A New Jersey Work Environment Council Fact Sheet

BAKKEN CRUDE OIL BY RAIL: NEW DANGERS FOR FIREFIGHTERS

The number of railroad tank cars containing extremely flammable crude oil from North Dakota's Bakken oil fields crossing the nation has increased dramatically, from less than 10,000 tank cars in 2008, to more than 400,000 in 2013. CSX and Norfolk trains travel through at least 11 New Jersey counties and many towns.

Deadly Derailments, Inadequate Tank Cars, and Decaying Bridges

Bakken crude is lighter and much more flammable than heavier oil. Thus, train derailments have resulted in fires and explosions. A 2013 derailment in Quebec led to a fire that killed 47 people. 2014 derailments include Lynchburg, VA (spill of 30,000 gallons into a river); Casselton, ND (spill of 400,000 gallons, fire, explosion, and evacuation of 1,400 people); and Aliceville, AL (explosion of 2.7 million gallons). The Alabama, North Dakota and Quebec spills were all from old DOT-111 tank cars, which are not designed for flammable liquids and are vulnerable to puncture. Deteriorating bridges also contribute to the risk.

Hazards for Firefighters, other Responders, and the Public

- Huge volumes: unit trains – containing mostly all one material – may hold three and one/half million gallons of crude oil in 100 cars, and may be a mile long.
- Toxic vapors, including hydrogen sulfide, benzene (a carcinogen), and toxic combustion products such as carbon monoxide, oxides of sulfur and nitrogen, and aldehydes.
- Highly flammable gases, although some oil may be processed to remove the flammable components before shipment. See table on the reverse which shows flammability data for Bakken and other sweet crude, and compares it to bitumen from tar sands.
- Toxic and flammable vapors can create explosions outdoors and in confined spaces, such as sewers. Heavier gases may accumulate in low areas, travel to an ignition source, and flash back.

Evacuation a Major Challenge

The 2012 US DOT *Emergency Response Guidebook, Guide 128,* says for a large spill of crude oil, consider initial downwind evacuation for at least 1000 feet; for a fire in just **one** tanker car, consider an initial evacuation of a **half mile in all directions.**

Pre-Incident Planning Challenges

There is a need to:

- Plan an enormous evacuation, often in densely populated areas.
- Have a large quantity of foam, specialized high-volume foam equipment, protective equipment, such as SCBAs for long duration operations, trucks and high volume water supplies.
- Train for large-scale response, involving a well-coordinated Incident Management System, more robust than responders often use.
- Ensure local, county, state, and federal agency, rail and oil industry cooperation. Planning and drills must include all of these parties, plus the public and unions representing railroad and first response workers.
- Have advance information on what trains are carrying what materials where. To-date, railroads like CSX and Norfolk Southern have refused to provide this information to local level responders.
- Also, all crude oil carries the same placard (# 1267), despite widely varying properties.

Measures of Flammability of Bakken Light Sweet Crude and Bitumen Emulsion

Source	Flashpoint, degrees F	Vapor pressure, psi @ 100 F	LEL + UEL, vol % in air	Boiling point range, degrees F
Phillips 66 SDS 724160 sweet crude, 4/25/14	<20	0.6 to 10	1.1 to 6.0	-128 to 1000
Conoco Phillips SDS 825378 Bakken sweet crude, 5/19/14	<20	8.5 to 15	not determined	70 to 110
Samples from 9 cars that did not derail at Lac-Megantic, Quebec, analyzed by Transportation Safety Board of Canada	< 23	9.0 to 9.6	not determined	<97 to 118
Cenovus Energy MSDS Bitumen emulsion, 3/14/14 (Canadian tar sands oil, as prepared for transport)	298	not available	0.8 to 8.0	360

Table Sources

Phillips 66 Sweet crude: www.phillips66.com/EN/products/Pages/msds.aspx, then type in "sweet crude."
Conoco Phillips Bakken sweet crude: www.conocophillips.com/sustainable-development/Documents/2014.05.30%20825378%20Bakken%20Crude%20Oil,%20Sweet.pdf
Analysis of Lac-Megantic samples by Transportation Safety Board of Canada, www.tsb.gc.ca/eng/enquetes-investigations/rail/2013/R13DOO54/lab/20140306/LP1482013.asp.
Cenovus Energy, Inc: Bitumen: www.cenovus.com/contractor/docs/BitumenEmulsion.pdf

Tar Sands Come to New Jersey

Bitumen from Canadian tar sands oil presents other hazards. It is heavy, much less flammable than Bakken crude, and thus sinks in water, presenting a monumental cleanup challenge. But it also has flammable components, as it must be diluted to ship, usually with natural gas condensates such as naphtha. It contains sulfur and can give off hydrogen sulfide when burning. Buckeye plans to ship by rail billions of gallons of Tar Sands oil from Albany, NY to its Perth Amboy, NJ facility.

For more information

Department of Transportation (DOT): *Commodity Preparedness and Incident Management Reference Sheet*, September, 2014. Excellent guide for hazards, emergency procedures, planning and preparedness, phmsa.dot.gov/pv_obj_cache/pv_obj_id_D49E5CEF1AC2AB4A887FDA7364FDD00E87BE0200/filename/Petroleum_Crude_Oil_CERG.pdf

International Association of Fire Chiefs, *Taking the Lead: Preparing Responders for New Types of Hazmat Incidents,* April 2014*,* Discusses Bakken crude, ethanol, and liquid natural gas, which all have different flammability properties firefighters must know, and the importance of having flow-studies of materials moving through their areas. www.iafc.org/onScene/article.cfm?ItemNumber=7458

Trains Plus Crude Oil Equals Trouble Down the Track, by Curtis Tate, an overview of Bakken by rail hazards, www.mcclatchydc.com/static/features/Trains+Oil/Trouble-down-the-track.html?brand=mcd

New Jersey Work Environment Council, *Danger in the Dark,* December 2014, a report on difficulties getting Emergency Response Plans (ERPs) from the Christie Administration, counties, municipalities and railroads, and the law requiring that ERPs be public. www.njwec.org/PDF/Reports/FINAL_DangerintheDark_Report.pdf

This fact sheet was produced by the New Jersey Work Environment Council (WEC), a coalition of 70 labor, community, and environmental organizations. Go to www.njwec.org or email us at info@njwec.org.

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