Petroleum History of Mexico: How it Got to Where it is Today*

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Abstract

Mexico has five major hydrocarbons-producing provinces: two for oil, the Southeast and the Tampico–Misantla basins; and three for gas, the Sabinas, Burgos, and Veracruz basins. It has seven other provinces with potential: California, Gulf of Cortes, Chihuahua, Sierra Madre Oriental, Sierra de Chiapas, Progreso Shelf, and the Deep Gulf of Mexico. Nevertheless, despite this natural-rich endowment, Mexico is the only country in the world among those considered to be oil-rich that has consistently lost production and reserves in the last ten years.

Many reasons can be attributed for these results, and as this article proves, the least of them is the country`s endowment of oil and gas resources. The explanation can be found in the petroleum history of Mexico. Since 1938 the country has had only one oil company responsible for all of its upstream activities. Even though Pemex`s performance is comparable with that of most of the majors, it is impossible that all the remnant potential of the whole country can be found and produced through only one company, no matter how large, wealthy, efficient, technologically advanced, and successful it can be.

The understanding of the petroleum history of Mexico helps explain why the country is so unexplored and undeveloped. Significant historical aspects/features/events have been:

- the legal frame, that up to now has precluded third party-participation outside of Pemex`s in the exploration activities of Mexico;
- the discovery of the supergiant onshore Mesozoic Chiapas–Tabasco and offshore Gulf of Campeche provinces in the 1970`s, that took Pemex to concentrate all its resources in the development of the Southeast basin;
- the historically allocated Capex for E&P, that has been totally insufficient to allow a systematic exploration and development of the country`s potential; and
- the exploration activities that have focused mostly in low-risk, extension opportunities with little expenditures allocated to test rank wildcat ones.
The results of these policies are complete basins / provinces / plays with tremendous potential untested for all practical reasons. The history, as it is being written today, allows for optimism as the country is being opened-up for third-party participation in the upstream, which will allow for spectacular results.
The Petroleum History of México
How it Got to Where it is Today

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Cartagena de Indias, Colombia
Sept. 2013
The Petroleum History of México

• Some background
• Evolution of the E&P sector
• Today and the future
• Closing remarks
Some background: México`s oil and gas basins

- 6 producing basins
- 6 with potential.
- No oil or gas yet produced from the deep GoM
## Oil and Gas historically discovered in México

<table>
<thead>
<tr>
<th></th>
<th>OIL (bb)</th>
<th></th>
<th>GAS (tcf)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovered (OIP)</td>
<td>263.32</td>
<td>100%</td>
<td>279.47</td>
<td>100%</td>
</tr>
<tr>
<td>Produced</td>
<td>40.62</td>
<td>15.42%</td>
<td>71.59</td>
<td>25.61%</td>
</tr>
<tr>
<td>Reserves (3P)</td>
<td>30.82</td>
<td>11.70%</td>
<td>63.23</td>
<td>22.62%</td>
</tr>
<tr>
<td>Remnant</td>
<td>191.88</td>
<td>72.87%</td>
<td>144.65</td>
<td>51.77%</td>
</tr>
</tbody>
</table>

Source: National Hydrocarbon Commission
The Syndrome of the "Bitten Apple"
First Commercial Oil, April 1904
Ébano – Pánuco Province, Tampico Basin
Northern Golden Lane, 1908

At the time this model was not understood

Northern Golden Lane prodn.

Ébano Panuco production

San Diego de la Mar-3

Pozos Cerro Azul – 4
260 MBOD
## Northern Golden Lane, 1908

<table>
<thead>
<tr>
<th>Pozo</th>
<th>Año</th>
<th>BOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerro Azul-4</td>
<td>1916</td>
<td>260,000</td>
</tr>
<tr>
<td>Potrero del Llano-4</td>
<td>1910</td>
<td>115,000</td>
</tr>
<tr>
<td>San Diego de la Mar-3</td>
<td>1908</td>
<td>80,000</td>
</tr>
<tr>
<td>Juan Casiano-7</td>
<td>1910</td>
<td>72,000</td>
</tr>
<tr>
<td>Álamo-2</td>
<td>1920</td>
<td>45,000</td>
</tr>
</tbody>
</table>

The San Diego de la Mar N°3 well blew up and flowed through two branches creating a crater half a km in diameter.

San Diego de la Mar-3 (Dos Bocas)
Poza Rica Field, 1930

One of the largest stratigraphic traps in the world in carbonate rocks

Poza Rica

Production history

Source Pemex

Poza Rica-2 discovery well

México’s production depended on the Poza Rica field for 30 years
The 1950’s through the 1970’s

Important fields were discovered in the Upper Jurassic and Middle Cretaceous of the Tampico - Misantla Basin and the Tertiary of the Sureste Basin

Js. Arenque
Js. Tamaulipas
Js. San Andrés
K. Faja de Oro North
K. Faja de Oro South

Source Pemex
In 1972 the Mesozoic carbonates underlying the Tertiary siliciclastics were reached discovering the giant accumulations of the Chiapas-Tabasco province and in 1976 the mega-offshore Campeche province was proven successfully.
What the discoveries in the Mesozoic meant

Reserves increased more than 65 BBO and production more than 2 MMBOD in less than 10 years.
The exploratory drilling reflects the investment.

4844 exploratory wells 1938 - 2009

Source: National Hydrocarbon Commission
There was also a drop in the activity in part due to the high productivity of the Mesozoic wells.
The History After the Big Discoveries

Source: National Hydrocarbon Commission
The future is dependent on the approval of a proposed Energy Reform Bill by the Mexican Congress.

México’s strategy is based on:

- Deep water exploration (and development)
- Chicontepec development
- Unconventionals (Shale gas and (tight) oil)
- Optimization of mature fields
- Exploration of traditional areas
Deep Waters

Half a million km², Pemex calculates a potential of 30 BBOE

Source: Pemex
The Perdido Fold Belt

Trion – 1, best discovery in Mexican side of the deep GoM
Unconventionals, Shale gas and oil

The EIA considers the potential for shale gas in México to be 545 TCF and the shale oil to be in the order of 13 BBO

Main plays:

• The Eagle Ford, continues extensively in México with same characteristics it has in South Texas
• The Paleozoic of Northern México
• The Upper Jurassic of the Gulf Coast

Source Pemex
Chicontepec Paleocanyon

It holds 38% of all the reserves of México. Its development requires unconventional technologies as it is mostly tight oil.

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<tr>
<th></th>
<th>OOIP:</th>
<th>OGIP:</th>
</tr>
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<tr>
<td>3P Reserves:</td>
<td>10,715 MMB</td>
<td>(13%)</td>
</tr>
<tr>
<td></td>
<td>27,636 MMMCF</td>
<td>(70%)</td>
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</table>

Cum production:

<table>
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<tr>
<th></th>
<th>MMBO</th>
<th>BCF</th>
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<tbody>
<tr>
<td></td>
<td>230</td>
<td>424</td>
</tr>
</tbody>
</table>

(0.2%) (1.0%)

Source: Pemex
The History of Dry Gas
The Dry Gas Basins that have been discovered in México are:

Burgos (1945) and Sabinas (1976) basins

Veracruz Basin, 1953
The History of Dry Gas
The two other Dry Gas Basins are:

Macuspana, Sureste Basin, 1905

Offshore Veracruz Basin, Lankahuasia field, 2002

Source Pemex
The Future

Pemex expects to bring production to 3 MMBOD, but the output will depend on the legal reform presented to Congress.

Source: Pemex
Closing Remarks

- Mexico has a very rich history regarding the search and extraction of its oil and gas.
- The volumes produced compared to those found are not what they should be.
- This is in part the result of what has been called the "Bitten Apple" syndrome.
- But also because insufficient participation of third parties which has limited the country's potential.
- There is a huge number of opportunities for the E&P for oil and gas.
- For these to be made real, a legal reform was presented to the Mexican Congress.
- México has enough oil and gas to write another 100 years of history.
Thank you!