Mexico Refined Product Imports and Infrastructure

November 10, 2016

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Baker & O’Brien: Independent Energy Consultants

Overview
- Independently owned and managed
- Technical and commercial expertise
- Active over full life cycle of assets: new project development -> business support -> commercial disputes

Consulting Staff
- Chemical, Mechanical, and Electrical Engineers
- Consultants average over 25 years industry experience
- Experienced problem solvers

This material is for information only and carries no expressed or implied warranty
• Gasoline: U.S. versus Mexico
  – Blending similarities and differences
  – Impact of sulfur regulation
  – Impact of RINS

• Refined Products Logistics /Transportation to Mexico

• Capabilities for Waterborne Deliveries

• Proposed Pipelines

• Summary
Fuel Exports to Mexico

- **Common Gasoline and Diesel Exporters to Mexico Include:**
  - Valero
  - Marathon
  - Shell-Pemex Deer Park
  - Western (El Paso)
  - CITGO
  - Flint Hills Refining
  - Exxon Mobil

- **MTBE Exporters Include:**
  - TPC
  - Lyondell
  - Enterprise
Gasoline Exports to Mexico

Rising Export Volumes

Total Finished Gasoline Plus Components
Volume BPD

http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n>PET&s=MGFEXMX1&f=M
Source: U.S. Energy Information Administration
### Similarities and Differences Between Mexico and U.S. Gasoline Qualities

<table>
<thead>
<tr>
<th></th>
<th>Southern United States</th>
<th>Mexico</th>
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</thead>
<tbody>
<tr>
<td>Seasonal RVP Specs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Max Winter RVP PSI</td>
<td>13.5</td>
<td>11.5</td>
</tr>
<tr>
<td>Regular Octane (R+M/2)</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Premium Octane (R+M/2)</td>
<td>93</td>
<td>92</td>
</tr>
<tr>
<td>Renewables Required</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>MTBE Blended</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfur, Per Gallon Max - PPM</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Sulfur, Average Max</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Aromatics, Vol % Max</td>
<td>50</td>
<td>25-35</td>
</tr>
<tr>
<td>Endpoint, Deg F</td>
<td>437</td>
<td>437</td>
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</table>
• Tier 2 currently limits gasoline sulfur to no more than 30 ppm sulfur on an annual average
• Tier 3 is identical but with no more than 10 ppm sulfur
  – Annual average, beginning Jan 1, 2017, per gallon cap of 80 ppm
• Applies to United States and territories, excluding California
  – Refiners and importers
• Includes Average, Banking, and Trading (ABT)
  – Volumes produced prior to 2017 that are below 30 ppm generate credits (five year lives) that are valid until Dec 31, 2019
• Three year delay for small refiners until 2020 (<155,000 bpcd company / 75,000 bpcd single refinery crude charge in 2012)

Note: Federal Register, April 28, 2014
• No public/exchange sulfur credit trading yet

• Assuming sulfur credits priced at $400 / million ppm sulfur gallons:
  – At 25 ppm average and 50,000 BPD gasoline production
  – Difference of 15 ppm to Tier 3 spec of 10 ppm
  – 15 ppm x $400 x 50,000 BPD x 42 / 1 million = $12,600 /day
  – Approximately $0.25/bbl or 0.6 cents / gallon

• For More Information See Baker & O’Brien’s RBN Energy Article on Tier 3
• RINS are traded in Cents per ethanol gallon blended
• A RINS price of 70 cents/gallon in a 10% blend would roughly equal a cost of 7 cents/gallon of finished gasoline

Source: Argus, Baker & O’Brien analysis
Summary of Gasoline Exports to Mexico

Advantages
• Octane
• RVP
• Sulfur
• RINS

Disadvantages
• Aromatics / Olefins
• Scheduling Challenges
• Segregated Tanks Required
• Multiple Products
Refiners Requirements for Export to Mexico

- Relationship with PMI (Pemex)
- Deepwater Port
- Dedicated Tanks
- Flexible Shipping Schedule
- Multiple Products Lifted (250-300 mbbls)
  - Gasoline
  - Alkylate
  - ULSD
- Accounting for Exports
  - Customs Paperwork
  - Possible Foreign Trade Zone Accounting
Options for New Entrants to Export to Mexico

- Sell Partial Volumes to Traders
- Sell Components to Traders
- Contract Tanks at Trans-Shipement Facility
  - Houston Ship Channel Options
  - Mississippi River Options
  - Offshore Options
- Possible Complications if MTBE is Needed
Mexico Population Density as Demand Drivers

Source: http://www.sawyoo.com/post_mexican-population-map_426433/
PMI Mexico’s Maritime Operations

Maritime Operations
(# vessels)

- Import
- Export
- Import/Export

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tr>
<td></td>
<td>1,608</td>
<td>1,711</td>
<td>1,858</td>
<td>1,641</td>
<td>1,335</td>
<td>1,569</td>
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</tbody>
</table>

Locations:
- Rosarito
- Guaymas
- Topolobampo
- San Carlos
- Mazatlán
- Cd. Madero
- Altamira
- Tuxpan
- Manzanillo
- L. Cárdenas
- Veracruz
- Lerma
- L. Pajaritos
- Salina Cruz
- Progreso
Refined Products Shipments to Mexico

Traditional Routes
Refined Products Shipments to Mexico

Possible Reform Destinations
Ship unloading at Tuxpan

Source: Google Earth
Port of Veracruz
Pemex Currently Owns almost all the Products Infrastructure in Mexico

Pemex Infrastructure

Production Facilities
- 6 refineries
- 8 petrochemical centers
- 11 gas processing centers

Storage and Transportation Capabilities
- 21 tankers
- ~13.5 MMb of refined products storage capacity
- 14+ thousand km of products pipelines
- 12+ thousand km of natural gas pipelines

Only the Natural Gas and LPG were open under regulation before the Energy Reform.
Proposed Refined Products Pipelines in Mexico

Main Projects under Development

**North System:**
- 300 MMUSD
- 80 km of pipelines
- 105 TB of storage capacity

**Golfo-Centro System:**
- 770 MMUSD
- 318 km of pipelines
- 1,045 TB of storage capacity
- Increase maritime port capacity

**Transoceanic System:**
- 1,700 MMUSD
- 594 km of pipelines
- 500 TB of storage capacity
- Increase maritime port capacity

**Peninsular System:**
- 350 MMUSD
- 329 km of pipelines
- 350 TB of storage capacity
- Increase of maritime port capacity
What about Pipelines to Mexico?

• Existing Cross Border Pipelines
  – El Paso
  – Laredo
  – Brownsville

• Two New Competing Pipelines
  – Howard Energy Partners
  – Magellan / TransMontaigne
Existing Refined Products Pipelines

- El Paso
- Laredo
- Corpus Christi
- Brownsville
- Three Rivers
- Montery
- Cadereyta Refinery
Proposed Pipelines

- Proposed 16" Pipeline
  - Magellan/TransMontaigne

- Proposed 12" Pipeline
  - Dos Aquilas

- Continuous Barge Movements

Locations:
- Laredo
- Corpus Christi
- Brownsville
- Cadereyta Refinery
- Monterrey
Dos Aguilas Pipeline

Project Overview

- **Length**: 287 miles in total, 151 miles in the US, 136 miles in Mexico
- **Pipeline size**: ≥12” diameter
- **Transportation Capacity**: 72,000 bpd, expandable to 90,000 bpd
- **Receipt Points**: Corpus Christi and USGC refineries
- **Delivery Points**: Laredo, Nuevo Laredo, Monterrey
- **Transit Time**: ~36 hours to Laredo, ~60 hours to Monterrey
- **Products**: Gasoline, ULSD, Jet fuel
- **Terminals**: Four terminals
- **Storage Capacity**: 1.2 MMbbls

*Linking refineries in the USGC directly with markets in Northern Mexico*
• Mexico imports of petroleum products increasing
  – Economic and population growth
  – Lack of refinery maintenance / spending

• Significant discounts for U.S. gasoline exports due to regulatory constraints

• Increased waterborne supplies require special capabilities

• Growth in cross border imports via existing pipes and trucks

• A major pipeline from Corpus Christi into Mexico would be a game changer