Weather-Proofing Solid Waste Operations & Facilities
Landfill Management Adaptations

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Introduction

- Changing weather patterns
- Debris management
- Effects on LFG
- Landfill management
- Adaptation
- Management plans
Changing Weather

- NCA4 and IPCC data
- Natural disasters
  - Coastal storms
  - Floods
  - Forest Fires
- Heat waves
- Variability
- High precipitation events
- Annual precipitation increase
Debris Management

• Varies by event
  • Floods
  • Coastal storms
  • Forest fires

• Clean-up response
• Temporary storage
• Landfill disposal
Debris Management

- Different effects near and regionally
- Planning
  - Effects more far-reaching
  - Importance of debris management plans
- Waste Projections
- Effects to LFG
  - Gas production rates
  - Sulfur
LFG Effects of Debris

• Building debris
• Drywall and sulfur
  • Gypsum decomposition
  • Odors
  • Regulatory issues
  • Permit limits
• Gas production affected
Precipitation Changes and LFG Generation Rates and Precipitation Changes

- Wet Landfill: $k = 0.057 \text{ yr}^{-1}$
- Mid LF: $0.038 \text{ yr}^{-1}$
- Dry LF: $0.02 \text{ yr}^{-1}$

Years of Operation

Generation Rate at 50% Methane (scfm)
Precipitation Changes and LFG

• Higher gas generation
  • More revenue
  • Odors
  • Migration

• Landfill liquids
  • Well slots
  • Blockages/surging
  • Ponding

• Settlement
LFG Adaptation Strategies

• Liquids management
  • Dewatering
  • Re-grade headers
  • Redrills
  • Dual extraction

• Gas expansion
• Supplemental collection
• Intermediate capping
• Migration control/supplemental wells
• Adjust gas model
Landfill Management

• High precipitation events
• Weather variability
• Changes to landfill liquids
• Erosion risks
• High wind events
• Heat waves
Adaptations for Management

- Liquids management
- Erosion control
- Leachate modeling
- Wind control
- Slope stability
- Good maintenance practices
- Fix what you know is not working
Emergency Management

• Importance of emergency management
  • Develop one
  • Check and revise current plan

• Consider staffing
  • Essential v. non-essential
  • Truck drivers
  • Routes
  • Staff are a part of the community

• Waste management is important infrastructure

Summary

- Weather patterns changing
- LFG and landfill changes
- Maintaining compliance
- Strategies to address changes
  - Effective/innovative use of existing technology
  - Site-specific
  - Proactive vs. reactive
  - Cadillac or pickup truck solutions
- Adaptation plans
- Management Plans
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