2.0 Appendix B - Past State Studies of Crude Oil and Ethanol Transportation Risks, Prevention, and Response

2.1 Summary of State and Federal Studies

2.1.1 California

State of California Interagency Rail Safety Working Group. "Oil by Rail Safety in California: Preliminary Findings and Recommendations." June 10, 2014. 20 pages.

Report Initiatives and Purpose

This preliminary study was the first document released by the state's Rail Safety Working Group, an interagency committee comprised of representatives from six state agencies that was convened by the California Governor's Office in January 2014 to examine safety concerns associated with crude-by-rail transportation and recommend actions the state and local agencies should take in response to those risks. The Rail Safety Working Group consists of 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.

This report is a summary of the initial recommendations put forth by the working group.

Report Summary and Scope

Within the span of one year, between 2012 and 2013, the way in which oil is transported within California changed dramatically. In 2012, about 70 percent of the oil imported by California refineries came through marine terminals and only 0.3 percent (about 1 million barrels) came by rail. One year later, crude by rail shipments in California increased six-fold, to 6.3 million barrels, and projections indicate the volume of oil entering the state by rail could jump to 25 percent of all refinery imports, up to 150 million barrels, by 2016. Most of the crude oil that has arrived in California by rail has come from North Dakota and Canada.

The study indicated that while the incidents involving crude by rail transportation have been minimal, the potential for highly dangerous or deadly incidents will increase because of the shear increase in the volume of crude oil transported by rail.

The study summarized the eight major crude-by-rail incidents that occurred in 2013 and 2014, and their causes. The working group identified and mapped the major rail routes traversed by unit trains of crude oil and identified the locations along each route with potential high vulnerability (such as high-derailment-risk urban areas and mountainous areas, and areas of vulnerable natural resources), and the locations of emergency response teams in relation to these highly vulnerable areas.

The study also looked at the state's ability to respond to CBR incidents and found the following:

- High-hazard areas for derailments are primarily located in the mountains, with at least one such site along every rail route into California. Other high-hazard areas are located in urban areas. In ten years (2002-2013), these areas encompass two percent of the state's trackage but have experienced 18 percent of the state's reported train derailments.

- Areas of vulnerable natural resources are located throughout California, and are locations where any rail incident would place waterways and sensitive ecosystems at risk.
- Urban areas are generally well covered by hazardous material response teams, but none are located near the high-hazard areas in rural and mountainous northern California. Other rural areas only have "Type III Hazmat" teams that are only able to provide a support role, not a lead role, in case of a major chemical or oil incident.

The study briefly summarized federal and state actions taken to increase the safety of crude-by-rail transportation. The bulk of the study was devoted to presenting recommendations from the working group.

2.1.2 Massachusetts

Commonwealth of Massachusetts Department of Environmental Protection. "Large Volume Ethanol Spills—Environmental Impacts and Response Options." Prepared by Shaw's Environmental and Infrastructure Group. July 2011. 107 pages.

Report Initiatives and Purpose

Growing volumes of ethanol shipments through Massachusetts in the late 2000s prompted the state Department of Environmental Protection to commission this study. By 2010, two to three unit trains of ethanol per week had been operating through Massachusetts, with each train carrying approximately three million gallons of ethanol, and one barge shipment per week had been carrying approximately 630,000 gallons of ethanol.

The Massachusetts Department of Environmental Protection, concerned about the increasing volumes of ethanol being transported by rail and barge through the state, and the differences in ethanol compared to standard gasoline, commissioned Shaw to prepare a study containing information on the environmental impacts of ethanol spills and emergency response techniques for treating ethanol and ethanol blends spills and fires.

Report Summary and Scope

This is the only comprehensive state-sponsored study that could be found assessing the environmental impacts and emergency response options for incidents involving rail and barge shipments of ethanol. The report contends that by 2010, denatured ethanol had become the largest volume hazardous material shipped by rail. This study considers assessment and response actions for rail and barge spills of denatured ethanol. The anticipated users of the study were local, state, and federal responders.

Thirty-two federal, state, and local agencies provided information and support for the study. Not only were agencies within the state of Massachusetts contacted, but six other states participated as well; the Ohio DEP, Illinois DEP, and Pennsylvania DEP provided information. In addition, six private-sector organizations were contacted, including one regional railroad, one transload operator, one refinery, and an oil company.

The study was divided into seven chapters, covering:

- Objectives and scope of document
- Physical and chemical characteristics of ethanol and gasoline blends

- Summary of ethanol spill incidents
- Fate and transportation characteristics of ethanol released in the environment
- Health effects and environmental risks of ethanol
- Spill assessment and delineation
- Response options for various types of ethanol spills and releases

The study provides a thorough look at the field response techniques for treating large-volume releases of denatured alcohol or ethanol blends during transportation by rail or barge. It does not address incidents or releases associated with the production, transloading, storage, or highway shipment of ethanol, although much of the information on the characteristics of ethanol and potential environmental risks resulting from spills and fires would be relevant.

2.1.3 Minnesota

Minnesota Department of Public Safety. "Minnesota's Preparedness for an Oil Transportation Incident." January 15, 2015. 192 pages

Report Initiatives and Purpose

1. Summarize the preparedness and emergency response framework in the state
2. Provide an assessment of costs and needs of fire departments and other emergency first responders for training and equipment to respond to discharge or spill incidents involving transportation of oil
3. Develop a comprehensive public and private response capacity inventory that, to the extent feasible, includes statewide identification of major emergency response equipment, equipment staging locations, mutual aid agreements, and capacities across industries involved in transportation and storage of oil
4. Provide information and analysis that forms the basis for allocation of funds under Minnesota Statutes, section 299A.55
5. Develop benchmarks or assessment criteria for the evaluation under Subdivision 2 [an evaluation of response preparedness and funding to be completed by January 2017]
6. Assist in long-range oil transportation incident preparedness planning
7. Make recommendations for any legislative changes

Report Study, Scope, and Methods

- Focuses on public safety preparedness and response to an oil transportation incident involving railroads or pipelines in Minnesota
    - does not provide analysis or recommendations on prevention activities, environmental mitigation and clean-up, infrastructure development (such as transportation or health system infrastructure), or relative merits of different modes of oil transportation
- Methods

- Review and analysis of information on state and federal laws, state and federal agencies, approaches developed by other states and provinces, and research, analysis, guidance from experts in the field of emergency preparedness and response
- Comprehensive interviews with subject matter experts, including rail and pipeline company representatives, state agency representatives, and associations of first responders and local governments
- A survey of fire department chiefs, sheriffs, police department chiefs, and emergency managers in jurisdictions that are potentially affected by an oil transportation incident
- Focused interviews with state and local elected officials in areas potentially affected by an oil transportation incident

Responsibilities

Under state and federal law, Minnesota has a comprehensive framework that would apply to an oil transportation incident:

- Railroad and pipeline companies are ultimately responsible for responding to an emergency involving the substances they transport. They must have plans in place to prevent and respond to discharges, and they must pay any costs associated with responding to a discharge.
- State agencies, particularly DPS and MPCA, have responsibilities associated with evaluating preparedness, coordinating agency response, and providing advice and resources to local governments during significant emergencies.
- Local governments are responsible for ensuring public safety in their communities; in all but the most catastrophic incidents, local officials are the incident commanders on scene. Local governments develop plans to respond to emergencies that may affect their communities, and they are empowered to develop mutual aid agreements and interjurisdictional organizations.
- Minnesota's statutory framework places an emphasis on coordination and collaboration across governments and sectors.

2.1.4 New York State – First Report

New York State Department of Transportation, New York State Department of Environmental Conservation, New York State Department of Health, New York State Division of Homeland Security and Emergency Services, and New York State Energy Research and Development Authority. "Transporting Crude Oil in New York State: A Review of Incident Response and Prevention Capacity – Status Update." December 2014. 58 pages.

Report Initiatives and Purpose

This report summarized actions taken by five State of New York regulatory agencies in the six-month period since the April 30, 2014 release of publication EO 125 (also summarized below) entitled "Transporting Crude Oil in New York State: A Review of Incident Response and Prevention Capacity." The original publication contained a list of action items and recommendations be taken by state and local government agencies and private industry,

including 11 recommendations the State should implement in order to reduce the State's vulnerability from accidents and spills related to the transportation of crude oil. The Status Update report summarized progress made on those action items.

Report Summary and Scope

The December 2014 Status Update report was intended to memorialize the following actions that had been taken by the State of New York in the six months since the April 2014 publication of EO 125 and included:

- Securing the commitment of the U.S. Coast Guard, Environmental Protection Agency (EPA), and National Oceanic and Atmospheric Administration to expedite emergency response activities and update environmental and contingency response plans
- Arranging for EPA, in consultation with the State Department of Environmental Conservation, to inspect the four Major Oil Storage Facilities in the state where crude oil is transferred from rail tank cars to other transportation modes
- Submitting comments on all federal proposed rulemaking activities related to crude-by-rail transportation and emergency planning issued by FRA, PHMSA, EPA, and other federal agencies. Also petitioning federal agencies to improve emergency plans and matched federal funding programs available to states for emergency preparedness
- Arranging for seven rail inspection "blitzes" conducted by FRA and NYSDOT representatives focusing on inspecting rail mainlines, rail yards, and tank car mechanical safety equipment. Inspections were held at three CSXT yards and two mainlines, and two Canadian Pacific yards and one mainline.
- Hiring five new state DOT rail inspectors to augment the state's existing inspection partnership with FRA
- Creating an interagency working group that has arranged training exercises, emergency drills and oil-related training for local and state responders, working with freight railroads, port and oil terminal operators, and state agencies
- Issuing new guidance from the State Division of Homeland Security and Emergency Services for fire department operations during the initial phases of a rail incident involving crude oil, including estimates of needed supplies such as foam and water depending on the magnitude of the incident (number of tank cars on fire, and number of cars exposed)
- One terminal operator, after reviewing the State's April 2014 report announced it would phase out the use of DOT-111 tank cars and require only CPC-1232 tank cars on its property

2.1.5 New York State – Second Report

New York State Department of Transportation, New York State Department of Environmental Conservation, New York State Department of Health, New York State Division of Homeland Security and Emergency Services, and New York State Energy Research and Development Authority. "Transporting Crude Oil in New York State: A Review of Incident Response and Prevention Capacity." April 30, 2014. 138 pages.

Report Initiatives and Purpose

This report, abbreviated as the Executive Order 125 report, was issued by New York State on April 30, 2014, and prepared by five different state agencies. The need for the New York State report came from an Executive Order issued by the Governor of New York directing the agencies to conduct a review of the state's crude oil incident prevention and response capabilities.

"In recognition of the increased risk of accidents and public concerns associated with the significant volume of crude oil transported through New York State, on January 28, 2014, Governor Andrew M. Cuomo issued Executive Order 125 (EO 125), directing state agencies to immediately conduct a coordinated review of New York State's crude oil incident prevention and response capacity. In EO 125, Governor Cuomo called upon state agencies to address the following specific issues:

1. the State's readiness to prevent and respond to rail and water incidents involving petroleum products;
2. statutory, regulatory, or administrative changes needed at the State level to better prevent and respond to incidents involving the transportation of crude oil and other petroleum products by rail, ship, and barge;
3. the role that local governments across the State play in protecting their communities and their residents from spills of petroleum products shipped by rail and water; and
4. enhanced coordination between the State and federal agencies to improve the State's capacity to prevent and respond to incidents involving the transportation of crude oil and other petroleum products by rail, ship, and barge.

Report Summary and Scope

This report provided an overview of the increase in crude oil transportation by rail and vessel through New York State and assessed the state's ability to effectively prevent and respond to incidents involving the transportation, transloading, and storage of crude oil. The base of information and assessments came from each of the five State agencies with responsibilities for rail safety, environmental protection, emergency response, public health, and energy development.

The Executive Order 125 report was divided into four main parts:

5. The Current Situation: Rising Concerns About the Transportation of Crude Oil (15 pages)
6. Findings and Recommendations: Recommendations and action steps for the federal government, state government, and industry partners (30 pages)
7. Timeline of Events Demonstrating New York State's Commitment to Protect Public Safety and the Environment (4 pages)
8. Appendices: Executive Order 125; Letters to Federal and Industry Partners; Rail Incident and Incident Data; Jurisdictional Agency and Role Descriptions (55 pages)

Key Judgments Made by Report

The first section, assessing the Current Situation, looked at the growth of U.S. and Canadian oil production, and the resulting change in transportation dynamics that has occurred. The report looked at incidents per billion ton-miles of crude oil transported and summarized recent crude oil incidents occurring on rail and inland waterways. The report discussed different crude oil classifications and their risks. The report also discussed railroads in the state involved in CBR transportation and noted that based on ten years of incident reporting rail safety has improved. The report also noted that the increase in crude-by-rail and crude-by-barge transportation has introduced new risks that the state should prepare for. Those risks were summarized in 11 key judgments, as follows:

- New York State is a major conduit for the North American crude oil boom
- The transportation of Bakken and Canadian synthetic and blended crudes each present unique risks
- Major recent incidents involving crude oil transportation have heightened national awareness
- Federal and State agencies have a strong hazardous material oversight safety record, but the sharp increase in crude oil poses new challenges
- The majority of the tank cars used to transport crude oil are outdated
- Recently adopted voluntary measures are incomplete and need to be incorporated into mandatory regulations on an expedited basis
- New York State needs for Bakken producers to provide critical information on crude oil characteristics and to mitigate at the source to ensure safe transportation
- Federal environmental and contingency response plans need to be expanded and updated to account for crude oil
- Trend and train-specific information is needed to prevent and respond to crude oil related incidents
- State legislative, regulatory, and administrative changes would enhance prevention and response capacity
- Local response agencies are the first line of defense and need to be properly trained and equipped

2.1.6 Pennsylvania

University of Delaware. "Assessment of Crude by Rail (CBR) Safety Issues in Commonwealth of Pennsylvania." Prepared by Dr. Allan Zarembski. August 13, 2015. 84 pages.

Report Initiatives and Purpose

The Commonwealth of Pennsylvania commissioned this study to assess the current level of risk associated with Crude by Rail shipments through the state and advise how the state could reduce the risk of a crude-by-rail incident.

Report Summary and Scope

The report used data from various government regulatory agencies, including the Federal Railroad Administration, Pipeline and Hazardous Materials Safety Administration, National Academy of Sciences, and Association of American Railroads, along with federal reports and railroad testimony at government hearings associated with CBR and rail safety. Individual Class I railroads that own track in the Commonwealth of Pennsylvania were contacted for the report.

The risk assessments provided in the report focus on three major areas of crude-by-rail safety:

- Risk of Derailment
- Risk of Tank Car Breach/Rupture
- Regulatory Oversight

The assessment of derailment risk included a summary of derailments by major categories (track, equipment, signals, etc.) both in the state of Pennsylvania and across the U.S. Data for this assessment came from the FRA's track safety database. The report compared incidents by major category (equipment, human factors, track, signal, etc.) that had occurred in Pennsylvania with nationwide totals over a 10-year period. The report also summarized major CBR derailments in the U.S. from 2013 to 2015 and noted the causes, as posted on the FRA's safety database.

The report identified ways to improve inspection or maintenance practices to reduce the potential for occurrence of the highest-risk derailment categories and categories where tank car failures might occur. The report also catalogued the number of asset protection devices (i.e., Hot Box Detectors) currently in place on Pennsylvania's Class I railroads.

The assessment also looked at proposed improvements to tank cars and operations (such as speed reductions) intended to reduce the risk of tank car rupture or breaches. This included a summary of proposed recommendations for various tank car types used to haul crude oil, including an effectiveness rating of puncture resistance for each car type. The report also assessed the risk reduction for tank car breaches from changes to two operating practices: reducing train speed for CBR, and use of ECP braking and other braking performance technologies (two-way end-of-train devices, distributed power).

The regulatory oversight section focused on efforts to reduce the volatility of Bakken crude oil prior to top loading in railcars, efforts for railroads to develop routing plans and procedures for high-hazard flammable trains, and a summary of federal and state agencies with regulatory oversight responsibilities for the transportation of hazardous materials or emergency management activities. The section included a summary of state rail inspection programs, based on information found in the FRA's Rail State Safety Participation Program. The section concluded with a summary of recent improvements and voluntary efforts prescribed the FRA and AAR, and specific operating practices implemented by CSX Transportation and Norfolk Southern to improve the safety and operation of CBR trains.

The report concluded with 27 recommendations for action to be taken by state agencies and railroads operating within the state.

2.1.7 Washington

Washington State Department of Ecology. "Washington State Marine & Rail Oil Transportation Study Preliminary Findings and Recommendations." October 1, 2014. 110 pages.

Report Initiatives and Purpose

This preliminary report preceded a larger, more comprehensive study (570 pages long) that was issued on March 1, 2015.

In April 2014, the Washington State Legislature directed and funded the state Department of Ecology to conduct a study on marine and oil transportation, in consultation with the FRA and state DOT, utilities commission, and emergency management division. The preliminary report containing recommendations for action was released in advance of the larger, comprehensive report as a result of a directive issued by the Governor of Washington State urging a quicker disclosure of findings and recommendations. The purpose of the study was to identify new safety challenges and environmental risks associated with the increase in rail and marine transportation of crude oil from the Bakken field, Canadian bitumen sands, and other new deposits. The report is intended to provide information that the Governor and State Legislature can use to determine what legislative, regulatory, or budgetary actions might be required to maximize the protection of public safety, the environment, Tribal Treaty rights, and the State's natural and economic resources as a result of the changing pattern of crude oil transportation.

Report Summary and Scope

The preliminary report was divided into six sections.

9. The Changing Oil Transportation Picture, which discussed the changes in rail and marine oil transportation, both nationally and in Washington State, the growth in transportation of Bakken crude oil and Canadian bitumen, and the growth of CBR rail-marine transload activities in Washington State.
10. Concerns about Crude by Rail Transportation Risk, which looked at the potential risks of CBR transportation in the areas of public health and safety, tribal treaties, the environment, and socio-economics.
11. Mitigating Risks from Crude by Rail Transportation through Prevention, which assessed the current regulatory framework and presented 11 findings and recommendations
12. Mitigating Potential Risks from Crude by Rail Marine Transportation through Prevention, which included 11 findings and recommendations
13. Mitigating Risks at CBR/marine transload terminals, which included 3 findings and recommendations
14. Mitigating Risk through Preparedness and Response, which included 15 findings and recommendations for action at the national, state, local, and industry level

The report used data from various government and regulatory agencies, including the Federal Railroad Administration, Energy Information Administration, Pipeline and Hazardous Materials Safety Administration, U.S. Coast Guard, and Association of American Railroads. The report also used data previously compiled by the Washington State Department of Ecology and other

state agencies, reports prepared by Washington State universities and regional coalitions, as well as individual correspondence with transload terminal operators.

2.1.8 Government Accountability Office

United States Government Accountability Office. "Report to Congressional Requesters. Oil and Gas Transportation: Department of Transportation Is Taking Actions to Address Rail Safety, but Additional Actions Are Needed to Improve Pipeline Safety." August 2014. 65 pages.

Report Initiatives and Purpose

The U.S. Government Accountability Office (GAO) was asked by the U.S. Senate Committee on Commerce, Science, and Transportation to examine the impact of shale oil and gas development on transportation infrastructure and safety. The GAO focused its review on the following areas:

- Overall challenges facing transportation infrastructure as a result of increased U.S. oil and gas production
- Specific pipeline safety risks and how the USDOT is addressing them
- Specific rail safety risks and how the USDOT is addressing them

Report Summary and Scope

To prepare its report, the GAO analyzed federal transportation infrastructure and safety data primarily from 2008 to 2012 or 2013, reviewed documents, and interviewed agency, industry, and safety stakeholders, as well as state and industry officials in states with large-scale shale oil and gas development.

The report is divided into seven sections covering:

- Challenges to transportation infrastructure from increased oil and gas production that could pose environmental, safety, or economic risks
- Safety risks from the expansion of unregulated gathering pipelines
- Federal efforts to address risks related to growing crude-by-rail traffic
- Conclusions and recommendations
- Study objectives, scope, and methodology
- Impacts of shale oil and gas development on highways in selected states
- Comments from the USDOT

The report found that from 2007 through 2012 annual production from shale and tight sandstone formations increased more than six fold for crude oil and fivefold for natural gas, aided significantly by advances in hydraulic fracturing and horizontal drilling. Much of the growth in production has occurred in regions with limited transportation linkages to processing facilities. In particular, the limited pipeline capacity to transport crude oil from these new production regions has resulted in an increased use of rail, truck, and barge. Use of these modes has increased safety risks to the natural and human environment, particularly when oil or gas is transported by truck, in comparison to pipeline transportation, which is underground. Use of these modes can also be

more expensive than pipelines and contribute to lost revenue, higher energy prices, and hindered development.

The report discussed the new pipelines being built in regions of increased shale oil and gas production. These new pipelines are being built as gathering pipelines, which traditionally are used as feeder pipelines to reach facilities or feed to higher-volume long-distance pipelines. However, the new generation of gathering pipelines under construction are larger in size and will operate at a higher pressure, increasing the safety risk. Neither the PHMSA nor states have a systematic method of gathering data on new construction of gathering pipelines, although one trade group estimates an annual increase of 14,000 miles of gas gathering pipelines and 7,800 miles of oil gathering pipelines per year through 2035. Further, in rural areas, the operation of gathering pipelines is unregulated, and these pipelines do not have to comply with PHMSA's emergency response planning requirements, even though the new pipelines will be larger and operating at the size and pressure (and therefore with similar risk) as federally regulated transmission lines.

The USDOT began a rulemaking to address this issue in 2011 but did not issue proposed rules. Subsequently, new gathering pipeline infrastructure has continued to grow, with industry predicting such growth will continue for the foreseeable future, raising concerns where such pipelines are not subject to safety regulations.

Rail shipments of crude oil in 2013 grew to 407,761 carloads per year, a dramatic increase from the approximately 9,700 carloads of crude oil moved in 2008. The majority of the oil is transported in unit trains consisting of 80 to 120 tank cars, each carrying about 30,000 gallons of oil. Nearly 50,000 tank cars were used to transport crude oil by rail as of April 2014. According to STB data, about 69 percent of the crude oil transported by rail in 2012 originated in North Dakota; Texas originated an additional 11 percent of crude oil carloads. The growth in shipments of crude oil by rail has revealed risks not fully addressed by current rail safety regulations, particularly in ensuring that oil is properly tested and packaged for shipping.

Changes to regulations have primarily focused on upgrades to tank car safety standards, although other areas of railroad transportation also should be looked at to improve the safety of crude-by-rail transportation, such as track inspection requirements. The DOT has begun to issue emergency orders and proposed rulemakings covering railroad operations that begin to address safety risks of transporting crude oil by rail. Railroads have also entered into a voluntary agreement with the USDOT in February 2014 to improve the safety of crude oil trains, including increased track inspections, improved emergency braking capabilities, use of a risk-based routing tool to identify the safest routes for transporting crude oil, lower-speed operation for crude oil trains, and emergency response training and planning.

2.1.9 Congressional Research Service

Congressional Research Service. "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress." December 4, 2014. 28 pages.

Report Initiatives and Purpose

This report was prepared for the members and committees of the U.S. Congress to provide background information and issues associated with U.S. rail transportation of crude oil. Several rail incidents that occurred in 2013 involved unit trains of crude oil, including the fatal fire and

explosion in Lac-Mégantic, Quebec, prompted regulatory agencies in the United States and Canada to issue new regulations and propose additional rules governing the transportation of crude oil by rail. Some members of Congress called for stricter regulations governing the design of tank cars, prevention of train derailments, and the selection of preferred routes for transporting oil. Many of these issues faced a possibility of being included in a reauthorization of the Rail Safety Improvement Act of 2008. This report was prepared to succinctly summarize the issues associated with crude oil transportation by rail.

Report Summary and Scope

The report discusses the increases in rail transportation of crude oil, driven by the rapid growth of oil production in the U.S. and Canada and the lack of sufficient pipeline infrastructure from new production regions to domestic markets. The report also stressed that railroads consistently spill less crude oil per ton-mile than other modes of land transportation.

The report is divided into four sections covering:

- The role of railroads, barges, and trucks in crude oil transportation
- Oil spill concerns, particularly those associated with Bakken crude and Canadian dilbit
- Federal oversight of oil transport by rail
- Issues for Congress concerning tank car safety, derailment prevention, railroad operations, incident response, and tradeoffs over rail vs. other modes in oil transportation

The report was prepared by specialists in transportation policy, energy policy, energy economics, environmental policy, and energy and infrastructure policy.

There were no findings or recommendations.

2.2 Discussion of Each Study's Findings and Recommendations

2.2.1 California Study Findings and Recommendations

Table B-1. California Study Findings and Recommendations

Finding	Recommendation
The number of state rail inspectors that handle inspections, investigations, and risk assessment and analysis for rail operations is inadequate for the current and projected volumes of oil shipments occurring in California.	Increase the number of California Public Utilities Commission rail inspectors by seven to increase agency inspections and enforcement actions related to tank cars, railroad lines, bridges, and hazardous material shipping requirements associated with the increases in crude-by-rail transportation.
The state's oil spill program prevents, prepares for, and cleans up oil spills in waters off the California coast, and is funded by a per-barrel oil fee of 6.5 cents on oil transported over marine water. There is no comparable fee structure or authority for preparedness activities for pipeline or crude-by-rail.	Expand the state's Oil Spill Prevention and Response program to cover inland oil spills, and the per-barrel fee to fund the program should be expanded to cover all sources of crude oil sent to refineries in the state.
Local emergency response offices, particularly those in rural areas do not have adequate resources to respond to crude-by-rail accidents. Many of these offices rely on volunteer firefighting departments, which lack the	Provide additional state funding for local emergency responders and establish regional hazardous material response teams that could be called upon to respond to CBR incidents and assist local offices as needed.

Finding	Recommendation
necessary forces, training, and equipment to respond to an oil-by-rail incident.	
Emergency response plans are developed at the federal, state, and local level, and implemented by local and regional agencies without regulated uniformity.	The state Office of Emergency Services (OES) should review and update local, state, and federal emergency response plans to ensure they address the risks associated with the increased transportation of oil by rail. The state OES should also update six Regional Plans for Hazardous Materials Emergency Response, with the goal of developing a more standardized approach to local emergency planning and include elements for responding to crude-by-rail incidents.
Emergency responders lack basic, critical information needed to plan for crude-by-rail incidents, including what resources railroads can provide in the event of an accident and how railroads would respond to one.	The state OES should request from the railroads a complete inventory of their firefighting equipment and spill recovery resources. In addition, OES should request that railroads provide "Worst Case Scenario" plans for responding for a multi-car tank-car rail derailment incident in any part of the state.
State and local emergency response teams and firefighters are unsure of the best response techniques or resources quantities necessary to respond to crude-by-rail incidents or associated explosions.	The Office of the State Fire Marshal (OSFM) should request that the United States Fire Administration issue guidance on resources required to respond to CBR incidents, such as training guidelines based on lessons learned during recent rail incidents. The U.S. Fire Administration should also provide training in multiple formats (web-based, video, or instructor-led) that allows each state's fire service training organization to deliver the training to meet specific needs.
California firefighters and first responders lack specialized training in the areas of oil rail safety and flammable liquid safety, and generally do not have financial resources to attend out-of-state training opportunities.	The State OES and OSFM should partner with railroads and oil companies to fund the establishment of a multi-agency West Coast Regional Training Center in Sacramento to maximize in-state training capabilities.
Tank car placards do not provide an indication of the flash point or vapor pressure of the specific type of crude oil within the car, thus requiring emergency teams to request this information from a railroad during an incident, which then prolongs emergency response decisions that can be made for each incident.	The United Nations, which assigns hazardous materials identifiers on tank placards, should recommend new classifications based on crude oil characteristics, to provide relevant information for first responders. If the United Nations is unwilling to expand identifiers on tank placards, the state OES and PUC should encourage the U.S. Department of Transportation to require some kind of external visual identification on tank cars containing Bakken crude oil and similar types of crude oil to aid first responders nationwide.
Although the USDOT recently issued an order requiring railroads transporting more than 1 million gallons of crude oil from the Bakken shale formation to provide the State with information on expected weekly shipments of crude oil and the routes they will traverse, railroads are not providing actual, real-time information on the types and quantities of oil being shipped into California, which would be helpful when responding to emergency incidents.	The state OES and PUC should require Class I railroads operating in California to establish a system where emergency responders can login and access the daily location and status of railcars and train consists, including hazmat carload detail for Bakken crude oil and other hazardous substances.
Communities want more information about what steps railroads are taking to ensure the safety of CBR shipments.	The state PUC and OES should request that railroads provide better outreach programs and more information to communities, including interactive websites and open community forums, on voluntary rail safety

Finding	Recommendation
	advancements,
Local response agencies and communities want more information on what steps railroads are taking to ensure the safety of CBR shipments and where those shipments are being transported.	The state should develop and post on a public website an interactive map depicting areas along rail lines with potential high vulnerability from CBR incidents, with map layers showing major rail lines, locations of earthquake faults near rail lines, water crossings and ecosystems, schools and hospitals, rail segments with a historically high frequency of derailments, and the location of certified emergency response hazmat teams.
Growing evidence suggests that older model DOT-111 tank cars are inadequate to protect against vapor explosions of highly flammable crude oil such as that from the Bakken shale formation.	The state PUC should request that the USDOT move quickly to finalize regulations for new and retrofitted tank cars in order to more rapidly phase out DOT-111 tank cars.
New rail safety improvements such as Positive Train Control (PTC) and Electronically Controlled Pneumatic brakes (PTC) have the potential to provide additional layers of safety and lower the risk of rail incidents.	The state PUC should request that the Federal Railroad Administration require the implementation of PTC on any rail lines over which crude oil trains are expected to operate, and request that FRA require ECP brake technology on crude oil trains.
There in inconsistency in the ways and timeliness with which railroads report incidents involving hazardous materials releases; some fail to report incidents.	The state PUC should clarify incident-reporting requirements for the release of hazardous substances by rail to ensure adequate and timely reporting.
Although individual accident reports are available on FRA's website, the state does not have access to broader data that FRA receives that determine accident and injury rates and trends for railroads operating in California (so-called "normalizing data") such as rate of accidents and injuries based on locomotive miles, freight train miles, employee hours, etc.	The state PUC should request that FRA provide state-specific normalizing data, including trend analysis and risk assessment, to evaluate the risks presented by the transportation of oil by rail.
Voluntarily efforts by the industry railroad to make crude oil transportation safer have no compliance components.	The U.S. Department of Transportation should codify the railroad industry's voluntary measures to improve CBR safety into regulations that are fully enforceable by federal and state authorities.
Voluntary efforts by the railroad industry to make crude oil transportation safer are not enough to ensure safety.	The USDOT should expand upon the railroad industry's voluntarily measures and strengthen regulations in the following areas: increased track inspections (with the state PUC conducting at least one additional inspection of crude oil routes each year); improved braking systems (with the state PUC requesting information and monitoring compliance of railroad efforts to improve braking systems); use of rail traffic routing technology (with the state PUC to request that the FRA provide the analysis and results of railroad industry rail route analyses); oil train speed restrictions (with the state PUC establishing additional areas where lower speed limits could reasonably enhance safety and enforcing compliance at those locations); and the installation of wayside wheel bearing detectors every 40 miles along rail lines with trains carrying 20 or more crude oil cars (with the state PUC conducting an inventory of wayside train inspection devices on oil shipment routes and recommending additional actions if necessary)
Multiple state agencies need timely and complete data to evaluate and regulate the risks from oil transportation by rail.	State agencies should put in place or strengthen existing measures to protect confidential railroad business information and data that may impact national security,

Finding	Recommendation
	while obtaining protected access to timely and complete railroad information to determine the risks of CBR transportation.

2.2.2 Massachusetts Study Findings and Recommendations

Table B-2. Massachusetts Study Findings and Recommendations

Findings	Recommendations
In some cases, ethanol rail incidents result in fire. In many cases, these fires have been significant, involving multiple tank cars and large volumes of ethanol.	
First responders to ethanol spills generally have been local firefighters that have focused on necessary evacuations, fire containment, and protection of nearby structures or tanks.	First responders must have available the training and equipment that will allow them to counter both the water-solubility and flammability of ethanol.
In most cases, ethanol fires have been allowed to burn out. Most incidents have not occurred in highly populated areas. Cooling water has been used to protect structures, tanks, and uninvolved railcars.	Contained burning is an effective response to an ethanol spill incident. It has been used in numerous spill incidents, albeit those incidents have not generally occurred in highly populated areas.
In some cases, where large amounts of water use were necessary to fight an ethanol fire, run-off to nearby streams occurred. In one case, the stream was subsequently dammed, and 500,000 gallons of impacted water were removed for disposal.	The use of cooling water may be necessary to protect structures, tanks, or uninvolved rail cars. However, the application of water to an ethanol fire, unless in sufficient volume, does not substantially decrease the flammability of ethanol. Runoff from water use should be contained and/or recovered to the extent possible to prevent infiltration to groundwater and impacts to surface water.
Alcohol resistant foam (AR-AFFF) has had limited use in large ethanol spill and fire situations, most likely because of the limited volume of foam available to local firefighters and concerns with migration and/or recovery of the foam/ethanol.	Local fire department stocks of alcohol resistant foam should be increased, as its use is effective. The foam must be alcohol resistant, or rapid degradation and loss of the foam blanket can occur.
When AR-AFFF has been used in ethanol spills, it most commonly was used to extinguish specific breached and burning cars that were blocking passage, or to extinguish fires inside tank cars prior to removal of the contents and movement of the car. The use of AR-AFFF has been effective in these circumstances.	In situations where foam is used to treat an ethanol spill and the ethanol/foam can be recovered, environmental impacts will be limited. Unless recovery of the foam/ethanol occurs, the potential for migration to storm drains, sanitary sewer lines, groundwater, and surface water will be present. Foam not recovered that reaches surface water can increase the biochemical oxygen demand loading to streams compared to the ethanol alone. In addition, foam use on unpaved surfaces does not limit the migration of ethanol to groundwater.
The fires have consumed large volumes of ethanol, thus limiting impacts to environmental media.	Contained burning is an effective response to an ethanol spill incident. However, additional efforts by first responders to control or prevent the migration of ethanol should also be considered, as these efforts will have benefits in reducing future response actions to address groundwater or surface water impacts, and will eliminate flammability hazards from ethanol that migrates into soil or other surfaces.
The most significant impacts related to ethanol spills have been to surface water. In some cases, surface water impacts have resulted in fish kills several days after the	Ethanol pools or impacts to soils should be identified as quickly as possible to prevent infiltration to groundwater and runoff to surface water. The high solubility of

Findings	Recommendations
spill as a result of oxygen depletion. These impacts have occurred some distance from the site of the original spill.	ethanol can result in rapid transport in these media. Recovery and excavation have largely been used to address such situations. Controlled burn has not been used, but could be considered in some situations.
Due to concerns of surface water impacts, response activities have more recently involved efforts to prevent discharge to surface water through damming. Aeration of small creeks and large rivers has also been used to improve dissolved oxygen content.	Ethanol impacts to surface water are a significant concern. Ethanol spills reaching ditches or small creeks can be addressed by damming, thus allowing time for biodegradation and preventing releases to larger water bodies. Aeration of these smaller water bodies can be used to improve their dissolved oxygen content and enhance biodegradation, but these actions may not reduce ethanol content sufficiently prior to discharge to a large water body. Once ethanol is discharged to a larger river, response options are limited. Monitoring of both dissolved oxygen and ethanol should be conducted in order to determine whether concentrations are approaching anoxic or toxic levels. Barge aerators can be used to improve dissolved oxygen levels.
Migration of spilled ethanol from the surface through soil to groundwater is also an area of concern, due to possible groundwater contamination and discharge to surface water, as well as methane generation. Where possible, spilled material has been recovered by pumping. In some cases, spilled material was not identified, and migration to groundwater and surface water occurred. In cases where groundwater impacts have occurred, ethanol has degraded relatively rapidly, although gasoline constituents have been more persistent.	Ethanol incidents in the marine environment have been rare, with none of a significant volume occurring in harbors or near-shore areas. Response options in such cases are similarly limited to the use of aeration to improve dissolved oxygen levels, although this would only be effective in smaller areas, such as inlets.

2.2.3 Minnesota Study Recommendations

1. Increase awareness about oil transportation incidents, and then develop additional capacity. This initial focus on building awareness more consistently across the state should be augmented by plans for large-scale drills and hands-on training for those jurisdictions that are prepared for those activities. Ultimately, DPS recommends expanding the state's training program to support more hands on training and exercises related to emergency preparedness in general.
2. Conducting the awareness-level training already underway for fire departments and other responders
3. Developing online resources for the public and first responders, such as awareness materials and training videos
4. Developing guidance for first responders and local governments on responding to an oil incident, including assessment and evacuation protocols
5. Connect funding for training and equipment to regional coordination.
6. DPS therefore intends to direct HSEM to develop a process for organizations to apply for training or equipment funding available in the Railroad and Pipeline Safety Account.

Requirements for funding should include the formation or expansion of a multi-county or regional collaborative group to identify and share resources.

7. Delay significant changes to the Railroad and Pipeline Safety Account and related allocations.
8. DPS recommends that the funding allocation and assessment be maintained as-is until the next report required under the 2014 legislation. At that time, there will be more information regarding the state's preparedness efforts and the impact of the changes underway.
9. Develop a state-level program evaluation approach to assess hazardous materials preparedness activities.
10. In order to effectively evaluate the state's actions under the 2014 legislation, DPS recommends that the state develop a program evaluation process and framework for hazardous materials incident preparedness. Agencies participating in the State Agency Responders Committee (particularly DPS and MPCA) should jointly develop a list of priority results for preparedness activities and establish timelines and measures to show progress towards these results.
11. Enhance existing databases (or develop new databases) to provide more comprehensive information about response resources across the state.
12. DPS intends to direct HSEM to identify whether its existing resource database system can be modified to include additional information regarding resources from state agencies, private sector organizations, and local governments, including but not limited to resources needed to respond to an oil transportation incident.
13. Establish Standards for Pipeline Preparedness and Response
14. For local and state government to be able to determine what resources may be needed to develop capacity for an oil transportation incident, it will be necessary to determine if rail and pipeline companies are adequately prepared to respond. The most concrete ways to evaluate preparedness are to examine an organization's written plan against established criteria and to test the organization's preparedness through exercises or drills. The new requirements for rail companies will allow the state to examine rail preparedness efforts, but pipeline companies do not have similarly well-defined responsibilities. Pipelines also transport significant quantities of potentially dangerous material in Minnesota, so additional attention to pipeline preparedness is warranted.
15. DPS recommends that the state adopt response standards, including timelines, for pipeline companies that are similar in scope and content to the response standards applicable to railroads.
16. DPS has not developed a position regarding the appropriate response times for pipeline companies, but will participate in the legislative process as requested.

2.2.4 New York State Study Recommendations – First Report

The 11 state government recommendations made in the original EO 125 report were:

1. Hire additional railroad inspectors and train new and existing staff in other inspection program components
2. Partner with federal, local, and industry partners to increase the number, frequency, and variety of preparedness training opportunities and drills
3. Enact legislation requiring crude oil producers to provide information on the volume and characteristics of crude oil transiting the state (federal action from USDOT subsequently addressed that information need)
4. Develop a one-stop Web portal that provides access to emergency points of contact, training, grants, and other preparedness and response resources
5. Develop a comprehensive database of available emergency response equipment to support timely and effective response
6. Partner with federal, industry, and local response organizations to develop and implement a comprehensive, geographically-tiered equipment network to ensure timely and effective response in underserved areas
7. Partner with EPA and USCG to expand existing environmental and contingency and plans, and develop Geographic Response Plans for all areas of the state
8. Develop regulations that require placing oil containment booms around waterborne crude oil transfers and restrict transfer operations only to locations that meet state regulatory requirements or have USCG approval
9. Amend existing state legislation to improve rail incident reporting requirements and ensure railroad reporting compliance
10. Develop more effective airborne contaminant plume modeling capability to assist first responders
11. Conduct a review of current federal, state, local, and industry response plans to ensure efficient planning and application
12. Amend the state's Navigation Law to enable greater Oil Spill Fund program capabilities (this was a later recommendation not part of the original report)

2.2.5 New York State Study Findings and Recommendations – Second Report

The main focus of the report was the development of 27 recommended action items listed below for the state to pursue at the federal, state, local, and industry level to increase its incident prevention and response capabilities in the event of a marine or rail incident involving the transportation of crude oil. The report included 11 the State should implement in order to reduce the State's vulnerability from accidents and spills related to the transportation of crude oil.

Table B-3. New York State Study Findings and Recommendations from Second Report

Finding	Recommendation
Federal Level	
The DOT-111 tank car used to transport oil is inadequate to protect public safety and the environment	USDOT should finalize new and retrofitted tank car regulations immediately
Railroad industry voluntary efforts are incomplete and	USDOT should strengthen the voluntary measured put

Finding	Recommendation
lack the permanence and protection of government regulations	forward by the AAR and codify them in regulations
Bakken crude oil is significantly different from other forms of crude, but the transportation classification criteria do not distinguish the difference	The United Nations (which assigns hazardous material identifiers) should recommend new classifications based on crude oil characteristics to enable appropriate packaging and transmission of information on the qualities of oil being transported
Railroads do not have the same emergency response plan requirements as tanker and barge operators	USDOT should update regulations requiring railroads to develop route-specific contingency plans for lines that carry crude oil
Federal hazmat grant funding is inadequate to address the increased risk posed by crude-by-rail transportation	USDOT should increase matched funding available to states through the Hazardous Materials Emergency Preparedness Grant Program
Federal environmental planning documents and contingency response plans need to be updated	U.S. Coast Guard, EPA, and NOAA should quickly update environmental and contingency response plans
Industrial facility railroad tracks are not regulated or inspected to the same level as mainline and rail yard track	USDOT should subject industrial facility railroads to the same standards and inspection protocols as the rest of the general railroad network
The federal oil spill response Research and Technology Plan, which informs technology decisions and best practices and was mandated by law in 1990, has never been finalized	The Coast Guard and EPA should update and complete the plan, and revise it every five years as required by law (Oil Pollution Act of 1990)
U.S. Coast Guard personnel rotate every three years, taking with them accumulated experience and relationships	USCG should establish a civilian Contingency Planning position in New York State to provide organizational continuity and support state emergency preparedness and response efforts
USCG Vessel Response Plans may not be sufficient given the boom in crude oil transportation	USCG should update Vessel Response Plans for tankers and tugs carrying crude oil in New York State to ensure response protocols address the risks associated with transporting crude oil
Existing U.S. Homeland Security grant programs will not fund the purchase of firefighting equipment critical for crude oil incidents, such as foam concentrate	USDHS should update the list of authorized equipment eligible for grant funding to include crude oil firefighting equipment
State Level	
New York State only participates in FRA and PHMSA inspection programs on a limited basis	The state should hire additional railroad inspectors
The State is not taking advantage of all available preparedness training and drill scenarios available for state and local safety personnel	Partner with federal, local, and industry partners to increase the number, frequency, and variety of preparedness training opportunities and drills
There is no mechanism for collecting information on the crude oil moving through New York State	Work with industry and federal partners to establish a mechanism for obtaining more complete information on the volume and characteristics of oil being transported and stored in the state
Access to federal, state, and industry training and readiness information is not well publicized and difficult to find	Establish a one-stop web portal that provides access to emergency points of contact, training, grants, and other preparedness resources
Response assets are not efficiently spaced around the state	Partner with federal, industry, and local response organizations to develop a geographically-tiered equipment network to ensure timely responses in underserved areas
New York State does not have a comprehensive database of crude oil-specific response assets	Develop a comprehensive database of available emergency response equipment to support the timely and effective response to crude oil incidents
New York does not have detailed Geographic Response	Work with the EPA and the USCG, which maintains

Finding	Recommendation
Plans to guide crude oil spill response	Area Contingency Plans, to develop Geographic Response Plans that serve as both a planning response document and spill response tool
Waterborne crude oil spills can often be quickly mitigated by pre-staging booms at transfer points	Develop state regulations that require placing oil containment booms around waterborne transfer facilities and only allow transfer operations at locations that meet state regulatory requirements or have USCG approval
Railroad incident reporting is inconsistent	Enact legislation to improve rail incident reporting and ensure railroad reporting compliance
The State has limited capabilities for toxic plume modeling	Develop more effective plume modeling capabilities
Federal, state, local, and industry emergency response plans often overlap	The State should review federal, state, and local statues, regulations, and policies to ensure efficient planning and application; assess where emergency plans overlap; and recommend changes, while also ensuring that all plans are current, comprehensive, and maintained
Industry Level	
The volatility of Bakken crude could be significantly reduced if dissolved gas were separated from the crude at the source	Urge the American Petroleum Institute and member oil companies to reduce the volatility of Bakken crude before loading it into a tank car
Emergency responder access to crude-by-rail shipment information is uneven	Class I railroads should implement a Web-based information access system to provide real-time information on hazardous materials
Communities on crude-by-rail routes have a limited ability to affect public health and safety outcomes	The AAR should work with API to clarify and expand community engagement requirements, particularly in regard to voluntary measures undertaken by railroads
Crude oil train route risk analysis has not been completed	Class I railroads should conclude their computer model-based route risk analysis as soon as possible and update it regularly

2.2.6 Pennsylvania Study Recommendations

The report concluded with 27 recommendations for action. Eighteen recommendations were categorized as "primary," meaning those that the state could implement on its own or in cooperation with freight railroads. The other nine recommendations were categorized as "secondary," because they were considered more difficult to implement or required action by a federal agency or entity other than the state or a freight railroad.

Primary Recommendations

Recommendations for Railroads

1. Routes carrying CBR trains in Pennsylvania should be tested at least three times per year to maintain an annual service defect rate of no greater than 0.04 to 0.06 service failures per mile
2. Routes carrying CBR trains in Pennsylvania should be tested by a railroad-owned Track Geometry Car at least four times per year
3. Routes carrying CBR trains in Pennsylvania should be tested by a vision-based joint bar inspection system at least once per year, in lieu of one of the required on-foot inspections, as permitted by FRA

4. Class I railroads hauling CBR trains in Pennsylvania should adopt the BNSF Railway voluntary speed reduction to 35 mph for crude oil trains through cities with a population greater than 100,000 people
5. Routes carrying CBR trains in Pennsylvania should be equipped with Wild Impact Load Detector units along their entire route and with a spacing that ensures that any route within the state will have a WILD unit no more than 200 miles preceding (in the loaded direction) that location
6. Any WILD measurement that exceeds 120 Kips should require the train to be stopped and the wheel inspected, and if conditions allow, proceed at a reduced speed of 30 mph until the alerting car can be set out for repairs to be made; any WILD measurement that exceeds 90 kips should require the car to be flagged and the identified wheels replaced no later than 1500 miles of additional travel
7. Railroads should equip all routes in the state with sufficient Hot Box Detectors to adequately monitor oil train movements, with a maximum spacing of 25 miles between Hot Box detectors
8. Routes carrying CBR trains in Pennsylvania should have at least one Acoustic Bearing Detector installed
9. Yards and sidings that handle significant CBR volumes should be inspected by Railroad inspectors at an interval one level higher than the assigned FRA track class (i.e., yards that are FRA Class 1 should be inspected at the FRA Class 2 level)
10. Railroads operating unit oil trains in Pennsylvania should equip those trains with Electronically Controlled Pneumatic (ECP), or in the absence of ECP brakes use two-way end-of-train devices or Distributed Power to improve braking performance
11. Class I railroads hauling CBR trains in Pennsylvania should complete their initial route analysis of High-hazard flammable train routes in the state as soon as possible

Recommendations for the Commonwealth

1. Designate appropriate state and local officials to work with Class I railroads to provide all needed information and assist in the route analysis
2. Perform coordinated railroad inspections by both Pennsylvania Public Utility Commission (PUC) track inspectors and Federal Railroad Administration track inspectors to inspect major CBR routes within the state, focusing on track, equipment, hazmat, and operating practices. Prioritize inspections on mainline turnouts, sidings, and yards that have significant CBR volumes, including track owned by railroads and track owned by refineries
3. Coordinate with FRA to perform annual inspections of all routes carrying CBR trains in Pennsylvania using the FRA's T-18 Gage Restraint Measurement System test vehicle; testing should include both GRMS and conventional track geometry measurements
4. Fill existing vacancies for Pennsylvania PUC track inspectors, and assess whether additional inspectors are required in the eastern part of the state where refineries are located

5. Pennsylvania Emergency Management Agency (PEMA) should work with Class I railroads in the state to implement information-sharing technology tools and make those tools available to emergency responders located along CBR routes
6. PEMA should work with the Class I railroads to hold a full-scale emergency response exercise involving emergency responders from communities along heavy oil train routes
7. PEMA should work with all communities along all routes carrying CBR trains to ensure that the communities have appropriate emergency response plans
8. PEMA should work with the Class I railroads to obtain an inventory of emergency response resources along all routes carrying CBR trains to include locations for the staging of emergency response equipment

Secondary Recommendations

Recommendations for Railroads:

1. In addition to conventional Track Geometry Car tests, all routes carrying CBR trains in Pennsylvania should be inspected by Autonomous Track Geometry Measurement (ATGM) and/or Vehicle Track Interaction (VTI) measurement systems
2. Class I railroads operating in Pennsylvania should verify that they have an adequate number of Hot Wheel Detectors on oil train routes, particularly on routes with terrain where wheels could be more prone to overheating (such as steeply graded routes)
3. Routes carrying CBR trains in Pennsylvania should be equipped with at least one Track Defect Detector (such as a Lateral Load Measurement System) to monitor loaded oil train cars

Recommendations for the Commonwealth:

1. Ensure that the Class I railroads owning track in Pennsylvania equip routes with Positive Train Control technology, in accordance with federally mandated implemented schedules
2. Direct the State of Pennsylvania track inspectors to focus attention on the conditions of turnouts on major CBR routes in the state
3. Direct State of Pennsylvania track inspectors to work with FRA inspectors to develop a coordinated inspection program for all yards and sidings that handle a significant number of CBR cars
4. Actively work with federal regulators on the development of national Minimum Characteristics Standards for all Crude By Rail shipments, with defined target characteristics
5. Direct the PUC to work with the FRA and Class I railroads to ensure that railroads are maintaining a Bridge Safety Management Program in accordance with the Code of Federal Regulations
6. Actively work with federal regulators and the railroad industry to support increasing tank car thermal protection standards to 800 minutes for a pool fire

2.2.7 Washington Study Findings and Recommendations

The Washington State report had 40 findings and associated recommendations.

Table B-4. Washington Study Findings and Recommendations

Finding	Recommendation
Crude by Rail Transportation	
Federal laws and regulations governing CBR are changing	The State should actively comment and engage the FRA and PHMSA in the establishment of operating requirements for CBR that provide the highest level of protection; strict classifications of what constitutes a high-hazard flammable train; and the most stringent requirements possible for tank car standards
Derailment prevention is key to public safety, health, and environmental protection	Modify the railroad regulatory fee structure to enable the state to hire additional FRA-certified state rail inspectors and increase inspections of railroad track, hazardous materials, operations, motive power, equipment, and grade crossing installations
CBR compliance measures are not consistently enforced or apply to all types high-hazard flammable trains/Key trains	The State should establish voluntary agreements with railroads operating in the State to operate loaded HHFT/Key Trains at a maximum speed of 45 mph
Washington State does not have enough state rail inspectors	Modify the railroad regulatory fee structure to enable the state to hire additional FRA-certified state rail inspectors and increase inspections
The state Utilities and Transportation Commission (UTC) has limited authority to conduct hazmat inspections on private shipper property	Amend statutory regulations to allow UTC state inspectors to enter a private shipper's property to conduct hazmat inspections related to rail operations
The state UTC has identified a number of at-grade highway-rail crossings with characteristics that increase the risk of an accident/incident, the severity of which would likely be increased in the event of an incident with a crude oil train	Provide state authority and funding to conduct a diagnostic review to determine whether the identified crossings have sufficient protective devices
The state UTC does not have jurisdiction over grade crossings in "first-class cities;" those cities are free to open, close, or modify grade crossings without UTC involvement	Amend state law to require first-class cities to report to the UTC when grade crossings are opened or closed, and allow those cities to opt in to the UTC's railroad crossing inspection and enforcement program
Federal and state safety and inspection regulations do not apply to private grade crossings	Amend state law to give the UTC jurisdiction over private crossings and enforce minimum safety standards
Current tank car hazardous material placarding does not provide enough information for non-railroad first responders in the event of an incident	The USDOT should amend hazardous material identification requirements on trains to be more user-friendly to first responders
FRA and state rail incident databases are not updated quickly enough, are difficult to use and navigate, and in some cases have inconsistent information between what the state reports and what the FRA reports	FRA, in conjunction with state and local governments, should review and enhance the usability of existing databases to include sort-ability by state and incident type, and ensure that state and federal preliminary accident investigation forms are placed online within one month
There is no mechanism for railroads, regulatory agencies, and stakeholders, to discuss rail safety and cooperative approaches to reducing accidents and promoting safe practices	FRA, PHMSA, and the state UTC should develop a Railroad Safety Committee to improve communication between state and federal agencies and railroads, and develop cooperative safety efforts. The program could be modeled after the U.S. Coast Guard/Washington State harbor safety committee
CBR Marine Transportation	
Build on the State's successful vessel spill and accident	The State Department of Ecology and Pilotage

Finding	Recommendation
prevention measures	Commission should continue to support maritime safety programs and continue to conduct training and drills in spill prevention and preparedness
Risk mitigation options that address human error and improve situational awareness are the most effective	The State Department of Ecology should develop marine safety, industry oversight, and inspection criteria to reduce human error and improve situational awareness, including supporting proposed USCG rulemaking on barge inspections and crew working hours, installing an automated track control system into mobile navigational systems used by state pilots, and advocating crew situational awareness training on all classes of vessels including commercial fishing and towing vessels
Modern ships with protected fuel tanks (a requirement for all vessels built after 2010) have been shown to reduce oil spill probability	The State should require all newly permitted or significantly expanded marine terminals to accept vessels built after 2010 only if equipped with the new fuel tank construction
There has been no railroad representation on the state Harbor Safety Committee, Area Maritime Committee, or area planning committees, all of which are involved in improving spill and accident prevention and maritime safety and security	Encourage railroads in Washington State to participate in the State's three harbor safety committees, two Area Maritime Security committees, the Northwest Area Committee, and local area planning committees; the state Ecology department and USCG should increase funding for the harbor safety committees
Tug Escort Requirements for oil tankers are not required at Grays Harbor or on the Columbia River, though some facilities have voluntary mandated them	Expand state regulations to require tug escorts for tank vessels not just along Puget Sound (existing requirement) but also for tank vessels on the Columbia River and at Grays Harbor
Other countries have funded programs to station Emergency Tow/Rescue Tugs at key points to stop drifting vessels from grounding on leeward shores or as passive escorts to high-risk ships	The State should evaluate the effectiveness of implementing an Emergency Tow/Rescue Tug program for Turn Point, Grays Harbor, and the Columbia River, working with the U.S. Coast Guard and Harbor Safety Committee
Current criteria used to classify a High-Risk Vessel are based on incorrect or inconsistent data	The State Department of Ecology should lead an analysis with the USCG and Harbor Safety Committee to develop a consistent precise definition of a High-Risk Vessel, and develop standards and tug escort requirements for High-Risk Vessels
A formal Vessel Tracking System (VTS), which would reduce shipping accidents such as collisions and groundings, is not in service at Grays Harbor. Existing VTS systems are facing reductions in funding and resources	The USCG should establish a long-term waterways management plan that includes appropriate VTS services to accommodate increased vessel traffic on the Columbia River, Grays Harbor, and the outer coast
Bunkering operations in Puget Sound have the potential to increase as a result of rising CBR transloading activities	The State Department of Ecology should work with USCG and the Harbor Safety Committees to update bunkering restrictions and evaluate limiting or moving bunkering activities to locations that have, or could implement, enhanced prevention and preparedness capabilities
Speed restrictions on container ships may reduce the likelihood of collisions with other vessels	The State Department of Ecology should work with the USCG and Harbor Safety Committees to restrict the speed of container ships in congested areas of ports or shipping channels in Puget Sound to reduce the likelihood of collisions
Foreign-flag tankers that import crude oil introduce additional risk by anchoring off the coast to store crude	Work with the USCG to enact regulations, voluntary actions, or revised harbor safety standards that eliminate

Finding	Recommendation
oil in their hulls and making multiple trips from anchorage to berth and back during the off-loading process	the industry practice of multiple berthing/partial discharging/anchoring of tankers carrying foreign crude oil
Crude by Rail Terminals	
The State Facility Oil Handling Regulation has not been updated for facility spill prevention standards since 1994 and does not include standards for crude by rail transload terminals	The State Department of Ecology should revise the Design Standards for Class 1 facilities to address all modes of oil handling into and out of a Class 1 facility
Existing state-established Best Achievable Protection (BAP) standards for preventing and preparing for oil spills only exist for tank vessels and has not been extended to facilities handling oil	The State Legislature should modify the BAP Planning Standards to all facilities handling oil
Oregon has differing regulations from Washington for oil spill prevention from tanker ships and facilities, which increases risk on the shared waterway of the Lower Columbia River	Encourage the state of Oregon to adopt facility oil handling regulations that include a requirement to pre-boom oil transfers to mitigate risk of and enhance protection from oil spills
Oil Spill Planning and Emergency Response	
Federal regulations governing oil spill response plans for High-Hazard Flammable Trains are being updated	The State should actively participate in the Notice of Proposed Rulemaking comment process with FRA and PHMSA to establish revised and more stringent requirements for oil spill response plans
Railroad equipment is not covered under state-approved oil spill contingency plans	Modify the State statutory definition of "facility" to include moving unit oil trains, as well as stationary trains conducting oil spill transfers in State Oil Spill Contingency Plans. Direct the State Department of Ecology to develop rules related to oil spill contingency plans for trains as per existing facility regulations
Washington State has not established a level of financial responsibility for oil handling facilities, including rail that would require a responsible party to pay for the costs and damages of an oil spill up to a certain amount	Modify State regulations and direct the State Department of Ecology extend financial responsibility requirements to rail and mobile facilities, and issue Certificates of Financial Responsibility to ensure that those transporting oil can pay for cleanup costs and damages resulting from oil spills
The current state definition of oil may not include certain heavy oils, diluted bitumen, synthetic crudes, or other types of oil produced in Canada that are being transported to Washington	The State Legislature should amend the definitions of oil to include crude oil, bitumen, synthetic crude oil, natural gas well condensate, and all other types of oil
State and local agencies do not have the means to gather information on the type or volume of oil being shipped through Washington	Modify state regulations to require railroads to submit advance notice to the State on the volume and characteristics of oil being transferred by rail facilities to other facilities or to vessels
Local, County, and State Emergency Preparedness Response Capabilities	
Almost two-thirds of local fire departments and fire districts do not have adequate funding to plan, train, and equip their communities for a crude oil incident, or purchase necessary equipment such as oil spill containment devices and responder health and safety monitoring and fire suppression devices	The State should establish and fund a grant program for enhanced and continuous oil spill response equipment and local first responder firefighting equipment; ongoing funding should also be made available to provide periodic training to first responders
Local responders have a lack of knowledge in the equipment and response resources available, and railroads plans in place, in the event of a crude-by-rail incident	Washington Military Department's Emergency Management Division (EMD) should adapt county-level emergency plans to address crude-by-rail Oil and Hazards Materials Response; the State should work with FRA and PHMSA to establish a strategy for railroads to work with local responders to identify response

Finding	Recommendation
	strategies, equipment, and available resources
Most local emergency response agencies do not have sufficient resources to adequately train their personnel or conduct emergency planning	The Washington Office of Financial Management and the state fire marshal should develop funding options for the legislature to provide coordinated training. The state fire marshal should work with the railroads to develop a mandatory first responder tank car training program, and expand existing centralized hazardous material training systems to address the unique hazards of transporting crude oil by rail
The State has not implemented a 2006 plan to form regional hazardous materials response teams	The State Department of Ecology and fire marshal should determine startup and recurring costs for establishing regional hazmat response teams, and determine a plan of action for how such teams should be composed, equipped, trained, located, funded, and directed to assist
Geographic Response Plans, which direct immediate actions for oil spills to water, have not been developed for most of the rail corridors through which crude by rail trains operate, and do not address new marine risks such as potentially submerged or sinking oils	The State Department of Ecology should update existing and develop new Geographic Response Plans for inland and marine areas at risk from oil spills, and include all rail corridors through which crude by rail trains are transiting or will transit in future
Oil Spill Response Resources	
The shift away from oil tanker vessels to rail and pipeline has caused a drop in revenues to the State's Spill Prevention, Preparedness, and Response Program	The State should identify new funding options to adequately fund the spills program
The State's oil spill response resources, planning standards, and response tactics may not adequately cover the changing oil characteristics and transportation modes that have occurred as a result of the shift to pipeline and crude by rail	Permitting agencies should require crude-by-rail facility applicants to conduct a thorough evaluation of specific locations of risk for train and/or vessel incidents; the State's Northwest Area Contingency Plan should establish a task force to analyze the type of volume of Group V oils currently moving into the region and target planning efforts at sinking oil
Plans to construct crude-by-rail transload facilities at Grays Harbor and on the Columbia will require enhancements to the current regulatory response planning and purchases of response equipment for oil spills from the facilities or tank vessel traffic serving them	The Department of Ecology should review statewide regulatory planning standards to determine whether the equipment standards are adequate for the potential increase in crude-by-rail facilities and associated tank vessel traffic, particularly at Grays Harbor and the Columbia River; Ecology should established and fund an enhanced and ongoing spill response equipment grant program, and work with local first responder groups to identify additional equipment and training needs
Mitigating Future Risk	
Oil transportation in the State needs to be evaluated as an ongoing, long-term process	Ensure permanent ongoing funding for the State Department of Ecology to develop and continually update a Rail Transportation Risk Analysis and continue updating a Vessel Transportation Risk Analysis
There is great concern among the public and stakeholder groups about the effect of crude oil transportation by rail and vessel	The State should continue outreach efforts on the changing energy picture to potentially affected tribes, communities, and stakeholders to further refine the issues of concern for future studies and action

2.2.8 U.S. Government Accountability Office Study Findings and Recommendations

Findings

1. The increase in U.S. oil and gas production presents challenges for transportation infrastructure because some of the increase is occurring in production areas with inadequate transportation linkages.
2. In particular, insufficient pipeline capacity has resulted in the increased use of rail, truck, and barge to transport crude oil from production areas to refineries.
3. These transportation limitations and related effects could pose environmental risks and have economic implications.
4. Additional pipeline capacity is being constructed to transport crude oil and natural gas. The new pipelines are gathering pipelines (defined as pipelines that transport products to processing facilities and other long-distance pipelines), but differ from older gather pipelines because they are larger in size and operate at higher pressure. Gathering pipelines, if located in rural areas, are generally not subject to USDOT or state safety regulations or emergency response requirements.
5. The increase in size and pressure of newer gathering pipelines raises safety concerns because they could affect a greater area in the event of an incident.
6. Crude oil carloads moved by rail in 2012 increased by 24 times over that moved in 2008, which has raised concerns about testing and packaging of crude oil, use of unit trains (trains of about 80 to 120 crude oil cars), and emergency response preparedness.
7. The USDOT has issued safety alerts on the importance of proper testing and packaging of crude oil. However, industry stakeholders said that DOT's guidance on this issue is vague and that clarity about the type and frequency of testing is needed. In July 2014, DOT proposed new regulations for crude oil shippers to develop a product-testing program subject to DOT's review.
8. Unit trains, which can carry 3 million or more gallons of crude oil, are not covered under DOT's comprehensive emergency response planning requirements for transporting crude oil by rail because the requirements currently only apply to individual tank cars and not unit trains. In July 2014, DOT sought public comment on potential options for addressing this gap in emergency response planning requirements for transporting crude oil by rail.

Recommendations

1. The USDOT, in conjunction with the PHMSA, should move forward with a Notice of Proposed Rulemaking that addresses the risks of larger-diameter, higher-pressure gathering pipelines, including subjecting such pipelines to emergency response planning requirements that currently do not apply.
2. Because of the ongoing rail safety rulemakings, the GAO did not make additional recommendations related to rail in this report.