Best Operating Practices For Reducing Emissions

From Natural Gas STAR Partners

NiSource and

EPA's Natural Gas STAR Program

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Why are Best Operating Practices Important?

- Many facilities have identified practical cost effective methane emissions practices
- Transmission & Distribution Companies have had great success in reducing methane emissions
  - Transmission Partners report saving 79.3 Bcf since 1993, 55% from *PRO's*
  - Distribution Partners report saving 10.6 Bcf since 1993, 7.2% from *PRO's*

Why Are Best Operating Practices Important?

- Partners share successes to reduce methane emissions and improve profitability
  - *BMP's: the consensus best practices*
  - *PRO's: Partner Reported Opportunities*
  - *Lessons Learned: expansion on the most advantageous BMP's and PRO's*
  - All posted on the GAS STAR website: http://www.epa.gov/gasstar

Transmission & Distribution Best Management Practices

- BMP 1: Implement Directed Inspection & Maintenance at Gate Stations and Surface Facilities
- BMP 2: Identify & Rehabilitate Leaky Distribution Piping
- BMP 3: Implement Directed Inspection & Maintenance at Compressor Stations
- BMP 4: Use of Turbines at Compressor Stations
- BMP 5: Identify & Replace High-Bleed Pneumatic Devices
- BMP 6: Partner Reported Opportunities (PRO's)

Gas STAR PRO Fact Sheets

- PRO Fact Sheets from Annual Reports 1994-2002
  - 54 PRO fact sheets posted on website
  - 43 PRO fact sheets applicable to Transmission & Distribution
    - 18 focused on operating practices
    - 25 focused on technology
  - Several new PRO fact sheets under development

Lessons Learned

- 14 Lessons Learned on website
- 9 applicable to Transmission
  - 5 focused on operating practices
  - 4 focused on technology
- 2 applicable to Distribution
  - Both on operating practices
- New Lessons Learned in development
  - Composite Wrap
  - Reducing Pressure in Distribution Systems

Best Operating Practices Lessons Learned

- Directed Inspection & Maintenance at Compressor Stations
- Directed Inspection & Maintenance at Gate Stations and Surface Facilities
- Reducing Emissions when Taking Compressors Off-line
- Using Hot Taps for In Service Pipeline Connections
- Using Pipeline Pump-Down Techniques to Lower Line Pressure before Maintenance

Some Best Operating Practices

Compressors & Engines

- Convert Engine Starting to Air
  - SAVES…1,350 Mcf/yr
  - PAYOUT…< 1 year
- Convert Engine Starting to Nitrogen
  - SAVES… 1,350 Mcf/yr
  - PAYOUT…< 1yr
- Lower Purge Pressure for Shutdown
  - SAVES… 500 Mcf/yr
  - PAYOUT… 3-10 yrs
- Reduce Frequency of Starts with Gas
  - SAVES… 132 Mcf/yr
  - PAYOUT… < 1yr

What is the Problem?

Compressor Starts Vent Methane and Salable Product

- How much methane is emitted?
  - Up to 132 Mcf per start
- How can these losses be reduced?
  - Alternative operating practices
    - use air
    - use nitrogen
  - Alternative technology
    - use electric starters
    - convert to electric drive

Partner Experience

Compressor Starts Vent Methane and Salable Product

- Partners report 1,350 Mcf/yr savings per compressor using air or nitrogen assuming ten starts per year
- DISCUSSION
  - Availability and cost of air and nitrogen are issues
  - Capital costs for electric starters reduce payout
  - Coordinating starts and shutdowns with maintenance schedules …
  - And modification of purge procedures to recover gas prior to venting can also gain savings with low costs

And More Operating Practices

- Other
  - Eliminate Unnecessary Equipment or Systems
    - SAVES… 2,000 Mcf/yr
    - PAYOUT… < 1yr
  - Increase Walking Surveys from 5 to 3 years
    - SAVES… 1,500 Mcf/yr
    - PAYOUT… 1-3 year
  - Improve Quality of Gas Receipts
    - SAVES…500 Mcf/yr
    - PAYOUT…3-10 years
- Pipelines/Piping
  - Use Inert Gases and Pigs for Purges
    - SAVES… 90 Mcf/yr
    - PAYOUT… > 10 yrs

What is the Problem?

Unnecessary Equipment or Systems provide sources of methane emissions

- How much methane is emitted?
  - DEPENDS: ONE unnecessary process controller vents 1 cfm or 0.5 MMcf/yr
  - Replacing multiple reciprocating compressor engines with one turbine compressor can save >2 MMcf/yr
- Other benefits
  - Increases efficiency
  - Lowers operating & maintenance costs
  - REDUCES METHANE EMISSIONS

Partner Experiences

- One partner reports savings of 7,940 Mcf/yr by eliminating 31 dehydrators with an average of 4 controller loops each
  - Payback was < 1 year !
- One partner reports saving 500 Mcf for each of 3 gasholders removed from service

And More Operating Practices

Valves

- Close Main & Unit Valves Prior to B/D
  - SAVES… 4,500 Mcf/yr
  - PAYOUT… <1yr
- Perform Leak Repair during line replacement
  - SAVES… 2,500 Mcf/yr
  - PAYOUT…1-3 yrs
- Inspect & Repair Compressor Station Blowdown Valves
  - SAVES…2,000 Mcf/yr
  - PAYOUT… < 1 yr
- Move Fire Gates to Reduce Venting
  - SAVES …1,700 Mcf/yr
  - PAYOUT… 3-10 years
- Test & Repair RV's
  - SAVES…170 Mcf/yr
  - PAYOUT… < 1 yr

What is the Problem?

Valve Placement

- How much methane is emitted?
  - DEPENDS: on piping geometry and proximity of isolation valves
- How can these losses be reduced?
  - One partner reports methane reductions of nearly 9 MMcf/yr by taking advantage of isolation valves and blowdown procedures

What is the Problem?

Leaking Relief Valves

- How much methane is emitted?
  - DEPENDS: as RV components wear or foul, leakage occurs, estimate 200 Mcf/yr per leaker
- How can these losses be reduced?
  - Leak check & repair on a planned schedule

Partner Experience

Leaking Relief Valves

- One partner reports saving 3,907 Mcf/yr by repairing 7 valves. Payback was immediate
- Another partner reports saving 853 Mcf/yr by repairing compressor RV's
- Another partner reports saving 10 Mcf/yr by using nitrogen to test 120 RV's versus "popping" off with natural gas

Discussion Questions

- To what extent are you implementing these PRO's?
- Do you have other best operating practices to suggest?
- How could these PRO's be improved upon or altered for use in your operations?
- What are the barriers (economic, lack of information, regulatory, etc.) that are preventing you from implementing these practices?

Emerging Technology: Optical Imaging