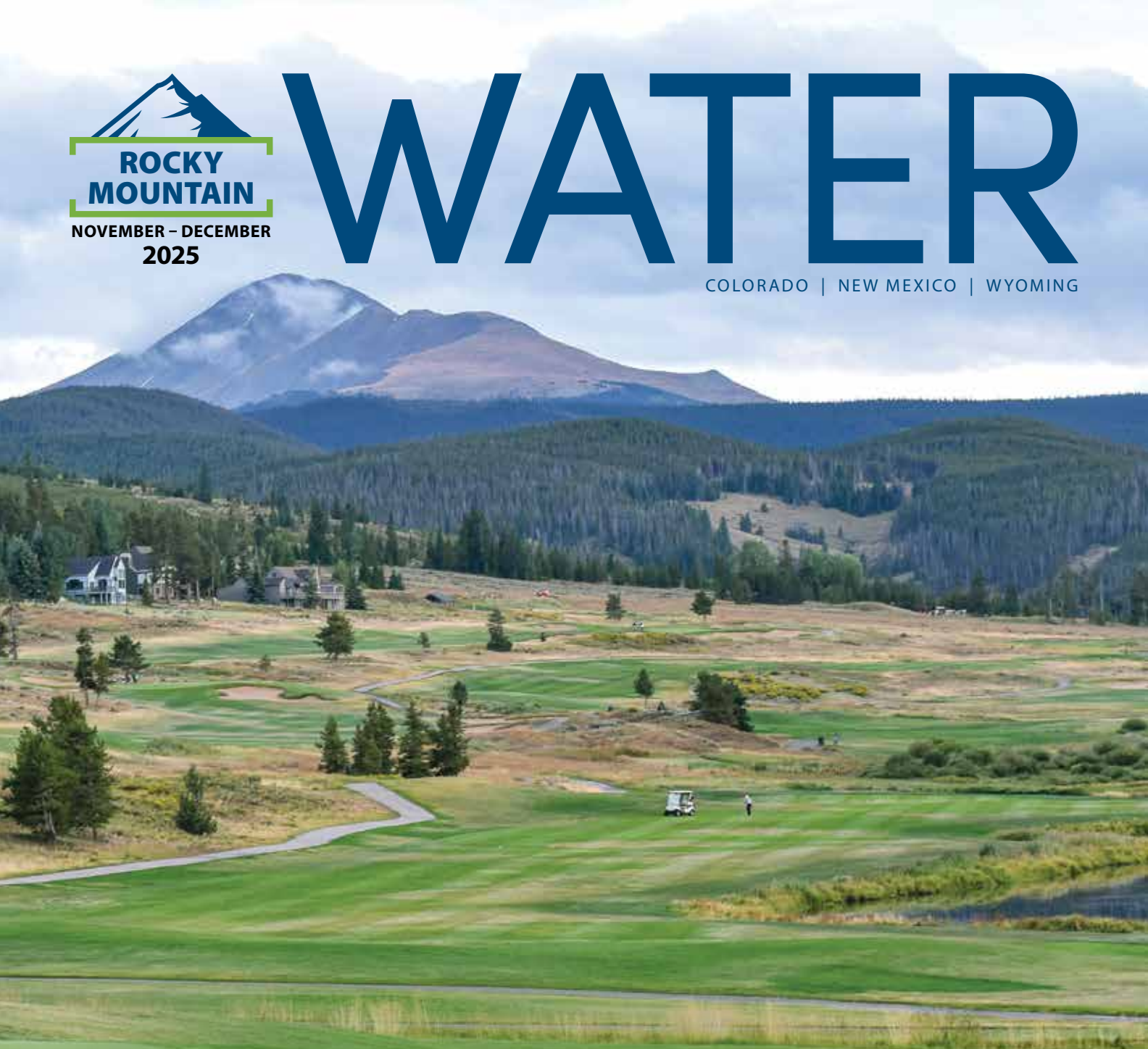

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Fighting Freeze and Failures:

A Tribal School's Wastewater Crisis Meets a Cold Reality

Suzan Chin-Taylor, MSc

In the rugged heart of Wyoming's Wind River Indian Reservation, St. Stephens Indian Mission faced a quietly growing crisis. Its lagoon-based wastewater treatment system – shared with the adjacent federally operated St. Stephens Indian School – wasn't just failing, it was frozen, overloaded with sludge, emitting persistent odors, and threatening the health and operations of the mission and the school it supported. Now, the story is one of resilience, innovation, and unexpected renewal.

A FAILING SYSTEM ON SACRED GROUND

The St. Stephens Indian Mission is home to a small rural community and sits just outside Riverton in Arapahoe, Wyoming. While modest in population, its grounds serve a dual purpose: not only for its own operations but also as the wastewater treatment site for the St. Stephens Indian School, a federal K-12 institution serving roughly 300 students.

The lagoon system had been patched over the years. "They did put some new plastic liners in around 15 years ago," said Father Andrew "Drew" Duncan of the Mission. "They dug out some of the sludge then, but not in the finishing pond. The system was very old."

Even with those updates, the treatment system remained vulnerable. The original surface aerators were failing frequently. "They were constantly freezing, clogging, and stopping," said Father Drew. The failures weren't just inconvenient – they were serious. Odors from the lagoon regularly drifted to nearby homes, including Father Drew's own residence just 100 yards away.

With no background in wastewater operations, Father Drew had taken on the role of operator out of necessity. He had newly arrived and was trying to learn on the fly. "I was taking courses to be the operator, but I didn't know how to fix any of it," he recalled. "We were constantly calling in repair people." That's when fate – and a trade show – intervened.

SEEKING HELP IN THE RIGHT PLACE

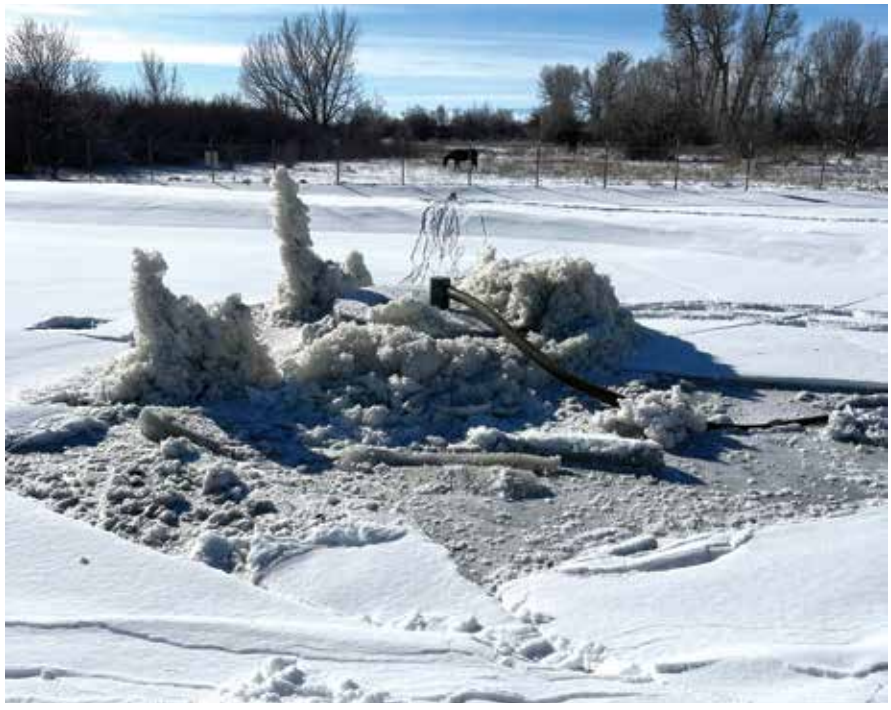
At a Wyoming Rural Water Association operator training school, Father Drew encountered a booth for Titus Wastewater Solutions. Lewis Titus, founder of the Casper-based company, was manning it. "I told him, 'I've got a system that doesn't work at all,'" said Father Drew.

Titus made the 150-mile trip to Arapahoe and confirmed the problem. The lagoons were shallow, heavily loaded with sludge, and operating with ineffective, outdated aeration equipment. A solution was devised, but the real challenge would be securing funding.

Because the school is a federally operated institution and the mission is a church-affiliated nonprofit, the wastewater system fell into a bureaucratic gray zone. While the Bureau of Indian Education (BIE) technically supported school infrastructure, accessing funding took months – often years.

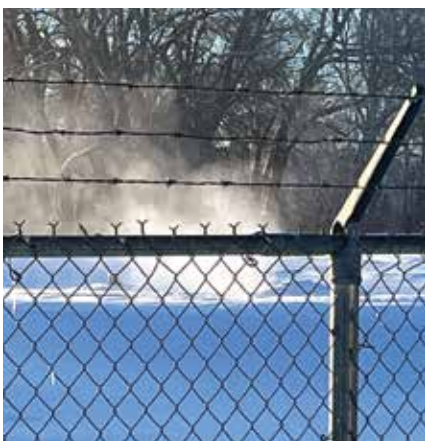
"I badgered the BIE all summer," said Titus. "Meanwhile, the lagoons started freezing. In November, Father Drew called me and said, 'There's already two inches of ice. If this freezes solid, we'll have to shut down the school.'"

That winter would turn out to be the coldest on record in the region.



Titus Wastewater Solutions Twister FL (Floating Aerator) in operation at St. Stephen's School Wastewater Treatment Lagoon.

Titus Twister FL (Floating Aerator) control, power and air supply unit on the shore of the St. Stephen's School Wastewater Treatment Lagoon.



Lagoon the following winter, Twister FL still operating under the snow pack.

Titus eventually secured emergency authorization. But by the time his team arrived, the lagoon was buried under 15 inches of snow, and the surface ice was nearly a foot thick. With temperatures plunging into the single digits, the crew couldn't even get close without a front-end loader clearing the road.

Breaking the ice was another matter. A thousand-pound iron weight bounced off the frozen surface. Even an 18-inch auger only managed a small hole. Eventually, the team resorted to using the aerators themselves – each weighing nearly 3,000 pounds – as battering rams to widen the opening.

Somehow, the units withstood the abuse. Once installed, they faced another challenge: sludge. "They were sitting right on top of it," Titus explained. "We got them running, and they ate their way through it."

As temperatures dropped further, to as low as -44°F, the equipment remained operational, preventing the lagoons from freezing solid. Three months of 0 to minus 44-degree temperatures were the true test. A power outage, which shut down the blower, was the only real challenge. This went several days before maintenance personnel discovered the shutdown. The aerator's air pipe was frozen solid. Titus's team resorted to creative solutions to restart the aerators. They heated propylene glycol antifreeze on a stove inside the mission, poured it into insulated coolers, and hand-delivered it down air pipes, melting the ice plug that was preventing air flow to the aerator diffuser. The system ran uninterrupted for the rest of that brutal winter.

A SURPRISING TURNAROUND – AND LASTING RESULTS

What started as a desperate intervention has proven durable and transformative. The aerators, still running three years later, have never broken down.

"To my knowledge, there's not been a single stoppage," said Father Drew. "They never froze up, even when it hit -44."

After installation, the federal school assumed operational oversight of the system. Odor issues, once a constant concern, vanished entirely. "There's not been any odor since. And that was a big change," said Father Drew. "My house is just 100 yards away. I used to smell it constantly. Now, nothing."

This change hasn't gone unnoticed by the local community. The lagoons sit just 30 yards from the Wind River, a popular fishing and swimming spot. "The tribal members come and fish right next to it again. The area has really opened back up for recreation," said Father Drew. "It's very pleasant now."

Photos taken by Father Drew show children swimming in the river next to the treatment site, something unimaginable during the years when the lagoon's odor and condition made it uninviting.

DUCKWEED – AND A DISAPPEARING CITATION

An unexpected side benefit of the installation has been the disappearance of a persistent duckweed problem. "There used to be times when the ponds were completely covered with duckweed," said Father Drew. "And when I first got here, we actually got an EPA citation for it."

Duckweed overgrowth is often a sign of low oxygen and poor water quality. Since the aerators went in, the plant has not returned. "I'm not a scientist," Father Drew said, "but it hasn't come back, and we haven't had any citations since either."

While it's difficult to definitively prove causation, the timing and conditions suggest a strong correlation. Installing the aerators during extreme cold likely disrupted the duckweed's life cycle. By the time spring arrived, the elevated dissolved oxygen and improved circulation may have prevented regrowth.

"There may be more to this than we expected," said Titus, "it's definitely worth looking deeper."

LESSONS FROM A QUIET SUCCESS

The transformation at St. Stephens illustrates how even small, rural treatment systems, long overlooked or underfunded, can rebound with the right attention and technology.

As the lagoons in this system are very shallow, the TITUS® FL-4 Floating Aerator was used in this project and operates with a side-draw intake and a durable, self-contained design that reduces volatile solids significantly, while protecting the lagoon liner. Its floating platform allows it to function even in high-sludge environments, and it can oxygenate water at impressive distances.

St. Stephen permanent structure pond in summer.

For a system that once relied on patchwork repairs and outdated machinery, the contrast has been dramatic. Still, the setup remains a work in progress. The current system, while stable, isn't fully optimized. Power supply upgrades and additional monitoring are still needed. To address potential outages, vibration monitors were installed that can automatically restart the aerators if they shut down.

And yet, even running at half speed, the system has proved itself.

"I went out the summer after installation and tested dissolved oxygen levels all around the lagoon," said Titus. "Top, bottom, everywhere, we were at 8 mg/L."

RECLAIMING A COMMUNITY ASSET

For Father Drew, the impact is both environmental and spiritual. The lagoon is no longer a problem to manage, but a symbol of renewal.

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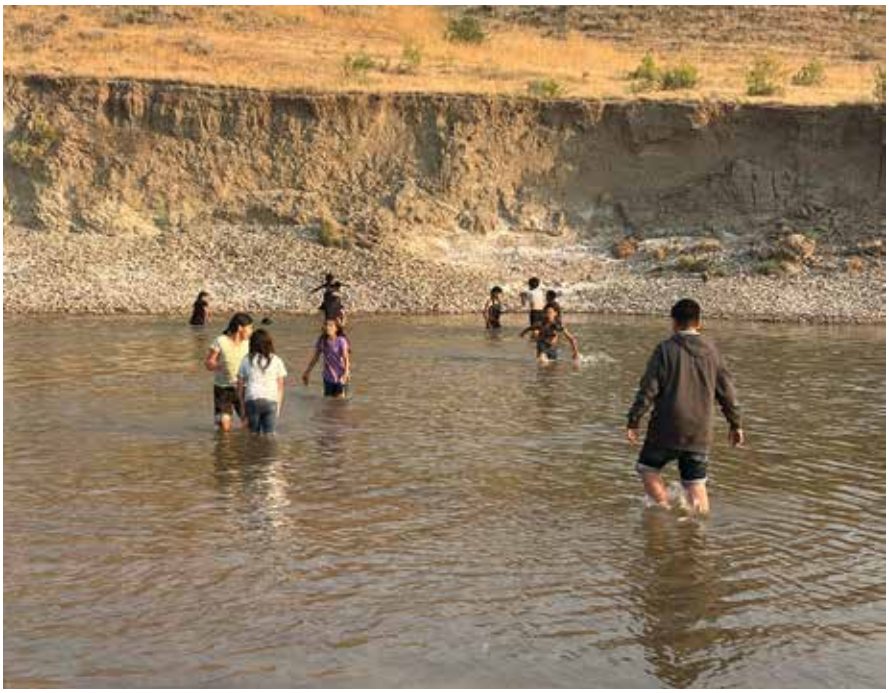

Nearby Wind River (30 yards) has now returned to being a popular recreational area for the local community.

"I can't say enough about how much better things have been," he said. "No odor. No breakdowns. The kids swim near there now. It's gone from being something we dreaded to something that just works."

And perhaps most tellingly, the wastewater system, once the site of frequent complaints and emergency repairs, is now something few people even notice. "That's the best compliment of all," said Father Drew. "It does its job, quietly."

Suzan Chin-Taylor, MSc is an international entrepreneur, author, course creator, podcast host and speaker who helps manufacturers, contractors, and service providers in the wastewater, stormwater and water sectors stand out, tell their story and drive demand. •

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