

SMART LANDFILLS: TRANSFORMING WASTE MANAGEMENT WITH REMOTE MONITORING

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Last October, David Hostetter, vice president of SCS Engineers, presented a session titled "Smart Landfills: Transforming Waste Management with Remote Monitoring." This discussion highlighted how landfill remote monitoring and control systems (RMCs) can save landfill managers time and money, enhance environmental compliance, and reduce health and safety risks.

Hostetter explained that "landfill remote monitoring is a way to identify what's happening at the facility using advanced technologies such as drones, satellites, and sensors." Many of these devices allow managers to address issues without being physically present at the landfill.

For instance, Hostetter demonstrated a mobile interface that allows landfill operators to monitor flare statuses from their cell phones. "We want these systems to be as approachable as possible," he emphasized. "There is a restart button in the middle of the screen. If the flare goes down in the middle of the night and you know why it went down, it's safe to restart it. You can literally flip over in bed, pull up your phone, hit the restart button, and watch something come back up."

He also shared an example of a drone flight conducted in the Caribbean, showcasing how the mobile interface integrates elevation data, thermal/infrared imaging, and aerial images generated by drones. "Other data sources beyond sensors can be integrated into one remote monitoring system."

According to Hostetter, some key advantages of RMCs include improved time management, enhanced health and safety, better quality of life for landfill managers, and reduced GHG emissions. Traditionally, landfill managers travel on-site to manually record pump station levels, flow rates, or flare readings. "All that can be done automatically through the system, so you don't physically have to go do it," he explained, freeing up time for other tasks.

Additionally, RMC helps reduce health and safety risks by minimizing the need for physical presence in potentially hazardous areas where dangers such as slip-and-fall incidents or methane exposure in control panels could occur.

One specific example Hostetter mentioned is how RMC monitor pump stations and tanks equipped with high-level alarms. These systems send alerts to landfill managers, allowing them to act quickly and prevent environmental risks. This technology enhances efficiency and improves employee well-being, driving a better quality of life for landfill managers who may otherwise have to get out of bed to fix something at a facility. It can have a positive impact on employees' health and safety by preventing exposure to workplace risks.

An added benefit of RMC is the improved relationship between landfill operators and local communities. "We're being more proactive instead of reactive. We're reducing the risks of an environmental issue, we're reducing our emissions, and we're reducing our odors," Hostetter noted.

"We all know that odors are an issue for the landfill industry," Hostetter acknowledged, adding that while odors rarely have a direct physiological effect, they can cause secondary impacts such as nausea or headaches among employees and nearby residents. Odors account for approximately 50% of all air-quality complaints in the United States, making it crucial to identify and manage their sources, which could range from condensate tanks to composting operations or flares.

To tackle this issue, Hostetter introduced three key technologies:

1. **Complaint Management System** — software that allow users and nearby residents to log odor complaints, detailing their intensity and character. This system enables landfill managers to map and analyze complaints, identifying odor hotspots and trends.
2. **Mobile Olfactometry System** — "brings the lab to you," allowing qualified analysts to assess odor samples on-site rather than shipping them to external labs.
3. **Total Reduced Sulfur (TRS) Measurements** — uses a system called "the centipede" to monitor TRS levels and identify patterns related to specific landfill operations or times of day. This data can be integrated into RMC systems for ongoing updates. "It can run continuously, so it can help you figure out whether there's a certain part of your operations or a specific time of day that really affects your concentrations," explained Hostetter.

As landfills continue to play a crucial role in waste and resource management, innovative technologies like RMC are transforming how facilities operate. These advancements improve efficiency, safety, and environmental responsibility, ultimately making landfill management smarter and more sustainable.