

# Sniffing for answers

A variety of odor mitigation strategies can be employed at solid waste facilities.

By Pat Sullivan



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**Part two:** Part I of the Odor Management Series, “Battle of the stink,” appeared in the September/October issue of *Waste Today* and covered how to meet regulatory requirements for odors at solid waste facilities. It is available at [www.WasteTodayMagazine.com/article/battle-of-the-stink](http://www.WasteTodayMagazine.com/article/battle-of-the-stink) (<http://www.WasteTodayMagazine.com/article/battle-of-the-stink>).

Odor management remains one of the most daunting tasks for any solid waste facility. Part I of this series on odor management at solid facilities covered regulatory requirements with two case studies detailing real-world examples of facilities battling odor issues. Part II of this series covers odor assessment, monitoring and mitigation strategies.

## ASSESSMENT AND MONITORING

When odor impacts from a facility are suspected, various tools are available for assessing and monitoring potential odors. It is critical to understand the release characteristics and off-site impacts for potential sources of odors.

Essentially, anywhere waste is stored or processed can be a source of odor. These can include but are not limited to:

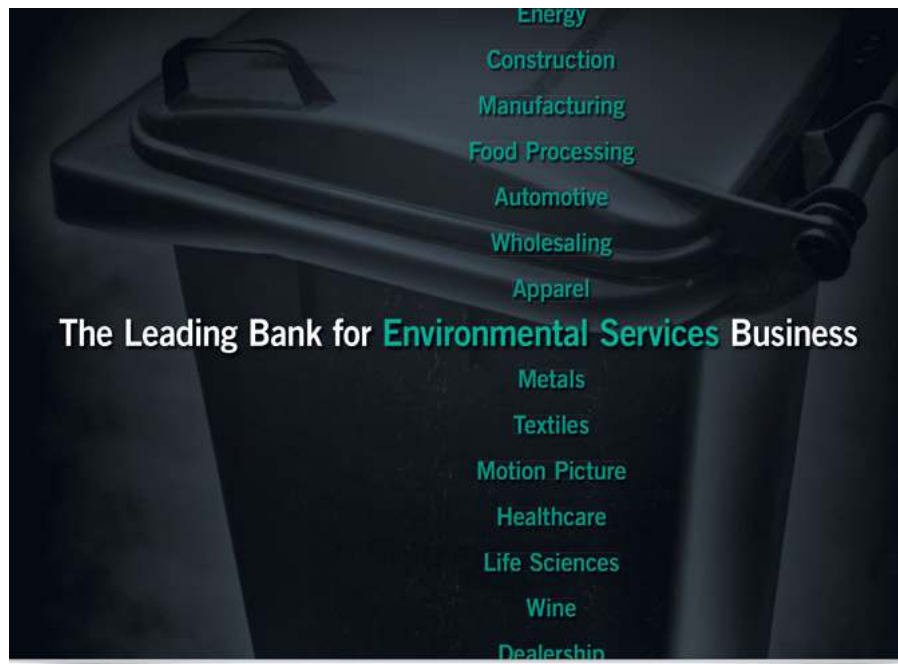
- the landfill active face where fresh waste is disposed, especially when certain odorous loads are involved (e.g., sewage sludge);
- landfill gas (LFG) emissions, including from LFG condensate;
- waste stockpiles;
- any equipment involved with the processing of waste (e.g., grinders, screeners, conveyors); waste hauling vehicles;
- tipping areas or floors;
- ponds that contain leachate, sludge or contact storm water;
- emissions from composting, anaerobic digestion or related organics operations;
- stack emissions from flares, engines or other combustion devices; and
- stack emissions from vents or stacks for buildings or enclosures containing collected wastes.

Some assessment and monitoring techniques are applied at the location of odor sources, while others are used at the fence line or in nearby neighborhoods.

At source locations, the following tools are commonly used:

- sampling/monitoring for an odor or chemical presence (This can be accomplished through collection of samples followed by laboratory analysis or through field monitoring techniques.);
- the use of emission models or calculations for odor generation where data are available from similar sources;
- direct emissions testing and measurement through stack or source testing methods; and
- the use of test methods for measuring surface emissions flux/emissions (e.g., flux chambers) from larger, area-type odor sources.

The use of one or more of these tools can be implemented to estimate the source strength of the odors as well as to differentiate which odors are derived from which sources.



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After collecting source information, it may be necessary to assess off-site odor impacts. The following assessment techniques can be beneficial for residents and operators:

- exposure and air dispersion models to predict the movement of odors from the source to the potential off-site impact locations;
- gas or air "fingerprinting" studies to compare the chemical or odor profile from the source with the receptor locations to see if there is a match;
- tracer studies that involve the release of known amounts of a tracer chemical from the source followed by measuring for the presence and concentration of these tracers in the surrounding neighborhood;
- odor sampling/analysis that involves the collection of samples of ambient air, analyzing those samples for odor presence, concentration and characteristics and typically involving an odor panel;
- field monitoring for odor using various hand-held devices (such as the Nasal Ranger field olfactometer) or trained inspectors; and
- ambient air testing for specific odor-causing chemicals that involves the collection and analysis of air samples to measure chemical concentrations, comparing them with odor thresholds.

The combination of these assessment/monitoring tools can be used to create characterizations that evaluate the release of odors from source locations as well as the resulting off-site impacts. This odor characterization can occur in discreet studies or as part of long term monitoring programs.

## MITIGATION STRATEGIES

Once odorous emissions and off-site impacts are confirmed, it may become necessary to mitigate these odors to comply with regulatory requirements, satisfy regulatory agency directives and/or to satisfy citizen concerns. Typical best management practices (BMPs) for odors include waste stream changes, operational controls, physical controls, odor treatment/control systems and institutional controls:

### Waste stream changes

- Limit or do not accept construction and demolition (C&D) fines (i.e., residual from C&D recycling) for landfilling or limit the area of disposal to reduce the footprint where odor generation must be addressed. If possible, consider disposing of this material in a segregated area with only C&D materials or other inert

wastes to avoid LFG generation. This will reduce odor impacts from hydrogen sulfide in LFG.

- Limit or do not accept the amounts and/or types of special wastes that can increase odor, such as organics, sludges/biosolids, special wastes and liquids.

#### Operational controls

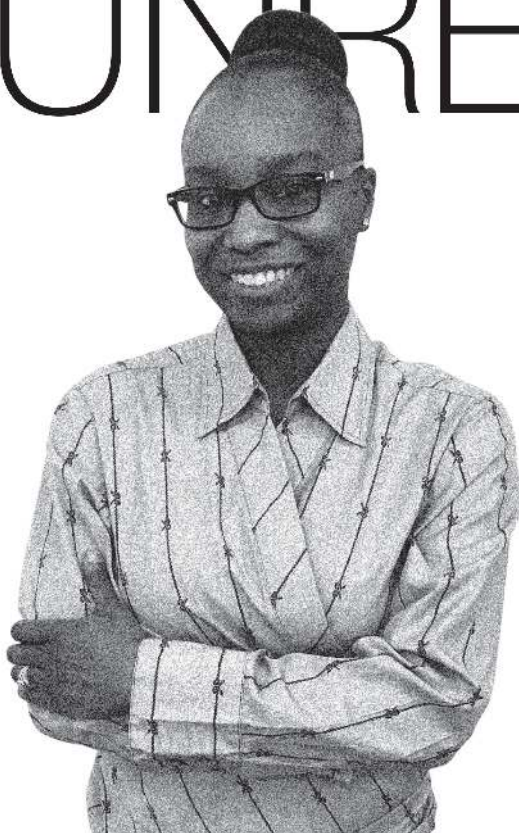
- Immediately place cover over odorous loads.
- Consider the use of biocovers for additional odor reduction.
- Consider the best cover procedures for LFG collection.
- Accelerate schedules for applying intermediate or final cover where possible.
- Consider alternative cover options that may provide improved odor/emissions control (e.g., Posi-shell, Enviro-cover and tarps).
- Minimize contact with water and percolation of liquids through the soil cover by sloping the cover surface.
- Periodically clean out ponds and sumps that can accumulate organic sludges and debris.
- Have procedures in place for odor reduction (e.g., barriers or water spray) for times when wastes will be exposed via excavation or well drilling.
- Limit the time periods for stockpiling and processing of odorous materials.
- Conduct compost windrow turning during times of day and/or under weather conditions that will result in the least off-site odor impacts.
- Prevent refuse hauling trucks from waiting/idling in surrounding neighborhoods and reduce waiting time at the scale house, especially for trucks containing odorous loads.
- Consider the best routing for refuse hauling vehicles delivering odorous loads, such as avoiding residential areas.
- Clean up leachate or condensate spills and seeps immediately.

#### Physical controls

- Consider barriers or wind breaks for certain on-site operations that produce odor.
- If possible, conduct very odorous activities (such as the handling and processing of food waste) in controlled enclosures.
- Make sure all incoming loads are covered and trucks are not leaking liquids.
- Consider encapsulates for extremely odorous loads.

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### Treatment/control systems

- Apply deodorants, reactants, neutralizers or encapsulates to intersect odorous emissions at the source area or before they leave the site (perimeter) using misting, atomizing or spraying systems.
- Enhance LFG systems collection and control (and maybe treatment) systems for maximum control of surface emissions to reduce leaks and seal around well casings and other penetrations to the cover.
- Install LFG system components (e.g., horizontal collectors) prior to when regulations would require them to control surface emissions in new waste.
- Use aeration systems for any ponds and sumps that may accumulate organic liquids.
- Consider additives to reduce odor generation.
- Design leachate or condensate collection and storage equipment to be closed loop or to have vapor recovery systems to route odorous gases to odor control units (for example, activated carbon).
- Consider controls for on-site composting operations, including aerated static piles, biocovers, biofilters and micropore-type covers.

### Institutional

- Develop and implement odor management and control plans that are specific to the on-site operations, conditions and meteorology.
- Develop and implement a comprehensive response procedure for possible odor complaints.
- Install and operate an on-site meteorological station, using data to determine the best and worst conditions for odor impact and correlating complaint data to use in air dispersion modeling.
- Conduct odor patrols and consider the use of odor or chemical monitoring devices (e.g., a Nasal Ranger or a Jerome meter for hydrogen sulfide monitoring).
- When odor issues are found or suspected, consider all the various investigation tools to assess the odor source(s) and magnitude of impacts, including monitoring, ambient air testing, source testing, tracer studies and air modeling.
- Try to get members of the public or the municipalities to contact the landfill to address odor complaints rather than regulatory agencies.
- Consider odor and odor impacts in the design and operation of all on-site facilities and processes.
- Identify other potential off-site odor sources in the areas around the waste processing facility.
- Understand the procedures the regulatory agencies use to respond to odor complaints, conduct odor investigations and decide on enforcement. Ensure that these procedures are reasonable and that the agency follows these procedures in each case.
- Understand the implications of taking certain types of wastes and proactively prepare for them.

### CRITICAL THINKING

Many people identify landfills and other solid waste facilities as likely sources of odor. Odor emissions and off-site migration of those odors can and do occur; however, off-site odor impacts are not always from local solid waste facilities.

Even when odorous emissions do leave the facility, not all impacts rise to the level of a regulatory defined nuisance. The level of exposure matters. If impacts are suspected, it is critical to use the tools available to properly assess and monitor for odorous emissions and impacts.

When odor issues have been identified and confirmed, it is always better to be proactive. Things can get out of hand quickly if you are reactive only as odor issues can take on a life of their own.

It is very important to develop and implement comprehensive plans for odor management and complaint response as well as to take all complaints seriously. Directly engage the public and any other stakeholders and be responsive to their complaints. It can be very helpful to educate the public about the facility and how it operates and to ask them to work with you in identifying instances of odors rather than immediately making complaints to odor regulators.

While odors seems to be a difficult task for any solid waste facility to manage correctly, they are manageable if the facility is willing to commit the necessary effort and resources.

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