

**AGENDA
BIOREACTOR WORKSHOP
AUSTIN, TX
US EPA Region 6**

September 24, 2008

Time

Subject

7:30-8:00 am

Registration

8:00-8:45 am

Introduction

- Overview of bioreactor landfill technology
 - Bioreactor landfill defined
 - Approach of bioreactor operation (liquids addition, air injection)
 - Motivations for bioreactor operation (environmental and economic benefits)
- Regulations and permitting
- Design issues and approaches (Retrofit Vs bioreactor-ready cell)
- Seminar organization

8:45-9:45

Regulatory framework and permitting mechanisms

- Regulations
 - Subtitle D
 - NSPS
 - NESHAP
 - State regulations
- Permitting mechanisms
 - Subtitle D
 - EPA XL
 - RD&D
 - State regulations
- Typical permitting issues
- Potential Community Concerns

9:45-10:00

Break

10:00-11:00

Fundamental of Liquids Addition

- Moisture balance and fluid flow fundamentals
 - Moisture balance fundamentals
 - Mass versus volume
 - Field Capacity, saturation
 - Fluid flow fundamentals
 - Saturated flow, hydraulic conductivity
 - Unsaturated flow, associated parameters
 - Multiphase flow
- Methods of liquids addition
 - Area application methods
 - Configurations (gravity, pressurized)
 - Documented applications
 - Vertical wells (gravity, pressurized)
 - Configurations (gravity, pressurized)
 - Documented applications
 - Horizontal trenches (gravity, pressurized)
 - Configurations (gravity, pressurized)
 - Documented applications
- Design issues
 - Available liquids
 - Available introduction techniques
 - Cell configuration
 - Volume of liquids to be added
 - Time period of operation
 - Slope stability concerns
 - Impact on gas collection system
 - Impact on head on liner
 - Avoidance of seeps
 - Other landfilling operations

- Other components of the system, e.g. gas extraction system, landfill cap system
- Design Approach
 - Selection of target liquid addition volume
 - Selection of liquids addition methods
 - Vertical well systems
 - Liquid addition rates
 - System specification
 - Diameter and configuration
 - Depth, screen length
 - Well location and spacing
 - Pipe connections
 - Operational strategies
 - Horizontal systems
 - Liquid addition rates
 - System specification
 - Trench length
 - Trench configuration and bedding
 - Vertical and horizontal spacing
 - Pipe design
 - Operational strategies
- Strategies for minimizing concerns

11:00-11:30

Liquids collection systems

- Traditional liquids removal systems
- Importance of liquids removal systems in bioreactor landfills
- Predicting head on the liner
 - Basic equations
 - HELP model
 - Approaches for bioreactor landfills
- Strategies for leachate collection system design

11:30 am–12:15 pm Gas collection systems

- Gas collection and recovery at landfills
 - Basics
 - Typical collection systems
- Gas collection issues associated with bioreactors
 - Increased gas production
 - Liquids interference with gas collection devices
- Predicting gas generation at bioreactors
- Design and operation strategies for gas collection at bioreactors
 - Vertical collection systems
 - Horizontal collection systems
 - Gas Collection through the leachate collection system
 - Surface collection systems
 - Strategies for liquids addition start times and cell configurations
 - Use of biocovers

12:15-1:30 pm Lunch (on your own)

1:30-2:30 pm Other design issues

- Slope stability
 - Fundamentals of slope stability
 - Importance of slope stability in bioreactor systems
 - Slope stability design
 - Incorporating bioreactor operation into slope stability design
 - Strategies for minimizing slope stability impact in bioreactors
- Air addition techniques
- Added waste density
 - Pipe sizing
 - Foundation design
 - Liner and leachate collection system design
- Leachate storage and treatment issues

- Long term leachate generation
- Equalization volume requirements
- Bioreactor-complimentary leachate treatment strategies
- Closure and post-closure issues

2:30-3:00 pm

Operation and Monitoring (part 1)

- Operational approaches
 - Intermittent versus continuous operation
 - Manual operation versus automated
- Operational issues
 - Potential safety concerns

3:00-3:15 pm

Break

3:15-4:00 pm

Operation and Monitoring (part 2)

- Monitoring
 - Monitoring parameters and frequency
 - Leachate
 - Gas
 - Waste mass
 - Instrumentation
 - Leachate
 - Gas
 - Waste mass
- Development of operations plan
- Training requirement

4:00-4:30 pm

Wrap-up

- Review of the major lessons
- Future direction of bioreactors

4:30 pm

Questions/Discussions