

Onsite leachate treatment system delivers big savings to Monroe County, Ind.

Problem: Meeting regulations for leachate became a costly endeavor for an Indiana landfill.

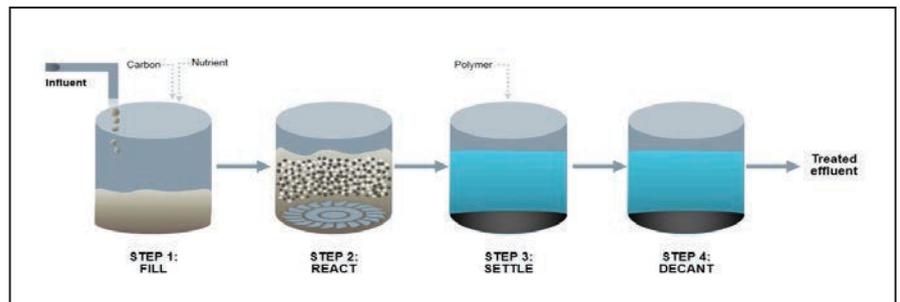
Solution: A simple onsite leachate treatment system delivered savings for the long term.

As stormwater drains through collected materials on land such as waste at a landfill, it becomes leachate, which can accumulate many kinds of toxic compounds.

During the 1980s and 1990s, increasingly rigorous regulations were put on U.S. landfills to protect groundwater from leachate contamination. Landfills had to design, engineer, and build drainage and collection systems to capture leachate, and they had to determine how to treat it. Most chose to transport leachate using trucks or pipelines to the nearest publicly owned water resource recovery facility (WRRF), but Monroe County, Ind. – home to 140,000 residents – decided on a more cost-effective, onsite approach.

Continuing compliance needs

Monroe County had a problem experienced by many municipalities throughout the U.S. In 2004, it decided to start closing the landfill it had opened in 1971 and outsource solid waste management. Even though the landfill was closing, the county had to continue collecting and processing an average of 22,710 m³/yr (6 million gal/yr) of landfill leachate for decades to come. Although



This diagram shows the steps of the Siemens batch PACT treatment steps. Siemens Energy, Inc.

hauling costs were less than half the national average and the county paid residential rates for wastewater services, continuing to haul its leachate to the local WRRF for treatment and disposal would be expensive.

The landfill, located about 16 km (10 mi) outside of Bloomington, Ind., consists of a 20-ha (50-ac) municipal solid waste section and a 2.8-ha (7-ac) construction and demolition section. In 2004, it stopped accepting public waste but still experienced issues with compliance, often because of leachate, said Tom McGlasson Jr., executive director at Monroe County Solid Waste Management District. To remedy the issues, the county updated the landfill's clay berms and installed new clay berms around the leachate collection system.

Leachate handling process become outdated

At first, the landfill pumped leachate from the collection system into a holding pond and transported it to the local WRRF using

septic haulers.

"But the holding ponds would occasionally overflow, resulting in compliance issues," McGlasson said. "In those years, they often needed to be running 24 hours a day, so their ability to keep up with the leachate flow during those times was a concern."

Hauling costs recently increased by 33%. Hauling leachate to the local WRRF costs about \$50 for 3800 L (1000 gal), McGlasson said. If the county still hauled all of the landfill's leachate to the WRRF for treatment, he estimates it would cost \$270,000 a year.

"We have a lot of seasonal rainfall variability in the spring and fall that adds to our leachate generation," McGlasson said. "Compounding that is the major construction that's been going on for about 2 years on the highway between our leachate pond and our wastewater treatment plant, which requires the trucks to take much, much longer to make their trips and keep up because of all the delays."



Landfill leachate is shown after it has gone through treatment. Siemens Energy, Inc.

Finding a simple, effective, and reliable treatment solution

McGlasson began investigating different options for onsite treatment in 2008. He said the county lacked the space and money to install such traditional treatment technology as clarifiers and trickling filters. “We also looked at a constructed wetland, but that was cost-prohibitive too, costing between \$1.5 million and \$2 million,” he added.

One solution stood out: Siemens Energy, Inc. PACT® (Powdered Activated Carbon Treatment) system. It uses a combination of powdered activated carbon and aerobic bacteria to adsorb and metabolize leachate contaminants in a single stage. The system reduces settling time compared to conventional activated sludge systems. This produces a much clearer effluent in a fraction of the time. This speed helps process batches faster during seasonal rainfall events. The

system releases clear water effluent into a stormwater ditch that empties into a local creek.

The county favored the Siemens solution for its low cost, ability to accommodate a small footprint, and ease of operation. The system could handle the county’s leachate, which can be highly variable in volume or occasionally contain shock loadings.

“Siemens reputation and financial strength helped, too,” McGlasson said. “We knew we could count on the company being around decades from now.”

The county installed the system at the landfill in spring 2009. Company engineers set up the system, trained employees how to operate it. The system “was easy to learn because of its simplicity,” McGlasson said. “We were most pleased.”

The landfill now treats between 64% and 79% of its leachate onsite, continuing to transport the remaining to the local WRRF.

The Siemens PACT system is housed in a 6- X 12-m (20- X 40-ft) shelter with a 7-m (24-ft) ceiling. The enclosure helps control temperature, which is critical in winter when wide temperature swings and extreme cold can diminish or extinguish the biomass. The system can treat as much as 144 m³/d (38,000 gal/d) during peak flows. Its automated programmable logic controller-driven control system was adapted to provide remote operation and alerts, which contributed to its ease of operation, McGlasson said.

Compact system provides straightforward operation

The system is easy to use and maintain, said Lee Paulsen, the environmental compliance and landfill director, who oversees day-to-day management of the landfill’s leachate.

“The PACT process is straightforward,” Paulsen said. “A float in the PACT tank

triggers a pump that fills the tank. The PACT tank first undergoes an aeration cycle. Then, the aeration automatically turns off and a polymer coagulating agent is added to expedite the settling of the sludge and suspended solids.”

Since the system began operating, the landfill has exceeded its permits only once due to an algae bloom on the holding pond. This “had nothing to do with the PACT treatment system,” Paulsen said.

Maintenance requirements for the system are minor. “Once every couple of years, we drain the tank, suck out all the sediment and clean aerators,” Paulsen said. “And I clean out the polymer tub once a week.”

The system provides operating flexibility in handling various loads of leachate and variability in its composition. “Our top concern is avoiding any leachate overflows,” Paulsen said. “But the PACT system gives us plenty of flexibility to process different volumes and different leachate constituents.”

Onsite treatment saves money

The system has produced significant savings for the county. Treating leachate onsite saved \$93,000 in 2016 and \$77,000 in 2017. And with the jump in hauling costs, savings were predicted to be even higher in 2018.

“Onsite leachate treatment is about half the cost of hauling it offsite,” McGlasson said. “Even though we still have to haul, we’re pocketing substantial savings.” This will be important because the landfill has to monitor leachate for another 20 years. “That’s a lot of savings we can redirect to citizen services and making Monroe County an even better place to live,” he said. ■

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