Controlling Odors in Solid Waste Composting Facilities

Though the municipal solid waste (MSW) composting industry has had both successes and failures in the past five years, public perception, particularly of odor problems, remains a major issue in MSW composting.

Severe odor problems were the major reason for shutting down three mixed waste composters in 1991 and early 1992—the Riedel facility in Portland, Ore.; the Trash Reduction System (TRS) in Des Moines, Iowa; and the Agripost facility in Dade County, Fla. (see Waste Age, June 1993, p.249). In May 1993, the Delaware Secretary of Natural Resources ordered the Delaware Solid Waste Authority (DSWA) to cease digester operations at the Delaware Reclamation Plant (DRP) in New Castle due to persistent odor complaints by nearby residents. Odors have also been the cause of serious regulatory review at other facilities, including those in Pembroke Pines, Fla., and St. Cloud, Minn. These experiences, affecting facilities of many different technologies and throughputs ranging from 60 tpd to 1,000 tpd, have raised significant concerns for solid waste managers around the country.

Technical, financial, and social factors all contribute to the odor problems that have plagued the composting industry. Proper planning before establishment of a facility will go a long way toward preventing problems that have caused plant shut-downs. The composting industry is learning from past experiences and is starting to pay

By Lori Segall and Adrienne Redd

Segall is a research associate with the Solid Waste Group at Tellus Institute in Boston. Redd is a freelance journalist based in Chalfont, Penn. and a previous contributor to Waste Age.
more attention to the following critical elements in facility planning.

**Develop facility siting policies**

As in real estate, the top three criteria for the success of a composting facility are location, location, location. Many state facility siting regulations call for a 200-500-foot setback from residences, schools, or other human activity, but this is not enough. Site topography must also be considered. Sometimes geological features can block air movement and actually hold odors in place, as in the case of the Recomp facility in St. Cloud, Minn. Before an odor control system was installed, malodorous gases generated by the facility were consistently caught by a ridge, affecting residents in a nearby trailer park. In order to prevent this kind of problem, German regulatory agencies, for example, often require air modeling for siting large-scale waste management facilities because prevailing wind patterns can push odors towards sensitive receptors, which are a half mile or further from the facility.

Operating landfills may seem like good places to site composting facilities, but odors from the landfill operations can compound the odors generated by the composting facility, increasing complaints. One example is the Agripost facility, which was half a mile from the Dade County North Landfill. According to Ed West, then president of Agripost, Inc., the excavation of the landfill in late 1990 exacerbated odor problems for residents of an upscale trailer park who then complained about the composting facility.

In addition to lay of the land and airflow considerations, the input of citizens must be included in siting decisions. Invoking the residents near a proposed solid waste facility in the decision-making process can help alleviate their fears that the facility will hurt property values and increase traffic, noise, and odor. Kent Portney of Tufts University (Somerville, Mass.) identifies four types of siting policies: economic incentives, public education and risk communication, negotiation and mediation, and risk substitution.

The first siting policy involves compensation to the community in order to build acceptance of a waste facility. This can include payments for in-kind services such as roads, reductions in fees for disposal by the host community, payments based on tonnage dumped, and property value guarantees. One downside of this first option is that citizens may regard the compensation as a bribe and may feel that no price makes up for loss of quality of life and community identity due to odors and negative perception of the area.

The second policy of public education and risk communication is to provide information about the facility so as to encourage public trust. Research contradicts early assumptions that public opposition stemmed from ignorance of the proposed facility and its workings. Newer approaches call for a more open relationship between developer and host community; developers providing information on plans in the early stages, including community representatives in their planning, and providing opportunities for public comment.

The third siting approach of environmental negotiation and mediation allows representatives of the planners and communities to meet—often with the help of an outside mediator—to articulate differing perspectives. This casts siting as a positive-sum decision and allows any compensation that the planners offer the community to be targeted at the most important needs of the community. It should be noted that successful negotiation will only occur in an atmosphere of mutual trust.

Risk substitution, the fourth approach, seeks existing risks, such as old incinerators or leaking landfills, and removes them, contingent upon the community's approval of a new facility. The success of this approach depends upon accurate assessment of risks and successful negotiation with the community.

It is not necessary that one recipe for siting be strictly followed; however, cognizance of and sensitivity toward the community may not only prevent serious opposition to a facility, it may point the way toward siting a facility that avoids problems. Listening to the community and working with its representatives before problems arise can save time and money and may ultimately save the facility from closure by avoiding a poor site before it becomes a problem.

**Develop effective odor control strategies**

Under certain conditions, facilities processing raw garbage will produce odors. This problem cannot be entirely eliminated but can be minimized with proper facility design and management. Biofilters, when designed and operated properly, can be effective in controlling odors. Chemical scrubbing techniques have also been used with varying degrees of success at sludge composting facilities.

Comprehensive design for odor control is very important. Of the facilities mentioned, only the Reuter facility in Pemroke Pines, Fla., and the Riedel facility in Portland, Ore., were originally designed for odor control, although the Riedel facility used immature compost in the curing piles to process air from the enclosed facility, rather than constructing a biofilter specifically designed to scrub
ATTENTION...SOLID AND HAZARDOUS WASTE INDUSTRY PROFESSIONALS/TECHNOLOGISTS

In its 23rd year, Wastech '95 remains the preeminent conference solely devoted to the examination of issues facing the land disposal of solid and hazardous waste. This year the conference will be exploring the alternatives and technical advances for the management and monitoring of landfill gas and leachate collection systems; design of liners and final covers; statistical analysis of groundwater data; and ecological impacts; as well as legislative and regulatory changes that affect landfills.

All papers presented at Wastech '95 will be published in the conference proceedings. To have your paper considered, please submit an abstract of no more than 250 words and a one page vita by August 15, 1994. Special considerations will be given to abstracts that advance the state-of-the-practice, practical applications, or present case studies of real world successes and failures.

Suggested topics (both applied and research) include, but are not limited to:

- **GAS & AIR EMISSIONS**
  - Control/Recovery Technologies
  - Emission Estimation and Testing
  - Regulatory Compliance (NMOCs & CAA)
  - Financial & Tax Issues

- **DESIGN - LINERS/LCS/CAPS**
  - Alternative Designs
  - Use of Predictive Models
  - Design Performance
  - Leachate Quality vs. Waste Input
  - Geotechnical and Stability Issues
  - Leachate Treatment
  - Integration of Existing, Lateral Expansion and New Units
  - Impact of Blasting on Liner/LCS Performance

- **GROUNDWATER STATISTICS**
  - Regulatory Issues/Requirements
  - Case Studies
  - Data Management and Analysis
  - Sampling Procedures
  - Small LF Compliance

- **SCIENTIFIC ISSUES**
  - Vegetation/Revegetation
  - Wetland Issues (Upgrading/Replacement/Mitigation)
  - Biodiversity
  - Risk Assessment and Comparable Waste Management Alternatives
  - Natural Resource Assessment

- **ENVIRONMENTAL ISSUES**
  - Case Studies
  - Allocation of Funds/Liability
  - Alternative Designs
  - Design Performance

- **TECHNICAL TOPICS**
  - Natural Resource Assessment
  - Landfill Leakage and Remediation
  - Regulatory Compliance vs. Field Performance
  - Flow Control/Interstate Restrictions
  - Successful Siting Case Studies
  - Rural Community Problems
  - Innovative Operations
  - Special Waste Management
  - Economics of Land Disposal
  - Construction and Demolition Landfills

Submit abstract and vita - no later than August 15, 1994 to:

Edward W. Repa, Ph.D.
NSWMA/WasteTech '95
4301 Connecticut Avenue, NW, #300
Washington, DC 20008
800/444-2869; 202/244-4700 Phone
202/966-4818 Fax

Sponsored by:
(part of the ENVIRONMENTAL INDUSTRY ASSOCIATION)
odors. Recomp’s addition of a biofilter has greatly reduced odor problems at the St. Cloud facility, but odor control has been less of an issue at facilities such as the Bedminster facility in Sevierville, Tenn., where biofilters have been operating effectively from the start.

Air from the tip floor and pre-processing areas must be treated as well as from the composting area. At the Agrisystems tunnel composting system in the Netherlands, a biofilter treats process air from the tunnels but not from the preprocessing area where malodorous gases emanate from an open tip floor door.

Effective “end-of-pipe” technologies are only part of the solution. Good management practices, such as processing all organics when they arrive and washing the tip floor regularly, are also necessary. In addition, simple measures, such as odor-locking double doors for the tipping areas, now common in Europe, can be effective. In this case, arriving garbage trucks are ushered into an odor vestibule, where the exterior door is closed before the door to the tip floor is opened. This reduces odor-laden air flow out of the tipping area.

MSW composting operational managers need relevant hands-on experience in the chemistry and biology of composting. Unlike other kinds of processing facilities, composting is a living process, which can turn anaerobic without proper attention to the necessary parameters—porosity, moisture content, carbon to nitrogen ratio, etc. The first facility manager at the Pembroke Pines facility had experience in construction of facilities but did not have experience in compost facility operations. Compost managers must have a good understanding of the composting process, as well as the functioning of the equipment, to be able to effectively troubleshoot when odor problems arise. The Composting Council (Alexandria, Va.) is developing an operators training manual which is the first step to a national compost facility operators certification process. Such certification is required in European countries, such as Switzerland.

Get realistic cost projections

Realistic cost projections, which take into account possible equipment downtime changes or expansions, is another critical factor. Composting facilities have been shut down when odor problems occurred and there were insufficient funds for remedies due to underestimation of true operating costs. The Riedel facility in Portland, Ore., for example, opened in April 1991, but was unable to finance the $3.5-million enclosure of the composting pad with installation of chemical scrubbers. On Jan. 31, 1992, the facility was forced to close. Similarly, vendors for the TRS facility submitted an unrealistically low bid to the City of Des Moines and consequently did not have contingency capital when the facility started generating offensive odors. According to Paul Lundy, environmental engineer for the Iowa Department of Natural Resources (DNR), “The good news is that the process works, but they [the TRS vendors] had no contingency plan because they had underbid so low that they squeaked.” At the DRP, the real cost of composting mixed solid waste with sludge in the Fairfield digesters was much higher than originally predicted. The DSWA could not afford the $4 million to add process gas afterburners, the Delaware DNR’s preferred odor control option.

Factors that have lead to poor cost projections include inaccurate assessments of equipment productivity and underestimations of operational downtime. Process efficiency depends on the equipment and the operational management. Cost projections must take into account the inevitable shutdown period and equipment downtime. Downtime for repairs and retrofits at Pembroke Pines, St. Cloud and the DRP have added significantly to these facilities’ operating costs.

Other factors contributing to poor cost projections include overestimations of end-product quantity and value. Facility planners have historically projected revenues from recovery of recyclables based on waste composition and secondary material values that changed over time. Recomp discontinued the handpicking line to recover recyclables because the value of these materials was too low. Before the plant shut-down, the DRP stopped operation of the flotation jig to recover glass because cullet prices were too low.

Compost product value has often been overestimated. At Pembroke Pines, Reuter originally expected to market compost through Bird Compost Management at $5 per ton, but problems with product quality canceled that contract. A similar problem with compost quality at the facility on Mackinac Island in Michigan led that project to falter. The facility, which composted residential waste, horse manure, sewage sludge, and food from restaurants, didn’t get permission from Michigan’s DNR to market compost, so the material had to be removed from the island by boat. The facility now plans to promote more source separation, rather than site separation, to prevent contamination of the final compost.

The case of Mackinac is another example of perception playing a major role in the acceptance of MSW composting. The Michigan DNR has not yet approved the marketing of composted MSW; the problem on Mackinac Island was that, although no protocol for chemical testing
of compost had yet been established by the DNR, the first batch of compost, produced in September 1992, was full of visual contaminants; it looked “terrible,” says Bruce Zimmerman, director, Mackinac Island Public Works Department. “It had shreds of plastic, rubber boots, tin cans, etc.” Not only do people not want to smell MSW composting plants, they want the finished product to look like potting soil; they don’t want to be reminded that it was once garbage, Zimmerman says.

Retrofitting after complaints are received is costly. But, if funding can be found, it can be effective. Faced with odor complaints for its biosolids composting facility, the City of Akron retrofitted the entire ventilation system and installed chemical scrubbing units from PEPCON Systems, Inc., at a cost of $16 million for the total upgrade (supported by U.S. EPA funding).

Facility planners who make sure that corners are not cut on construction will save money in repairs and retrofitting in the long run. For example, in order to keep costs down during construction of the Reuter facility in Pembroke Pines, Fla., aeration channels beneath the composting pad were built using thin PVC pipes. The pipes developed cracks that allowed groundwater to seep into the lines (The water table in this part of Florida is only 18 to 24 inches below the ground.). Malodorous gases collected and condensed in the pipes, which were supposed to remove exhaust, and did not drain properly, causing even more offensive odors. In addition, the water displaced air flow capacity, creating incomplete aeration of the windrows, further exacerbating odor problems. The Reuter facility had to temporarily close to tear up the floor and install better aeration piping, costing approximately $2.5 million dollars. At press time, the repairs had been completed, but the facility remains closed due to fears of continued odor problems. Reuter is seeking financing for further odor control measures.

There are people out there

As part of the host community compensation plan, facility developers should set up an odor response plan with input from members of the community and take action when odor events occur. Developers have to be mindful of the potential impact of their facility on residents’ quality of life. “The community won’t tolerate gross inconveniences, such as not being able to open their windows or sit in their yards. Odors only have to happen occasionally for people to be angry,” explains Rick Folmsbee of the Delaware Department of Natural Resources.

A number of compost facility managers have refused to legitimize neighbor’s odor complaints, apparently assuming, “if we pretend it’s not there, it will go away.” Delaware regulators reported that DRP managers ignored resident complaints for years. This led to an antagonistic relationship between nearby residents and the DSWA. Complaints were finally heard by the governors office and action was taken to close the facility.

In the case of St. Cloud, Minn., a similar attitude of disregard for neighbor complaints in the early years of plant operation lead to a very contentious relationship between Recomp and residents in the nearby neighborhood. Community relations improved with a new facility manager and addition of the enclosed agitated bin composting system and biofilter. Jerry Johnson, coordinator of the Tri-County Management Commission asserts that, although everyone has noticed that odors have improved considerably, people are still angry and will continue to complain for the very reason that they remember how bad the odors were when they were ignored.

The MSW composting industry, like the material it produces, is maturing. Progress toward better composting systems is being made through the lessons learned from past experiences. Research into technical process improvements and odor control is underway. But the issues discussed here relate to the planning and management of facilities that are applicable to all composting technologies. Attention to basic criteria for success–appropriate facility siting, effective odor control strategies, realistic cost projections, adequate construction quality, competent operational managers, and good community relations–can help ensure the success of composting as an important solid waste management strategy.

Selected Odor Control Systems

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airector, Inc.</td>
<td>Brooklyn, N.Y.</td>
<td>neutralizes odors</td>
</tr>
<tr>
<td>American Air Filter</td>
<td>Louisville, Ky.</td>
<td>&quot;a scrubber product line&quot;</td>
</tr>
<tr>
<td>Biofiltration, Inc.</td>
<td>Ft. Lauderdale, Fla.</td>
<td>neutralizes odor</td>
</tr>
<tr>
<td>Calvert Environmental</td>
<td>San Diego, Ca.</td>
<td>Scrubbers; designed for wastewater plants and composting facilities</td>
</tr>
<tr>
<td>Ecolo Odor Control Systems, Inc.</td>
<td>Mississauga, Ontario</td>
<td>Deodorizers</td>
</tr>
<tr>
<td>EPOLEON Corp.</td>
<td>Torrance, Calif.</td>
<td>Neutralizes odors</td>
</tr>
<tr>
<td>Met-Pro Corp.</td>
<td>Owosso, Mich.</td>
<td>Scrubbers</td>
</tr>
<tr>
<td>NuTech Environmental Corp.</td>
<td>Denver, CA</td>
<td>20 different products</td>
</tr>
<tr>
<td>Quad Environmental Systems</td>
<td>Northbrook, IL</td>
<td>Chemical reactions system</td>
</tr>
<tr>
<td>Zep Enviro-Chem Co™</td>
<td>Atlanta</td>
<td>——</td>
</tr>
</tbody>
</table>
SWANA’s 32nd ANNUAL SOLID WASTE EXPOSITION
San Antonio, Texas, August 1-4, 1994
LIST OF EXHIBITORS
(as of May 12, 1994)

3M Specialty Chemical Division
AMSOIL
Acme Cleaning Equipment, Inc.
Advantage Lift Systems, Inc.
Aggregate Equipment, Inc.
Airspace Saver Daily Cover/Fabrene, Inc.
Akzo Industrial Systems
Aljon, Inc.
Allied Waste Industries, Inc.
American Academy of Environmental Engineers
American Ash Recycling Corp.
American Balco Co.
American Excelsior Co.
American Re-Fuel Co.
American Waste Digi
Amoco Fabrics & Fibers Co.
Anheuser-Busch Recycling Corp.
Aqua-Shed Manufacturing Corp.
Atech Barks, Inc.
B.A.G. Corp.
BOMAG—a product of Compaction America
Babcock & Wilcox/National Ecology
Baltimore 95!
Barclay Recycling, Inc.
Belton Industries, Inc.
Black & Veatch
Brask Enterprises, Inc.
Browning-Ferris Industries, Inc.
Bryan A. Stirrat & Assoc.
C.E. Shepherd Company, Inc.
CH2M Hill
CP Rail System
Camp Dresser & McKee
Canada, Foreign Affairs & Int’l Trade
Cardinal Scale Mfg. Co.
Carolina Software
Caron Compactor Co.
Caterpillar, Inc.
Central Plastics Co.
Clarion Rear Vision Systems
Clean Environment Equipment
Columbia Corp.
Computer Analysis & Planning
Crane Carrier Co.
Cromoco, Inc.
Crumb Rubber Technology, Inc.
EMCO Industries
EMCON
EPI Environmental Products, Inc.
ESP Corp.
East Manufacturing Corp.
Enstar
Federal Signal Corp.
Freese & Nichols
Fuel Harvester Equipment, Inc.
GATZ Envirolease Corp.

GBB
Galbreath, Inc.
Geraghty & Miller, Inc.
Golder Construction Services, Inc.
Government Products News Magazine
Gujdelle Lining Systems, Inc.
HDR Engineering, Inc.
HNTB Corp.
Haleco Mfg. Co., Inc.
Harling Lawrence Management Group, Inc.
Harr Waste Management, Inc.
Henderson Technologies Corp.
Hull & Associates Engineering, Inc.
Huntington Engineering & Environmental
Igesund Recycling Systems
Information Systems, Inc.
Instrumentation Northwest
Intec Video Systems
International Transquip Industries, Inc.
James Clem Corp.
John Zink Co.
KG Rear Vision
Kehl Manufacturing Co.
Landfill Control Technologies
Landfill Gas & Environmental Co., Inc.
Lloyd, Gosselin, Fowler, Blevins & Seefor
Logemnann Brothers
MSW Management Magazine
Magnificent Machinery Co.
Master Builders, Inc.
Mepro Co.
Met-Pro Corp., Systems Division
Mobile Computing Corp.
Moody’s Investors Service
Mosley Machinery Co., Inc.
Motorola Corp.
N-Viro International Corp.
National Association for Plastic Container
Recovery
National Foam Environmental Products
National Recovery Technologies
National Renewable Energy Laboratory
New Waste Concepts, Inc.
Norseman Plastics
Norton Environmental
Olahn Manufacturing, Inc.
Organic Waste Technologies, Inc.
Oshkosh Truck Corp.
Otto Industries, Inc.
PVC Geomembrane Institute
PWT Waste Solutions
Pak-More Manufacturing, Co.
Parametric, Inc.
Pautronics
Pan Rite Systems
Petebill Motors Co.
Phillips Petroleum Co.
Piper Industries
Plastic Fusion Fabricators, Inc.
Plexco/Cherven Chemical
Poly Pipe Industries, Inc.
Poly-Flex, Inc.
Polyfelt Americas
Post, Buckley, Schuh & Jemigan, Inc.
PowerScreen Texas, Inc.
Public Works Publications
Red Industries, Inc.
Rehrig Pacific Co.
Reynolds Environmental Corp.
Resource Recycling
Rezex
Rochem Separation Systems
Roto Industries, Inc.
Rotonics Manufacturing, Inc.—RMI
Roy E. Weston
Rusmar, Inc.
SCS Engineers/SCS Field Services
SLT North America, Inc.
SWANA
Sanifill
Scrap Tire Management Council
Serot Cop.
Setco
Solid Waste Technologies
Steco—A Division of Blue Tee Corp.
Steel Recycling Institute
Structural Instrumentation
Swaploader U.S.A., Ltd.
Tenns Environmental Systems, Inc.
Terraco Environmental, Inc.
Texas Disposal Systems
The Hauler Publication
The Heil Co.
The Read Corp.
Tire Resource Systems, Inc.
Toter, Inc.
Triple/S Dynamics
U.S. EPA MITE Program
U.S. EPA, Office of Solid Waste
USA Waste Services, Inc.
Ultraseal International
United States Filter Corp.
ViroGroup, Inc.
WMX Technologies, Inc.
Warren & Baer Manufacturing, Inc.
Waste Age Publications
Waste Energy Technology
Watersaver Company, Inc./Wright Lining
Wayne Engineering Corp.
World Wastes Magazine
Zarn, Inc.

120 WASTEAGE JULY 1994