Lon Whitman
Corporate Outreach and Strategic Alliances

“ANGELS GET WINGS”
and help in the
Recovery of Wyoming Stranded Oil

The Wyoming Enhanced Oil Recovery Commission and
Technical Advisory Board Joint Meeting

January 15th, 2009
Denver, Colorado
“Mommy...

Daddy says that every time an EOR project receives Management Approval, an Angel gets its Wings. I asked Santa for more EOR Projects for Christmas and I got ‘em! Look at all the Angels!”
The EORI “Outreach” Program focuses on:

- **Direct Corporate Contact**
  - Producers operating in Wyoming
  - Related Service Companies (SURTEK, Praxair, FabTech, Nicholas Consulting Group)
  - Professional and Industry Organizations (SPE, WGA, IPAA, IOGCC, IPAMS, WYOGCC, PAW)
  - CO₂ Suppliers and Developing Sources
  - Pipeline

- **Short Courses and Workshops**
  - CO₂ EOR
  - Chemical Flooding
  - Geologic Fractures

- **Conferences and Topical Meetings**
  - CO₂ in Wyoming
  - EOR and IOR in Wyoming Fields

- **Development of Contractual and Cooperative Projects with Wyoming Producers**

- **Facilitation of Strategic Alliances between EORI, Service Companies, Required Specialized Consultants and Wyoming Producers**

- **Pilot Projects**
Direct Corporate Contact

“Newer” Corporate Relations:

- Continental Resources
- Osborne Heirs
- EXCO
- Denbury
- Legado
- Mark Nicholas – Nicholas Consulting Group - Midland
- Fabrication Technologies - Casper
- Mountain West Energy – In-situ Vapor Extraction
- Nitrogen Injection Projects
  - Praxair
  - Wyoming Cryogenics
Direct Corporate Contact

Regular On-Going Contact:
- Merit
- Citation
- Anadarko
- EOG Resources
- St. Mary L&E
- Marathon
- ExxonMobil Gas and Power Marketing
- ConocoPhillips
- TR Operating
- Elk Petroleum
- Resolute Resources
- True Oil
- XTO
- Encore Acquisitions
- Wyoming Pipeline Authority
- Petroleum Association of Wyoming
- Wyoming Oil and Gas Conservation Commission
- El Paso Western Pipelines
- SURTEK
- Refined Energy Holdings
- DKRW Advanced Fuels
- Blue Source
- PacifiCorp Energy
- Ballard Petroleum
- Black Hills Exploration
- KinderMorgan CO₂
- Questar
Industry Conference Participation

- IPAMS “Rocky Mountain Energy Conference”- Planning Team and Sponsor
- Steve Melzer CO₂ EOR and Carbon Management Conferences - Planning Team and Sponsor
  - Carbon Management Workshop in Houston – December 8th – 10th – Presentation
  - Midland CO₂ Conference – December 11th and 12th – Presentation
- UTCLE 2008 Carbon Management Workshop – Sponsor
- WGA Monthly Meeting – September 3rd – Presentation
- Oklahoma Independent Petroleum Association Annual Meeting – September 25th and 26th - Presentation
- Wyoming Pipelines: The Territory Ahead – October 31st – Planning team with UW School of Law and SER
2008 EORI CONFERENCES

2nd Annual WY CO₂ Conference – May 29th and 30th
2008 EORI CONFERENCES

2nd Annual WY CO$_2$ Conference – May 29$^{th}$ and 30$^{th}$

– 250 Attended (Double from 2007)
– Excellent Presentations and very positive response to the conference
– Great Participation by TAB members
  • Steve Melzer – has presented at every EORI Conference we have had
  • Anadarko – Jason Gaines
  • John Stroud – Merit
  • Chuck Peterson – Devon
– Continued Participation and Sponsorship
  • Kelly Geohegan – ExxonMobil
  • Blue Source – Ray Hattenbach
  • El Paso Western Pipelines – Roland Harris – El Paso has been a sponsor of every CO$_2$ and EOR Conference we have had
  • Jon Doyle – DWRK – continued support of our CO$_2$ Conference; held a cocktail party for the conference
  • Wyoming Pipeline Authority – Brian Jeffries
– Widening participation
  • WY Representative Tom Lubnau
2008 EORI CONFERENCES

Wyoming EOR Conference - September 15th and 16th

The Wyoming Enhanced Oil Recovery Institute

The 2008 Wyoming EOR/IOR Conference

Increased Value from Vintage Fields

Dates: Monday and Tuesday, September 15th and 16th
Location: Snow King Resort, Jackson, Wyoming

Agenda (Tentative)

Monday 15th September
8:00 am to 12:45 pm  Session 1: EOR in Practice
8:00 am to 8:30 am  Introduction - Jim Steidtmann & Lon Whitman, EORI
8:30 am to 9:15 am  Keynote - Dr. Larry W. Lake, UT Austin, “What We Know about EOR Today”
9:15 am to 9:30 am  Break
9:30 am to 10:15 am  Dr. James Griffin, Texas A&M, “Why EOR Makes Sense”
10:15 am to 11:30 am  Glen Murrell, EORI, “EOR Screening & Scoping tools for Wyoming Oil Fields”
11:30 am to 12:45 pm  Lunch
12:45 pm to 1:45 pm  Session 2: Miscible Gas Flooding
12:45 pm to 1:45 pm  Joe Shive & Mark Holtz, Praxair, Inc., “Newgen@ EOR”
1:45 pm to 3:00 pm  Steve Meier, Meier CO2 Consulting, “CO2 Flooding”
3:00 pm to 3:15 pm  Break
3:15 pm to 4:15 pm  Craig Walters, Anadarko Petroleum Corporation, “CO2 EOR projects: from cradle to grave”
5:00 pm  Cocktail Reception

Tuesday 16th September
8:00 am to 10:15 am  Session 3: EOR Geology and Risk
8:00 am to 9:15 am  Randi Martens, University of Wyoming, “Why Geology is key to the success of EOR projects”
9:15 am to 9:30 am  Break
9:30 am to 10:30 am  Session 4: Chemical EOR
9:30 am to 10:30 am  Malcolm Pitts, SURTEK, “Field Oil Recoveries Using Chemical Enhanced Oil Recovery Technology”
10:30 am to 11:30 am  Dr. Randal Sergiht, New Mexico Tech, “Injectivity Characteristics of EOR Polymers”
11:30 am to 12:30 pm  Lunch
12:30 pm to 1:15 pm  Bob Cristofferson, Citation Oil & Gas, “Enigma: A Case study of ASP Implementation”
1:15 pm to 2:00 pm  John Putnam, Fabrication Technologies, Inc, “Project Implementation - Key to Success in the Field”
2:00 pm to 2:15 pm  Break
2:15 pm to 3:15 pm  Special Session: Don Likwutz, WOGCC, “EOR in Wyoming”
3:15 pm to 3:30 pm  Summary and Close

Speakers include:
- Larry Lake, UT Austin
- Steve Meier, Meier CO2 Consulting
- Randi Martens, University of Wyoming, Geology and Geophysics
- Joe Shive & Mark Holtz, Praxair, Inc.
- Malcolm Pitts, SURTEK
- Bob Cristofferson, Citation Oil & Gas
- Craig Walters, Anadarko Petroleum Corporation
- John Putnam, Fabrication Technologies Inc.
- Glen Murrell, EORI

For further details and to register please visit our website (http://eori.uwyo.edu/)
For sponsorship or speaking opportunities please contact Lon Whitman at lw717@uwyo.edu or at 307-766-0577
2008 EORI CONFERENCES

Wyoming EOR Conference - September 15\textsuperscript{th} and 16\textsuperscript{th}

- 125 Attended
- Growing TAB Participation
  - Steve Melzer
  - Jim Griffin
  - Randy Seright
  - Anadarko – Craig Walters
- New Presenters
  - Larry Lake – UT Austin
  - Malcolm Pitts – Surtek
  - Bob Christofferson – Citation
  - Randi Martinsen – University of Wyoming
  - Joe Shine – Praxair
  - John Putnam – FabTech
  - Don Likwartz – WYOGCC
2009 EORI Conferences and Workshops

• Geologic Fractures and Stresses Workshop in Jackson this February with John Lorenz
  – Open to 30 – 20 is ideal number
  – Widening participation
    • True
    • Legado
    • Ultra Petroleum

• 3rd Wyoming CO₂ Conference, Casper – Expanding to 3 days
  – June 23rd, 24th and 25th, 2009
  • Casper – Parkway Plaza
  • Including One Day with UW Law School and Legal Issues around CO₂
  • Field Trip(s)

• 2nd Wyoming EOR Conference, Jackson
  – September 14th and 15th, 2009
Contractual and Cooperative Projects

*No Slow Down in Project Development – Our Work is Critical*

Current and Developing:

3 Powder River Basin Field Studies
– Geology, Reservoir and EOR/IOR Options

3-4 Big Horn Basin Field Studies
– Geology, Reservoir and EOR/IOR Options
Some Facts and Statistics on CO$_2$ EOR in Wyoming
Wyoming Oil Production
1998 - 2007

Oil Production in Millions of Bbls/Yr
## Crude & Condensate Production
### 1998 - 2007

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CO2 OIL Bbl</th>
<th>Change %</th>
<th>OTHER OIL Bbl</th>
<th>Change %</th>
<th>CONDENSATE Bbl</th>
<th>Change %</th>
<th>CRUDE &amp; CONDENSATE Bbl</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>2,619,000</td>
<td>-12.8%</td>
<td>55,922,811</td>
<td>-7.9%</td>
<td>7,285,008</td>
<td>10.5%</td>
<td>65,826,819</td>
<td>-6.4%</td>
</tr>
<tr>
<td>1999</td>
<td>2,463,000</td>
<td>-6.0%</td>
<td>52,212,049</td>
<td>-6.8%</td>
<td>6,940,826</td>
<td>-4.8%</td>
<td>61,616,875</td>
<td>-6.4%</td>
</tr>
<tr>
<td>2000</td>
<td>2,481,000</td>
<td>0.7%</td>
<td>50,901,206</td>
<td>-2.5%</td>
<td>7,370,392</td>
<td>6.2%</td>
<td>60,752,598</td>
<td>-1.4%</td>
</tr>
<tr>
<td>2001</td>
<td>2,371,000</td>
<td>-4.4%</td>
<td>47,553,474</td>
<td>-7.1%</td>
<td>7,779,199</td>
<td>5.5%</td>
<td>57,403,946</td>
<td>-5.5%</td>
</tr>
<tr>
<td>2002</td>
<td>2,297,000</td>
<td>-3.1%</td>
<td>43,633,711</td>
<td>-7.7%</td>
<td>8,860,483</td>
<td>12.6%</td>
<td>54,791,194</td>
<td>-4.6%</td>
</tr>
<tr>
<td>2003</td>
<td>2,302,000</td>
<td>0.2%</td>
<td>41,111,635</td>
<td>-5.9%</td>
<td>9,133,451</td>
<td>3.1%</td>
<td>52,547,086</td>
<td>-4.1%</td>
</tr>
<tr>
<td>2004</td>
<td>3,021,000</td>
<td>31.2%</td>
<td>38,900,824</td>
<td>-5.4%</td>
<td>9,880,875</td>
<td>8.2%</td>
<td>51,802,699</td>
<td>-1.4%</td>
</tr>
<tr>
<td>2005</td>
<td>4,160,427</td>
<td>37.7%</td>
<td>37,139,767</td>
<td>-4.5%</td>
<td>10,436,708</td>
<td>5.6%</td>
<td>51,736,902</td>
<td>-0.1%</td>
</tr>
<tr>
<td>2006</td>
<td>4,740,214</td>
<td>13.9%</td>
<td>36,911,960</td>
<td>-0.6%</td>
<td>11,383,151</td>
<td>9.1%</td>
<td>53,035,325</td>
<td>2.5%</td>
</tr>
<tr>
<td>2007</td>
<td>5,677,279</td>
<td>19.8%</td>
<td>35,639,863</td>
<td>-3.4%</td>
<td>12,812,346</td>
<td>12.6%</td>
<td>54,129,488</td>
<td>2.0%</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>7.7%</td>
<td>-5.2%</td>
<td></td>
<td></td>
<td>6.9%</td>
<td></td>
<td></td>
<td>-2.5%</td>
</tr>
</tbody>
</table>
CO$_2$ EOR OIL PRODUCTION

Year


Million Barrels

0 1 2 3 4 5 6

CO₂ EOR OIL PRODUCTION in WYOMING

• CO₂ EOR Oil Production averaged a 7.7% increase over the 10-yr period from 1998-2007

• In 2007, CO₂ EOR Oil Production accounted for 10.5% of the Total Oil Production of 54.1 MMB in the State of Wyoming

• Creating a 2% increase in Total Oil Production over 2006
Strategic Alliances
Strategic Alliances

WY Chemical Flooding Consortium

Developing with interested Wyoming Operators
Strategic Alliances

WY Minnelusa Consortium

- One-Year Phases
- Improved/Enhanced Production from the Minnelusa
- Work focus and direction decided by the Consortium
- Current focus on Geology
  - Gene George Consulting for the Consortium
Strategic Alliances

CO$_2$ Pipeline Infrastructure Project with the Wyoming Pipeline Authority and Interested Wyoming Producers
Strategic Alliances

A project with The Nicholas Consulting Group and EORI to develop a Screening Model for Full Cost Economics for CO₂ EOR Projects (Total Project)
A Project with Fabrication Technologies for Surface Equipment Design and Full Cost Economics for Chemical Flooding EOR Projects with Wyoming Operators.
Strategic Alliances

A Project with Praxair to develop Nitrogen EOR Pilot Projects with Wyoming Operators
Pilot Projects

Development of Pilot Projects with Wyoming Operators to test and implement EOR/IOR techniques researched and studied at EORI.
Lon D. Whitman, P.Eng.
Corporate Outreach and Strategic Alliances

Tel: 307 760 0577
LWhitma3@uwyo.edu
QUESTIONS?