Crude Oil by Rail Transport
Protecting America’s Founding River
The James River Watershed

- 10,000 square miles
- 25% of Virginia’s land mass
- Home to 1 in 3 Virginians
- Encompasses 38 counties and 21 cities
- 15% of the Chesapeake Bay’s 64,000 sq. mile watershed
In Virginia, Clean Water is a Right

• Virginia’s Constitution specifies only two core functions of government:
  
  Education & Conservation

• Title IX: “...it shall be the Commonwealth's policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction...”
1952 Cuyahoga River fire – burned for 3 days

This river caught fire in 1868, 1912, 1936 & 1969
Cuyahoga River, Ohio - 1969
“The reality is that the 1969 Cuyahoga fire was not a symbol of how bad conditions on the nation’s rivers could become, but how bad they had once been. The 1969 fire was not the first time an industrial river in the United States had caught on fire, but the last. Throughout the late 19th and early 20th century, river fires were common. There were at least 13 on the Cuyahoga alone, but rivers in Baltimore, Detroit, Buffalo, Philadelphia, and elsewhere had fires as well.”

- Washington Post, June 22, 2014
By 1969, each state in the US had enacted some degree of environmental protections.

The First Earth Day celebration - 1970

US Environmental Protection Agency founded – 1970

Clean Water Act – 1972

James River Association founded - 1976
2014

A Year of Change
April 30, 2014: James River, Lynchburg
Lac-Mégantic, Québec, Canada
July 6, 2013

1.6 million gallons of oil spilled  -  47 killed  -  Rail company bankrupt
Downtown Lynchburg, Virginia
High use pedestrian/bike trail, public event park, residences and businesses directly adjacent to explosion site
Known Bakken crude rail route through Virginia
Crude-by-Rail: Business is booming

**Crude By Rail Carloads**

US Class I Railroads - Loadings - AAR Statistics

- 2008: 0
- 2009: 0
- 2010: 10,000
- 2011: 30,000
- 2012: 100,000
- 2013: 450,000
Change in Originated Carloads for Class I RRs:
Q1 2010 to Q3 2011 vs. Q1 2012 to Q3 2013

To date, recent declines in coal traffic far exceed recent gains in crude oil and associated traffic.

Crude oil: 463,643
Crude industrial sand: 213,236
Paper products: 75,528
Primary metal products: 75,303
Cement: 44,378
Products of petrol. refining: 42,916
Metallic ores: 21,093
Lumber & wood: 13,294
Ground earths & minerals: -8,279
Waste & scrap: -56,003
Food: -78,404
Chemicals: -263,839
Grain: -684,720

Source: AAR - Freight Commodity Statistics
Bakken crude oil

Oil from the Bakken shale formation which is primarily in North Dakota, where production has skyrocketed in recent years due to the availability of hydraulic fracturing ("fracking") techniques. It is sometimes referred to as a “light, sweet” crude.

Highly flammable, much more so than some crude oils. Today, Bakken crude moves in “unit trains” of up to 120 rail cars containing more than 3 million gallons, as long as a mile and a half and frequently made up of unsafe DOT-111 tankers.
"The Department of Energy found no data showing correlation between crude oil properties and the likelihood or severity of a fire caused by a derailment," Robin Rorick, director of transit issues for the American Petroleum Institute, said in a statement.

Source: UPI, “Feds irked by industry stance on oil-train safety”, March 25, 2015

Bakken crude oil has “a higher gas content, higher vapor pressure, lower flash point and boiling point and thus a higher degree of volatility than most other crudes in the U.S., which correlates to increased ignitability and flammability.”

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*:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>ORIGIN</th>
<th>VOLATILITY</th>
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<tbody>
<tr>
<td>North Dakota Sweet</td>
<td>North Dakota</td>
<td>8.56 psi</td>
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<tr>
<td>Brent</td>
<td>North Sea</td>
<td>6.17</td>
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<td>Basrah Light</td>
<td>Iraq</td>
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<td>Thunder Horse</td>
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<td>Russia</td>
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<td>Forcados</td>
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<tr>
<td>Cabinda</td>
<td>Angola</td>
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</table>

*Reid Vapor Pressure is a common measurement of how quickly a liquid fuel evaporates and emits gases.

Common toxins in Bakken crude oil obtained from hydraulic fracturing

N-Hexane
Ethyl Benzene
Xylenes
Benzene
Hydrogen Sulfide
Naphthalene

Crude oil condensate can contain sulfur, nitrogen and oxygen containing organic compounds as well as heavy metals like mercury, arsenic, nickel, and vanadium

Source: ConocoPhillips, Safety Data Sheet, Bakken crude, revised May 19, 2014
DOT-111 tanker

- The head shields are prone to puncture by couplers in collisions.
- A typical DOT-111 holds as much as 30,000 gallons.
- Valves and fittings atop the cars are poorly shielded and may open in a derailment or rollover.
- The steel shell of a dot-111 is less than a half-inch thick and easily ruptured in a derailment.

The draft sill, which connects the tank to the wheels, may fail in derailments, causing the tank to tear.

The valves on the bottom of the car may burst during an accident.
DOT-111s are rail cars designed to carry liquids, and have been in service in North America for several decades. They are prone to punctures, oil spills, fires and explosions and lack safety features required for shipping other poisonous and toxic liquids. As crude production in the United States has surged exponentially in recent years, these outdated rail cars have been used to transport the crude oil throughout the country.

The U.S. and Canadian government recognized decades ago that the DOT-111s were unsafe for carrying hazardous materials, finding that the chance of a “breach” (i.e., loss of contents, potentially leading to an explosion) is over 50% in some derailment scenarios.

U.S. and Canadian safety investigators have repeatedly found that DOT-111s are unsafe and recommended that they not be used for explosive or hazardous materials, including crude oil; however, the U.S. government’s proposal to phase out these rail cars fails to take sufficient or immediate action to protect the public.
Between 1975 and 2012, 800,000 gallons of oil spilled due to rail accidents.

In 2013 alone, 1.15 million gallons were spilled.
Crude-by-Rail across the US
Crude-by-Rail: JRA Policy Goals

• Increased rail line inspections

• **Improved federal safety standards:**
  • Speed limits
  • Adequate insurance
  • Safe tanker design req’ts
  • Reclassification of Bakken crude oil based upon its high volatility
  • Req’d notification of local & state gov’ts of hazardous material rail transport in relevant jurisdictions
Upper James Riverkeeper
To Protect & Restore the upper & middle James River, tributaries and streams:
The ears, eyes and voice of America’s Founding River

TheJamesRiver.org
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waterkeeper.org

“Upper James Riverkeeper”
“James River Association”
Protect America’s Founding River...

RiverAtRisk.org