One hurdle faced by many U.S. businesses that utilize surface impounds or wastewater control systems is viable outdoor odor management. With few effective and affordable industrial odor suppression options, businesses often locate far from urban centers, but odor can still impact people living near the facility. However, some companies have successfully employed a new technology, which uses engineered mist to deliver a wide range of treatment agents to control odor molecules.

Michigan Sugar, the third-largest beet sugar processor in the U.S., was facing wastewater odor issues with its wet surface impound. Producing approximately 1.3 billion lb of sugar each year, its products include granulated sugar, powdered sugar, brown sugar and liquid sugar, which are sold in wholesale and retail quantities under the Pioneer Sugar and Big Chief Sugar brands. The largest of four Michigan Sugar plants, the Bay City factory processes 8,700 tons of sugar beets per day—1.5 million tons per year—during its 200- to 220-day production campaign, yielding more than half a billion lb of sugar annually.

With company owners and employees all living in and around the areas where the facilities are located, management is acutely aware of its role as a corporate citizen. “We have always strived to be a positive force in the communities where we operate, and to demonstrate responsible environmental stewardship,” said Bay City Factory Manager Gary Witzgall. “We believe that we can have the greatest positive impact by supporting issues and causes that are important to our grower-owners, neighbors and employees right in their own communities.”

**Mitigating Odor**

As part of that philosophy, company officials take a number of proactive measures to control the inevitable odor that accompanies sugar beet processing. The first step is washing the incoming
stock, catching the debris and depositing it into a settling pond. Effluent moves through several purifying stages—including anaerobic digestion, aeration and clarification—while microbes feed off the residual sugar and effectively clean the water.

One detail that differentiates the manufacturing operation at the Bay City plant is an additional step. “In most sugar beet factories, at the end of the process you have the final product with a quantity of molasses left over,” Witzgall explained. “We process that molasses again in a special operation to extract even more sugar. It helps us maximize our resources and reduce waste.”

At the end of the process, a slurry is created with water jets to allow the remaining settled solids to be pumped into tanker trucks. The mixture is recycled by transporting it back to the fields, where it is injected into the soil as a nutrient-rich organic fertilizer. The disturbance from the high-pressure water jets tends to release large amounts of odor vapor as the liquid reaches the proper consistency. Although the perimeter misting system forms a barrier surrounding the ponds, it does not reach far enough to interact with the odor at its worst, as it is being generated.

The atomizer nozzle creates an engineered fog of tiny droplets, which travel with the odor vapor.
To supplement the perimeter system, the company first attempted to mitigate the odor from slurrying by using atomized mist equipment designed for snowmaking. While the unit had some beneficial effect, plant operators felt that it was not sufficient, so operations personnel began searching for a better technique to improve odor control. During that search, they contacted Dust Control Technology (DCT), supplier of the OdorBoss brand of odor control equipment, and also visited a scrap yard where the firm’s equipment was being used to control odor in a large outdoor operation. They decided to rent an OB-60G for a month when the ponds were being emptied.

Re-engineering Odor Control

Inspired by DCT’s DustBoss line of industrial fan-driven dust suppression products, the OB-60G has been engineered to deliver a finer mist that is better suited to odor control. “We already had these industrial-strength, extremely durable designs that are very effective at suppressing dust,” said DCT President Laura Stiverson. “And both dust suppression and odor control are based on similar principles of matching the droplet size to its target. The closer the water droplet size is to the size of the odor vapor droplets, the more likely there will be a collision between the two.”

The system creates an engineered fog comprised of millions of tiny droplets as small as 15 μ in diameter (approximately twice the size of a human red blood cell), which travel with odor molecules on air currents. The OB-60G is designed to run either a pre-mixed solution or with an injection system that precisely meters in odor management additives for maximum effectiveness. The equipment is optimized for the company’s family of highly effective and environmentally safe treatment agents that control odor on a molecular level, but it will accommodate a wide range of additives.

Suppression is delivered by an open-ended barrel design containing a powerful fan on one end and the company’s Odor X Atomizer nozzle on the other. The device is mounted on a towable roadworthy trailer that is also fitted with a 500-gal water tank.

“We had been getting a rising number of inquiries about odor control applications,” Stiverson said. “There appears to be a growing need in a variety of different industries, and large-scale food processing operations are among them. As regulatory concerns and public
scrutiny continue to escalate, we feel that more companies will be looking at odor management as an increasingly important issue.”

**Mobile and Transportable**

The OB-60G can quickly be repositioned on its trailer to accommodate changing work locations or shifting wind patterns. Engineered to be moved and adjusted with changing conditions by a standard pickup truck or small skid steer, the low-maintenance unit runs for up to 16 hours on a single tank under normal operating conditions. The design can also be set for specific oscillation arcs and aimed precisely to intercept odor vapor where the concentration is highest.

“Since the unit is transportable, if there is a problem area or a drastic change in wind direction, the unit can be hitched to a pickup and repositioned,” Stiverson added. “It only takes a few minutes, and they’re back in operation.”

The water/treatment agent mixture is pumped from the tank by an integrated 10-hp air compressor through the single air nozzle, which atomizes the pressurized liquid. The cone of fog is propelled by a 25-hp electric fan generating 30,000 cu ft per minute, and the unit features a standard 359-degree built-in electric oscillator. In addition to its side-to-side oscillation, the unit also has a vertical angle adjustment between 0 and 50 degrees for expanded reach and precise aiming. A touch screen panel housed in a protective NEMA 3R cabinet attached to the side of the OdorBoss controls the device’s features.

With a strong policy toward corporate environmental responsibility and a close working relationship with the community, Michigan Sugar is continuously investigating additional solutions to odor emissions. “We take odor concerns voiced by the surrounding community very seriously,” Witzgall said. “We all live in the immediate area, so it’s more than an issue of following the regulations. We want to do what’s best for the community over and above merely staying compliant.”

**Bay City Impacts**

After running the unit 24/7 for a month at the Bay City plant, operators found it so effective that they decided to extend the rental for another month. “We’ve done a lot of homework on odor control systems, traveling across the country looking at different methods in action,” Witzgall said. “We haven’t seen anything with this kind of mobile, yet high-strength, platform. It does a nice job for us, and we plan to rent again next year.”

Odor complaints are down since implementing the unit, and visitors to the site have remarked on its effectiveness. “Odor management is a top priority for us,” Witzgall concluded. “Although it’s largely behind-the-scenes work, we are continuously making improvements to our process that help us better control the smell. That includes redesigning some of our piping routes, adding the perimeter misting system and experimenting with various filters.

“I suspect there will be millions in capital investments made in the next few years,” he said. “We’ve made some great strides, but we’re not stopping there.”

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