Abstract

This presentation will review the history, current activities, and future opportunities for the oil industry in Mexico. Initial exploration by international companies was focused on the Misantla Basin of the middle Gulf of Mexico in Tamaulipas and Veracruz states and the initial salt diapir-associated discoveries in the Saline Basin of Veracruz state. The transition to Pemex operations after nationalization in 1938 and its exploration continued to focus on the Mesozoic reservoirs of the Gulf Coast. Pemex's exploration successes expanded to the Tertiary section in the 1950s and 1960s in the Saline Basin in Veracruz, the Macuspana Basin in Tabasco, and the Burgos Basin in Tamaulipas and Nuevo Leon. We will also look at the northern Mexico successes in the Mesozoic Sabinas Basin in Coahuila and Nuevo Leon during the 1960s and follow the southern region Mesozoic successes from the late 1950s and the rapid increase in discoveries in the early 1970s. The large number of exploration successes and major discoveries that followed the expansion of exploration into the shallow waters of the southern Gulf of Mexico in the mid-1970s will be addressed.

Current producing play types will be discussed and new discoveries will be referenced to the currently producing play types. Potential new areas and play types will be discussed.

References Cited


Guzman, A.E., 2013, Petroleum History of Mexico: How it Got to Where it is Today, Search and Discovery Article #10530 (2013).

Pemex Exploración y Producción, 1999, Hydrocarbon Reserves of Mexico, Volume I and Volume II.

Pemex Exploración y Producción, 2009, Hydrocarbon Reserves of Mexico.
Pemex Exploración y Producción, 2014, Oil and Gas Exploration and Production in Northern Mexico.
PremierOil, 2017, Zama Discovery Interim Update.
Sierra Oil & Gas, 2018, Mexico Super-Basins: Tampico-Misantla and Sureste.
Spectrum Geo Ltd., 2017, Recent survey illuminates possible postsalt Aeolian sandstone play fairway.
Mexico Productive Plays: Past, Present, and Future

Presenter: John Hattner
Outline

- History
- Producing Oil Plays by Basin
- Potential
Stratigraphic and Lithologic Column
Northern Region, Mexico
Mesozoic Carbonate Plays:
- Patch Reefs
- Fringe Reefs
- Debris Deposits
- Primary Porosity
Misantla Basin
Tampico-Misantla Basin

Hydrocarbon Reserves of Mexico, PEMEX, Exploración y Producción - 1999
Sedimentary Model: Upper Jurassic  Kimmeridgian
Veracruz Basin
Veracruz Basin
Figure 3. Structural cross section showing the inverse faulting patterns limiting Mata Pionche field.
Veracruz Basin

Mesozoic – Thrust Fault Structures
Tertiary – Stratigraphic Traps
Lankahuasa

Offshore Pliocene – Sandstone Play
Saline-Comalcalco Basin

Campeche-Sigsbee Salt Basin

Saline-Comalcalco Basin
Ogarrio Field - Seismic Section

Hydrocarbon Reserves of Mexico, PEMEX, Exploración y Producción - 1999

Salt
Burgos Basin

United States of America

Paleocene

Reynosa

Miocene

Oligocene

Eocene

Gulf of Mexico
Onshore Burgos Basin Cross Section
Monterrey Field - Structural Cross Section

Tertiary Sand Play – Growth Fault Structures and Stratigraphic Trap
Monterrey Field - Seismic Section
Macuspana Basin
Mascupana Basin
Chicontepec Basin
Chicontepec Basin
Figure 3. Cross section showing sandstones deposited under the regional Lower Eocene unconformity. Sandstones have a limited lateral continuity.
Chicontepec Seismic Line
Sabinas Basin

Merced
Monclova-Buena Suerte
Lampazos
Sabinas Basin
Monterrey

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors.
Sabinas Basin Dry Gas Fields

- A: Salt Detachment
- B: Basement Inverse Faulting
- C: Smooth Folding
- D: Domes and Salt Detachments

[Map of Sabinas Basin Dry Gas Fields with regions A, B, C, and D marked.]
Villahermosa Uplift - Onshore
## Stratigraphic Column
### Southern Region

<table>
<thead>
<tr>
<th>Era</th>
<th>System</th>
<th>Series and Stage</th>
<th>Symbol</th>
<th>Lithology</th>
<th>Major Reservoir</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENOZOIC</td>
<td>TERTIARY</td>
<td>QUATERNARY</td>
<td>Plio</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EOC</td>
<td>Pal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eocene</td>
<td>San</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paleocene</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MENDEZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KIS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KSAN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIDDLE</td>
<td>KM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOWER</td>
<td>KI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MENDEZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KIS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KSAN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIDDLE</td>
<td>KM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOWER</td>
<td>KI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>JURASSIC</td>
<td>Tithonian</td>
<td>JST</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KIMMERIDIAN</td>
<td>JSK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OXFORDIAN</td>
<td>JSO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**
- Purple: Dolomite
- Limestone/Breccia
- Yellow: Sandstone
- Green: Limestone
- Blue: Marl
- Brown: Anhydrite
- Pink: Salt

**Note:** The legend and specific lithology symbols are not fully detailed in the image.
Jujo-Tecominoacán Field - Structural Cross Section

Mesozoic - Inverse Fault Structures
Jujo-Tecominoacán Field - Seismic Section

Hydrocarbon Reserves of Mexico, PEMEX, Exploración y Producción - 1999
Villahermosa Uplift - Offshore
<table>
<thead>
<tr>
<th>Era</th>
<th>Series and Stage</th>
<th>Lithology</th>
<th>Major Reservoir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cenozoic</td>
<td>Quaternary</td>
<td>Pleistocene</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>Middle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Miocene</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pliocene</td>
<td>Pliocene</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>Middle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eocene</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>Middle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oligocene</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>Middle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paleocene</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>Middle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cretaceous</td>
<td>Upper</td>
<td>BTP-KS</td>
</tr>
<tr>
<td></td>
<td>(Turonian)</td>
<td></td>
<td>KS</td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>KM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>K1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jurassic</td>
<td>Tithonian</td>
<td>JST</td>
</tr>
<tr>
<td></td>
<td>Kimmeridgian</td>
<td>Jsk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oxfordian</td>
<td>Jso</td>
<td></td>
</tr>
</tbody>
</table>
Top Breccia Depth Structure
Cantarell Complex
Cantarell Complex - Structural Cross Section
Canterell – Sihil Seismic Section
Southern Region Basins

- Salina del Istmo Basin
- Cruz Basin
- Cateyaco Fold-belt
- Marbella Northern Fold-belt
- Los Pescadores Basin
- Zama Discovery (1+ BBL)
- Amoca and Mizton Discoveries
- Reforma-Akal Fold-belt
- Villanermosta Uplift
- Macuspana Basin
- Saline-Comalcalco Basin
- Chiapa-Tabasco Fold-trend
- Middle Cretaceous Carbonate Platform

Zama Discovery, Amoca and Mizton Discoveries

Contributors: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors.
Shallow Water Tectonic Setting – Cross Section

Comisión Nacional de Hidrocarburos.
Shallow Water Tectonic Setting – Cross Section

Selina Basin

Comalcalco Basin

Comisión Nacional de Hidrocarburos.
Shallow Water Tectonic Setting – Cross Section
Zama Discovery

Well was side-tracked to west and contingency 16" liner set above fault.

ST drilled ahead to 13 5/8" casing point.

Current hole depth 3381 m MD

Flat spot

PTD 4426 m MD

Zama Main

Zama Deep

2km

Salt

Seismic section (left) runs E-W through well

Good conformance of seismic amplitude with structure

2017, PremierOil
Saline Basin - Offshore

- Top Lower Eocene
- Top Paleocene (Middle Wilcox)
- Top Cretaceous
- Upper Jurassic / Lower Cretaceous
- Round 2 Block
- Round 1 Block
Deep Water
Deep Water Potential

Burgos Basin

Perdido Fold belt

Trion-1
TD 6119m

Maximino-1
TD 6943m

Supremus-1
TD 4029m

C. Crust
O. Crust
Tri-Jurassic
J-Cret
Salt
Paleocene
L. Eocene
U. Eocene
Oligocene
Miocene
Pli-Pleistocene

40 km
20 km
10 km
0 km

PEMEX, Exploración y Producción
Perdido Discoveries

- Trion
- Maximina
- Supremus
The Perdido Fold Belt

PEMEX, Exploración y Producción
Campeche-Sigsbee Salt Basin
Campeche Basin Potential
Extensional Raft Play

2017, Spectrum Geo Ltd.