

# Recognition and Assessment of Landfill Gas Hazards

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# Objectives

- Anticipate and recognize potential hazards present
- Provide a method for evaluating employee exposure
- Recognize the need for devising a strategy prior to initiating any work operations where exposure might occur
- Offer control method options

# Landfill Gases

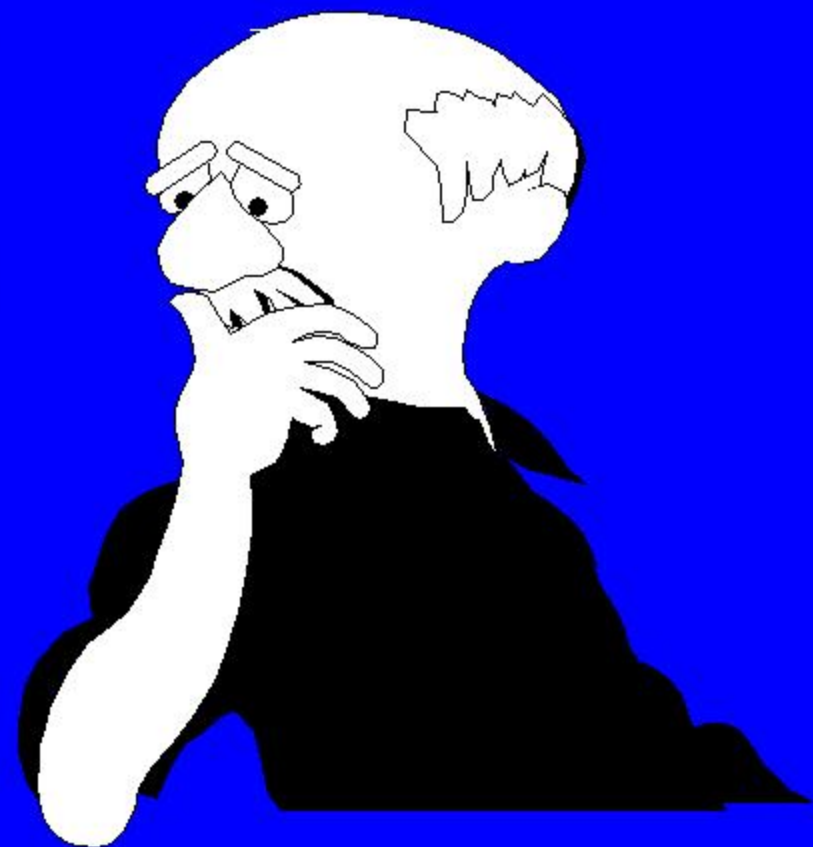
## A Quick Review



- Methane gas
- Carbon Dioxide
- Hydrogen sulfide
- Volatile Organic Compounds
- Particulates

# Conditions Affecting Landfill Gas Production

- Waste Composition
- Age of Refuse
- Presence of oxygen
- Moisture Content
- Temperature



# Pre Planning Strategy

- Site characterization
- Anticipated Work Activity
- Sampling Strategy
- Personal Protective Equipment Needs
- Evacuation Levels
- Emergency Response



# Anticipate Exposures

- Gas Well Monitoring Operations
- Maintenance
- Trenching, Evacuation
- Gas Well Construction Operations
- Emergencies



# Potential Sources of Worker Exposure



- Gas wells
- Leachate pipes
- Gas probe piping systems
- Condensate pipes
- Manholes
- Vaults

# Job Tasks that Illustrate Potential Exposure



# Landfill Gas Air Monitoring Procedures

- Personal
- Area
- Continuous
- Intermittent
- Full shift



# Direct Reading Air Monitoring Equipment

- Combustible Gas Indicator
- Photoionization Detector
- Flame Ionization Detector/Organic Vapor Analyzer



# Protecting Employees from Workplace Hazards

- Employers must protect employees from workplace hazards such as machines, hazardous substances, and dangerous work procedures that can cause injury
- Employers must:
  - Use all feasible engineering and work practice controls to eliminate and reduce hazards
  - Then use appropriate personal protective equipment (PPE) if these controls do not eliminate the hazards.
- **Remember, PPE is the last level of control!**

# Methods of Control

- Active
- Passive



# Engineering Controls

- Initial design specifications
- Substitute less harmful material
- Change process
- Enclose process
- Isolate process
- Ventilation



# Work Practice Controls

*If . . .*

Employees can be removed from exposure to the potential hazard by changing the way they do their jobs,

*Then . . .*

The hazard can be eliminated with a work practice control.

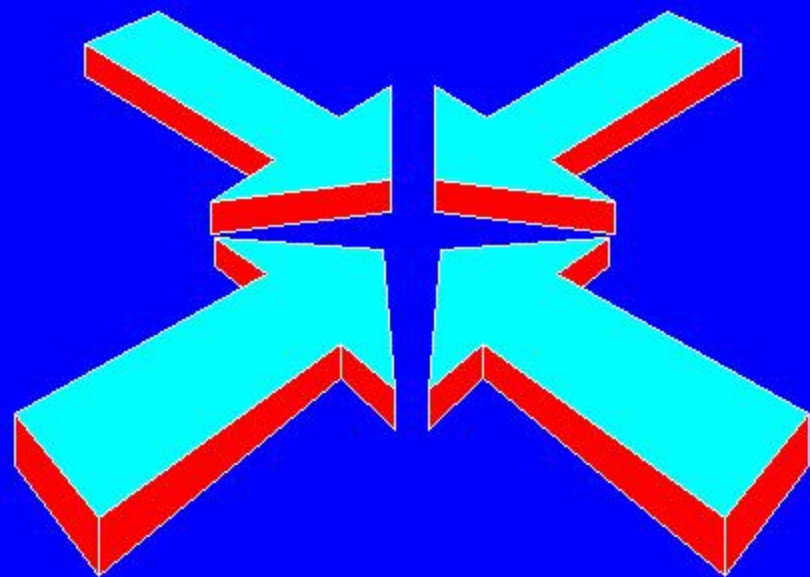
# PPE Selection Criteria

Employers must implement a PPE program where they:

- Assess the workplace for hazards
- Use engineering and work practice controls to eliminate or reduce hazards before using PPE
- Select appropriate PPE to protect employees from hazards that cannot be eliminated
- Inform employees why the PPE is necessary and when it must be worn
- Train employees how to use and care for their PPE and how to recognize deterioration and failure
- Require employees to wear selected PPE in the workplace

# Other Considerations

- Informing Contractors
- Additional Hazards
- Maintaining Sample Results
- OSHA Compliance



# Methods to Inform Workers



# Summary

- Identify all potential hazards
- Devise a strategy to reduce exposure
- Involve employees/contractors in process
- Use engineering controls whenever feasible
- Plan for emergencies