Shute Creek Facility and Controlled Freeze Zone™ Updates

Wyoming EORI 6th Annual CO2 Conference

Clay Condon, CO₂/Helium Sales Manager
Scott Kelman, Research Engineer
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This presentation includes forward-looking statements. Actual future conditions (including economic conditions, energy demand, and energy supply) could differ materially due to changes in technology, the development of new supply sources, political events, demographic changes, and other factors discussed herein (and in Item 1 of ExxonMobil’s latest report on Form 10-K). This material is not to be reproduced without the permission of Exxon Mobil Corporation.
Overview

• ExxonMobil Wyoming CO\textsubscript{2} Facilities

• History of ExxonMobil in Wyoming CO\textsubscript{2}

• Lessons learned as a CO\textsubscript{2} supplier

• Controlled Freeze Zone\textsuperscript{TM} Update
LaBarge: 25 Years of Success

- Reservoir
  - Produced from the LaBarge Madison reservoir
  - Average well produces 45 MMCFD
  - Challenging composition

- Treating
  - Gathered to the Black Canyon Processing Facility
  - Transported 40 miles to the Shute Creek Treating Facility

- Unique operational challenges

Source: Based on Public Sources
Shute Creek Treating Facility

Source: ExxonMobil Analysis
Wyoming CO₂ Developments

Source: Based on Public Sources
Lessons to a CO$_2$ Supplier

- Projects do not always proceed as planned
  - Timing of project completion
  - Amount of CO2 needed
  - Permits and regulatory environment

- Actual sales impacted by your downtime

- Supply and demand profiles do not match
  - Plan to continually bring on new customers

- Prices will send mixed signals over the project life

- CO$_2$ can be utilized to benefit the project and the community
Controlled Freeze Zone™

*CFZ™ Uses a Different Approach* -- Rather than *avoiding* solidification of CO₂, *control* it and *confine* it to specially designed section in distillation column

Source: ExxonMobil Analysis
Pilot Plant / Commercial Demonstration Plant

1986 Clear Lake Pilot Plant

- Successfully proved the concept in 1986 in a 600 KSCFD pilot plant
- First facility to successfully demonstrate freezing and remelting of CO$_2$ as part of a separation process

2012 LaBarge CDP

- 23 times more capacity than original pilot plant
- Size suitable to enable 75X scale up to 1 BSCFD
- Wide range of feed compositions
- Integrated with Shute Creek CH$_4$ and CO$_2$ sales lines and acid gas injection

Source: ExxonMobil Analysis
Commercial Demonstration Plant Design

- **CFZ™ Commercial Demonstration Plant (CDP)** currently in its operational and testing phase
- CDP has a capacity to handle up to 13.5 MMSCFD of feed gas with significant variations in inlet composition:
  - Up to 72 mol% CO₂
  - Up to 35 mol% H₂S
- Three feed gas streams are used to blend the desired feed gas
  - Sales gas stream of Methane with a small amount of Nitrogen
  - CO₂ sales gas stream with a small amount of Methane
  - Acid gas stream with 65 mol% H₂S and 35 mol% CO₂
- The plant operates using a high percentage recycle of both the bottom and overhead products back to the inlet feed to minimize feed gas required during the testing program
- When no H₂S is in the CFZ feed stream the bottoms product (CO₂) is sent to the Shute Creek sales lines for use in EOR. When H₂S is in the CFZ feed stream the bottoms product will be sent to be geosequestered via Shute Creek Acid gas injection.
Controlled Freeze Zone™: CDP Test Program

• Gather all necessary data to confidently scale-up, design, and operate facilities of up to 1 BSCFD

• Test program started in March 2012 and is anticipated to last approximately a year

• Tests to date demonstrate very effective and efficient separations

Source: ExxonMobil Analysis
Controlled Freeze Zone™: CO₂ Profile Processing 42% CO₂ Feed Case

- **Feed Stream**: 42% CO₂ in Feed
- **Entering CFZ™**: 21.1% CO₂
- **Leaving CFZ™**: 4.1% CO₂
- **Rectifier Overhead**: 0.9% CO₂ in OVHD Product
- **Bottoms Product**: 99.5 to 100% CO₂
Controlled Freeze Zone™: CO$_2$ Profile Processing 71% CO$_2$ Feed Case

CO$_2$ Monitors - Vapor Streams @ 16h0m0s

- **Entering CFZ™**
- **Leaving CFZ™**
- **Overhead**
- **600 psig**
- **Feed Stream**
- **Bottoms Product**
- **Rectifier Overhead**
- **0.6% CO$_2$ in OVHD Product**
- **99.5 to 100% CO$_2$ in Bottoms Product**
- **71% CO$_2$ in Feed**
- **71% CO$_2$ in Feed**
- **71.0%**
- **22.5%**
- **3.7%**

ExxonMobil Gas & Power Marketing
Summary

- The CFZ™ technology demonstrates ExxonMobil’s high commitment to:
  - advancing the most advantageous sour gas technologies,
  - developing integrated solutions to meet the challenges of sour natural gas, and
  - facilitating management of CO₂ and acid gases, including geosequestration and EOR
The Road Ahead

- New CO2 sources
  - Financing
  - Transport
  - Sustainability
  - Performance
  - Planning
- New CO2 pipelines
- New EOR projects
- Continued EOR success in Wyoming
Carbon Dioxide Sales Organization

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paul Greenwood</td>
<td>Manager Americas Gas Marketing</td>
<td>713-656-8303, <a href="mailto:paul.greenwood@exxonmobil.com">paul.greenwood@exxonmobil.com</a></td>
</tr>
<tr>
<td>Clay Condon</td>
<td>Manager CO$_2$ and Helium Business</td>
<td>713-656-3612, <a href="mailto:j.clayton.condon@exxonmobil.com">j.clayton.condon@exxonmobil.com</a></td>
</tr>
<tr>
<td>Betty Becker</td>
<td>Logistics</td>
<td>713-656-9338, <a href="mailto:betty.j.becker@exxonmobil.com">betty.j.becker@exxonmobil.com</a></td>
</tr>
<tr>
<td>Eduardo Naranjo</td>
<td>Sales</td>
<td>713-656-7143, <a href="mailto:eduardo.j.naranjo@exxonmobil.com">eduardo.j.naranjo@exxonmobil.com</a></td>
</tr>
<tr>
<td>Tim Khayyal</td>
<td>Sales</td>
<td>713-656-8840, <a href="mailto:tim.khayyal@exxonmobil.com">tim.khayyal@exxonmobil.com</a></td>
</tr>
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