

California Transportation Fuel Overview & Crude Oil Trends

Hazardous Materials Commission Retreat

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California Energy Commission



Transportation Fuel Infrastructure Overview




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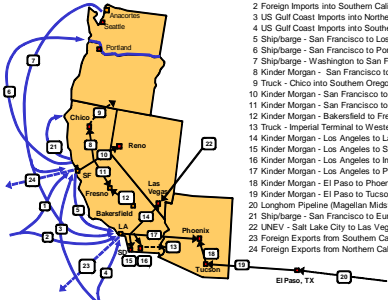
Fuel Infrastructure – Key Elements

- The California transportation fuel “infrastructure” consists of several **interconnected** assets operated by a combination of refiner and third-party companies
 - Refineries
 - Pipelines
 - Marine terminals
 - Storage tanks
 - Rail
- Crude oil and petroleum product infrastructure assets are separate and distinct from one another – not interchangeable
- Unlike with the electricity distribution system, Northern California is not directly connected to Southern California

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Western States – Fuel Flows



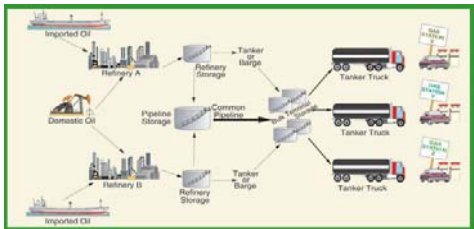
- Foreign Imports into Northern California
- Foreign Imports into Southern California
- US Gulf Coast Imports into Northern California
- US Gulf Coast Imports into Southern California
- Ship/Barge - San Francisco to Los Angeles
- Ship/Barge - San Francisco to Portland
- Ship/Barge - Washington to San Francisco and Los Angeles
- Kinder Morgan - San Francisco to Chico
- Truck - Chico into Southern Oregon
- Kinder Morgan - San Francisco to Reno
- Kinder Morgan - San Francisco to Fresno
- Kinder Morgan - Bakersfield to Fresno
- Truck - Imperial Terminal to Western Arizona
- Kinder Morgan - Los Angeles to Las Vegas
- Kinder Morgan - Los Angeles to San Diego
- Kinder Morgan - Los Angeles to Imperial
- Kinder Morgan - Los Angeles to Phoenix
- Kinder Morgan - El Paso to Phoenix
- Kinder Morgan - El Paso to Tucson
- Longhorn Pipeline (Magellan Midstream Partners, L.P.)
- Ship/Barge - San Francisco to Eureka
- LINEV - Salt Lake City to Las Vegas
- Foreign Exports from Southern California
- Foreign Exports from Northern California

Source: Stillwater Associates.

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Transportation Fuel Infrastructure




Source: Energy Information Administration

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Key Elements - Refineries

- 3 primary refinery locations
- 13 refineries produce transportation fuels that meet California standards
- 8 smaller refineries produce asphalt and other petroleum products
- California refineries provide majority of transportation fuel to neighboring states
- Process over 1.6 million barrels per day of crude oil



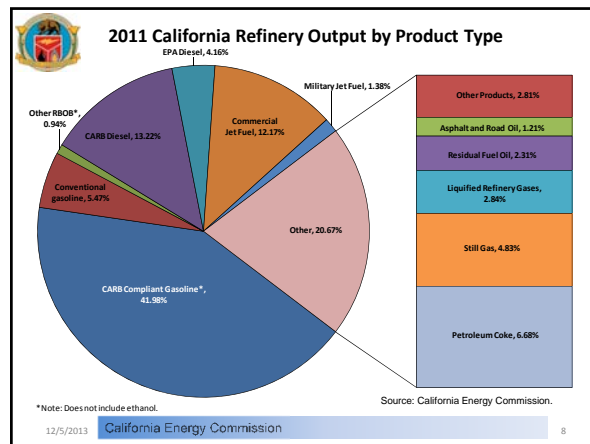
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Key Elements - Refineries




- Refineries are a primary hub of logistical activity
 - Raw materials imported & finished products shipped
- Crude oil is received by pipelines, marine vessels, and more recently via rail car
- Process units operate continuously at or near maximum capacity, except during periods of planned maintenance or unplanned outages

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Key Elements – Refineries (cont)

- Output from the refineries is usually placed in intermediate tanks prior to blending the finished products
- The majority of gasoline, diesel and jet fuel is shipped from the refinery by pipeline to over 60 distribution terminals
- Most of the refineries dispense a smaller portion of their output into tanker trucks that are loaded at the refinery



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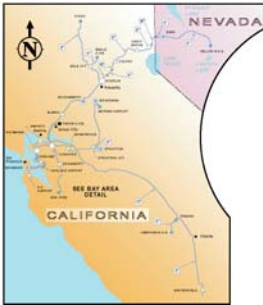
Key Elements – Pipelines

- Pipelines are used throughout the distribution infrastructure to interconnect key elements
- Intra-state pipelines are used to convey petroleum products within California's borders
- Interstate pipelines are used to export transportation fuels to Arizona and Nevada
 - NV – Over 90% of supply
 - AZ – Over 50% of supply
- Pipelines usually include pump stations, break-out tanks, storage tanks and distribution terminals
- As is the case with refineries, pipeline systems normally operate on a continuous basis
- Pipelines can only operate if transportation fuels are available to push liquid through the system

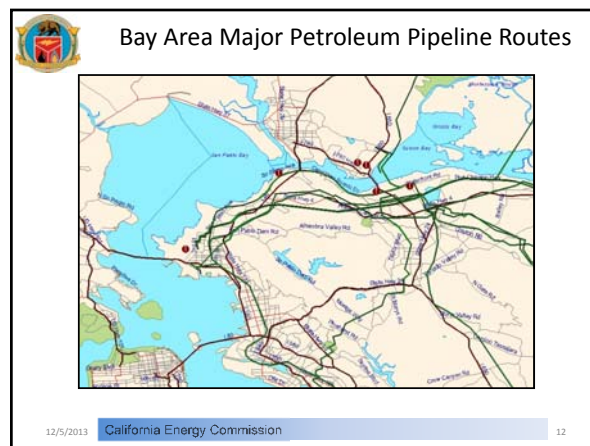
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Key Elements - Pipelines (cont)

- The pipeline infrastructure in California is controlled by a combination of common carrier and private companies
- Kinder Morgan is the sole common carrier of petroleum product pipelines in the State and transports the majority of transportation fuels through its system every day
- Other private companies, such as Chevron, ExxonMobil, Shell, and Tesoro operate some proprietary systems or segments that handle the balance of transportation fuels




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Key Elements - Pipelines (cont)


- Kinder Morgan's Northern California system is not connected to its Southern California system.
- Fuel re-supply by pipeline from Southern California not possible
- Tanker trucks quickest, viable option to bring in additional fuel



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Key Elements – Marine Facilities


- Marine facilities are located in sheltered harbors with adequate draught to accommodate typical sizes of petroleum product tankers and crude oil vessels
- Wharves usually have adjacent storage tanks that are used to temporarily hold petroleum products prior to transfer to a subsequent location
- Most refiners operate a proprietary dock
- Third party storage provides access to majors and independents
 - Kinder Morgan
 - Pacific Atlantic
 - NuStar
 - Petro-Diamond



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Key Elements – Storage Tanks


- Storage tanks are vital to the continuous flow of petroleum products into and through California
- Tanks are located at docks, refineries, terminals and tank farms
- Tanks serve different storage purposes:
 - Unload marine vessels
 - Receive pipeline shipments
 - Feed truck loading facilities
 - Hold inventories in advance of planned maintenance
 - Strategic storage that can be used for emergencies or periods of rapid price increases



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Rail Logistics - Ethanol

- State receive ethanol at a resupply “hub” via unit Midwest trains, Richmond & Selby in Northern California
- Ethanol is then trucked from the “hub” to nearby gasoline distribution terminals



- Current federal and state regulations require 10% ethanol in gasoline

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Rail Logistics – Other Uses

- Refiners use rail cars to routinely ship propane and seasonally send out and receive butane
- Rail cars are also used to deliver refinery feedstock such as gas oils and sulphuric acid for alkylation units
- More recently, California refiners have started using rail cars to import crude oil from Canada and domestic sources outside the state due to changing trends of increasing oil production and discounted prices

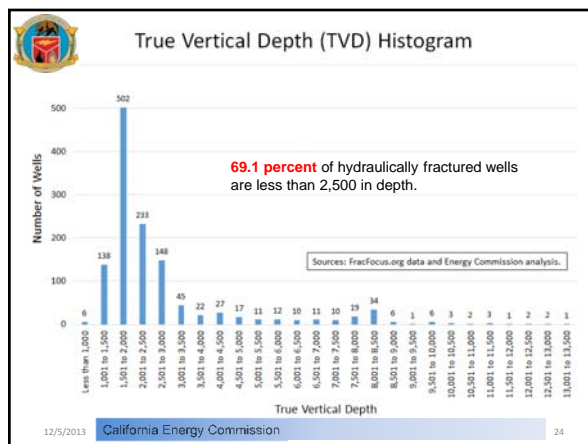
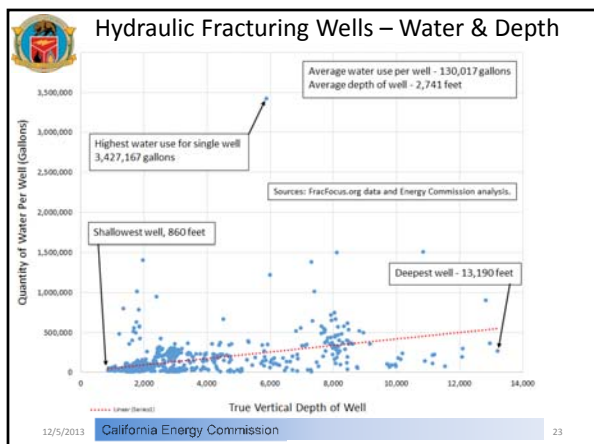
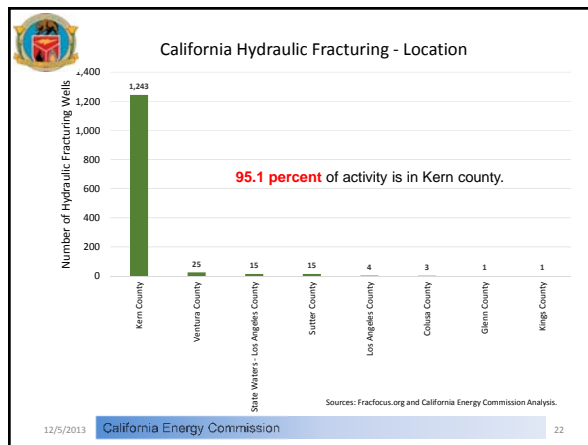
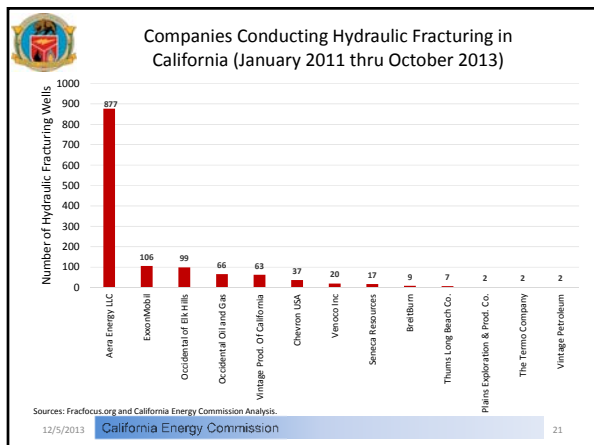
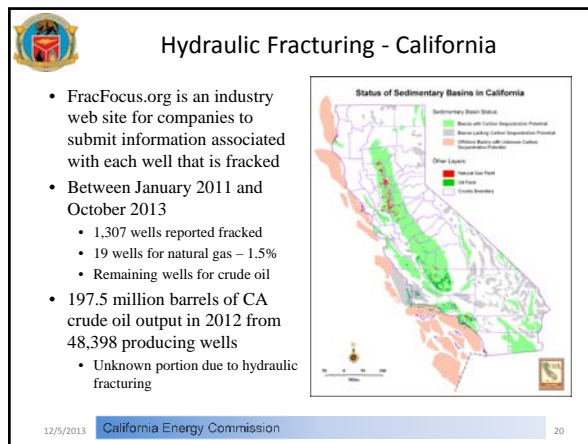
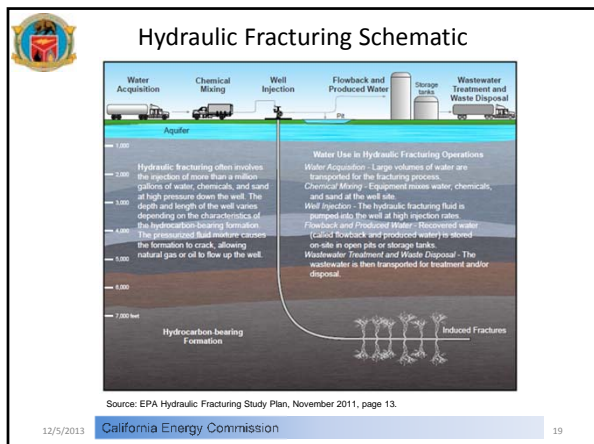


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Hydraulic Fracturing Overview

- Hydraulic fracturing or fracking is not a new procedure and is estimated to have been used in over one million wells worldwide
- According to the California Independent Producers Association...
 - Hydraulic fracturing is a type of “completion” technique where high pressure water, sand, and chemicals are injected usually thousands of feet below the surface into low permeability rock to create microscopic fractures that allow oil and natural gas trapped in small pores to migrate to the wellbore and be produced.
 - The injected fluid for each hydraulic fracturing job is typically 95% water, 4.5% sand, and 0.5% chemicals.
- Fracking had initially been utilized as early as 1947 in Kansas
- California fracking activity dates back to the 1950s

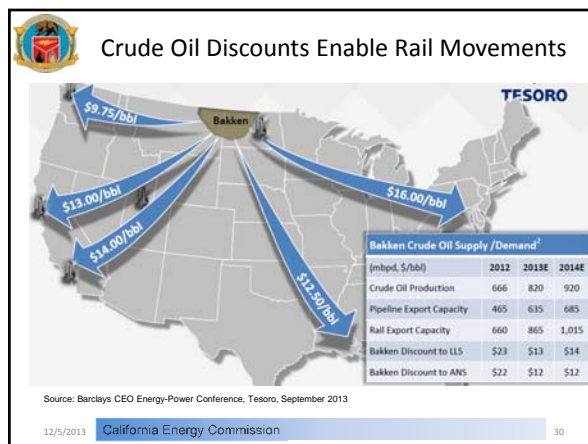
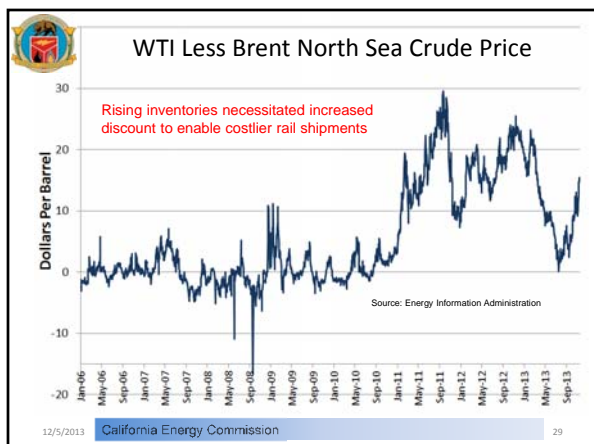
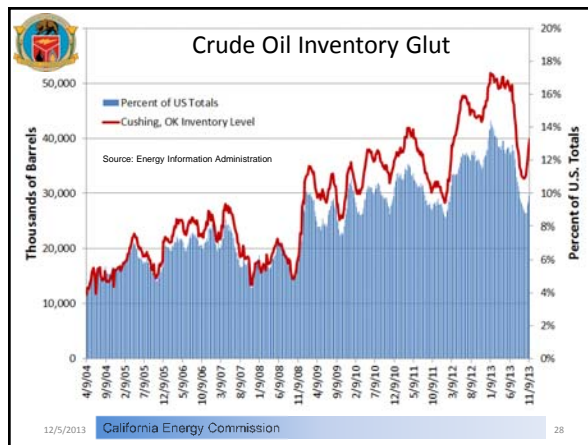
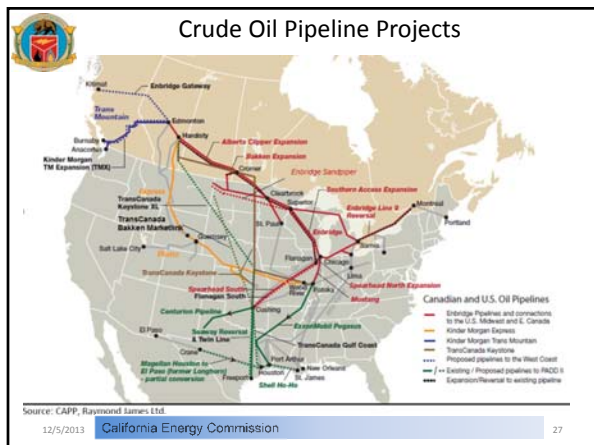
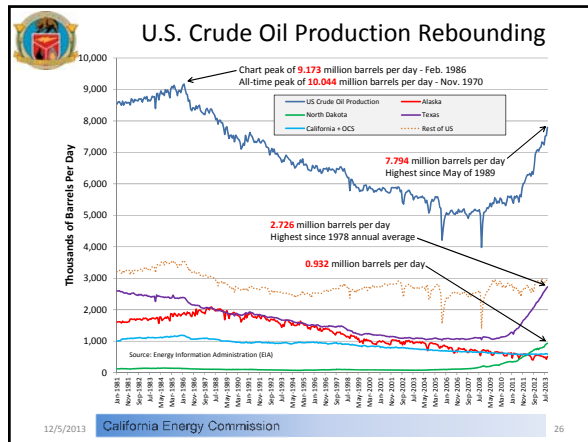
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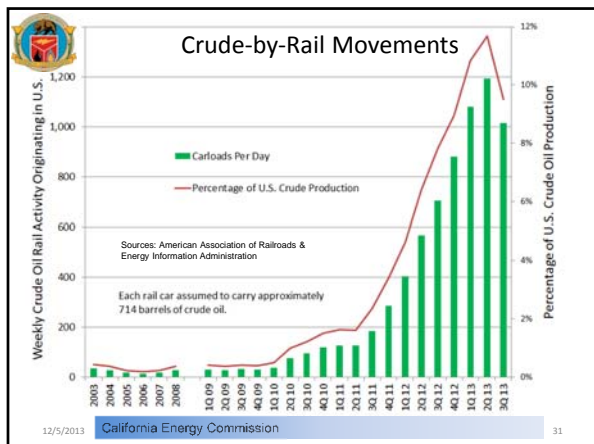


Hydraulic Fracturing – New Paradigm

- Hydraulic fracturing in California could halt production decline and result in a resurgence of output – but too early to tell
- However, hydraulic fracturing activity in North Dakota and Texas has dramatically increased domestic crude oil production
- Increased output has outpaced the ability of industry to transport this extra crude oil to refiners via a network of pipelines
- Expansion of existing crude oil pipeline systems and construction of new pipeline segments have increased the ability to ship crude oil from these regions...but not fast enough
- Temporary gluts of crude oil compelled producers to discount their price for the oil sufficient to enable the economic transportation by rail cars

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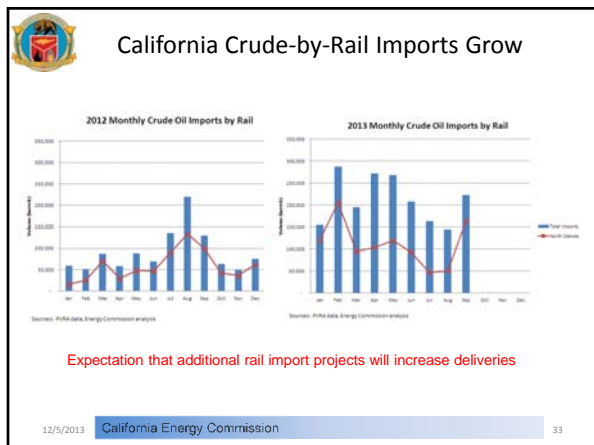


Crude Oil Sources – Bay Area Refineries

- Northern California refineries processed 642.2 thousand barrels per day of crude oil during 2012
 - 316.0 TBD foreign marine imports
 - 247.8 TBD pipeline shipments
 - 77.8 TBD ANS marine imports
 - 0.6 TBD rail imports
- Bay Area refineries processed 39.5 percent of total crude oil
- Increased rail-by-crude likely to back out marine receipts of similar quality
- Rail capability increases flexibility to enhance supply options & reduces risk of crude oil receipt curtailment

Source: Plains All American

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Crude-by-Rail Projects - California

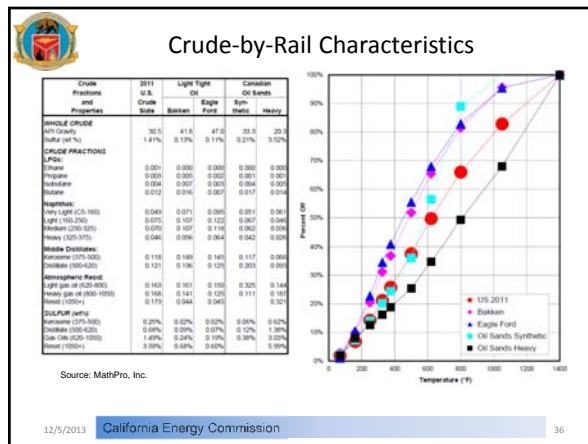
- Alon Crude Flexibility Project - Planned**
 - Alon – Bakersfield Refinery
 - 2 unit trains per day
 - 104 rail cars per unit train
 - 150,000 BPD offloading capacity
 - Will be able to receive heavy crude oil
 - Oil tankage connected to main crude oil trunk lines – transfer to other refineries
- Valero – Wilmington Refinery – Planned**
 - Up to 60,000 BPD
 - Seeking permit approval
 - No estimated date for completion
- Plains All American – Bakersfield Crude Terminal – Planned**
 - Purchased UDS assets, including “planned” project
 - Up to 65,000 BPD
 - Pipeline connection
- Valero – Benicia Crude Oil By Rail Project - Planned**
 - Benicia refinery
 - Up to 100 rail cars per day
 - Up to 70,000 BPD
 - Operational 2015, first quarter

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Crude-by-Rail Projects – Outside California

- Tesoro – Anacortes Refinery – Operational**
 - Up to 50,000 BPD
 - 40 percent of refinery crude oil supply
 - Operational September 2012
- Tesoro – Savages, Port of Vancouver Project – Planned**
 - Rail receipts of unit trains & loading of marine vessels
 - Initial capacity up to 120,000 BPD
 - Tesoro will have off-take rights to 60,000 BPD
 - Expansion capability of up to 280,000 BPD
 - Port authority approved proposal on 7/24/13
 - Initial start-up during 2014
- Phillips 66 – Ferndale Refinery – Operational**
 - Up to 20,000 BPD, mixed freight cars
 - Awaiting permits for expansion to 40,000 BPD in 2014
- BP – Cherry Point Refinery – Under Construction**
 - Up to 60,000 BPD
 - Operational by Spring of 2014

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Crude-by-Rail – Safety Issues

- July 6, 2013 - Montreal Maine & Atlantic Railway Ltd. train with 72 tankers of crude oil crashed in the Quebec town of Lac-Megantic
- Resulting fire and explosions killed 47 people
- Locomotive had broken piston that created a small fire while at rest
- Engine was switched off after the fire was extinguished
- Unattended locomotive began rolling along 1.2% grade after air breaks failed & an insufficient number of hand brakes had been set



Source: Paul Chiasson, The Canadian Press

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Crude-by-Rail – Safety Issues

- August 7, 2013 - Federal Railroad Administration (FRA) of the U.S. Department of Transportation (DOT) issues Emergency Order No. 28, Notice No. 1
- Order requires...*railroads operating on the general system to implement additional processes and procedures to ensure that certain unattended trains and vehicles on mainline track or mainline siding outside of a yard or terminal are properly secured against unintended movement*
- Based on FRA's accident reporting data for the period from 2009 through 2012, 35.7 percent of train accidents were human factor-caused
- Approximately 8.5 percent of human factor-caused train accidents from calendar year 2011 until April 2013 were the result of improper securement

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Questions?



John Muir House, circa 1914, Martinez, California

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