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Rehab for a Rehab Center

A microbial inoculator generator is at the heart of a remediation project for a large system at an upstate New York care center for homeless men

By Scottie Dayton

Two single-pass buried sand filters with direct discharge to a protected trout stream failed an 80-bed rehabilitation facility for homeless men in upstate New York. About 100 yards from the buildings, a thick cake of raw sewage covered the ground, attracting swarms of insects.

The local health department cited the charity organization in charge of the facility. Lacking money for repairs, they faced fines or being closed down. Mark Noga, president of Knight Treatment Systems in Oswego, learned of the predicament and proposed a benefit project to the onsite community.

> "Because the system was designed properly and had worked since 1973, remediation was the most cost-effective and expedient solution."
> **Eric Murdock**

Noga provided microbial inoculator generators. Eric Murdock, P.E., owner of Onsite Engineering in Syracuse, handled regulatory issues and acted as project engineer. HiBlow USA donated linear air pumps, and SJE-Rhombus furnished the control panel.

"We assumed that pharmaceuticals killed some of the biology and initiated the failure," says Murdock. "Because the system was designed properly and had worked since 1973, remediation was the most cost-effective and expedient solution."

By not altering the design or dispersal method, Murdock also avoided going through another permitting process. The auxiliary components were installed in one day. Within 31 days, 95 percent of the ponding had dried up, and the area could be mowed for the first time in months.

Soils

Subsurface investigation was unnecessary.

System components

The original system was designed to handle 11,250 gpd. Major components including retrofit are:

- Two existing concrete grease traps
- Existing 21,500-gallon two-compartment concrete septic tank
- Existing 5,500-gallon two-compartment concrete pretreatment tank

The second compartment of the wet well has four effluent filters installed in 1986. (Photos courtesy of Knight Treatment Systems)

SYSTEM PROFILE

Location:	Upstate New York
Facility served:	Rehabilitation center
Engineer of record:	Eric Murdock, P.E., Onsite Engineering, Syracuse, N.Y.
Installer:	Mark Noga, Knight Treatment Systems, Oswego, N.Y.
Site conditions:	Subsurface investigation unnecessary
Type of system:	White Knight Microbial Inoculator Generator systems, Knight Treatment Systems
Hydraulic capacity:	11,250 gpd

ABOVE: An air hose feeds a diffuser in the dosing station to prevent the water from going semi-anaerobic. RIGHT: A staff member checks one of the four effluent filters. The electrical service panel is on the pole in the background.

with Model WK-78 White Knight Microbial Inoculator Generator system from Knight Treatment Systems in the second compartment
- Cast-in-place wet well with an existing Goulds recirculation pump in the first chamber and four existing effluent filters in the second compartment
- Cast-in-place dosing station with existing Goulds pump
- HP-80 and HP-150 linear air pumps from HiBlow USA
- Two 93-foot-square sand filters, each with 15 4-inch PVC perforated laterals
- Installer Friendly Series programmable duplex-demand time-dosed control panel from SJE-Rhombus

System operation

Split flows from the grease interceptors and bathrooms drain by gravity through an 8-inch Schedule 40 PVC main to a wye, then to the septic tank and pretreatment tank. The first compartment of the pretreatment tank allows more solids to settle before effluent drains into the second chamber for treatment by the microbial inoculator generator. The unit has tubular media inside two 27.5-inch-high by 16-inch-diameter high-density polyethylene columns fixed above two fine-bubble membrane diffusers.

"We added auxiliary diffusers because water sitting in those chambers could go semi-anaerobic while waiting to move somewhere else. Once we introduce oxygen, we want to keep the effluent aerobic through dispersal."
Eric Murdock

The diffusers, with 11 feet of static liquid over them, send a stream of bubbles from the bottom of the tank to oxygenate the water and distribute the introduced aerobic and facultative bacteria. The bacterial cultures reproduce rapidly as they digest organic matter and nitrogen.

"Natural bacteria found in wastewater, such as the coliform group, are not as aggressive at decomposition as the pure cultures," says Noga. "They also tolerate a wider range of temperatures."

Liquid flowing into the pretreatment tank displaces microorganism-laden water out the other side and into the 72-inch-square by 72-inch-deep wet well. The pump in the first chamber cycles 12 times a day for 15 minutes, sending 600 gallons per dose back to the septic tank. For the remainder of the day, flows cascade over the dividing wall into the second compartment, then drain through the effluent filters to the dosing station.

Every hour, the dosing pump runs for two minutes, alternately sending 160 gallons to the distribution boxes, one per sand filter. The rejuvenating system is meeting discharge permit limits.

Installation

The septic tank had been pumped three months previously and was not an issue.

Facility staff and residents dug the 50-foot-long, 12-inch-deep trench for the airlines. The maintenance worker removed the old control panel, installed the new one, and tapped into a breaker at the electrical service panel to provide power to the recirculation pump.

Noga and his technician lowered the two 40-pound columns via their tethers to the floor of the pretreatment tank, then inoculated each one with a packet of ISO-500 bacteria. They brought the flexible hoses from the units into the riser and connected them to the air supply manifold fed by the HP-150 pump delivering 5 psi/4 cfm.

"The greater the depth, the more efficient fine-bubble diffusion becomes because of increased oxygen uptake," says Noga. "A high volume of air is unnecessary." It took less than 30 minutes to install both columns.

The HP-80 pump, delivering 2 psi/3 cfm, aerated the wet well and dosing station via two feeder lines to auxiliary diffusers. "We added auxiliary diffusers because water sitting in those chambers could go semi-anaerobic while waiting to move somewhere else," says Murdock. "Once we introduce oxygen, we want to keep the effluent aerobic through dispersal."

Mark Noga checks the water quality at a distribution box.

Murdock asked the facility staff to install a water meter to monitor usage. "They used slightly more than 4,000 gpd, but reduced it to about 3,000 gpd by repairing leaking fixtures," he says. "That helped the system dry out faster."

Maintenance

Knight Treatment Systems holds the maintenance agreement. Twice a year, a technician checks the columns for restrictions, removes any biofilm on the fine-bubble diffusers, checks the air connections, cleans the effluent filters, and re-inoculates the system to mitigate any potential for upset.

He cleans or replaces the air pump filters as needed and the diaphragms every three years. Under New York state regulations, the tanks are checked annually and pumped when solids reach 25 percent of the total capacity. Murdock samples the system annually to meet the surface water discharge ordinance.

MORE INFO:

Goulds Water Technology
866/325-4210
www.completewatersystems.com/brand/goulds

HiBlow USA
734/429-5618
www.hiblow-usa.com

Knight Treatment Systems
800/560-2454
www.knighttreatmentsystems.com
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888/342-5753
www.sjerhombus.com
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