

PAPA Bus Tour

History and Production of Asphalt

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August 3, 2016



History of Asphalt

- Asphalt used as early as 6,000 B.C.
 - Sumeria ship building
 - Tower of Babel
- 3,000 B.C. - 476 Persians build roads
- 1802 Asphalt used on bridge decks, walks in France
- 1870 First asphalt road in Newark, NJ
- 1876 Pennsylvania Ave, Washington D.C.
- 1900 Asphalt refined from crude oil

Origins of Asphalt

- Naturally Occurring
 - Rock Asphalt
 - Lake Asphalt
 - Oil Sands
- Refined
 - Crude Oil

Lake Asphalt Mining

from Paving the Way: Asphalt in America; Dan McNichol 2005



Oil Sands

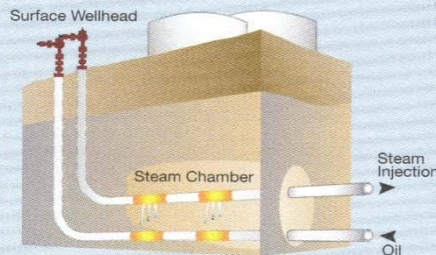


The Canadian Press May 2, 2016

Recovering the oil

Oil sands are recovered using two main methods: mining and drilling (in situ). The method used depends on how deep the reserves are deposited.

Steam Assisted Gravity Drainage drilling (in situ) method

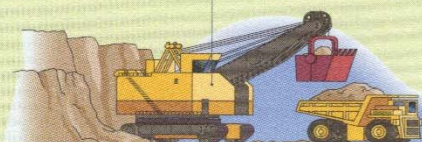


20% mined

20% of the oil sands reserves are close enough to the surface to be mined using large shovels and trucks.

Mining shovels dig into sand and load it into trucks.

Trucks take oil sands to crushers, where it is prepared for extraction.



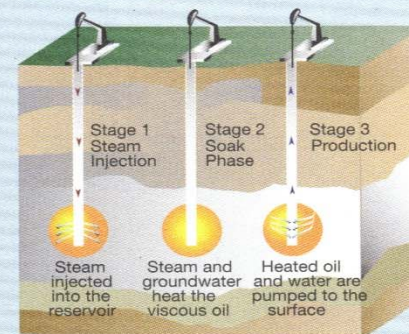
Mining method



80% drilling (in situ)

80% of oil sands reserves are too deep to be mined so are recovered in place, or in situ, by drilling wells. Drilling (in situ) methods create minimal land disturbance and do not require tailings ponds.

Advanced technology is used to inject steam, combustion or other sources of heat into the reservoir to warm the bitumen so it can be pumped to the surface through recovery wells.



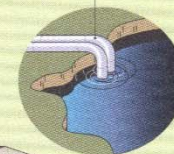
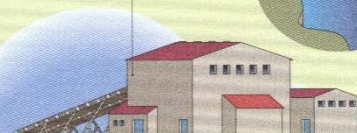
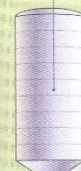
Cyclic Steam Stimulation drilling (in situ) method

Oil sands that lie more than 70 metres (200 feet) below the ground are recovered using drilling methods.

Hot water is added to the oil sands and then transported via hydrotransport to the extraction plant.

Bitumen is extracted from the oil sands in the separation vessels.

The tailings are pumped to the settling basin, where the water is recycled and reused in the process.



Crude Oil

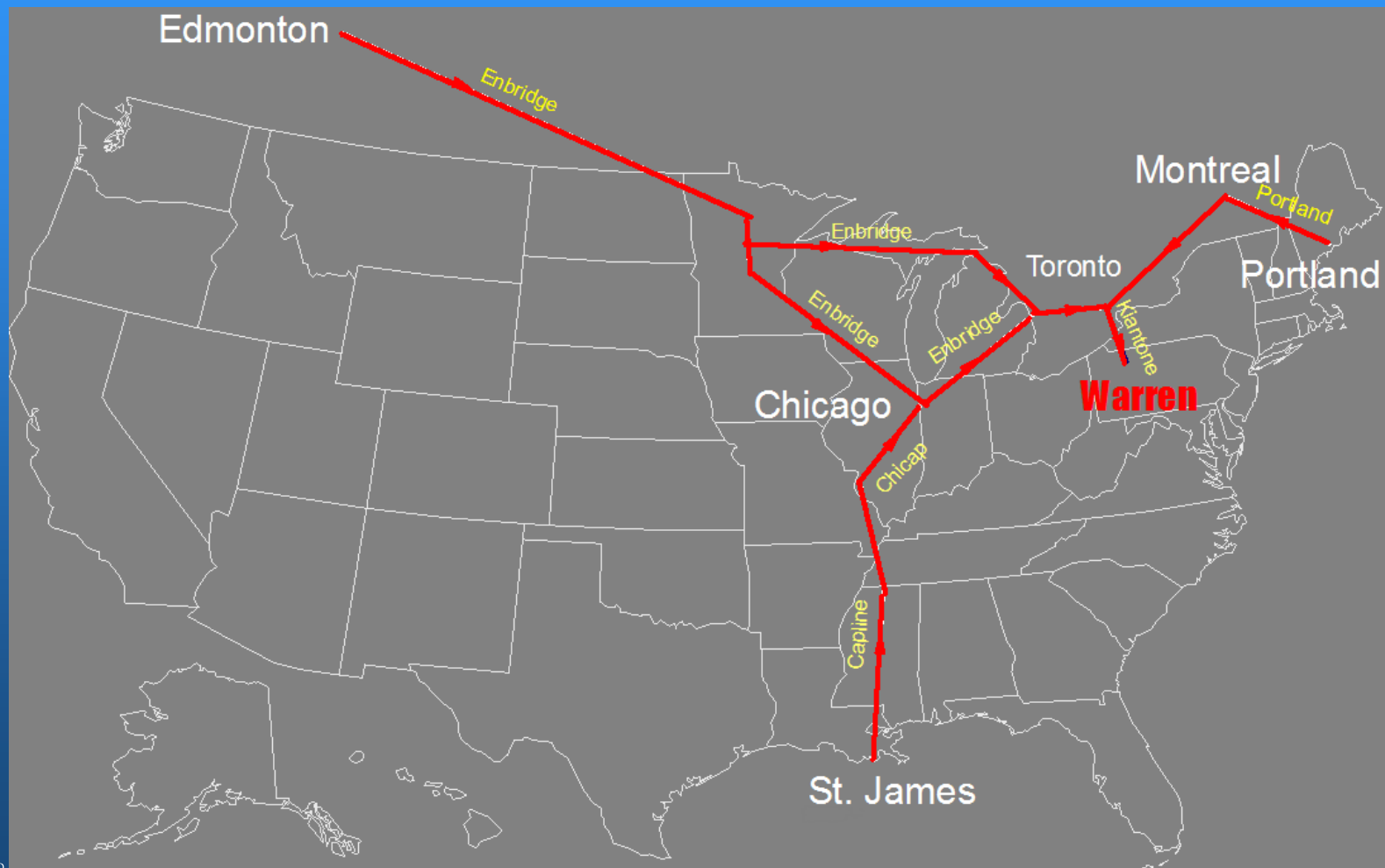
- Light Crude
 - Bakken, Utica, Marcellus
 - WTI, Canadian Sweet, LLS, Brent
 - Synthetic
- Heavy Crude
 - Bow River, Cold Lake, WCS, Lloyd
 - Mayan, Boscan

North American Crude Oil Transport

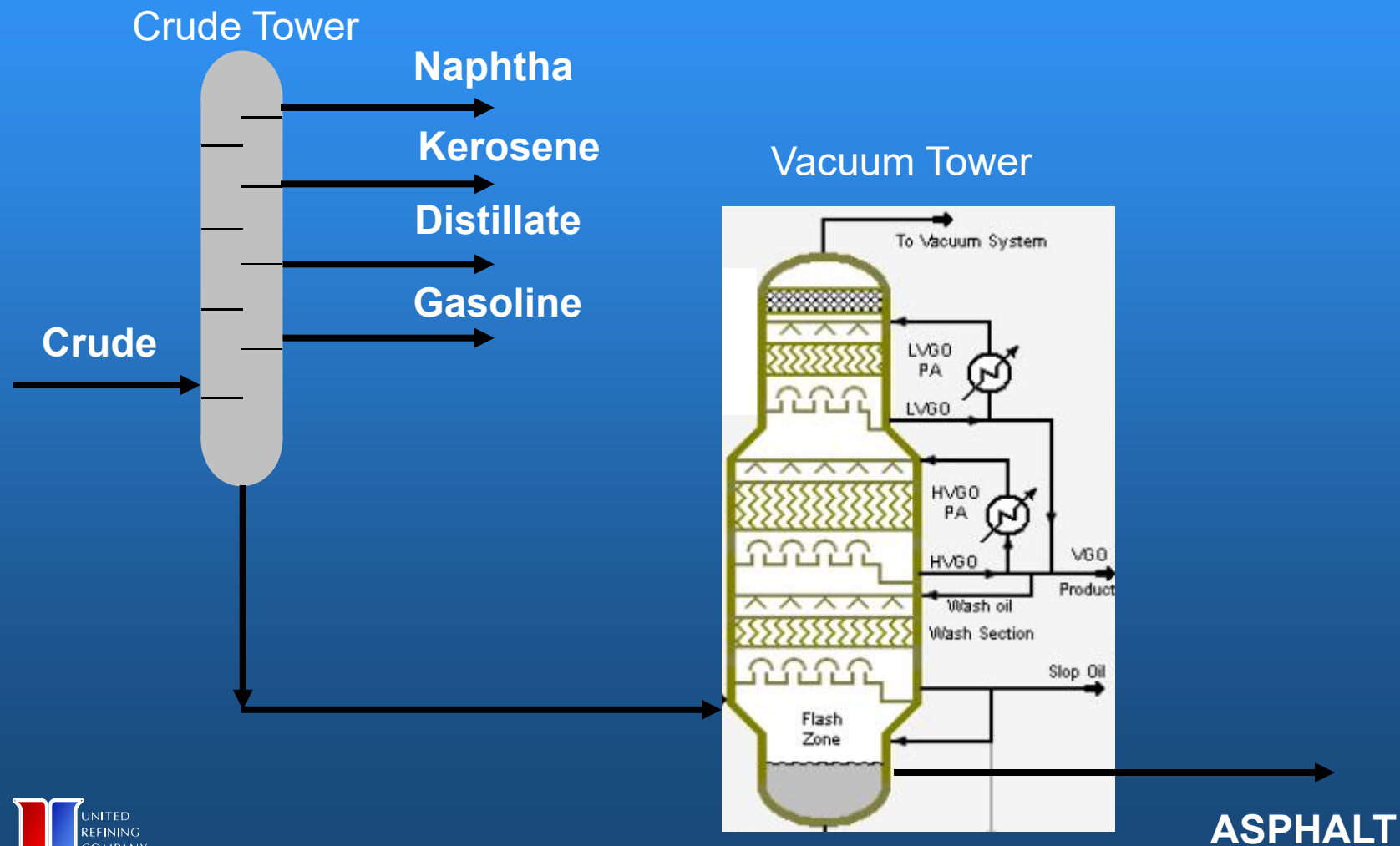
- Pipeline
- Rail
- Barge



North American Crude Oil Pipelines



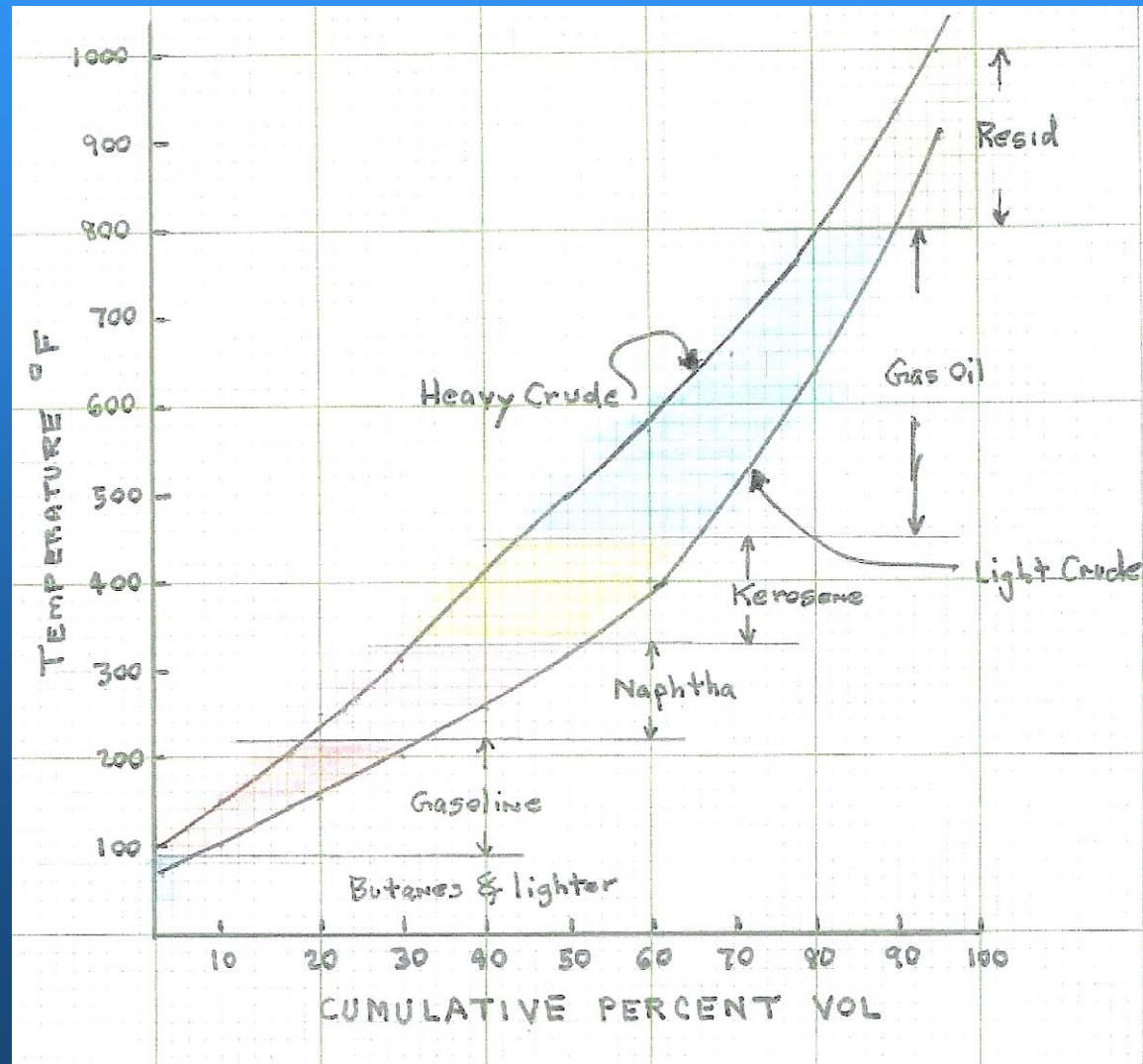
Refinery Process Schematic



Refinery Process Units



Distillation Curve



Asphalt Modifiers

- Shingles
- RAP
- Rubber
- Recycled Oils
- Acids

Questions?

