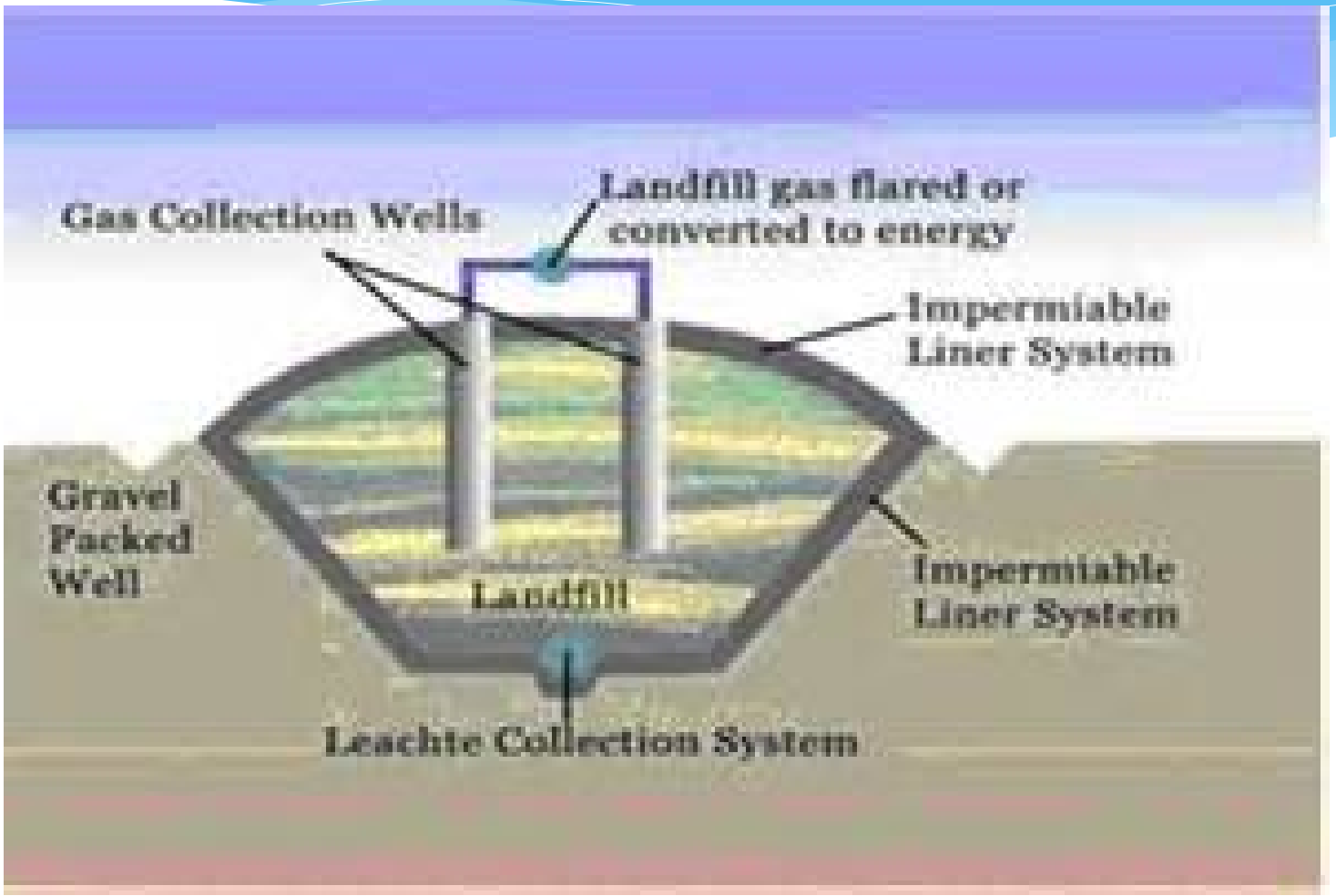
Demonstration Project for Landfill Gas Utilization

April 8th 2015


Gas Collection Wells
Landfill gas flared or converted to energy
Impermiable Liner System
Gravel Packed Well
Landfill
Impermiable Liner System
Leachte Collection System

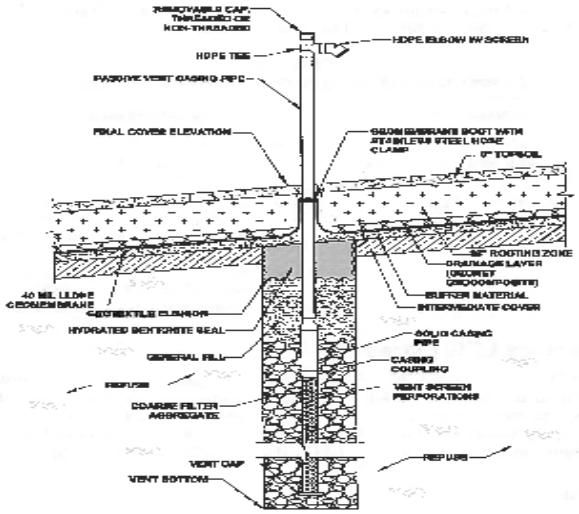
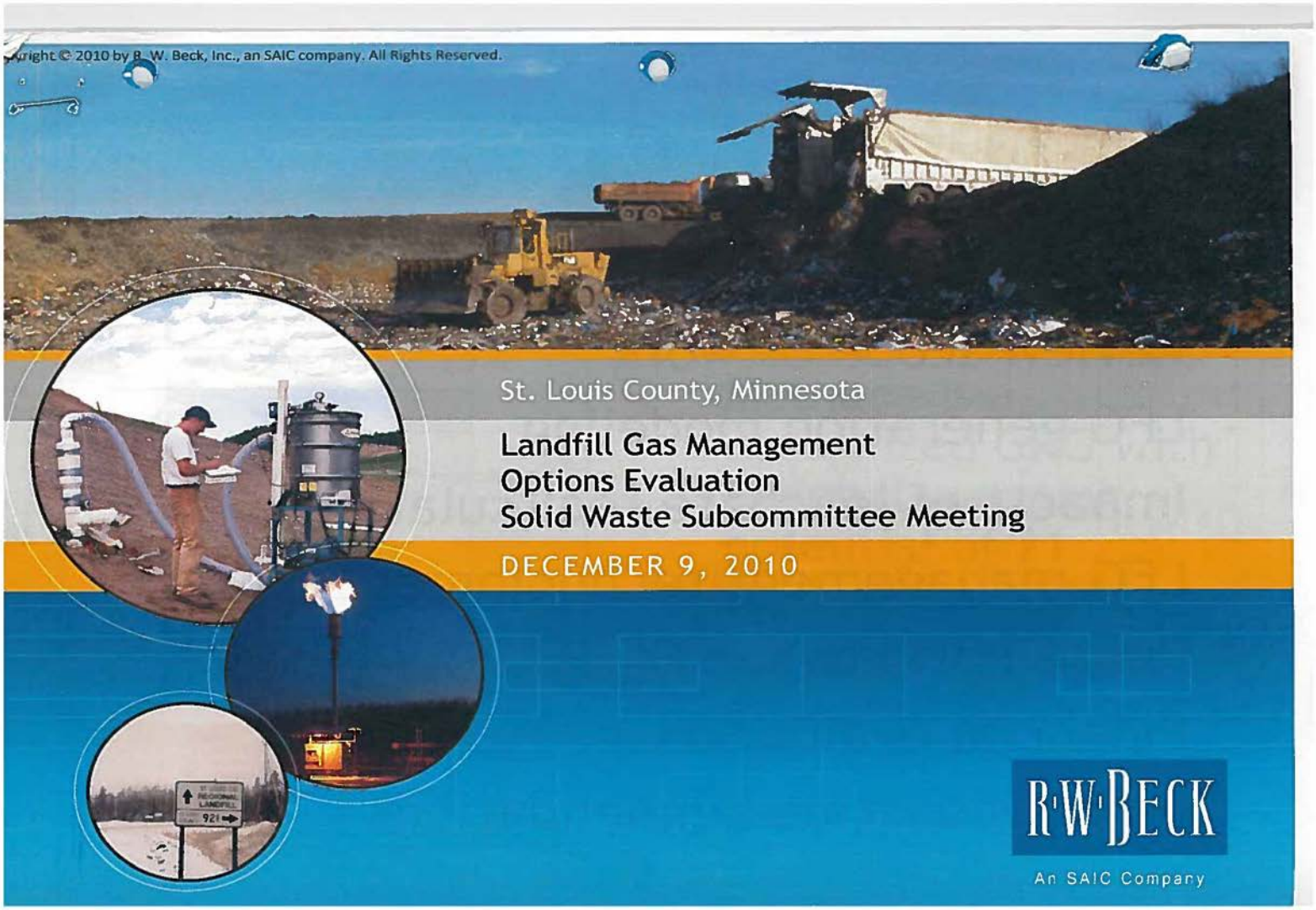


Figure 4-1: Typical Passive Gas Vent

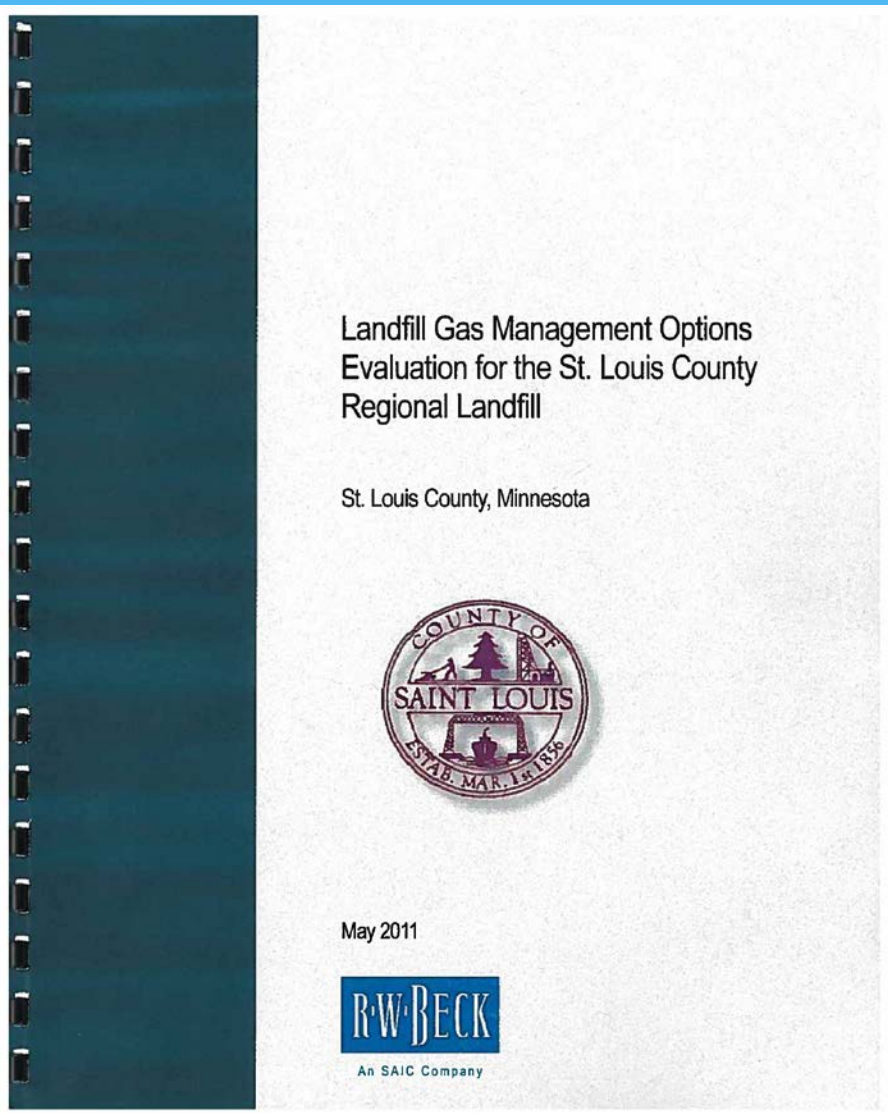
Passive gas vents are fairly simple in design, construction and maintenance requirements. A passive venting system may be converted to an active GCCS by modifying the gas vent wellhead. However, it should be noted that converted passive gas vents are typically not as efficient as gas wells designed specifically for active gas collection. Active gas well design may include a bentonite seal underlying the landfill surface to limit air intrusion, a deeper well screen and/or a designed gravel/filter pack to enhance the collection point radius of influence.

Passive gas venting is typically the most economical option for LFG management. Costs associated with installing gas vents include drilling and materials. There is typically not a piping system underlying the waste that connects the passive gas vents. Although there may be surficial horizontal perforated pipe to provide a pathway for LFG generated underneath the cover material, but above the vertical gas vent well screen. Typical passive gas vent costs can range from $4,500 to $10,000 per gas vent.

2010 Solid Waste Subcommittee presentation



2011 Landfill Gas Management Evaluation



Passive Venting

- LFG vented directly to atmosphere
- Current method of LFG management
  - Includes perforated pipe screen within waste

Options for gas utilization

- Direct Off-site Utilization (Mittal) ~ $3,200,000
  - Annual O&M = $150,000
- Electric Generation and Sale (MN Power)~ $2,600,000
  - Annual O&M = $135,000
- On-Site Landfill Gas Utilization (Beck/Crow Wing) ~ $211,000
  - Annual O&M = $25,000
  - Recycling Center
    - Main heat source
- On-Site Landfill Gas Utilization (SLC pilot project) $75,000
  - Annual O&M = $10,000
  - Auxillary heat source
- Project paybacks
- In-place gas wells

Potential Issues

* Landfill gas components
  * 50 % methane, about half the methane and BTU's of natural gas
  * Landfill gas may be corrosive from hydrogen sulfide
  * Landfill gas is dirty with particulates and siloxanes
* Condensate Management
  * Contains up to 20% moisture which can lead to freezing condensate in lines

Solutions

* Don’t re-invent the wheel
  * Demonstration Project
  * Landfill gas utilization has performed for many years
  * Learn from others mistakes
  * Start small
* Work with established partners
  * Northeast Technical Services and Leisch Engineering are supportive and will provide technical assistance

Gas Filtration Products

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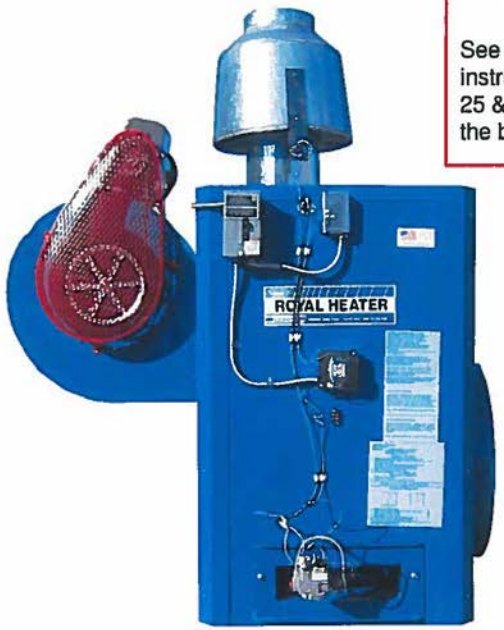
ATTENTION!

See special Methane instructions on page 24-25 & H17 pilot insert in the back of this manual



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Demonstration Building

* Recycling Building

Timeline

* Pilot project design and construction summer 2015
* Installation of auxiliary furnace in recycling facility by 2015 heating season
* Monitor and evaluate performance winter 2015-2016

Future use

* Additional Uses include
  * Vehicle fuel
  * Leachate pond heating
  * Portable fuel tanks for other sites

Questions ?