Alachua County Southwest Landfill

Leachate Recirculation and Landfill Gas to Energy Project Updates

Presented By:

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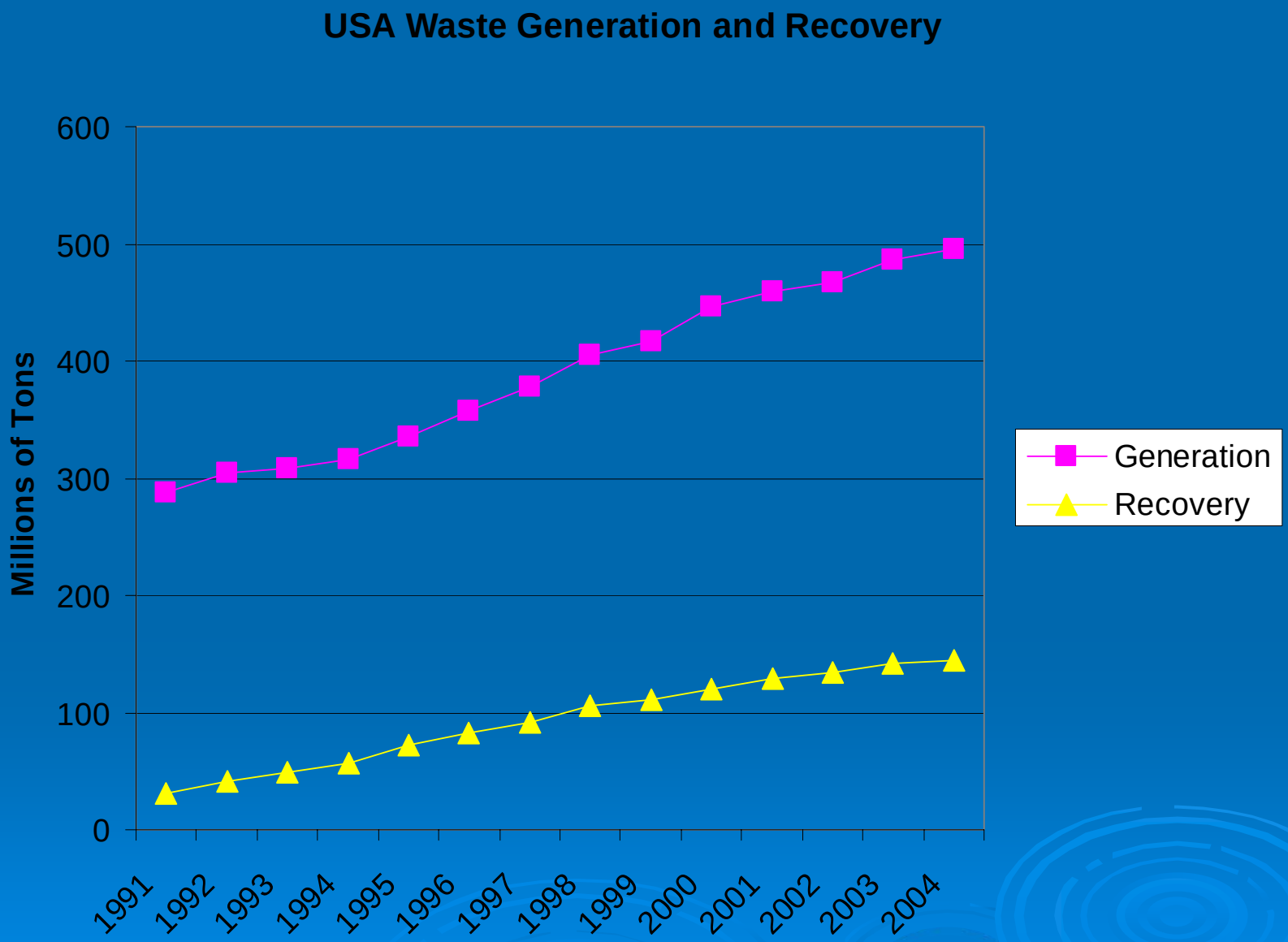
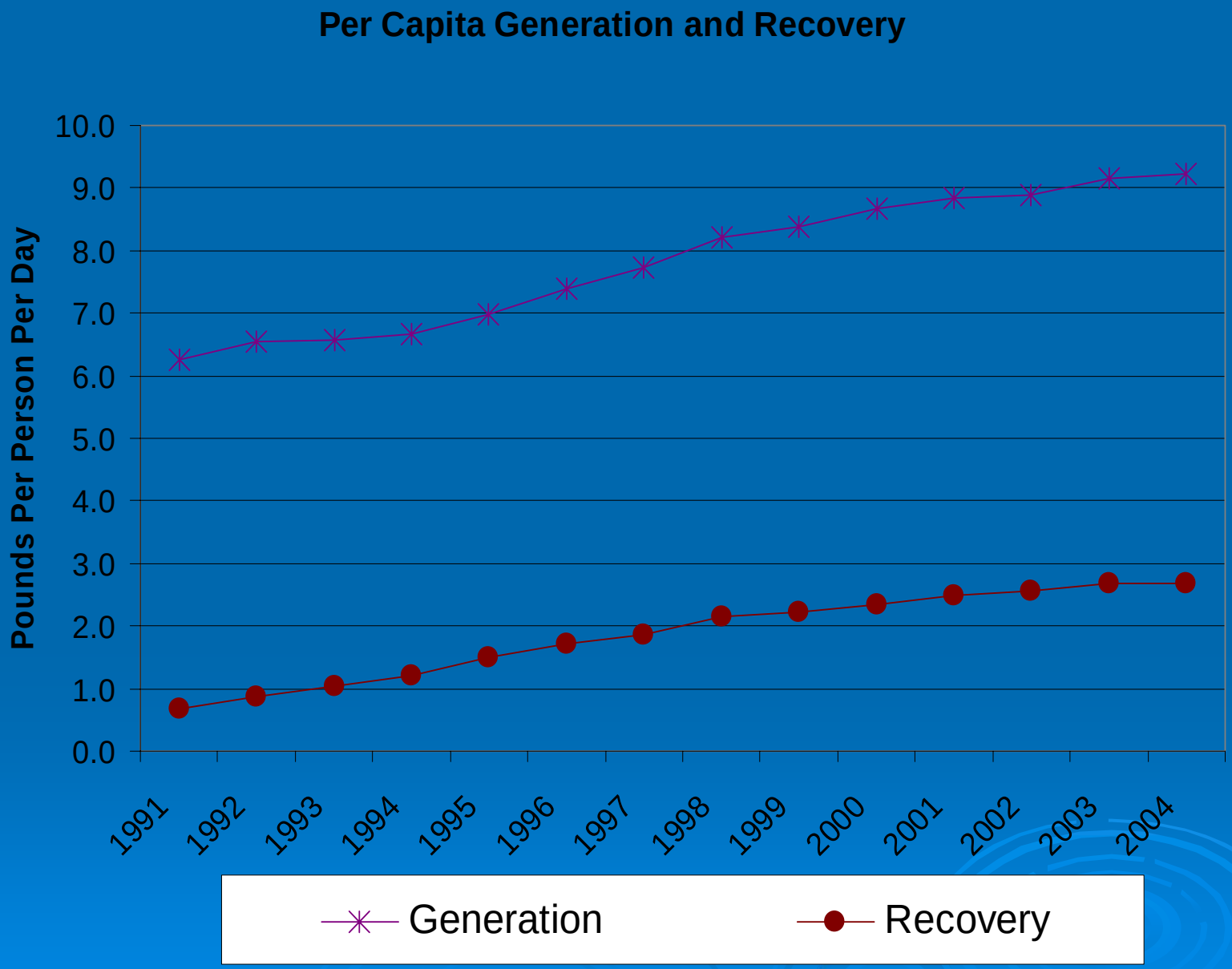
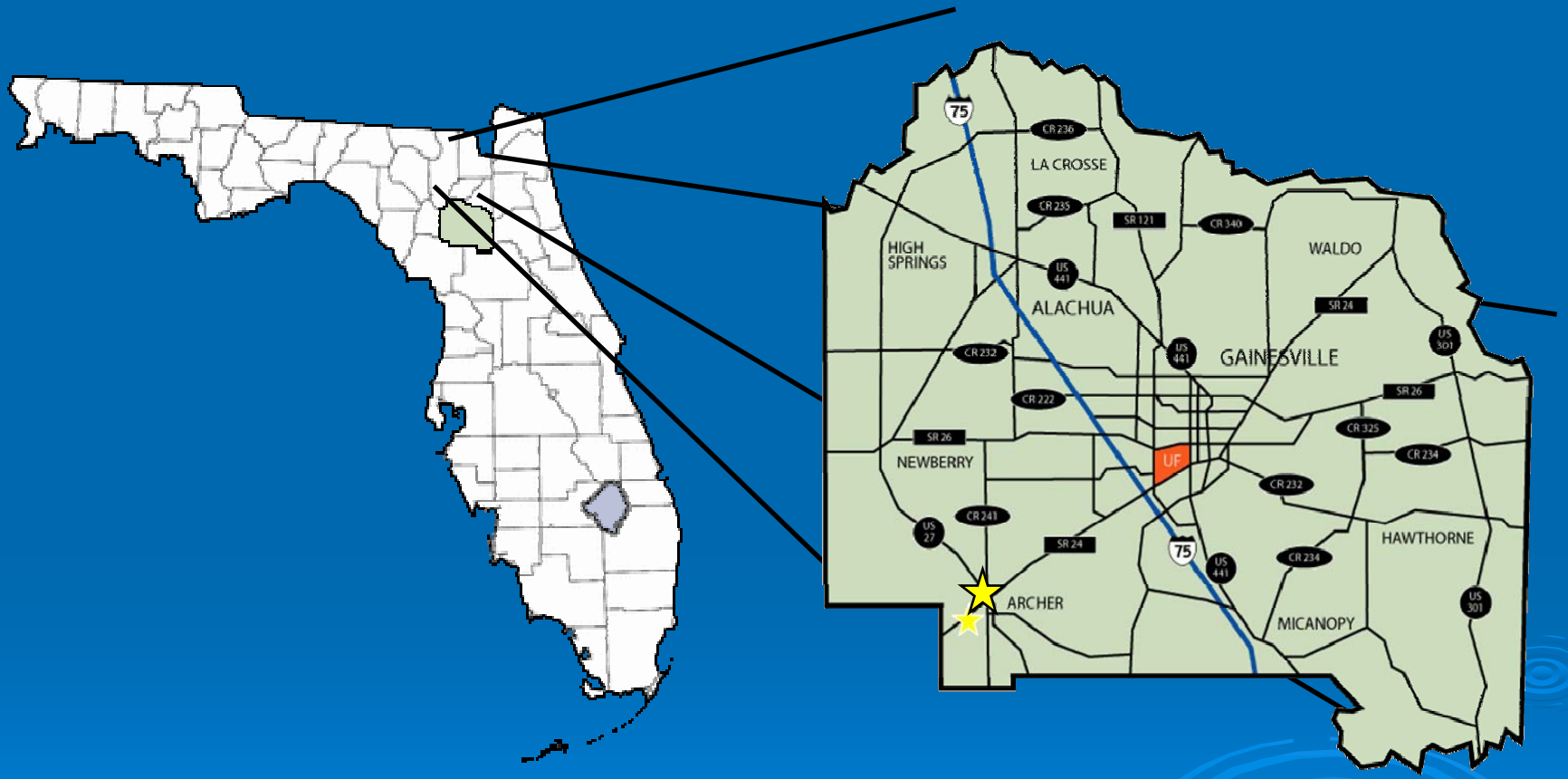

USA Waste Generation and Recovery
Millions of Tons
600
500
400
300
200
100
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
Generation
Recovery


Per Capita Generation and Recovery
Pounds Per Person Per Day
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
Generation
Recovery

Southwest Landfill Location



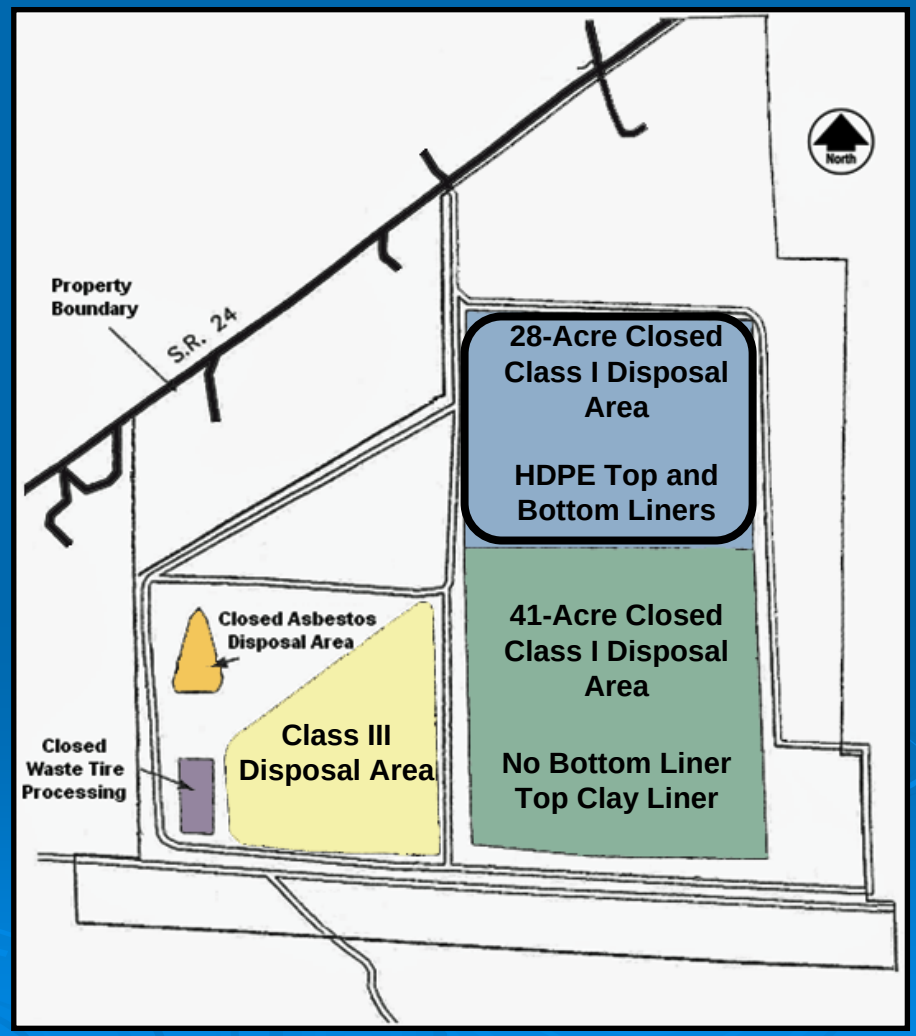
232 acres in North Central Florida
15 miles southwest of Gainesville

What's it mean?

- Garbage could generate 50 GW (in theory)
- Current installed USA electric capacity: 600 GW

Southwest Landfill History

- Opened November 1973
- UF recirculated Leachate from 1990 to 1995
- Closed December 1998
- FDEP approved resumption of recirculation in 2002
- FDEP approved adding groundwater in 2004



28-Acre Lined Cell

- Composite bottom liner protects the aquifer
- HDPE top liner captures explosive methane gas

Swamp Gas Alert!

EPA and FDEP consider "Bio-reactors" to be experimental…Caution

- Increased gas emissions and odors
- Fire potential
- Slope instability
- Liner instability
- Surface seeps

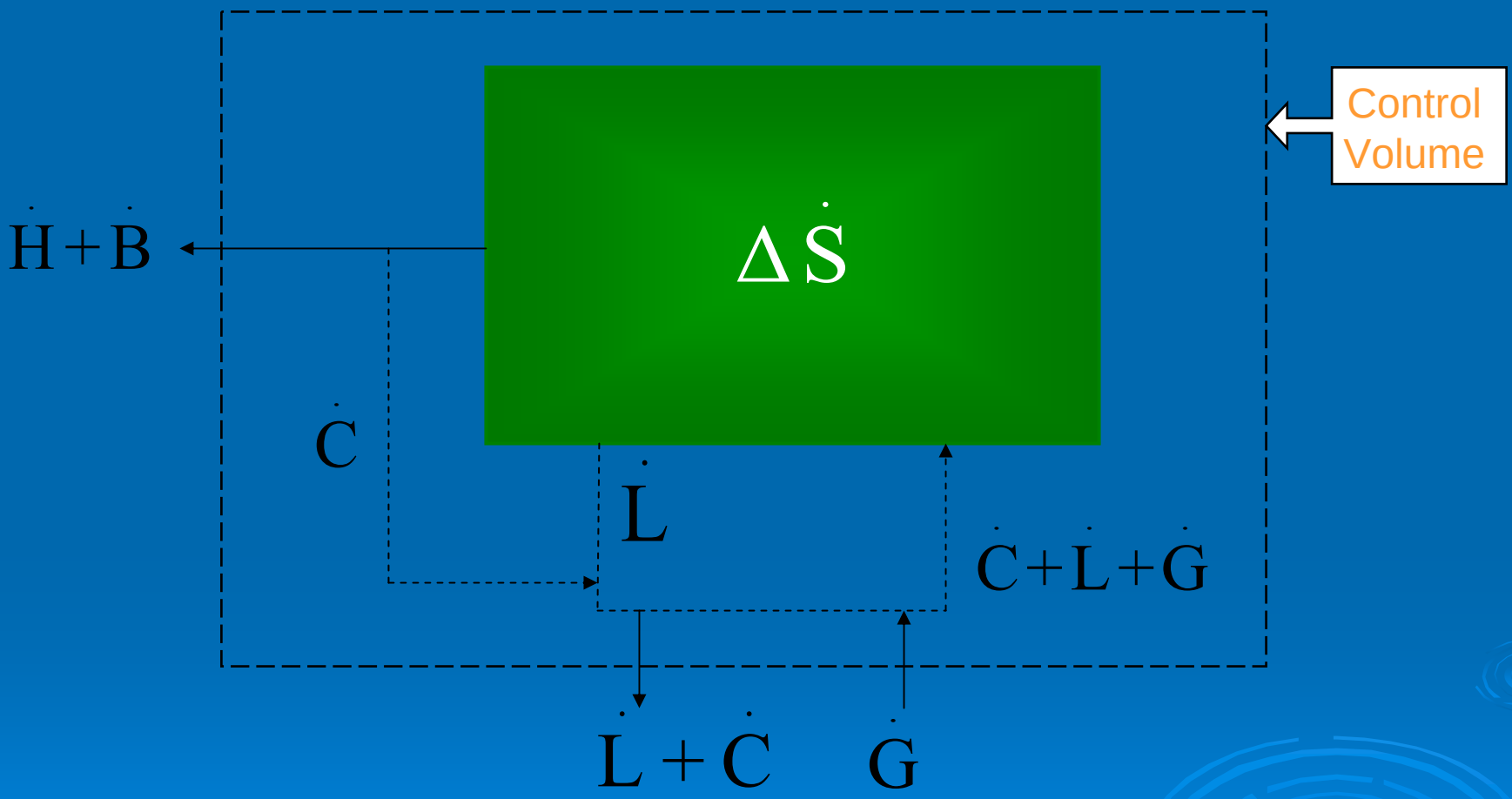
What is a “Bio-reactor?”

A landfill that has water added
to stimulate biodegradation
Can use a variety of liquids, including

- Leachate
- Sludges
- Waste or pure water

The Goal:
Maintain moisture near Field Capacity

Overall Mass Balance



$$\Delta \dot{S} = \dot{G} - (\dot{B} + \dot{H} + \dot{L} + \dot{C})$$

What is Leachate?

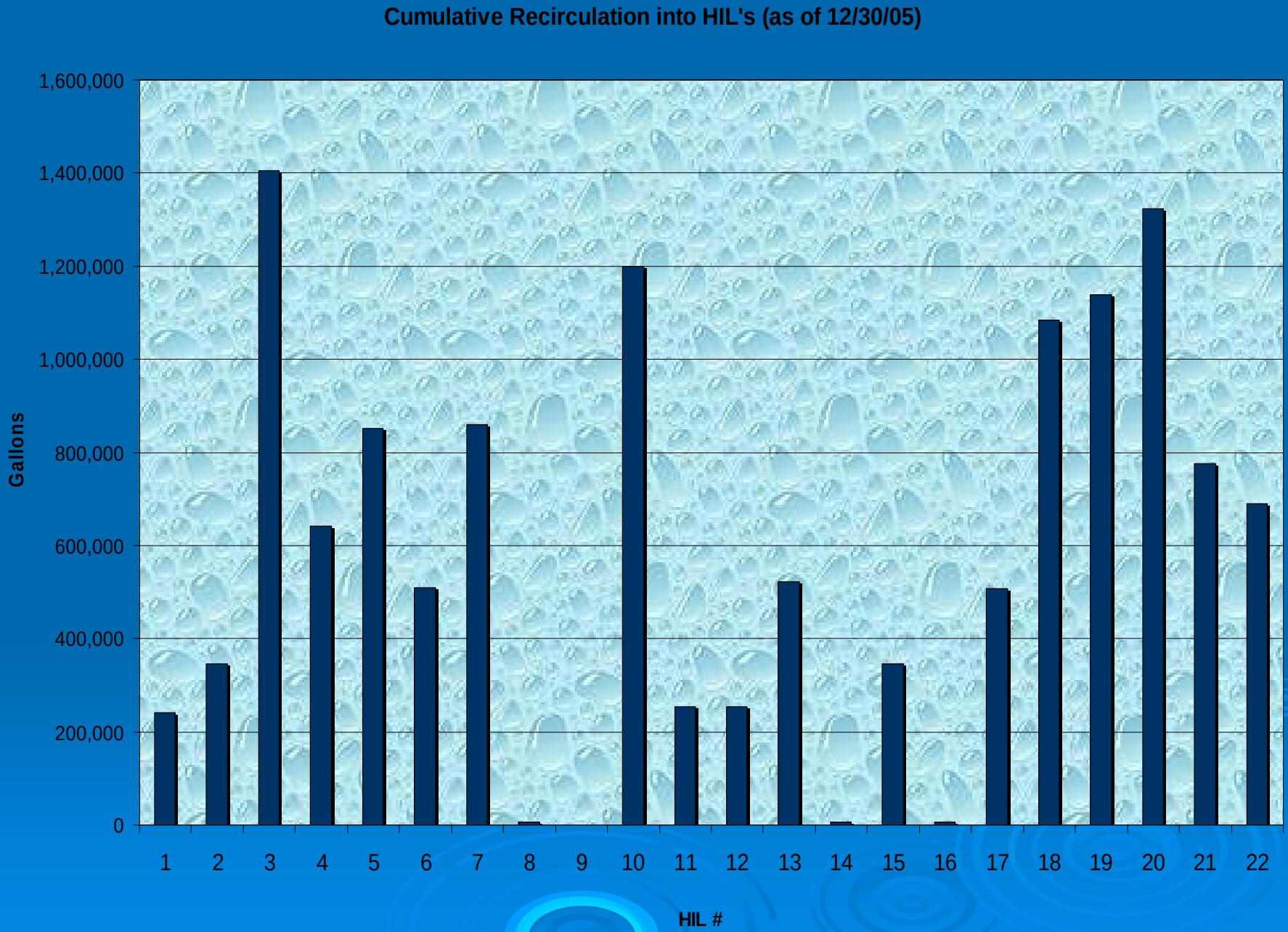
	Leachate:	Seawater:
Chloride:	2,000	19,400 ppm
Sodium:	1,100	10,700
Sulfate:	0	904
Magnesium:	0	1,290
Calcium:	0	411
Bicarbonate:	900	150
Iron:	2,400	0.01
Ammonia:	900	<1
Color:	Coffee	Colorless

Leachate Recirculation

- 15 million gallons have been recirculated from July 17, 2003 through Dec. 22, 2005 (40kgpd)
- 3.7 million gallons of external groundwater were added from June 1, 2004 to February 31, 2005

Leachate Recirculation System

1. Leachate is drained by gravity
2. Accumulated in a sump
3. Pumped back into the landfill
   - 5 Horizontal Gas Wells – Top
   - 22 Horizontal Injection Lines - Interior


Cumulative Recirculation into HIL's (as of 12/30/05)
Gallons
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
HIL #

Recirculation Operational Issues

- Distribution of leachate
- Seepage
- Instrument failure
- Interference with gas collection

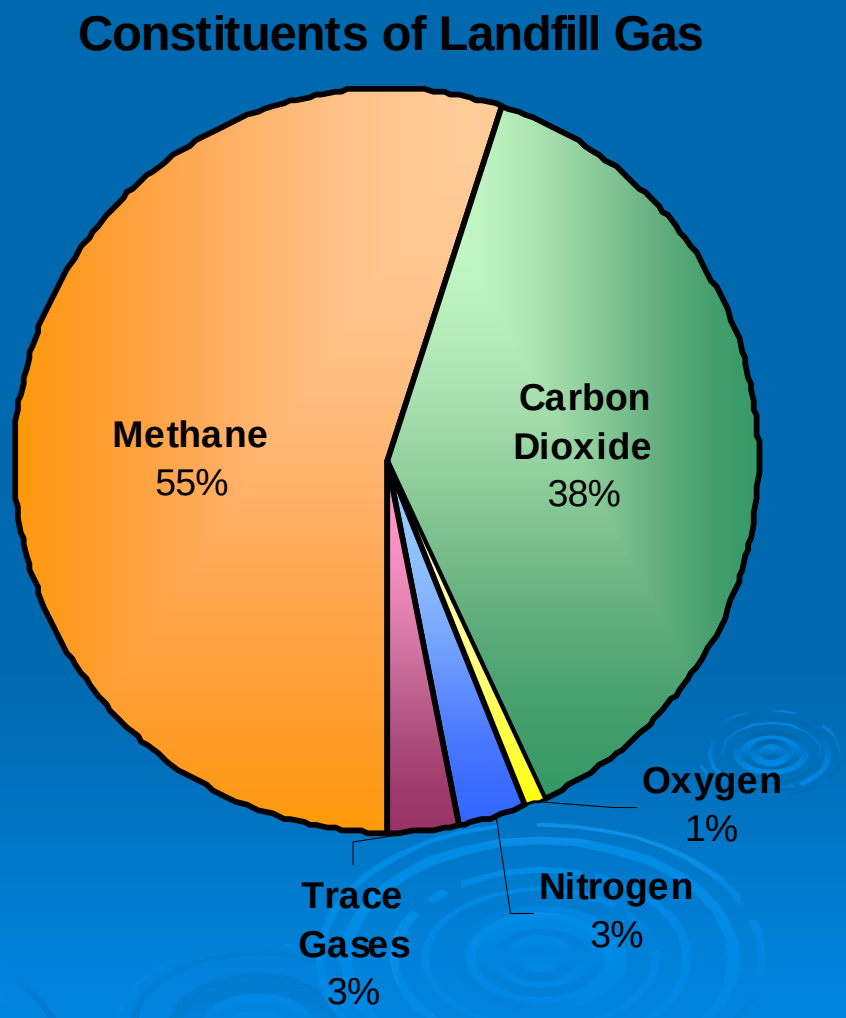
Leachate Recirculation Advantages

- Eliminates need for hauling
- Stabilizes waste quickly
- Stimulates landfill gas production

What is Landfill Gas?

- LFG is dangerous
- Explosive as a 5 to 15 % mixture in air
- LFG is valuable
- Has about 55% the fuel value of natural gas

Landfill Gas – Produced from decomposition of organic material; aka Swamp Gas



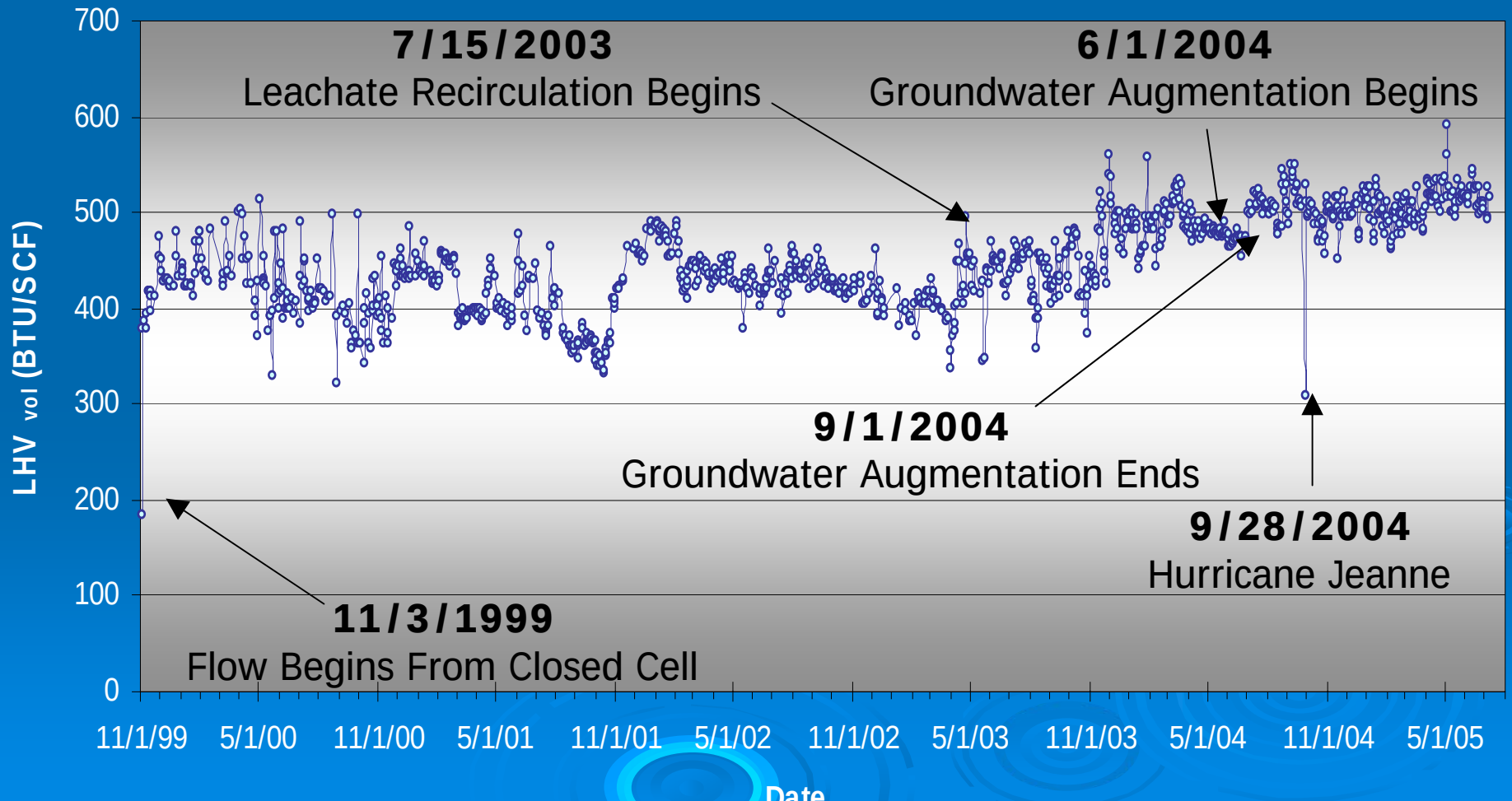
Landfill Gas to Energy

- Began in December 2003
- Partnership with Gainesville Regional Utilities (GRU)
- A single unit produces up to 920 kW

Landfill Gas to Energy System

1. Landfill gas is collected by applying a vacuum through 5 horizontal and 27 vertical gas wells and 20 cleanouts
2. Pressurized to 3 psi
3. Delivered to GRU's generators
4. Converted to electricity

Landfill Gas Lower Heating Values

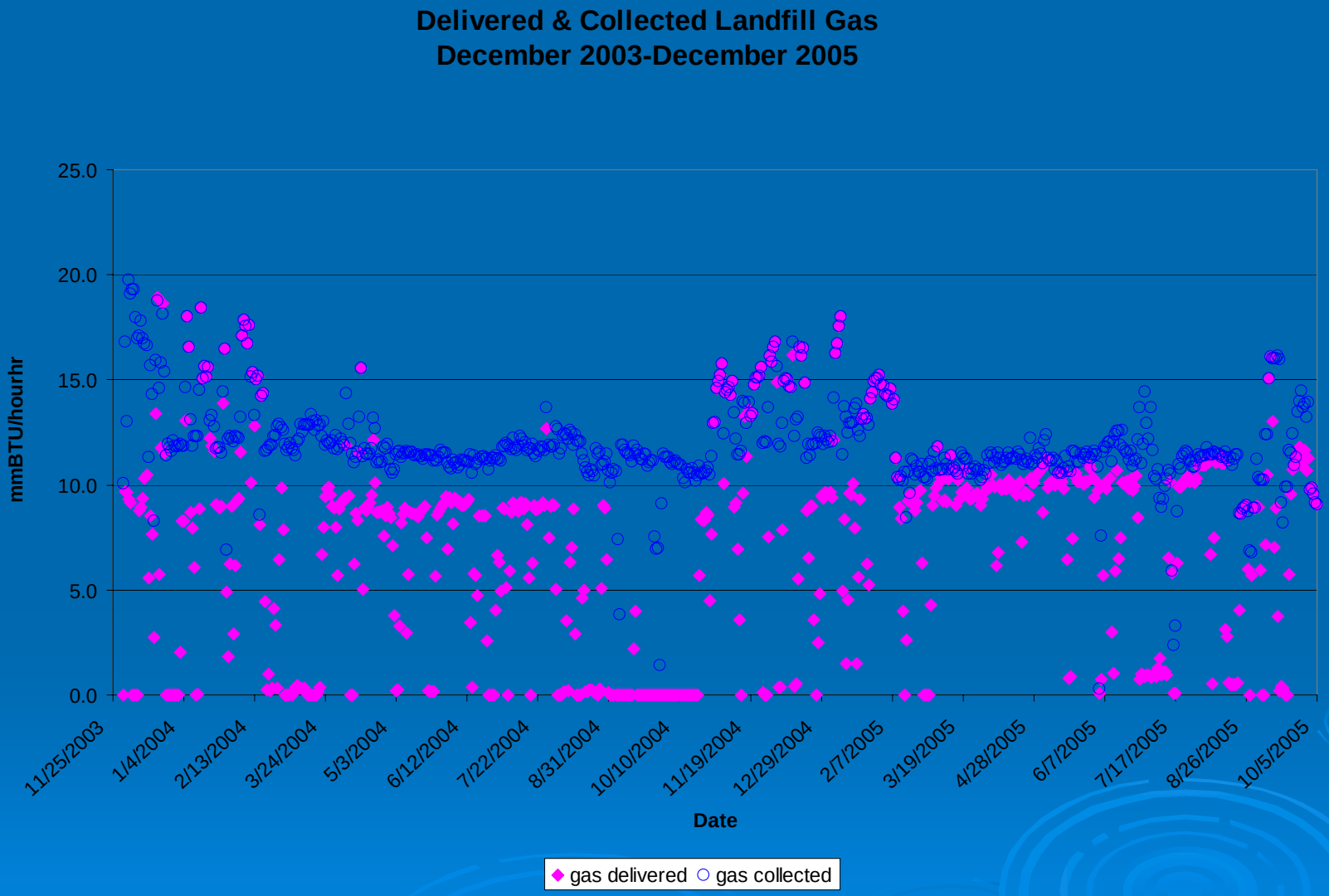


Landfill Gas to Energy Advantages

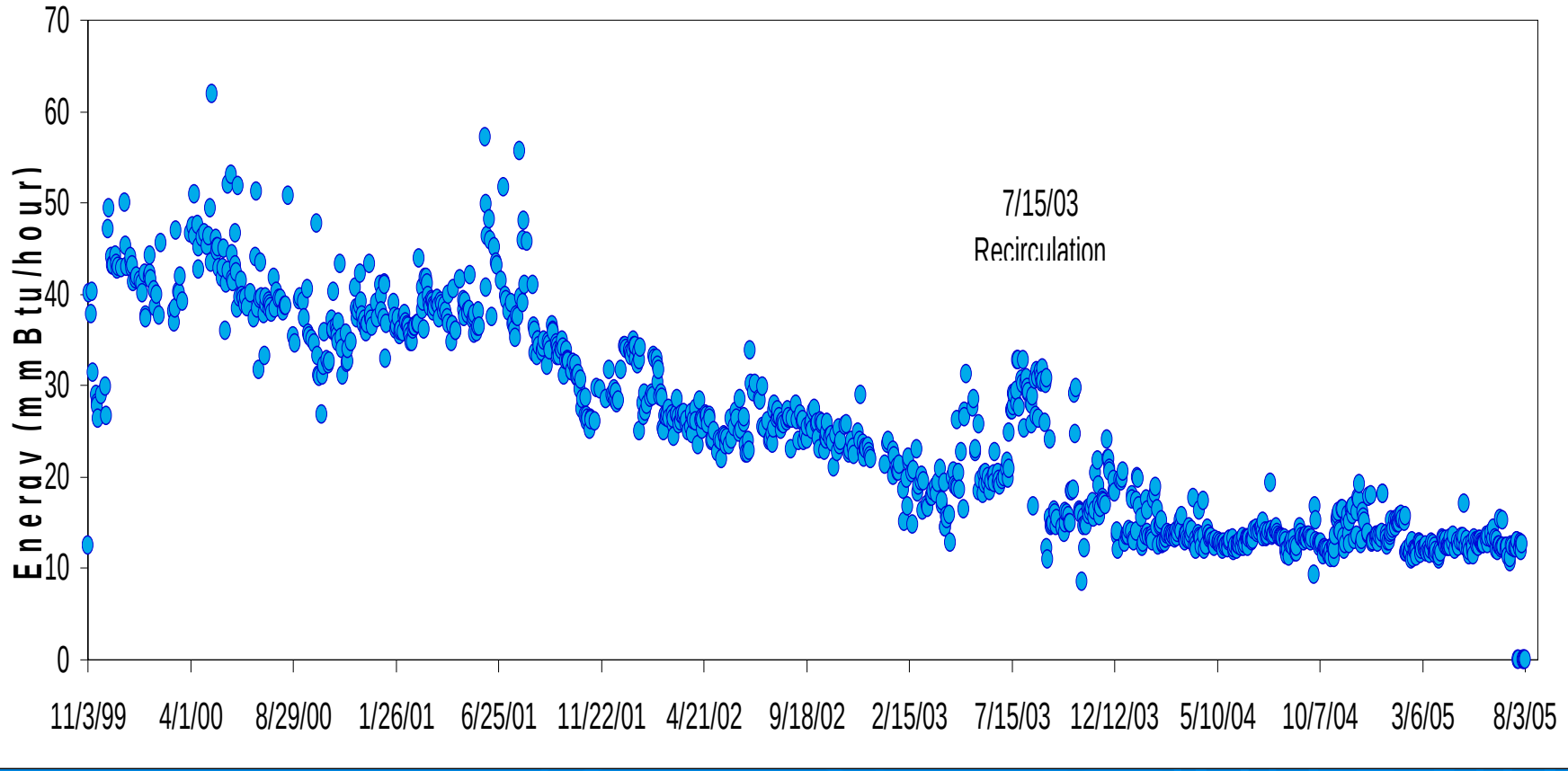
- Utilizes a renewable energy source (biomass)
- Reduces greenhouse emissions
- Generates revenue -- county projects

5-year payback (2008)

- Supplements traditional energy production


Delivered & Collected Landfill Gas
December 2003-December 2005
mmBTU/hourhr
25.0
20.0
15.0
10.0
5.0
0.0
11/25/2003
1/4/2004
2/13/2004
3/24/2004
5/3/2004
6/12/2004
7/22/2004
8/31/2004
10/10/2004
11/19/2004
12/29/2004
2/7/2005
3/19/2005
4/28/2005
6/7/2005
7/17/2005
8/26/2005
10/5/2005
Date
gas delivered
gas collected

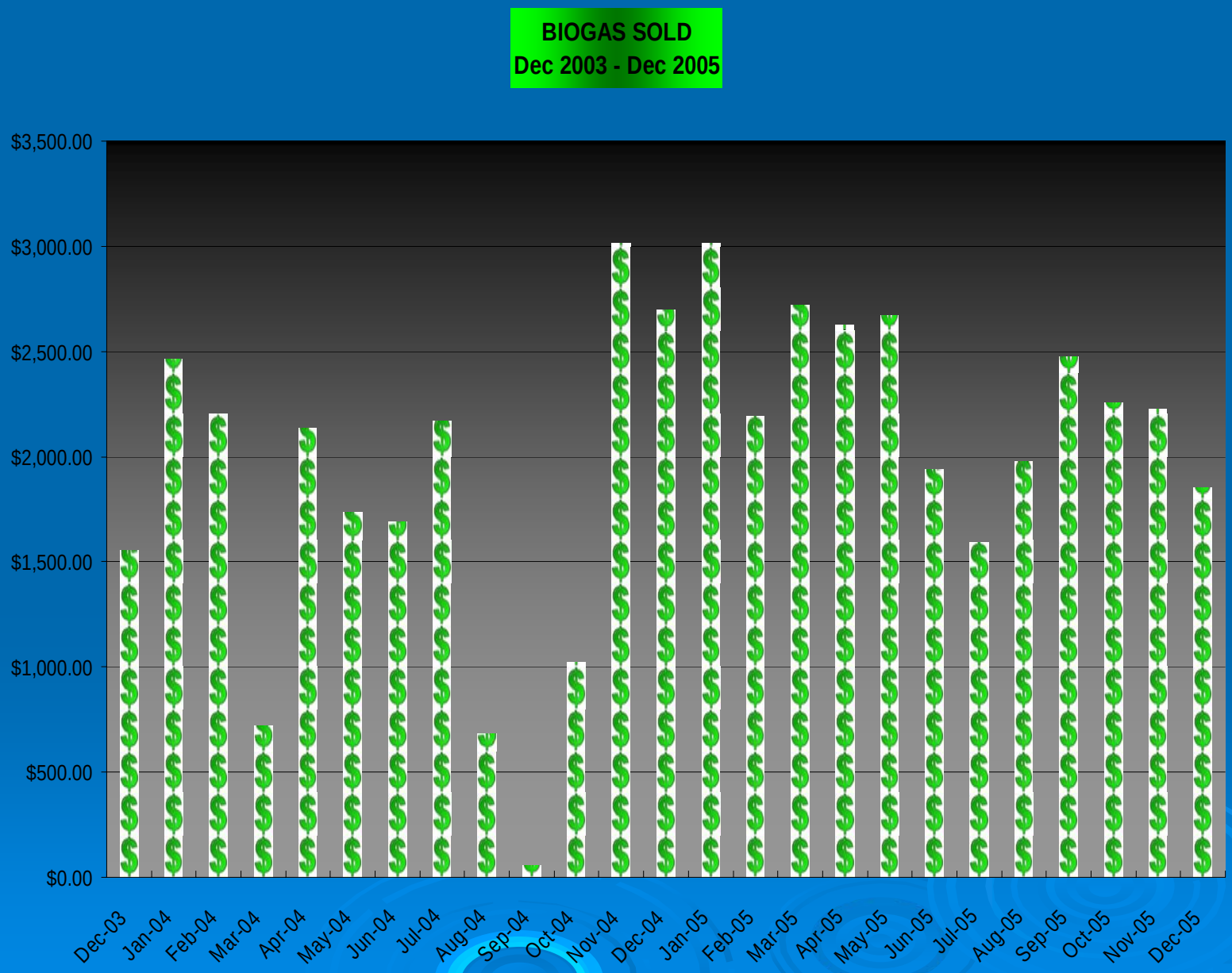
Energy Production at the SWLF Since Closure



Operational Issues

- Instrument failure
- Storm activity
- Liner Design (air intrusion)
- Communication between gas collection system and Generators
- Daily temperature variation affects AF ratio
- Gas utilization ratio –

1st Year 50%, 2nd Year >70%


BIOGAS SOLD
Dec 2003 - Dec 2005
$3,500.00
$3,000.00
$2,500.00
$2,000.00
$1,500.00
$1,000.00
$500.00
$0.00
Dec-03
Jan-04
Feb-04
Mar-04
Apr-04
May-04
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05

Any questions?

- What is the impact of recirculation on leachate quality and quantity?
- How has recirulation affected the expected – i.e. the Dry Tomb – gas production curve?
- Are bio-reactors economically viable?
- Eventual disposition of recirculated liquids?

Year	Generation	Recovery	%Recovery	Generation	Recovery	Population	Power Equivalent
1991	288	31	11%	6.3	0.67	252	29
1992	305	41	13%	6.6	0.88	255	31
1993	309	49	16%	6.6	1.04	258	31
1994	316	57	18%	6.7	1.20	260	32
1995	335	72	21%	7.0	1.50	263	34
1996	358	83	23%	7.4	1.72	265	36
1997	378	91	24%	7.7	1.86	268	38
1998	405	106	26%	8.2	2.15	270	41
1999	417	111	27%	8.4	2.23	273	42
2000	446	120	27%	8.7	2.33	282	45
2001	460	129	28%	8.8	2.48	285	46
2002	467	134	29%	8.9	2.55	288	47
2003	486	142	29%	9.2	2.67	291	49
2004	495	144	29%	9.2	2.68	294	50