Hydrogen Sulfide Gas at Class 2 Landfills:
A regulatory perspective

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Overview

- November last year all Class 2 landfills should have received an informational letter from DHEC about Hydrogen Sulfide (H₂S) generation at Class 2 landfills.

- Due to the rainy year we had in 2013, H₂S generation became a concern at some of our landfills.
Hydrogen Sulfide Is Deadly

“Who”- Hydrogen Sulfide

- Gas that is colorless, flammable, hazardous, rotten egg smell- Ability to smell can be lost instantly
- LEL 4% (40,000ppm)
- IDLH is 100ppm
- Highly Soluble
- Production slowed by high pH
Where- Is this an issue

- Natural or industrial settings
- Air monitoring on one landfill showed hydrogen sulfide levels ranging from 1 to 7,000 ppb.
- Air monitoring data from a residential neighborhood surrounding the landfill ranged from 0 to 160 ppb. The residential monitoring data was collected from both inside and outside people’s homes

How- Is it formed

- Gypsum disposal in wet conditions- SOURCE/FOOD
- Organic waste located around gypsum disposal- BACTERIA
- Anaerobic conditions
- Low pH (less than ~8)
- The formation of H$_2$S is an exothermic reaction- potential for landfill fires
Why- Should I be concerned

- Irritant and asphyxiate
- Low concentrations can cause irritation of eyes, nose, throat, lungs
- Repeated or prolonged exposures may cause eye inflammation, headache, fatigue, irritability, insomnia, digestive disturbances and weight loss

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Why- Should I be concerned

- Heavier than air (can concentrate at ground level)
- Critical on hot humid days with no wind
- BEWARE: Trenches/low topography
- There have been confirmed instances of H₂S exposures producing negative health effects from landfills, even in SC
When- Can this be a problem

- Cleanup of hurricane or flood debris can result in substantial quantities of saturated wallboard being sent to landfills (or after heavy rains)
- Significant sources of sulfur:
  1. Gypsum/ Drywall
  2. Pulp and paper mill waste
  3. Sludges from wastewater treatment plants

What- Can I do about it

- Control water infiltration and ponding
- Additional cover and/or regrading slopes
- Add lime/fine concrete... something to raise pH
- Decrease sulfate containing waste/ dispose of in area away from organic material
What- Can I do about it

- Minimize the breakup of gypsum/drywall
- Train employees to recognize and mitigate hazards
- Use a H$_2$S meter to monitor around LF
- But what if we already have a problem after disposal?

OK, so now that we know what H$_2$S is and what causes it to be generated at a Class 2 Landfill, what is SC DHEC’s perspective on it?
Should there be a problem with H₂S at the Landfill, the Department’s primary concern is to prevent harm to any persons who work at the site, visit the site, or live or work near the site.

**Tips for heading off a problem with H₂S**
Tips for heading off a problem with \( \text{H}_2\text{S} \)

• Self-conducted inspections
Tips for heading off a problem with $\text{H}_2\text{S}$

- Self-conducted inspections

- Be mindful of large rain events

- Inspect loads for large amounts of drywall. Proper waste management is key. Lack of positive drainage increases likelihood of $\text{H}_2\text{S}$ generation.
Communicate, communicate, communicate!

So you have a suspected H$_2$S problem. What’s next??
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- Site visit by Department staff
- Barhole survey
So you have a confirmed H₂S problem. What’s next??

Corrective Action Plan (CAP) can be requested which may involve use of a contractor to design a remediation, mirroring that of Methane remediation at Class 3 Landfills. However, if you have a serious problem do not wait on a DHEC response if there is an immediate danger. Act quickly!
So you have a confirmed H$_2$S problem. What’s next??

Can SC DHEC require gas monitoring at a Class 2 Landfill?

Regulation R. 61-107.19 Part IV Subpart C.21 states: “A gas monitoring system shall be designed and installed as required on a case-by-case basis to ensure that gas generated at the landfill will not create a hazard to health, safety, or property.”
What are some consequences of a H$_2$S problem?

- Serious injury or worse
What are some consequences of a H₂S problem?

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• Expenses associated with assessment of the problem
• Public image to the local community
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• Serious injury or worse
• Expenses associated with assessment of the problem
• Public image to the local community
• Other costs such as lost time spent handling this issue and increased financial assurance due to need for a monitoring and/or removal system

• Enforcement actions (a last step)
Recap

- Hydrogen Sulfide (H₂S) gas is generated when Gypsum (drywall) comes into contact with organic material and water in anaerobic conditions
- Can be a health and environmental problem
- Can result in Injury or worse, along with financial burdens
- Preventable through proper landfill operation and management

References/ Additional Information

- [http://www.cdc.gov/niosh/topics/hydrogensulfide/](http://www.cdc.gov/niosh/topics/hydrogensulfide/)
Questions??
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