Oil and Gas Methane Emission Reduction Best Practices

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Flaring Reduction Fugitive Emissions Capture are Related

- Flared gas is a major portion of the saleable methane lost from a facility
  - Fugitive and vented methane are the remaining portions
- Recovery of flare gas provides an avenue for capture and use of fugitive and vented emissions
  - Fugitive leak capture is not done if gas is flared
- Capture of fugitive and vented emissions improves economics of flare reduction projects
  - Fugitive and vented emissions often have higher methane and higher heat content
- Most fugitive and vented emissions can be captured for beneficial use
Top Five Fugitive and Vented Emission Sources

- **Tank Venting**
  - Install Vapor Recovery Units and Micro Turbine Generators

- **Pneumatic Instrument Venting**
  - Replace High Bleed with Low Bleed or Instrument Air

- **Fugitive Emissions**
  - Leak Detection and Repair Program with Infrared Technology

- **Compressor Seals**
  - Replace Centrifugal Compressor Wet Seals with Dry Seals
  - Economic Rod Packing Replacement in Reciprocating Compressors

- **Gas Well Venting**
  - Reduced Emissions Completions for Gas Wells
  - Smart Automation Plunger Lifts for Liquids Unloading
Tank Venting

- Problem: Gas is vented from low-pressure crude oil and gas condensate storage vessels due to flashing, working, and standing losses
- BMPs: Vapor recovery towers (VRT) and units (VRU) capture tank vapors using compressors

Source: Anadarko, VRT

Source: Hy-Bon Engineering, VRU
Pneumatic Instrument Venting

- Problem: Process controllers, chemical pumps, and glycol pumps often vent pressurized natural gas used for pneumatic actuation

- BMPs:
  - Retrofit high-bleed devices to low-bleed,
  - Replace natural gas with compressed air,
  - Use electric or solar powered pumps

Source: Anadarko, Solar chemical pump
Fugitive Emissions

• Problem: Natural gas is odorless and colorless so leaks from valves, connectors, and open ended lines go unnoticed

• BMPs:
  – Regular leak inspection and repair surveys using leak detection technologies
  – Infrared remote leak detection technologies
Fugitive Emissions Measurement

- Verification of emission reductions and project scoping requires emissions measurement
  - High volume sampler measures emissions up to 14 m³/hour
  - Rotameter measures flow rate of vent stacks
  - Calibrated bags measure vent emissions by timing inflation

High volume sampler in use
Compressor Methane Losses

- Problem: Compressor seals are designed to leak gas, shutdown practices vent large volumes of gas

- BMPs:
  - Economic replacement of rod packing,
  - Replace wet seals with dry seals,
  - Route blowdown gas to fuel

Source: CECO, Rod packing

Source: EPA, Dry seal schematic
Gas Well Venting

• Problem: Well completion and liquids unloading vent large volumes of gas

• BMPs:
  – Recover completion gas with portable separation and treatment equipment
  – Smart automation plunger lift reduces operational venting

Source: Williams, Completion skid

Source: Weatherford, Plunger lift diagram
Methane to Markets Best Practices Technical Documents

- Methane to Markets has documents that address BMPs for these sources and more
- Over 80 technical documents available in Chinese, Russian, Spanish, and English online at: epa.gov/gasstar
Methane Saving Project Experiences

- Methane to Markets Participants are currently using technologies to recover valuable vented and fugitive methane
- Selected technology presentations for this section:
  - Micro-turbines and other uses for low-pressure gas (BP experience)
  - Latest technology to identify, measure and recover tank emissions (Hy-Bon experience)
  - Advanced well completions and infrared cameras for leak detection (Marathon experience)
  - Infrared methane emissions imaging (FLIR experience)
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