Salt Creek Field
CO$_2$ Revitalizes Old Giant

CO$_2$ in Wyoming – Joint Producers Meeting
Sponsored by the Wyoming EOR Institute

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Presented by: Craig Walters, Rockies EOR Mgr
Anadarko’s Wyoming EOR Assets

- **Fields**
  - Monell
  - Salt Creek
  - Sussex

- **Pipelines**
  - 33 mile, 8”
  - 125 mile, 16”

- **CO₂ Supply**
  - XOM Shute Creek
Salt Creek – Overview

- General Facts
  - Discovered in late 1800’s
  - 1.7 Bbbl OOIP (0.7 Bbbl cum prod)
  - 9 productive intervals
  - Over 4,000 total wellbores

- Active CO₂ Flood Area (Wall Creek 2)
  - 2,200’ / 105°F BHT / 19% por / 52 mD
  - 39° API; MMP 1,250 psi
  - CO₂ injection commenced Jan. 2004
  - 150 active CO₂ WAG injectors
  - 20-acre 5-spot pattern
  - Flowing producers – identical inj/prod set-up

- Significant Future Development
  - Miscible flanks, immiscible crest, minor horizons

- Planned sequestration of 660 Bcf CO₂
Salt Creek – Operational Challenges

- **Brownfield Revitalization**
  - Rework every wellbore – including prior P&A’s
  - Surface considerations – old infrastructure, populated areas

- **Facilities (Surface)**
  - Temperature plays a significant role
    - CO₂ density varies significantly with minor temperature variations
    - Low produced fluid temperatures cause freezing and poor bulk separation
  - Full stream production (flowing wells)
    - Well testing
    - Facility slugging

- **Reservoir (Downhole)**
  - Relatively shallow reservoir
    - Limited operating window between fracture and minimum miscibility pressures
  - “Fast” reservoir processing
    - Requires diligent pattern surveillance and WAG monitoring
Salt Creek – CO₂ Flood Performance

Cumulative Production > 3 MMBO

Reservoir Performing as Expected!!

- Decreased CO₂ Inj due to high temps (reduced density) and WAG cycles
- Freezing due to cold weather and high GLR

Dimensionless Performance Curve

Expected Range

Pore Volume Injected

Oil Recovery, % OOIP

Oil Production
CO₂ Injection

215 MMCFD
5,000 BOPD

Jan-04 Jul-04 Jan-05 Jul-05 Jan-06 Jul-06 Jan-07 Jul-07
Summary

- Salt Creek
  - Performing as expected
  - Very unique CO$_2$ flood pushing operational envelope
  - Phased development allows for continuous learning and improvement
  - Many additional phases, horizons and years of development

- Knowledge Transfer
  - Apply lessons learned to future phases at Salt Creek and other Anadarko operated Wyoming fields such as Monell and Sussex fields