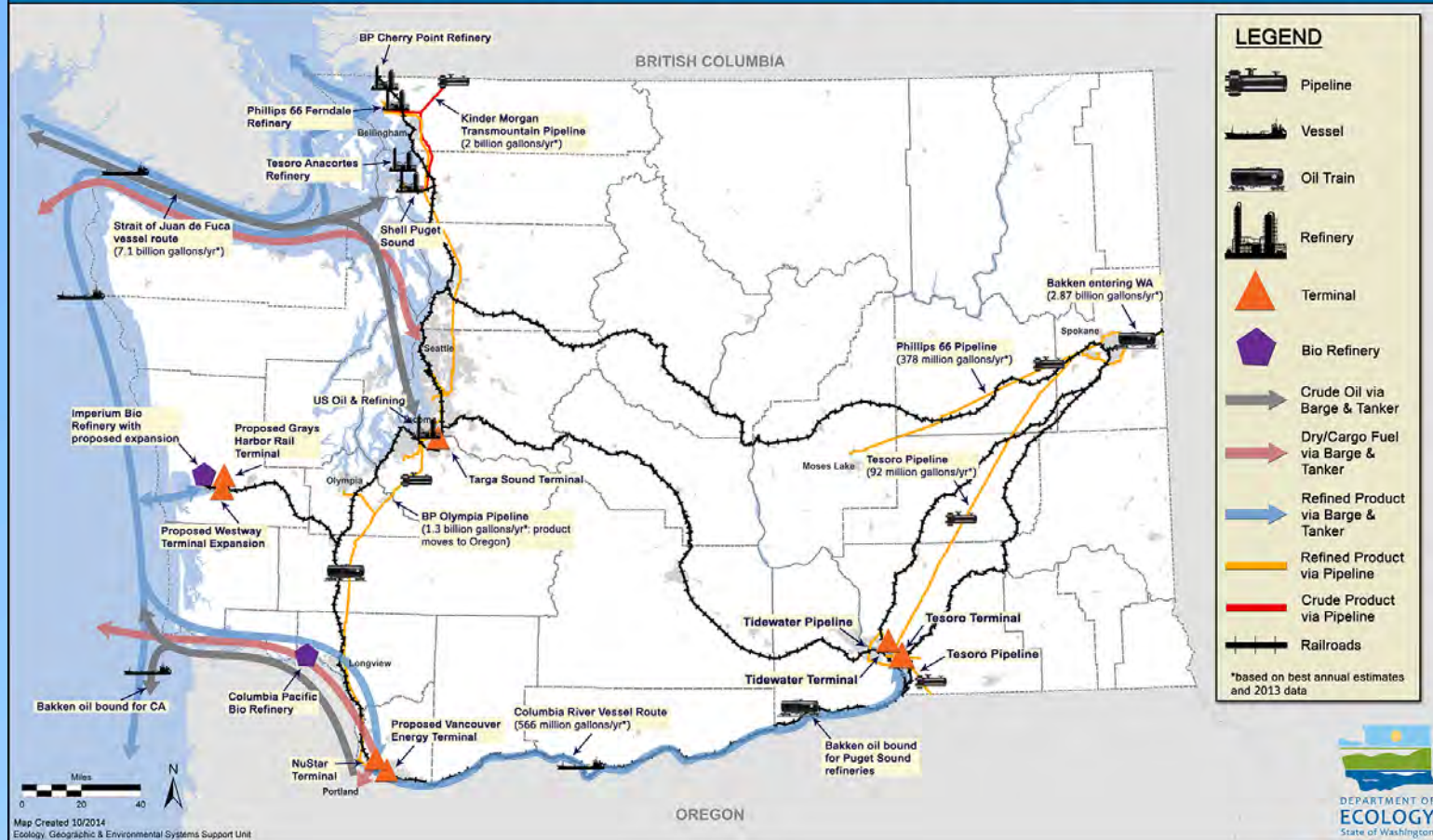


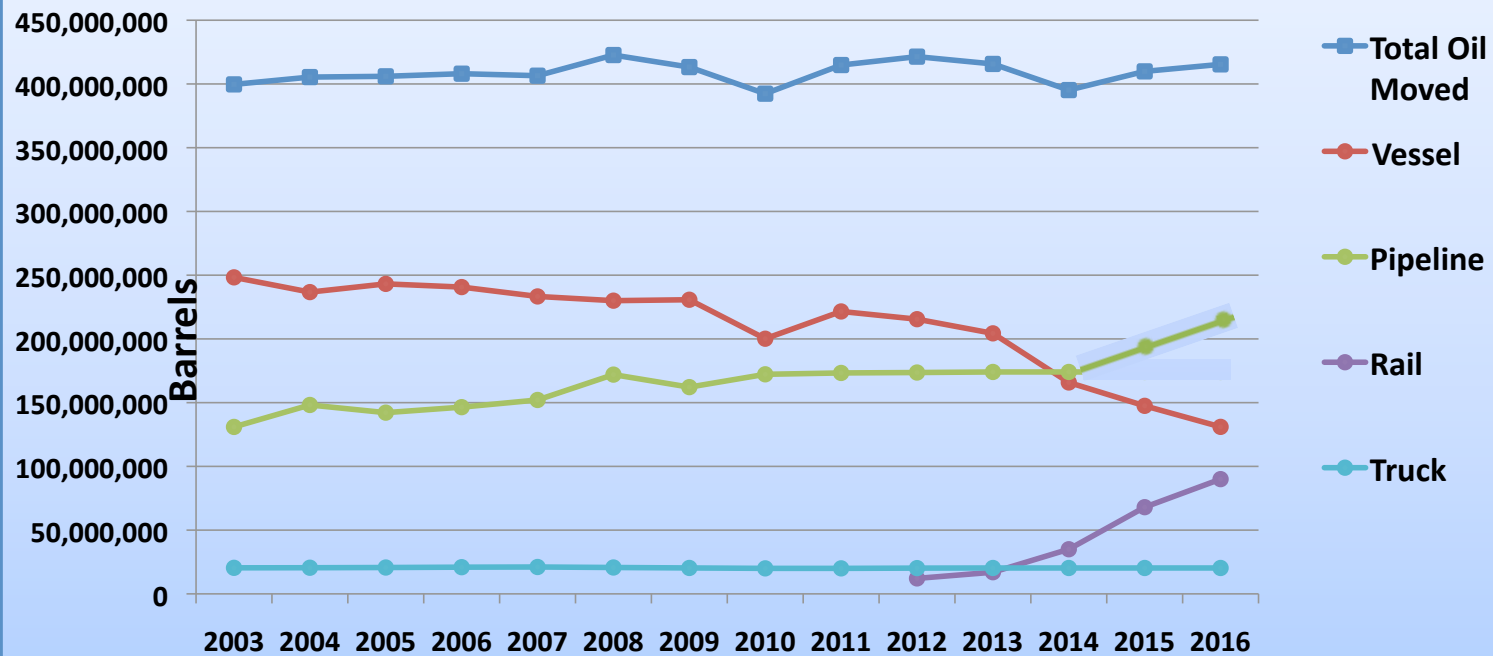
Washington's Changing Energy Picture



Oil Movement In & Out of Washington State



Oil Moved by Transport Mode

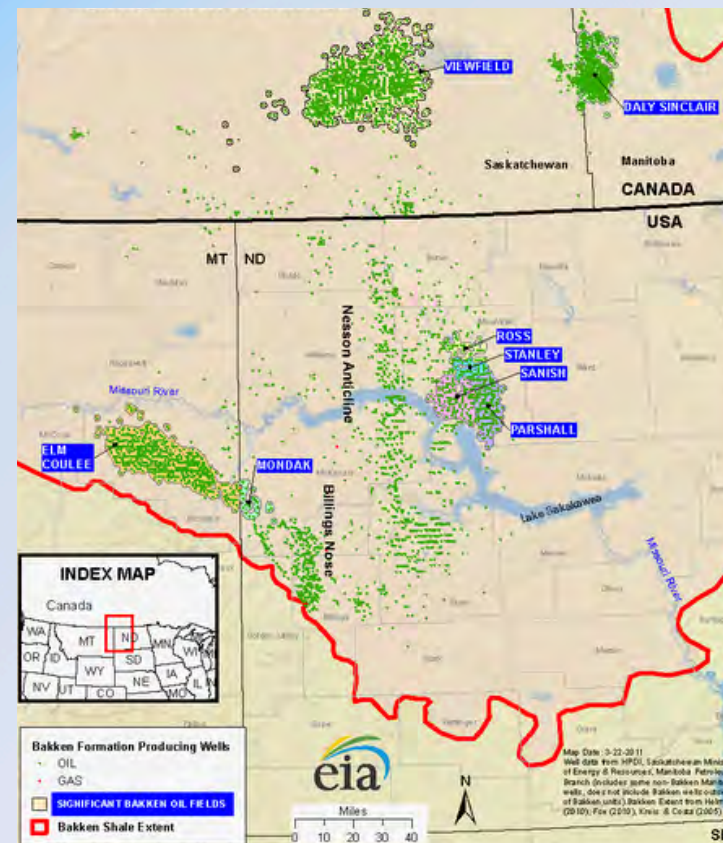


Refineries & Facilities (existing & proposed) for crude oil by rail – June 2014

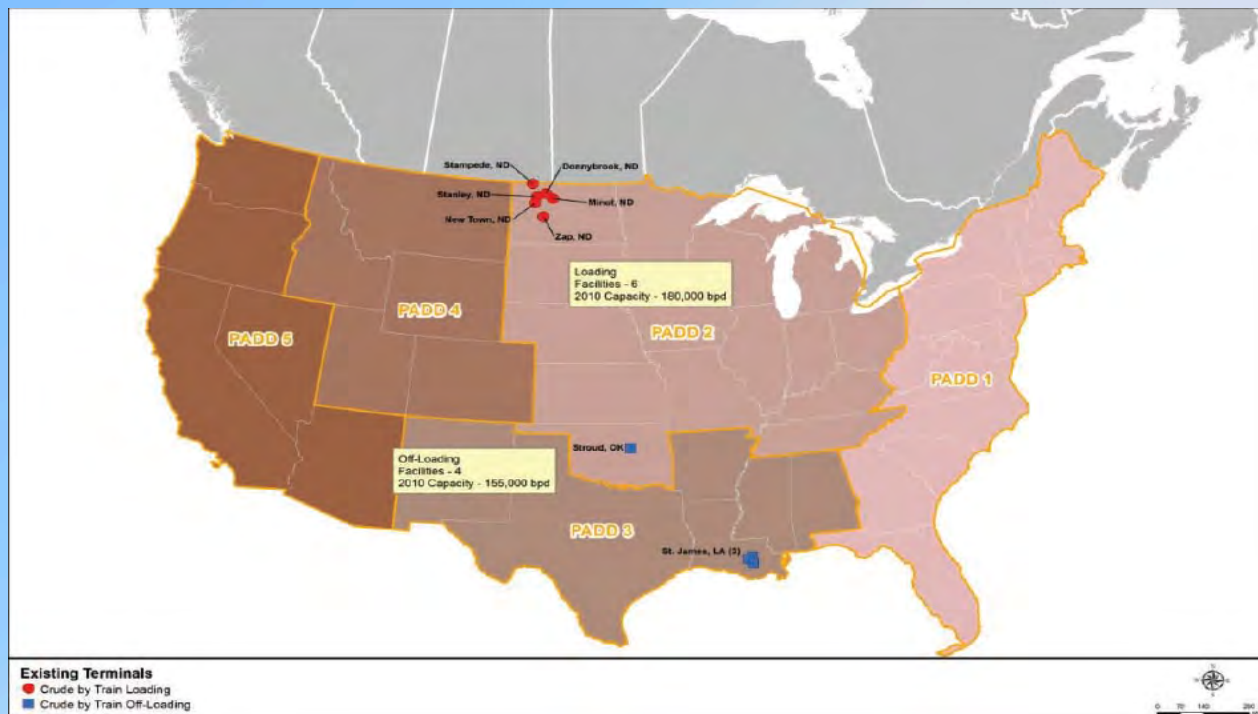


Bakken Crude

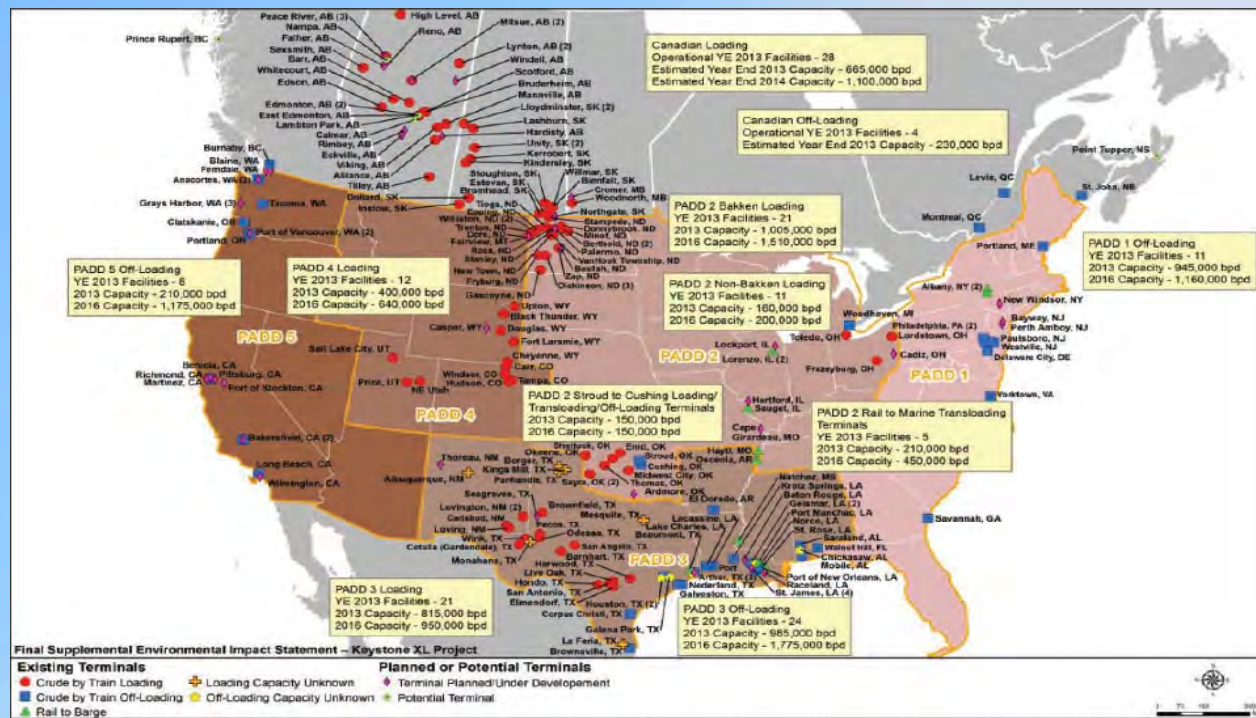
- Very light sweet crude
- No pipeline infrastructure
- Unit trains
- Up to 3% benzene

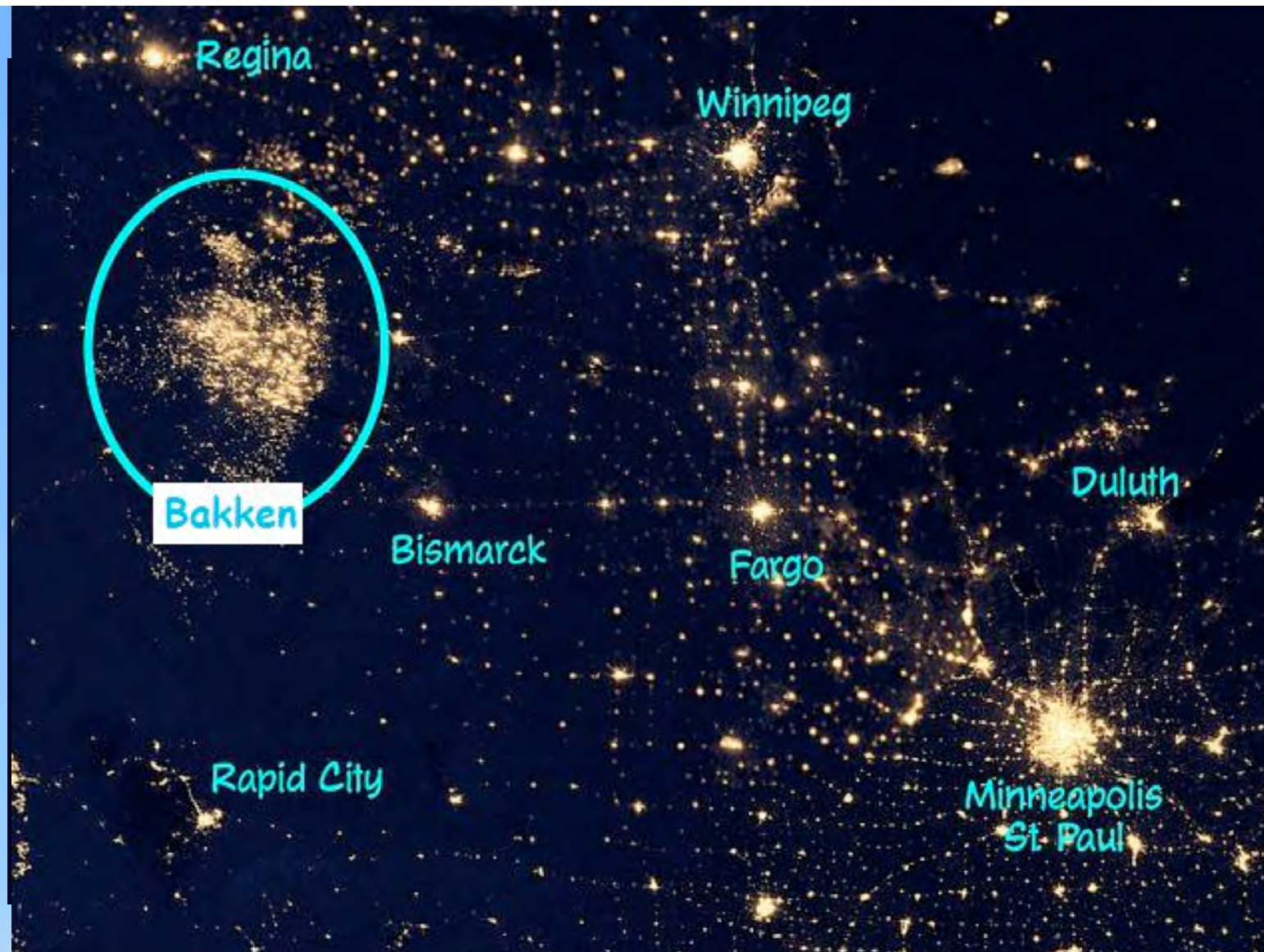


United States existing terminals 2010



US existing and proposed terminals - 2013







Roy Luck

Public concerns over oil train safety



Emerging Energy Transportation Risks

Oil by Rail Incidents – Bakken Crude

June 30, 1992 - Superior, WI

July 6, 2013 - Lac-Mégantic, Quebec

October 19, 2013 - Gainford, Alberta

November 8, 2013 - Aliceville, AL

December 30, 2013 - Casselton, ND

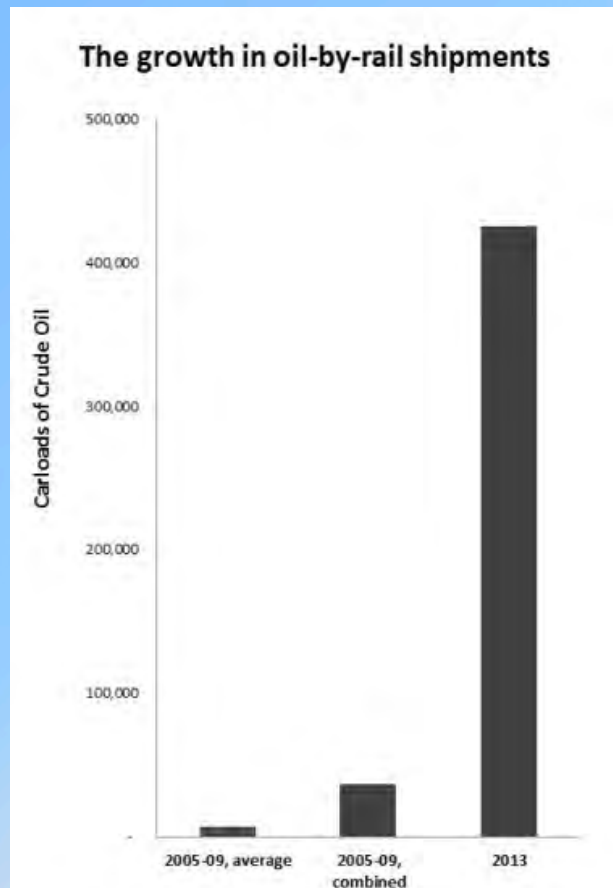
January 7, 2014 - Plaster Rock, New
Brunswick

January 20, 2014 - Philadelphia, PA

April 30, 2014 - Lynchburg, VA



Emerging Energy Transportation Risks



More crude oil was spilled in U.S. rail incidents in 2013 (1.15 million gallons) than was spilled in the previous four decades (0.8 M gallons).

This does not include the 1.5 million gallons spilled in Lac Megantic, Canada (July 2013) where 47 people died.





2016/06/03





Where did the oil go?

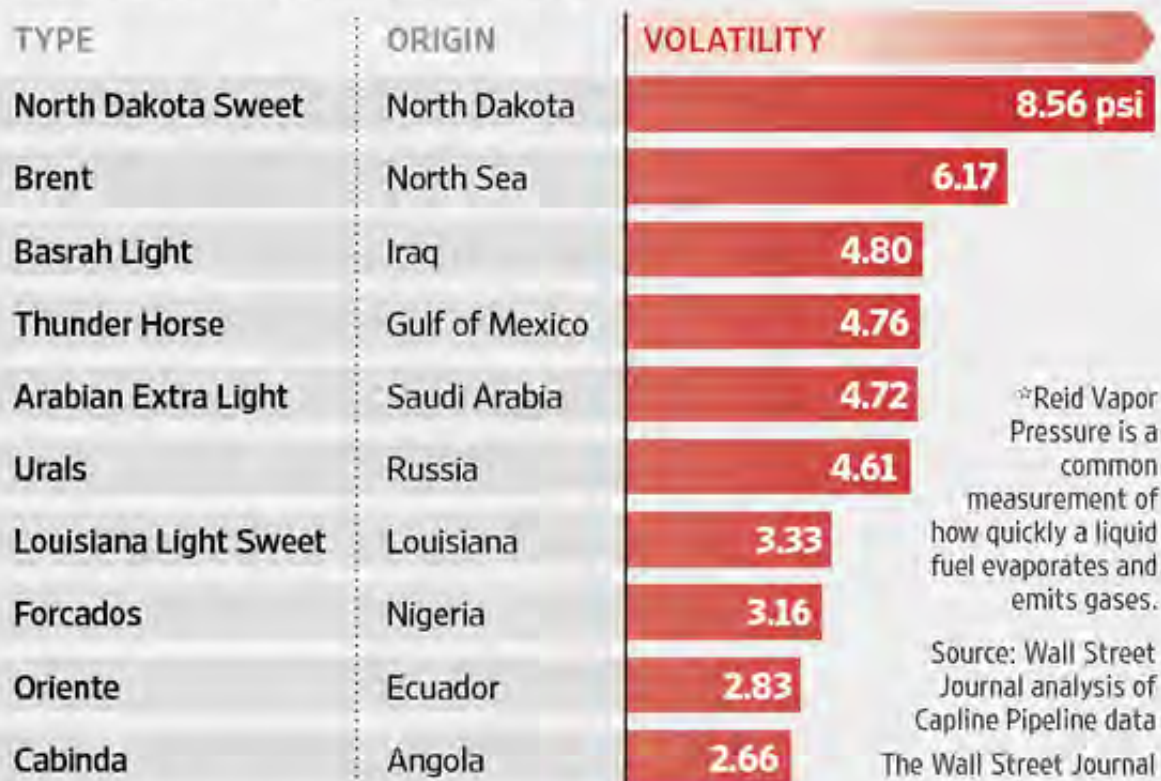
Missing from Rail Cars:	47,000 gallons
Recovered from WWTP:	13,000 gallons
<u>Soil Contamination:</u>	<u>18,000 gallons</u>
Estimated Burned in Fire:	16,000 gallons



Under Pressure

Investigators are looking into how fast North Dakota crude emits gases and how that contributes to oil-train explosions.

Select types of crude oil that are commonly run in U.S. refineries, by average Reid Vapor Pressure*



An aerial photograph of an oil sands processing facility. The landscape is dominated by large, dark, irregular ponds of oil sands slurry, interspersed with lighter-colored sandy areas and a network of dirt roads. In the upper center, there are two distinct, rectangular ponds with a greenish-yellow hue. The overall scene depicts a large-scale industrial operation in a natural setting.

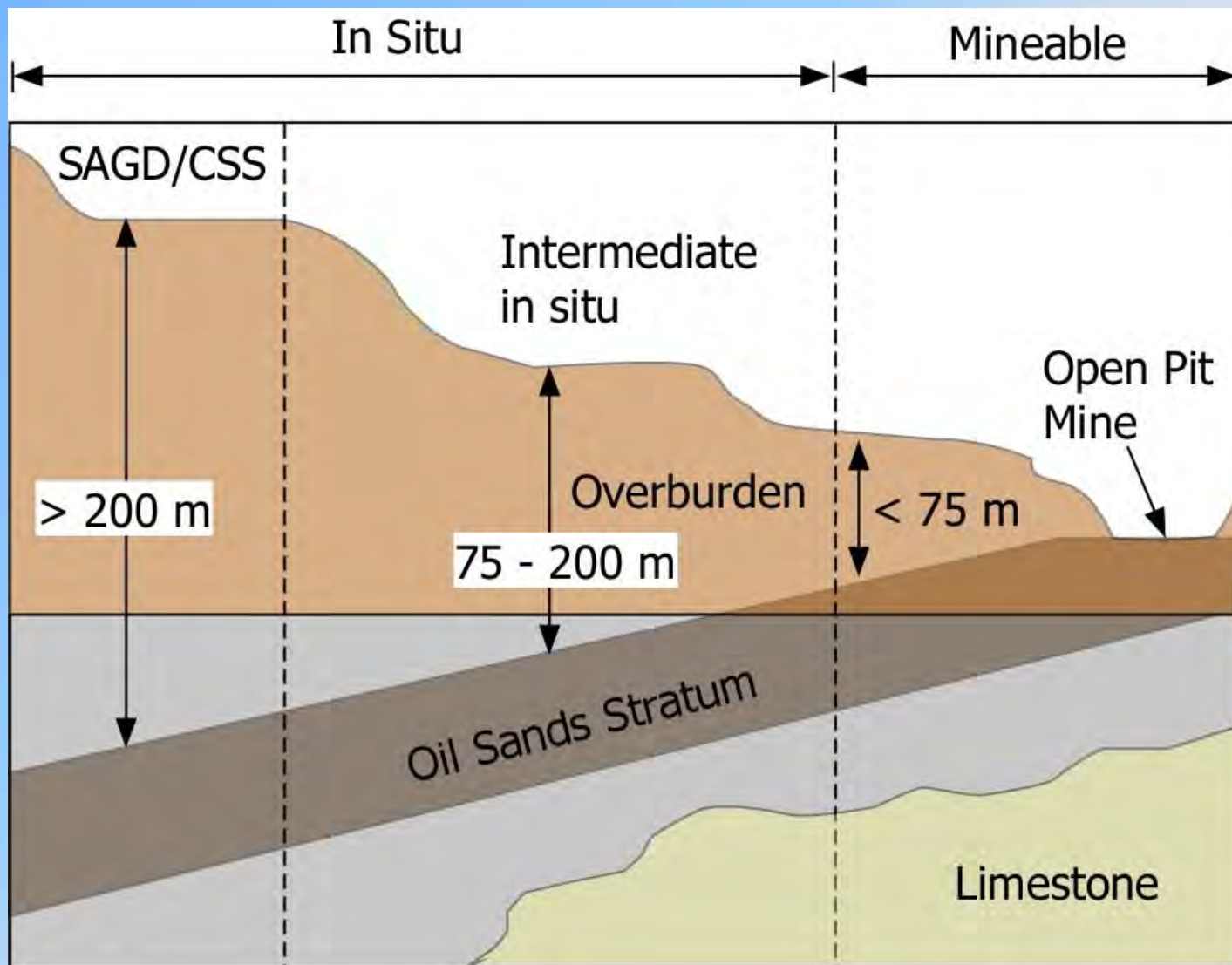
Canadian Oil Sands Products



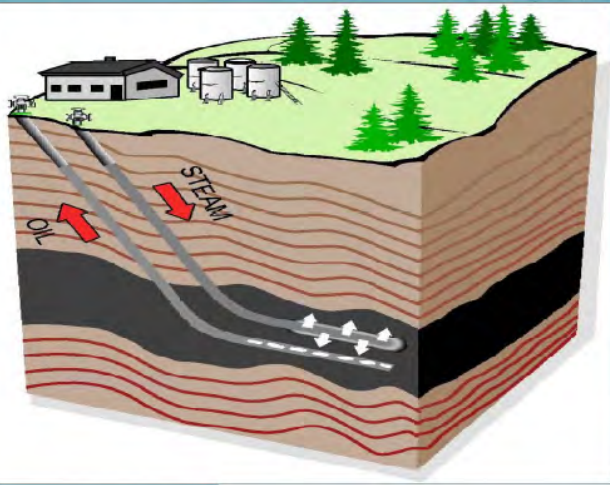


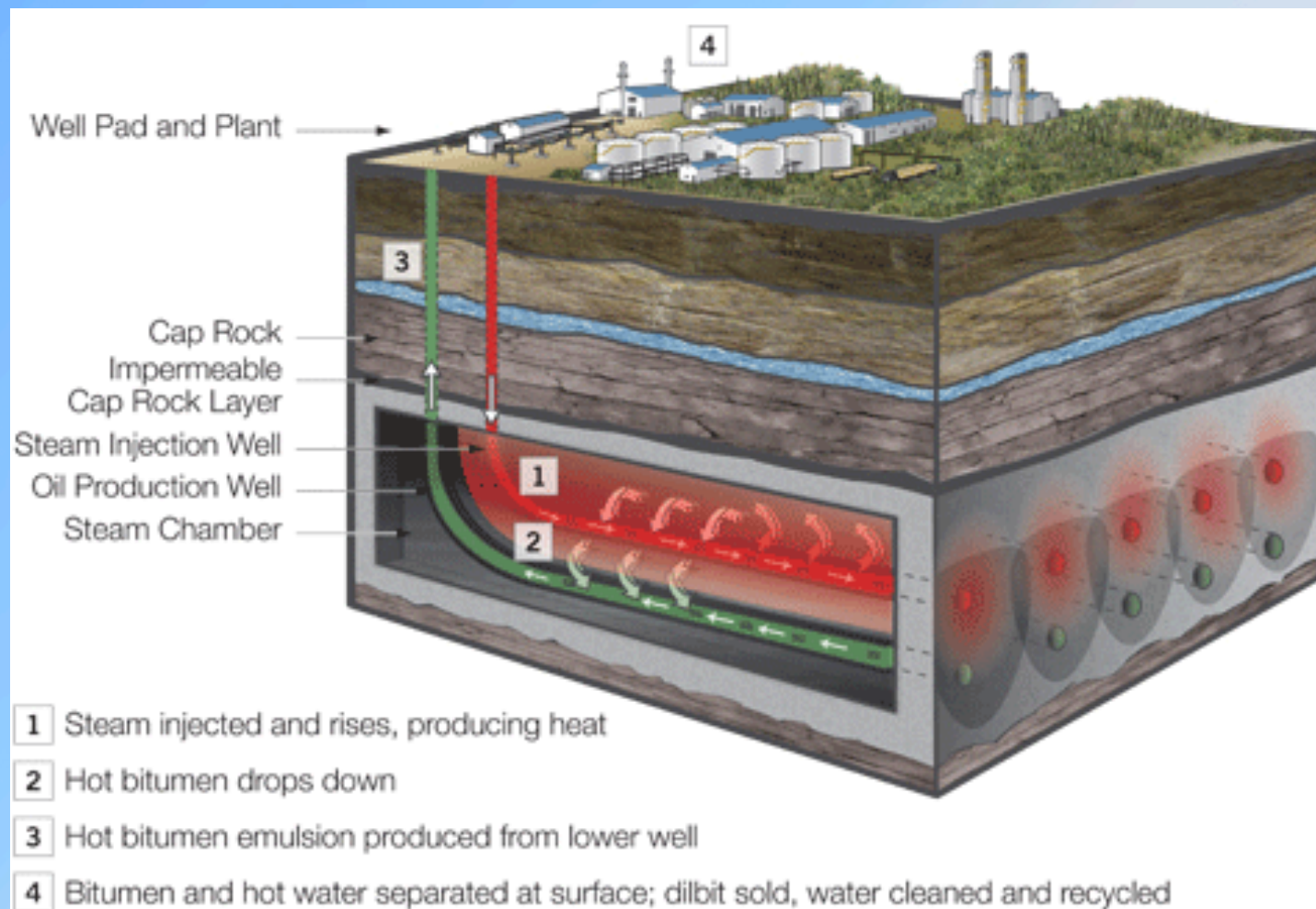
Oil Sands

Glacial
Till



Surface mining vs. in situ production





Emerging Energy Transportation Risks

Oil Sands Products

Oil sands/(tar sands): Naturally-occurring combination of bitumen, clay, sand, and water

Bitumen: Viscous raw petroleum product resulting from in-situ partial biodegradation of crude oil reserve

Diluent: Any lighter viscosity petroleum product used to dilute bitumen for transportation. CRW, or crude naptha has been the most common diluent.

Dilbit: Diluted bitumen, bitumen mixed with any diluent for transport (30:70)

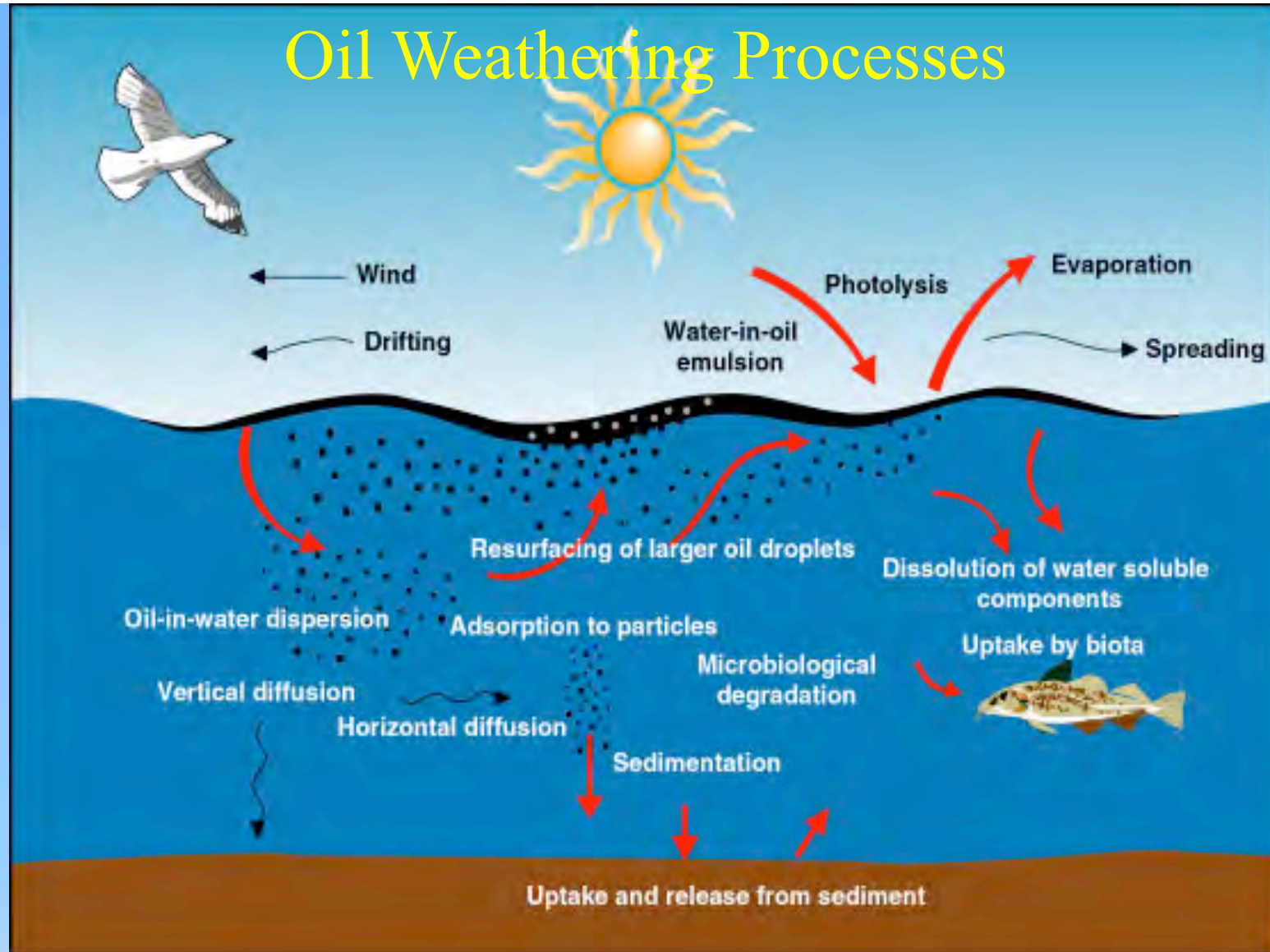
Syncrude: Synthetic crude “cracked” on site

Synbit: Bitumen combined with synthetic crude oil (50:50)

Dilsynbit: Synbit combined with a diluent



Oil Weathering Processes





**Washington State
2014 Marine and Rail
Oil Transportation Study**

ESHB 1449

- **Contingency planning requirements for rail**
- **Geographic response planning**
- **Rail and Pipeline Reporting**
- **Equipment Grants**
- **Columbia River Risk Assessment**
- **Grays Harbor Rule Development**
- **Barrel Tax Extended to Rail**
- **Oil Spill Response Account Access**
- **Rail Financial Documentation**
- **Local emergency planning**

