

# Oil & Gas Meeting

October 6, 2010

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Dallas/Ft Worth – Region 4  
Pollution Prevention

# SBEA – Small Business and Environmental Assistance

- Small Business and Local Government Assistance (SBLGA)
  - \* Focus on compliance, advocacy and outreach
- Pollution Prevention and Education (PPE)
  - \* Focus on source reduction and waste minimization and education through workshops and other events

# How We Can Help

- ◉ Compliance Assistance
- ◉ Technical Assistance
- ◉ New Technologies
- ◉ Site Visits

# Oil and Gas

# Tools

- RG 482 – “Common Environmental Requirements for Regulated Oil and Gas Operations”
- The Oil and Gas assistance Webpage - <http://www.tceq.state.tx.us/assistance/sblga/industry/oilgas.html>
- Methane to Markets thru EPA’s Natural Gas Star Program

# In the Field

# Common Findings

1. Maintenance Issues

2. Leaking Components

\*Tanks and all other equipment at the site should be maintained as represented in registrations and/or per manufacturer's recommended specifications for optimum revenue realization









PAT PEND

SENTINEL  
MFG CO  
TULSA



# Some Areas of Concern

# Compressors

- Emissions controls installed and operating?
- Catalyst materials in the converter?
- Evaluating most recent stack test results?
- Compressor runtime log vs. gas vented and reported in emissions inventory
- Frequency of compressor blowdown and volume blowdown? Metered?
- Gas destination if compressor down?
- Seals = fugitive leaks

# Compressors

According to a study conducted (in 2004) by Duke Energy Gas Transmission, INGAA, Natural Gas Star Program:

- ⦿  $\approx 1,600$  compressor stations ( $\approx 8,500$  compressors) in US Transmission sector
- ⦿  $\approx 49.6$  bcf /yr is lost from compressor fugitives
- ⦿  $\approx 7.0$  bcf is lost from compressor venting

# Engine/Compressor Leaks

- Consider engines/compressors and related vents at each site for VOC emissions
- Engines/compressors that leak significant VOC emissions can result in safety issues as well as dollar loss from the leaks

# Helpful Information

- Convert engine startup to nitrogen

<http://www.epa.gov/gasstar/documents/convertenginestartingtonitrogen.pdf>

- Reduce frequency of engine starts w/ gas

<http://www.epa.gov/gasstar/documents/reducethefrequencyofenginestarts.pdf>

- Replace gas starters w/ air

<http://www.epa.gov/gasstar/documents/replacegas.pdf>

- Replace ignition – reduce false starts

<http://www.epa.gov/gasstar/documents/replaceignitionreducefalsestarts.pdf>

- Automate systems operation to reduce venting

<http://www.epa.gov/gasstar/documents/automatesystemsoperationtoreduceventing.pdf>

# Helpful Information cont...

- Reduce emissions while compressors down

[http://www.epa.gov/gasstar/documents/ll\\_compressorsoffline.pdf](http://www.epa.gov/gasstar/documents/ll_compressorsoffline.pdf)

- Install electric starters

<http://www.epa.gov/gasstar/documents/installelectricstarters.pdf>

- Automated air/fuel ratio controls

<http://www.epa.gov/gasstar/documents/auto-air-fuel-ratio.pdf>

- Lower purge pressure for shutdown controls

<http://www.epa.gov/gasstar/documents/lowerpurgepressure.pdf>

- Installation of electric compressors - Any?

# Amine Units

- Remove  $\text{CO}_2$  and  $\text{H}_2\text{S}$  from natural gas streams before it is sent to pipelines
- In the amine solution, BTEX is absorbed
- Can account for up to 25% of the BTEX emissions at a site

# Amine Units cont...

## Current Removal Options

- Carbon Bed Absorption  
De-humidification and disposal = can be expensive
- Incinerator  
Permitting process; high capital cost and fuel use
- Direct-Fired Thermal Oxidizer (DTFO)  
High operating cost b/c no heat recovery; good for high VOC concentrations
- Regenerated Thermal Oxidizer (RTO)  
Optimal for long, continuous operations with low VOC content
- BTEX Trex  
BTEX and VOCs stripped away (stripper); fuels itself; usually low capital cost and low operating cost

# Thief Hatches

- Very serious concern of companies
  - Have heard from major operators that consequences can be severe for not adhering to policy of keeping them closed... i.e., loss of job
- Should not be rattling; this indicates a loose system
- Maintenance program to inspect gaskets and fittings to ensure they are operating properly

# Success Story

## Tank Battery Vapor Loss

- The Midland region had a compressor station that represented zero emissions from the condensate tank in the PBR registration. The tank was found to be leaking condensate vapors from the thief hatch.
- The condensate tank contained 63 gravity condensate with a BTU value greater than 2700. The company calculated their dollar loss over the 11 months the tank leaked at **1.67 million dollars**.
- They found they had five other sites that represented zero emissions also were leaking.

# Glycol Dehydrators

- Produced gas is saturated with water; it must be removed for gas transmission
- Ensure all emissions controls are operating – trace your control piping
- Optimize circulation rates; gas pressure and flow generally decline over time but circulation rates often remain at max; over-circulation can lead to increased emissions w/o significant reduction in gas-moisture content

# Glycol Dehydrators cont...

- Install a flash tank separator to recover rich glycol in an energy-exchange pump

[http://www.epa.gov/gasstar/documents/II\\_flashtanks3.pdf](http://www.epa.gov/gasstar/documents/II_flashtanks3.pdf)

- Electronic pump eliminates makeup (motive) gas required

[http://www.epa.gov/gasstar/documents/II\\_glycol\\_pumps3.pdf](http://www.epa.gov/gasstar/documents/II_glycol_pumps3.pdf)

# Is Recovery Profitable?

Option	Capital Costs	Annual O&M Costs	Emissions Savings	Payback Period
Optimize Circulation Rate	Negligible	Negligible	394 to 39,420 Mcf/yr	Immediate
Install Flash Tank	\$6,500 to \$18,800	Negligible	710 to 10,643 Mcf/yr	4 to 11 months
Install Electric Pump	\$1,400 to \$13,000	\$165 to \$6,500	360 to 36,000 Mcf/yr	< 1 month to several years

# Case Study

- ◎ **Gas STAR Partner Experience**
- ◎ One partner routes glycol gas from FTS to fuel gas system
- ◎ Saving 24 Mcf/day (8,760 Mcf/year) at each
- ◎ Dehydrator unit
- ◎ Texaco (now Chevron) has installed FTS
- ◎ Recovered 98% of methane from the glycol
- ◎ Reduced emissions from 1,232 - 1,706 Mcf/year to < 47 MCF/year

# Tanks/Vapor Recovery Units

- Tanks must be inspected routinely
- Tanks must be maintained routinely
- If you operate a VRU, the equipment must function properly and the tank hatches must be kept closed or your vapor/money still gets away
- Oxygen is not wanted in the system anyway

# VRU Study

- ◉ If the intent is to serve as a hood ornament, that's what you'll get
- ◉ It must be sized and maintained properly
- ◉ The sample of studies conducted with various vendors indicated that 90-95% reductions of emissions were realistic

# Is It Profitable?

Peak Capacity (Mcf/day)	Installation & Capital Costs (\$)	O&M Costs (\$/yr)	Value of Gas (\$/yr)	Annual Savings (\$)	Simple Payback (months)	Internal Rate of Return
25	35,738	7,367	51,465	44,098	10	121%
50	46,073	8,419	102,930	94,511	6	204%
100	55,524	10,103	205,860	195,797	4	352%
200	74,425	11,787	411,720	399,933	3	537%
500	103,969	16,839	1,029,300	1,012,461	2	974%

# Reduced Emissions

## Top Five US Companies for Emissions Reductions Using VRUs in 2005

Company	2005 Annual Reductions (Mcf)
C1	1,346,208
C2	313,753
C3	160,650
C4	54,597
C5	31,329

# Case Study

Capital Cost	\$92,500
Installation Cost	\$9,500
Installed Cost	\$102,000
Gas Volume (Mcf/day)	450
Value @ \$7.00/Mcf	\$3,150
Annual Revenue	\$1,149,750
Monthly Incremental Revenue	\$95,812
Payback (months)	1.06

# Flares

- ◉ Alternative to venting to atmosphere and causing EHS hazards
- ◉ Emissions sources piped directly to flare (minimal sulfur content)
- ◉ Depending on heat contents, additional fuel may be required
- ◉ No revenue, gas destroyed by combustion; potential fuel cost
- ◉ More information - <http://www.epa.gov/gasstar/documents/installflares.pdf>

# Case Study

- 99% of the flare gas was 'blowing' by the pilot lights
- Air assist fan speeds adjusted
- Evaluated 'Why is this stream being burned?' **368,000 SCFD; \$2,366/day; \$863,711/year**
- The former flare gas now routed to fuel gas system
- Another flare found with same problem and fixed

# Flare Air Speed

SBEA

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Pollution Prevention

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