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DISTRICT

**AGENDA: 4**

# **Bay Area Energy Projects**

## **Stationary Source Committee**

**May 1, 2014**

**Jeff McKay**

**Deputy Air Pollution Control Officer**



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# OUTLINE

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- Review of Relevant Emission Source Types
- Description of Emissions from Proposed Projects
- Status of each Project



# BAY AREA ENERGY PROJECTS

- Valero Crude by Rail Project (Benicia)
- WesPac Crude Oil Terminal (Pittsburg)
- Kinder Morgan Rail Operation (Richmond)
- Phillips 66: Propane/Butane Recovery (Rodeo)
- Chevron Hydrogen and Sulfur Recovery Project





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# BAY AREA ENERGY PROJECTS





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# TRANSPORT BY RAILCAR SACRAMENTO, CA



*Railcars and a truck transporting crude*





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# FLARING AT PHILLIPS 66

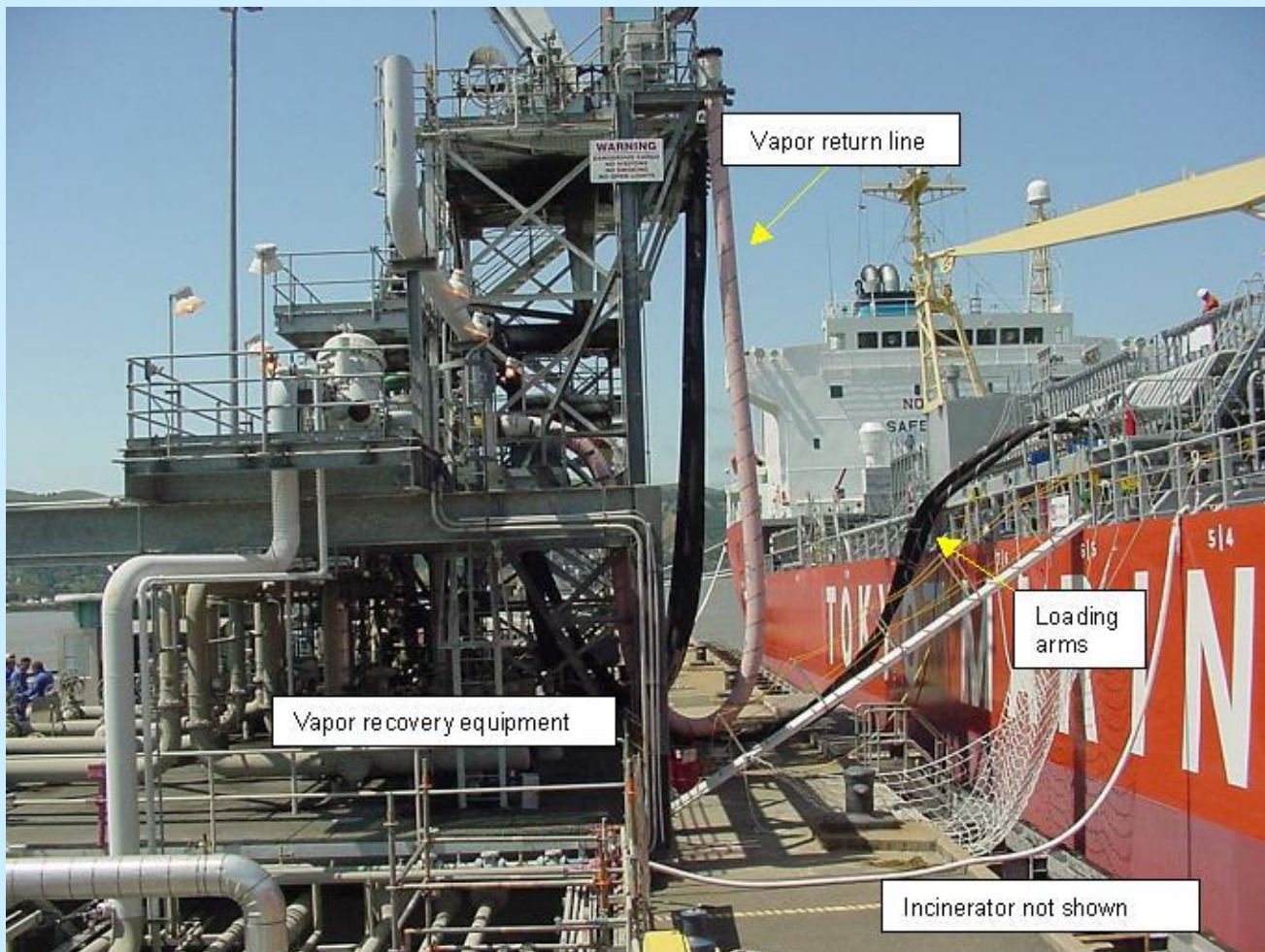


Excess refinery fuel gas is one of the reasons for flaring.



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# TRANSPORT BY SHIP





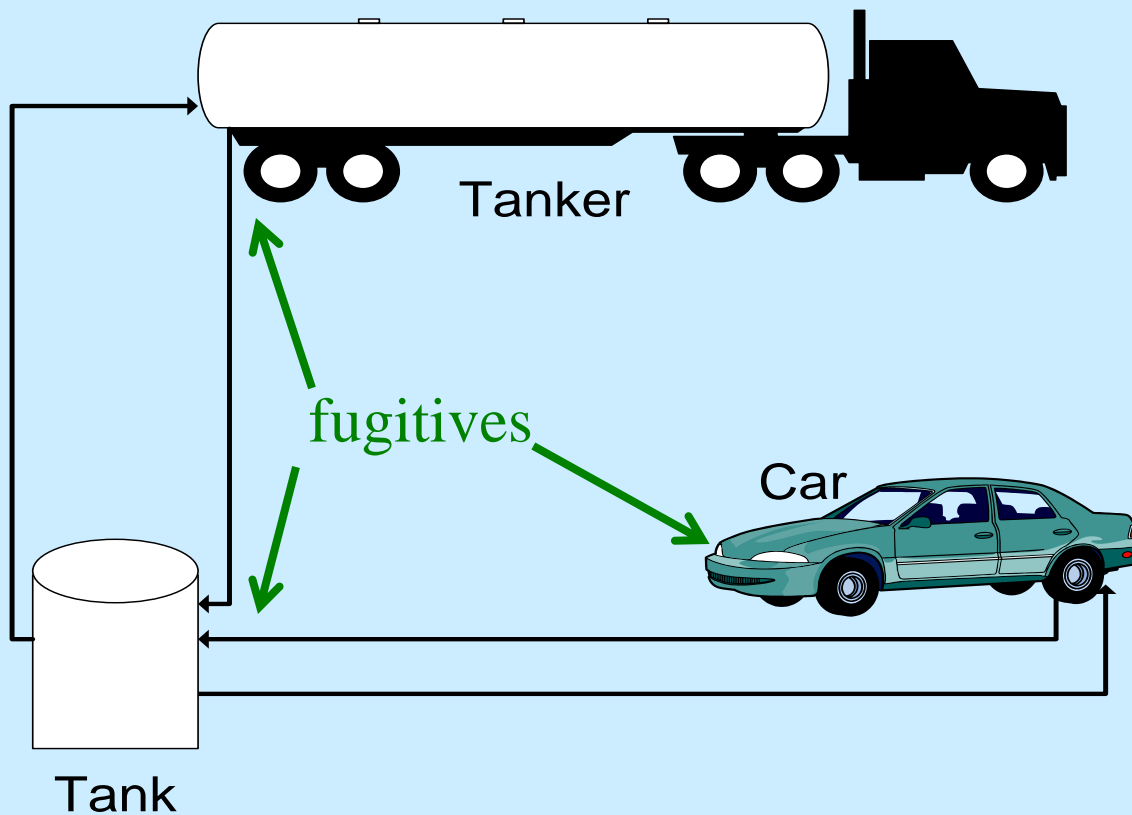
# EMISSIONS EXAMPLES

1. Fugitive Volatile Organic Compounds during transfer
2. Typical Bay Area refinery total Processing emissions
3. Ship Emissions associated with crude Transport





# GAS STATION



Size of GDF	Throughput (barrels / day)	Fugitive VOC (tons / year)
Smaller	100	0.5
Larger	800	4.2



# REFINERY EMISSIONS

## Average Bay Area Refinery : tons / year

*Average throughput is 160,000 bbl/day*

- Volatile Organic Compounds (VOC) 900
- Nitrogen Oxides (NO<sub>x</sub>) 800
- Sulfur Dioxide (SO<sub>2</sub>) 500
- Particulate Matter (PM) 200
- Greenhouse Gases (CO<sub>2</sub>e) 3 M



# SHIP TRANSPORT EMISSIONS (tons per year)

*Typical Marine Terminal tanker transit within Bay Area  
(single terminal)*

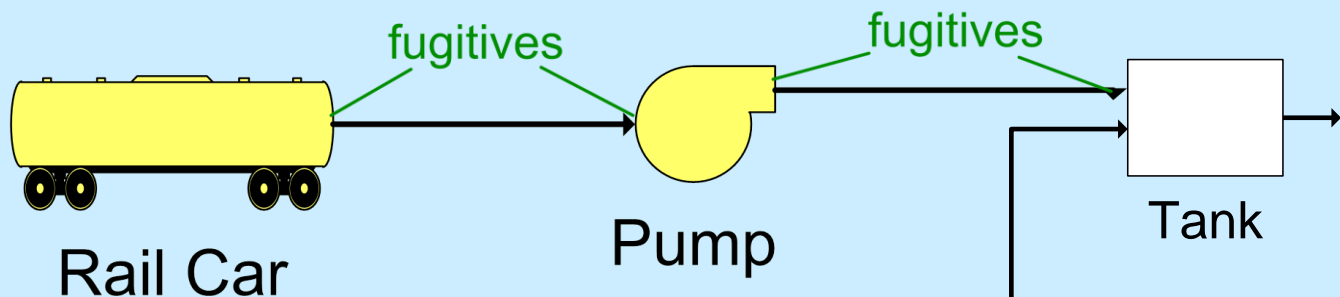
	bbl / day	NOx	SO2	VOC	PM	GHG
Marine Terminal	50,000	105	4	4	2.5	8,000





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# VALERO

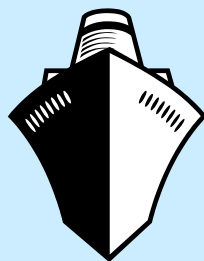


Rail Car

Pump

Tank

- Permit Application 2/13
- DEIR this month?  
(Benicia)



Ship

Ship to Rail: -70,000 bbl/day

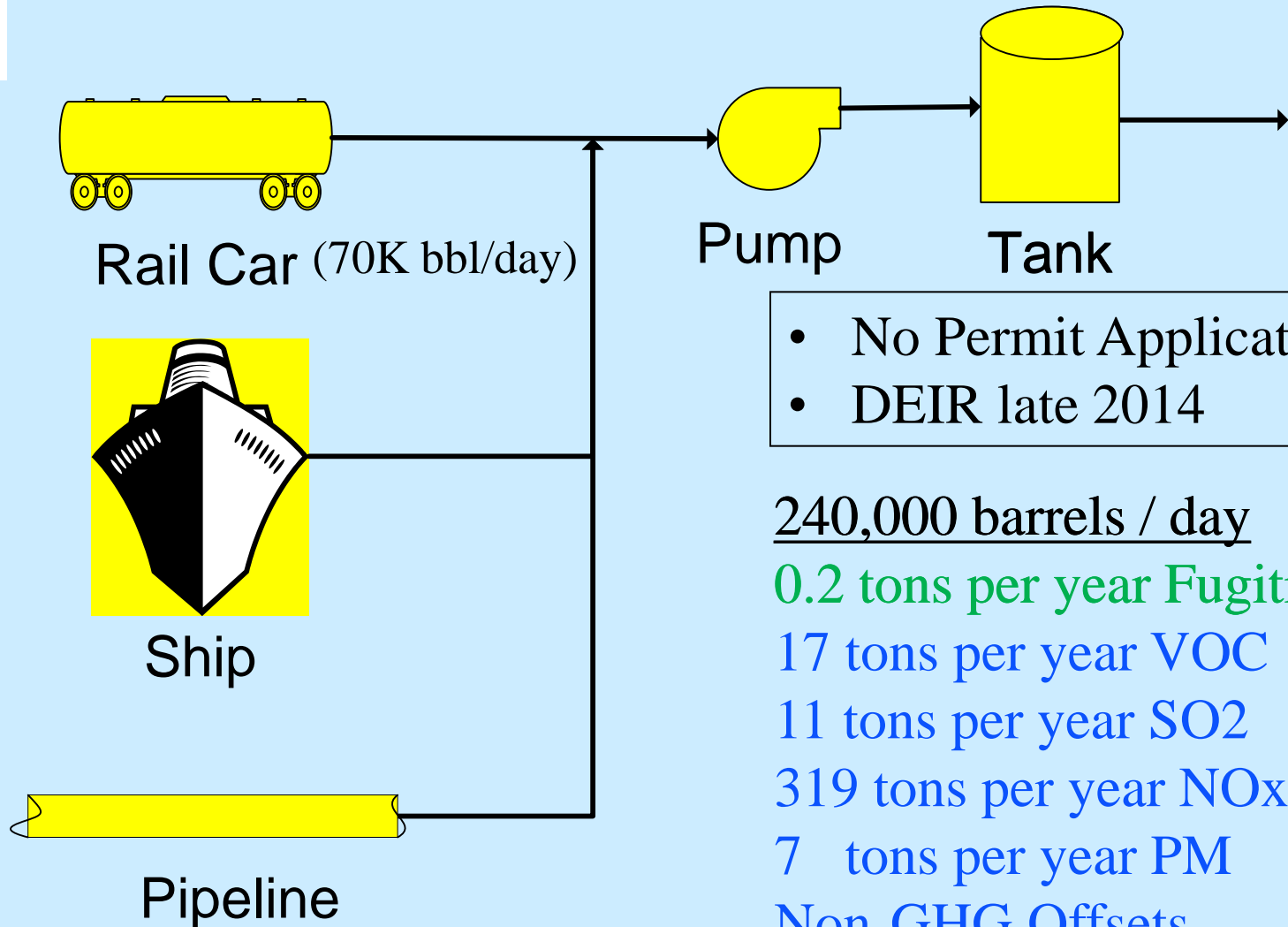
- 58 tons per year NO<sub>x</sub>
- 26 tons per year SO<sub>2</sub>
- 3.5 tons per year VOC
- 2.7 tons per year PM
- 4000 tons per year GHG

## Project Fugitives

+ 2 tons/yr VOC to be offset



# WESPAC



- No Permit Application
- DEIR late 2014

240,000 barrels / day

0.2 tons per year Fugitive

17 tons per year VOC

11 tons per year SO<sub>2</sub>

319 tons per year NO<sub>x</sub>

7 tons per year PM

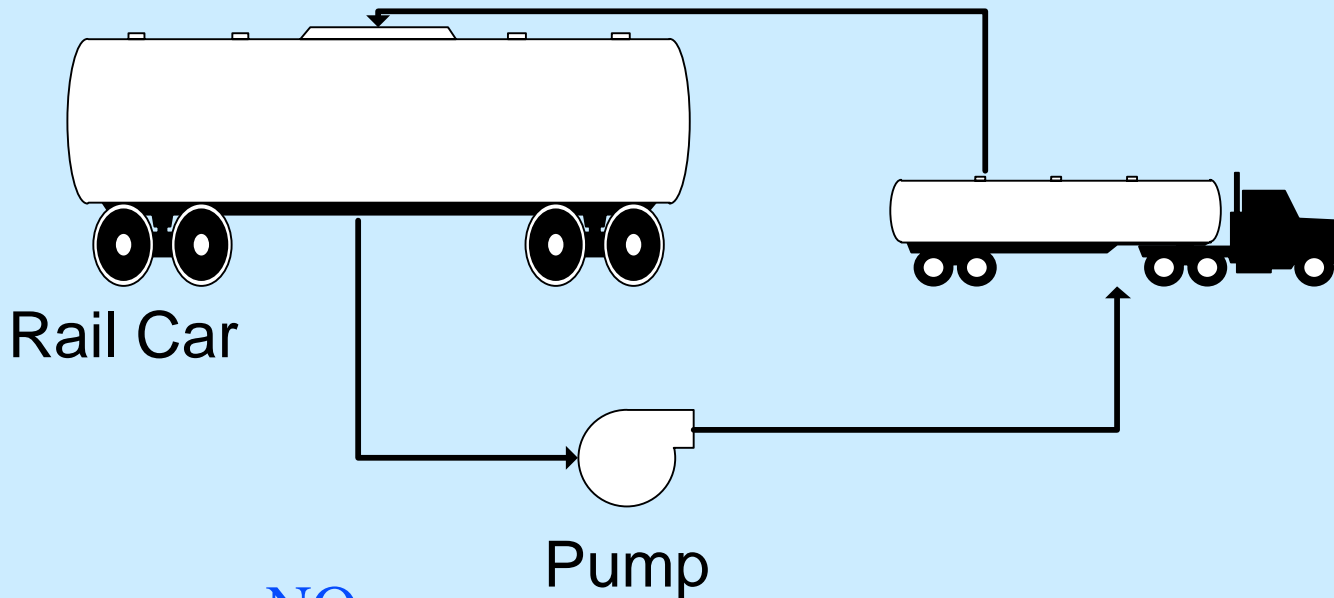
Non-GHG Offsets

33,000 tons per year GHG



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# KINDER MORGAN



## Rail

22 tons per year NO<sub>x</sub>

0.4 tons per year SO<sub>2</sub>

1.2 tons per year VOC

1 ton per year PM

1200 ton per year GHG

Permit Limit: 16,000 bbl / day

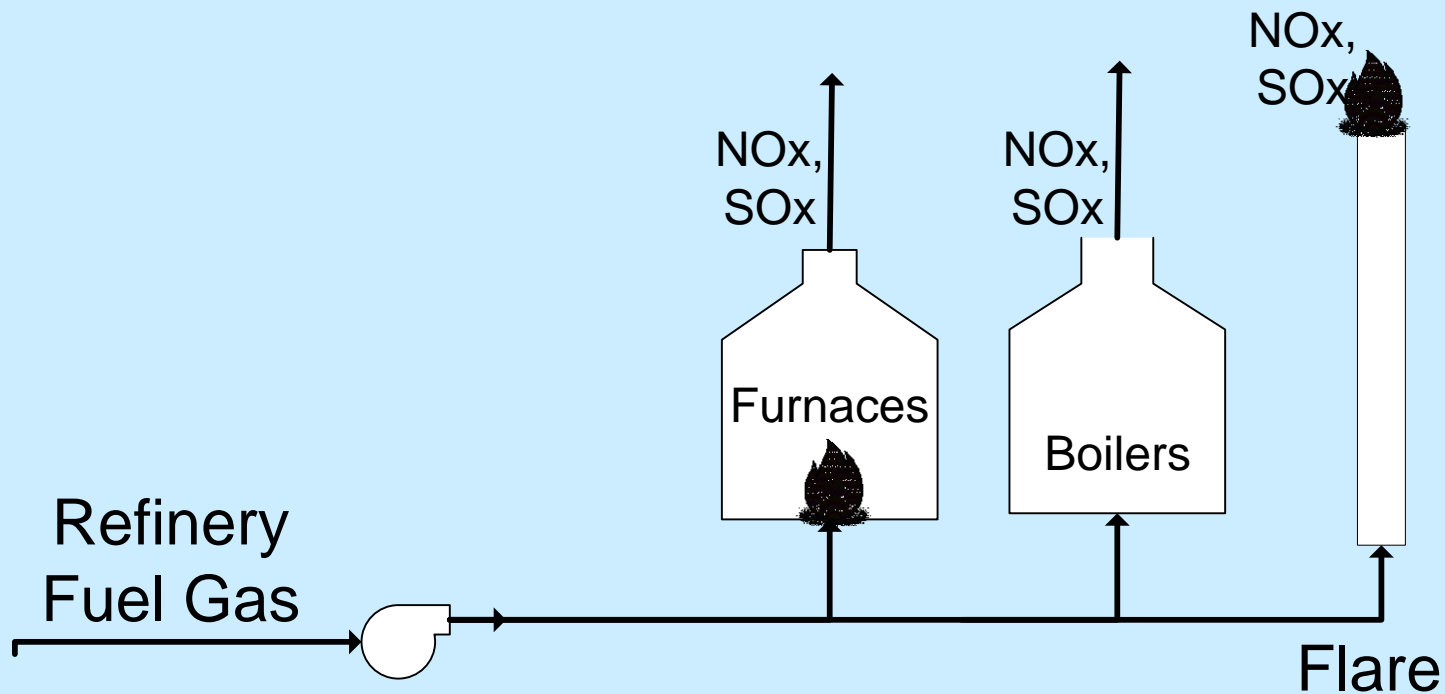
4.8 tons / yr Fugitive VOC





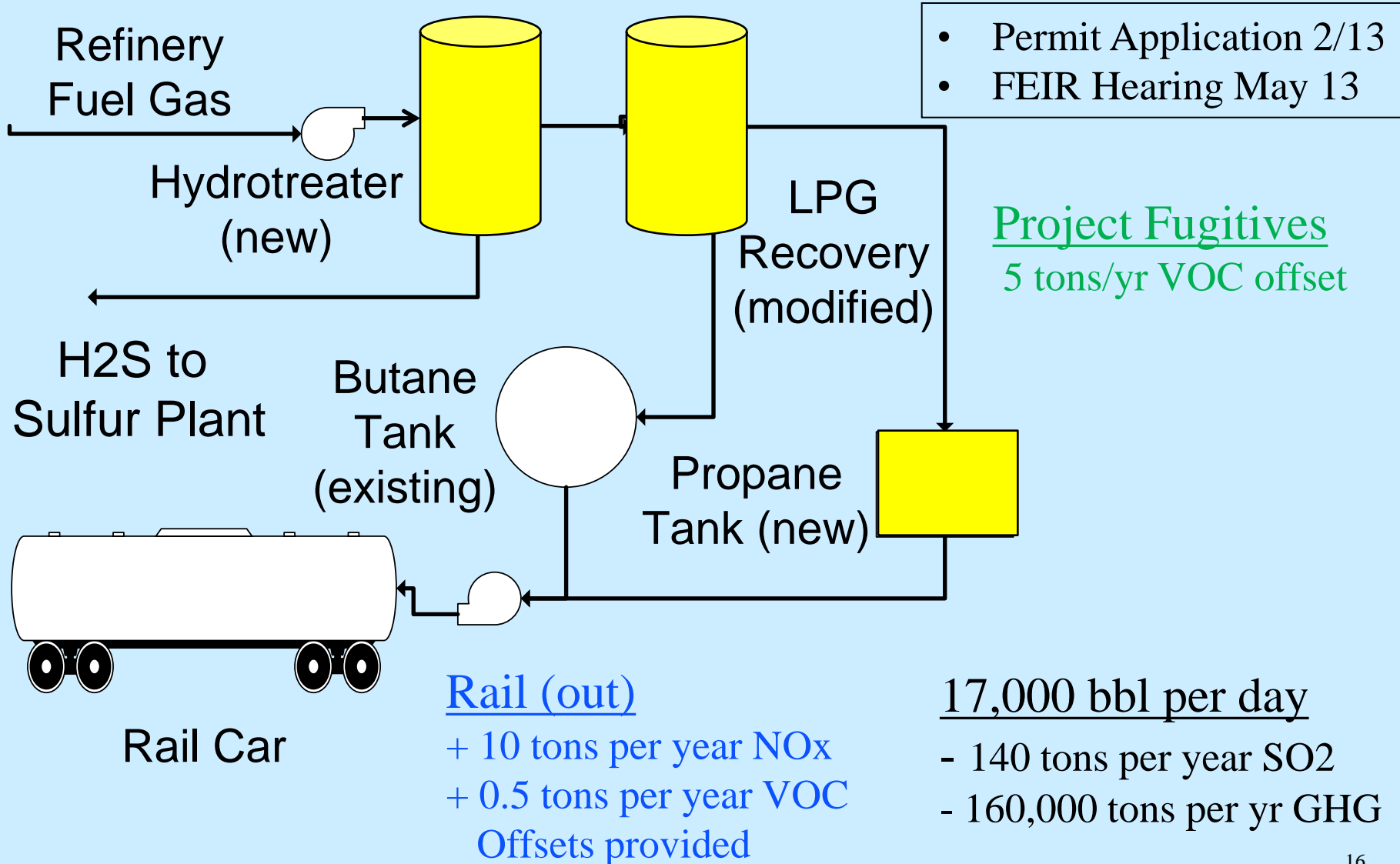
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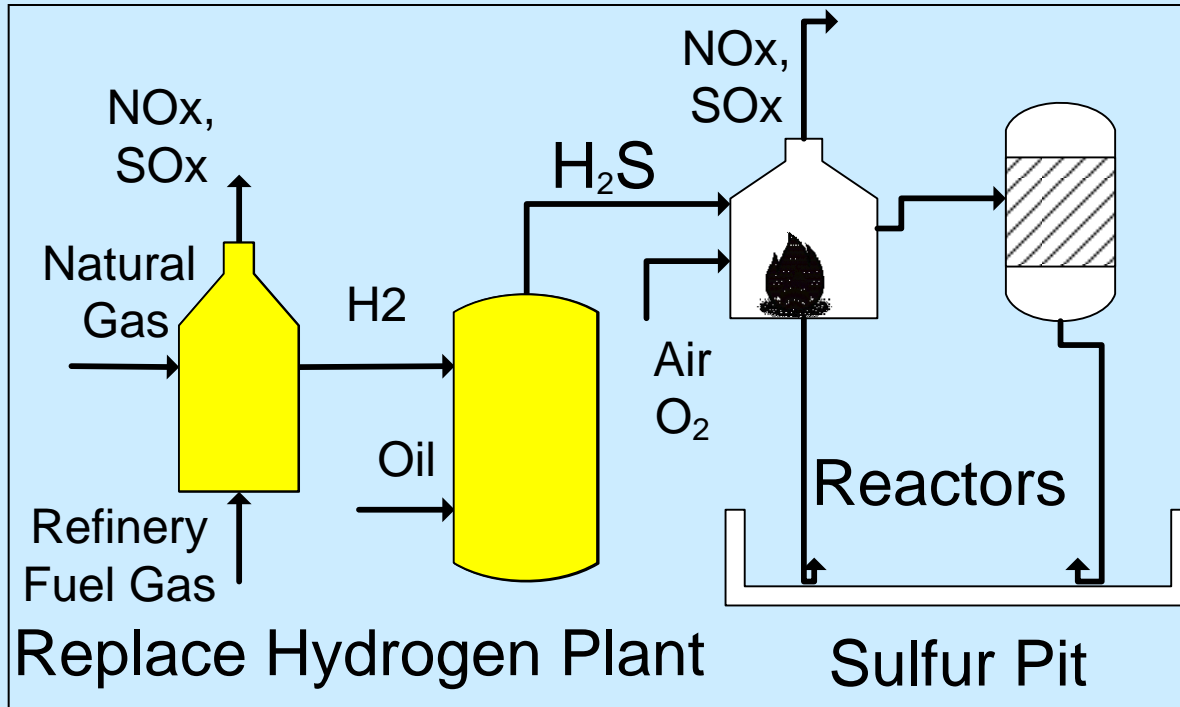
# PHILLIPS PROPANE BUTANE



- Methane
- Propane
- Butane
- Trace H<sub>2</sub>S

# PHILLIPS PROPANE BUTANE





## DEIR Requirements: No Net Increase

- Throughput capacity unchanged
- Fewer and cleaner ships and tugs
- Domed tanks
- Low NOx burners retrofit
- Solar energy (2 MW)

## DEIR Proposal

10 tons per year Fugitive  
 27 tons per year VOC  
 30 tons per year SO<sub>2</sub>  
 82 tons per year Nox  
 9 tons per year PM  
 2.1 M tons per year GHG





# REGIONAL EMISSIONS FROM TRANSPORTATION OF CRUDE BY RAIL SELECT BAY AREA PROJECTS

Tons per year

	<b>NOx</b>	<b>SOx</b>	<b>VOC</b>	<b>PM</b>	<b>GHG</b>	<b>Fugitives</b>
<b>Valero</b>	-58	-26	-3.5	2.7	-4000	2
<b>WesPac</b>	33	1	1.7	1	5600	1.7
<b>KinderMorgan</b>	22	0.4	1.2	1	1200	4.8
	<b>-3</b>	<b>-24.6</b>	<b>-0.6</b>	<b>4.7</b>	<b>2800</b>	<b>8.5</b>



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# CONTINUING UPDATES

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- Updates to the Air District Board will continue on a regular basis



# CRUDE BY RAIL

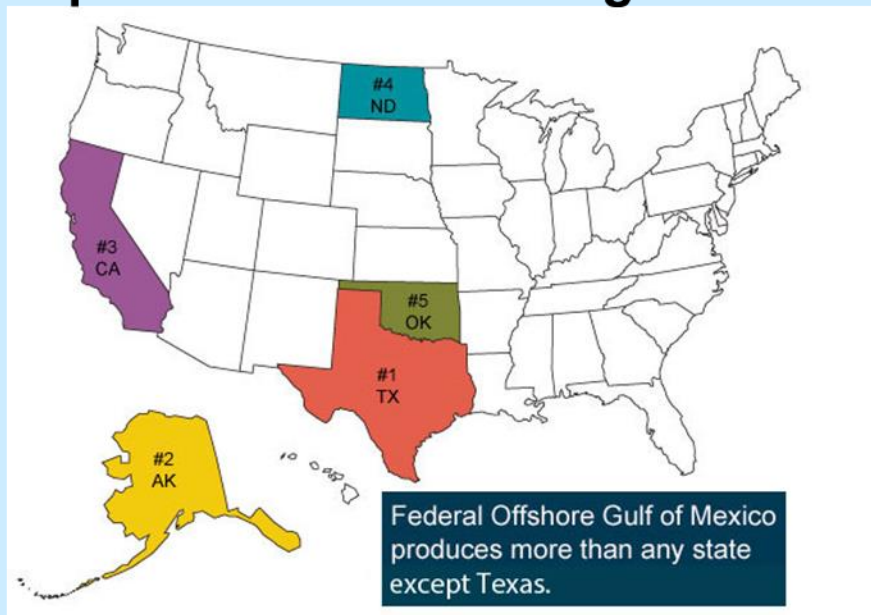
- Generally displaces crude delivered by ship
- Domestic source often less expensive
- Relatively flexible source and destination



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# US CRUDE OIL PRODUCTION

## Top Crude Oil Producing States

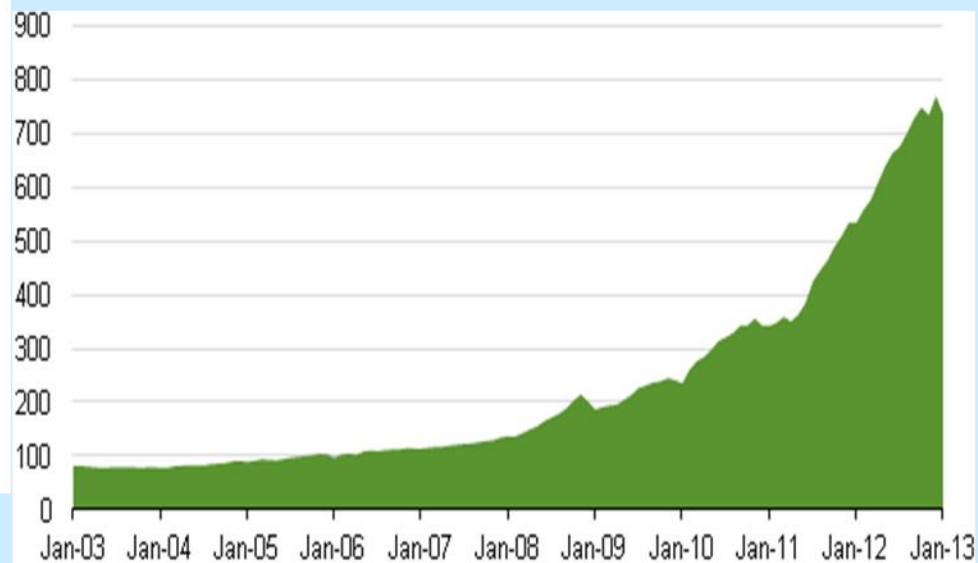


### Top U.S. Crude Oil Producers in 2012:

- |                    |     |
|--------------------|-----|
| 1. Texas:          | 31% |
| 2. Gulf of Mexico: | 20% |
| 3. North Dakota:   | 10% |
| 4. California:     | 8%  |

## North Dakota Monthly Oil Production

Thousand barrels per day



Source: North Dakota Oil Production Reaches New High in 2012, U.S. Energy Information Administration, March 18, 2013.



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# FLASH POINT

## Highest to Lowest Flammability

	<b>Gasoline</b>	<b>Baaken Crude</b>	<b>Typical Crude*</b>
<b>Flash Point</b>	<b>- 45 F</b>	<b>- 31 F</b>	<b>20 F</b>

**Crude properties vary by oil field and wells within a field (-40 to 32 F)**

**\* Sweet Crude – Conoco Phillips MSDS**

**Other Canadian Crudes have a flashpoint of – 40 F.**

**North Slope Crude has a flash point of 25 F**

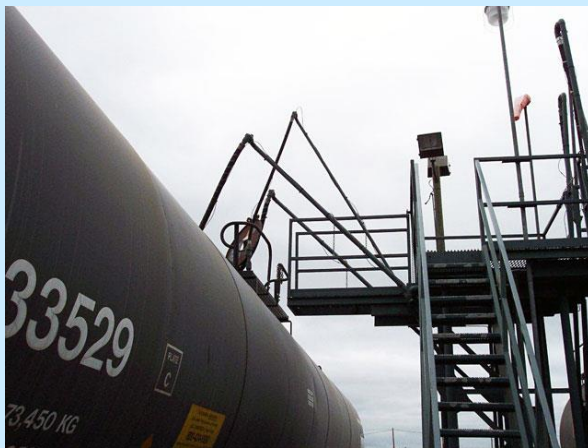
**Note:**

**Gasoline is the most flammable**



# Rail Logistics – Other Uses

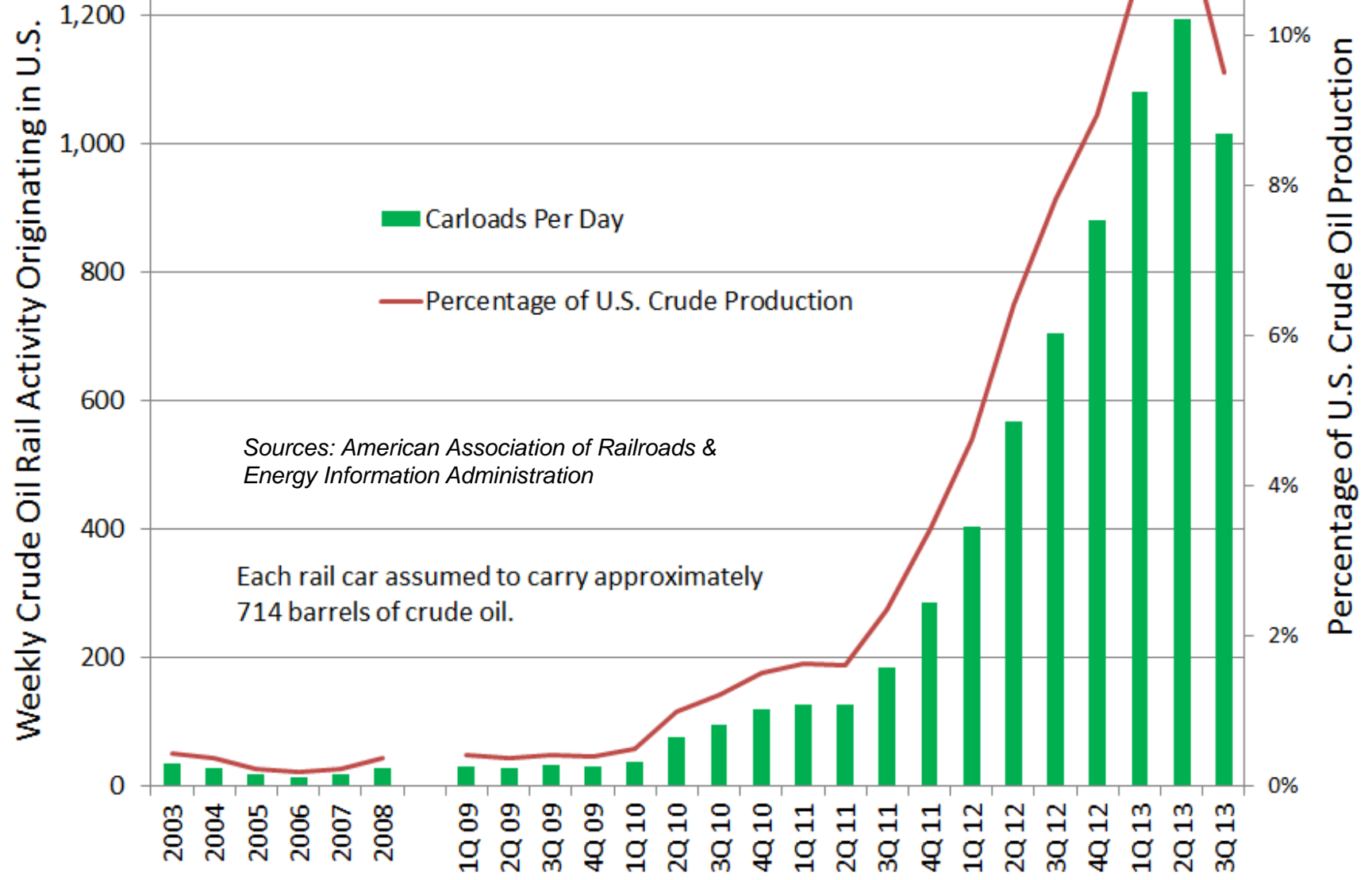
- Refiners use rail cars to routinely ship propane and seasonally send out and receive butane
- Rail cars are also used to deliver refinery feedstock such as gas oils and sulphuric acid for alkylation units
- More recently, California refiners have started using rail cars to import crude oil from Canada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







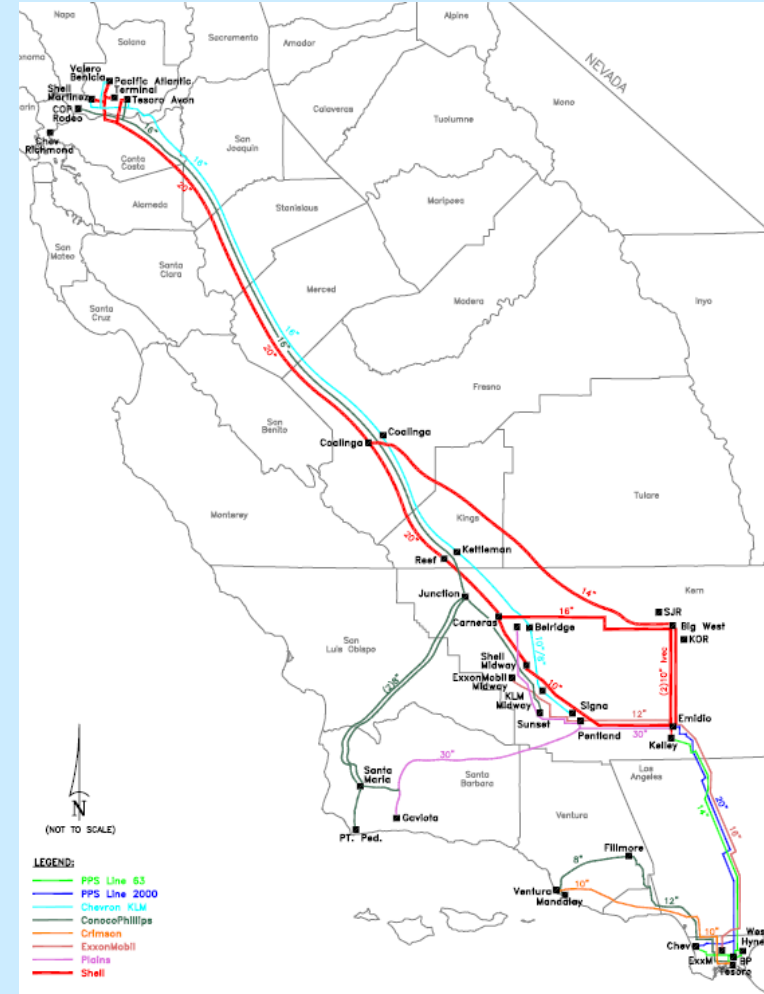
# Crude-by-Rail Movements





# 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

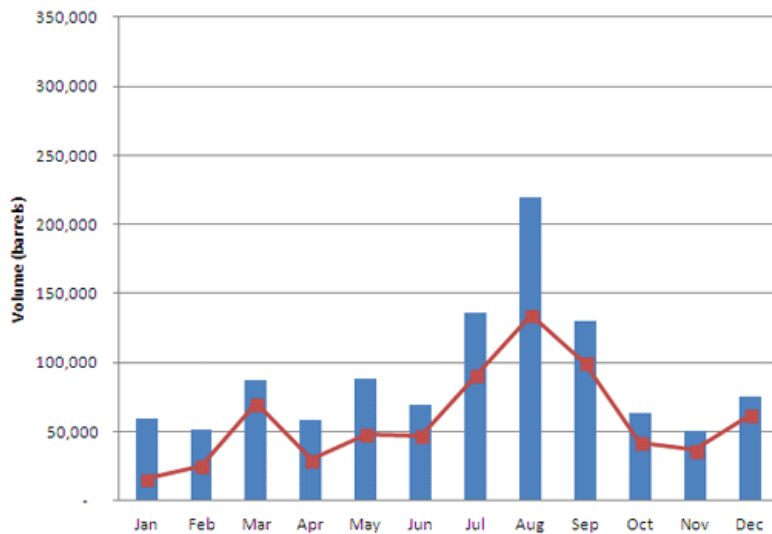


Source: Plains All American

# California Crude-by-Rail Imports Grow

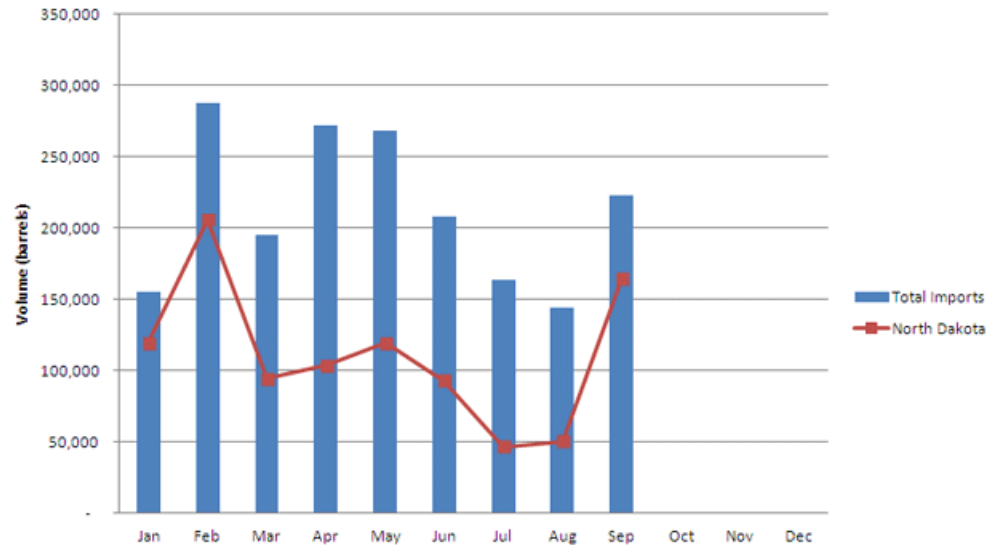


### 2012 Monthly Crude Oil Imports by Rail



Sources: PIIRA data, Energy Commission analysis

### 2013 Monthly Crude Oil Imports by Rail



Sources: PIIRA data, Energy Commission analysis

*Expectation that additional rail import projects will increase deliveries*