Processor Best Management Practices and Opportunities

Innovative Technologies for the Oil & Gas Industry: Product Capture, Process Optimization, and Pollution Prevention

Targa Resources and the Gas Processors Association

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epa.gov/gasstar
Processor Opportunities: Agenda

- Industry Emissions
- Recommended Technologies and Practices
- Selected Methane Saving Opportunities
  - Eliminate Unnecessary Equipment
  - Composite Wrap
  - Leak Inspection & Maintenance
- Discussion
Natural Gas and Petroleum Industry Emissions

- Processing sector responsible for 35 Bcf of methane emissions annually, not including gathering/booster stations, which contribute >21 Bcf

Emissions and Reductions

- Production/Gathering/Booster: 159 Bcf
- Oil Downstream: 2 Bcf
- Oil Downstream: 2 Bcf
- Distribution: 67 Bcf
- Transmission & Storage: 95 Bcf
- 28 Bcf
- 4 Bcf

Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 - 2004
Recommended Technologies and Practices

- **BMP 1: Convert Gas Pneumatic Controls to Instrument Air**
  - Gas pneumatic controls in Gathering/Booster Stations

- **BMP 2: Install Flash Tank Separators in Glycol Dehydrators**
  - Glycol regeneration vents methane

- **BMP 3: DI&M at Gas Processing Plants and Booster Stations**
  - Equipment leaks cause methane emissions
BMP 4: Partner Reported Opportunities (PROs)

- **Partner**
  - Identified and practiced by Gas STAR partners - your peers

- **Reported**
  - Submitted to EPA in partners’ Annual Reports

- **Opportunities**
  - Peer-identified, cost-effective practices and technologies to reduce methane emissions
Processor BMPs

88% of the processing sector reductions came from PROs

- Eliminate Unnecessary Equipment: 15%
- Storage Related: 6%
- Pipe Leak Related: 5%
- Dehydrator Related: 4%
- Compressor Related: 1%
- Others (18% from Leak Imaging of Flowlines): 57%
- BMP 1: Pneumatics: 6%
- BMP 2: Flash Tank Separators: < 1%
- BMP 3: DI&M: 5%
PRO Fact Sheets

- Additional valuable information
- Facilitate technology transfer
- One page
- Easy to review

- 29 PROs apply to Processing sector
  - 17 focused on operating practices
  - 12 focused on technologies

- PRO Fact Sheets are derived from Annual Reports 1994-2003
  - Total 63 posted PRO Fact Sheets at epa.gov/gasstar/techprac.htm
Overview of PROs

Sample of Processing PROs

- Begin DI&M at Remote Facilities
- Convert Engine Starting to Nitrogen
- Convert Pneumatics To Mechanical Controls
- Eliminate Unnecessary Equipment and/or Systems
- Install Electric Starters
- Pipe Glycol Dehydrator to VRU
- Recycle Line Recovers Gas During Condensate Loading
- Replace Ignition – Reduce False Starts
- Use Inert Gases & Pigs to Perform Pipeline Purges
- Use of Composite Wrap Repair
Operating Practice PROs

- Eliminate unnecessary equipment and/or systems
- Rerouting of glycol skimmer gas
- Pipe glycol dehydrator to vapor recovery unit
- Inspect and repair compressor station blowdown valves
- Begin DI&M at remote facilities
Eliminate Unnecessary Equipment and/or Systems

What is the problem?
- As operating parameters change over time, partners have found that certain pieces of equipment initially crucial to operations have become superfluous.

Partner solution
- Take unnecessary equipment out of service.

Methane savings
- Based on removal of 10 separators and 3 glycol dehydrators.

Applicability
- Applies to all facilities that are operating well below design levels.

Methane Savings
- 5 to 130,000 Mcf/yr.

Project Economics

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Eliminate Unnecessary Equipment and/or Systems

ExxonMobil

- Replaced a 930 horsepower (Hp) compressor with 465 Hp at its Fresh Water Bayou facility in southern Vermilion Parish, Louisiana
  - Total project cost = $30,000
  - Emissions reductions = 1,556 Mcf/yr
  - Value Savings: $7/Mcf x 1,556 Mcf = $10,892/yr

- Took two satellite tanks out of service and began pumping directly to the tank battery
  - Total project cost = $120,000
  - Emissions reductions = 15,735 Mcf/yr
  - Value Savings: $7/Mcf x 15,735 Mcf = $110,145/yr
Technology PROs

- Use of composite wrap repair
- Install pressurized storage of condensate
- Aerial imaging of flowlines to identify leaks
- Recycle line recovers gas during condensate loading
- Convert gas-driven chemical pumps to instrument air
Use of Composite Wrap Repair

What is the problem?
- Pipeline is shutdown and vented to cut and weld pipe segment in damaged areas

Partner solution
- Use composite wrap, which consists of a filler material, a thin composite wrap and a special adhesive

Methane savings
- Based on repair frequencies between 2 - 65 times per year

Applicability
- Suitable for non-leaking defects on straight sections with up to 80% wall loss and no internal corrosion

Methane Savings
- 5,400 Mcf/yr

Project Economics
- Project Cost: > $10,000
- Annual O&M Costs: < $100
- Payback: Immediate
Use of Composite Wrap Repair

- Repairing non-leaking pipeline damage with composite wrap sleeves, such as Clock Spring®
  - Eliminates venting emissions
  - Inexpensive
  - Can repair while operating
- Non-leaking pipeline defects
  - External Corrosion
  - Dents
  - Gouges

Source: Clock Spring® Company L. P.
New PROs

- Broad dissemination of PROs is key to program success and effective peer-based technology transfer
  - Zero Emission Dehydrators
  - Recover Gas from Pipeline Pigging Operations
  - Nitrogen Rejection Unit Optimization
Aerial Imaging of Flowlines

What is the problem?
- Pipelines and flowlines into processing plant contain leaks that go unnoticed and undetected resulting in methane losses

Partner solution
- Aerial Imaging of flowlines using aircraft to cover large areas at one time

Methane savings
- Based on a one time survey of flowlines and the repair that resulting from the detection of leaks

Applicability
- Applies to all facilities with flowlines that are visible from the air

Methane Savings
- 5 to 1,500,000 Mcf/yr

Project Economics

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Aerial Imaging of Flowlines

Enbridge Energy Partners
- Conducted two helicopter leak surveys in 2004 and 2005 finding leaks in flowlines and repairing them
  - 2004 Survey and repairs reduced 769,000 Mcf of methane emissions
  - 2005 Survey and repairs reduced 1,224,000 Mcf of methane emissions
  - Total value of almost $14 Million at $7/Mcf

Duke Energy Field Services
- Conducted surveys over several gathering systems
  - 2005 Survey and repairs reduced 695,000 Mcf of methane emissions
  - Total value of almost $5 Million at $7/Mcf
Discussion

- Industry experience applying these technologies and practices
- Limitations on application of these technologies and practices
- Actual costs and benefits