Advanced Exploration Technology & Concepts: Key to Future Gulf of Mexico Deep Shelf Oil & Gas

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Gulf Slope Energy

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Shelf Miocene Sub-Salt Play Area
Exploring a Proven Petroleum System

400+ MMboe were discovered in the 1990s in the Shelf Miocene Sub-Salt play

<table>
<thead>
<tr>
<th>Field</th>
<th>Cumulative Production</th>
<th>Discover Year</th>
<th>Prod Year 1</th>
<th>Prod Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahogany</td>
<td>&gt;45 MMBoe</td>
<td>1993</td>
<td>1993</td>
<td>2000</td>
</tr>
<tr>
<td>Enchilada</td>
<td>&gt;30 MMBoe</td>
<td>1995</td>
<td>1995</td>
<td>1997</td>
</tr>
<tr>
<td>Tanzanite</td>
<td>&gt;20 MMBoe</td>
<td>1998</td>
<td>1998</td>
<td>1999</td>
</tr>
<tr>
<td>Tarantula</td>
<td>&gt;15 MMBoe</td>
<td>2001</td>
<td>2001</td>
<td>2004</td>
</tr>
</tbody>
</table>
Shelf Miocene Sub-Salt Target Section

Ultra-Deep Gas

Shelf Miocene

Deepwater Miocene & Lower Tertiary

North

Lafitte

North

Hickory

Mahogany

Shelf

Deepwater

South

Tahiti

Jack

South

Plio-Pleistocene Supra-Salt

Pl. Pleistocene

Shelf

Proven & Potential Section

Upper Miocene

Lafitte

Moore & Lefler 2014

Lower Tertiary

Salt

Upper Tertiary

Lower Miocene

Salt

Salt
The play was 1st produced in the 1990’s but older technology left potential giant fields behind.

**Evolution of the Shelf Miocene Sub-Salt Play**

- **Thick sand below salt discovered by accident**
  - SMI 200 well discovered 1000’ of thick reservoir sand below an unexpected salt sheet, in late 1985

- **Shift to Deepwater**
  - Seismic advances lead to massive discoveries in deepwater GoM, followed globally (Brazil, West Africa, East Africa, and others)
  - Extensive R&D spending on sub-salt imaging & drilling due to global “size of the prize”

- **GulfSlope Captures Leading Lease Position**
  - Industry applies RTM to Shelf Miocene Sub-Salt play
  - GulfSlope acquires a leading position in the Shelf Miocene Sub-Salt play

- **Mahogany discovered in 1993, with 400+ MMboe discovered in play by 2000**

- **Shelf Miocene Sub-Salt Exploration Limited by Seismic Clarity**
  - Early sub-salt seismic has difficulty with GoM shelf
  - Play limited by drilling depth capabilities

- **Seismic Advancements**
  - New Reverse Time Migration (RTM) more accurately images sub-salt
  - RTM and other technologies proven successful in sub-salt deepwater GoM, Brazil, West Africa, & East Africa

- **- 1990 - Shelf Miocene Sub-Salt Play 1st Developed**
- **- 2000 - Sub-Salt Seismic Successful in deepwater**
- **- 2010 - Deepwater Technology Re-applies to the Shelf**
Dynamic Salt & Sediment Model

Heaney 2014
Observed Trap Styles in Play Area Today
15+ Sequences - Lowstand Sand Potential

<table>
<thead>
<tr>
<th>Sequences</th>
<th>Primary Zones</th>
<th>Sub Epoch</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td></td>
<td>UPPER MIOCENE</td>
</tr>
<tr>
<td>M1A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td></td>
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<td>M3</td>
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<tr>
<td>M4</td>
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<tr>
<td>M5</td>
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<td>MIDDLE MIOCENE</td>
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<td>M6</td>
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<tr>
<td>M7</td>
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<tr>
<td>M8</td>
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<td>LOWER MIOCENE</td>
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<tr>
<td>M9</td>
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<td></td>
</tr>
<tr>
<td>M10</td>
<td></td>
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<tr>
<td>M11</td>
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Miocene Deltas Feed Salt-Supported Extended-Slope Creating Confined Mini-Basins

Moore 2014
Miocene Subsalt Pay Sands - Slope Fans + Basin Floor Fans

Shelf Miocene Producing Fields

Deepwater Miocene Producing Fields

UM  Upper Miocene
MM  Middle Miocene
LM  Lower Miocene

Moore 2014
Advanced Seismic Technology
Better Imaging at Lower Cost

- Technology Evolution
  - Seismic Processing
    - Faster, better and cheaper processing techniques
    - Advanced processing yields the most accurate view of subsalt prospects
  - Algorithm Evolution
    - 1990s: Kirchhoff
    - 2000s: WEM and Beam migration
    - Today: RTM

Subsalt Miocene Play discovered
Seismic Processing Improvements

Why this Opportunity Still Exists Today...

<table>
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<tr>
<th>Legacy: WEM Processing</th>
<th>Modern: RTM Reprocessed</th>
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</thead>
</table>

Previous generations of seismic sub-salt images were often unclear

Recent advances in seismic processing provide clearer images

Unclear interpretation of geology below salt

Additional salt body appears

Base of salt now clear

Potential targets now defined
Geophysical Advantage of Play

Advanced Seismic Technology now allows us to find Deepwater Size Prospects in Shallow Water
Geologic Advantages of Play

- High Porosity-Permeability Miocene Sand Reservoirs
- Slope Fans & Amalgamated Channels - Confined Mini-Basin Geometries
- 5 Key Fields - Conger, Mahogany, Hickory, Tanzanite, Enchilada
- Proven Petroleum System - High Volumes Liquid Oil and/or Condensate
- New & Advanced Seismic Processing Clarifies Sub-Salt Imaging

Economic Advantages of Play

- Moderate Drill Depths - 15,000’ - 25,000’ - Good pressure drives
- Mostly Jack-up Rig Access - $ 125-175K/day - $ 40-60 MM per wildcat
- Mostly Conventional Platforms - $40-75 MM per platform
- Existing Platform-Pipeline Infrastructure across area
Emerging Shelf Play = Shelf Miocene Sub-Salt Play

PIONEERING SUBSALT SHELF DISCOVERIES

Tarantula Development
Tanzanite Development
Hickory Development

Tanzanite Development
Tanzanite
Hickory

Gorilla Jack-Up
Mahogany Development
Mahogany

Mahogany Semi - Sub
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