

Recent Train Accidents Call for a Rational, Risk-Based, Mitigation Approach

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On March 24, 2014 the Bay Area News Group reported that the Phillips 66 oil company had submitted a draft environmental report proposing to ship crude oil through the Amtrak passenger rail network in the San Francisco Bay Area.ⁱ The company is considering rail shipments to its Santa Maria refinery that would average five trains per week with 80 tank cars - roughly 4,800 feet per train.

Recent catastrophic derailments – such as the one in Lac-Mégantic, Quebec which killed 47 people and destroyed vast areas of town – have brought the risk of tanker derailments into the national spotlight. The American Association of Railroads (AAR) notes that in 2008 just 9,500 carloads of crude were transported along Class I railroads; in 2013 the number was on the order of 400,000 carloads.ⁱⁱ The total number of accidents involving rail crude shipments has increased at a similar exponential rate as shown in the figure below.

These shipments would be carried on 205 miles of Amtrak rail that pass through four heavily populated Bay Area counties. Hinman Consulting Engineers studied the hazard they might create to Area residents and businesses. Using census data, they completed a geographical analysis of household density and property values in the counties. The analysis showed approximately **47,000 households** and **\$22 billion in improved property value** lay within 1000 feet of these rail routes.

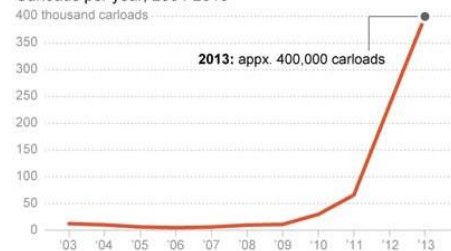
The rate of derailment was estimated using empirical models from University of Illinois researchersⁱⁱⁱ, resulting in a probability of 3.3% per year of at least one derailment in the Bay Area. When limited to only the most highly populated stretches, including Berkeley, Emeryville, Oakland, Santa Clara, San Jose and others, the estimated likelihood of at least one derailment over the next 30 years is approximately 28%, *assuming no increase in shipping volumes*.

Estimating the damage of such an incident is difficult. However, assuming certain parameters from the Lac-Mégantic accident, a reasonable estimate given a derailment along a populated stretch of track and an impact zone of 1,000 feet on either side, is that an average of **117 households could be destroyed along with \$244 million in property value**. The figure below shows in red the areas with the highest concentrations of real estate improvements along proposed shipping routes. If the event happened in the highest populated areas such as Oakland’s Jack London Square or downtown San Jose, the damage could be many times this figure. These estimates do not include loss of revenue, environmental cleanup costs, loss of human life, or other societal costs.

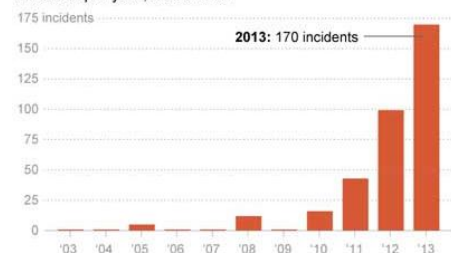
Oil transport, accidents increase

With soaring U.S. oil production, the industry has been relying more heavily on railroads to get fuel to refineries and storage centers. As a result, the number of rail tank cars that released crude oil during accidents has skyrocketed in recent years.

Carloads per year, 2004-2013



Incidents per year, 2003-2013



*NOTE: Incidents per year shows individual tank cars involved in a release as separate accidents.

SOURCE: Department of Transportation

AP

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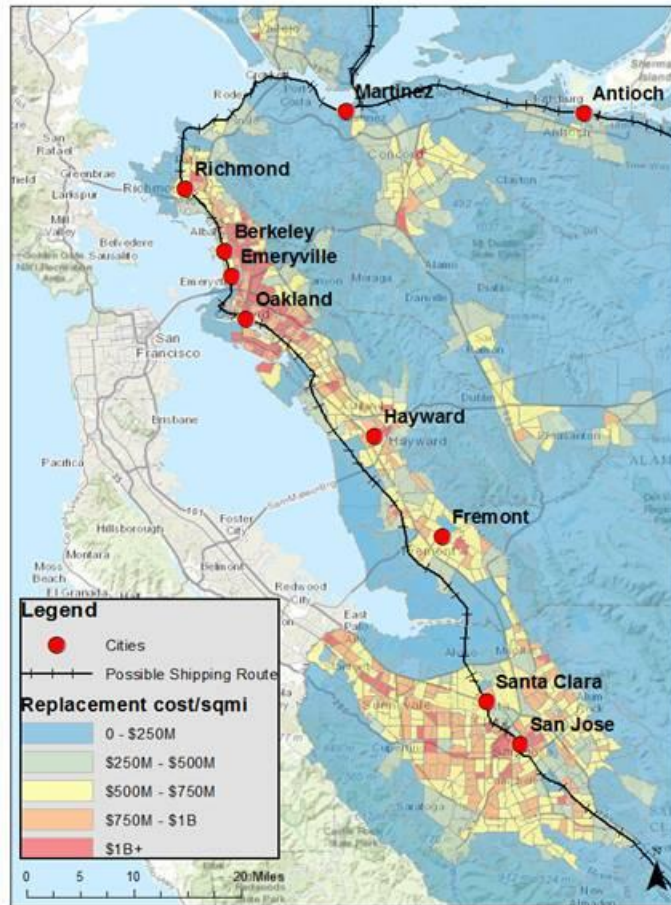
² Senior Engineer, Hinman Consulting Engineers



The risk of crude oil rail transportation can be managed using preparedness, mitigation and insurance strategies. Response training for railway personnel, as well as local officials and residents of towns through which trains pass, is a critical preparedness step that can save lives and property. If response times can be reduced through better training and notification, and departments are provided with proper equipment and sufficient supplies, the fire impact will be reduced, potentially saving homes and lives.

Mitigation of high risk segments may include strategies such as reduced speed zones, railway realignments, or construction of spill and fire barriers. A quantified risk analysis can be used to prioritize options based on a benefit-cost analysis and their "return on investment," and to help insurers more efficiently underwrite liability, property and business interruption policies.

Building Replacement Costs along Rail Shipping Routes



The AAR estimated that by mid-2013 about 900,000 barrels of Bakken crude were being produced every day, a significant fraction of the approximately 7.5 million total barrels per day produced domestically^{iv}. Crude oil transportation by rail will continue to be a necessary component of the nation's energy supply for many years. Recent and tragic incidents in North America, however, show that the oil boom has brought with it new transportation risks that should be carefully considered.

ⁱ Lochner, T. "East Bay and South Bay passenger rail corridor proposed to move crude oil." *Contra Costa Times*. <http://www.contracostatimes.com/news/ci_25412227/east-bay-and-south-bay-passenger-rail-corridor> Accessed 25 Mar. 2014.

ⁱⁱ American Association of Railroads, "Moving Crude Oil by Rail," AAR, December, 2013

ⁱⁱⁱ Anderson, R. and Barkan, C., "Derailment Probability Analyses and Modeling of Mainline Freight Trains", <<http://ict.illinois.edu/railroad/CEE/pdf/Conference%20Proceedings/2005/Anderson%20and%20Barkan%202005.pdf>> Accessed 18 Jan. 2014.

^{iv} Ibid, AAR