

# They Had a Hammer

An aerobic bacterial generator helps a designer and installer replace a failed mound system on a Native American reservation in northwest Wisconsin

By **Scottie Dayton**

Onsite systems installed 35 years ago as part of a work program on the Bad River Indian Reservation in Ashland, Wis., were failing from age. Because many systems were next to the Bad River or tributaries feeding Lake Superior, tribal elders worked with the U.S. EPA and Indian Health Service to replace them.

A typical system was a two-bedroom mobile home and a three-bedroom house on the same lot. When the mound near the mobile home failed, the owner rerouted the lateral to surface discharge 10 feet behind the building and near a ravine draining to the Bad River. The house had effluent ponding from two rusted steel septic tanks.

William Baudhuin, P.E., R.L.S., of Baudhuin Engineering in Sturgeon Bay, Wis., designed the replacement system. Tony Brown, of Brown Plumb-

ing and Heating in Ashland, won the bid to install it.

Baudhuin specified Xypex, a concrete admixture, to increase the life expectancy and impermeability of the tanks. Because of the tight quarters, he also specified a Sludge-Hammer aerobic bacterial generator to pretreat the effluent before the mound.

"The system had to fit in a 60-foot-wide space between the two driveways," says Baudhuin. "I had no room for individual systems." Pretreatment also enabled him to reduce the mound's footprint by one-third. The system, now in compliance, is producing effluent with 30 mg/l BOD and TSS.

## Site conditions

Soils are loam. The high seasonal water table is 21 inches below grade. The topography is low and flat.



Shawn Hoppwood, left, from Wieser Concrete and Jake Baudhuin from Baudhuin Engineering set the 5-foot-tall risers on the 1,800/1,100-gallon triple septic tank. (Photos courtesy of Brown Plumbing and Heating)

## System Profile

<b>Location:</b>	Ashland, Wis.
<b>Facility served:</b>	Bad River Indian Reservation
<b>System designer:</b>	William Baudhuin, P.E., R.L.S., Baudhuin Engineering Inc., Sturgeon Bay, Wis.
<b>Installer:</b>	Tony Brown, Brown Plumbing and Heating, Ashland
<b>Site conditions:</b>	Loam soils; high seasonal water table 21 inches below grade
<b>Type of system:</b>	S-86 aerobic bacterial generator, SludgeHammer Group Ltd.
<b>Hydraulic capacity:</b>	750 gpd

## System components

Baudhuin designed the system to handle 750 gpd. Its major components are:

- Low-profile 1,800/1,100-gallon septic tank with aerobic, effluent, and pump chambers from Wieser Concrete.
- S-86 aerobic bacterial generator, SludgeHammer Group Ltd.
- PL-525 effluent filter, Polylok.
- WEO 512 high-head 1/2 hp Goulds pump.
- EPS foam, Mikey Block.
- 140 feet of EZflow by Infiltrator geosynthetic aggregate from Infiltrator Systems.
- Control panel from SJE-Rhombus.

## System operation

The 111-foot-long 4-inch lateral from the mobile home enters the north side of the 1,260-gallon aero-

bic chamber. The 75-foot-long lateral from the house ties in from the south. The aerobic generator, sitting on the bottom of the tank, has 150 square feet of surface area on which proprietary bacteria colonize.

An air pump at the surface introduces oxygen into the unit. The resulting vigorous circulation directs wastewater through the generator at 15,000 to 20,000 gpd, ensuring that the liquid is processed 20 times in 24 hours.

Treated clear water flows into the 540-gallon effluent filter compartment before entering the 1,100-gallon pump chamber. The pump runs five times per day, delivering 500 gallons to the mound. The microbes digest the nutrients in the effluent so completely that nothing remains to create a biomat.

The 88- by 32-foot mound has a 2-inch PVC force main supplying





**EZflow by Infiltrator media is shown in the 4-foot-wide trenches.**



**Project manager Greg Brown from Brown Plumbing and Heating uses a laser to set the elevation on a 4-foot-wide trench.**

two 70- by 3-foot zones six feet apart, each with three 12-inch drainage bundles. The center of each bundle is a drain tile housing 1.5-inch Schedule 40 perforated PVC pipe with 3/16-inch orifices three feet apart and facing down.

On either side of the drain tile is a 12-inch-diameter bundle of lightweight geosynthetic aggregate. Polyethylene netting holds the trio together.

### Installation

Project manager Greg Brown and crew collapsed and abandoned the existing tanks and tore down the existing mound, using its sand for bedding the septic tank and backfilling. "One thing we discovered that led to the mound failures was that they contained no rock," says Brown. "They were pure sand with one distribution pipe running through the center."

Using the backhoe bucket, the



**Greg Brown sets observation ports in the mound. Geotextile fabric covers the media.**

operator plowed the rows for the mound, pulling up the soil and folding it over in furrows. "The site had no slope," says Tony Brown. "The elevation was 607.98 feet on one end of the mound and 608 feet on the other." The men built up the grade with six inches of C-33 washed sand. The west end of the mound was 10 feet from the highway right-of-way.

Les Dykstra of Dykstra Construction in Ashland excavated the trenches for the drainage bundles, while Brown's crew slipped 10-foot lengths of perforated pipe into the drain tile housings. After plumbing the field, they laid geotextile fabric over the bundles and extended it two-thirds of the way down the sides. "We capped the mound with six inches each of sand and topsoil on the top and six inches of sand along the sides, then seeded it," says Brown.

Dykstra, meanwhile, excavated

the hole for the septic tank 20 feet east of the mound and hit water. "It was hard to hold the ditch," he says. "The soil below four feet was spongy and the sides of the excavation kept caving in. We continued trenching back until we had a 10- by 20-foot hole five feet deep for an 8.5- by 15-foot tank."

After Brown's men bedded the hole with 24 inches of sand, a Wieser Concrete crane operator lowered the tank. "We had to set it deep to accommodate the lateral from the house, which came in at 46 inches," says Brown. "To prevent hydraulic pressure from pop-

ping the tank out of the ground, we mounded topsoil on top of it, then extended the three risers 18 inches." Setting the SludgeHammer required hooking up the air pump and inoculating the unit with a microbial stick that started the colonies growing.

Excavating the trenches for the building laterals and laying the 4-inch PVC pipe was time consuming. "We had to insulate all 186 feet of pipe with Mikey Block," says Brown. "The Ashland distributor, LDC Cattle Co., cut the 2.5- by 9-foot-long by 4-inch-thick foam for us. We laid the pipe in the trench, backfilled with six inches of sand, laid the insulation over it, and covered it with topsoil."

After soil structure, Brown's second biggest issue was soil settling. "I'm still returning to the site to top it off, especially around the tank," he says. The system was installed in two days.

**"The site had no slope. The elevation was 607.98 feet on one end of the mound and 608 feet on the other."**

**Tony Brown**

### Maintenance

Brown Plumbing and Heating has the one-year maintenance contract. Once the remaining systems are installed, Brown and Baudhuin will sponsor an operation and maintenance training session for the homeowners.

"We don't want them unplugging aerobic generators or pushing buttons on control panels," says Brown. "We've already had two alarms because the mobile home had a leaking toilet. The septic tank was taking on twice as much water as was time-dosed to discharge." Since the leak was stopped, there have been no more alarms. ■

### MORE INFO:

**Goulds Pumps/ITT**  
315/255-3378  
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