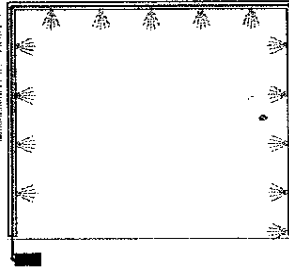
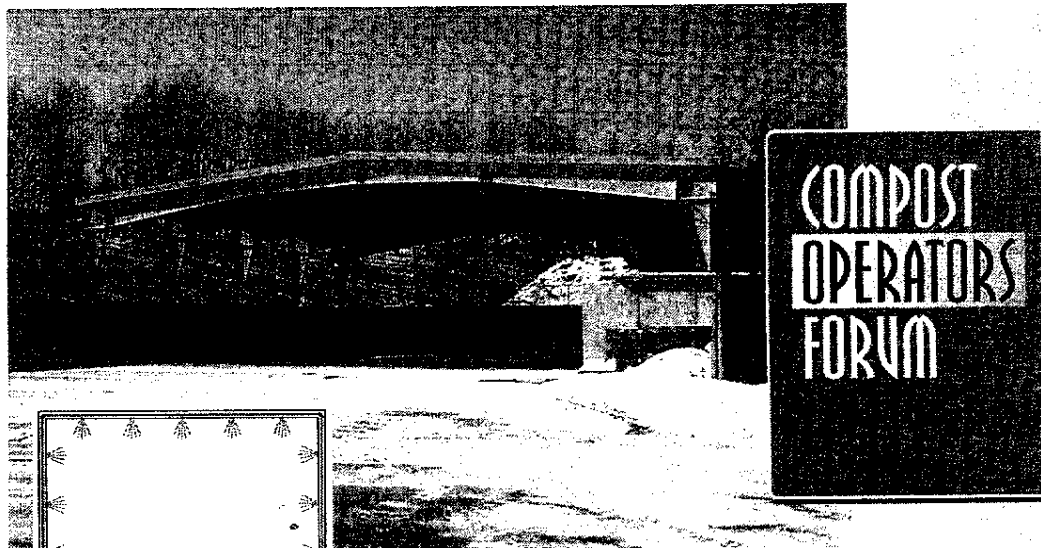


AS MANAGER of a composting facility in the middle of a “sensitized neighborhood,” Bob Spencer needed to know every trick in the book when it came to managing odors. Spencer worked at the WeCare Environmental LLC composting plant in Marlborough, Massachusetts (originally owned by Bedminster Marlborough), which was designed to process mixed municipal solid waste with biosolids. The plant is located at a wastewater treatment facility in a neighborhood where residents had battled a biosolids-only composting operation — eventually leading to its closure — a number of years before. “When WeCare began operating the facility in 2004, we were under the scrutiny of a community Odor Advisory Committee and the Massachusetts Department of Environmental Protection,” recalls Spencer, an environmental planning consultant based in Sterling, Massachusetts, who also works with Apple D’Or Tree, Inc., a regional green waste recycling and composting company. “Air sampling was being done weekly, with measurements taken from the biofilter, the roof of the biofilter building, the property line, and a downwind location.”

The WeCare plant came through the “restart-up” phase well, but being vigilant about treating all sources of odors was critical. Spencer’s toolbox included both the enclosed biofilter, as well as rapid odor treatment products. “I’ve mostly worked at plants where the active composting phases have been enclosed, with building air treated through biofilters,” he says. “Optimizing the biofilter’s performance and addressing obvious point sources of odors, e.g., tip floor, digesters, biosolids hoppers, screen-



Enzymes made by GOC Technologies react with bacteria in the composting materials to break down odor compounds. The product, applied topically on the windrow, typically is used in emergency and preventive situations.



For composting pads under cover, perforated pipes are mounted on the building poles (see illustration) to dose the air with Hinsilblon’s waterless vapor product made from essential oils.

Rapid Odor Treatment Options

Treating odors “on the spot” — topically, misting into air and in drains and collection carts — is a critical survival strategy for compost facilities.

Nora Goldstein

ers, had its own learning curve. But it is the less obvious sources that get overlooked, and can present significant odor challenges.”

The seams between the metal buildings and the concrete are a case in point. Condensation builds up on the interior walls, drips down and can ooze out along the seams. That concentrated condensate is highly odorous. At least once a week, Spencer had an employee put on a backpack with a 10 to 15 gallon tank and a sprayer. An odor enzyme product from GOC Technologies, Inc. was mixed with water and put in the tank. “It would take

about three hours to walk around the buildings and spray those seams,” says Spencer. “Sometimes we would spray incoming trucks and building doors as well. The treatment would last for several days, either long enough for the odor to disappear or until we had a chance to clean the area.” He adds that the backpack with tank cost about \$80.

The water traps in the biofiltration building were another odor source that took a while to discover. “We would smell an odor between the composting and biofilter buildings, and couldn’t identify where it



was coming from," says Spencer. "Eventually, we went on the roof of the biofilter building and smelled around the vents that were connected to the drains in the floor of the biofilter, which collect leachate that comes through the filters. What we discovered is that when the back pressure in the biofilter got to a certain level, the path of least resistance for the untreated air was down into the drains and up the vent pipes. So we had untreated building air coming out of those pipes. We built a trap in the well for the drains, and once a week, we would pour a liquid odor agent in the trap, which would treat that source effectively."

Topical Treatments

Space constraints at the Marlborough facility required that compost curing be done off-site. One of the first locations, when Bedminster Marlborough was operating the plant, was a gravel pit where the compost was stockpiled and then used to reclaim the pit. As the fresh compost was being unloaded, there was a distinct malodor emitted from the material. A resident living adjacent to the gravel pit would complain about the odors. "We solved the problem by purchasing a 55-gallon gas-powered liquid sprayer for \$1,200 at an agriculture supply store," recalls Spencer. "We would mix two ounces of a GOC product in with the water, and then spray the top of the piles with the mixture. The odor control effect was immediate, and it solved the problem."

More recently, he adds, the sprayer was called into action at a farm that was receiving loads of a protein sludge from a food processor. "The raw material actually smelled pretty good, but once it was put into windrows and started composting, it had a very unpleasant, pungent odor. The farmer was receiving several hundred tons/week of the material, and owners of several businesses on a commercial retail strip nearby were being affected by the odors traveling off-site. We brought the sprayer to the site and sprayed the surface of the pile, and it was very effective in eliminating the odors."

The GOC products utilize enzymes that react with bacteria in the composting materials to break down the odor compounds. "In a given situation, the odor compounds eventually will break down into CO₂ and water," explains David Hill of GOC Technologies. "Our formulas have been engi-



At some sites, all of the feedstocks are treated with the enzyme product (being sprayed above as material comes out of a shredder) prior to composting to both control odors and accelerate the degradation process.

neered by identifying what bacteria must be present to break down specific compounds, and what enzymes are needed along the way to react with those compounds. By understanding the decomposition chains, we can tell what gas will be produced as a by-product of a specific decomposition step, and what bacteria needs to be present to break down the next gas produced. The role of the enzyme is to be a catalyst for that decomposition to occur. The key to successful odor control is diversity of the microbial population and not allowing volatilization until most compounds have been degraded."

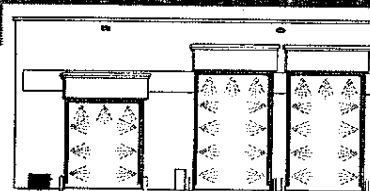
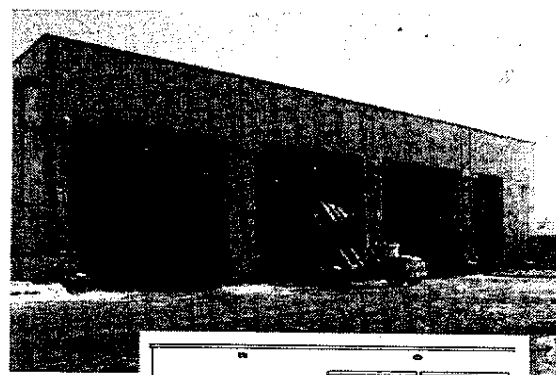
GOC has developed enzyme-based products for specific compost feedstocks, including manure, green waste, food waste and various types of municipal wastewater biosolids. The company now has about two dozen products that address a wide range of odor compounds. The product retails for \$45 to \$75/gallon, depending on the odor compounds to be treated. Typically 1- to 3-gallons of concentrate is needed per acre of square surface to be treated, depending on the intensity of the problem. "These products are typically used in emergency and preventive situations," says Hill. "So only selected areas are treated. When used topically, the average cost per ton will be less than \$.10. If a site chooses to treat every ton of material, the cost is \$.70 to \$.80 per ton but there are benefits beyond odor control to offset the costs." Those benefits include more complete degradation of the feedstocks, resulting in less rejects when the compost product is screened, he adds, noting that a composting site

in the United Kingdom processing green waste with some produce averages only 10 percent rejects after 14 to 16 weeks of composting (with three turns of the windrows). The dose rate is 2-ounces of concentrate per ton, with enough water added to make mixing possible. The product can be applied with spray bars as the material leaves the shredder; a few facilities apply it from spray bars mounted on the turner when the feedstock is mixed and turned the first time.

The enzyme products typically have a 3-year shelf-life as long as they are not mixed with water and stored. "When water is added, the product starts to degrade because bacteria in the water will begin to digest the product," says Hill.

Atmospheric Odor Control

An odor-neutralizing agent delivered in a vapor phase is another rapid odor treatment tool used at composting facilities. This is especially useful around building doors, or at composting sites that are open to the atmosphere. One upgrade WeCare Environmental made after purchasing the facility from Bedminster Marlborough, was to install the Hinsilblon atmospheric spray system around the doors of the tipping floor building. A similar system was also installed by WeCare Environmental at a biosolids composting facility it manages in Rockland County, New York. "When the overhead doors come up, spray nozzles come on and dose the air with a neutralizing agent," says Spencer. "We



The Vapor Phase Odor Control System is installed around building doors to treat odors that can escape via drag out fumes and crosswinds. The system (installed (top) and shown in the illustration) is activated each time the doors open and close.



have found that type of system works well for fugitive odor emissions that can't be captured and scrubbed through a biofilter."

The Marlborough plant has two rotary digester drums that mix compost feedstocks and initiate the composting process. The digesters have hatchways on the side that are used to access the drums for maintenance. To control fugitive odors during maintenance, WeCare purchased a mobile Hinsilblon unit that can be wheeled to the area where the air needs to be treated. "It is like a giant air conditioner on wheels," explains Spencer. "We plug it in and a fan comes on and doses the air with an evaporative agent. It is very effective at dosing the spot that needs odor treatment."

Hinsilblon's Vapor Phase Odor Control System uses a blend of essential oils that combine with the odor compounds in the air in various ways — by "combination," absorption, adsorption, interference, and oxidation, explains Chris Planker of Hinsilblon, Inc. With the door delivery system, 2-inch perforated pipes are mounted around the doorways to create an "odor curtain." When the doors open and close, a waterless vapor is released to treat odors that can escape via drag out fumes and crosswinds. The system can also be mounted on the building poles at covered but open-sided composting sites. At completely open-air facilities, Hinsilblon can install the perforated pipes on fence posts around the perimeter of the site.

Essentially, trace elements in the essential oils interact with molecules in the odor compounds to form nonoffensive odors. Explains Planker: "When working in combination, trace elements in the essential oils evaporate and get down to a molecular form that combines with molecules in the odor compounds, forming new molecules with different odor characteristics. "With absorption, the larger essential oil molecule absorbs the odor molecule. With adsorption, the two molecules attach to each other, forming a new molecule with different odor characteristics. Interference basically involves two odors canceling each other out. And finally, there is always a certain amount of oxidation going on. When dealing in the vapor phase, all of these interactions are occurring, so we're never exactly sure which interaction is doing the bulk of the work — whether the molecules in the odor compounds are degrading or being formed into new molecules with no odor that can be detected by the human nose."

Customers buying the essential oil chemicals do not have to pay for the vapor delivery system itself, he adds. The basic operating cost is \$1/hour for every 100 feet of air line, with a one horsepower blower for every 100-feet (or every 10,000 cubic feet per minute). Product usage is 6-gallons/month for every 100-feet of air line. The Hinsilblon website notes that the maximum effective treatment is 15 ppm of odorous compounds.

Collection Containers, Roll-Off Boxes

Another aspect of composting that can benefit from rapid odor treatment is feedstock collection, especially in commercial and institutional organics diversion programs. Food residuals begin to break down in the collection containers — toters, roll-off boxes, compactors — and can be a significant odor source. Bob Spencer discovered that a commercially available deodorant/absorbent, Zep Prevail, can be added to collection containers to effectively minimize release of odors. "I got the MSDS sheet on the product to be sure that it didn't contain anything that would compromise the compost quality," he says. "It is a nontoxic,

corn-based product, which comes in crystal or powder form; that basically is a masking agent. We have the generators throw the powder into the compactor each time they dump a load in from a barrel. Three scoops, 7- or 8-ounces each, can treat a 30 cy container." The product also can be added, in smaller quantities, to toters and collection barrels.

At the Marlborough plant, WeCare offers a container wash-out and deodorizing service to haulers for \$75/load. Trucks pull into the tipping building and unload. Then, with the back door of the roll-off still open, the seals are inspected and then a high-powered hose is used to "blast" the inside of the container. The wash-out water goes into a drain that is connected to the sewer system. "It is amazing how odors adhere to metal — it is like a biological scum," he adds. "Just rinsing out the compactors or roll-off boxes for three minutes, then throwing in three scoops of Zep Prevail, gets out the chunks of food waste lodged in the corners of the containers and removes the odors. The whole process — inspection of seals, wash-out and odor treatment — takes about five to ten minutes."

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