CO₂EOR
CO₂ Operations: Oil Recovery Process

CO₂ PIPELINE - from Jackson Dome

INJECTION WELL - Injects CO₂ in dense phase

PRODUCTION WELLS
Produce oil, water and CO₂ (CO₂ is recycled)

Model for Oil Recovery Using CO₂ is +/- 17% of Original Oil in Place (Based on Little Creek)

Primary recovery = +/- 20%
Secondary recovery (waterfloods) = +/- 18%
Tertiary (CO₂) = +/- 17%

CO₂ moves through formation mixing with oil droplets, expanding them and moving them to producing wells.
CO₂EOR Generalized Type Curve

<table>
<thead>
<tr>
<th>Production Rate</th>
<th>Incline (Yrs)</th>
<th>Plateau (Yrs)</th>
<th>Decline (Yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large Fields</td>
<td>6</td>
<td>6.5</td>
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<tr>
<td></td>
<td>Average Fields</td>
<td>4.5</td>
<td>5.5</td>
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<td></td>
<td>Small Fields</td>
<td>4</td>
<td>5</td>
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(Log Scale)
Current U.S. CO₂ Sources & Pipelines

U.S. CO₂ EOR Production
Approximately 280,000 Bbls/d
Potential Sources of Additional CO₂

- **Natural Sources**
  - Jackson Dome
  - McElmo Dome
  - La Barge

- **Carbon Gasification Projects**
  - Convert solid carbon into Syngas
  - Syngas can be converted into various products
  - By product is CO₂

- **Existing Emitters of “Pure” CO₂**
  - Up to 150 MMcf/d in the aggregate
  - Smaller volumes per plant

- **Existing Emitters of “Dilute” CO₂**
  - Large volumes
  - Expensive to capture based on current technologies
Potential
“CO₂ enhanced oil recovery (CO₂EOR) offers the potential for storing significant volumes of carbon dioxide emissions while increasing domestic oil production”

Approximately 84.8 billion barrels of oil in existing US oilfields could be recovered using state-of-the-art CO₂EOR (In a range of $50-$100/barrel, it is economically feasible to recover 39 to 48 billion barrels)

Next generation technology offers potential for recovering more stranded oil and storing significantly more CO₂

Infrastructure for CO₂EOR can be used for large-scale carbon capture and sequestration (CCS) projects in underlying saline formations
Examples
Tinsley Field: 2011 Planned Activity
SW Mississippi

Map showing SW Mississippi with cities such as Brookhaven, Mallalieu, Smithdale, Olive, Little Creek, McComb, Lockhart, and Donaldsonville.
Net Daily Production by Field

- Mallalieu Area
- Brookhaven
- McComb Area
- LCU Area
- Lockhart Crossing
- Total

SW Mississippi