JUMP START METHANE PRODUCTION IN A BIOREACTOR LANDFILL USING SEPTAGE

St. Clair County, Michigan

CTI and Associates, Inc.

January 23, 2014

Outline

- Introduction/Background
- Legislative Changes
- Project Overview
- Funding
- Future

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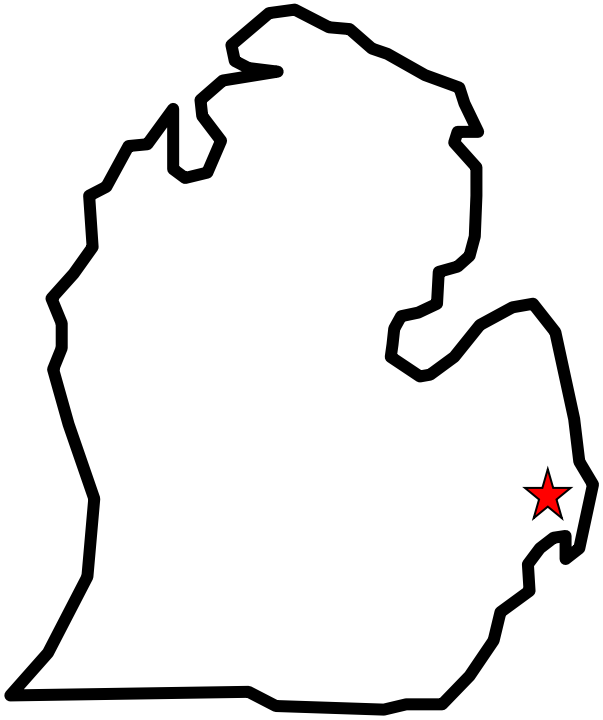
Introduction/Background



- St. Clair County (SCC), Michigan
  - Suburb of Detroit
  - Population ≅ 160,000
  - Predominantly rural/agricultural
  - Approx. 30% sewered
  - Owns/operates Smiths Creek Landfill
- Smiths Creek Landfill (SCL)
  - 600 tons/day
  - 27M bcy capacity (≅ 7M in place)
  - Managed by Matt Williams (presenter)

History (2004-2005)

- SCC interested in increasing site life at SCL
- SCC interested in generating extra revenue from LFG
  - Initial RFP was met with hesitation from developers
  - Too little LFG to make investment
- Increasing concerns regarding pollution from land application of septage
  - Local study identified SCL as a potential location for a septage receiving facility based on central location
- Septage Bioreactor Landfill concept was identified
  - Regulatory hurdles to overcome

Why Septage?

- Readily available in many communities
- Not welcomed by WWTP
- Land application may lead to water contamination
- Promotes waste degradation by
  - Moisture addition
  - Microbial seed addition
  - Chemistry regulation
  - pH control

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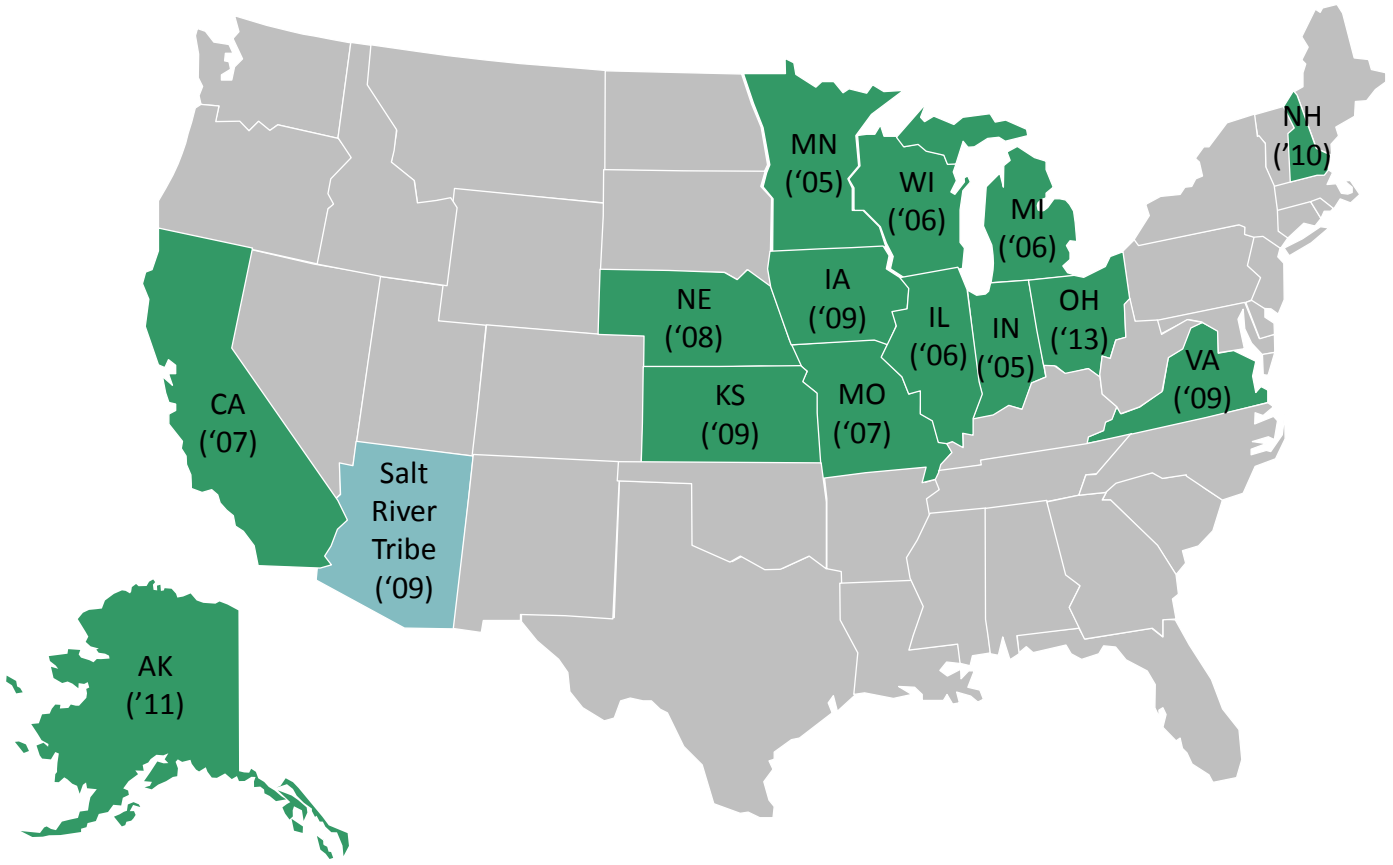
Regulatory Hurdles

- In 2004, liquids other than leachate not permitted in Michigan landfills
- Federal regulations allowed for research, development and demonstration (RD&D) projects
  - Not adopted in MI at the time
  - No avenue for injecting liquids other than leachate

RDDP States (2013)



Legislative Changes

- SCC worked with legislators and MDEQ on rule change and project authorization

2005
Project inception

2006
Regulatory changes allow for RDDP

2007
Permit issued

2008
Septage injection begins; project underway

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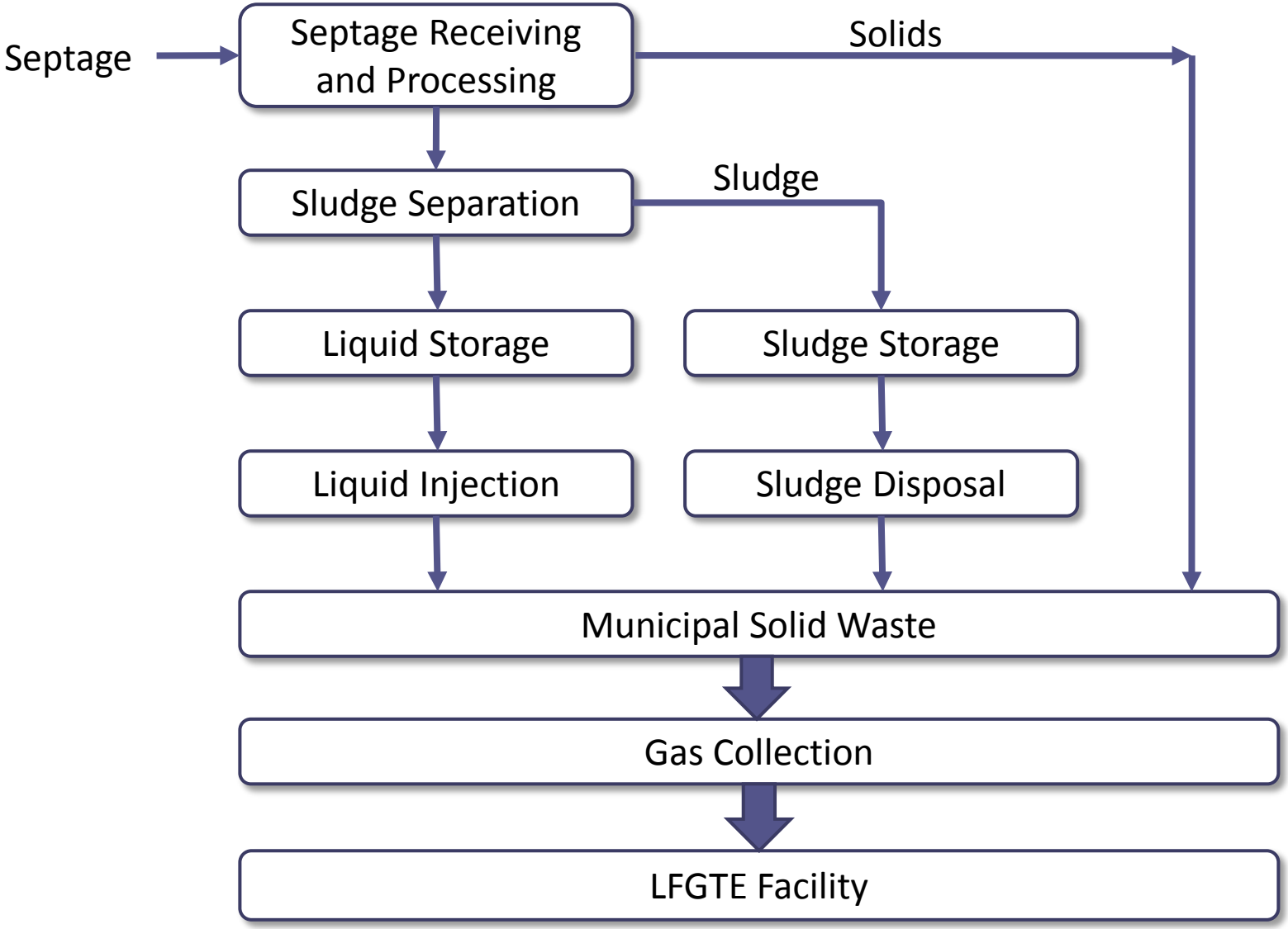
General Description

- Septage collected by local haulers processed at an on-site receiving facility
  - Volume tracked, solids removed, stored in on-site tanks
- Septage injected via subsurface lines into MSW
- LFG collected using horizontal gas extraction lines
- Entire system monitored for a variety of parameters to measure performance and document compliance
- In operation since 2008


Septage
Septage Receiving and Processing
Solids
Sludge Separation
Sludge
Liquid Storage
Sludge Storage
Liquid Injection
Sludge Disposal
Municipal Solid Waste
Gas Collection
LFGTE Facility

Facility Overview

Septage Receiving

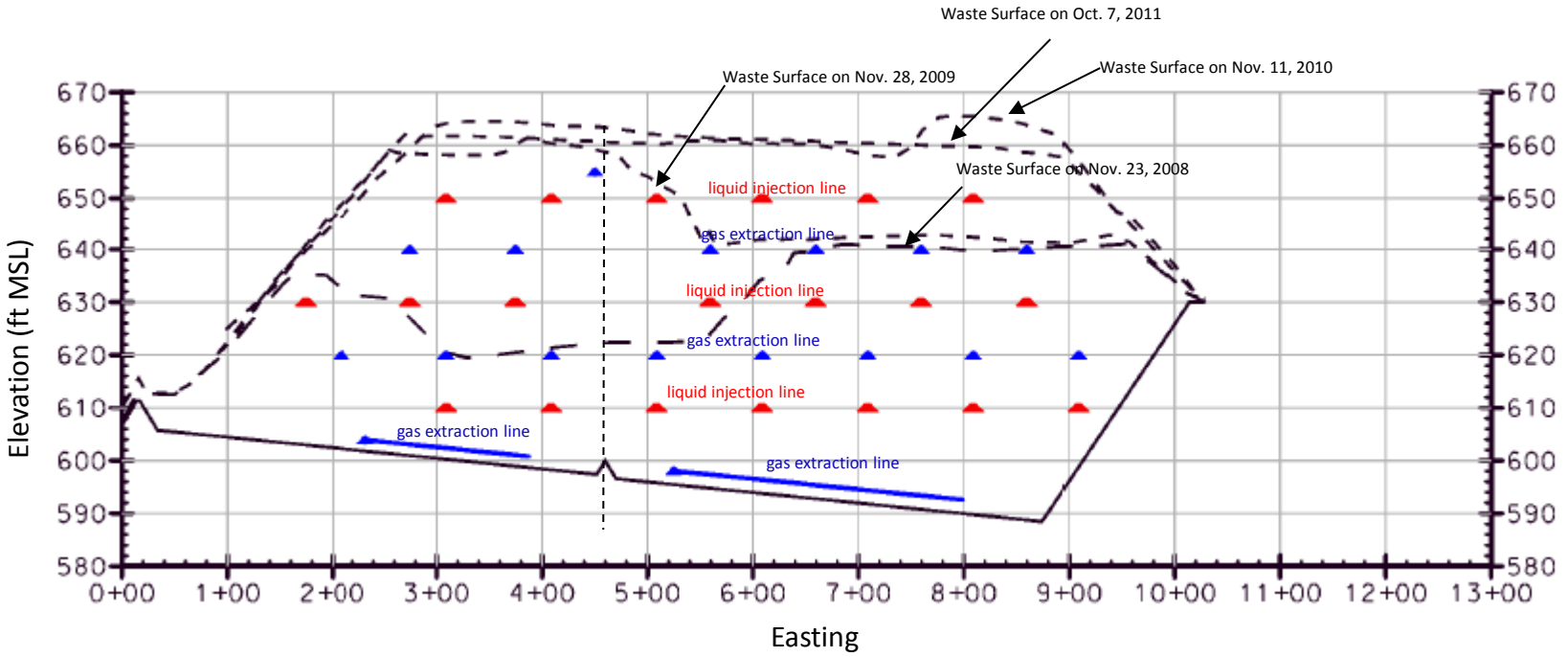
Septage Processing

Liquid/Sludge Separation

Septage Injection Lines

Landfill Gas Extraction Lines

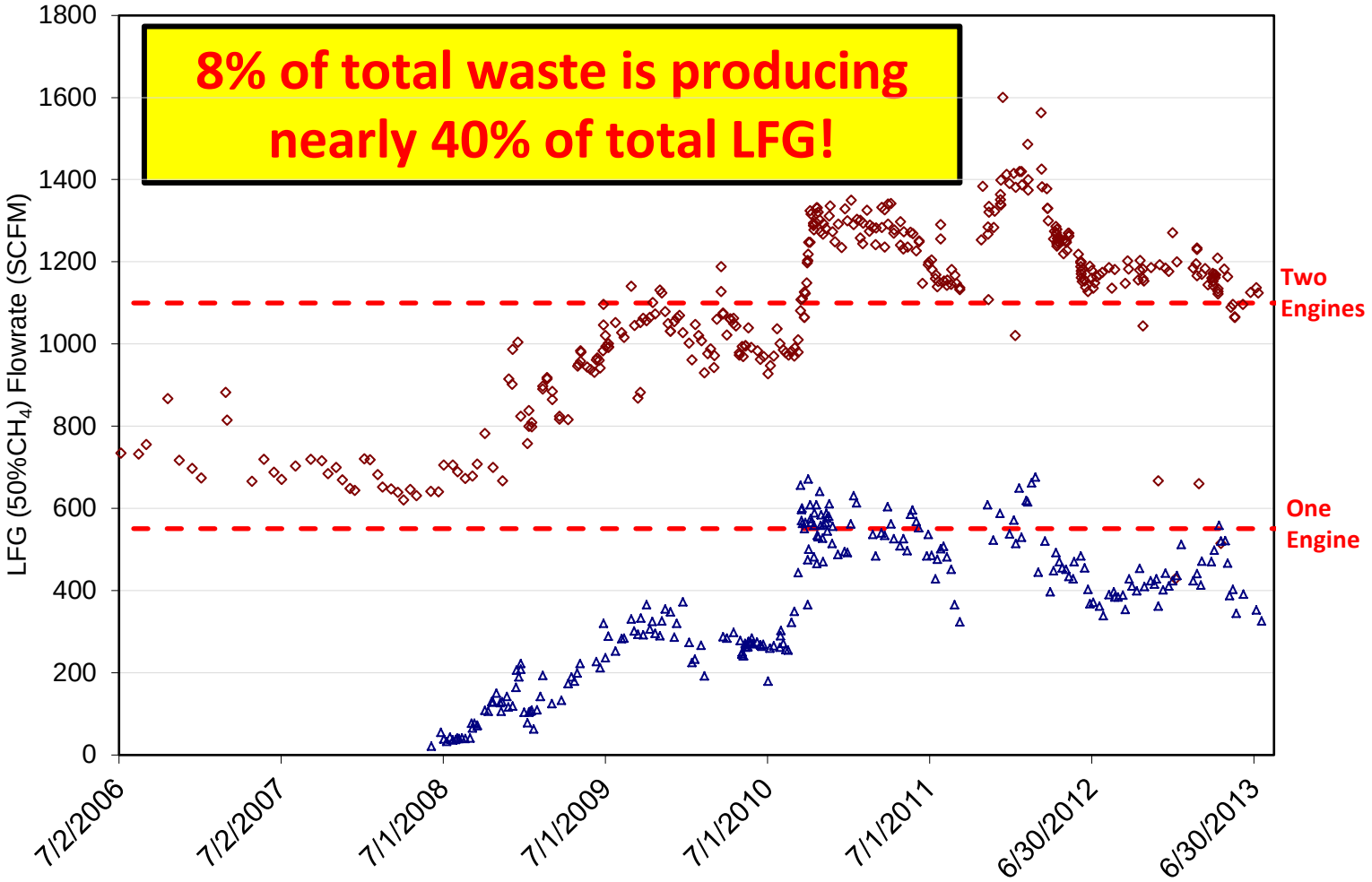
Liquid Injection and Gas Extraction Lines



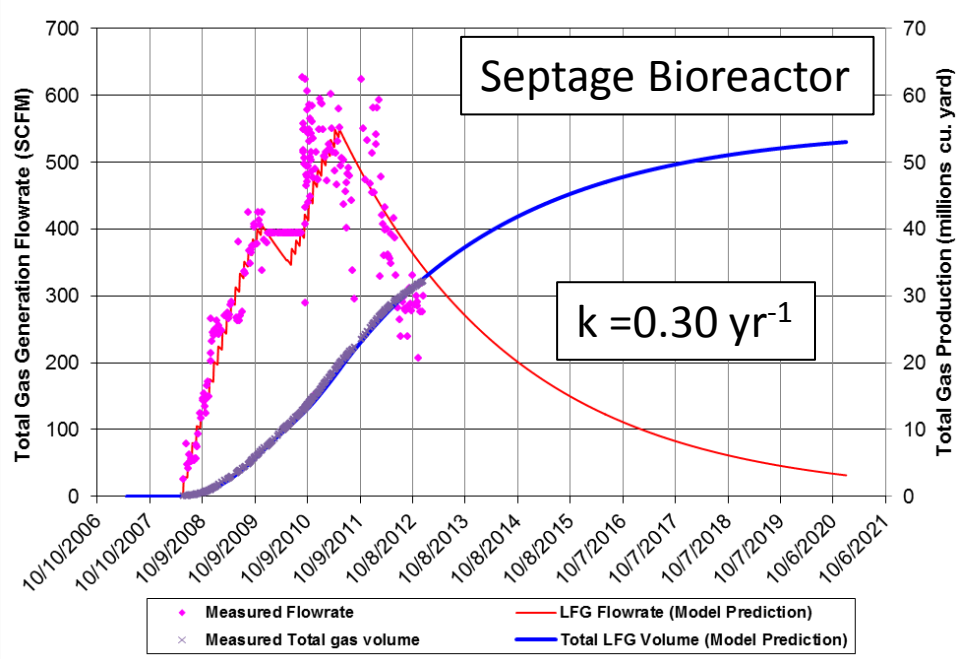
Observation/Benefits

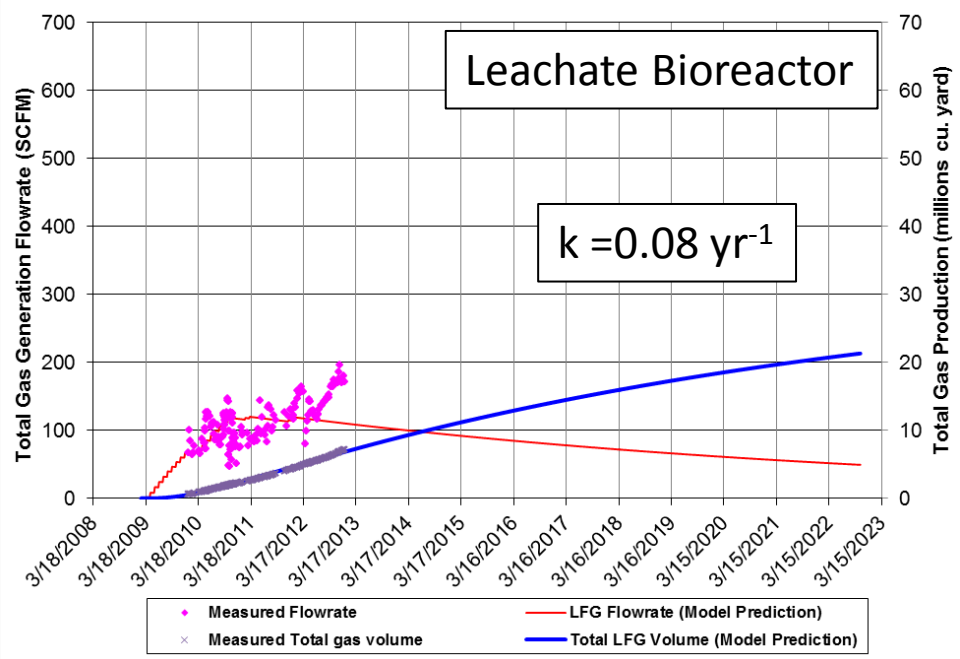
- Waste settlement
  - Airspace utilization factor (AUF) is increasing over time
  - Airspace recovery ~5% per year
- Leachate quality
  - No increase in BOD from septage
  - Increases in total P and phosphate indicate a sufficient phosphate level for biomass growth
  - High levels of ammonia indicate a high degree of solid waste decomposition
- LFG collection
  - Significantly increased decay rate coefficient (k)

LFG Collection

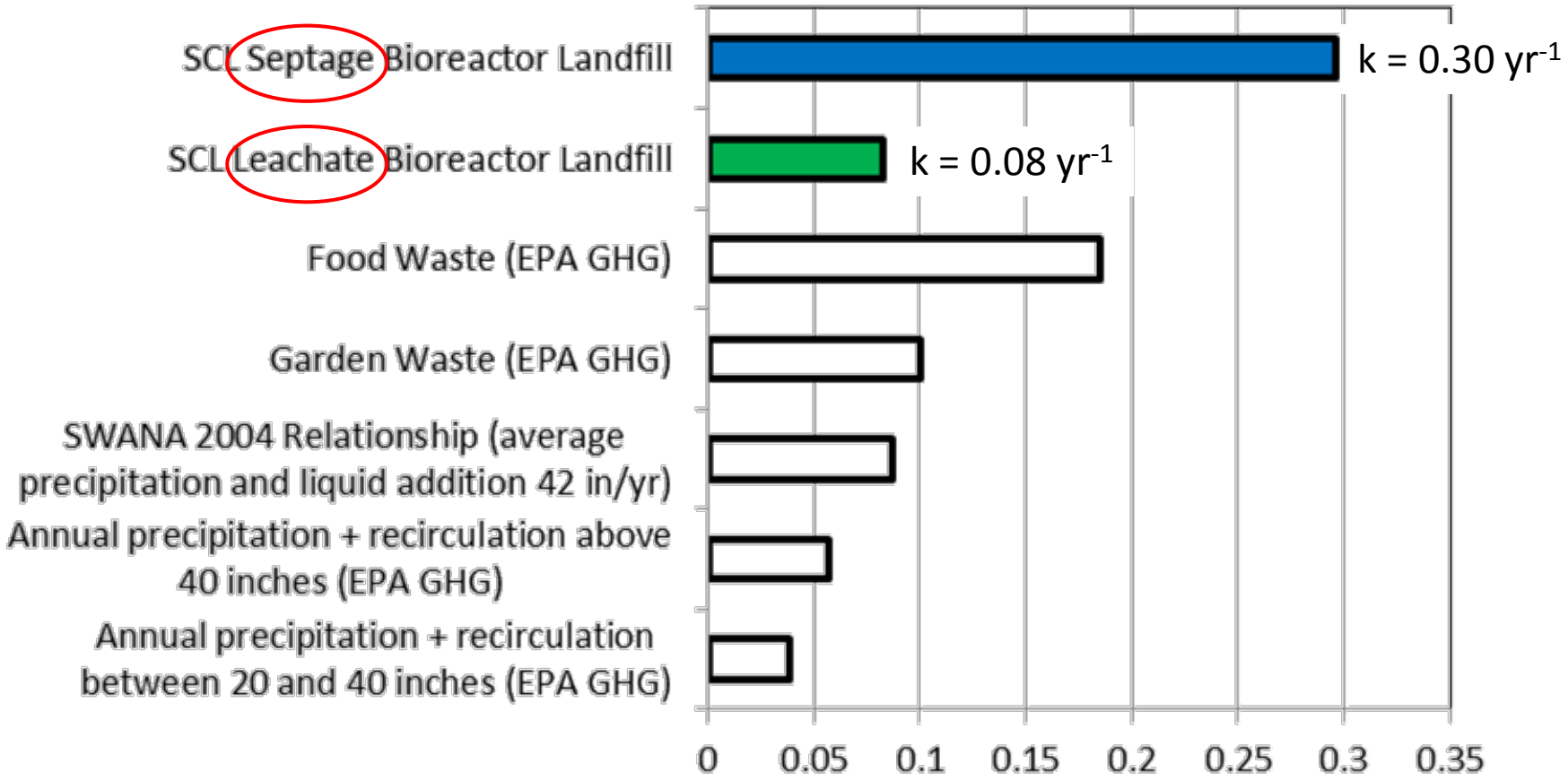


LFG Generation Modeling





Decay Rate Coefficient (k) Comparison



Other Benefits

- SCC able to partner with developer & install LFGTE facility (3.2 MW capacity)
  - Generates approx. $750k in revenue per year
- Increased settlement = site life increase
  - Landfill can service residents for longer
  - Construction costs are delayed (reuse existing cells)
- Siting of septage receiving facility has eliminated land application of septage in SCC
  - Decreased water pollution potential

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Funding

- SRF loan used to fund majority of project
  - Low interest (2.5%) loan with 20-year payback
- Classified as environmentally innovative by the USEPA, subject to Green Project Reserve funding
  - 40% of loan was forgiven
  - Precedent for future similar projects
- Won the EPA's 2010 Performance & Innovation in the SRF Creating Environmental Success (PISCES) award

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Planned Expansion

- Second RD&D permit granted for septage bioreactor technology expansion
- SCC expanding into new and existing areas of landfill
- Expansion will focus on applicability of technology to commingled waste
- Obtaining a second SRF loan to complete project
  - Considered environmentally innovative; expected to receive 50% principal forgiveness

A New Business Model

- Acceptance of septage gives municipality access to SRF funds (typically reserved for wastewater projects)
- Allows landfill construction to be financed
  - municipalities able to conserve $$ in the short term
  - obtain low interest loans not typically available
- Principal forgiveness of 40% and 50% has provided significant savings for SCC

Future Opportunities

- Any municipality could take advantage of SCC model with a few considerations:
  - Is septage readily available in my community?
  - Am I in an RDDP state or do I have any other state regulatory hurdles?
    - If not, amendments will need to be made (SCC demonstrated this is possible!)
  - SRF loan guidelines vary by State but all are required to provide $$ to green projects

Thank You!

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