Chevron Pacific Rim Operations and History

1879 – 2014
The First 135 Years
Discussion Topics

1) Chevron Info and Brief History
2) Crude Oil Production ‘Gamechangers’
3) Tight Oil Developments
4) Q & A
Chevron Overview

61,000 employees

2nd largest US energy company

$33 billion investment budget 2014

Fully integrated oil company:

✓ Upstream
✓ Downstream
✓ Chemicals, Lubes
✓ Research & Development
✓ Business Development

© 2014 Chevron
First Standard Oil of California ‘Family refineries’

Newhall 1875
(north of Los Angeles)

Pacific Coast 1880
Alameda
(near Oakland)
Chevron Pacific Rim Refining 2014

- Vancouver 55 mbd
- Richmond, CA 240 mbd
- El Segundo, CA 260 mbd
- Salt Lake City 55 mbd
- Hawaii 54 mbd
- Korea JV 50% of 700 mbd
- Singapore JV 50% of 290 mbd
- Australia 50% of 100 mbd
- Thailand 64% of 160 mbd
San Joaquin Valley Business Unit 2014
Core Areas of Operation, 180 mbd OEG

Portion of California shown in this satellite image.

**A** Coalinga *est.*1887

**B** Midway Sunset *est.*1894

**C** Kern River *est.*1899

**D** Cymric *est.*1909

**E** Lost Hills *est.*1910

**F** Elk Hills *est.*1911
  Non-Operated

**G** San Ardo *est.*1947

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Athabasca Oil Sands Plant Expansion:

255 MBD Upgrader

Converts 8 API bitumen to 34 API syncrude

CVX 20% JV

Shell 60%

Marathon 20%
Chevron Historic Milestones

1879
Pacific Coast Oil Company established and purchases CA Star Oil Works

1900
Pacific Coast Oil purchased by Standard Oil, but remains separate operation until 1906.

1911
Dissolution of Standard Oil Trust makes Standard Oil of California (SoCal) independent

1926
SoCal merges with Pacific Oil Company

1932
Bahrain Petroleum [SoCal] strikes oil in Bahrain

1933
SoCal wins Saudi Arabia concession; SoCal establishes California-Arabia Standard Oil Company, Casoc, to hold concession for Saudi Arabia

1933
SoCal discovers oil in Saudi Arabia [first to develop commercially 1938]

1936
Texaco joins with SoCal to found the Arab-American Oil Company [Aramco]
California-Texas company, **Caltex**, founded as a joint venture between SoCal and Texaco as outlet for future oil production in Bahrain and Saudi Arabia

**1961**
SoCal buys Standard Oil of Kentucky

**1984**
SoCal buys Gulf; after restructuring changes name to Chevron

**1993**
Chevron forms Tengezchevroil JV with the Republic of Kazakhstan

**2001**
Chevron buys Texaco and changes name to ChevronTexaco

**2004**
Buys Unocal and changes name to Chevron
SoCal Aviation fuel powered Charles Lindbergh
Historic first transatlantic flight in May 1927
As engine technology improved and different engines required specific lubrication needs, the family of Delo motor oils expanded. Just prior to World War II, U.S. submarines were operating on straight mineral oil, meaning their engines occasionally had to be overhauled at sea, even on short trips. In 1941, the company developed compounded diesel engine oil, RPM Delo Special Motor Oil, with extended drain capabilities, enabling U.S. submarines to extend overhauls and triple cruising range. Also in 1941, Diesel Engine Lubricating Oil (DELO) became a registered trademark.
Crude Oil Production Gamechangers

- Pico Canyon North Los Angeles 1876
- Spindletop Texas 1901
- Saudi Arabia Dammam #7 1938
- Alaska North Slope 1978
- US Tight Oil 2010+
First Commercial Well in the West
Pico Canyon – California Star Oil – 1876
Pico Canyon #4

- From a depth of 300 feet, this 4th well averaged 30 bpd
- Using one of California's first steam-powered oil rigs, Mentry's crew went deeper
- On Sept. 26, 1876, at 600 ft, a mighty geyser shot through the casing, producing 50 bpd
- It was also the longest-running oil well in the world when it was finally capped in 1990
- Pico#4 produced 1,500,000 barrels
Anthony F. Lucas discovered the first major gusher in Texas, *The Lucas gusher* at Spindletop near Beaumont, Tx.

Lucas was a Croatian born mining engineer who completed his studies at the Polytechnic institute in Graz, Austria.

Started drilling at Spindletop in November 1900

Exhausted after 2 months of strenuous drilling, the crew shut down for a week over Christmas, having reached a depth of 880 feet.

http://www.priweb.org/ed/pgws/history/spindletop/spindletop2.html
Lucas Well #1  1900-1901
Spindletop Gamechanger

January 1901 – within a week drilled down to a depth of 1,020 feet.

On January 10th:

✓ crew pulled the drill out to change bits
✓ lowered drill bit back to 700 feet
✓ without drilling further, mud started bubbling back up the hole
✓ seconds later, the drill pipe shot out of the ground with great force
✓ then…nothing happened for ~10 minutes

Then, all of a sudden, a noise like a cannon shot came from the hole, and mud came shooting out of the ground like a rocket. Within a few seconds, natural gas, then oil followed. The oil "gusher" rose to 150 feet – double the size of the drilling derrick. This was more oil than had ever been seen anywhere in the entire world.

Lucas had been hopeful that this well might produce 5 bpd.

Lucas #1, flowed at an initial rate of nearly 100,000 bpd -- more than all of the other producing wells in the United States COMBINED!

http://www.priweb.org/ed/pgws/history/spindletop/spindletop2.html
Spindletop Texas 1901

✓ About 50,000 people came to see it. This resulted in a huge land rush and immense escalation of property values and a huge migration of people to the area.

✓ Within a year, as many as 285 wells were operating on Spindletop Hill and over 600 oil companies had been chartered.

✓ The population of Spindletop area sprang from 8,000 to 60,000!

✓ Anthony Lucas enabled the United States to surpass Russia as the world's leading oil producer.

✓ With the Lucas gusher, a black-gold rush began, and fortune-seekers from all over the world poured into Texas.

✓ Over time, Houston became a center of the oil industry

http://en.wikipedia.org/wiki/Anthony_Francis_Lucas
http://www.priweb.org/ed/pgws/history/spindletop/spindletop2.html
The discovery of the Spindletop oilfield had an almost incalculable effect on world history, as well as Texas history.

Eager to find similar deposits, investors spent billions of dollars throughout the Lone Star state in search of oil and natural gas.

By 1902 there were more than 500 Texas corporations doing business in Beaumont. Many of the major oil companies were born at Spindletop including: The Texas Company (Texaco), Gulf Oil, Sun Oil Company, and Humble (later Exxon).
Camp at Dhahran 1939
Max Steineke was a famous American geologist, and later Aramco Chief Geologist who is referred to as the discoverer of oil in Saudi Arabia under SoCal contracts with the Saudi government in the 1930's.

He graduated from Stanford University in 1921 with an AB degree in geology.
An exploration team set off in 1935 in search of oil in Saudi Arabia. After several wells and 2 years, there was no commercial discovery; this was in the 1929+ Great Depression era.

**Within the board of SoCal, there was great debate:**

- those who wanted to continue
- those who didn’t

**Then Dammam No. 7 came in March 1938**

- If it hadn’t, it’s quite likely that SoCal would have left
- No. 7 produced >3000 BPD and was the first commercial Saudi well
- The camp was established at Dhahran which became Aramco HQ.

Incredible to think that Steineke sat on Bahrain and looked toward Dammam and decided to drill on a jebel [anticline] there. Look how small that oilfield is compared to many others…

Steineke was also responsible for finding Ghawar
Native Iñupiats used oil-saturated peat for fuel, heat and light for thousands of years.

1836
First geologist confirmation of potential oil near Barrow.

1923/1946
US Navy began exploration in Alaska to secure stable US oil supply sites discovered were too costly to develop with current technology.

1957
First commercial well in South/Central Alaska but challenged by harsh climate and remoteness.

1968
Prudhoe Bay discovery and first wells developed; ~1200 bpd flow each
- Reserves est. 25 billion bbls
- #1 field in N. America; #18 globally
- ARCO and Humble Oil discovery

1977
Trans Alaskan Pipeline completed
- 3 year build; cost of 8 B$
- 48” diameter, 800 miles long
- Peak flow 2000 mbd in 1988

http://en.wikipedia.org/wiki/Prudhoe_Bay_Oil_Field
http://en.wikipedia.org/wiki/Trans-Alaska_Pipeline_System

Map of Northern Alaska, Prudhoe Bay is in center

Horizontal Drilling
Game Changer #5

Another American innovation that has changed the world forever

Harold Hamm
CEO Continental Resources

Per Harold Hamm CEO Continental Resources: Fracking technology has been in use for more than 60 years. **What is new is horizontal drilling.**

No. of Horizontal drilling rigs in the U.S.:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>2014</td>
<td>&gt; 1,200</td>
</tr>
</tbody>
</table>

Horizontal drilling wouldn't be viable without being combined with hydraulic fracturing. However, when done in combination, the results are absolutely game-changing.

Per **Pioneer Natural Resources** CEO Scott Sheffield on working the Permian:

Now 'in six months, a horizontal well produced 140,000 barrels of oil equivalent’ vs a 'conventional vertical well takes 30 to 35 years to produce 140,000 bbl OE’

Also keep in mind: this isn't just pulling production forward, but **it's accessing oil and gas that would never have been recoverable before.**

US Tight Oil is reversing a 40 year decline trend
U.S. Crude Import Sources
Million Barrels per Day

- **Other OPEC**
- **Angola**
- **Nigeria**
- **Iraq**
- **Venezuela**
- **Saudi Arabia**
- **Other Non-OPEC**
- **Mexico**
- **Canada**

**2008**

- 9.8

**2014**

- 7.4

- ▼ 54%
- ▼ 51%
- ▼ 32%
- ▲ 40%

**Source:** EIA (as of May 2014).

- **U.S. crude oil production growth facilitated a 25% reduction in crude imports from 2008 to 2014.**
- **OPEC, particularly West Africa light crudes, accounts for ~90% of decline.**
U.S. Refining System Configured for Heavy Crudes
Million Barrels Per Day

Regional Refining Capacity

- **U.S.**
  - Cracking: 17.9
  - Coking: 11.0
  - Other: 6.0
- **Europe**
  - Cracking: 15.7
  - Coking: 4.4
  - Other: 0
- **China**
  - Cracking: 11.0
  - Coking: 4.4
  - Other: 0
- **Russia**
  - Cracking: 6.0
  - Coking: 0
  - Other: 0
- **India**
  - Cracking: 4.4
  - Coking: 0
  - Other: 0

**Source:** IHS

- **U.S. has the largest refining distillation capacity at 18 mmbd**
  - U.S. system is most complex, reflecting heavy investment in “coking” refineries to process heavy crudes
  - $100 billion spent over past 20+ years in Gulf Coast and Midwest to process heavy crudes
U.S. Refining System Configured for Heavy Crudes
Million Barrels Per Day

The main problem with light tight oil is the mismatch with the US refining system. US has been built or rebuilt for medium and heavy sour crude; not 40-60 API crude oil.

Regional Refining Capacity

<table>
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<tr>
<th>Region</th>
<th>Cracking</th>
<th>Coking</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>10.9</td>
<td>4.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Europe</td>
<td>4.0</td>
<td>3.6</td>
<td>8.1</td>
</tr>
<tr>
<td>China</td>
<td>0.5</td>
<td>8.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Russia</td>
<td>0.5</td>
<td>5.5</td>
<td>0.0</td>
</tr>
<tr>
<td>India</td>
<td>0.5</td>
<td>5.5</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: IHS
Tight oil production at 40-60 API is growing to 4+ mmbd

Canadian Dilbit has 30% light crude in the blend and production is growing to 2000+ mbd

Refiners get full of light when running a tight oil and or Cdn Dilbit

US bans crude exports 1975 -- after Arab crude embargo

- If its topped or stabilized crude or condensate, then it becomes an exportable oil

- Politics brewing:
  - Keep the crude export ban
  - End the export ban

Where this goes next is hard to predict

What is the next ‘gamechanger’?
Questions?