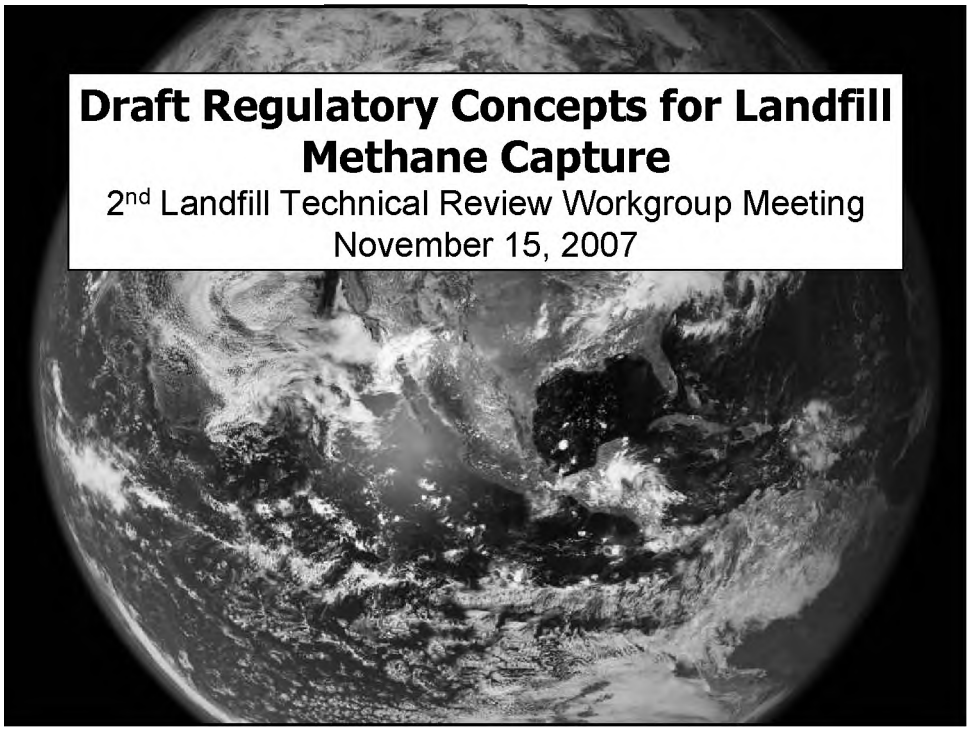

Draft Regulatory Concepts for Landfill Methane Capture

2nd Landfill Technical Review Workgroup Meeting
November 15, 2007

Agenda

- Applicability
- Exemption Criteria
- Methane Destruction Efficiencies
- Surface Methane Emission Standards
- Next Steps

Applicability

Draft Regulatory Concepts

Applicability

- All new and existing MSW landfills
  - Some landfills may only need to satisfy reporting requirements

Exemption Criteria

Draft Regulatory Concepts

Exemption Criteria

- Landfills Using Passive or Carbon Adsorption Systems
  - Measured methane flow rate is below a minimum specified level (to be determined) needed to continuously sustain an enclosed flare

Draft Regulatory Concepts

Exemption Criteria

- Low Methane Emission Landfills
  - Meet surface methane emissions standards
    - Exemption would be reevaluated after a specified period of time (frequency to be determined, may differ for active versus closed)

Draft Regulatory Concepts

Exemption Criteria

- Low Methane Emission Landfills (cont.)
  - Calculated methane flow rate is below a minimum specified level (to be determined) needed to continuously sustain an enclosed flare
  - Methane concentrations in subsurface boundary probes <5%, if installed

Draft Regulatory Concepts

Exemption Criteria

- Permanent GCCS Shutdown or Removal
  - Meet surface methane emissions standards
  - Measured methane flow rate is below a minimum specified level (to be determined) needed to continuously sustain an enclosed flare

Draft Regulatory Concepts

Exemption Criteria

- Permanent GCCS Shutdown or Removal (cont.)
  - Methane concentrations in subsurface boundary probes <5%, if installed

Methane Destruction Efficiencies

Methane Destruction Efficiencies

- Bay Area AQMD – Flares
  - Average methane DE: 99.9%
  - Methane DE Range: (all >99%)
- Bay Area AQMD – IC Engines Rich Burn
  - Average Methane DE: 99.5%
  - Methane DE Range: 98.4% - 99.99%

Methane Destruction Efficiencies

- Bay Area AQMD – IC Engines Lean Burn
  - Average Methane DE: 96.1%
  - Methane DE Range: 92.3% - 98.9%
- Bay Area AQMD – Large Gas Turbines
  - Average Methane DE: >99.98%
  - Methane DE Range: All 99.98%

Methane Destruction Efficiencies

- Bay Area AQMD – Microturbines
  - Average Methane DE: 99.9%
  - Methane DE Range: All 99.9%
- SCS Engineers – Flares
  - Average Methane DE: 99.9%
  - Methane DE Range: All 99.9%

Methane Destruction Efficiencies

- SCS Engineers – Engines
  - Average Methane DE: 98.3%
  - Methane DE Range: 97.5% - 98.6%
- SCS Engineers – Turbines
  - Average Methane DE: 99.9%
  - Methane DE Range: All 99.9%

Methane Destruction Efficiencies

- San Diego County APCD – Flares
  - Average Methane DE: 99.9%
  - Methane DE Range: All >99.9%
- San Diego County APCD – Engines
  - Average Methane DE: 99.6%
  - Methane DE Range: 98.6% - 99.8%

Methane Destruction Efficiencies

- San Diego County APCD – Turbines
  - Average Methane DE: >99.9%
  - Methane DE Range: All >99.9%
- Ventura County APCD – Engine
  - Average Methane DE: 99.8%
  - Methane DE Range: All 99.8%

Methane Destruction Efficiencies

- Covanta – Lean Burn Engines
  - Average Methane DE: 94.2%
  - Methane DE Range: 90.9% - 96.9%
  - Outlet Methane Concentration range: ~1,500 ppmv – 3,000 ppmv
  - Installed in 1980

Methane Destruction Efficiencies

- Proposed Methane DE Values:
  - Flares
    - CCAR – 99%
    - SCS Engineers – 99.96%
    - ARB – 99%
  - Lean Burn Engines
    - CCAR – 93.6%
    - ARB – (to be determined)

Methane Destruction Efficiencies

- Proposed Methane DE Values:
  - Rich Burn Engines
    - SCS Engineers – 98.3%
    - CCAR – 99%
    - ARB – 99%
  - Turbines
    - SCS Engineers – 99.97%
    - CCAR – 99%
    - ARB – 99%

Methane Surface Emissions Standards

Surface Methane Emissions Standards

- Effectiveness of 50 ppm integrated surface sampling standard
  - How often is it exceeded?
  - Can it be any lower?
  - Any real impact on increasing gas collection efficiency?

Next Steps

- Other topics or issues of concern?
- Develop draft regulatory language
- Cost Effectiveness Analysis
- Complete Source Test Data Evaluations
- Evaluate SCAQMD Integrated Surface Sampling Results

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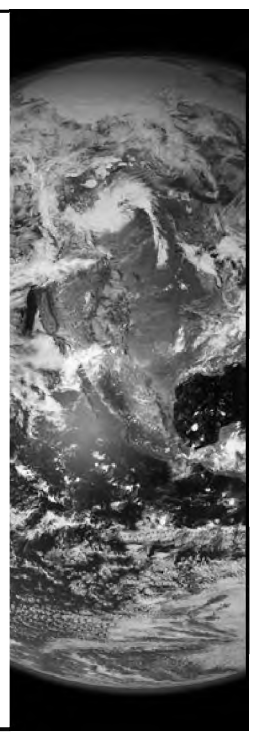
Landfill Methane Control Measure Website:
http://www.arb.ca.gov/cc/ccea/landfills/landfills.htm



Thank you.