Function of Control Systems

- Migration control – designed to prevent the off-site migration of landfill gas
- Odor control – designed to alleviate landfill gas odors
- Emissions control – designed to minimize landfill gas emissions into the atmosphere
- Groundwater protection
- Cover protection – designed to keep a flexible plastic membrane cover from floating
- Energy/products recovery – systems designed to recover landfill gas for beneficial use.

Modes and Methods of Controlling landfill gas
- Passive Control
- Active Control

The landfill gas Monitoring and Perimeter Control System

Active Landfill Gas Collection System Components: Wellfield

- The landfill gas wellfield
- Extraction Points
  - Vertical wells
  - Horizontal wells
  - Surface collectors

Typical Vertical Landfill Gas Extraction Wells with Above & Below Grade Wellhead Configurations

Typical Horizontal Well Details, Front & Side Profiles

USEPA’s LFG in China Workshops (2008)
7. LFG Collection and Control (English)

**Horizontal Wells vs. Vertical Wells**
- Reduced interference with LF operations
- Early landfill gas Collection
- Wells can be installed when landfill is active
- Well ROI isn’t as good vertically as horizontally
- Horizontally bore wells are costly to build
- Better vacuum spread throughout the landfill
- Can be installed after filling is complete
- Must Protect wells when placing trash over or around wells

**Active Interior Wellfield Extraction**
- Advantages: typically the best method for collection
- Disadvantages: flooding, interference with landfill gas system operation, well failure

**Landfill Gas Wells and Wellheads**
- Components of the Wellhead
- Wellhead Flow Measurement
- Wellhead Valve
- Wellhead Flex Hoses
- Wellhead Access Ports (Gas Sampling)
- Access Ports and Wellhead Instrumentation

**Typical Vertical Wellhead**

**Typical Vertical Wellhead w/ Orifice Plate**

USEPA’s LFG in China Workshops (2008)
Typical Horizontal Wellhead

Active Landfill Gas Collection System
Components: Collection/Treatment

- Header pipelines
  - Aboveground
  - Belowground

- The landfill gas Treatment and Disposal Facility
  - Blowers (exhausters)
  - Activated Carbon (does not remove methane); Flares

Aboveground Piping Support

USEPA’s LFG in China Workshops (2008)
Typical Below Grade Header Trench

Extraction System Condensate Management
- Landfill gas is saturated
- Condensate can contaminate groundwater
- Re-injection/infiltration
- Off-site transportation

Condensate System Components
- Traps
  - collect and drain condensate back to landfill or sump/container
  - configurations vary - “liquid” or “loop seal”
  - “J”, “P”, or “bucket” types
- Sumps
  - collection point
  - manually or automatically drained
  - fitted with a pump
- In-Line Knockouts
Condensate Collection and Storage

- Storage tanks
- Manually or automatically pumped
- Single tank is most common
- Must check levels
- Tank may have: level gauge, flame arrester vent, emission control system, secondary containment, anchoring tie downs, drain valve, and liquid transfer connection fittings.
Condensate Treatment and Disposal

- Treatment may be simple or complex
- May consist of two phases - aqueous and hydrocarbon
- Number of treatment options
- Appropriate protective gear should always be used when handling or working with condensate