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Bakken Crude and the Ford Pinto of Railcars: The Growing Need for Adequate Regulation of the Transportation of Crude Oil by Rail

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BAKKEN CRUDE AND THE FORD PINTO OF RAILCARS:
THE GROWING NEED FOR ADEQUATE REGULATION OF
THE TRANSPORTATION OF CRUDE OIL BY RAIL

I. INTRODUCTION

On July 6, 2013, a violent explosion rocked the small town of Lac-Mégantic, located in Quebec, Canada.¹ The explosion leveled nearby buildings and took the lives of forty-seven individuals.² Response teams finally extinguished the flames after two days of relentless battle against the fire.³ The source of the explosion was a runaway train that derailed when passing through the town.⁴ While train derailments are violent in their own right, they are not commonly associated with explosions of such magnitude.⁵ The train that derailed, however, was a seventy-two car train transporting nearly two million gallons of crude oil from the Bakken Shale⁶ region of North Dakota by means of DOT-111 tanker cars.⁷ Upon derailment, a spark ignited the leaking crude oil, causing the tankers to explode.⁸

Transportation of crude oil by rail has become an increasingly common practice and is currently responsible for the transportation of “more than [ten] percent of” all American oil.⁹ While the

1. Marcus Stern & Sebastian Jones, *Boom - North America's Explosive Oil-by-Rail Problem*, THE WEATHER CHANNEL (Dec. 8, 2014), <http://stories.weather.com/boom> (detailing Lac-Mégantic explosion).

2. *Id.* (discussing damage caused by Lac-Mégantic explosion).

3. *Id.* (elaborating on damage explosion caused).

4. Michal W. Robbins, *Why Do These Train Cars Carrying Oil Keep Blowing Up?*, MOTHER JONES (May 27, 2014, 6:00 AM), <http://www.motherjones.com/environment/2014/05/oil-tank-trains-bakken-crude-accidents> (discussing source of Lac-Mégantic explosion).

5. *See id.* (discussing increased dangers of transporting oil by rail).

6. The Bakken Shale is an oil shale “located in Eastern Montana and Western North Dakota, as well as parts of” Canada. Bakken Shale Oil Formation, Bakken Shale, <http://bakkenshale.com/> (last visited December 20, 2015). It is “one of the largest oil developments in the [United States] in the past 40 years.” *Id.*

7. *See Robbins, supra* note 4 (discussing contents of derailed tank cars).

8. *See id.* (explaining cause of Lac-Mégantic explosion); *see also* Joe Eaton, *New Oil Train Safety Rules Divide Rail Industry*, NAT'L GEOGRAPHIC (Nov. 1, 2014, 3:10 PM), <http://news.nationalgeographic.com/news/energy/2014/10/141031-rail-in-dustry-safety-oil-standards/> (detailing why crude oil in tankers exploded).

9. *See* Clifford Krauss & Jad Mouawad, *Accidents Surge as Oil Industry Takes the Train*, N.Y. TIMES (Jan. 25, 2014), http://www.nytimes.com/2014/01/26/business/energy-environment/accidents-surge-as-oil-industry-takes-the-train.html?_r=1 (discussing sharp increase in use of rail to transport crude oil).

industry intended rail car use to be a temporary fix to a temporary problem, the practice appears to be here to stay.¹⁰ Oil production has boomed in states that are not traditionally associated with oil production, and, as a result, states such as North Dakota lack sufficient pipeline capacity to deliver all their crude oil to refineries.¹¹ Unwilling to wait for Congress to approve the Keystone XL Pipeline,¹² oil companies have turned to railways, resulting in an over four thousand percent increase in the annual number of carloads transporting crude oil.¹³ This unexpected and dramatic rise in rail-car use spawned an equally sudden demand for tanker cars (tankers) that could transport crude oil.¹⁴ To meet this surge in demand, rail companies provided oil companies with the one tanker that they had available, the DOT-111, which some have named the “Ford Pinto of tanker cars.”¹⁵ The DOT-111 earned its nickname because of its reputation as a tanker car prone to puncturing, leaking, and sparking; “[it] was never intended to haul volatile crude oil.”¹⁶ The dangers of the DOT-111 tank car are compounded given the current state of the American rail system.¹⁷ Many portions of the American railway system, including tracks and

10. *See id.* (discussing oil company plans to expand railways to Athabasca oil sands).

11. *See id.* (explaining need for oil by rail).

12. The Keystone XL Pipeline is a proposed expansion of the already existing Keystone Pipeline. *See What is the Keystone XL Pipeline?*, STATEIMPACT, <https://stateimpact.npr.org/texas/tag/keystone-xl-pipeline/> (last visited Sept. 20, 2015) (explaining that Keystone Pipeline and proposed expansion project named Keystone XL Pipeline). The expansion involves two different sections: northern and southern. *See id.* The southern expansion, which connected Oklahoma to the Gulf Coast by way of Texas, is already operating. *See id.* The northern section, which connects Nebraska to Alberta and, more importantly, passes through North Dakota’s Bakken shale play, is currently in development. *See id.* The northern expansion is not complete because TransCanada, the company building the Keystone XL Pipeline, has been unable to obtain a Presidential Permit allowing it to build a pipeline across the boarder between the United States and Canada. *See id.* The issuance of the Presidential Permit has become a political issue: some argue that the pipeline will add jobs to the American economy while others are concerned of the Keystone XL Pipeline’s potential environmental impact. *See id.*

13. *See Krauss & Mouawad, supra* note 9 (quantifying increase in use of rail to transporting crude oil). Currently, approximately 400,000 carloads of crude oil travel by railcar per year compared to 9,500 in 2008. *Id.*

14. *Id.* (discussing recent oil boom).

15. Weather Films, *Boom: An Investigation by the Weather Channel and InsideClimate News*, VIMEO, <https://vimeo.com/113817083> (last visited Oct. 3, 2015) (explaining why DOT-111 is used for transporting crude oil).

16. *See Stern & Jones, supra* note 1 (discussing DOT-111’s dangerous design flaws).

17. *See id.* (discussing how oil by rail problems extend beyond DOT-111 tankers).

bridges, are “more than a century in age” and have not been maintained for years.¹⁸

Considering the aging infrastructure of the American railway system and the DOT-111’s propensity to leak, continued transportation of crude oil by railcar poses serious environmental and safety concerns.¹⁹ Not only did the Lac-Megantic derailment result in a deadly explosion, but its punctured DOT-111 tanker cars spilled oil into “nearby waterways.”²⁰ With the increased reliance on trains to transport oil, the number of gallons of spilled oil has increased as well.²¹ As this method of transportation continues to grow, so does the threat to the environment.²²

In response to the Lac-Megantic catastrophe, Canadian regulators acted swiftly, requiring the DOT-111 to either “be retrofitted or phased out by May 2017.”²³ While the United States Department of Transportation issued emergency orders in the wake of Lac-Megantic, these orders focused primarily on the due diligence required of rail companies in transporting crude oil through towns.²⁴ Meaningful regulation pertaining to the use or improvement of the DOT-111 faces staunch opposition from oil and railroad companies.²⁵ As a result, regulatory efforts to curtail the dangers of oil by rail have had mixed-success.²⁶

Section II of this Comment discusses the events and factors that have contributed to the increasing use and danger of rail for

18. See Weather Films, *supra* note 15 (discussing flaws of aging American railways).

19. See Krauss & Mouawad, *supra* note 9 (discussing dangers of transportation of crude oil by rail).

20. Eaton, *supra* note 8 (expanding damages from oil by rail beyond explosions and to oil spills).

21. See Robbins, *supra* note 4 (explaining how increases in railcar use correlates with increases of oil spills).

22. See *id.* (explaining how increases in railcar use correlates with increases of oil spill).

23. Eaton, *supra* note 8 (discussing Canadian regulatory response to Lac-Megantic accident).

24. See *DOT Issues Emergency Order Requiring Stricter Standards to Transport Crude Oil by Rail*, U.S. DEP’T OF TRANSP., <http://www.dot.gov/briefing-room/dot-issues-emergency-order-requiring-stricter-standards-transport-crude-oil-rail> (last updated Mar. 6, 2014) (discussing United States’ response to Lec-Megantic explosion). The DOT passed four emergency orders over the span of seven months. *Id.*

25. See Eaton, *supra* note 8 (discussing oil and rail company opposition to regulations concerning transportation of crude oil by rail).

26. See *id.* (explaining current state of regulation pertaining to transportation of crude oil by rail).

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transporting crude oil.²⁷ Section III assesses the destructive and environmental dangers posed by transportation of crude oil by rail.²⁸ Section IV analyzes the regulatory response to the rise of oil as a result of rail shipments.²⁹ Finally, Section V addresses the need for more regulation and discusses the impediments to additional regulation of transporting oil by rail.³⁰

II. BACKGROUND

A. North Dakota's Bakken Shale and the North American Oil Boom

Since 2008, North America has experienced a sharp increase in oil production.³¹ One of the main catalysts for the sudden boom in the United States is the increase of oil production in North Dakota.³² Previously, North Dakota produced less than 200 thousand barrels of oil per day.³³ Now, North Dakota produces over 1.2 million barrels per day.³⁴ With this rapid growth in production, North Dakota has surpassed California and Alaska to become the United States' "second leading oil producing state."³⁵

The oil boom in North Dakota can be attributed to both finally accessing the Bakken Shale and an increasing demand for domestic

27. For a discussion of the events and factors that have contributed to the increasing use and danger of oil by rail, see *infra* notes 31-123 and accompanying text.

28. For a discussion of the destructive and environmental dangers of oil by rail, see *infra* notes 124-161 and accompanying text.

29. For a discussion of the regulatory response to the rise of oil by rail, see *infra* notes 162-215 and accompanying text.

30. For a discussion of the need for more regulation and the impediments to additional regulation, see *infra* notes 216-251 and accompanying text.

31. See Weather Films, *supra* note 15 (discussing oil boom in North America, particularly United States).

32. *Id.* (attributing United States' oil boom to fracking in North Dakota).

33. *Id.* (discussing pre-fracking levels of production).

34. *Id.* (comparing current levels of oil production to those of just five years ago).

35. See *id.* (discussing North Dakota's rise to one of the United States' leading oil producers); see also Jack Nicas, *Oil Fuels Population Boom in North Dakota City*, WALL ST. J. (Apr. 6, 2012, 8:23 PM), <http://www.wsj.com/articles/SB10001424052702304072004577328100938723454> (comparing United States' top four oil producing states: Alaska, California, North Dakota, and Texas); see also Associated Press, *ND Becomes Nation's Second-Leading Oil Producer*, FOX NEWS (May 15, 2012), <http://www.foxnews.com/us/2012/05/15/nd-becomes-nation-second-leading-oil-producer/> (commenting on North Dakota passing Alaska as United States' second-leading producer of oil). North Dakota's oil production is "second only to Texas." See Weather Films, *supra* note 15.

oil.³⁶ Although the shale has only recently become accessible, residents of North Dakota have long known that the Bakken Shale contained oil deep beneath the surface.³⁷ New technologies, such as hydraulic fracturing (fracking), have allowed North Dakota to tap into the Bakken Shale, resulting in a surge in oil production.³⁸ North Dakota is able to sustain such high levels of production due to the increasing demand for domestic oil.³⁹ In 2009, prior to fracking in the Bakken Shale, the United States imported approximately two-thirds of the oil it consumed.⁴⁰ As a result of fracking, the United States now only imports approximately one-third of the oil it consumes.⁴¹

While oil companies have been able to hire more labor to keep up with North Dakota's rapidly increasing oil production, the state's pipeline infrastructure is insufficient.⁴² To keep up with production, oil companies turned to railways as a means of transporting the excess crude oil.⁴³ Approximately two-thirds of the oil produced in North Dakota travels to refineries via rail.⁴⁴

36. See Robbins, *supra* note 4 (discussing catalyst of oil boom in North Dakota).

37. *New Boom Reshapes Oil World, Rocks North Dakota*, NPR (Sept. 25, 2011, 4:00 PM), <http://www.npr.org/2011/09/25/140784004/new-boom-reshapes-oil-world-rocks-north-dakota> (discussing oil boom in North Dakota).

38. See Christina Nunez, *N.D. Oil Train Fire Spotlights Risks of Transporting Crude*, NAT'L GEOGRAPHIC (Jan. 1, 2014, 10:03 AM), <http://news.nationalgeographic.com/news/energy/2013/12/131231-north-dakota-oil-train-fire/> (discussing use of fracking in North Dakota). "Hydraulic fracturing, or fracking, is a technique designed to recover gas and oil from shale rock." *What is Fracking and Why is it Controversial?*, BBC NEWS (June 27, 2013), <http://www.bbc.com/news/uk-14432401> (defining hydraulic fracturing). The process involves drilling horizontally into a rock layer containing natural gas, known as a shale, and using a "high-pressure water mixture . . . to release the gas inside." *Id.* Fracking is a controversial practice because it can be used to reach natural gas previously thought to be unobtainable, but at the cost of severe negative impacts on the environment. See *id.*

39. See *New Boom Reshapes Oil World, Rocks North Dakota*, *supra* note 37 (discussing increasing demand for domestic oil).

40. *Id.* (discussing United States' prior dependence on foreign oil).

41. See Kiran Dhillon, *Why Are U.S. Oil Imports Falling?*, TIME (Apr. 17, 2014), <http://time.com/67163/why-are-u-s-oil-imports-falling/> (discussing sharp decline in oil imports).

42. See *New Boom Reshapes Oil World, Rocks North Dakota*, *supra* note 37 (discussing boom towns popping up in North Dakota as workers flood well sites); see also Stern & Jones, *supra* note 1 (explaining how North Dakota's pipelines were insufficient to keep up with oil production). Construction of the Keystone XL pipeline would alleviate much of the burden placed on North Dakota's current pipelines. See Eaton, *supra* note 8; see also *infra* notes 55-58, 230-48 and accompanying text.

43. Weather Films, *supra* note 15 (explaining how oil companies are using railroad system to transport crude oil that pipelines cannot carry).

44. See Krauss & Mouawad, *supra* note 9 (discussing amount of oil North Dakota ships on railcar).

North Dakota is not alone in this new practice.⁴⁵ Oil by rail has become common throughout the American Midwest and Canada.⁴⁶ Roughly two hundred railroad lines, or “virtual pipelines,” connect Casselton, North Dakota; Houston, Texas; and numerous shale plays in between these states.⁴⁷ These lines are not limited to the Midwest; they reach as far west as Bakersfield, California and pass through major cities such as Philadelphia, Pennsylvania and Portland, Oregon.⁴⁸ Prior to 2010, less than one percent of American oil was carried via rail, but today that share is “more than ten percent.”⁴⁹

Canada transports crude oil from the Alberta oil sands to refineries by rail.⁵⁰ The oil sands in Alberta, Canada are the third largest in the world and are capable of producing 1.9 million barrels of oil per day.⁵¹ Transporting crude oil by rail is a growing practice in Canada, just like it is in the United States.⁵² Evidencing this growth, in December of 2013, the first train carrying crude oil from Canadian oil sands departed from a newly constructed rail terminal in Edmonton, Alberta.⁵³ The new terminal runs East and West across Canada and can distribute 890 thousand barrels of oil per day.⁵⁴

45. *See id.* (commenting that transporting oil by rail is not unique to North Dakota).

46. *See id.* (discussing how use of railcar has become popular throughout Midwest).

47. *See id.* (mapping railroads lines used for transporting oil).

48. *See id.* (discussing expansiveness of railroad lines carrying oil, including a line connecting Topeka, Kansas to Bakersfield, California); *see also* Stern & Jones, *supra* note 1 (naming Philadelphia and Portland as major urban areas that tankers carrying oil pass through).

49. *See* Krauss & Mouawad, *supra* note 9 (discussing increasing use of rail to transport oil).

50. *See* Yadullah Hussain, *Oil-by-rail Gathers Steam as New Capacity Comes on Line*, FIN. POST (Jan. 9, 2014, 4:51 PM), http://business.financialpost.com/2014/01/09/oil-by-rail-gathers-steam-as-new-capacity-comes-on-line/?__lsa=07fa-5ee3 (discussing expansion of Canada’s rail infrastructure to accommodate oil by rail).

51. *Oil Sands*, ALBERTA, <http://www.energy.alberta.ca/ourbusiness/oil-sands.asp> (last visited Jan. 22, 2015) (discussing size and production capacity of Alberta oil sands). Alberta’s oil sands are third behind Saudi Arabia and Venezuela’s. *Id.* Alberta anticipates being able to produce as much as 3.8 million barrels per day by 2022. *Id.*

52. *See* Hussain, *supra* note 50 (discussing increasing use of rail to transport crude oil in Canada).

53. *See id.* (discussing expansion of rail infrastructure to accommodate demands of oil distribution). Canexus Corp., owner of the new terminal, is one of many companies building new terminals or expanding old ones in an effort to match demand for crude oil. *See id.* Some of these projects cost more than 100 million dollars to complete. *Id.*

54. *See id.* (comparing capacity of new rail terminal to Keystone XL pipeline).

Transportation of crude oil by rail was initially a short-term and makeshift solution for the distribution problems in the United States, but the practice appears to have become permanent.⁵⁵ Although the Keystone XL pipeline would increase Midwest pipeline capacity and reduce dependency on rail, politics have made the pipeline's future uncertain.⁵⁶ Delays regarding the Keystone XL pipeline have caused oil companies to further invest in rail.⁵⁷ While the Keystone XL pipeline could carry 830 thousand barrels per day, rail is already carrying 760 thousand barrels per day.⁵⁸

B. American Rail: A Second Great Boom and the Transportation of Crude Oil

With the increasing use of rail to transport unstable crude oil, the critics of the practice are scrutinizing the state of the American railroad system.⁵⁹ In particular, critics are concerned that American railroads are not in sufficient condition to transport such hazardous cargo, especially considering that some sections are over one hundred years old.⁶⁰ Critics fear that without adequate federal oversight, the private businesses that own the majority of American railroad lines lack the proper incentives to safely maintain railroad lines.⁶¹

1. *The Reemergence of American Freight Rail*

By the 1970s, the once great American railroad system struggled to keep pace with its more popular competitors: airplanes and

55. See Krauss & Mouawad, *supra* note 9 (terming transportation of oil by rail "stopgap measure").

56. See *id.* (linking delays in Keystone XL Pipeline to increased demand for oil by rail); see also Robbins, *supra* note 4 (discussing growing uncertainty regarding approval of Keystone XL pipeline).

57. See Eaton, *supra* note 8 (discussing American Petroleum Institute's argument that failure to approve Keystone XL pipeline requires further investment in rail).

58. See *id.* (comparing estimated capacity of Keystone XL pipeline to current capabilities of American rail). For a further discussion of the Keystone XL pipeline's impact on oil by rail, see *infra* notes 230-48 and accompanying text.

59. See Joann Muller et al., *All Aboard: Why America's Second Rail Boom Has Plenty of Room to Run*, FORBES (Jan. 22, 2014, 6:00 AM), <http://www.forbes.com/sites/joannmuller/2014/01/22/americas-second-rail-boom/> (discussing how transportation of oil by rail has resulted in heightened scrutiny of American railroad infrastructure).

60. See Weather Films, *supra* note 15 (expressing concern over age of railroad infrastructure).

61. See Stern & Jones, *supra* note 1 (discussing lack of standards for private maintenance of railroads). For a more complete discussion of the state of regulation regarding railroad maintenance, see *infra* notes 162-215 and accompanying text.

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automobiles.⁶² American rail began to transition into its modern form when Congress passed the Staggers Rail Act of 1980,⁶³ which deregulated the industry by allowing railroad companies to exit the flagging passenger rail business and focus exclusively on freight.⁶⁴ Once deregulated, railroad companies possessed greater control over price setting and could contract privately with shippers.⁶⁵ Price control and contracting increased competition not only amongst the rail companies, but also amongst the airline and automobile industries.⁶⁶

Since the passage of the Staggers Rail Act, the rail industry has centralized its resources; the industry condensed from twenty-six large railroad carriers into just seven large carriers.⁶⁷ Further, the post-Staggers Act era also led to an influx of investment.⁶⁸ Because railroads are privately owned, private owners of American railroads bear the costly responsibility of maintaining a sound infrastructure.⁶⁹ In the thirty years since the passage of the Staggers Act, the rail industry has invested over 500 billion dollars in infrastructure.⁷⁰

62. See Elizabeth Dovell, *U.S. Rail Infrastructure*, COUNCIL ON FOREIGN REL. (Mar. 7, 2012), <http://www.cfr.org/infrastructure/us-rail-infrastructure/p27585> (discussing American rail industry's inability to keep up with emerging modes of transportation in twentieth century); see also Joel Palley, *Impact of the Staggers Rail Act of 1980*, U.S. DEP'T OF TRANSP. FED. RAILROAD ADMIN. (Mar. 8, 2011), <https://www.fra.dot.gov/eLib/Details/L03012> (discussing additional obstacles rail industry faced when competing with airline and automotive industry).

63. Staggers Rail Act of 1980, 49 U.S.C. § 10101 (2012).

64. See Dovell, *supra* note 62 (discussing Staggers Rail Act's role in bringing about modern rail system by deregulating American railroad industry and thus allowing railroads to control price setting and privately contract with shippers). The Staggers Rail Act did not completely deregulate the industry, but it did represent a significant decrease in regulation of the industry. See *id.*

65. See Palley, *supra* note 62 (listing rail industry's new freedoms post Staggers Rail Act).

66. See *id.* (discussing positive impact of Staggers Rail Act). Prior to the Staggers Rail Act, freight rail had been sharply declining in market share of freight shipments; after the Staggers Rail Act, however, rail stabilized at above forty percent market share, which is greater than its pre-Staggers' share. See *id.*

67. See Dovell, *supra* note 62 (commenting on consolidation of rail industry post Staggers Rail Act).

68. See Michael Grunwald, *Back on Tracks*, TIME (July 9, 2012), <http://business.time.com/2012/07/09/us-freight-railroads/> (discussing rail's heavy investment in its own infrastructure).

69. See Am. Soc'y for Civil Eng'rs, *Rail: Conditions & Capacity*, 2013 REP. CARD FOR AM. INFRASTRUCTURE, <http://www.infrastructurereportcard.org/a/#p/rail/conditions-and-capacity> (last visited Feb. 3, 2015) (discussing rail infrastructure's dependency on private investment).

70. See *id.* (providing amount rail industry has invested into its infrastructure). Investment is not purely a private matter; state and federal governments have also provided grants to railroads. See Am. Soc'y for Civil Eng'rs, *Rail: Success Stories*, 2013 REP. CARD FOR AM. INFRASTRUCTURE, <http://www.infrastructurereportcard.org/a/#p/rail/success-stories> (last visited Feb. 3, 2015) (discussing use of fed-

In recent years, the private sector has spent approximately twenty billion dollars per year on railroad infrastructure.⁷¹ In its *2013 Report Card For America's Infrastructure*, the American Society of Civil Engineers noted, "in 2010 alone, freight railroads renewed the rails on more than 3,100 miles of railroad track, equivalent to going coast to coast."⁷² Investment trends indicate that even without extensive federal oversight, the rail industry's private sector has placed an emphasis on securing its infrastructure.⁷³ Notwithstanding its impressive investment in infrastructure, the American Society of Civil Engineers graded the rail industry a "C+" in its *2013 Report Card For America's Infrastructure*.⁷⁴

2. Growing Concerns Over Safety

The Midwest's oil shale boom has been the driving force in the railroad industry's most recent resurgence.⁷⁵ Currently, American freight rails are transporting an unprecedented amount of crude oil.⁷⁶ With increased transportation of this dangerous freight, there

eral and state funds to invest in Oklahoma's "rolling pipeline"). In 2011, the Oklahoma Department of Transportation invested in a "rolling pipeline" project to improve the transportation of oil cars through Oklahoma. *See id.* The project would upgrade the existing state owned rail line from Class Three standards to Class Two standards so that it could support longer trains traveling at faster speeds. *See id.* "Using a 20 percent local match, the \$8.4-million project was awarded a TIGER grant in 2011 to create a rolling pipeline of domestically produced energy due to its unusually high benefit-cost ratio." *Id.* (internal quotation marks omitted). In this case, the benefits of rail were clear because trucking costs were prohibitive and no pipeline alternative existed." *See id.*

71. *See* Muller et al., *supra* note 59 (quantifying private sector investments in railroad infrastructure); *see also* Am. Soc'y for Civil Eng'rs, *Rail: Investment and Funding*, 2013 REP. CARD FOR AM. INFRASTRUCTURE, <http://www.infrastructurereportcard.org/a/#p/rail/investment-and-funding> (last visited Feb. 3, 2015) [hereinafter *Investment and Funding*] (listing consistently increasing private sector investment amounts of \$20.2 billion in 2007 through \$23.3 billion in 2011).

72. *See* Am. Soc'y for Civil Eng'rs, *Rail*, 2013 REP. CARD FOR AM. INFRASTRUCTURE, <http://www.infrastructurereportcard.org/a/#p/rail/overview> (last visited Feb. 3, 2015) [hereinafter *Rail*] (detailing extent to which rail industry invests in infrastructure).

73. *See* Grunwald, *supra* note 68 (deeming rail industry to be evidence that private sector can be trusted to invest in infrastructure).

74. *See* *Rail*, *supra* note 72 (assessing quality of United States' rail infrastructure). While a C+ is not a strong grade, rail tied with bridges for the second highest grade; the highest grade went to solid waste, which only received a "B-." *See id.*

75. *See* Grunwald, *supra* note 68 (linking current oil boom to current railroad boom).

76. *See* Muller et al., *supra* note 59 (attributing rail boom to oil boom). BNSF Chairman Matt Rose described the current trend in transportation of oil by rail as "like nothing I've ever seen in my career." *See id.*

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is an equally growing concern over rail safety.⁷⁷ As pressure mounts to transport as much oil as possible from Alberta's tar sands to Gulf Coast refineries, railroads are adding an increasing number of oil tankers to their trains to maximize the amount of oil each train can transport.⁷⁸ Consequently, railroad companies are using longer trains to accommodate additional oil tankers, a practice contributing to a dramatic increase in rail accidents.⁷⁹ Despite an eighty percent decrease in the railroad accident rate from 1980 to 2012, American rail accidents in 2013 were responsible for spilling more oil in that one year than the previous thirty years combined.⁸⁰

Despite the praise for the private sector's investments in infrastructure, critics are concerned that rail infrastructure may be inadequate to transport such high volumes of crude oil.⁸¹ The disparity of resources between the freight rail industry's largest and smallest companies is of particular concern.⁸² North American railroads are classified as Class 1, railroads with operating revenues of more than \$433.2 million; Class 2, railroads with operating revenues less than \$433.2 million but more than \$34.7 million; or Class 3, railroads

77. *See id.* (connecting increased transportation of oil by rail to increased risk of accidents); *see also*, Robbins, *supra* note 4 (noting sharp increase in rail accidents over recent years).

78. *See* James Conca, *Pick Your Poison for Crude—Pipeline, Rail, Truck or Boat*, FORBES (Apr. 26, 2014, 10:35 AM), <http://www.forbes.com/sites/jamesconca/2014/04/26/pick-your-poison-for-crude-pipeline-rail-truck-or-boat/> (explaining growing pressure on railroads to maximize amount of oil each train transports). Delays with the Keystone XL Pipeline have left railroads with the burden of meeting the pipeline's promised supply of oil from Alberta's tar sands. *See id.*

79. *See id.* (attributing recent increase in rail accidents to aggressively adding more cars to each train).

80. *See id.* (providing puzzling statistics that show decreases in accidents but increases in amount of oil spilled). In 2013, American railroad accidents spilled 1.5 million gallons of crude oil. *See id.* This number would be significantly greater if it were to include oil spilled in Canada as well; the Lac-Mégantic derailment alone spilled 1.6 million gallons of crude oil. *See id.* While an increase in the amount of oil spilled is an expected consequence of shipping more oil on rail, it still marks a troubling upward trend. *See id.* The rail and oil industries argue that the vast majority of oil shipped by rail arrives safely at its destination, but for those concerned about the environment and human health, the issue is more a matter of net oil spilled, and less the rate at which spills occur. *See id.*

81. *See* Eric de Place & Rich Feldman, *The Big Problem with Letting Small Railroads Haul Oil*, SIGHTLINE DAILY (Oct. 8, 2014, 10:00 AM), <http://daily.sightline.org/2014/10/08/the-big-problem-with-letting-small-railroads-haul-oil/> [hereinafter de Place & Feldman, *The Big Problem*] (expressing concern regarding small railroad companies transporting oil due to insufficient resources to maintain safe rails); *see also* Stern & Jones, *supra* note 1 (raising concerns over private sector's maintenance of rail bridges).

82. *See* de Place & Feldman, *The Big Problem*, *supra* note 81 (comparing investment practices common amongst small railroads to investment practices of larger railroads).

with operating revenues less than \$34.7 million.⁸³ Class I railroads, comprised only of North America's seven largest railroad companies, own and operate large, national railroads, whereas the smaller railroad companies own the short, local railroads.⁸⁴ While the seven giant companies can finance the necessary maintenance that their rails require, smaller railroad companies lack sufficient resources to do the same for short line rails.⁸⁵

Montreal, Maine & Atlantic (MMA) was responsible for the freight train that derailed and exploded in Lac-Mégantic.⁸⁶ Assembled from the bankruptcy assets of four small railroad companies, MMA was a regional railroad company based out of Chicago that struggled since its inception to establish financial stability.⁸⁷ Leading up to the tragic events of Lac-Mégantic, financial struggles forced MMA to reduce staff and maintenance efforts.⁸⁸ According to statements investigators took from MMA employees, MMA used second-hand locomotives to transport Bakken crude oil and elected to "lower[] the speed limit instead of repairing the tracks."⁸⁹

The troubling circumstances surrounding the Lac-Mégantic derailment are not unique to MMA; other small railroads face similar problems.⁹⁰ In less than one year, two trains carrying oil de-

83. See *Rail: Conditions & Capacity*, *supra* note 69 (listing three types of rail and what type of company primarily owns each classification).

84. See *id.* (explaining that short line railroads are maintained by small railroad companies).

85. See de Place & Feldman, *The Big Problem*, *supra* note 81 (discussing widespread financial instability of small railroad companies across United States). There are seven major railroads operating in North America, and they are the only Class I railroads: BNSF Railway, CSX Transportation, Grand Trunk Corporation, Kansas City Southern Railway, Norfolk Southern Combined Railroad Subsidiaries, Soo Line Railroad, and Union Pacific Railroad. *Freight Rail Today*, U.S. DEPARTMENT OF TRANSP. FED. RAILROAD ADMIN., <https://www.fra.dot.gov/Page/P0362> (last visited May 31, 2015) (listing seven Class I railroads).

86. See de Place & Feldman, *The Big Problem*, *supra* note 81 (assessing financial stability of small railroad company that owned train that derailed in Lac-Mégantic). MMA was a regional railroad, and costs associated with the fall-out from the Lac-Mégantic tragedy bankrupted MMA. See *id.*

87. See *id.* (explaining formation and economic instability of MMA).

88. See *id.* (discussing cutbacks MMA made).

89. Monique Beaudin, *MMA Workers Feared a Catastrophe, Document Shows*, MONTREAL GAZETTE (Jun. 12, 2014), <http://www.montrealgazette.com/news/workers+feared+catastrophe+document+shows/9937577/story.html> (recounting MMA employees' allegations of insufficient investment by MMA). MMA employees gave statements as part of the Sûreté du Québec investigation into the Lac-Mégantic catastrophe. See *id.*

90. See de Place & Feldman, *The Big Problem*, *supra* note 81 (assessing dangers in allowing small railroad companies to transport oil). Large Class I railroad companies are not immune to oil car derailments. See Tracie Mauriello, *Railroads, Regulators Adopt Curbs on Shipping Crude Oil*, PITTSBURGH POST-GAZETTE (Feb. 21, 2014, 11:46 PM), <http://www.post-gazette.com/news/transportation/2014/02/22/>

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railed in western Alabama, one in November 2013 and the other in June 2014.⁹¹ Both derailments happened just west of Tuscaloosa, on railroads owned by small companies.⁹² The more troubling of the derailments was the November 2013 derailment in Aliceville, Alabama.⁹³ A small railroad company, Alabama & Gulf Coast Railway (AGR), owned the train that derailed while traversing a small wooden trestle in Aliceville; the resulting oil spill was the worst derailment oil spill in the history of the United States.⁹⁴ Like MMA, financial troubles and inconsistent management plagued AGR.⁹⁵ While an inability to invest in the maintenance of the trestle is the likely cause of the derailment, it is impossible to determine whether AGR adequately maintained the trestle because the derailment caused a fire and burned the trestle to ash.⁹⁶

Additional concerns exist regarding the sufficiency of the insurance that railroad companies carry.⁹⁷ Genesee & Wyoming, one of the nation's largest and most successful regional and short line railroad companies, is insured for liability up to 500 million

Railroads-regulators-adopt-curbs-on-shipping-crude-oil/stories/201402220059. In Pennsylvania, two oil-carrying trains derailed within a month of each other in early 2014; Class 1 railroad companies owned both the trains and the railroads that the trains derailed on. *See id.*; *see also* Sarah Glover et al., *Train Derails on Bridge over Schuylkill River*, NBC10.COM, <http://www.nbcphiladelphia.com/news/local/Train-Derails-Schuylkill-Expressway-Closed-241114931.html> (last updated Jan. 21, 2014, 1:06 AM) (detailing 2014 Philadelphia train derailment).

91. *See de Place & Feldman, The Big Problem, supra* note 81 (discussing November 2013 derailment); *see also* Stern & Jones, *supra* note 1 (discussing June 2014 derailment).

92. *See de Place & Feldman, The Big Problem, supra* note 81 (discussing derailment on wooden trestle owned by Alabama & Gulf Coast Railway); *see also* Stern & Jones, *supra* note 1 (discussing derailment near M&O bridge in Tuscaloosa, Alabama).

93. *Compare de Place & Feldman, The Big Problem, supra* note 81 (noting resulting oil spill from Aliceville derailment was worst spill by oil car in United States history) *with* Brianne Britzius, *Residents Return Home After Train Derailment in Tuscaloosa Co.*, FOX 6 WBRC, <http://www.myfoxal.com/story/25790227/residents-return-home-after-train-derailment-in-tuscaloosa-co> (last updated June 23, 2014, 4:50 PM) (noting oil cars derailed in Buhl, Alabama but did not leak crude oil).

94. *See de Place & Feldman, The Big Problem, supra* note 81 (stating conditions under which train derailed).

95. *See id.* (comparing MMA and AGR's similar struggles with obtaining consistent investments and management). AGR never had a consistent source of capital or leadership because railroad holding companies routinely bought and sold AGR. *See id.* As such, the railroad company's ownership was constantly changing, leading to unpredictable changes in management and varying degrees of capital to invest in maintaining its infrastructure. *See id.*

96. *See id.* (determining conclusive information regarding state of trestle would likely be impossible to discover in wreckage).

97. *See id.* (analyzing insurance's effect on transporting oil by rail).

dollars.⁹⁸ A typical short line railroad company will be insured up to twenty million dollars.⁹⁹ The estimated cost of rebuilding Lac-Megantic, however, is 2.7 billion dollars.¹⁰⁰ If Genessee & Wyoming was the company responsible for the accident and were to use up its entire insurance policy and liquidate all of its assets, it would still be 600 million dollars shy of the total liability cost.¹⁰¹ Therefore, non-Class 1 railroad companies are simply not capitalized sufficient enough to protect themselves from liability of carrying oil.¹⁰² The Lac-Megantic accident left MMA bankrupt, forcing the Canadian government to step in and cover much of the costs associated with the accident.¹⁰³

C. The DOT-111 Tanker Car: A Known Danger

Critics cite the DOT-111 tank car as the most dangerous elements of transporting oil by rail.¹⁰⁴ The DOT-111 debuted in the 1960s as a tanker for transporting corn syrup and other nonflammable cargo.¹⁰⁵ As such, the tanker's design is inherently unsuitable for transporting flammable cargo such as Bakken crude oil.¹⁰⁶ In 1991, after decades of use, the National Transportation Safety Board (NTSB) issued numerous warnings regarding the tendency of the DOT-111's shell to puncture in derailments.¹⁰⁷ Notwithstanding the NTSB's findings, the ethanol industry continues to use DOT-111 tankers, even after a derailment in 2009 caused a deadly fire.¹⁰⁸

98. *See id.* (detailing value of Genessee & Wyoming's insurance policy).

99. *See* Marina Villeneuve, *After 'End of the World' Explosion, Lac-Megantic Aims to Rebuild*, PORTLAND PRESS HERALD (Apr. 17, 2014), <http://www.pressherald.com/2014/04/17/after-end-of-the-world-explosion-lac-megantic-aims-to-rebuild/> (discussing insurance policies common for small railroad companies traveling short distances). A twenty-five million dollar policy is typically the maximum available policy for short-line railroad companies. *See id.* This is the type of policy that MMA had. *See id.*

100. *Id.* (estimating cost of rebuilding Lac-Megantic).

101. *See* de Place & Feldman, *The Big Problem*, *supra* note 81 (valuing Genessee & Wyoming and its insurance policy at 2.1 billion dollars).

102. *See id.* (discussing industry's general lack of preparation to deal with major accident liability).

103. *See* Villeneuve, *supra* note 99 (discussing financial consequences of Lac-Megantic accident).

104. *See* Stern & Jones, *supra* note 1 (analyzing in depth issues surrounding DOT-111).

105. *See id.* (discussing origins of DOT-111).

106. *See id.* (noting DOT-111 does not lend tanker to carrying flammable cargo).

107. *See id.* (discussing NTSB warnings regarding dangers DOT-111 posed).

108. *See id.* (criticizing continued use of DOT-111s despite NTSB warnings that tanker was unsafe for transporting hazardous materials).

The 2009 derailment led the NTSB to comment on the DOT-111's "need for extra protection such as head shields, tank jackets, more robust top fittings protection, and modification of bottom outlet valves on DOT-111 tank cars used to transport hazardous materials."¹⁰⁹ The DOT-111's head shields lack adequate protection for transporting hazardous materials because in their current state, they are prone to massive puncturing if the couplers break off upon collision.¹¹⁰ The steel shell of the DOT-111 is less than 1/2-inch thick, whereas modern tanker cars have a 9/16-inch jacket.¹¹¹ In the event of a DOT-111 rolling over during derailment, the insufficiently shielded top valve and fittings of the DOT-111 are susceptible to opening up and spilling the tanker's cargo.¹¹² In addition to the flaws that the NTSB enumerated, "the draft sill, which connects the tank to the wheels, may fail in derailments, causing the tank to tear" and subsequently dump its cargo.¹¹³ A tank car so prone to leaking its cargo is ill-equipped to carry hazardous cargo, especially considering the flammability of the cargo.¹¹⁴

Unforeseen demand for tank cars is in part responsible for the oil industry's use of the decades-old DOT-111.¹¹⁵ The rail industry could not have predicted the United States' recent oil boom and the oil industry's subsequent reliance on rail to transport such large volumes of crude oil.¹¹⁶ As such, the rail industry did not have tankers designed to carry such hazardous material readily available; what it did have was the DOT-111.¹¹⁷ Although the DOT-111 was the only available tanker, the rail industry was already well aware of the dangers it posed.¹¹⁸ Over the years, the oil industry has ac-

109. See Stern & Jones, *supra* note 1 (internal quotation marks omitted) (quoting NTSB's comment on DOT-111's design and necessary modifications to make tanker safer).

110. Robbins, *supra* note 4 (detailing flaw in DOT-111 head shield); see also Weather Films, *supra* note 15 (discussing unsafe design of DOT-111).

111. Eaton, *supra* note 8 (comparing old DOT-111 to modern tank cars).

112. Robbins, *supra* note 4 (detailing flaw in DOT-111's top valve).

113. *Id.* (listing DOT-111's design flaws).

114. See Weather Films, *supra* note 15 (discussing violent danger transporting Bakken crude oil by rail poses).

115. See *id.* (attributing oil industry's use of DOT-111 to sudden and significant demand for tankers).

116. See *id.* (commenting how unexpected recent North American oil boom was).

117. See *id.* (explaining how unexpected boom led to reliance on transportation equipment ill equipped to transfer explosive material).

118. See Stern & Jones, *supra* note 1 (determining NTSB warned of DOT-111's dangers since 1991).

quired modern tankers, but approximately seventy-eight thousand original-design DOT-111s are still in active use.¹¹⁹

The DOT-111 has many design flaws that pose a grave danger to the environment and to citizens of towns that DOT-111 tanks pass through, but it can be retrofitted to compensate for its flaws.¹²⁰ In the aftermath of Lac-Megantic, companies such as GBW Railcar Services have formed to serve as tanker car repair shops, ensuring that tankers are in sufficient operating condition and that DOT-111s are adequately updated.¹²¹ While the means to retrofit the dangerous DOT-111 exist, the oil industry is hesitant to invest in such precautions.¹²² The estimated cost of retrofitting all DOT-111s still in use is one billion dollars, which is undoubtedly a sizable investment; nevertheless, one billion dollars is still less than half the cost of rebuilding Lac-Megantic and defending the related lawsuits.¹²³

III. THE DANGERS OF OIL BY RAIL

Transporting oil by rail poses two primary dangers.¹²⁴ First, tankers engulfed in flames can cause explosions.¹²⁵ Second, spilling crude oil is an environmental hazard.¹²⁶

A. Explosive Crude

The derailment at Lac-Megantic is proof that transporting oil by rail poses a serious threat to humans.¹²⁷ This explosive threat is two-fold: there is the violence of the initial blast followed by the subsequent fire.¹²⁸ Of the Lac-Megantic catastrophe's forty-seven

119. See Robbins, *supra* note 4 (providing approximate number of original design DOT-111s still in use).

120. See Eaton, *supra* note 8 (discussing options for addressing DOT-111 design flaws).

121. See *id.* (discussing ability to retrofit DOT-111 tankers to comply with modern designs).

122. See *id.* (noting oil industry's resistance to investing money in rail safety).

123. See Robbins, *supra* note 4 (estimating cost of retrofitting all DOT-111 tankers in use); see also Villeneuve, *supra* note 99 (estimating cost of rebuilding Lac-Megantic to be 2.7 billion dollars).

124. For a general discussion of the two dangers, see *infra* notes 127-161 and accompanying text.

125. For a discussion of the explosive dangers, see *infra* notes 127-145 and accompanying text.

126. For a discussion of the environmental dangers, see *infra* notes 146-161 and accompanying text.

127. See Stern & Jones, *supra* note 1 (discussing how Lac-Megantic derailment killed forty-seven people).

128. See Villeneuve, *supra* note 99 (explaining damage of first initial explosion followed by fire that spread further into town).

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victims, five remain missing.¹²⁹ The fact that five bodies were never recovered suggests that the initial blast vaporized these victims.¹³⁰ The fire that followed the blast did not present as immediate of a threat as the initial explosion, but it is concerning that response teams took two days to put out the fire that burned through Lac-Megantic.¹³¹ Evidence supports that an initial explosion and subsequent fire can heat the remaining derailed tankers carrying oil to the point of sparking a second wave of explosions.¹³²

It is troubling to imagine such a catastrophic event happening in a major urban area, but the reality is that DOT-111 tankers carrying Bakken crude oil travel through major towns and cities.¹³³ Specifically there are forty-six “federally designated high-threat urban areas” in which these dangerous tankers travel.¹³⁴ DOT-111s carry oil through both major cities such as Philadelphia, Pennsylvania, and smaller cities such as Aurora, Illinois, located just outside of Chicago.¹³⁵ If a DOT-111 carrying Bakken crude oil were to derail and explode in one of these cities, the damage would be unimaginable.¹³⁶ The United States has already come close to suffering its own Lac-Megantic catastrophe when a train with DOT-111 tankers carrying Bakken crude oil derailed and exploded outside the town of Casselton, North Dakota.¹³⁷

129. Stern & Jones, *supra* note 1 (noting that five victims are still missing).

130. *See id.* (stating Lac-Megantic explosion vaporized five of the forty-seven victims).

131. *See* Weather Films, *supra* note 15 (discussing severity of fire in Lac-Megantic).

132. *See* Stern & Jones, *supra* note 1 (explaining how burning oil tankers act as “blow torches” to nearby tankers and thereby trigger another set of explosions). For a further discussion on how burning oil tankers can lead to a chain reaction of exploding oil tankers, see *infra* notes 144-145. The February of 2015 derailment in West Virginia demonstrated this effect, as there were multiple waves of explosions. *See* Dan Heyman & Richard Pérez-Peña, *Spilled Oil Keeps Flames Burning After a Train Derailment in West Virginia*, N.Y. TIMES (Feb. 17, 2015), <http://www.nytimes.com/2015/02/18/us/west-virginia-train-derailment-dumps-oil-into-river.html> (describing terror residents felt after witnessing multiple waves of explosions).

133. *See* Weather Films, *supra* note 15 (discussing urban and metropolitan areas that tankers carrying oil travel through).

134. *See* Mauriello, *supra* note 90 (recognizing federally designated threat zones).

135. *See* Weather Films, *supra* note 15 (listing densely populated areas in which tankers carrying oil pass through). In January 2014, a tanker carrying oil derailed on a bridge crossing the Schuylkill River in Philadelphia; fortunately, the derailment did not result in a spill. *See* Glover et al., *supra* note 90.

136. *See* Weather Films, *supra* note 15 (expressing fear that Lac-Megantic level explosion could happen in more densely populated areas).

137. *See* Krauss & Mouawad, *supra* note 9 (reporting on oil explosion outside of Casselton). The derailment, which occurred just one half mile outside the small

The unique properties of Bakken crude oil contribute to violent explosions.¹³⁸ Not all crude oil is the same, and “Bakken’s [crude oil] is more like gasoline and rich in volatile natural gas liquids, including methane, ethane, propane and butane.”¹³⁹ When refineries process crude oil, they separate out the crude oil from the natural gases.¹⁴⁰ North Dakota, however, lacks the capacity to refine all of its Bakken crude oil in-state, and thus ships its excess via rail to refineries along the Gulf Coast.¹⁴¹ During transport to the south, “the natural gas liquids separate from the oil and become gaseous, forming an explosive propane-butane blanket on top of the oil.”¹⁴² If the “blanket” were to ignite, as would occur if a tanker derails and sparks the gas, the tanker would explode.¹⁴³ The flames from the initial explosion would heat nearby tankers to extreme temperatures and, as the flames spread, would trigger a chain of exploding tankers.¹⁴⁴ As trains are getting longer, and thus linking more and more oil tankers, a derailment could potentially cause incredible damage.¹⁴⁵

B. Environmental Concerns

Trains carrying oil that derail also pose a significant risk to the environment.¹⁴⁶ In 2013, American trains spilled 1.5 million gallons of oil; this is more than the amount spilled in the preceding

town of Casselton, North Dakota, resulted in a fiery explosion and forced the evacuation of the town. *Id.*

138. *See* Stern & Jones, *supra* note 1 (linking properties of Bakken crude to violence of explosions).

139. *Id.* (attributing violent explosions to Bakken’s similarity to gasoline and abundance of volatile natural gases).

140. *Id.* (describing how crude oil gets separated from natural gases).

141. *See id.* (explaining why Bakken crude oil is not separated from natural gases when it ships out of North Dakota).

142. *Id.* (describing how Bakken crude oil becomes explosive).

143. *See* Stern & Jones, *supra* note 1 (discussing how sparks and punctured tankers could trigger explosion).

144. *See id.* (explaining how one explosion could trigger chain of explosions by acting as “blow torch” to nearby tankers). Stern and Jones explain this phenomenon as follows:

If a railcar ruptures—and if some of the gas comes into contact with the outside air and a spark occurs—the railcar will explode and act as a blow torch on the car next to it. The result is a series of explosions like those captured on cellphones after the Lac-Megantic. . . .

Id.

145. *See id.* (discussing extent of damage that train explosions can cause). A single train can haul as much as three million gallons of oil, which is “enough to fill a football field almost as high as the goal posts.” *Id.*

146. For a discussion of how train derailments harm the environment, see *infra* notes 147-161 and accompanying text.

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forty-two years combined.¹⁴⁷ In 2013, the worst oil spill resulted from a derailment outside of Aliceville, Alabama.¹⁴⁸ Twenty-six train cars derailed and spilled an estimated 700 thousand gallons of Bakken crude.¹⁴⁹ That was the largest American oil spill from a derailed train on record.¹⁵⁰ While not all derailments spill hundreds of thousands of gallons of crude oil, oil tanker derailments are occurring at an increasingly rapid rate.¹⁵¹

Again, Lac-Mégantic is an example of how damaging a derailment can be, as that train spilled 1.6 million gallons of oil.¹⁵² The Lac-Mégantic derailment alone spilled more oil than all American tankers combined in 2013.¹⁵³ Oil spilled into the surrounding soil, the Chaudière River, and the town's sewer system.¹⁵⁴ Officials estimate the derailment contaminated 12.3 million gallons of water and between twelve thousand and twenty-two thousand cubic meters of soil.¹⁵⁵ The Quebec government values Lac-Mégantic's environmental cleanup cost at 200 million dollars.¹⁵⁶

Waterways in particular are susceptible to environmental contamination from crude oil spills.¹⁵⁷ The nation's more prominent

147. See Robbins, *supra* note 4 (discussing amount of oil spilled since 1971).

148. See *id.* (discussing Aliceville oil spill in comparison to other oil spills).

149. *Id.* (detailing Aliceville oil spill).

150. See de Place & Feldman, *The Big Problem*, *supra* note 81 (distinguishing Aliceville oil spill as United States' worst).

151. See Joby Warrick, *Trains Are Carrying – And Spilling – a Record Amount of Oil*, WASH. POST (Feb. 17, 2015), <http://www.washingtonpost.com/news/energy-environment/wp/2015/02/17/trains-are-carrying-and-spilling-a-record-amount-of-oil/> (analyzing sharp increase in number of oil spills attributed to train derailments in 2013 and 2014 compared to previous twenty-five years). In 2014, 141 trains derailed and resulted in an oil spill. See *id.* In comparison, from 1975 to 2012, the average number of train derailments resulting in oil spills was twenty-five per year. See *id.*

152. See Villeneuve, *supra* note 99 (discussing how much oil was spilled in Lac-Mégantic).

153. See Robbins, *supra* note 4 (comparing Lac-Mégantic derailment to American oil spills in 2013).

154. See Monique Beaudin, *Huge Scope of Lac-Mégantic Cleanup Comes into Focus*, MONTREAL GAZETTE (Jan. 2, 2014), <http://www.montrealgazette.com/health/Huge+scope+M%C3%A9gantic+cleanup+comes+into+focus/9348298/story.html> (assessing extent to which spilled oil seeped into Lac-Mégantic and surrounding area). See *id.*

155. See Villeneuve, *supra* note 99 (quantifying impact of oil spill on Lac-Mégantic water); see also Beaudin, *supra* note 154 (quantifying impact of oil spill on Lac-Mégantic soil). Experts attribute oil's pervasive permeation into Lac-Mégantic's waters to its infiltration of Lac-Mégantic's sewer system. See Beaudin, *supra* note 154.

156. See Beaudin, *supra* note 154 (estimating costs of environmental cleanup for Lac-Mégantic to be at least 200 million dollars).

157. See Curtis Tate, *Lynchburg, Va., Oil Train Derailment Illustrates Threat to Rivers*, McCLATCHY DC (May 2, 2014), <http://www.mcclatchydc.com/2014/05/02/>

railroads typically run along waterways because the land surrounding waterways offers flatter gradients suitable for railroads using heavy trains.¹⁵⁸ As booming demand for oil forces railroad companies to put additional tankers on each train, trains are becoming heavier and therefore need to travel on the flat railroads lining waterways.¹⁵⁹ Naturally, as more trains carrying crude oil travel along waterways, the risk of a spill contaminating a waterway increases.¹⁶⁰ Contaminated waterways pose not only a threat to local communities near the derailment, but to all other areas downstream from the derailment.¹⁶¹

IV. REGULATION OF OIL BY RAIL

Both the United States and Canada have initiated regulatory responses to the Lac-Mégantic disaster and the growing risk of transporting oil by rail.¹⁶² While both nations plan to phase out the DOT-111 by 2017, neither has offered a comprehensive plan for reducing the risks presented by tank cars and Bakken crude oil.¹⁶³ Early proposals, however, indicate Canadian regulators are taking a more aggressive approach to regulation than their American coun-

226425/lynchburg-va-oil-train-derailment.html (discussing exposure of waterways to oils spills from train derailments). Following the derailment in Lynchburg, the environmental watchdog group, Columbia Riverkeeper, called upon state and local governments to follow the lead set by Albany, New York and suspend expansion activity for all rail terminals along waterways. *See id.*

158. *See id.* (discussing how important railroads typically run along waterways). The term “grade” refers to the slope of the railroad. *See* Robert S. McGonigal, *Grades and Curves*, TRAINS (May 1, 2006), <http://trn.trains.com/railroads/abcs-of-railroading/2006/05/grades-and-curves> (discussing effects of grade and curve on productivity of trains). Heavier trains are most efficient on a flat gradient, as even a slight rise can add significant resistance to the locomotive. *See id.*

159. *See* Tate, *supra* note 157 (discussing increased dependence on railroads that line waterways).

160. *See id.* (suggesting that increased use of oil tankers on trains increases risk of contaminating waterways with crude oil).

161. *Id.* (discussing threat of contamination of water used by towns downstream from derailment).

162. *See* Patrick Rucker & David Ljunggren, *Exclusive - Canada Insists on Oil Train Tanker Phase-out Ahead of U.S.*, REUTERS (Jan. 14, 2015, 4:37 PM), <http://www.reuters.com/article/2015/01/14/us-oil-railways-idUSKBN0KN2CB20150114> (discussing Canadian regulator’s insistence of May 2017 phase-out deadline).

163. *See id.* (criticizing Canada’s failure to address routing issues); *see also* Eric de Place & Rich Feldman, *Canada vs. the USA on Oil Train Standards*, SIGHTLINE DAILY (Sept. 10, 2014, 6:30 AM), <http://daily.sightline.org/2014/09/10/canada-vs-the-usa-on-oil-train-standards/> [hereinafter de Place & Feldman, *Canada vs. the USA*] (criticizing United States’ failure to address issue of gross under insurance).

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terparts.¹⁶⁴ In putting forward adequate regulations, both governments face aggressive opposition from the oil and rail industries.¹⁶⁵

A. Canada's Response to Lac-Mégantic

Transport Canada is Canada's rail safety regulator.¹⁶⁶ In April 2014, Transport Canada prohibited the use of DOT-111 units that had an inherent design flaw in the bottom of the tanker, requiring the rail companies to immediately remove five thousand of the most dangerous units from operation.¹⁶⁷ The regulator required the remaining DOT-111s produced prior to 2014 to be retrofitted or phased out.¹⁶⁸ Despite some critics labeling the proposed deadline as unrealistic, Transport Canada has, thus far, defended its aggressive May 2017 deadline for phase out compliance.¹⁶⁹

Additionally, Transport Canada focused on regulating train operation.¹⁷⁰ Investigations into the Lac-Mégantic derailment identified two factors leading to the runaway train: a lone, fatigued conductor and a failure of the handbrake system.¹⁷¹ As a result, Transport Canada now requires that each train have two conductors and that rail companies better monitor fatigue levels of their conductors.¹⁷² Additionally, Transport Canada imposed standardized handbrake requirements for trains.¹⁷³

164. See de Place & Feldman, *Canada vs. the USA*, *supra* note 163 (determining that Canadian regulators have addressed numerous aspects of oil by rail better than American regulators).

165. See Eaton, *supra* note 8 (analyzing oil and rail industries' opposition to regulation).

166. See *id.* (discussing Canadian regulatory response to Lac-Mégantic catastrophe).

167. See de Place & Feldman, *Canada vs. the USA*, *supra* note 163 (praising immediate removal of certain DOT-111 units resulting in five thousand fewer DOT-111s available for transporting oil by rail).

168. See Eaton, *supra* note 8 (detailing Canadian phase-out of pre-2014 DOT-111s).

169. See Rucker & Ljunggren, *supra* note 163 (confirming Transport Canada's May 2017 deadline).

170. See *Proposed Rail Safety Laws to Make Oil Carriers Responsible for Accidents*, CBC NEWS, <http://www.cbc.ca/news/politics/proposed-rail-safety-laws-to-make-oil-carriers-responsible-for-accidents-1.2964879> (last updated Feb. 20, 2015, 8:04 PM) [hereinafter *Proposed Rail Safety Laws*] (discussing regulatory changes since Lac-Mégantic).

171. See Monique Muise, *Lac-Mégantic: What Causes a Runaway Train?*, MONTREAL GAZETTE (July 7, 2013), <http://www.montrealgazette.com/M%C3%A9gantic+What+causes+runaway+train/8631894/story.html> (examining events that caused train to run away).

172. See *Proposed Rail Safety Laws*, *supra* note 170 (discussing regulations related to train conductors).

173. See *id.* (discussing standard handbrake requirements for trains).

On June 24, 2015, Canadian Transport Minister Lisa Raitt announced the passage of new regulations contained within the Safe and Accountable Rail Act (SSRA) to address additional concerns regarding oil-by-rail safety.¹⁷⁴ Of these regulations, the most prominent is the new minimum insurance requirements for trains that transport crude oil.¹⁷⁵ Typically, short line railroads carry insurance in the amount of twenty-five million dollars, an amount grossly insufficient for covering the costs of a significant accident involving Bakken crude oil.¹⁷⁶ The SSRA creates two tiers of liability insurance requirements for short line railroads: the lesser requiring 100 million dollars and the greater requiring 250 million dollars.¹⁷⁷ Moreover, railroad companies must now pay a per tonnage fee when shipping crude oil.¹⁷⁸ Fee payments go towards a 250 million dollar fund to pay for damages in excess of the railroad's insurance policy.¹⁷⁹

The SSRA also implements further regulations regarding safe rail practices.¹⁸⁰ First, the SSRA expands the Transportation Minister's authority to order new safety standards and to expand local governments' access to information regarding trains carrying oil.¹⁸¹ Providing local governments with access to information mitigates the damage a derailment would cause because first responders are better prepared for such an accident.¹⁸² Second, the SSRA makes revisions to the Safety Management System (SMS) guidelines.¹⁸³

174. See *Canadian Safe And Accountable Rail Act Made Law*, UNITED TRANSP. UNION (June 24, 2015), <http://utu.org/2015/06/24/canadian-safe-and-accountable-rail-act-made-law/> (commenting on new rail regulations for 2015).

175. See *Proposed Rail Safety Laws*, *supra* note 170 (highlighting new insurance requirements of SSRA).

176. For a further discussion on the insurance that railroad companies carry, see *supra* notes 97-103 and accompanying text.

177. See *Railway Liability Rules*, CBC NEWS (Feb. 20, 2015, 7:42 PM), <http://www.cbc.ca/news/railway-liability-rules-1.2965782> (discussing how regulation will establish two tiers of insurance requirements for short line rails).

178. See *Proposed Rail Safety Laws*, *supra* note 170 (discussing additional insurance requirements).

179. See *id.* (identifying purpose of per ton fee).

180. See Mark Winfield, *Opinion: Federal Rail-Safety Measures Remain Inadequate*, MONTREAL GAZETTE, <http://montrealgazette.com/news/national/opinion-federal-rail-safety-measures-remain-inadequate> (last updated Feb. 25, 2015, 12:53 PM) (discussing additional regulations proposed SSRA).

181. See *id.* (discussing expansion of powers).

182. See *id.* (acknowledging importance of information to first responders).

183. See *id.* (discussing new suggestions for Safety Management Systems). A Safety Management System (SMS) is framework for assessing and managing risk within a companies transportation practices. See *Frequently Asked Questions*, TRANSPORT CANADA, <https://www.tc.gc.ca/eng/railsafety/railsafety-faq-969.html> (last visited Oct. 4, 2015). Transport Canada requires railroads to adopt an SMS as part of

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Transport Canada now requires railroad companies to appoint executives responsible for the safety and monitoring of employee fatigue.¹⁸⁴ Some critics of oil-by-rail are concerned about the self-regulation of safety standards, but the SSRA also grants protection to whistleblowers.¹⁸⁵

B. United States' Regulation of Oil-by-Rail

In May 2015, the Pipeline and Hazardous Materials Safety Administration (PHMSA), in conjunction with the Federal Railroad Administration, finalized a rule regarding the transportation of crude oil by rail.¹⁸⁶ The regulation pertains to the phase out of the DOT-111, reduced speed limits, new braking standards, and rail routing assessment requirements.¹⁸⁷

The PHMSA plans to phase out use of the DOT-111 for the transportation of crude oil by October 2017.¹⁸⁸ Unlike Transport Canada, American regulators have not required the immediate removal of any DOT-111s.¹⁸⁹ Moreover, the Final Rule against using the DOT-111 only applies to trains with at least twenty tankers carrying high-hazard cargo.¹⁹⁰ To replace the DOT-111, PHMSA has put forward two options: (1) the DOT-117, with a thicker shell, a steel jacket, thermal protection, a head shield, and “electronic-controlled pneumatic brakes”; or (2) the CPC-1232, which addresses

an effort to ingrain safety into the daily culture of the railroad. *See* Winfield, *supra* note 180.

184. *See* Winfield, *supra* note 180 (elaborating on SMS requirements).

185. *See id.* (voicing concerns over railroad companies self-regulating safety).

186. *See* Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, 80 Fed. Reg. 26,644 (May 8, 2015) (to be codified at 49 C.F.R. pts. 171, 172, 173, 174, and 179) [hereinafter “Final Rule”] (finalizing regulations for transportation of crude oil by rail); *see also* Kathryn J. Gainey & Nina S. Thanawala, *Recent Regulatory and Legislative Developments Involving Transportation of Crude Oil and Hazardous Commodities by Rail*, FED. LAW., July 2015, at 58 available at <http://www.fedbar.org/Image-Library/Sections-and-Divisions/TTSL/TFL-July2015.aspx?FT=.pdf> (discussing PHMSA’s new regulations).

187. *See* Gainey & Thanawala, *supra* note 186 (listing proposed regulations).

188. *See id.* (detailing PHSA’s replacements for DOT-111). The October 2017 deadline only applies for the transportation of what the Department of Transportation considers to be the most dangerous of cargo. *See* Kathryn J. Gainey, *Regulatory Update on Transportation of Crude Oil by Rail*, FED. LAW., Oct./Nov. 2014, at 10 available at <http://www.steptoe.com/assets/htmldocuments/Transportation%20of%20Crude%20Oil%20By%20Rail.pdf>. The phase-out date of the DOT-111 for transporting the least dangerous cargo is October 2020. *See id.*

189. *See* de Place & Feldman, *Canada vs. the USA*, *supra* note 163 (criticizing United States’ failure to immediately remove dangerous DOT-111s).

190. *See id.* (identifying loophole allowing continued use of DOT-111 for transportation of crude oil); *see also* Gainey & Thanawala, *supra* note 186 (detailing discontinuation of DOT-111).

the issues the DOT-111 had with its bottom release valve.¹⁹¹ Under the Final Rule, railroads may retrofit their DOT-111s, but retrofitting must bring the DOT-111 up to the standards of the DOT-117.¹⁹²

In addition to the phase out of the DOT-111, the Final Rule reduces speed limits and requires new electronically controlled pneumatic brakes for “single train[s] transporting seventy or more loaded tank cars containing Class 3 flammable liquid.”¹⁹³ The regulation limits the maximum speed limit for trains carrying high-hazard cargo to fifty miles per hour.¹⁹⁴ Trains with tank cars that fail to meet the standard are limited to speeds no faster than forty miles per hour.¹⁹⁵ PHMSA also requires that trains be equipped with an “enhanced brake signal propagation system . . . involving end-of-train devices, distributed power systems, or electronic-controlled pneumatic brakes.”¹⁹⁶ The regulation will limit trains that do not comply with the proposed brake standard to a maximum speed of thirty miles per hour.¹⁹⁷

PHMSA also requires railroads transporting crude oil to “perform routing analyses.”¹⁹⁸ Railroads already perform routing analyses by assessing twenty-seven different factors to determine the “safest, most secure route.”¹⁹⁹ The Final Rule does not require railroads to provide state first responders with a weekly, reasonable estimate of the number of tanker cars carrying crude oil passing through each county.²⁰⁰

191. *See* Gainey & Thanawala, *supra* note 186 (describing replacements for DOT-111).

192. *See id.* (qualifying retrofitting option).

193. *See id.* (quoting Final Rule in discussion of proposed speed related regulations).

194. *See id.* (identifying maximum speed allowed for trains carrying crude oil).

195. *See* Gainey & Thanawala, *supra* note 186 (limiting speed for trains with tankers that are not up to DOT-117 standard).

196. *See id.* (discussing PHSA’s new brake system requirements).

197. *See id.* (assessing consequences of failing to comply with new brake system).

198. *See id.* (discussing PHMSA’s plans to address issues regarding trains carrying crude oil through populated areas).

199. *See* Gainey, *supra* note 188 (defining routing analyses). Railroads already perform routing analyses for other hazardous cargo, such as chlorine. *See id.*

200. *See* Gainey & Thanawala, *supra* note 186 (discussing lack of notification requirement in Final Rule).

C. Rail and Oil Industries' Reaction to Regulation

In opposition, the oil industry and railroads argue that both Canada and the United States have proposed regulations that would be an unnecessary and costly burden.²⁰¹ While there has been a recent rise in the number of oil spills from derailments, the oil and rail industries “stress that 99.998 percent of hazardous rail shipments happen without incident.”²⁰² Although united in their opposition against new regulations, the oil and rail industries differ when attributing blame for the recent increase in accidents.²⁰³ Oil companies place blame on their rail industry cohorts, citing human error and track deficiencies.²⁰⁴ The rail industry, on the other hand, is split between blaming railroads and railcar producers.²⁰⁵ Railroads counter the oil industry’s claim by blaming the combustibility of crude oil, and turns on the railcar industry by questioning the “crashworthiness of tank cars.”²⁰⁶

Both the oil and rail industries debate the reasonableness of the phase out timelines for the DOT-111.²⁰⁷ Industry surveys estimate only fifteen thousand of the fifty thousand DOT-111s in use can be retrofitted by 2017.²⁰⁸ The estimate appears low because the DOT-111 requires such extensive retrofitting.²⁰⁹ If the estimate is accurate, railroads will have to phase out approximately thirty-five

201. See Timothy Cama, *Oil Train Fire Rekindles Push for Tanker Rules*, THE HILL (Feb. 18, 2015, 6:00 AM), <http://thehill.com/policy/transportation/233049-oil-train-fire-rekindles-push-for-tanker-rules> (explaining oil and rail industry’s opposition to regulation).

202. See *id.* (discussing overall safety improvements of oil by rail).

203. See Lynn Cook et al., *Energy, Rail Firms Fight Some Crude-Train Rules*, WALL ST. J. (Sept. 30, 2014, 7:31 PM), <http://www.wsj.com/articles/energy-rail-firms-unite-against-some-crude-train-rules-1412119895> (breaking down oil and rail industries’ differing explanations for increase in accidents).

204. See *id.* (explaining oil industry’s understanding of rail accidents).

205. See *id.* (discussing differing interests within rail industry between railroads and tanker producers).

206. See *id.* (detailing stance of railroads against regulation).

207. See *id.* (questioning whether timeline for phase-out is reasonable). Railroads do not want to incur the costs that a phase-out of the DOT-111 would require. See *id.* The oil industry does not want the added costs for railroads to raise shipping rates. See *id.* Railcar producers stand to financially gain from the phase-out, either by selling new tank cars or by providing retrofitting services for old DOT-111s. See Eaton, *supra* note 8. Still, the Railway Supply Institute argues that the rail industry will not be able to phase-out or retrofit DOT-111s by the end of 2017. See Eaton, *supra* note 8. This argument is not shared by the entire railcar producing industry, as Greenbrier Cos. has labeled the phase-out timetable as “tight but achievable.” See Cook et al., *supra* note 203.

208. See Eaton, *supra* note 8 (detailing Railway Supply Institute’s estimates).

209. See *id.* (listing retrofitting requirements for DOT-111).

thousand DOT-111s within the next three years.²¹⁰ The oil industry and railroads are concerned that such a dramatic decline in available tank cars would also result in a proportionate decline in the transportation of oil by rail.²¹¹

Railroads further object to reducing speed limits.²¹² They are concerned that slower travel speeds for trains carrying oil will result in reduced efficiency throughout the industry's entire network.²¹³ A significant delay in train traffic could delay delivery of other goods and result in higher shipping costs.²¹⁴ Moreover, railroads question whether reduced speeds are necessary, as derailments have resulted in oil leaks even when trains were traveling at reduced speeds.²¹⁵

V. THE FUTURE OF OIL BY RAIL

The transportation of oil by rail raises two primary future concerns: (1) whether the practice is sufficiently regulated; and (2) whether the practice will continue to have such a large presence in the oil industry.²¹⁶ Concerns regarding regulation have risen as derailments in early 2015 have cast doubt as to the adequacy of Transport Canada and PHMSA's regulations for tank cars.²¹⁷ These derailments have reignited the debate over oil by rail, especially in the context of the Keystone XL Pipeline.²¹⁸

Although both the United States and Canada are taking steps towards implementing new regulations, recent evidence suggests that both nations' proposals may be insufficient to properly address

210. *See id.* (discussing phase out of DOT-111).

211. *See id.* (highlighting concerns of oil industry and railroads).

212. *See* Cook et al., *supra* note 203 (discussing railroads' concerns over reducing speed of train traffic).

213. *See id.* (explaining railroads are concerned about efficiency if speeds are lowered).

214. *See* Jim Snyder, *Railways Enlist Lumberyards in U.S. Oil-Train Speed Fight*, BLOOMBERG, <http://www.bloomberg.com/news/articles/2014-10-15/railways-enlist-lumberyards-in-u-s-oil-train-speed-fight> (last updated Oct. 15, 2014, 12:41 PM) (specifying impact of reducing travel speeds below forty miles per hour for trains).

215. *See id.* (listing numerous oil spills that resulted from derailments of trains traveling at slower speeds as part of argument presented by those who do not believe that reduced speed limits may be ineffective in reducing number of oil spills).

216. For a further discussion of the ongoing issues regarding transporting crude oil in North America, see *infra* notes 217-251 and accompanying text.

217. For a further discussion of potential inadequacies of Transport Canada's and PHMSA's regulatory solutions, see *infra* notes 219-229 and accompanying text.

218. For a discussion of the recent derailments that reignited debate over the safety of oil by rail and the Keystone XL Pipeline, see *infra* notes 223-229 and accompanying text.

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the issues of transporting oil in North America.²¹⁹ In February 2015, two derailments, only days apart, resulted in an oil spill, fire, and explosion.²²⁰ On February 14, 2015, a train derailed in Ontario, partially puncturing nineteen of the twenty-five tankers and spilling an estimated 260,000 gallons of oil.²²¹ On February 17, 2015, just three days later, a train of 109 tanker cars derailed in West Virginia; nineteen of the twenty-six tankers that derailed caught fire, forcing nearby residents to evacuate.²²²

Both trains that derailed were using the CPC-1232 tank car.²²³ Transport Canada and PHMSA have both proposed replacing the DOT-111 with the CPC-1232.²²⁴ These February spills and resulting fires are evidence that Transport Canada and PHMSA's regulatory measures may be insufficient.²²⁵ While the CPC-1232 may address the bottom pressure release valve issues of the DOT-111, it does not address the inadequacies of the DOT-111's thin steel shell, as both have 7/16-inch shells.²²⁶ Further, the leaks and fires in West Virginia and Ontario are not the first involving the CPC-1232.²²⁷ In April 2014, prior to the PHMSA's notice of proposed rulemaking, a

219. For a discussion of the recent evidence, see *infra* notes 220-229 and accompanying text.

220. See Edward McAllister, *Derailed CSX Train in West Virginia Hauled Newer-Model Tank Cars*, REUTERS (Feb. 17, 2015, 5:18 PM), <http://www.reuters.com/article/2015/02/17/us-usa-train-derailment-csx-idUSKBN0LK1ST20150217> (detailing two oil by rail accidents that occurred within three days of each other).

221. See Rob Gillies, *Canada Safety Board Says Latest Oil Train Derailment Shows New Safety Standards Are Inadequate*, U.S. NEWS & WORLD REP. (Feb. 23, 2015, 6:44 PM), <http://www.usnews.com/news/world/articles/2015/02/23/canada-oil-train-accident-shows-new-safety-rules-inadequate> (detailing derailment in Ontario, Canada).

222. See Heyman & Pérez-Peña, *supra* note 132 (detailing derailment in West Virginia).

223. See McAllister, *supra* note 220 (identifying tank car in West Virginia derailment); see also Gillies, *supra* note 221 (identifying tank car in Ontario derailment).

224. See Gillies, *supra* note 221 (discussing Canada's regulatory support of CPC-1232). For a discussion of PHMSA's proposed replacement tank cars, see *supra* note 191 and accompanying text.

225. See Gillies, *supra* note 221 (raising questions regarding Canada's regulation of tank cars carrying crude oil); see also James West, *Trains Hauling Crude Oil Across North America Just Keep Exploding*, MOTHER JONES (Feb. 17, 2015, 2:18 PM), <http://www.motherjones.com/environment/2015/02/train-derailment-crude-oil-explosion-west-virginia> (criticizing proposed rules that recommend CPC-1232 models instead of DOT-111 models).

226. See West, *supra* note 225 (comparing shell thickness of DOT-111 and CPC-1232 models to proposed shells designed with thicker walls).

227. See *id.* (describing West Virginia and Lynchburg, Virginia derailments, in which both trains were pulling CPC-1232 tankers).

train using CPC-1232 tankers derailed in Lynchburg, Virginia.²²⁸ There, the tankers caught fire, leaked oil, and fell into the James River.²²⁹

Debate over the transportation of crude oil escalated in February 2015.²³⁰ On February 24, 2015, one week after the derailment in West Virginia, President Obama vetoed the construction of the Keystone XL pipeline.²³¹ For Americans, then, there is a battle over determining how oil, particularly Bakken crude, should be transported.²³²

Both transportation of oil via rail and pipelines have risks that can result in oil spills.²³³ Rail is far more likely to have an accident resulting in an oil leak.²³⁴ In 2013, transport by rail resulted in over four hundred accidents per billion barrels of oil, while pipelines annually average twenty-two accidents per billion barrels of oil transported.²³⁵ While four hundred accidents may seem high, in 2011, rail resulted in over seven hundred accidents.²³⁶

228. See Christina Nunez, *Oil Train Derails in Lynchburg, Virginia*, NAT'L GEOGRAPHIC (May 2, 2014, 2:07 PM), <http://news.nationalgeographic.com/news/energy/2014/04/140430-oil-train-derails-in-lynchburg-virginia/> [hereinafter Nunez, *Oil Train Derails*] (recounting train derailment in Lynchburg, Virginia that caused significant damage); see also West, *supra* note 225 (identifying tankers used in Lynchburg derailment as CPC-1232 models).

229. See Nunez, *Oil Train Derails*, *supra* note 228 (detailing damage of Lynchburg derailment). One CPC-1232 tank car also fell into Kanawha River during the West Virginia derailment, similar to the derailment in Lynchburg. See McAllister, *supra* note 220.

230. See Ken Silverstein, *Interest in Keystone Pipeline Mushrooms After Rail Cars Carrying Oil Explode*, FORBES (Feb. 19, 2015, 7:55 AM), <http://www.forbes.com/sites/kensilverstein/2015/02/19/interest-in-keystone-pipeline-mushrooms-after-rail-cars-carrying-oil-explode/> (commenting on growing debate over safety and efficiency of oil by rail and Keystone XL).

231. See Elana Schor, *President Obama Vetoes Keystone Bill; GOP Plans Override Vote*, POLITICO, <http://www.politico.com/story/2015/02/obama-vetoes-keystone-bill-115462.html> (last updated Feb. 24, 2015, 6:43 PM) (discussing reasons why President Obama vetoed Keystone XL).

232. See Silverstein, *supra* note 230 (discussing debate over best way to transport crude oil in United States).

233. See Christopher Ingraham, *It's a Lot Riskier to Move Oil by Train Instead of Pipeline*, WASH. POST (Feb. 20, 2015), <http://www.washingtonpost.com/blogs/wonkblog/wp/2015/02/20/its-a-lot-riskier-to-move-oil-by-train-instead-of-pipeline/> (comparing dangers of transporting oil via rail versus via pipeline).

234. See *id.* (noting rail poses higher risk for accident than does pipeline, and pipeline accidents occur at more stable rate).

235. See *id.* (comparing number of accidents per billion barrels of oil transported via rail versus via pipeline).

236. See *id.* (noting decline in frequency of rail accidents).

The unpredicted and sudden demand for oil by rail can explain this high accident rate.²³⁷ The decline in accidents from 2001 to 2013, however, could be representative of the rail industry gaining more experience in transporting such high volumes of crude oil.²³⁸ Transportation by rail may be more prone to accidents generally, but pipeline accidents typically leak more oil.²³⁹ Although pipeline accidents may be “bigger” in the sense that they leak more oil, they lack the explosive capacity that accompanies derailments.²⁴⁰

When assessing what mode of transportation of crude oil is most appropriate, economic factors must be considered in addition to weighing the risks of rail versus pipeline distribution.²⁴¹ Even if transportation by way of rail was the more dangerous option, it would still be the more immediately accessible option.²⁴² The reason why rail has been used to transport Bakken crude oil is because the pipeline infrastructure in North Dakota, and in other parts of the nation, is insufficient to meet the demand for refined oil.²⁴³ Building a pipeline infrastructure is costly and requires regulatory oversight.²⁴⁴ The ongoing debate over the Keystone XL Pipeline establishes political uncertainty.²⁴⁵ In comparison, North America’s railroad infrastructure is already expansive enough to transport oil from wells to refineries.²⁴⁶ North American pipelines cover only fifty-seven thousand miles, while railroads cover 140

237. *See id.* (hypothesizing rail industry’s lack of preparation for demand from oil industry could correlate to high accident rate in recent years).

238. *See* Ingraham, *supra* note 233 (analyzing reasons for increases and decreases in trends in rail accidents).

239. *See id.* (comparing rail and pipeline by gallons of oil spilled). In 2013, rail spilled far more oil per billion barrels of oil transported than pipeline, but the amount of oil spilled by rail was uncharacteristically high due to major spills in Aliceville, Alabama and Casselton, North Dakota. *See id.*

240. *See id.* (concluding oil transportation via rail is more dangerous than oil transportation via pipeline).

241. For a discussion of the economic differences between transporting oil by rail or pipeline, see *infra* notes 242-248 and accompanying text.

242. *See* Silverstein, *supra* note 230 (discussing rail’s advantage over pipeline in regions that are experiencing North American oil boom).

243. *See id.* (explaining that pipelines are not used to transport Bakken Crude because producers are unable to build pipelines to meet high demand).

244. *See id.* (detailing barriers to pipeline expansion).

245. *See* Loren Steffy, *Keystone Rhetoric Roils as Oil Trains Roll*, FORBES (Feb. 24, 2015, 10:06 AM), <http://www.forbes.com/sites/lorensteffy/2015/02/24/keystone-rhetoric-roils-as-oil-trains-roll/> (commenting on political entrenchment surrounding Keystone XL, including Republicans’ stance, President Obama’s stance, and Keystone XL’s future).

246. *See* Silverstein, *supra* note 230 (noting expansive nature of ground railroads as compared to limited coverage of pipelines).

thousand miles.²⁴⁷ Rail has the advantage of being immediately accessible to the oil industry, making it a cheaper and more certain option.²⁴⁸

With the future of the Keystone XL pipeline becoming more uncertain, the increased use of rail to transport oil becomes more likely.²⁴⁹ Although concerns and resulting regulations regarding the transportation of oil by rail have risen since the 2015 derailments, much more needs to be accomplished.²⁵⁰ The oil and rail industries will continue to use the DOT-111 tanker into 2017, and there are significant concerns that the replacement tankers will continue to pose the same risks, allowing for continued dangers.²⁵¹

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247. See Conca, *supra* note 78 (explaining that railroad track is currently more expansive than crude oil pipeline coverage in United States).

248. See *id.* (noting that adapting railroads to oil industry's needs by building new terminals and constructing new railroads is less expensive than expanding pipeline coverage).

249. See Eaton, *supra* note 8 (discussing American Petroleum Institute's argument that failure to approve Keystone XL pipeline requires further investment in rail).

250. See Silverstein, *supra* note 230 (discussing growing interest in oil by rail). For a further discussion of the growing interest in oil by rail, see *supra* notes 230-232 and accompanying text.

251. See de Place & Feldman, *Canada vs. the USA*, *supra* note 163 (criticizing both United States and Canada for not immediately banning all DOT-111s from transporting Bakken crude oil). For a discussion of why the replacement tankers will continue to pose concerns, see *supra* notes 219-229 and accompanying text.

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