Landfill Offset Methodology

Interface-LaGrange Landfill Collection and Combustion Project

Melissa Weitz (EPA) and Erin Kelley (Interface)

Climate Leaders Partners' Meeting
Marina Del Rey, CA
January 19, 2006

INTERFACE

Landfills and GHG

- Most municipal solid waste is deposited in landfills, where bacteria decompose the organic material
- Product of decomposition is landfill gas
  - methane (CH_4) and carbon dioxide (CO_2), smaller amounts of non-methane volatile organic compounds (NMVOC), nitrous oxide (N_2O), nitrogen oxides (NO_X), and carbon monoxide (CO)
- In United States, landfills largest source of anthropogenic CH_4, accounting for 24 percent of the U.S. total emissions of this GHG
- Method for reducing emissions from landfills is the combustion of landfill gas by a flare or at an energy project to oxidize CH_4 to CO_2

Interface Project Background

Project Description: Installation at LaGrange landfill of a cap, vertical wells, horizontal pipes to collect gas and pipe to flares and energy technologies for combustion

- Project will use a flare, 2 hot oil heaters and a small package boiler to combust methane

- **Key Services Provided by the Project:** Destruction of methane

- **Technology/Practice Introduced:** Collection and conveyance of landfill gas to flares and energy end users

- **Project Size/Output:** 38 acres of 2 unlined, capped cells, 47.5 acres of 5 new cells. 1.5 million tons waste in place. Receives over 80,000 tons of waste annually

- **Location/Spatial Area**: LaGrange, Georgia

Pipes and flare installed for gas collection and combustion at LaGrange landfill

Determine Regulatory Eligibility

- Federal
  - New Source Performance Standards (NSPS)
  - Emission Guidelines (EG)
  - National Emission Standards for Hazardous Air Pollutants (NESHAP)

  For this project, collection and control not required by federal regulations.

  Testing conducted on the landfill determined 14.4 Mg NMOC emitted, threshold for NSPS regulations is 50 Mg NMOC

- State
  - No existing state regulations require the LaGrange landfill to flare gas
- Local
  - No existing local regulations require the LaGrange landfill to flare gas

Project Boundary

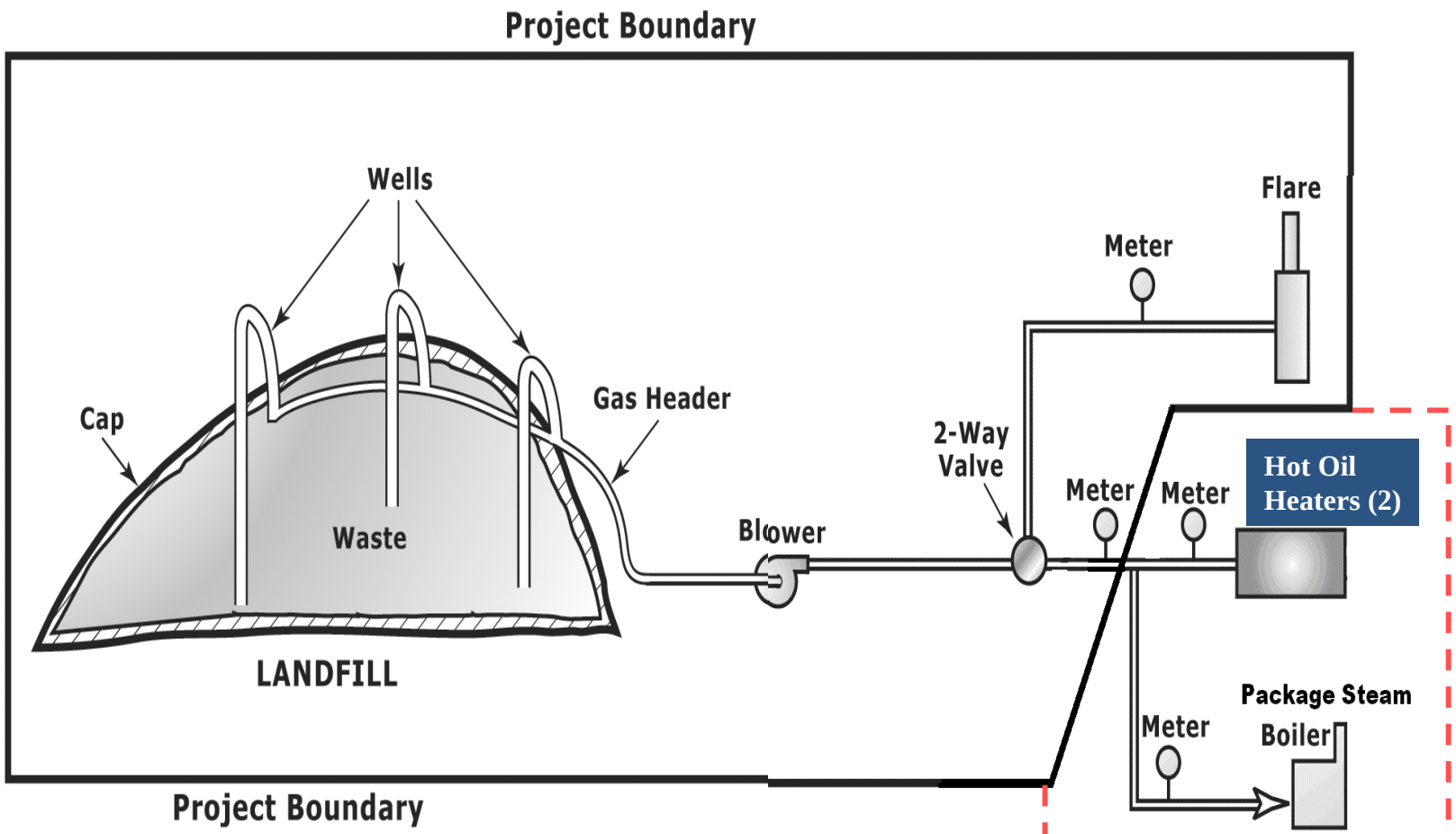
- Physical Boundary
  - landfill, cap, gas collection wells and header piping, blower, and flare. Includes direct or indirect emissions from the use of energy for blower, and in construction and demolition.
- GHG Accounting Boundary
  - CH_4 only from landfill, other GHGs associated with energy use*
- Temporal Boundary
  - Construction through demolition

- Leakage

  Not expected to result in significant leakage

* *In this project, only CH_4 is included in the GHG accounting boundary for emissions from the landfill itself, and only those GHG emissions resulting from construction, demolition, and operation of the project that are deemed significant are included in the boundary.*

Physical Project Boundary



Construction of gas collection and combustion system at LaGrange landfill

Performance Threshold

- Data Set – landfill practices in U.S.
- Spatial Area - United States
- Temporal Range - Past 15 years

Gas Management Practices at landfills not required to Control Gas*

Gas Management Approach	Number of Landfills	Percentage of Landfills
No LFG Collection and Control	1,174	82%
LFG Collection and Control	264	18%

*There are an estimated 1438 non-NSPS and 630 NSPS LF in the U.S.

Estimate Emissions Reductions

- Estimate Gas Generation – LandGEM software provides annual estimation of LFG and methane generation
  - Inputs include waste accepted, methane generation rate, generation capacity, methane concentration
- Estimate Gas Collection Efficiency – estimated 45% for calculation
  - inputs are based on project parameters (e.g., coverage, number of wells)
- Baseline
  - what would have been captured/oxidized in absence of project (includes a 10% adjustment for oxidation)
- Estimate Emission Reductions

	2004	2005	2006	2007	2008
CH4 Generated ($MTCO_2e$)	41,607.48	43,979.25	46,258.03	48,447.46	50,551.03
CH4 Combusted ($MTCO_2e$)	18,348.90	19,394.85	20,399.79	21,365.33	22,293.01
Baseline ($MTCO_2e$)	1,834.89	1,939.48	2,039.98	2,136.53	2,229.30
Emissions Reductions ($MTCO_2e$)	**16,514.01**	**17,455.37**	**18,359.81**	**19,228.80**	**20,063.70**

Monitoring

- Most projects will use direct measurements
  - End-use metering: Single instrument simultaneously measures gas flow and CH_4 concentration, uncertainty low
  - Monthly monitoring: portable or fixed instrument measures gas flow rate and CH_4 concentration, readings taken monthly, uncertainty higher
- End-use metering for Interface project
  - At the Landfill
    - Flare
    - Pipeline from the landfill to Interface
  - At Interface
    - Boilers
    - Fluid systems

Quantify Emissions Reductions

- Quantifying Reductions
  - Emissions Reduction = Project Emissions – Baseline Emissions
- Baseline
  - the amount of CH_4 captured/oxidized in the absence of the project
  - for landfill projects, an assumption is made that approximately 10% of available CH_4 is oxidized to CO_2
- Emissions reductions
  - are therefore calculated as 90% of the amount of methane combusted by the project

LFG to flare / energy device (cuft)	**123,856,036.00**
MT CH_4	**948.78**
MT CH_4 combusted (98%)	**929.81**
GWP CH_4	**21**
MT CH_4 combusted in MTCO_2e	**19,525.95**
Baseline (Adjustment for Oxidation) (10%)	**-1,952.60**
Emissions Reductions (MTCO_2e)	**17,572.50**

- Project Lifetime – proposed 20 year lifetime for project
  - Analyses shows that LaGrange landfill unlikely to exceed NSPS cutoff