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Safety of Crude Oil by Rail

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Summary

In the last several years, rail has come to play an important role in the transportation of growing U.S. crude oil production. Over the last seven months, a number of serious accidents have resulted in intense review of the safety of shipping large quantities of oil by rail. The focus has been on classification of the oil, the integrity of tank cars, and rail operations. Regulatory processes have been initiated to attempt to deal with these issues in a timely manner. This issue analysis provides facts that illuminate the players, concerns, current status of regulatory action, as well as the potential issues going forward.

Further regulation of crude by rail is a near certainty, but the ultimate scope and pace remains unclear. Whether regulatory action actually slows down what has become a burgeoning transportation option for crude oil producers and refiners is an open question. It is increasingly unlikely that regulatory action—unless truly drastic—will stop shipment of crude by rail. However, moving forward, regulatory action such as phasing out older tank cars, rerouting trains, or imposing stringent requirements for testing, could impact the economics of crude by rail.

Rail Transportation of Crude Oil Has Received Increased Public and Regulatory Scrutiny

There is an ongoing debate about the relative safety merits of shipping crude by rail versus pipeline. Comparisons between the two modes are difficult because of different reporting requirements. Both modes deliver more than 99 percent of their crude product safely. All sides agree, however, that safety is paramount, especially because the modes are currently complementary when it comes to moving crude to market.

However, a series of serious incidents across North America involving trains moving crude oil has placed the safety of transporting crude oil by rail under closer scrutiny. These incidents include:[1]

- July 2013, Lac Mégantic, Canada: a train carrying crude oil derailed and exploded, resulting in 47 deaths
- October 2013, Alberta, Canada: a train carrying crude oil derailed and exploded
- December 2013, North Dakota: a train carrying crude oil derailed and exploded
- January 2014, New Brunswick, Canada: a train carrying crude oil derailed and exploded
- January 2014, Philadelphia: a train carrying crude oil derailed on a busy bridge
- February 2014, western Pennsylvania: a train carrying heavy crude oil derailed and spilled

[1] For more details on these incidents (with the exception of the most recent), see John Frittelli et al., "U.S. Rail Transportation of Crude Oil: Background and Issues for Congress," Congressional Research Service, February 6, 2014, p. 10, http://www.fas.org/sgp/crs/misc/R43390.pdf.

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Rail Has Become an Increasingly Popular Option for Moving Crude Oil in North America

The rapid ramp up of oil production in North America has led to dramatic increases in the utilization of rail as a means of transporting oil to market. Railroads are now transporting more than 11 percent of U.S. oil production to market, up from 1 percent five years ago. Rail has become a vital option especially for producers in regions that are not traditional centers of production and do not have significant infrastructure in place to transport the large volumes of crude now being produced. In North Dakota, for example, production has expanded at a breakneck clip from less than 100,000 barrels per day in 2005 to nearly a million barrels per day by the end of 2013. Pipeline takeaway capacity has not kept up with rapidly expanding crude oil production. Faced with pipeline congestion and constraints, producers first turned to rail as a near-term solution to move their oil to market. As production has continued to increase, expansion of rail capacity has also been driven by logistical and market opportunities.

As a result, North Dakota producers sent between 746,000 and 776,000 barrels per day out of the state by rail in December 2013 (for 2013 as a whole, about 62 percent of the total crude that left the state left by rail). The trend is expected to continue; North Dakota projects that 1.2 million barrels per day will leave the state by rail in 2014 (about 60 percent of the total). On average last year, the U.S. rail industry was estimated to have carried more than 400,000 carloads of crude oil (approximately 730,000 barrels/day), up from 9,500 carloads in 2008.[2] The total volume for North America is likely much higher, as the estimate does not include Canadian-originated crude. The Congressional Research Service (CRS) estimated that Canada sent 40 million barrels of its crude oil by rail in 2013. While rail carries an increasingly significant portion of the U.S. crude oil supply to market, crude oil still comprises a very small portion of overall freight rail or about 1.4 percent of loadings in 2013.

As the amount of oil being shipped by rail has increased, industry statements and trade press accounts indicate that companies have moved to using unit trains for shipping higher volumes. Unlike a manifest train, which might carry a variety of different commodities, a unit train carries only one commodity (i.e., crude oil). Unit trains of oil consist of between 50 and 120 tank cars, the equivalent of 50,000 to 90,000 barrels of oil, becoming a "virtual pipeline." Unit trains increase efficiency because cars can move from their origin to destination without the need to be switched or shunted in rail yards (in other words, nonstop service without having to split up or store cars en route). Unit trains therefore have lower costs per unit than non-unit trains. According to the American Association of Railroads (AAR), "a single large unit train might carry 85,000 barrels of oil and be loaded or unloaded in 24 hours." There is no publicly available data on how much oil is being shipped in unit trains versus non-unit trains.

According to the National Transportation Safety Board (NTSB), however, the risk associated with unit trains is greater than with manifest trains because of a higher concentration of hazardous materials. As CRS points out, however, unit trains may diminish risk by avoiding the decoupling and recoupling of cars in rail yards, which could involve an element of human error.

The Rail Industry Is Complex and Regulated by a Variety of Players

There are multiple actors involved in shipping crude by rail and in ensuring its safety.

- Rail operators (such as CSX or BNSF, for example) are responsible for moving the crude and maintaining the rails and other infrastructure, but they do not own the crude or (for the most part) the tank cars in which it is shipped.
- Owners of the crude (producers or purchasers, generally refineries) are the shippers. Shippers may own the tank cars or lease them. This is a bit of a simplification, as "shipper" is not a legal term in the Hazardous Materials Regulations and different entities may have different legal responsibilities at different points in the supply chain.

[2] A carload is equivalent to 600–700 barrels, or 25,000–30,000 gallons.

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- The railroad industry breaks these categories down into carriers (the rail companies) and shippers/consigners (the shippers and owners of the material being transported, who may or may not be different entities).

In the United States, multiple agencies, both regulatory and investigative, are involved in overseeing the transportation of crude oil by rail:

- The Federal Railroad Administration (FRA) oversees safety of the carriers and ensures compliance with railroad safety regulations, including track maintenance, inspection standards, and operating practices.
- The Pipelines and Hazardous Materials Safety Administration (PHMSA) oversees safety as it relates to moving hazardous materials. Both FRA and PHMSA are located within the Department of Transportation (DOT), but are separate agencies with different leadership, mandates, and prerogatives.
- The National Transportation Safety Board (NTSB) is an independent agency not within DOT whose mission is to advance transportation safety. The NTSB is responsible for conducting accident investigations and safety studies, as well as advocating and promoting safety recommendations. However, NTSB does not have authority to actually promulgate transportation safety regulations.
- In Canada, Transport Canada and the Canadian Transportation Agency regulate railroads, while the Transportation Safety Board plays a similar role to NTSB.

Other actors have played a role in developing safety standards, mostly the associations representing the shippers and carriers. These associations are the American Association of Railroads, which is an organization of Class I railroads, the American Short Line and Regional Railroad Association (ASLRRA), and the American Petroleum Institute (API), which represents producers. For example, AAR sets industry standards on a wide variety of technical issues.

Three Main Regulatory Issues Dominate the Current Conversation

The three main issues are: 1) classification; 2) tank cars; and 3) railroad operations.

The first is **classification**. Under the hazardous materials regulations (HMR) shippers must classify their materials according to hazard class.[3] Proper classification is critical because it ensures that hazardous materials are placed in the appropriate tank cars and that emergency responders will know the right protocols to follow in the event of an accident.

Crude oil and petroleum products are in hazard class 3 (flammable liquids). Each hazard class is further divided into packing group (PG): Packing Group I, Packing Group II, and Packing Group III. Each packing group has different flash points, with Packing Group I being the most dangerous and Packing Group III being the least dangerous. For example, a crude oil may be defined as Class 3 Packing Group I, Class 3 Packing Group II, or Class 3 Packing Group III. It is the offeror's[4]

[3] There are nine classes of hazardous materials: explosives (class 1); gases (class 2); flammable/combustible liquids (class 3, which includes crude oil); flammable solid, spontaneously combustible, dangerous when wet (class 4), oxidizing agents/organic peroxides (class 5); poisonous materials/infectious substances (class 6); radioactive materials (class 7); corrosive materials (class 8); miscellaneous (class 9).

[4] An offeror is the company or entity offering crude for contract; the contract may be with the tank leasing company or with the carrier (railroad). An offeror may be distinct from the company that owns the material in transit and the carrier. PHMSA's definition of offeror, when determining the scope of the HMR's applicability is: "…any person who performs or is responsible for performing any pre-transportation function required by the HMR or who tenders or makes the hazardous material available to a carrier for transportation in commerce. A carrier is not an offeror when it performs a function as a condition of accepting a hazardous material to another carrier for continued transportation without performing pre-transportation function." For more information on the distinctions between offerors, shippers, and their legal responsibilities, see PHMSA, "Interpretation #CHI-98-001," May 16, 1988,

responsibility to properly classify the material being shipped. An offeror must also certify that the hazardous material being offered is in compliance with the HMR. In addition, an offeror cannot offer a hazardous material for transportation unless a tank car being used to transport it meets the applicable HMR requirements.

At a minimum, according to PHMSA, the material being shipped must be tested for "flash point, corrosivity, specific gravity at loading and reference temperatures, and the presence and concentration of specific compounds such as sulfur."

Officials at FRA and PHMSA (and their Canadian counterparts) are concerned that offerors have been misclassifying crude oil or not testing crude oil before it is shipped. These concerns initially arose from FRA audits that found that classification was being based solely on Material Safety Data sheets, not on testing of the crude itself. These audits revealed that crude oil had been misclassified as a PG III material when it should have been a PG I material and as a consequence "was being transported in AAR class tank cars that were not equipped with the required design enhancements."[5]

As a result of concerns about misclassification of Bakken crude, PHMSA and FRA undertook a series of inspections of Bakken crude from August through November 1, 2013 (known as Operation Classification or the "Bakken blitz"). As a result of their inspection activities, PHMSA and FRA have issued several safety advisories, including one in August and one in November. While the August advisory dealt with a host of issues not specific to classification, the November advisory reinforced the importance of proper classification and provided additional guidance on safety planning.

Based on the final results of their inspections, PHMSA announced in early February 2014 that 11 of 18 crude samples destined for tank cars that the agency randomly sampled had been misclassified (put in the wrong packing group, not in the wrong class). PHMSA fined three companies a total of $93,000 for these violations. In addition, Canadian officials have announced that the crude oil involved in the Lac Mégantic accident in Quebec was misclassified. As a result of the discovery that some crude was being misclassified, PHMSA expanded the scope of its inspection to include other factors that affect classification such as Reid vapor pressure, corrosivity, hydrogen sulfide content and the composition/concentration of the entrained gases in the material.

There are also concerns that crude from the Bakken region of North Dakota may be more flammable than other types of crude. This was first broached in a letter that the FRA sent to the API last summer after the Lac Mégantic accident that stated that FRA and PHMSA were looking into whether Bakken crude had special properties. In early January 2014, PHMSA released a safety alert to the public that advised that Bakken crude may be more flammable than traditional crudes. The *Wall Street Journal* did its own investigation, which concluded that crude oil from the Bakken contains several times more combustible gases than other crudes.

Most recently, the concerns over classification and flammability led the Department of Transportation to issue an Emergency Restriction/Prohibition Order. The order was issued because DOT determined that misclassification poses "an imminent hazard"—and because there is "clear evidence of an ongoing problem with classification of petroleum crude oil that is being shipped by rail." The order prohibits shippers from listing crude oil as PG III material, requiring classification as PG I or PG II material (and therefore requires shipping on DOT-specification cars). The order also mandates the proper testing "with sufficient frequency and quality" and classification of crude oil prior to its being offered for transportation (the HMR is not specific about how often testing needs to be performed). This order is similar to one issued by Canadian authorities that requires testing of all crude being shipped by rail.

http://phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=7c54f71912c6b110VgnVCM1000009ed07898RCRD&vgnextchannel=6629d3516bce9110VgnVCM1000009ed07898RCRD&vgnextfmt=print.

[5] In some cases, Class 3 PG III materials can be shipped on a model called the AAR 211, which is similar to the DOT-111. See footnote 6 for more information on different tank car specifications.

The second issue concerns the **tank cars**. Crude oil is generally transported in a tank car model called the DOT-111.[6] The DOT-111 is a nonpressurized tank car that carries many materials (including many hazmat commodities), ranging from caustic soda, liquid fertilizers, to sulfuric acid and including both flammable and nonflammable materials. According to an Association of American Railroads fact sheet, there are 228,000 DOT-111s in service, of which 94,000 carry flammable liquids.

DOT-111 Tank Car Fleet Breakdown
(As of the Third Quarter of 2013)

DOT-111 Tank Cars	Total Cars	Percent of the Entire DOT-111 Tank Car Fleet
All DOT-111s	272,119	100.0%
Non-Hazmat DOT-111s	101,360	37.2%
Hazardous Material DOT-111s*	170,759	62.8%
Other Hazardous Materials Service	76,769	28.2%
Flammable Liquids (FL) Service*	94,178	34.6%
CPC-1232 Compliant Tank Car - FL Service (Jacketed and Non-Jacketed)	14,160	5.2%
Jacketed Tank Car - FL Service	14,677	5.4%
Non-Jacketed Tank Car (Existing Base Car) - FL Service *	**65,341**	**24.0%**
Existing Base Car, Ethanol Service	28,970	10.6%
Existing Base Car, Crude Oil Service	21,646	8.0%
Existing Base Car, Other Flammable Liquid Service	25,703	9.4%

* = These figures are not additive of the subcategories because some tank cars carry loads in more than one commodity category.

NTSB has done safety investigations related to the DOT-111 in 1991, 1992, 2003, 2006, and 2009 and has been recommending improvements to the DOT-111 since 1991. The 1991 NTSB study found that 54 percent of DOT-111 cars involved in accidents released product, a significantly higher rate than pressurized tank cars such as the DOT-105 or 106. NTSB issued a report in 2009 following an accident involving a DOT-111 carrying ethanol. That report detailed the susceptibility of those cars to puncture in the wake of an accident involving ethanol that killed one person and injured nine others. NTSB has found that the DOT-111 has a "high incidence of [tank] failure when involved in accidents." NTSB further concluded that the DOT-111 performed poorly in accident scenarios, illustrating its "inability…to withstand the forces of accidents, even when the train is traveling" slowly. NTSB further concluded that the DOT-111 "…can almost always be expected to breach in derailments that involve pileups or multiple car-to-car impacts." NTSB has recommended equipping DOT-111s with enhanced tank head and shell puncture resistance systems and top fittings protection, require bottom outlet valves be designed to remain closed during accidents, and have center sill or draft sill attachment designs that conform to the 2011 AAR tank car specifications.

In the wake of the 2009 ethanol accident, AAR's Tank Car Committee formed a task force that drafted new designs for DOT-111s (this design is technically called the CPC-1232, and the pre-2011 cars are called legacy DOT-111s). The new design included increased minimum head and shell thickness, top fitting protection, a thicker head shield, and head and shells constructed of normalized steel. The committee recommended that new DOT-111s ordered after October 1, 2011, be built to this standard.

[6] It is worth noting that Canadian heavy crude oil is not generally shipped by DOT-111s, and that the concerns about tank cars and classification are more about US Bakken and other light oils. For more detail on different tank cars, their specifications, and typical commodities shipped in them, the best summary is the AAR guide to tank cars, which offers a fairly comprehensive overview of different tank cars.

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Of the 94,178 cars in flammable service, 14,150, or 5 percent of the total DOT-111 fleet (15 percent of the flammable service fleet), have been manufactured to comply with new standards.

The 2011 standards were also sent in a petition for rulemaking to PHMSA asking that these standards be made mandatory, but PHMSA did not act. In May 2012, PHMSA stated in a letter to NTSB that it had initiated an advanced notice of proposed rulemaking to request comment on the AAR petition to upgrade DOT-111 standards, but no proposed rule was issued and no 2011 or 2012 advanced notice of proposed rulemaking on tank car standards could be found on PHMSA's list of recent NPRMs and ANPRMs.

Following the Lac Mégantic accident in 2013, PHMSA and FRA have taken several steps to address tank car standards. One of the most prominent of these has been an advanced notice of proposed rulemaking issued by PHSMA in September 2013, which covers, among other issues, upgrades to the DOT-111.

Transportation Secretary Anthony Foxx has outlined a timeline for issuing the DOT-111 rule, with a proposed rule to be published by November 2014, the comment period ending in January 2015, and a final rule to follow shortly thereafter. There are three main issues before PHMSA. The first is whether it will require upgrades that go beyond the scope of AAR's 2011 standards. If they do, the question is whether to require retrofits to the post-2011 cars or grandfather them in to the system. A second issue is what to do with the pre-2011 legacy tank cars—whether they will be phased out, retrofitted, or left in service. The third issue is timeline. It is not just what happens to the older cars, but over what timeline that matters. An immediate phaseout will be much more costly than a gradual phaseout; likewise, an immediate retrofit requirement will be significantly more burdensome than a gradual requirement.

AAR had previously stated that the cost of retrofitting old tank cars would be prohibitive. However, in November 2013, AAR reversed its position and requested that PHMSA require retrofitting of all existing cars (AAR was joined by the American Short Line and Regional Railroad Association). They now recommend that cars that could not be retrofitted should be phased out of flammable service and that the post-2011 cars be retrofitted with high-flow-capacity pressure relief devices. Moreover, AAR has stated that even the new tank cars built to the 2011 standards might require some upgrades, including installing high-flow-capacity relief valves and design modifications to prevent bottom outlets from opening in event of an accident.

This position is not shared by the American Petroleum Institute, which represents many shippers. In its comments to PHMSA, API supports enhanced design features for new DOT-111 cars but has conditionally opposed retrofits on legacy cars and categorically opposed retrofits on the post-2011 DOT-111 cars. API's position is that "there is not currently adequate data and analysis on the costs and benefits of retrofit options for DOT-111 tank cars built prior to the [2011] standard" and that a task force should be convened to consider retrofit options before any decision is made about the pre-2011 legacy cars. Only "if" there is a "thorough cost/benefit analysis that demonstrates the need for retrofits" would API be supportive. API further stated that it believes enhancing safety is necessary but that this needs to be achieved by rail operations improvements including, among other things, fixing broken or washed out rails and improving training and procedures in shipping Class 3 Packing Groups I and II materials. In comments, two other major industry players, the Railway Supply Institute and the North American Freight Car Association, took different positions on the need for retrofits, but both advised a minimum of a 10-year phase-in period for any retrofits, should they be required.

There are many reasons that some are opposed to phaseouts and/or retrofits, either of the pre-2011 legacy cars and/or of the post-2011 standard cars.

- DOT-111s have a long service life, and those built relatively recently (before 2011) may have had up to 35 years left in service (the typical life of a tank car is 30 to 40 years). This is true of cars built in the years before the 2011 standard, but is especially true of cars that were built in good faith to the post-2011 standard.

- The cost of retrofitting or phaseout is significant; a new tank car that is not coiled/insulated is estimated to cost between $120,000 and $138,000. Retrofits would presumably cost less but still be significant. The AAR had previously estimated it would cost over a billion dollars to do the retrofits; current estimates range from $20,000 to $40,000 per car.
- There is already a backlog of DOT-111s on order (according to CRS, in the summer of 2013, manufacturers had more than 60,000 tank cars of all types on order); the oil industry is concerned about the amount of time it would take to retrofit or build enough cars to keep pace with current (expanding) production. The current backlog has already resulted in extended delivery times of 24 to 30 months, a number that could increase if retrofits were required in a timely manner. There are a limited number of manufacturers that can produce tank cars to these specifications. Further, as the Railway Supply Institute argues, shippers may compensate for any decrease in rail availability by turning to trucks, which could create additional risks.
- Any retrofits might make tank cars heavier and reduce their capacity, possibly increasing the number of tank cars required to move the same amount of product.

However, there are also compelling reasons to require retrofits or phaseouts of the pre-2011 legacy DOT-111s. According to NTSB, safety benefits are not realized if old and new tank cars are comingled.

The differences between API and AAR reflect who will pay the costs of retrofits. Railroads own less than 1 percent of tank cars in North America. It is shippers who own or lease tank cars that would have to pay the costs of retrofits or of a phaseout.

The ultimate timeline for any phaseout or retrofit requirement will have an enormous impact on the final regulatory costs to industry. Citibank wrote in a recent note that regulatory changes to tank cars are unlikely to change the profitability or long-term opportunity of shipping crude by rail, as long as two conditions are met: 1) tank car production ramps up as expected, and 2) there is at least a five-year time period to accommodate any phaseout or retrofits.

The final issue is **rail operations**. Rail operations is the blanket term for how the rail industry manages itself and has come under increased scrutiny recently on a host of operations from how much brake force is applied to how the railroads inspect and maintain the tracks.

On February 21, DOT and AAR released the commitments AAR had made to enhance rail safety. AAR committed to, among others, the following:

- undertake mechanical and track inspection beyond what is required by federal regulations,
- conduct route analyses using 27 factors to assess the safest routes,
- install wheel alignment detectors along every 40 miles of track,
- establish speed restrictions (50 miles per hour [mph] for unit trains and 40 mph for trains with at least one pre-2011 DOT-111 loaded with crude or non-DOT 111s loaded with crude when that train is within the limits of a high-threat urban area),
- contribute $5 million to develop new training programs for hazardous materials shipping and utilizing brake systems that reduce the likelihood that trains will pile up in the event of derailments. AAR's members have agreed to implement these actions by July 1.

Each commitment also contained specific dates by which AAR members would comply, the latest of which is July 1, 2014.

In January 2014, FRA also issued a final rule on track safety standards and improving rail integrity (that rule had been in the works since before the Lac Mégantic accident but has bearing on rail operations). Instead of requiring railroads to schedule inspections, it requires a specified track failure rate. There are multiple other issues on the railway operations side that federal regulators are looking at closely, including terminal operations, short track issues, railroad crew size, positive train control, and route selection.[7]

Finally, the Railroad Safety Advisory Committee (RSAC), a group composed of industry, labor, and government representatives who develop recommendations on new regulatory standards, has created three new working groups to formulate new regulatory recommendations on 1) hazardous materials transportation by rail; 2) appropriate train crew sizes; and 3) train securement procedures. These groups are supposed to produce formal recommendations by April 2014.

Other Actions Have Been Taken by Federal and State Regulators and Private Industry

While the classification and tank car issues discussed above are the most prominent federal actions, PHMSA and FRA have taken other steps as well. PHMSA and FRA have reiterated the requirements for safety and security planning set out in the hazardous materials regulations and stated that they expect shippers by rail and rail carriers to revise their safety and security plans to address the issues outlined in the August advisory.

After the accident in North Dakota, U.S. regulators and safety inspectors moved more aggressively to address the issue. NTSB, in partnership with the Transportation Safety Board of Canada, issued three recommendations to improve the safety of crude by rail. It was unprecedented for the two safety boards to issue joint recommendations. The recommendations include 1) expanded hazmat route planning to avoid populated areas; 2) increased audits to ensure proper safety response capabilities, and 3) increased audits to ensure proper classification of hazardous materials.

In response, the Department of Transportation said that it had already taken action on implementing NTSB's recommendations. In January 2014, Secretary of Transportation Foxx held a meeting with API, AAR, and the ASLRRA. What was agreed at the meeting was disputed by the parties involved, but Foxx sent a letter reiterating his understanding of what participants in the meeting had agreed:

- AAR agreed to consider and provide details about routing protocols for hazardous materials, reducing the speed of crude unit trains passing through high-consequence areas, and increasing and improving track, mechanical, and other rail safety inspections (they have begun to implement this agreement, as described above);
- API agreed to share expertise and testing information with PHMSA about the characteristics of Bakken crude, identify best practices regarding testing and classification, and collaborate with PHMSA on improving analysis of crude oil characteristics. In late February, API pledged to develop a comprehensive standard for testing, classification, loading and unloading of crude;
- Both AAR and API agreed to improve emergency responder capabilities and training to address crude oil incidents and recommission the AAR Tank Car Committee to reach consensus on additional changes to the 2011 DOT-111 standards.

Not content to wait for the federal government, other state and local officials are also taking action. New York governor Andrew Cuomo has directed state agencies to submit an extensive assessment of spill preparedness. Oregon's governor ordered a review of rail safety standards and spill responsiveness. The Port of Portland said that it would not allow any rail terminals to be built until train safety concerns are addressed. Chicago aldermen have also proposed a fee on using older railcars, with revenue put toward emergency response and recovery (a separate Chicago proposal would ban the older DOT-111 from entering Chicago as a public nuisance). Minnesota officials recently acknowledged that they were not equipped to deal with a major train oil fire, should one occur. Communities in Washington, D.C., and Albany, N.Y., have also begun to express concern about projects related to crude oil shipped by rail.

[7] For more information on these issues, see Frittelli et al., "U.S. Rail Transportation of Crude Oil," pp. 17–19.

Other industry players have indicated that they are taking action. Refiner Tesoro announced in February that the company would upgrade its tank car fleet to comply with the 2011 standard, but it also said that oil "is not the company's responsibility when it is in transit." Canadian refiner Irving said that it would convert all of its railcars to the 2011 standard by April 30, while PBF Energy said it would do the same by June. BNSF Railway announced that it would purchase 5,000 new tank cars that exceed the 2011 safety standard; the railway did not previously own any tank cars, but according to Platts, the aim is to "accelerat[e] the transition to the so-called Next Generation Tank Car and giv[e] railcar builders incentive to design and produce the cars." Meanwhile, railroads Canadian National and Canadian Pacific announced that they would charge shippers higher rates if they used the older, pre-2011 tank cars.

Other Issues Have Not yet Been Addressed

One additional issue not yet fully addressed by the market or by regulators is liability. As a recent *Wall Street Journal* article pointed out, costs associated with cleanup often exceed the ability of insurance to pay. It is still not entirely clear who will pay. The rail line involved in the Lac Mégantic accident went into bankruptcy; its bankruptcy trustee is currently suing the owner of the crude oil the train was carrying. The train operator claims that the crude owner should have known the tank cars were susceptible to rupture. The issue had not been a prominent part of the debate the way that classification, tank cars, and rail operations has, but who is responsible for bearing the financial burden of any accident is likely to be a significant part of the debate moving forward. That debate, like the debate about tank cars, is about who is at fault when accidents occur—shippers/offerors or carriers.

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