

Memorandum



CITY OF DALLAS

DATE February 5, 2010

TO Transportation and Environment Committee Members: Linda Koop (Chair), Sheffie Kadane (Vice Chair), Jerry Allen, Tennell Atkins, Carolyn R. Davis, Angela Hunt, Delia Jasso, Pauline Medrano, Ron Natinsky, Vonciel Jones Hill

SUBJECT **Green Energy from McCommas Bluff Landfill**

Attached is the briefing: Green Energy from McCommas Bluff Landfill. This briefing will be presented to the Transportation and Environment Committee on Monday, February 8, 2010.

Please let me know if you need additional information.

A handwritten signature in black ink, appearing to read 'Ryan S. Evans'.

Ryan S. Evans
First Assistant City Manager

Attachment

C: Honorable Mayor and Members of the City Council
Mary K. Suhm, City Manager
Deborah A. Watkins, City Secretary
Thomas P. Perkins, Jr., City Attorney
Craig D. Kinton, City Auditor
Judge C. Victor Lander, Administrative Judge
Jill A. Jordan, P.E., Assistant City Manager
Forest Turner, Assistant City Manager
A.C. Gonzalez, Assistant City Manager
David K. Cook, Chief Financial Officer
Mary Nix, Director, Sanitation Services
Helena Stevens-Thompson, Assistant to the City Manager

Green Energy from McCommas Bluff Landfill

Briefing to:

Transportation and Environment
Committee

February 8, 2010

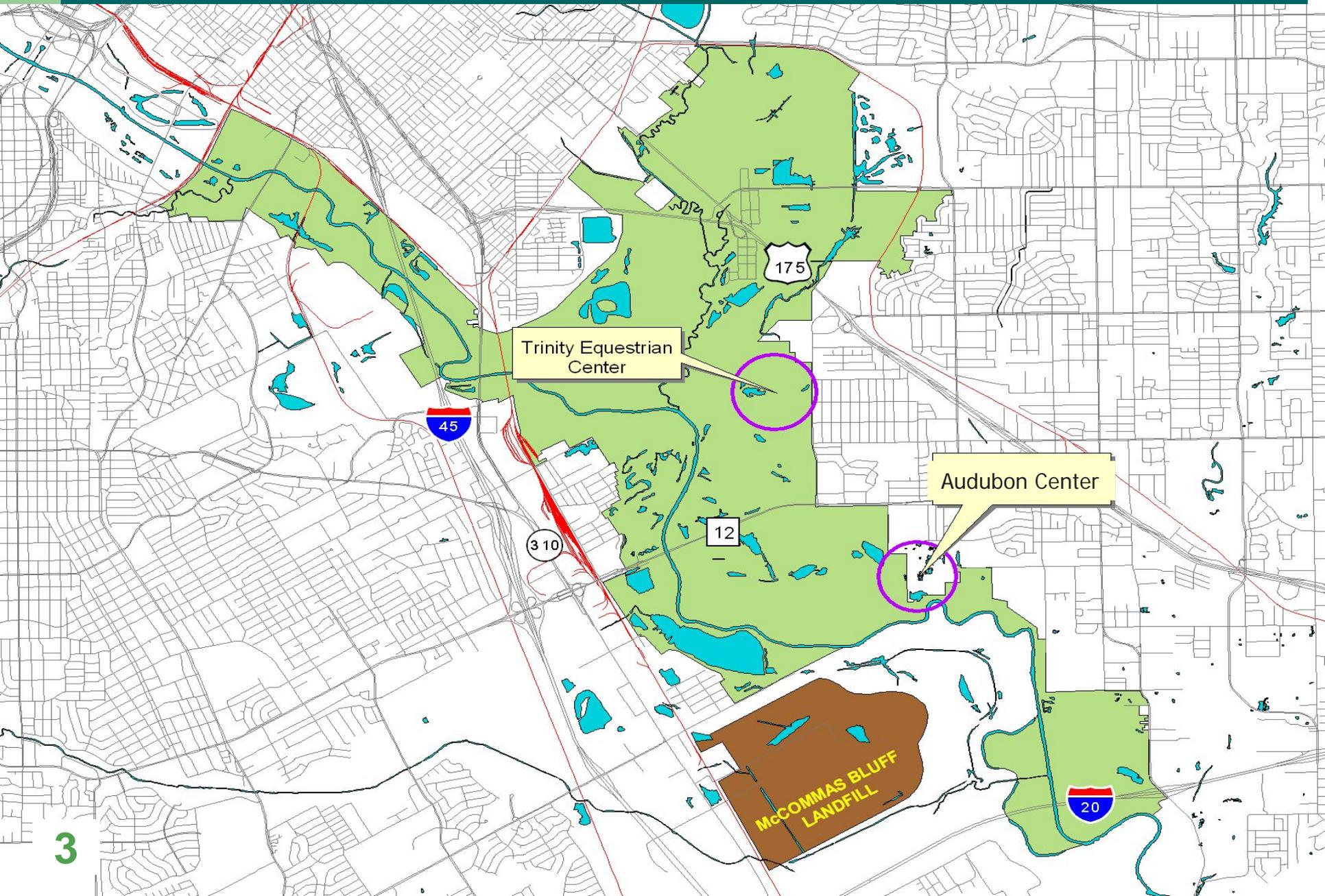
Ron Smith, Sanitation Services



Where is it ?

- Located at the corner of Hwy 310 and I-20
- 2,025 acres
 - 996 acres - for waste disposal
 - 1,029 acres - for natural buffer, access roads, utilities
- Landfill “life”
 - Permitted in 1980 with an estimated 50 years
 - Current projection: 47 years (to 2056)
 - Landfill life has extended, due to improving compaction equipment over time and careful site management
- Borders the developing Trinity Corridor with hiking trails, equestrian center, canoeing and the Audubon Center nearby. Wetland mitigation property supports wildlife and abundance of native plants

McCommas Bluff Landfill in the Trinity Corridor



Landfill Facts

- **Large landfill – 11th by national measure**
- **Capacity:**
 - 156M cubic yards (CY) – capacity when site opened
 - 104M CY – current capacity after 28 years of operation
 - 2.25M CY - average annual usage:
 - Primarily, 1.8 M tons of solid waste
 - Also, daily soil cover, protective liners, berms and roadways, and final top cover (approx.10-15% of space)
- **Gas Production: 5 million cubic feet per day**
 - Capable of heating 30,000 Dallas homes (or 11% of SAN customers)

What is Landfill Gas ?

- Landfill Gas (**LFG**) is a by-product of waste decomposition over time
- Composed of:
 - 55% methane
 - 54% carbon dioxide (CO₂)
 - 1% trace elements
- Uses
 - Industrial heating fuel
 - Natural gas substitution for household uses
 - Vehicle fuel for CNG / LNG units
 - Any use that Natural Gas serves

Managing Landfill Gas

- Methane is a combustible gas and is designated by EPA as a “greenhouse gas”
 - Federal and state law requires proper management
 - Safety requirements necessary to prevent explosion or fire
- Management methods are, primarily:
 - Passive venting from the waste mass
 - Collection of gas through a matrix of wells and header conduits – then controlled gas destruction via a flare
 - Collection of gas (as above), processing of gas, and then beneficial re-use

How the City manages its Landfill Gas

- City recognized the value of beneficial re-use in early 1990s
- Technical operations and financing for Landfill Gas management required new expertise
 - City entered a 30-year lease agreement in Dec 1994
 - Lessee is granted use of property to build gas processing facility
 - Lessee is required to collect all Landfill Gas, finance all expenses, meet regulatory requirements, and find market to sell gas
 - Lessee is to invest capital and recoup costs in first half of 30-year term
 - City receives \$120,000 / year as rent for first 14 years
 - **City then receives 12.5% of Lessee's gross revenue from gas sales, effective December 2008** (\$1.2M revenue budgeted for FY10)

How the City manages its Landfill Gas

- Lessee installs gas collection wells
 - 311 wells in place now
 - wells drilled through in-place waste (about 80 feet deep)
 - lateral collection conduits and sumps added to system
- Lessee uses equipment to draw gas from wells under a controlled vacuum
 - 1995 -1999: Lessee flared gas while preparing gas processing plant
 - 1999 - now: Gas plant cleans gas to pipeline quality and then sells gas in open market



Landfill Gas Processing Plant – on 2-acre tract

Benefit of the Gas Lease

- Collecting the gas maintains full compliance with environmental regulations
- Avoids direct cost to City
 - \$ 0.5M - Gas well field installation
 - \$ 1.5M - Flare and vacuum equipment
 - \$14.0M - Processing plant
- Provides City with revenue, after lessee recoups capital cost, royalty payments started Dec.2008

How much more gas ...?

- Continuing to deposit waste will ensure increasing gas production over time
- Each waste cells produces gas for 15-30 years
- Gas can be recovered only after waste cell is full
- Nine more waste cells to be used over next 47 years, with gas production extending up to 30 years beyond ... or through 2087
- Lease agreement ends in 2024
- **Begin planning now to take over gas lease then**

LFG as Renewable Energy

- **EPA identifies certain energy sources as “renewable” sources:**
 - Solar
 - Wind
 - Landfill gas
 - Hydro Power
 - Hydrogen
 - Geothermal

Maximizing the Green Energy Benefit

- City pursued use of ***Biotechnology*** as means to maximize landfill life and gas production
- Received TCEQ permission in 2007 to begin to employ biotechnology methods
 - Adds fluids to waste mass to speed up decomposition
 - Also accelerates gas production, providing City with increased annual revenue-share from sales
 - Rapid decomposition promotes landfill settlement, creating up to 30% recovery in previously-used waste capacity
- McCommas Bluff Landfill as a model site for others

Conventional and Bioreactor Gas Curves

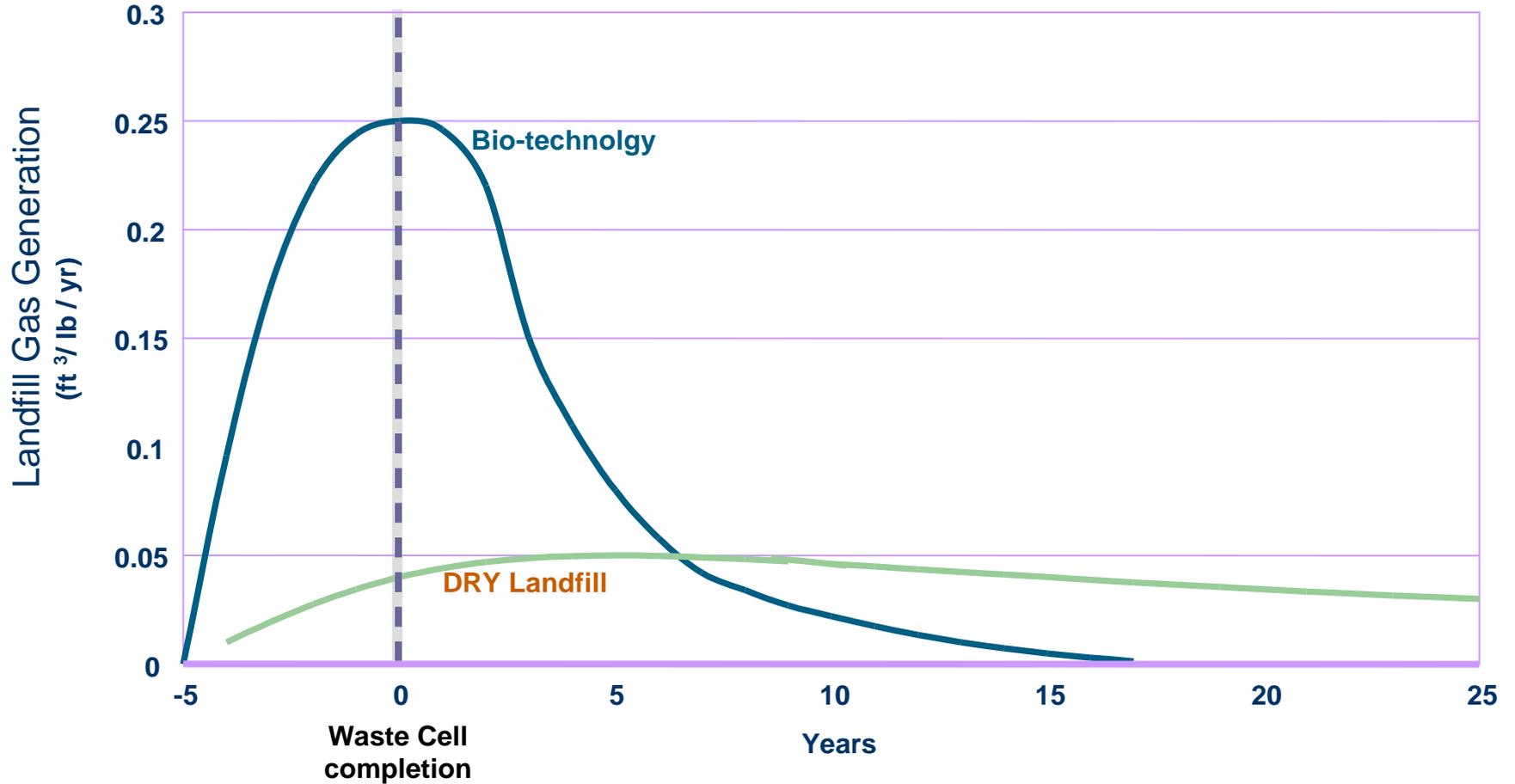
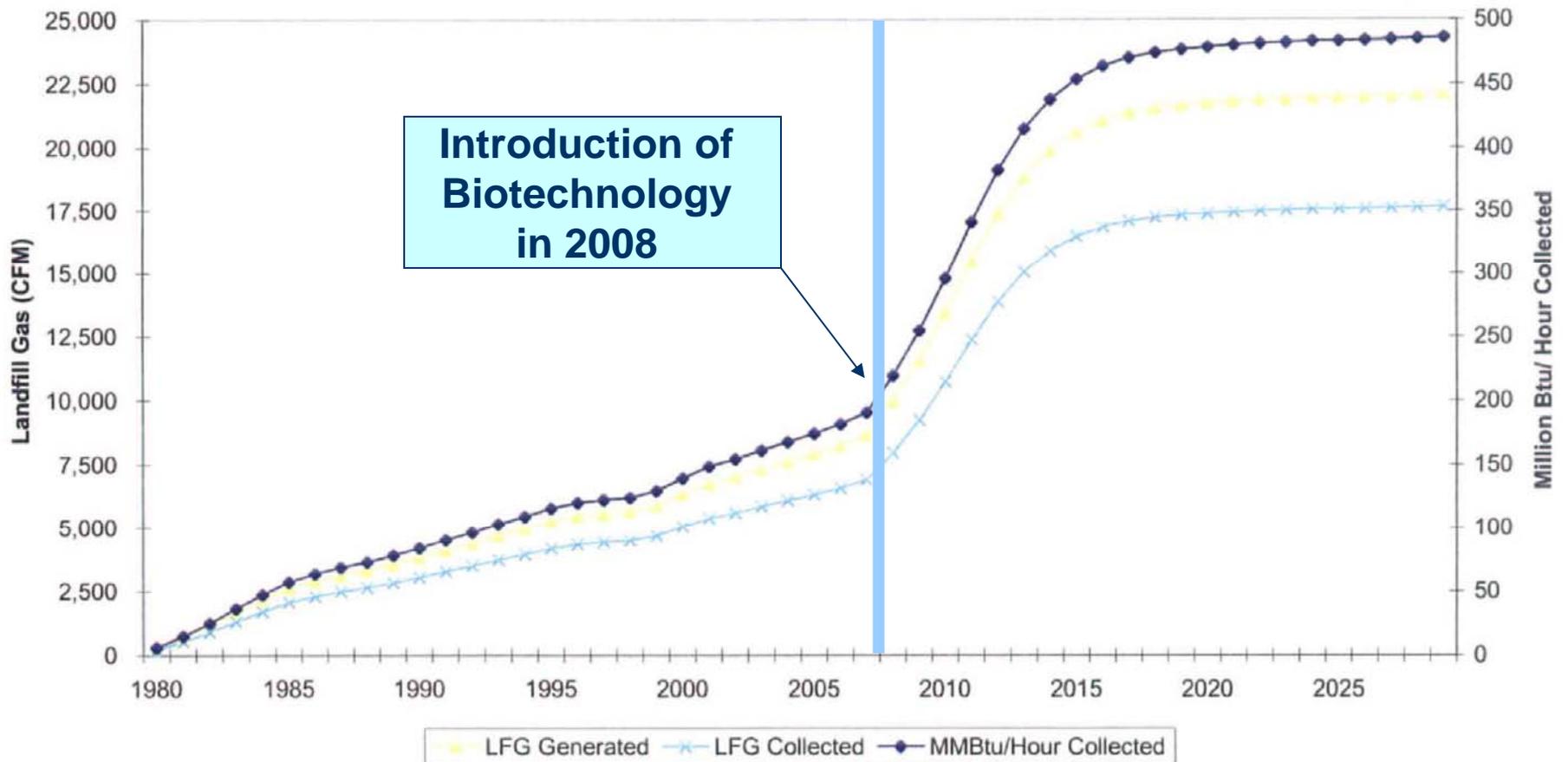


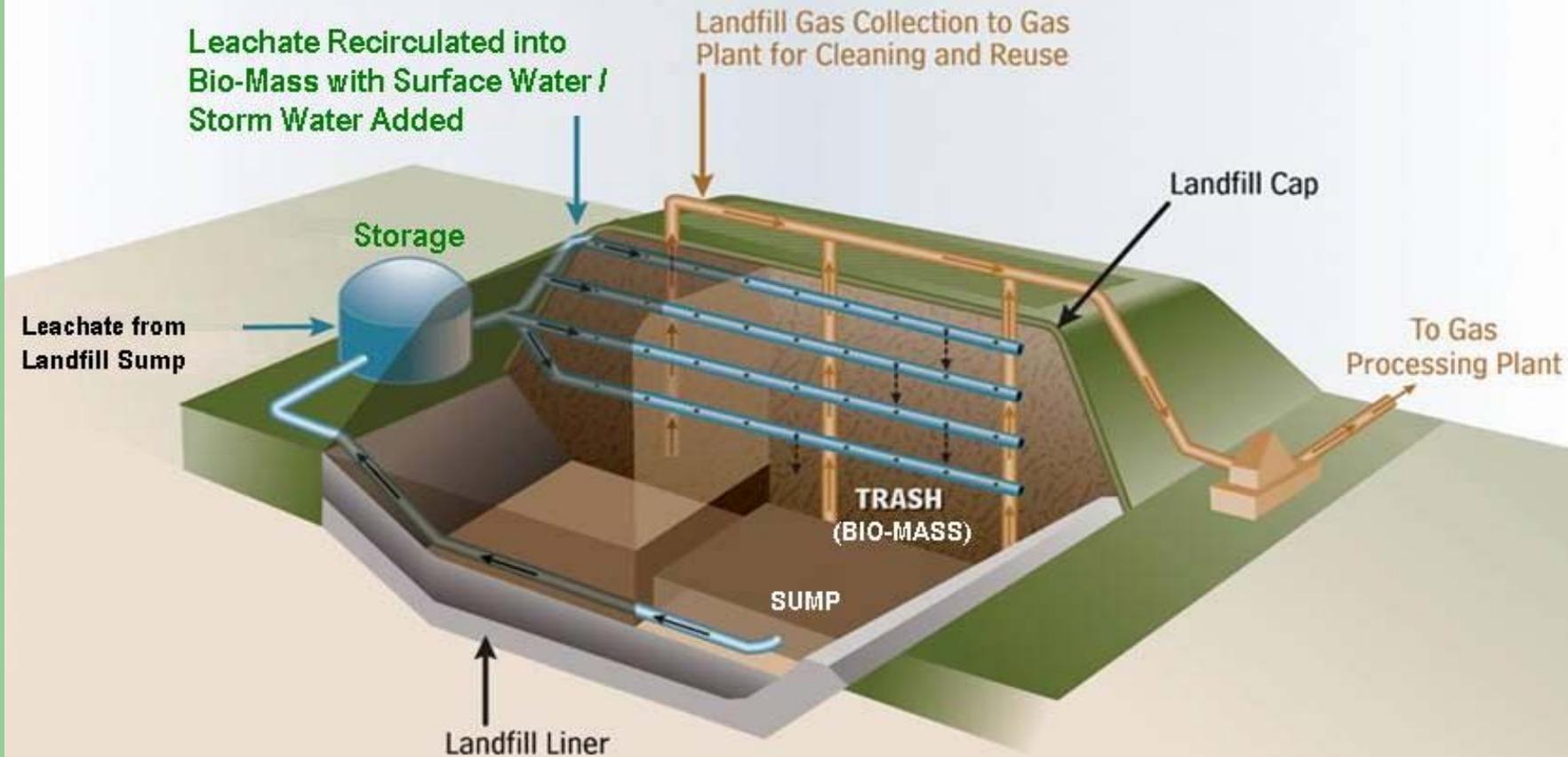
Figure 5
Landfill Gas and MMBtu/Hour Collected vs. Time
 McCommas Bluff Landfill, Dallas TX
 May 2005
Combined Bioreactor Project



Other Benefits of Biotechnology

- Re-use of landfill space
 - Accelerating the waste decomposition speeds up the landfill settlement ... resulting in waste space that can be re-used
 - Re-use space saves money:
 - Reduced need for new cell construction (\$4M per construction project)
- Reduces or eliminates the cost of leachate disposal
 - Waste fluids are typically pumped from landfill to sewer system
 - Biotechnology allows for fluids to be “cleaned” with repeated trickling through waste mass

Design of Bio-Tech Cell





**Use of scrap tires (shredded)
in landfill's Biotechnology
filter layers**

Who actually uses our gas ?

- Landfill gas is transported via pipeline to market
- McCommas' gas is sold to a buyer with highest offer – who often seeks credit for use of renewable energy source
- Buyer may receive tax incentives
- City receives royalty based on gas sales

How do others manage landfill gas ?

- Passive venting (mostly **small** sites)
 - Only allowable if quantities are very small
- Harmlessly burn gas using landfill flare (**mid-sized** sites)
- Larger sites – seek beneficial gas use
 - McCommas Bluff Landfill: produces pipeline-quality gas
 - WMT Lewisville landfill: generates electricity (6MW)
 - WMT Skyline landfill: generates electricity (12MW)
 - Portions of electricity used for landfill needs
 - Excess power sold to grid

Summary

- All landfills must manage LFG by regulation
- McCommas site produces 5M cubic feet daily – and processes it for pipeline-quality sale
- Biotechnology methods are maximizing gas production and associated revenues
- Future of gas plant management
 - Gas production to continue beyond 2050
 - Plan now for end-of-lease in December 2024
 - **Future briefings to address transition of lease**