Methane Emission Mitigation
DJ Basin
Producers Technology Transfer Workshop
April 29, 2008
Denver, Colorado

Core Methane Emission Control Strategies

- Pneumatic device retrofit
- Pneumatic device replacement
- Flashing emission controls
- Inspection with IR camera
- Ongoing evaluation of new technology
Pneumatic Retrofits

- Retrofitted 548 Mizer style valves installed
  - Recovers approximately 77 MMscf methane per year
  - Three-month payout

Pneumatic Replacement

- Replaced 106 high bleed devices to date
  - Recovers 82.5 MMscf methane per year
  - Three month payout
- Will replace an additional 264 devices in 2008
Flashing Emission Controls

- 2004-2006 dynamic regulatory changes
  - Controlled 360 Production Batteries

- Vapor recovery units (VRU) – preferred alternative
  - Historic installation configuration – VRU connected directly to storage tanks
  - Operational and safety concerns
    - O₂ intrusion
    - Equipment repairs result in extended down time

- 2007 additional regulatory changes
  - Controlled 314 production batteries
  - Operational issues pushed controls to combustion devices (ECD)

Process Modifications to Reduce Flash Emissions

In 2006 piloted the use of a secondary flash vessel.
Process Modifications to Reduce Flash Emission

In 2007, modified the design to a larger buffer tank.

Flash Vessel

- Sep
- Sep
- Sep
- Sep
- Sep
- Sep
- Sep
- Sep
- Sep

VRU → ECD

- Tank
- Tank
- Buffer
- Tank

Oil

Flash gas

gas to sales line
Flash Vessel (buffer tank)

**Benefits**
- Reduces methane emissions
- Reduces products of combustion to atmosphere
- Increased safety due to lower pressure seen at tank
- Gas from buffer tank is compressed back into sales line
- This vessel also eliminates $O_2$ intrusion

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Flash Vessel

**Economic evaluation:**
- Average of 1-2 MCF for every 10 bbls oil
- Price of buffer tank $7,700
- 40~50 bbl location = 4 Mcf a day
- Pay out on buffer tank is 1 year

**In 2008, all new pad locations will receive a buffer tank, VRU and ECD.**
IR Camera Inspections – DJ Basin

Implemented IR camera inspections in summer 2007
- Two cameras in E&P service
- One camera in midstream service

Initial findings led to the formation of maintenance teams to incorporate the use of the IR camera and facilitate repairs.

Goal was to inspect every separator, tank and wellhead in the Wattenberg Field.

Developed simple recordkeeping and maintenance log to facilitate data trending in the future.

Most significant finding:
- Thief hatch seals
Based on the IR camera findings, Anadarko began a gasket material replacement and longevity program for Enardo and Jayco thief hatches.

- Original equipment was outfitted with Buna-N gaskets
- Retrofitted with Viton
- Now evaluating Fluorosilicone rubber gaskets

Conducting additional pilot studies with teflon vacuum gaskets
IR Camera Inspections – DJ Basin

Use of the IR Camera has allowed for the repair of leaks there were otherwise not detectible

- Thermostats
- Fittings
- Regulators
- Gaskets
- Valves

Result – less methane vented to atmosphere.

Ongoing Evaluation of New Technology

- Solar powered production separators
  - Cost prohibitive for retrofit
  - Evaluating pilot for new purchases

- Compressed ambient air-driven separators
  - Solar powered compressor
  - Replaces field gas with compressed ambient air to drive pneumatics
  - Initial pilot underway
Questions?