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Hydrogen Sulfide at Landfills

The decomposition of waste at landfills produces hydrogen sulfide (H₂S). Serious health, safety and environmental concerns are associated with H₂S. Site management should evaluate landfills for the presence of H₂S on an ongoing basis to control and manage these risks.

Hydrogen sulfide is a colorless, corrosive, flammable gas that is very toxic. In landfills, the decomposition of certain organic materials under anaerobic (without oxygen) conditions produces H₂S. In low concentrations, H₂S smells like rotten eggs. The odor threshold for H₂S is very low (0.05 to 0.1 ppmv). H₂S presents a high potential for odors and is a danger to personnel.

Beyond the odor concern that comes with H₂S, we must consider personnel exposure. The OSHA Permissible Exposure Limit (PEL) for H₂S is 10 ppm. At 10 ppm or lower, personnel may be exposed to H₂S for up to 8 hours a day, 5 days a week, without harm. Exposure to higher concentrations can be dangerous or even fatal. 20 ppm is the Short Term Exposure Limit (STEL) and 50 ppm the ceiling limit. Concentrations greater than 100 ppm are Immediately Dangerous to Life and Health (IDLH).

Construction and Demolition (C&D) waste materials can contain large amounts of gypsum from discarded wallboard. Sulfate-reducing bacteria produce H₂S from the sulfate and organic carbon contained in the wallboard. Landfills that receive large quantities of waste containing gypsum should anticipate production of H₂S and

related odors. As an example, 100 tons of sulfate has the potential to produce 35 tons of H₂S.

It is important to monitor for H₂S to quantify levels that may be present. When levels exceed 150 ppm, sense of smell is significantly impaired and personnel may not notice the rotten egg odor any longer. This is very dangerous as exposure may occur unknowingly. Electrochemical sensor technology exists that can identify H₂S at levels as low as 0.5 ppm. Four-gas monitors that measure Oxygen, H₂S, Carbon Monoxide and Flammable gas are recommended safety equipment for personnel working at landfills. These monitors provide an audible warning alarm when levels exceed the set points for these constituents. For H₂S the alarm set point should be 10 ppm. When atmospheric H₂S levels exceed 10 ppm, an alarm will sound alerting personnel to move upwind to a safe atmosphere.

Installing and maintaining effective gas collection and control systems (GCCS) at landfills is the first step in controlling H₂S. Daily cover, using soil and similar materials to control odor, is also important. Clay and other materials that are capable of sealing in odors are preferred to sandy or other porous materials. Other landfill cover systems, such as spray on materials are also available to help control odors. Using surface emissions monitoring (SEM) to evaluate GCCS and cover effectiveness can identify areas where elevated emissions exist. Target these areas for control action such as additional vacuum or cover. Bottom line is that H₂S can present a hazard at landfills. Take appropriate action to manage it effectively.

Submitted by:

Michael D. Knox

Eastern Region Compliance Manager

SCS Field Services