Oil by Rail Safety in California

Preliminary Findings and Recommendations

A crude oil train travels across the Clear Creek Trestle in Plumas County, California and through the Feather River Canyon on June 5, 2014.

State of California
INTERAGENCY RAIL SAFETY WORKING GROUP

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I. Introduction

California is on the cusp of dramatic changes in how oil is transported to the state. In 2012, about 70% of oil imported by California refineries came through marine terminals;[1] only one million barrels or 0.3% came by rail.[2] In 2013, crude oil imports by rail jumped 506% to 6.3 million barrels, or approximately 1% of total imports.[3] Many experts, including the California Energy Commission, project that this number could increase by up to 150 million barrels, or 25% of total imports, by 2016. There currently are at least a half dozen planned infrastructure projects statewide that would facilitate greatly expanded oil by rail shipments, either refinery expansions and retrofits allowing for processing of more imported oil, such as from the Bakken shale formation in North Dakota, or expansion of rail terminal facilities.[4] To date, most crude oil by rail has come from Canada and North Dakota.

These trends parallel what has been a sharp increase in oil by rail shipments nationally, especially in response to increases in production of oil from the Bakken shale formation. Oil from the Bakken is high-quality, light, sweet crude, making it more valuable and economically competitive than some of the other domestic crude oils. While moving oil by rail is more expensive than by pipeline ($12/barrel of oil (bbl) versus $6/bbl), it is faster and offers greater flexibility, enabling companies to take advantage of $30/bbl price differentials across the United States. Industry is currently investing heavily in rail infrastructure and rail tank cars; Burlington Northern Santa Fe plans to invest $400 million to expand rail capacity in North Dakota alone.[5] Over the last several years, oil by rail in the United States has increased from 9,500 carloads in 2008 to 434,000 carloads in 2013.[6] (A carload holds about 600 to 700 barrels, or between 25,000 to 30,000 gallons.)[7]

The federal government has primary authority over railroad safety. California, however, enforces federal requirements, as well as state specific rules, and state and local agencies have the lead in the areas of emergency planning, preparedness and response. States additionally can help ensure that federal and voluntary industry actions are adequate given the risks posed by oil by rail. In January 2014, the Governor's Office convened a Rail Safety Working Group to examine safety

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[1] Office of Spill Prevention and Response, "OSPR Statewide Oil Program: Briefing to the Governor's Office," December 19, 2013.

[2] California Energy Commission, "Crude Imports by Rail (2012, 2013, 2014)," Energy Almanac, last modified May 2014, http://energyalmanac.ca.gov/petroleum/statistics/2013_crude_by_rail.html.

[3] Ibid.

[4] These include:

- Bakersfield – Plains All American (under construction): 90 cars per day
- Pittsburg – WesPac Energy Project (planned): 70 cars per day, construction could begin in early 2014 and would reach completion in about 18 months
- Benicia – Valero (planned): 100 cars per day, could be operational by the first quarter of 2015
- Bakersfield – Alon (planned): 200 cars per day
- Wilmington – Valero (planned): 85 cars per day
- Santa Maria – Phillips 66 (planned)

[5] Burlington Northern Santa Fe, "BNSF 2014 Capital Spending Now in Full Swing: $1 Billion Going to Northern Corridor States," May 1, 2014, http://www.bnsf.com/media/news-releases/2014/may/2014-05-01a.html.

[6] Association of American Railroads, "Moving Crude Oil by Rail," December 2013, https://www.aar.org/keyissues/Documents/Background-Papers/Crude-oil-by-rail.pdf.

[7] Association of American Railroads, "Just the Facts – Railroads Safely Move Hazardous Materials, Including Crude Oil," https://www.aar.org/safety/Documents/Just%20the%20Facts%20on%20Hazmat%20and%20Crude%20Oil%20Safety.pdf.

concerns and recommend actions the state and others should take in response to this emerging risk.[8] This report contains a summary of initial recommendations from the Working Group.

II. Scope of the Problem

A. Recent Accidents and Risks of Oil by Rail Transport

As oil by rail shipments have increased in recent years, there has been a dramatic increase in the number of incidents involving crude oil by rail. Nationally, rail incidents rose from several per year prior to 2010 to 155 in 2013, and 90 thus far in 2014.[9] More crude oil by volume was spilled in rail incidents in 2013 than was spilled in the nearly four decades prior.[10] California is experiencing similar trends, albeit on a smaller scale to date. Incidents involving oil by rail in California increased from 3 in 2011 to 25 in 2013; as of May, there have been 24 thus far in 2014.[11] Total petroleum spills by rail in California (crude oil and other) increased from 98 in 2010 to 182 in 2013.[12] Most reported incidents document a relatively small volume of oil released, but as detailed below, the potential for high-consequence incidents will increase as more oil is transported by rail.

Incidents involving crude oil from the Bakken shale formation have been particularly devastating – most notably, the tragic accident in July 2013 in Lac-Mégantic, Quebec, where 63 tank cars of crude oil exploded, killing 47 people.[13]

Lac-Mégantic, Quebec[14]

[8] The Working Group includes representatives from the California Public Utilities Commission, California Office of Emergency Services, California Environmental Protection Agency, Department of Toxic Substances Control, California Energy Commission, California Natural Resources Agency, California Office of the State Fire Marshal, Department of Oil, Gas and Geothermal Resources, and Office of Spill Prevention and Response.
[9] Pipeline and Hazardous Material Administration, "Incident Reports Database Search," Office of Hazardous Materials Safety, June 2014, https://hazmatonline.phmsa.dot.gov/IncidentReportsSearch/search.aspx.
[10] McClatchyDC, "More oil spilled from trains in 2013 than previous 4 decades, federal data show," January 20, 2014, http://www.mcclatchydc.com/2014/01/20/215143/more-oil-spilled-from-trains-in.html.
[11] California Office of Emergency Services, "Historical HazMat Spill Notifications," May 6, 2014, http://www.calema.ca.gov/HazardousMaterials/Pages/Historical-HazMat-Spill-Notifications.aspx.
[12] Ibid.
[13] Congressional Research Service, "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress," May 5, 2014, http://www.fas.org/sgp/crs/misc/R43390.pdf.
[14] The Atlantic, "Freight Train Derails and Explodes in Lac Mégantic, Quebec," July 8, 2013, http://www.theatlantic.com/infocus/2013/07/freight-train-derails-and-explodes-in-lac-megantic-quebec/100548/.

In addition to Lac-Mégantic, there have been eight major accidents in 2013 and 2014 combined:[15]

- **October 19, 2013 – Gainford, Alberta**: No injuries, 100 people evacuated, 13 cars derailed (9 carrying liquefied petroleum gas and 4 carrying Canadian crude oil)
- **November 8, 2013 – Aliceville, Alabama**: No injuries, 30 cars carrying North Dakota crude oil derailed
- **December 30, 2013 – Casselton, North Dakota**: No injuries, 1,400 people evacuated, 34 cars derailed (20 carrying North Dakota crude oil)
- **January 7, 2014 – Plaster Rock, New Brunswick**: No injuries, 17 cars derailed (5 carrying Canadian crude oil)
- **January 20, 2014 – Philadelphia, Pennsylvania**: No injuries, 7 cars derailed (6 carrying Canadian crude oil)
- **February 13, 2014 – Vandergrift, Pennsylvania**: No injuries, 21 cars derailed (19 carrying Canadian crude oil)
- **April 30, 2014 – Lynchburg, Virginia**: No injuries, 15 cars carrying crude oil derailed
- **May 9, 2014 – LaSalle, Colorado**: No injuries, 6 cars carrying crude oil derailed[16]

The causes of these accidents vary and some are still being investigated, but they include track failures, inadequate rail car equipment, and human error (such as leaving cars unattended without proper braking systems). Federal safety experts believe many recent rail car failures are due to the rupture of tank cars containing a pressurized liquid above its boiling point, and are closely examining the potential unique risks posed by transporting oil from the Bakken shale formation. The concern is that the light, gasoline-like nature of the crude oil from Bakken (and other similar shale plays) is inherently more flammable than other crude oil and makes such rail car ruptures more likely, especially given existing tank car standards. Others posit that oil producers are not extracting enough propane (or other natural gas liquids) from Bakken, and similar crude oil, before transport, thereby exacerbating the risk of rupture.

The National Transportation Safety Board (NTSB) has also found numerous deficiencies in the regulation of rail safety. These include that crude oil transported by rail sometimes has been incorrectly characterized and labeled, and not transported with the level of protection mandated for the degree of hazard posed, inadequacies in route planning to avoid population centers and environmentally sensitive areas, and a need for auditing rail carriers to ensure adequate response plans are in place.[17] In addition, a comprehensive recent report by New York found similar weaknesses in the existing regulatory scheme, including: outdated tank cars with insufficient placards, a lack of critical information about the characteristics of crude oil being transported, a

[15] Congressional Research Service, "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress," May 5, 2014, http://www.fas.org/sgp/crs/misc/R43390.pdf.
[16] Huffington Post, "6 Cars Of Crude Oil Train Derail Near LaSalle, Colorado," May 10, 2014, http://www.huffingtonpost.com/2014/05/10/crude-oil-train-colorado_n_5298679.html.
[17] National Transportation Safety Board, "Safety Recommendation R-14-1," January 23, 2014, http://www.ntsb.gov/doclib/recletters/2014/R-14-001-003.pdf.

lack of data about trends in the movement and volume of crude oil, and a need to expand and update federal environmental and contingency response plans.[18]

B. Oil by Rail Routes and Risks in California

In California, trains transporting crude oil are expected to travel via the Feather River or Donner Pass to the Bay Area, the Tehachapi Pass to Bakersfield, or into Los Angeles. As a result, they will travel through some of the state's most densely populated areas, as well as some of the most sensitive ecological areas, since rail lines frequently operate near or over rivers and other sensitive waterways in the state.

Agencies in the Working Group collaborated to identify and map areas along rail routes with potential high vulnerability, and to identify the locations of emergency response teams relative to the vulnerabilities.[19] As seen in the attached map, there are serious risks throughout the state from oil by rail and significant gaps in local emergency response capabilities.

Specifically, the mapping exercise found the following:

- High hazard areas[20] for derailments are primarily located in the mountains, with at least one such site along every rail route into California. Some high hazard areas are also located in more urban areas, such as in the San Bernardino-Riverside and San Luis Obispo regions. Overall, high hazard areas represent an estimated 2% of track and 18% of the derailments that have occurred.[21] This means that 82% of derailments have occurred in a wide range of other locations. The high hazard areas do not reflect the locations of other types of rail accidents (e.g., collisions). Therefore, while the highlighted areas are important, they are not the only sites where accidents may occur.

- Areas of vulnerable natural resources are located throughout the state, including in urban areas. A rail accident almost anywhere in California would place waterways and sensitive ecosystems at risk. The high hazard areas for derailments are generally located in areas with high natural resources vulnerability and nearby waterways (e.g., Dunsmuir, the Feather River Canyon).

- Emergency hazardous material response teams ("hazmat") in California have generally good coverage of urban areas, but none are located near the high hazard areas in rural Northern California. Some areas such as Yuba City and Monterey only contain "Type III Hazmat" teams, units that are equipped to perform only in a support rather than lead role during a major chemical or oil incident.

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[18] State of New York, "Transporting Crude Oil in New York State: A Review of Incident Prevention and Response Capacity," April 30, 2014, http://www.governor.ny.gov/assets/documents/CrudeOilReport.pdf.
[19] The map was prepared by OSPR, OES, CPUC, CalEPA, and the California Department of Technology.
[20] "High hazard areas" are areas that were identified in Decision 97-09-045 of the California Public Utilities Commission, and were identified either by a statistically significant high frequency of derailments, or by the existence of restrictive railroad operating rules to address unusually risky operating characteristics such as steep grade and sharp curves. There is considerable overlap between the two identification criteria.
[21] For 2003 to 2013 in areas identified via the statistical method described in the preceding footnote.

Other populated areas near rail routes, such as Stockton, San Luis Obispo, Santa Maria, and Barstow, contain only "Non-Certified Hazmat" teams, which are local teams that have not applied to be certified by the state as meeting certain levels of training and equipment.[22]

- Population centers, schools, and hospitals are frequently located near rail lines in urban areas and in the Central Valley. A highly populated area is located near a major high hazard area for derailments in the San Bernardino-Riverside area.

- Earthquake faults in California are located along rail lines in many areas, especially in urban areas in and around Los Angeles and the Bay Area. A major earthquake could damage tracks and bridges beyond the immediate area of the marked faults.

III. Government Actions to Date

A. Federal

Federal law governs most major aspects of rail transport, and preempts most state regulation. The principal agency responsible for promulgating and enforcing the safety of rail shipments of crude oil is Department of Transportation (DOT), and specifically within DOT: the Federal Railroad Administration (FRA) and the Pipeline and Hazardous Materials Safety Administration (PHMSA).

DOT has responded to the spate of accidents and increased volume of oil by rail with a series of increasingly stringent emergency orders and advisories.[23] Among the most important of the federal actions are the following:

- Requirements for proper testing, characterization, classification and designation of oil shipped by rail
- Investigation of how shippers and carriers are classifying crude oil
- Review of crew staffing levels and operating procedures
- Requirement for updated safety and security plans

[22] Although Non-Certified Hazmat teams are not a part of the formal mutual aid system, they may be fully capable of responding to and mitigating an event.

[23] The actions include:

August 2013 - Operation Classification
August 2, 2013 - Joint FRA-PHMSA Safety Advisory 2013-06
August 7, 2013 - FRA Emergency Order 28
September 6, 2013 - PHMSA Advanced Notice Of Proposed Rulemaking (ANPRM): Rail Petitions and Recommendations to Improve the Safety of Railroad Tank Car Transportation
November 20, 3013 - Joint PHMSA-FRA Safety Advisory 2013-07
January 2, 2014 - PHMSA Safety Alert, Preliminary Guidance from Operation Classification
January 21, 2014 - NTSB Safety Recommendations to FRA and PHMSA
February 21, 2014 - 8-Part Agreement between DOT and the Association of American Railroads
February 25, 2014 - DOT Emergency Restriction/Prohibition Order
March 6, 2014 - DOT Amended and Restated Emergency Restriction/Prohibition Order
May 7, 2014 - DOT Emergency Restriction/Prohibition Order, FRA Safety Advisory 2014-01

- Restrictions on leaving trains unattended
- Requirement for advance notification to State Emergency Response Commissions of weekly shipments of significant volumes of Bakken crude oil by county

PHMSA also has initiated a rulemaking to consider revisions to the regulations governing the transportation of hazardous materials by rail. The changes under consideration include more stringent requirements for the tank cars most typically used to transport Bakken or other crude oil, DOT Specification 111 (DOT-111) tank cars. In addition, earlier this year DOT reached an agreement with the Association of American Railroads (AAR) under which industry agreed to eight voluntary safety measures, including: reduced speed for crude oil trains with older tank cars going through urban areas, analyses to determine the safest routes for crude oil trains, increased track inspections, enhanced braking systems, installation of wayside defective bearing detectors along tracks, better emergency response plans, improved emergency response training, and working with communities through which oil trains move to address community concerns. The voluntary measures go into effect between March and July 2014.

B. California

At the state level, the California Public Utilities Commission (CPUC) shares authority with the federal government to enforce federal rail safety requirements, and also has authority to enforce state safety rules. The CPUC has also been an active participant in federal rulemaking efforts, including through the FRA's Railroad Safety Advisory Committee.

Various state agencies engage in prevention, planning, emergency response, and cleanup activities applicable to oil by rail, including the Office of Emergency Services (OES), the Office of State Fire Marshal (OSFM), California Environmental Protection Agency (CalEPA), and the Office of Spill Prevention and Response (OSPR). These state agencies are all beginning to prepare for the heightened risks posed by oil by rail. Local agencies, including the local Certified Unified Program Agencies (CUPAs), also play critical roles in emergency preparedness and response, and have expressed growing concern about increased oil by rail transport.

Several aspects of the state's emergency response framework are currently being updated: The CalEPA Emergency Response Management Committee is revising the Hazardous Material and Oil Spill annex of the State Emergency Plan, OES is leading an effort to review and update the six Regional Plans for Hazardous Materials Emergency Response, and OES has also re-started meetings of the State Emergency Response Commission (SERC), the federally-mandated state coordinating body for hazardous materials release response planning.

IV. Recommendations

The Working Group's preliminary findings and recommendations are set forth below. In sum, while the federal actions taken to date are significant, they do not go far enough to address the risks of increased oil by rail transport. The state should press both the federal government and the railroad industry to take additional safety measures. Additionally, the state should strengthen its inspection and enforcement resources, remedy significant gaps in its emergency preparedness and response programs, and provide the public with an interactive map showing potential high risk areas from oil by rail traffic.

1. Increase the Number of California Public Utilities Commission Rail Inspectors

The CPUC is responsible for enforcing federal and state railroad safety requirements, including those governing railroad tracks, facilities, bridges, rail crossings, motive power and equipment, operating practices, and hazardous material shipping requirements.

The CPUC has only 52 total authorized positions in the Railroad Operations and Safety Branch to handle inspections, investigations, and risk assessment and analysis for railroad operations (freight and passenger), including inspections of rail cars and thousands of miles of rail track, bridges and railroad crossings in the state. This staffing level is seriously inadequate given current and projected numbers of oil shipments. With existing resources, the CPUC is often not able to meet its statutory mandate to inspect every mile of railroad annually. Increased transportation of oil by rail will mean more tank cars subject to inspection, increased tonnage and wear and tear on track and structures, and greater potential for hazardous spills with explosive potential, creating a corresponding greater need for resources.

The Legislature should approve the proposal in the Governor's Budget to add seven rail inspectors to the CPUC so that it can carry out additional inspections and enforcement actions related to tank cars, railroad lines, bridges, and hazardous material shipping requirements necessary to respond to increases in the transport of oil by rail.

2. Improve Emergency Preparedness and Response Programs

The state needs to strengthen all aspects of its emergency preparedness and response programs to deal with the threats posed by oil by rail – from preparedness and training in advance of any incidents to effective response and cleanup after an incident occurs. State and local agencies have important, complementary responsibilities in this area. OES is responsible for coordinating emergency response statewide, while local agencies typically are the first on the scene responding following an incident. These agencies handle initial emergency response and immediate actions to abate the hazard. In the event of an oil spill, OSPR manages the incident, including cleanup, natural resource protection, hazardous waste management, and cost recovery from responsible parties. As agencies update their programs, they should do so in a coordinated fashion that does not result in duplicative efforts or obligations on industry.

Specific recommendations in this area include the following:

a. Expand the Oil Spill Prevention & Response Program to Cover Inland Oil Spills

The State Office of Spill Prevention and Response (OSPR) has a program to prevent, prepare for, and clean up oil spills in waters off the California coast, funded by a per barrel oil fee of 6.5 cents on oil transported over marine water. OSPR, however, has no comparable fee structure or authority for preparedness activities for oil that is transported to or within California by rail or pipeline, even though it is designated in statute as the state Incident Commander for spills to inland waters of the state. Therefore OSPR has no program in place to prepare for

and respond to oil spills to inland rivers, streams, or other water bodies, despite the fact that rail lines frequently operate near sensitive waterways in the state.

The Legislature should fund the proposal in the Governor's Budget to extend the per barrel fee to cover all sources of crude oil sent to refineries in the state, and to provide OSPR with the regulatory authority and resources to establish an inland spill preparedness and response program. This will enable OSPR to expand its proven maritime oil spill program to inland areas. The program will: support existing prevention measures as appropriate, enhance preparedness for spills (including training and drills, cleanup contractor testing requirements, industry drills and exercises, geographic response and contingency planning, oiled wildlife rescue and multi-agency coordination), and allow OSPR to oversee responses to oil spills in order to maximize containment, protect and restore natural resources, and ensure effective cleanup. These activities should be closely coordinated with the work of state and local emergency response agencies, as described below.

b. Provide Additional Funding for Local Emergency Responders

According to a recent analysis conducted by OES, numerous local emergency response offices lack adequate resources to respond to oil by rail accidents. Many of these first responders are in rural areas, such as Plumas, Siskiyou, and Modoc counties, where some of the highest risk rail lines are and some of our state's most pristine natural resources are located. Additionally, many of these areas have little or no funding for firefighters and rely on volunteer firefighters. Specifically, 40% of the fire fighters in California are volunteer firefighters, with many fire departments entirely staffed by volunteer firefighters. These departments lack the necessary capacity to support a hazmat team to purchase or maintain necessary specialized vehicles and equipment, or to obtain training in the specialized areas of oil rail safety and flammable liquid, and their response time to a significant oil by rail accident could be hours. Moreover, these small departments cannot rely on the assistance of larger, certified departments because those departments could be engaged in an incident locally and would be unavailable.

The Legislature should authorize additional funding to establish regional hazardous materials response teams and otherwise remedy the gaps in local emergency response training, equipment, and planning capabilities needed to adequately prepare for oil by rail incidents.

c. Review & Update of Local, State and Federal Emergency Response Plans

The State of California has several local, state and federal emergency response plans for government agencies to respond to and minimize the impacts of potential hazardous material incidents. These are implemented through various local and regional agencies, including Local Emergency Planning Committees (LEPCs) and six Mutual Aid Regions.

OES is currently leading an effort to review and update the six Regional Plans for Hazardous Materials Emergency Response, with the goal of developing a more

standardized approach to local emergency planning. As part of this assessment and update, OES should incorporate elements for responding to crude oil by rail incidents. OES should also review local Area Plans – plans prepared by local agencies that serve as a blueprint for responding to hazardous materials releases – to determine if updates due to potential increases in oil by rail incidents are appropriate.

In addition, OES, CalEPA and OSPR should partner with US EPA Region 9 and the FRA to undertake a review of local, state and federal emergency response plans to ensure they address the risks associated with increased transportation of oil by rail in California.

d. Improve Emergency Response Capabilities

Emergency responders currently lack basic, critical information needed to help plan for and respond to oil by rail incidents, including what resources railroads can provide in the event of an accident, and how they would respond to potential worst case scenarios.

The recent voluntary agreement between AAR and DOT calls on the railroads to develop an inventory of emergency response resources available in case of a release of large amounts of crude oil along routes over which trains with 20 or more cars of crude oil operate. This inventory will include locations for the staging of emergency response equipment and, where appropriate, contacts for the notification of communities. When the inventory is completed, railroads will provide DOT with information on the deployment of the resources and make the information available upon request to appropriate emergency responders.

In light of this agreement, OES should request that railroads provide a complete inventory of their firefighting and spill recovery resources to the state. Effective response capability planning requires that the state has information in advance on the type of equipment available, strategic location of the resources, as well as the amount accessible. This inventory assessment should also indicate how resources are deployed, the trigger points for deployment, and the contact names and numbers for these resources to be made available to the local emergency responders.

In addition to these resource inventories, OES, in coordination with OSPR, should request that the railroads provide “Worst Case Scenario” plans for responding to a multi-car incident in any part of California.

For oil by rail, a Worst Case Scenario plan would likely involve a major train derailment in a highly populated part of the state with 10 or more tank cars breaching, burning, exploding, and spilling oil downhill, resulting in high loss of life and extensive damage to buildings and communities. An example like this should be used to test the emergency response plans of the county or region that could be affected, and reveal any gaps in the response plans.

With both an inventory of resources and Worst Case Scenario plans from the railroads, state and local emergency responders can effectively test response capabilities and update Regional Plans and local Area Plans.

e. Request Improved Guidance from United States Fire Administration on Resources Needed to Respond to Oil by Rail Incidents

While the International Association of Fire Chiefs has recently provided helpful direction on planning for the safe transport of crude oil by rail, there is a need for additional guidance. Currently, nationwide, response teams and firefighters are unsure of the best response techniques and quantities of resources necessary to respond to oil by rail accidents, especially in light of recent explosions. Lessons can be learned from previous accidents in both the United States and Canada.

OSFM should request that the United States Fire Administration promptly issue guidance on the resources required, including, but not limited to:

i. Training based upon lessons learned during recent accidents across the United States to prepare firefighters for derailment, spill/leak, and fire risks. Training should highlight best practices from lessons learned from previous incidents and required resources for the hazard classification of this type of crude oil product.
ii. Provide accessible training in multiple formats (web based, video, or instructor facilitated) that allows for each state's fire service training organization to deliver the training to meet specific needs.

f. Increase Emergency Response Training

California firefighters and first responders lack training in the specialized areas of oil rail safety and flammable liquid, as well as financial resources to attend out of state trainings. To maximize state training capabilities, the state has begun planning for a multi-agency West Coast Regional Training Center in Sacramento. OES and OSFM should seek partnerships with railroads and oil companies to help fund establishment of this center.

3. Request Improved Identifiers on Tank Placards for First Responders

Information about the flash point and vapor pressure of the specific type of crude oil in each tank car is of critical importance in the event of a derailment so that emergency responders can quickly determine what resources and equipment are needed to contain the incident. Currently, this information is on-board the train, but not captured visually on tank car placards. If first responders can quickly identify an incident involving Bakken, or similar crude, from a safe distance by using the visual information on the placard, decisions can be made on whether to attack the fire or spill, or take a more defensive posture and wait for additional resources.

As New York recently concluded in its report, the United Nations, which assigns unique hazardous materials identifiers on tank placards, should recommend new classifications based on crude oil characteristics to enable appropriate packaging and inform response personnel as

to the qualities of the crude oil and the State of California supports this recommendation. This would provide the immediate visual identification required.

Alternatively, if the United Nations does not assign a new classification for this category of crude oil, OES, in coordination with CPUC should recommend that DOT, at a minimum, require some kind of external visual identification on tank cars of Bakken and similar crude, to aid first responders nationwide.

4. Request Railroads to Provide Real-Time Shipment Information to Emergency Responders

As noted, DOT recently issued an order requiring railroads transporting more than 1 million gallons of crude oil from the Bakken shale formation to provide the State Emergency Response Commission (the Chair of the Commission is the Director of OES) with information on expected weekly shipments of crude oil, including number of trains, contents of crude oil, and routes over which material will be transported. Upon receipt, OES will share this data with local, regional, and state emergency response offices throughout the state. OES also will share this information with the public to the maximum extent permitted by DOT rules and other applicable law.

While advance weekly information about crude by rail shipments by county is vital, local and state emergency responders and regulators will also benefit by knowing in actual real-time what is sent into the state, in what quantities, and along which routes.

CPUC and OES should request that Class I railroads operating in California establish a system where emergency responders can securely log-in and access the daily location and status of rail cars and train consists (including hazmat carload detail for Bakken crude oil and other hazardous substances).

5. Request Railroads Provide More Information to Affected Communities

The increase in oil by rail activity has generated considerable interest and concern from communities in which rail facilities are located or rail lines pass through. Communities in particular want more information about what steps the railroads are taking to ensure safety. The CPUC and OES should request that the railroads should provide better outreach programs and more information to communities, including interactive websites and open community forums, and updates on additional voluntary safety advancements.

6. Develop and Post Interactive Oil by Rail Map

The state should develop and post on a public website an interactive map depicting areas along rail lines with potential high vulnerability. The maps include layers that represent the major rail lines in California, locations of earthquake faults near rail lines, natural resource vulnerabilities (water crossings and sensitive ecosystems), population vulnerabilities (populated areas, schools, daycare centers, and hospitals), and rail segments that have an historically high frequency of derailments. The location of certified emergency response hazmat teams should be included. State agencies should update the webpage as relevant, additional information becomes publicly available

7. Request DOT to Expedite Phase Out of Older, Riskier Tank Cars

Currently, as much as 82% of crude oil in the United States is shipped in older model DOT-111 tank cars.[24] There is growing evidence that such cars are inadequate to protect against vapor explosions of highly flammable crude such as that from the Bakken shale formation. The remaining 18% of tank cars are new or retrofitted as a result of recent voluntary industry action to increase safety. As noted above, PHMSA is currently considering regulatory changes that will address tank cars, On May 7, 2014, it issued Safety Advisory 2014-01 strongly urging the phase-out of the older DOT-111 tank cars—but it did not require this by any certain date. On April 23, 2014 Canada ordered that older tank cars be phased out by May 2017 and that the least crash-resistant DOT-111 tank cars be removed from dangerous goods service within 30 days.[25]

The CPUC should request that DOT move expeditiously to finalize new and retrofitted tank car regulations that will result in a more rapid phase out of DOT 111 tank cars.

8. Accelerate Implementation of New Accident Prevention Technology

a. Positive Train Control

Positive Train Control (PTC) is an advanced technology that incorporates GPS tracking to automatically stop or slow trains prior to an accident. In particular, Positive Train Control is designed to prevent train-to-train collisions, derailments caused by excessive speed and unauthorized movement of trains onto sections of track where repairs are being made or as a result of a misaligned track switch. The Rail Safety Improvement Act of 2008 requires Class I railroads to install PTC on tracks that carry passengers or poison- or toxic-by-inhalation materials by the end of 2015.[26]

The CPUC should request that the FRA identify routes that crude oil trains are expected to run on without PTC in California under current requirements and consider requiring the implementation of Positive Train Control on these routes.

b. Electronically-Controlled Pneumatic Brakes

Electronically controlled pneumatic (ECP) brakes instantly signal a brake application to all cars, whereas current pneumatic brakes rely on lowering the air pressure in the train air brake line that can be well over a mile long.
This new braking technology provides faster application of brakes and reduces the chances of brake failure. Although each car in a train and the locomotive must be equipped with this technology, unit trains, which typically are used for oil by rail

[24] State of New York, "Transporting Crude Oil in New York State: A Review of Incident Prevention and Response Capacity," April 30, 2014, http://www.governor.ny.gov/assets/documents/CrudeOilReport.pdf.
[25] Government of Canada, "Transport Canada takes action in response to TSB's initial Lac-Mégantic recommendations," News Release, April 23, 2014, http://news.gc.ca/web/article-en.do?nid=841129.
[26] Association of American Railroads, "Positive Train Control," 2013, https://www.aar.org/safety/Pages/Positive-Train-Control.aspx#.U5DxwHJdVHU.

transport, are especially suited for this type of technology because all cars travel together and can operate efficiently under an overarching braking system.[27]

Crude oil trains represent the ideal application of this new technology.[28] Unit train cars stay together for long periods of service, new cars are being built, cars are likely undergoing retrofit, and the benefit is magnified by the magnitude of the risk reduction that would be accomplished for these high risk trains.

The CPUC should request that the FRA require electronically-controlled brake technology on crude oil trains.

9. Update California Public Utilities Commission Incident Reporting Requirements

Current CPUC reporting requirements for incidents involving hazardous materials releases have been interpreted by the railroads in varying ways, resulting in some railroads failing to report incidents, or to be late in reporting such incidents.

To ensure adequate and timely reporting, the CPUC should clarify incident reporting requirements for the release of hazardous substances by rail.

10. Request Railroads Provide the State of California with Broader Accident and Injury Data

Under federal law, states are entitled to receive information about railroad accidents and injuries provided to the federal government. However, while individual accident reports are available through the FRA's website, the state does not have access to basic, broader data (that the FRA receives) needed to determine accident and injury rates and trends for railroads operating in California—so called "normalizing data." This includes information such as the rate of accidents or injuries based on locomotive miles, passenger and freight train miles, number of passengers transported, and employee hours.

The CPUC should request that FRA provide state-specific normalizing data to enable state accident analysis, including trend analysis and risk assessment, to evaluate the risks presented by the transportation of oil by rail. (Notably, the railroads previously provided the state with this type of state-specific normalizing data for many years, but not more recently.)

11. Ensure Compliance with Industry Voluntary Agreement

As noted, earlier this year the railroad industry agreed with DOT to implement eight voluntary safety measures. While significant, these measures are only voluntary. To ensure that they are fully enforceable by federal and state authorities, DOT should codify the agreement into regulation. In the meantime, it is important for the state to monitor the agreement and ensure that the railroads comply with its provisions, as noted below. In addition, the agreement should be strengthened in several areas.

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[27] Unit trains are freight trains carrying a single commodity that is bound for a single destination. Currently, unit trains carrying crude oil are generally between 70 to 100 cars long.

[28] Federal Railroad Administration (2006), Final Report, Booz Allen Hamilton.

- ***Increased Track Inspections*** – The voluntary agreement calls for additional internal rail and comprehensive track geometry inspections by the railroads.

  The CPUC should monitor and publicly report the extent of railroad compliance with these inspection requirements on crude oil routes. In addition, to the extent consistent with its existing inspection mandates, the PUC should conduct at least one additional inspection of the crude oil routes each year.

- ***Braking Systems*** – The agreement requires better braking systems that will allow train crews to apply emergency brakes from both ends of the train in order to stop trains faster. This end-of-train braking technology has been required for many years on certain trains and railroad grades, but the voluntary agreement goes beyond this by requiring it on crude oil trains regardless of the existing criteria.

  The CPUC should request that railroads document where the voluntary agreement adds this requirement, that is, where crude oil trains travel and the existing regulation does not apply. The CPUC should also request information on, and monitor, the extent to which the railroads have complied with this request and consider ways to enforce these voluntary braking applications.

- ***Use of Rail Traffic Routing Technology*** – The agreement calls for railroads to use a more sophisticated risk management tool that accounts for multiple risk factors in determining the safest and most secure rail routes for trains with 20 or more cars of crude oil.

  The CPUC should ask the FRA to provide the analysis and results of the route analyses outlined above. This will enable the CPUC to better plan its inspection and risk prevention activities.

- ***Lower Speeds*** – The agreement provides for lower speed limits (no more than 40 miles per hour) for crude oil trains of more than 20 cars containing older tank cars in federally designated "high-threat-urban areas."

  This designation may omit areas of California where lower speed limits could reasonably enhance safety. The CPUC should complete a survey of speed limits on California railroads and determine whether there are additional areas where lower speed limits might be appropriate. If, after the survey, speed reductions in particular areas appear warranted, the CPUC should petition the FRA to consider additional speed restrictions.

  In addition, the CPUC should develop a proposal for monitoring and enforcing the new speed limits outlined in the voluntary agreement.

- ***Increased Trackside Safety Technology*** – The agreement calls for railroads to employ wayside wheel bearing detectors every 40 miles along tracks with trains carrying 20 or more crude oil cars.

To ensure that optimal intervals are established for the defect, the CPUC should inventory wayside train inspection technology on crude oil shipment routes, and recommend additional actions, if necessary.

12. Ensure State Agencies Have Adequate Data

Multiple state agencies need timely and complete data to successfully evaluate and regulate the risks from oil by rail transport. This is highlighted throughout the recommendations in this report such as the need for real-time shipment information, and state-specific normalizing accident and injury data. Other data is critical for agencies such as the California Energy Commission and the Department of Oil and Gas and Geothermal Resources to analyze trends in petroleum demand and sources of oil and gas production,

State agencies currently are working to identify what data they have and where there may be potential data gaps, and should work with federal agencies and the rail industry to obtain the information needed to fill those data gaps.

State agencies should put in place or strengthen existing measures, to the extent that such measures are inadequate, to protect confidential business information and data that may impact national security.

V. Conclusion

Transportation of oil by rail has dramatically increased in recent years and will likely continue to increase in the future, both nationally and in California, because of the increased oil production from the Bakken shale and other oil fields. Current regulations and industry practices are not adequate given this recent boom. Minimizing the potentially serious risks of transporting oil by rail will require strengthened federal requirements, expedited tank car upgrades, and other proactive measures by industry. It will also require additional resources, planning and preparation, and coordination among local and state agencies.

This report represents interim recommendations of the interagency Rail Safety Working Group. The group will continue to meet and refine recommendations and actions in light of new information.

Appendix

Agency Glossary

CalEPA	California Environmental Protection Agency
CalTech	California Department of Technology
CEC	California Energy Commission
CNRA	California Natural Resources Agency
CPUC	California Public Utilities Commission
DOGGR	Department of Oil, Gas and Geothermal Resources
DTSC	Department of Toxic Substances Control
OES	California Office of Emergency Services
OSFM	Office of the State Fire Marshal
OSPR	Office of Spill Prevention and Response

Recommendations by Agency

Lead Agency (or Agencies)	Recommendation
OES, CPUC, OSPR, EPA, CTA	Develop and post on a public website an interactive map depicting areas along rail lines with potential high vulnerability
OES, CPUC, OSPR, EPA, CEC, DOGGR	Identify any data gaps state agencies have and work with federal agencies and railroad industry to address
State Legislature	Approve the proposal in the Governor's Budget to add seven rail inspectors to the CPUC
State Legislature	Approve the proposal in the Governor's Budget to extend the per barrel oil fee to establish an inland oil spill preparedness and response program
State Legislature	Approve funding to establish regional hazardous materials response teams and otherwise remedy the gaps in local emergency response programs needed to adequately prepare for oil by rail incidents

OSPR	Establish inland oil spill preparedness and response program, upon funding by Legislature
OES	Incorporate elements for responding to crude oil by rail incidents in the assessment and update of the six Regional Plans for Hazardous Materials Emergency Response
OES	Review local Area Plans to determine if updates due to l increases in oil by rail incidents are appropriate
OES	Partner in coordination with CalEPA and OSPR with US EPA Region 9 and the FRA to undertake a review of local, state and federal emergency response plans
OES	Request that railroads provide a complete inventory of their firefighting and spill recovery resources (as outlined in the voluntary agreement)to the state
OES	Request (in coordination with OSPR) that the railroads provide "Worst Case Scenario" plans for responding to a multi-car incident in any part of California
OES	Recommend (in coordination with CPUC) that DOT require external visual identification on tank cars of Bakken and similar crude to aid first responders
OES	Request (in coordination with CPUC) that Class I railroads operating in California establish a system where emergency responders can securely log-in and access the daily location and status of rail cars and train consists
OES	Request (in coordination with CPUC) that the railroads provide better outreach programs and more information to communities
OSFM	Request that the United States Fire Administration promptly issue guidance on the resources required to respond to oil by rail accidents
OSFM	Seek partnerships (in coordination with OES) with railroads and oil companies to help fund establishment of a West Coast Regional Training Center
CPUC	Request that DOT move expeditiously to finalize new and retrofitted tank car regulations
CPUC	Request that the FRA identify routes that crude oil trains are expected to run on without PTC in California under current requirements and consider requiring the implementation of PTC on these routes
CPUC	Request that the FRA require electronically-controlled pneumatic brake technology on crude oil trains
CPUC	Clarify incident reporting requirements for the release of hazardous substances by rail

CPUC	Request that FRA provide California with normalized data to enable accident and injury analysis
CPUC	Monitor and publicly report the extent of railroad compliance with inspection requirements on crude oil
CPUC	Conduct at least one additional inspection of the crude oil routes each year, consistent with existing inspection requirements
CPUC	Request information on, and monitor, the extent to which the railroads have complied with the braking systems request (as outlined in the voluntary agreement)
CPUC	Ask the FRA to provide the results of the route analyses outlined in the voluntary agreement
CPUC	Complete a survey of speed limits on California railroads and determine whether there are additional areas where lower speed limits might be appropriate and if warranted, petition the FRA to consider additional restrictions
CPUC	Develop a proposal for monitoring and enforcing the new speed limits outlined in the voluntary agreement
CPUC	Inventory wayside train inspection technology on crude oil shipment routes

California Department of Fish and Wildlife
Office of Spill Prevention and Response

Data Source: CDFW, CDOC, CPUC, CalOES
Requestor: Rail Task Force
Author: J. Muskat
Date Created: 6/10/2014

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Crude By Rail
Areas of Concern

0 25 50 75 100
Miles