Question???

- How do you know if your landfill is a good candidate for energy recovery and how big the LFG collection pipes and the flare for a gas control system need to be?

Answer

- Use EPA Basic Screening Tool for project potential and use LFG generation modeling.

LFG Generation

- Phases of LFG generation
- LFG generation volume (Lo)
- LFG generation rates (k)
- LFG generation life (a long time)

Collection Rate = Generation Rate x Collection Efficiency

Landfill Gas Recovery Rate

The amount of LFG that can be collected is a function of:
- How much LFG is being generated
- LFG system collection efficiency
- Air infiltration (cover issues)
- Geometry of the landfill
- Refuse permeability
- Extraction well spacing

USEPA’s LFG in China Workshops (2008)
6. LFG Quantification and Modeling (English)

**Modeling vs Measurement**
- In U.S., modeling using U.S. EPA published default values, or assumptions based on experience at similar sites.
- Site specific data and/Limited field testing program consisting of an extraction pump test from either a single LFG extraction well or a limited number of wells in a portion of the site being tested, or
- A combination of the two.

**EPA Modeling**
- LFG Flow = k x Lo x Exp(-kt)
- t = years
- k = rate factor yr^-1
  - Dry 0.02; AP42 0.04; NSPS Wet 0.05; Bioreactor up to 0.70
- Lo = methane yield per unit of mass
  - 100 cu m/kg = 1.6 cu ft/lb
  - 170 cu m/kg = 2.6 cu ft/lb
- C_{NMOC} (4,000 ppmv)

**Modeling**
- Lo and k are never what the EPA suggests.
- At some sites this gets you close.
- Some sites the results are as much as an order of magnitude off.
- It is best to solve for Lo and k from other similar landfills.

**Relationship between Lo and k**
- There are a number of combinations of Lo and k that can be used to predict LFG generated by a landfill.
- Can calculate k based on methane collection data from a closed section of a landfill. This allows the modeler to clearly see the methane decline with respect to time.

**LFG Extraction System Design Criteria (Extraction Wells)**
- **Refuse Permeability** Horizontal to Vertical
  - Design - Wet landfills: 3:1
  - Design - Dry landfills: 5:1 – 10:1
  - Measured (localized): 33:1

**Radius of Influence**
- **Radius of influence** (ROI) field testing had been attempted to guide well spacing. One such method (EPA’s Method 2E) has been published. However, such tests are costly and often difficult to interpret.
- ROI is more like an amoeba than a circle.
6. LFG Quantification and Modeling (English)

Radius of Influence

- The Rules and Regulation Committee surveyed well design practices at over 58 United States landfills in 1991.
- It was found that nearly 60% of landfills used spacing of 200’ or greater
- Some landfills use mixed spacing.

Active System

- Flare Station: The facility at which the LFG is gathered and thermally destructed.
- Recovery: The utilization of the LFG for productive purposes; can include power generation, low/high BTU fuel.
- If recovery system goes down, the flare starts so LFG continues to be burned.