# Fugitive Emissions Equals Fugitive Dollars

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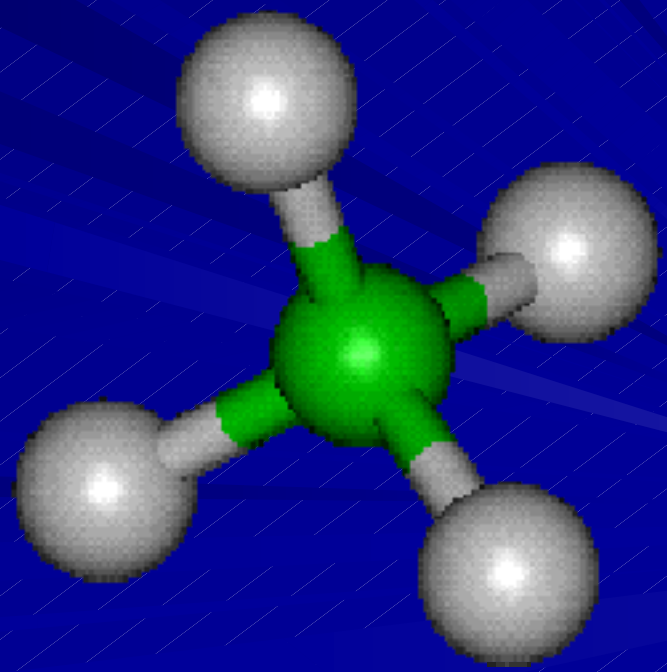
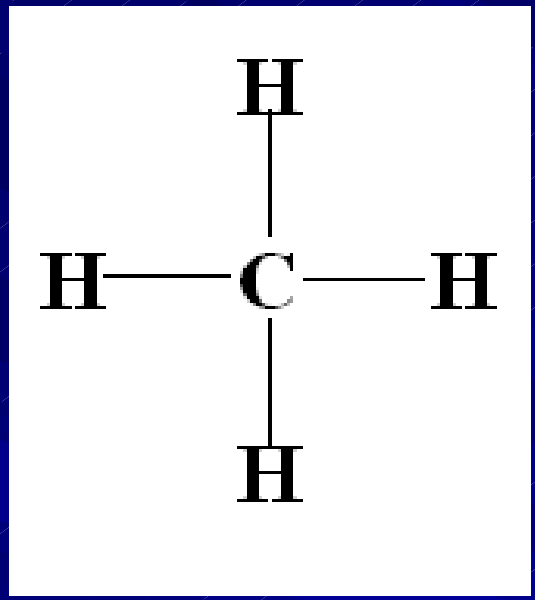
# Methane

$CH_4$

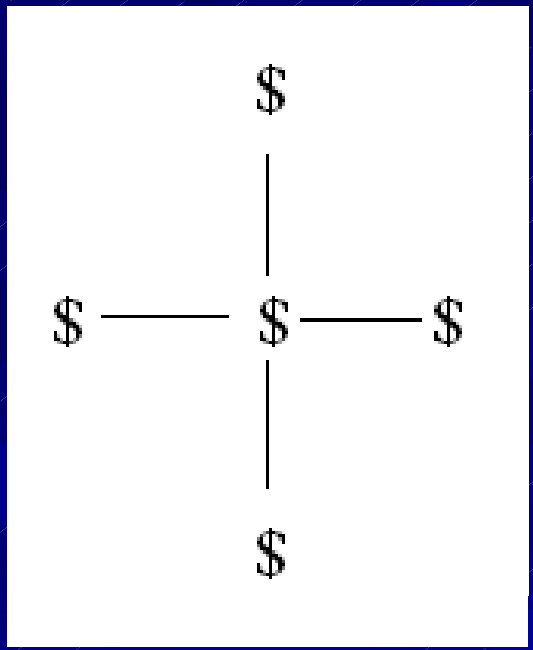


# Methane




Lewis Diagram

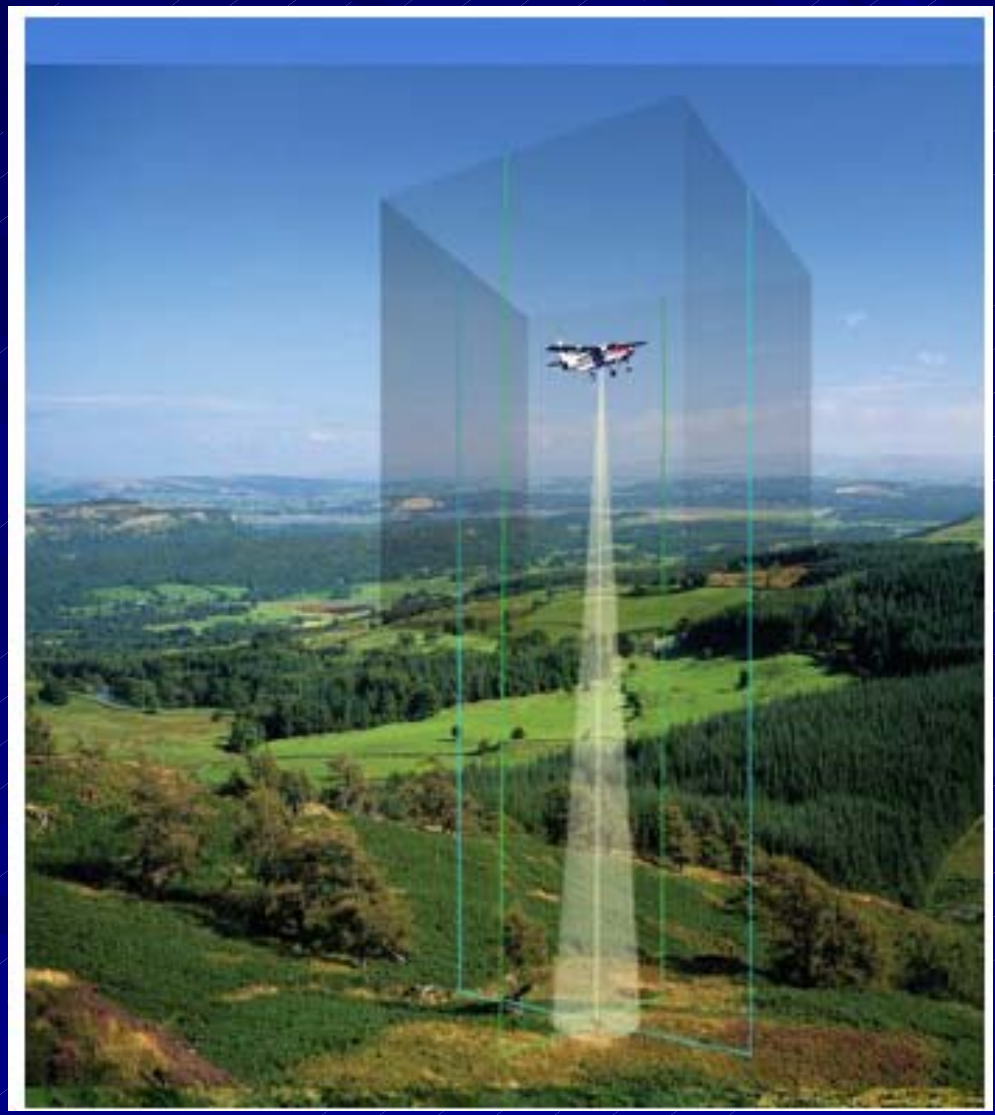
# Methane




Citi Bank Diagram

# Passive Detection

# Active Detection



# Over-Flight

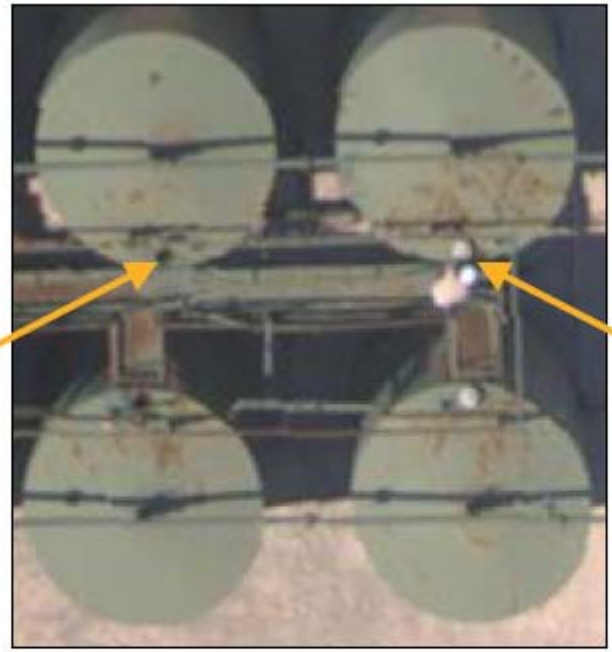

TX


SAN PATRICIO
ARANSAS
Corpus Christi Bay
Corpus Christi
Mustang Island
NUECES
Kingsville
Baffin Bay
Laguna Madre
KLEBERG
Padre Island

# Site Location

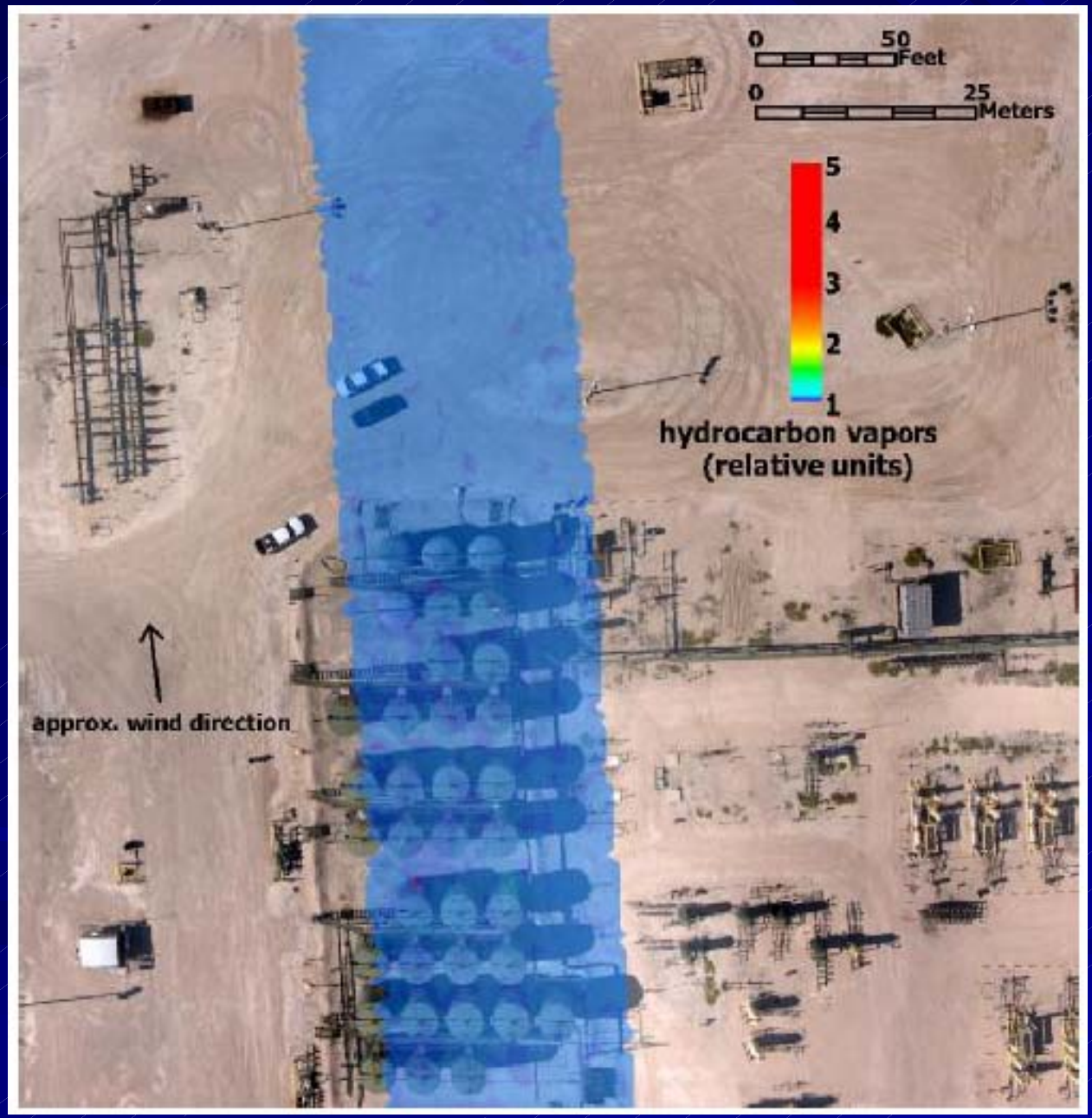
South of Kingsville, TX

# Two Passes



Thief Hatch Opened

Thief Hatch Closed



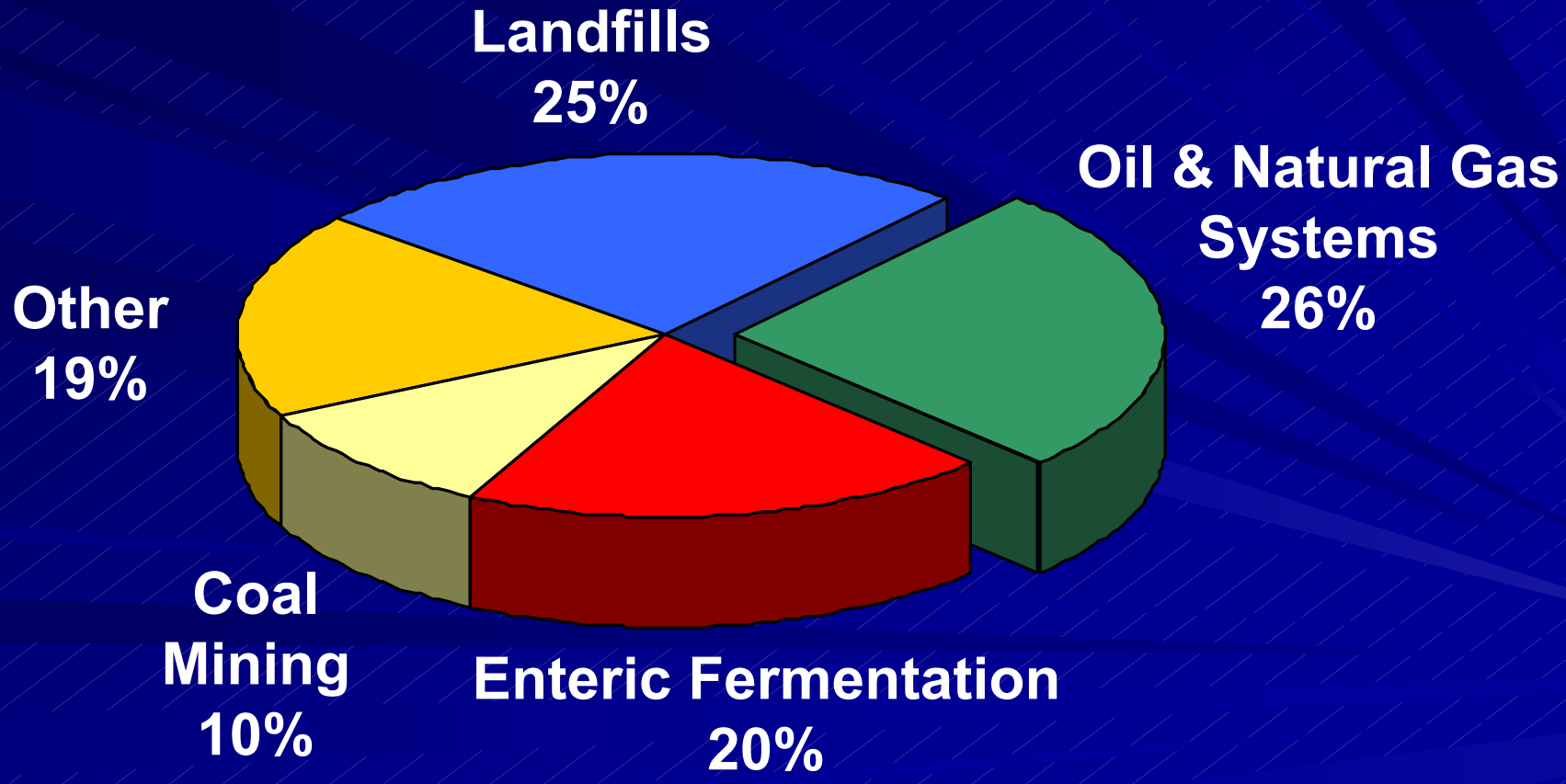

# First Pass VRU Turned On


# Second Pass
# VRU Turned Off

# Point Source

# How much is lost?

The production sector accounts for 44% of the CH4 emissions in the oil and gas industry.




*Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2004,* USEPA, April, 2006

# Fugitive Emissions

Estimated loss of 131 Million Tons*

or

Estimated

$2 Billion of Lost Revenue

* $CO_2$ equivalent tons

Source: EPA - Inventory of U.S. GHG Emissions and Sinks 1990 -2004


# What to do with vent gas?

$6.00/Mcf

# Three Main Sources

Offshore Platforms

Tank Batteries

Gas Pneumatic Controls

# How to Limit Emissions

## & Make Money at the Same Time

Vapor Recovery

Plunger Lifts

Compressed Air Controls

# Why Vapor Recovery

Even water can have dissolved gas in solution. This is mostly true for deeper wells (>10,000 ft.).

Light volatiles from condensate can be captured (high Btu content).

Crude oil can yield as much a $2 per bbl of vapor.

# Vapor Recovery Costs

| Vapor Recovery Unit Sizes and Costs | | | | |
|---|---|---|---|---|
| Capacity (Mcfd) | Compressor Horsepower | Capital Costs($) | Installation Costs($) | O&M Costs ($/year) |
| 25 | 5 - 10 | 15,125 | 7,560 - 15,125 | 5,250 |
| 50 | 10 - 15 | 19,500 | 9,750 - 19,500 | 6,000 |
| 100 | 15 - 25 | 23,500 | 11,750 - 23,500 | 7,200 |
| 200 | 30 - 50 | 31,500 | 15,750 - 31,500 | 8,400 |
| 500 | 60 - 80 | 44,000 | 22,000 - 44,000 | 12,000 |

Note: Cost information provided by Natural Gas STAR partners and VRU manufacturers.

# Four Steps

1. Identify Possible Locations for VRU.
2. Quantify the Volume of Emissions.
3. Measure the Site.
4. Evaluate Cost Benefits.

# Example

With API Gravity of 38$^{o}$

Separator Pressure = to 40 psi

Production of 1000 bbl/day

Vapor Emissions Rate = 43 Scf/bbl

Total Vapor Captured = 43 Mcf per day

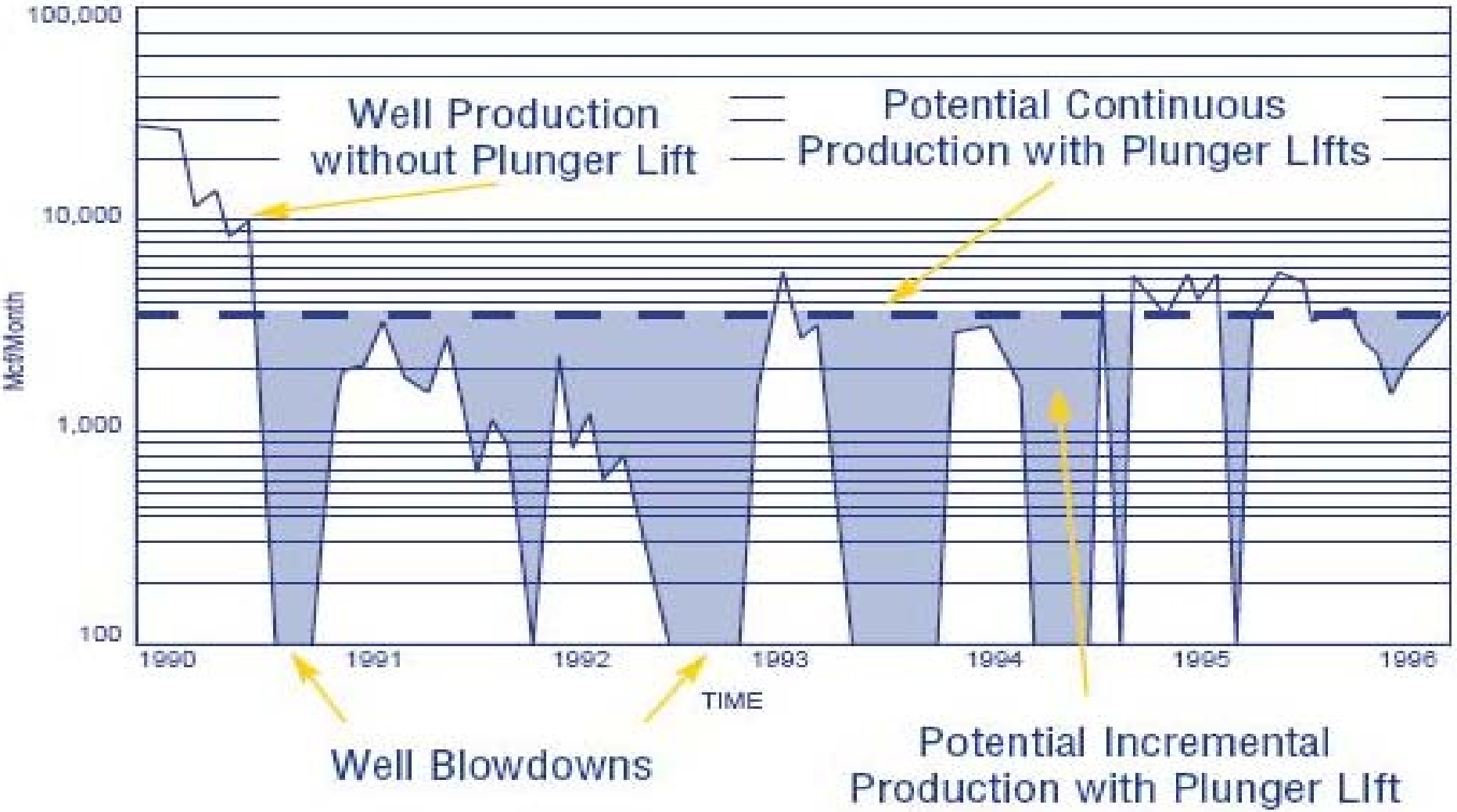
Source: EPA

# Why Plunger Lifts

Plunger Lifts Limit Blowdown$

Limited Venting or Flaring

# Plunger Lifts



# Plunger Lift Benefits

Revenue from Increased Production

Avoid Title V Issues

Fewer Workovers

# Plunger Lift Evaluation

## Common Requirements for Plunger Lift Applications

- ★ Well blowdowns and other fluid removal techniques are necessary to maintain production.
- ★ Wells must produce at least 400 scf of gas per barrel of fluid per 1,000 feet of depth.
- ★ Wells with shut-in wellhead pressure that is 1.5 times the sales line pressure.
- ★ Wells with scale or paraffin buildup.

# Plunger Lift Pay Back

14 Wells at Midland Farm Field, Texas

Before Plunger Lift

Total Production 2510 Mcfd

30 Days After Plunger Lift Installation

Total Production 3869 Mcfd

Source: World Oil, November 1995

# Question

If a 10,000’ well with a 8” casing

and 214.7 psig shut-in pressure

is vented  weekly how much money

is lost annually?

# Answer

$15,864
Annually

Cost of a plunger lift ≈ $8000

# Ga$ Pneumatic **Ca$e $tudie$**

How much are you losing?

- Unocal Fresh Water Bayou Facility -
After installing the compressed air controls increased throughput by 69,350 Mcf annually.

$416,100

Source: EPA

# Ga$ Pneumatic **Ca$e $tudie$**

Conversion Project Cost

$60,000

# Ga$ Pneumatic **Ca$e $tudie$**

In South Louisiana Chevron – Texaco converted 10 facilities to compressed air at a cost of
$40,000.

Annual payback at today's prices
$138,000

# For More Information

Useful Web Sites

http://www.epa.gov/gasstar/

http://www.fe.doe.gov/index.html

http://www.pttc.org/