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# LFG Issues During Post-Closure Development of Landfills

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# Outline of Presentation

- Introduction
- California LFG Regulations
- Effects of Development on LFG and  
Effects of LFG on Development
- Examples
- Summary

# Introduction

- Development on closed/inactive landfills is on the increase
  - Brownfields revitalization projects
  - Increased surrounding property value
  - Urban expansion
- Development can create complicated LFG management and compliance situations

# California LFG Regulations

# California LFG Regulations

## ■ Statewide

- California Code of Regulations, Title 27
  - §20921 – §20945 Gas Monitoring & Control
    - Existing on-site structures and perimeter
  - §21190 – Postclosure Land Use
    - Proposed On-Site Development



# State LFG Regulation Summary

- Existing On-Site Structures and Property Boundary
  - CCR Title 27 §20921 – §20945 Gas Monitoring & Control
    - On-site Structures
      - 1.25% methane threshold
    - Property Boundary
      - Perimeter Probe Network
        - 5% methane threshold

# State LFG Regulation Summary (cont.)

## ■ Proposed Development

### – §21190 – Postclosure Land Use

#### ■ Development Over-Refuse §21190(e)

- Methane Gas Sensors
- Active/Passive vent systems
- Periodic Gas Monitoring

#### ■ Development within 1000' of Refuse §21190(g)

- Geomembrane or equiv.
- Vent pipes
- Methane Gas Sensors
- Periodic Gas Monitoring

# Local LFG Regulation Summary

## ■ Local Regulations

### – LA County Building Code 110.3

- Requires engineered and approved gas mitigation system beneath any structure located within 1000' of a landfill property

### – LA City Methane Ordinance

- Designates methane “hot” zone within City of LA
- Methane investigation and membrane design required within “hot” zone

### – SCAQMD Rule 1150.1

- Enhanced probe spacing and monitoring requirements for LFG perimeter migration monitoring probes

# Effects of Development on LFG and Effects of LFG on Development

# LFG Generation

- Site Development Can Influence LFG Generation
  - Structures and Paving reduce water infiltration which may result in lower LFG generation
  - But may also prolong the LFG generating life of a landfill

# LFG Migration

## ■ Vertical Migration

- Structures and paving can reduce or eliminate vertical (upward) LFG migration through cover
- Potential for increased vertical (downward) LFG migration and groundwater impacts

## ■ Lateral Migration

- Elimination or reduction of vertical migration pathways can force LFG to migrate laterally

# LFG Collection and Control

- Placement of Control Systems Must Consider Site Development Issues
  - subgrade locations, cover material, infiltration from landscaping irrigation, building layouts, etc.
- Buried Piping
  - Slope, cost, trenching, access, and condensate drainage issues

# LFG Collection and Control (cont.)

- Remote Access Points and Vaults for LFG Wellheads
  - Piping, cost, conduits for surface emissions , etc.
- Location of LFG Control Facility
  - Aesthetics, noise, safety, and other issues
- Potential Health, Safety, and Nuisance Impacts to On-Site Receptors
- Building Construction Considerations
  - Methane membranes, sensors, and alarm systems

# Examples

# Landfill #1 - Setting



- 115-acre cut and cover operation
- Operated over 5 years (1960-1964)
- Golf course development on-site since 1965

# Landfill #1 - Setting

- Undeveloped area at time of closure
- Residential Development adjacent to refuse (1976)



- Perimeter GCCS being installed along residential area due to lateral migration
- Proposed parking lot over portion of refuse area

# Landfill #1 - Development Issues

- Proposed perimeter GCCS must integrate with the existing golf course
  - Subgrade header installed adjacent to cart path
  - Installation of system split into separate sections to allow for installation during slow season

# Landfill #1 - Development Issues

- Proposed parking area paving altered to allow for LFG migration through landfill cover



# Landfill #2 - Setting

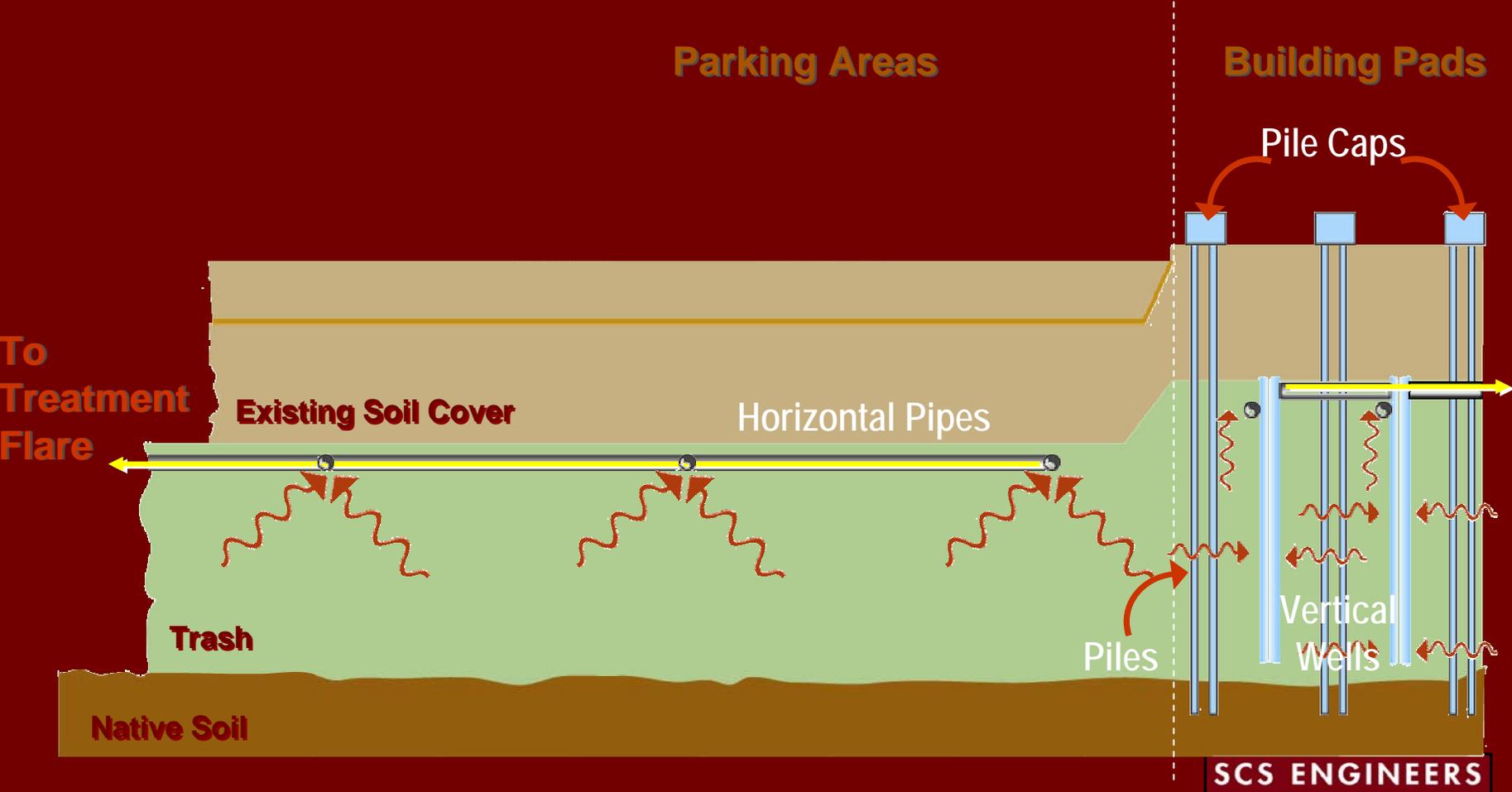
- 157-acre cut and cover fill
- Operated for 5 years (1959-1964)
- Currently undeveloped
- Maximum refuse depth = 60 feet
- LFG Migration issues along SW perimeter
- Proposed Commercial/Residential Development



# Landfill #2 Development Issues

- Gas control over entire site
- Vertical wells proposed under buildings
- Horizontal wells across site
- Gas treatment system
- Automated monitoring system (24/7)
- Back-up power and monitoring systems

# Gas System—Building Pads



# Landfill #3 - Setting



- 34-acre canyon fill
- Operated for 6 years (1951-1957)
- Currently undeveloped
- Correctional facilities adjacent to north and southwest
- Maximum refuse thickness of 170 feet
- Another Landfill Adjacent to South

# Landfill #3 - Current Status

## ■ Subsurface Combustion Issues



- Adjacent residences identified smoke from landfill
- Temporary cap repair performed to mitigate subsurface combustion

# Landfill #3 - Current Status

- Adjacent land use (correctional facilities) evacuated due to LFG migration potential



- Access only allowed after internal building methane sweeps
- Facility currently used for film shoots

# Landfill #3 – Development Issues

- Proposed Redevelopment of Correctional Facility Adjacent to SW
  - Site is now on regulatory “radar”
  - Both landfills now subject to §21190 – Postclosure Land Use
    - Postclosure land use proposal required
    - Site must also adhere to local (LA County building code) regulations

# Landfill #4 - Setting



- 14-acre former burn dump
- Operated for 21 years as a burn dump (1928-1949)
- Operated 9 years as MSW landfill (1949-1958)
- Currently developed as a city park
- Residences adjacent to the east

# Landfill #4 – Development Issues

- Lateral LFG Migration Along Residential Perimeter
  - LFG extraction system installed along LFG compliance perimeter
- Proposed Redevelopment of Site into Active Use Park
  - LFG system designed to integrate into park utilization
    - Subgrade headers
    - Well location outside of refuse footprint (away from active areas)

# Summary

# Summary

- LFG migration emissions is a major concern for closed landfills being redeveloped
- When evaluating LFG issues at these sites consider the following:
  - Does the proposed development consider potential impacts from LFG?
  - How will proposed LFG remediation impact development?
  - Have costs for LFG migration remediation been factored into the development proposal?