

Keeping Odor Under Control

Aeration technology allows for effective odor control in a variety of storage ponds

By Ed Sullivan

One of the most critical requirements of wastewater management—the prevention of odors escaping from storage ponds—is so problematic that it is a disaster-waiting-to-happen for many facilities. Even occasional lapses in maintaining an effective odor cap can have dire consequences.

For example, when the turbulence caused by brush aerators releases aerosols and bacteria-laden mist into neighborhoods, the risks can be dreadful: serious health hazards, public outrage and even shutdowns.

Such scenarios are not limited to sludge storage ponds. Industrial storage basins holding manufacturing effluents and even rainwater, contain odor-producing sulfurous compounds (e.g. mercaptans/thiols) that can waft over communities unless capped effectively.

“We are very concerned about maintaining an odor cap,” said David Williams, project engineer at Shell Oil (Shell Manufacturing) Martinez Refinery, California. “Our treatment pond is about 1/4 mile from a residential community. We’ve got a delicate situation where even just a slight amount of odor could arouse complaints from the community. So, we keep a close eye on it.”

William’s concern about odor control led him to a new aeration technology to replace two brush aerators that had been installed in the Martinez refinery pond. These rental units were unreliable and were attributed to incidents that produced odor complaints from local residents.

The need for a reliable technology

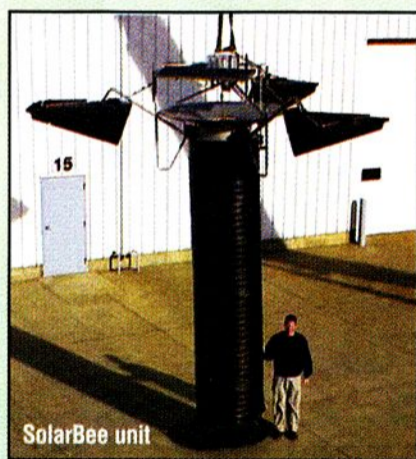
Although in wide use, the failure of brush aerators to provide a continuous odor cap is unfortunately not a rare situation. Brush aerators often do not provide an odor cap to the edges of a pond, in which case putrid gases can escape into the air.

Moreover, the turbulent action of brush aerators can disturb pond sediment, causing bacterial oxygen demand (BOD) to rise and eat away the odor-insulating oxygen blanket, and even cause the formation of sludge islands at the surface of ponds.

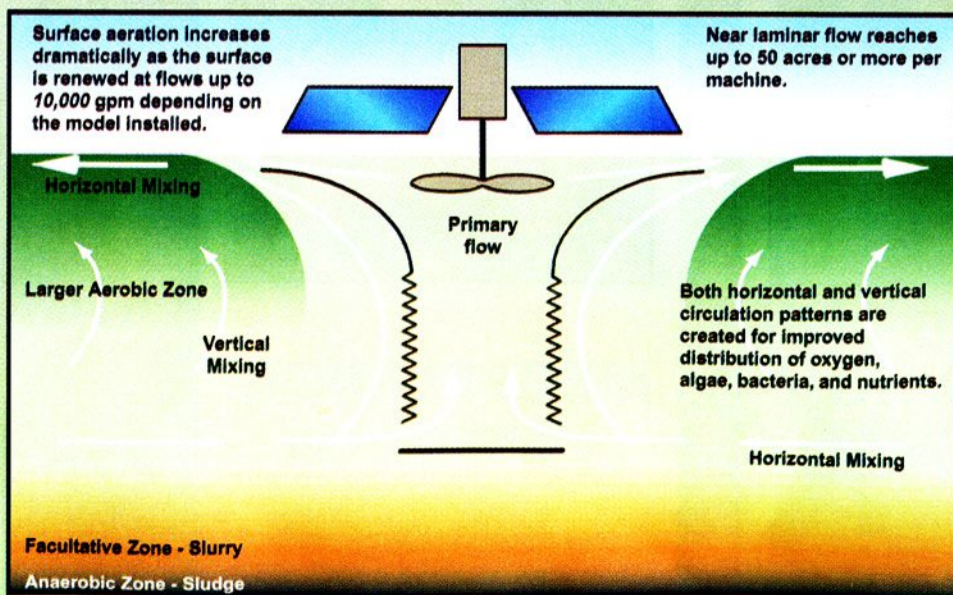
Worse yet, brush aerators can whip up aerosols and potentially harmful bacteria that can be carried by winds into surrounding neighborhoods.

The need for a technology that assures reliable odor control has led wastewater managers to use some extraordinary methods for covering and dispersing odors from sludge storage basins and anaerobic ponds.

Some plants are spraying or injecting deodorizers to “neutralize” rank vapors or installing costly blower systems to filter odorous compounds from the air. A few facilities have installed multi-million-dollar windmill arrays to disperse odors upward into the air and (hopefully) away from the community.



SolarBee unit



Mechanism of operation for the SolarBee system.

ponds, whether industrial or municipal.

The circulator solution

At the Shell Oil Martinez Refinery, Williams found a new technology that could provide reliable odor control. The solution was SolarBee, solar-powered water circulators that aerate ponds by circulating just the top 2 ft of the pond at a rate of up to 10,000 gpm.

This circulation occurs with a gentle, “near laminar” long-distance flow pattern that provides an oxygenated odor cap across the entire surface 24 hours a day.

“The SolarBee installation gave us a good opportunity to shift the paradigm in pond aeration,” Williams said. “In a bigger sense it gave us an opportunity to take a look at the way we do business, and we’ve really shifted from having an expectation that to aerate a pond you need a brush aeration system or to use a fossil-fuel, power-intensive method.”

Engineered as a self-contained system by Pump Systems, Inc. (PSI), SolarBee units are powered by solar panels manufactured by Shell Solar, Royal Dutch Shell’s global photovoltaics division.

This “circulator solution” also provides impressive cost savings for the Martinez facility.

“Because the wastewater pond is at a remote location, we had been using rented diesel generators to power the brush aerators,” Williams explained. The total rental costs for testing that system was about \$15,000 a month. The alternative of powering the site from the grid would have cost up to \$150,000 due to the remote location and electrical classification.

The units have the additional bonus of saving \$10,000 per year in energy costs over the alternative of hard-wired aerators.

“What we have today, at about half the cost of the electrical motors alone, is an environmentally-friendly system that avoids the use of hard power and provides a working relationship between Shell Solar & Shell Manufacturing, plus significant dollar savings,” Williams said.

Effective odor control for all types of ponds

Williams reported that since the installation of the circulator systems, Shell Manufacturing’s Martinez wastewater pond “has had zero odor complaints due to inadequate aeration.”

Equally impressive are the results that have been achieved using this approach at numerous industrial and municipal ponds, according to Williams.

In Discovery Bay, Calif., a wastewater treatment plant constructed in 2003 was equipped with two brush aerators that were anchored from shore in each of two lagoons. Gregory Harris, a partner at Herwit Engineering, the designer of the facility, said the brush aerators began to fail after a year.

“The floats on them became corroded and began to leak,” Harris said. “Then two of the units sank. Naturally, we were pretty unhappy with the aerators’ performance. Plus, they sprayed water all over the place and consumed a lot of electric power. But we had to do something to aerate the surface of the water, or we would have at least occasional odor problems from the sludge ponds.”

Harris looked at the SolarBee circulation system, which he had heard was effective at aerating pond water and controlling algae.

“We did not have a heavy biological load but thought it might be a good aeration solution for odor cap,” he said.

The Discovery Bay facility was able to take advantage of rebates from a state energy conservation program, the California Wastewater Optimization Program.

“We were able to turn off the two aerators that were still operational,” Harris said. “We installed two SolarBees in August 2004, and they have worked well ever since. We’ve taken DO

In other cases, chemicals such as hydrogen peroxide have been poured into ponds in order to re-aerate surface waters and fortify odor caps.

Such dramatic investments and exceptional methods demonstrate the unquestionable need for odor control at wastewater storage



In June 2002, the City of Englewood, Colo., installed a SolarBee unit in its 80-million gal drinking water reservoir for blue-green algae control.



The Palmdale (Calif.) Water District had been using up to 3,000 lb of copper sulfate powder per week to control algae growth in its 4,130 ac-ft lake until it put in a Solar Bee unit.



Emery Lake, Calif. has seen an increase in catfish, bass and red-eared sunfish, since installing a circulator.

samples from the water, and the lowest we've seen has been 3 mg/L. Also, the pond was saturated with algae after the two brush aerators sank. Now there is no algae in the water."

"Based on performance that we have seen, from the combination of the energy that the district is saving plus the rebates we're receiving from the state, the payback

on the SolarBee units will be less than two years," he added.

In another case, the city of Myrtle Beach, S.C., was spending \$30,000 to 50,000 per year for deodorizer, which was sprayed into the air in an effort to contain wastewater odor problems that had residents up in arms.

"This raw sewage pond was originally equipped with a bubble (diffuser) aeration system at the bottom of the 48-ac pond," explained Michael Lipparelli, SolarBee regional sales manager.

"That aeration was supposed to keep everything suspended so that sludge would not build. Yet, they found themselves in a situation where the diffuser aerators were throwing the sludge and odors up toward the surface of the pond, where it would gas-off and waft over the city," Lipparelli said.

A few months ago the Myrtle Beach facility had two SolarBee units installed. Within a few weeks these circulators had built an odor cap that was sufficient to eliminate the need for spraying and allowed the facility to turn the bubbler system off, thereby gaining additional savings on energy costs.

"Many times engineers design a pond where it is known that there may be odor capping issues," said Joel Bleth, president of PSI. "Other times, odor problems occur because of unforeseen conditions, such as changes in manufacturing processes that produce organic effluents, or population growth that creates pond oxygen demand beyond what most aeration systems can handle with consistent reliability."

Bleth added that many industrial wastewater managers may not be aware that the effluents of their processes may cause severe odor problems that could lead to a crisis.

"Wineries, pulp processors, manufacturers, food processors—all produce organic waste," Bleth said. "Wastewater pond managers try various sorts of systems and chemicals to prevent an odor crisis, but even an occasional failure of an odor cap can result in an air quality citation in a very brief time, especially in heavily populated areas." **WWD**

Ed Sullivan is a technical writer based in Hermosa Beach, Calif. He can be reached by e-mail at edsullivan7@netzero.com.

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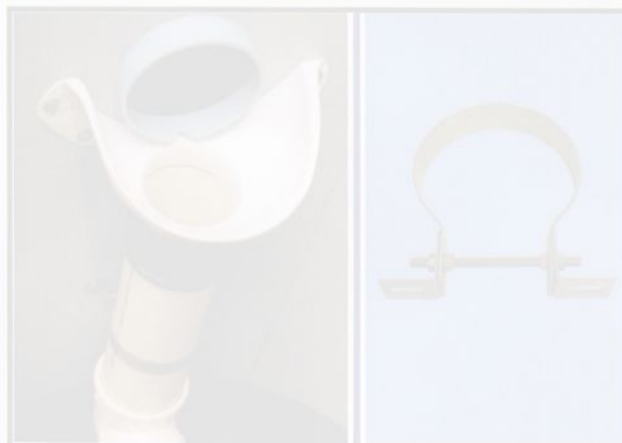
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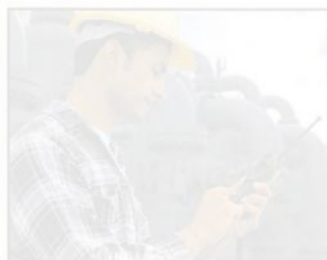
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