THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

March 19, 2019

The Honorable Richard C. Shelby
Chairman, Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

The enclosed Report to Congress on Shipping Crude Oil by Truck, Rail, and Pipeline is submitted pursuant to the Fiscal Year 2016 Senate Appropriations Report, which requests that the U.S. Department of Transportation analyze and report on the comparative safety of shipping crude oil by truck, rail, and pipeline.

Congress requested that the report specifically include:

1. The total volume of crude oil shipped and spilled by each mode of transportation over each of the past 10 years, as well as future estimates of crude oil shipment volumes by each mode of transportation based on recent trends and current policy, including the Department's tank car rulemaking; and

2. An indication to Congress of the safest mode of transportation for the shipment of crude oil, as well as necessary measures to improve the safety of each form of transportation.

The Pipeline and Hazardous Materials Safety Administration prepared this report in accordance with Congress's request. The Report on Shipping Crude Oil by Truck, Rail, and Pipeline compiles crude oil transportation and incident data to show the volume of crude oil shipped by mode, volume of crude oil spilled by mode, percent of crude oil spilled by mode, incidents by mode, and human consequences by mode. These metrics are used to inform Congress of measures to improve the safety of transporting crude oil.

Similar letters have been sent to the Vice Chairman of the Senate Committee on Appropriations and to the Chairman and Ranking Member of the House Committee on Appropriations.

Sincerely,

Elaine L. Chao

Enclosure

THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

March 19, 2019

The Honorable Patrick J. Leahy
Vice Chair, Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Senator Leahy:

The enclosed Report to Congress on Shipping Crude Oil by Truck, Rail, and Pipeline is submitted pursuant to the Fiscal Year 2016 Senate Appropriations Report, which requests that the U.S. Department of Transportation analyze and report on the comparative safety of shipping crude oil by truck, rail, and pipeline.

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Similar letters have been sent to the Chairman of the Senate Committee on Appropriations and to the Chairman and Ranking Member of the House Committee on Appropriations.

Sincerely,

Elaine L. Chao

Enclosure

THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

March 19, 2019

The Honorable Nita M. Lowey
Chairwoman, Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Madam Chairwoman:

The enclosed Report to Congress on Shipping Crude Oil by Truck, Rail, and Pipeline is submitted pursuant to the Fiscal Year 2016 Senate Appropriations Report, which requests that the U.S. Department of Transportation analyze and report on the comparative safety of shipping crude oil by truck, rail, and pipeline.

Congress requested that the report specifically include:

1. The total volume of crude oil shipped and spilled by each mode of transportation over each of the past 10 years, as well as future estimates of crude oil shipment volumes by each mode of transportation based on recent trends and current policy, including the Department's tank car rulemaking; and

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Similar letters have been sent to the Ranking Member of the House Committee on Appropriations and to the Chairman and Vice Chairman of the Senate Committee on Appropriations.

Sincerely,

Elaine L. Chao

Enclosure

THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

March 19, 2019

The Honorable Kay Granger
Ranking Member, Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Congresswoman Granger:

The enclosed Report to Congress on Shipping Crude Oil by Truck, Rail, and Pipeline is submitted pursuant to the Fiscal Year 2016 Senate Appropriations Report, which requests that the U.S. Department of Transportation analyze and report on the comparative safety of shipping crude oil by truck, rail, and pipeline.

Congress requested that the report specifically include:

1. The total volume of crude oil shipped and spilled by each mode of transportation over each of the past 10 years, as well as future estimates of crude oil shipment volumes by each mode of transportation based on recent trends and current policy, including the Department's tank car rulemaking; and

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Elaine L. Chao

Enclosure

U.S. Department
of Transportation
**Pipeline and
Hazardous Materials
Safety Administration**

Report on Shipping Crude Oil by Truck, Rail, and Pipeline

Office of Hazardous Materials Safety (OHMS)

October 2018

Contents

I. Background

The Fiscal Year 2016 Senate Appropriations Report[1] requests the U.S. Department of Transportation (DOT) to analyze and report the comparative safety of shipping crude oil by rail, pipeline, and truck. Congress requests that the report include:

1. The total volume of crude oil spilled and total volume of crude oil shipped by each mode of transportation over each of the past 10 years, as well as future estimates of crude oil shipment volumes by each mode of transportation based on recent trends and current policy, including the DOT's tank car rulemaking; and

2. An indication to Congress of the safest mode of transportation for the shipment of crude oil, as well as necessary measures to improve the safety of each form of transportation.

The Pipeline and Hazardous Materials Safety Administration (PHMSA) has prepared this report in accordance with Congress' request. The Report on Shipping Crude Oil by Truck, Rail, and Pipeline compiles crude oil transportation and incident data to show volume of crude oil shipped by mode, volume of crude oil spilled by mode, percent of crude oil spilled by mode, incidents by mode, and human consequences by mode. These metrics are used to inform Congress of measures that can be used to improve the safety of transporting crude oil.

Congress requested that the analysis cover rail, truck, and pipeline. However, a similarly timed study[2] produced by the Transportation Research Board (TRB) prompted PHMSA to examine crude oil shipped by water in addition to the other aforementioned modes. PHMSA provides this additional analysis in Appendix A.

[1] S. Rept. 114-75, at 91 (2015).
[2] Committee for a Study of Domestic Transportation of Petroleum, Natural Gas, and Ethanol, Transportation Research Board, Special Report 325 Safely Transporting Hazardous Liquids and Gasses in a Changing U.S. Energy Landscape (2017), https://www.nap.edu/catalog/24923/safely-transporting-hazardous-liquids-and-gases-in-a-changing-us-energy-landscape [hereinafter *TRB Special Report 325*].

II. Historical Volumes of Crude Oil Shipments by Mode

This report compiles historical data for refinery receipts and transportation incidents to satisfy Congress' request for the total volume of crude oil spilled and total volume of crude oil shipped by each mode of transportation over each of the past 10 years. The time period from 2007 to 2016 is used because refinery receipt data is not yet available for 2017.[3] Table 1 shows the annual volume of crude oil shipped by truck, rail, and pipeline, the volume of crude oil spilled, and the percent of crude oil spilled.

Table 1: Volume of Crude Oil Shipped and Spilled by Pipeline, Rail, and Truck

Volume of Crude Oil Shipped and Spilled by Mode (K gal)									
	PIPELINE			RAIL			TRUCK		
Year	Shipped	Spilled	% Spilled	Shipped	Spilled	% Spilled	Shipped	Spilled	% Spilled
2007	114,780,204	541	0.0005%	167,244	0	0.0000%	2,762,298	32	0.0012%
2008	112,789,656	2,196	0.0019%	181,944	81	0.0446%	2,909,970	19	0.0007%
2009	112,582,596	886	0.0008%	174,300	0	0.0000%	2,846,928	13	0.0004%
2010	118,125,966	2,211	0.0019%	181,776	5	0.0027%	3,034,080	25	0.0008%
2011	121,909,032	1,484	0.0012%	274,470	4	0.0014%	3,999,660	69	0.0017%
2012	129,802,638	631	0.0005%	1,436,358	4	0.0003%	5,512,584	60	0.0011%
2013	133,989,366	1,815	0.0014%	3,670,128	945	0.0258%	6,107,136	113	0.0018%
2014	144,549,762	740	0.0005%	6,613,278	58	0.0009%	6,403,110	105	0.0016%
2015	153,702,486	878	0.0006%	5,260,080	611	0.0116%	7,419,426	63	0.0009%
2016	156,398,382	1,781	0.0011%	5,093,382	42	0.0008%	6,899,676	23	0.0003%
TOTAL	1,298,630,088	13,161	0.0010%	23,052,960	1,751	0.0076%	47,894,868	521	0.0011%

The volume of crude oil shipped is compiled from the Energy Information Administration's (EIA) Refinery Receipts of Crude Oil by Method of Transportation. The volume of crude oil spilled is aggregated from Form DOT F 5800.1[4] submissions and Form PHMSA F 7000-1[5] submissions. Percent spilled is calculated by dividing the volume spilled by the volume shipped. A more comprehensive methodology can be found in Appendix B: Methodology.

[3] *See* Energy Information Administration, U.S. Department of Energy, U.S. Refinery Receipts of Crude Oil by Method of Transportation https://www.eia.gov/dnav/pet/pet_pnp_caprec_dcu_nus_a.htm [hereinafter *EIA Refinery Receipts*] (scheduling the 2017 data to be released in June 2018).

[4] *See* 49 Code of Federal Regulations (CFR) 171-180 (requiring that Form DOT F 5800.1 be submitted to PHMSA in the event of a crude oil spill by train, truck, or non-bulk inland water carriers).

[5] *See* 49 CFR 195 (requiring that Form PHMSA F 7000-1 be submitted to PHMSA in the event of a crude oil spill by pipeline of more than five barrels).

Figure 1a: Volume of Crude Oil Shipped by Mode

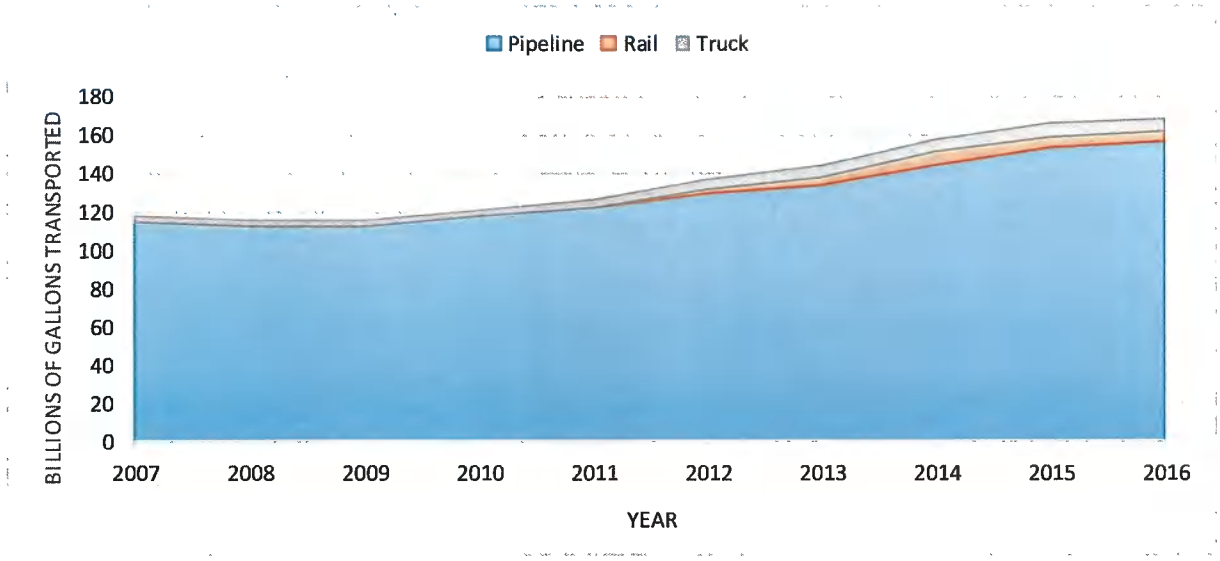

Figure 1a shows an increase in the total volume of crude oil shipped by the Pipeline, Rail, and Truck modes. It also shows discrete increases in the volume shipped by each mode.

Figure 1b: Volume of Crude Oil Shipped by Mode, Logarithmic Scale

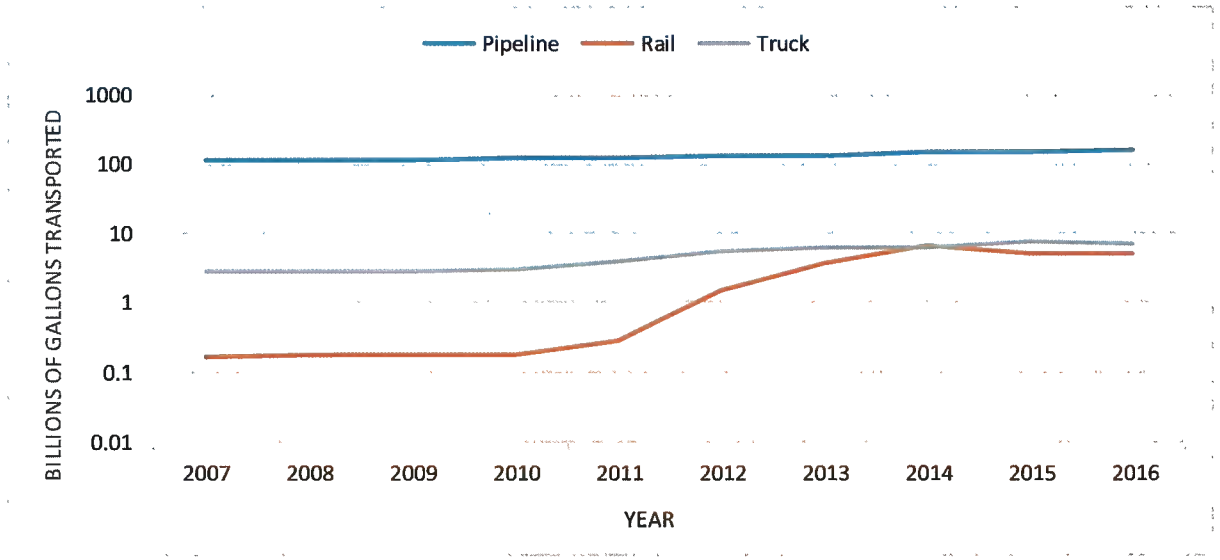

Figure 1b shows relative increases in the volume of crude oil shipped by each mode. Crude oil shipped by rail increased more than tenfold from between 2011 and 2014. Pipeline has driven and continues to drive the total volume trend, despite having the smallest year-to-year changes.

Figure 2: Volume of Crude Oil Spilled by Mode

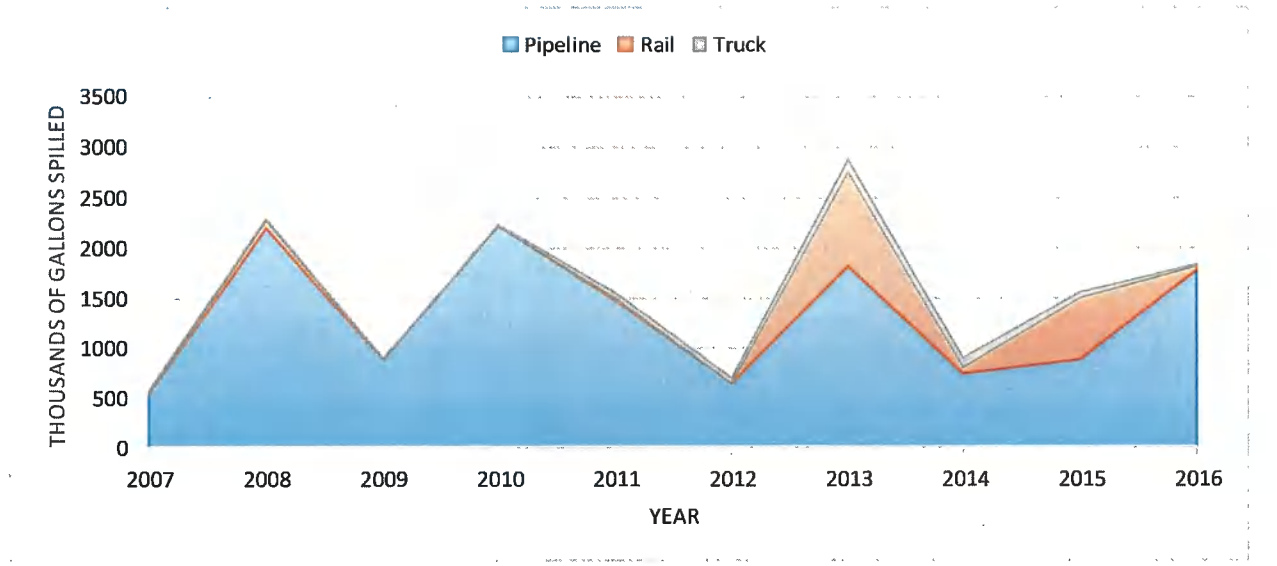

Figure 2 shows the annual volume of crude oil spilled. Volume spilled for Truck and Rail is nominal compared to Pipeline until 2013, when large derailments occurred in Aliceville, Alabama[6] and Casselton, North Dakota,[7] spilling approximately 450,000 gallons and 400,000 gallons, respectively.

[6] https://www.reuters.com/article/us-crude-train-explosion/crude-oil-tank-cars-ablaze-after-train-derails-in-alabama-idUSBRE9A70Q920131109

[7] http://www.startribune.com/ntsb-400-000-gallons-of-crude-spilled-in-casselton-train-wreck/239948631/

III. Future Predictors of Volume by Mode

Pursuant to the Fiscal Year 2016 Senate Appropriations Report, PHMSA provides a synopsis on future estimates of crude oil shipments, modal shifts, and potentially influencing factors.

Crude Oil Demand / Price per Barrel

Modal transportation of crude oil is largely driven by the price per barrel. As demand increases, the Crude Oil Brent Price (Brent Price) will also increase. Therefore, more expensive modes of transportation become economically viable as the spread between Brent Price and domestic spot markets increases.[8] Generally, pipeline is cheapest, followed by rail, followed by truck.[9] PHMSA supports the general conclusion of rail volume and truck volume increasing if oil demand and prices increase, but PHMSA yields to the EIA's expertise in making those predictions. Price predictions can be found in EIA's Short-Term Energy Outlook[10] and Long-Term Energy Outlook.[11]

High-Hazard Flammable Train Rulemaking

On May 8, 2015, PHMSA published HM-251, a final rule titled "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains."[12] As part of this rulemaking, PHMSA received comments from the Rail Supply Institute (RSI) suggesting the proposed retrofit schedule of DOT-111 tank cars could result in a modal shift from rail to truck.[13] Specifically, RSI suggested that from 2015 to 2025, over-the-road trucks could be needed to replace railcar capacity.[14] PHMSA received similar comments from conglomerate Archer Daniel Midland.[15] However, PHMSA contended—and continues to contend—that, based on a comprehensive analysis of the graduated retrofit schedule, there will be no loss in capacity and, consequently, no modal shift.[16]

This report notes that RSI's projected modal shift due to overcapacity was based on a 2014 Brattle Group study, which predicted that the volume of crude oil transportation by rail would continue to increase annually.[17] In actuality, crude by rail peaked in 2014 and receded slightly in years following.[18]

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[8] *See* Arup Mallik & Mason Hamilton, Energy Information Administration, Today in Energy, March 11, 2016 (2016) *available at* http://www.eia.gov/todayinenergy/detail.cfm?id=25332 (explaining that the economics of crude by rail depend on spot price spreads).
[9] Association of Oil Pipelines, *About Pipelines,* (August 22, 2014) *available at* http://www.aopl.org/pipeline-basics/about-pipelines/ (presenting a spread of transportation rates by mode for crude oil transportation).
[10] *Available at* http://www.eia.gov/forecasts/steo/ .
[11] *Available at* http://www.eia.gov/forecasts/aeo/ .
[12] 80 FR 26643.
[13] 80 FR 26740.
[14] 80 FR 26741.
[15] 80 FR 26741.
[16] 80 FR 26741.
[17] 80 FR 26741.
[18] *See* EIA Refinery Receipts.

PHMSA also received comments from rail users and other stakeholders that speed restrictions could reduce rail network fluidity and result in modal shifts.[19] PHMSA agreed, and concluded, that should the rail network become overcrowded, modal shifts to truck could occur.[20]

FAST Act

The "Fixing America's Surface Transportation Act of 2015," (FAST Act)[21] included the "Hazardous Materials Transportation Safety Improvement Act of 2015"[22] and instructed the Secretary of Transportation to make specific regulatory amendments to the tank car design standards and phase-out schedule codified in the HM-251 final rule. On August 15, 2016, PHMSA issued HM-251C, a final rule titled, "FAST Act Requirements for Flammable Liquids and Rail Tank Cars," implementing changes required by the FAST Act.[23] In developing this rulemaking, PHMSA revised predictions of tank car fleets and carloads affected through 2029.[24]

[19] 80 FR 26686.
[20] 80 FR 26687.
[21] Pub. L. 114-94.
[22] *Id. at* 7001-7311.
[23] 81 FR 53935, *available at* https://www.gpo.gov/fdsys/pkg/FR-2016-08-15/pdf/2016-19406.pdf.
[24] *Id. at* 53940–53954.

IV. Modal Safety Comparison

Congress requests that PHMSA indicate which is the safest mode of transportation for the shipment of crude oil, as well as necessary measures to improve the safety of each mode of transportation.

In this section, PHMSA has derived several metrics that may play a role in determining the safety of a mode. These metrics are percent spilled, volume shipped per incident, and human consequences.

Figure 3: Percent of Crude Oil Spilled by Mode

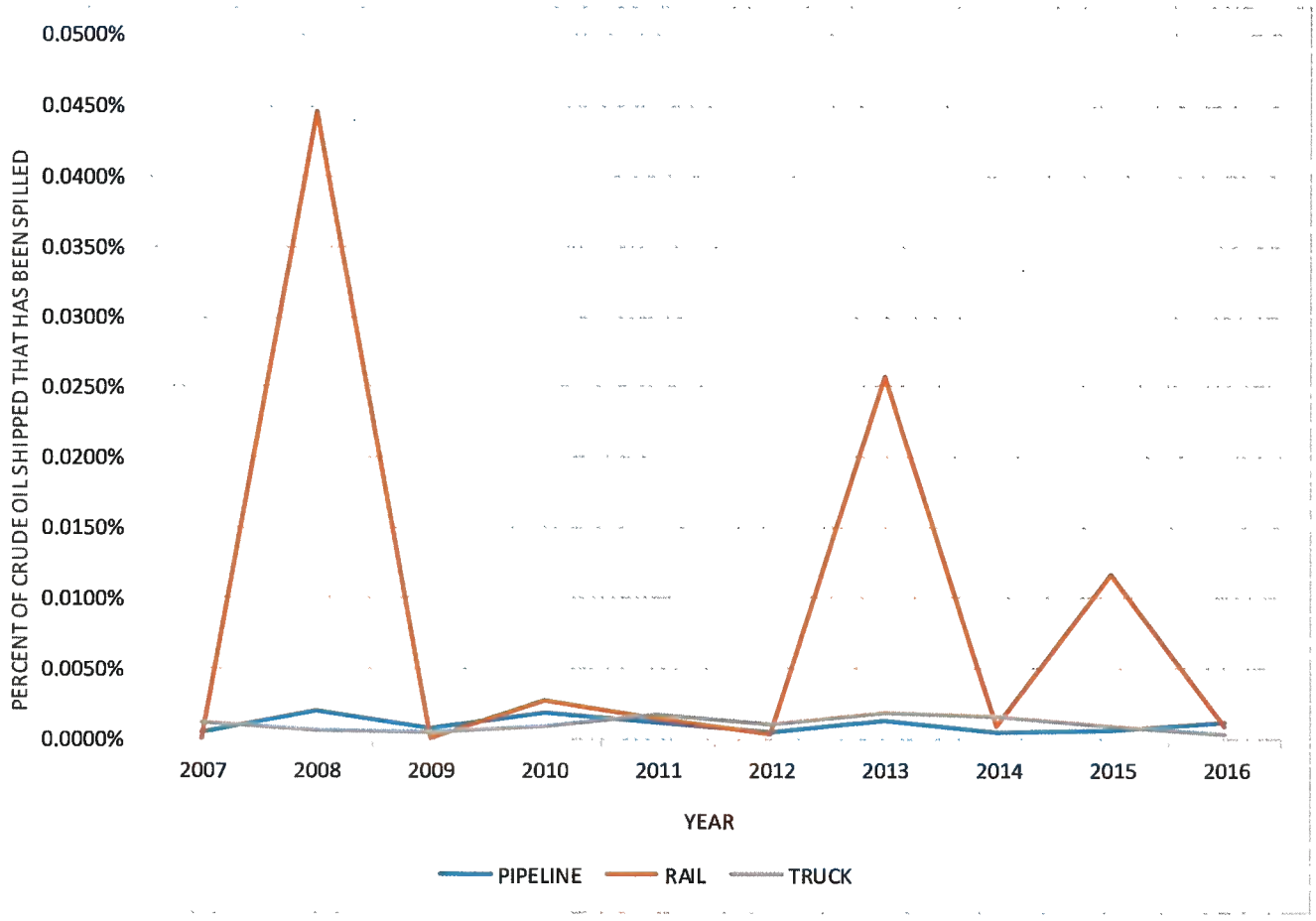

Figure 3 shows that the percent of crude oil spilled is consistent over time, with the exception of rail, which is driven by high-impact incidents. PHMSA derived the percentage spilled by dividing the volume shipped by the volume spilled.

Table 2: Incident Counts and Volume of Crude Oil Shipped per Incident

Incidents Involving Crude Oil by Mode			
Year	Mode Shipped		
	PIPELINE	RAIL	TRUCK
2007	132	1	45
2008	141	8	46
2009	123	1	33
2010	156	9	45
2011	147	34	90
2012	189	88	99
2013	206	119	124
2014	241	144	188
2015	257	43	141
2016	204	6	51
Total	1796	453	862
Total Volume (K gal)	1,298,630,088	23,052,960	47,894,868
Volume Shipped per Incident (K gal)	723,068	50,890	55,562

Table 2 combines the volume data requested by Congress with incident counts from the data sets used to aggregate volume spilled. For pipeline, an incident occurred approximately once every 720 million gallons of crude oil shipped. For rail, an incident occurred approximately once every 50 million gallons of crude oil shipped. For truck, an incident occurred approximately once every 55 million gallons of crude oil shipped.

Table 3: Human Consequences by Mode

Human Consequences of Shipping Crude Oil (2007–2016)			
Consequence	Incidents by Mode		
	PIPELINE	RAIL	TRUCK
Serious Injuries	14	0	1
Fatalities	3	0	3

Table 3 shows the total serious injuries and fatalities from incidents with crude oil releases. These totals are aggregated from injury and fatality fields from Form DOT F 5800.1 and Form PHMSA F 7000-1 submissions. Due to the extremely rare occurrence of a fatality or hospitalization, PHMSA chooses not to normalize this data or present it by year. PHMSA cautions that, despite these low domestic numbers, incidents involving crude oil can be extremely dangerous as evidenced by the 47 deaths resulting from a crude oil derailment in Lac Megantic, Quebec.[25]

[25] http://www.bbc.com/news/world-us-canada-42548824

V. Conclusions and Recommendations

PHMSA attempted to determine the safest mode for transporting crude oil by viewing spill volume data, incident counts, and human consequence data through the lens of a *severity* * *exposure* * *probability* risk model and comparing the results with a TRB study done in parallel. The TRB study included crude transportation by water, prompting PHMSA to also perform an analysis of crude by water.[26] Despite not being able to explicitly conclude which mode is the safest, PHMSA is able to draw other analytical conclusions, identify data gaps, and make recommendations to further facilitate the safe transportation of crude oil.

After considering TRB's results and recommendations[27] in conjunction with our own data, PHMSA concludes that:

1. **Transporting oil by water has the lowest percent spilled relative to other modes.**[28] However, modal shifts to water are unlikely to occur, because transportation by water is geographically limited. **PHMSA recommends looking for cross-modal applicability in the Safety Management Systems and regulatory changes that fostered an exemplary safety level for transporting oil by water.**

2. **Each mode has its own unique safety risks, and more factors or different methodologies need to be considered to comprehensively answer the question of which mode is the safest**. If percent spilled is used as a proxy for safety, shipping crude oil by water would be safer than by pipeline, by pipeline would be safer than by truck, and by truck would be safer than by rail. If incident rate is used as a proxy for safety, shipping crude by pipeline would be considered safer than by truck, and by truck would be considered safer than by rail. If human consequences are used as a proxy for safety, then shipping crude by rail would be considered safer than by truck, and by truck would be considered safer than by pipeline. **PHMSA recommends additional study of modal comparisons using composite consequence metrics including spill data, incidents, and human consequence factors, as well as other consequence factors such as economic or environmental damages. PHMSA also recommends that additional risk methodologies are explored such as a risk matrix methodology.**

3. **Significant knowledge gaps exist for the exposure, vulnerability, and consequences of crude oil transportation.** PHMSA is currently filling these knowledge gaps with a rail liability study to determine whether current rail insurance requirements for Class 2

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[26] Appendix A

[27] TRB Special Report 325 117-119 (Recommending that PHMSA review successes and failures in responding to safety challenges, develop a more forward-looking approach to safety assurance, approach risk monitoring with a data and analytical basis, re-evaluate incident data collected, encourage operators to use qualitative risk assessment tools, continuously gauge the success of risk-reducing provisions of the HHFT rulemaking, study accident prevention as well as mitigation, and ensure that federal emergency preparedness grants are being used towards addressing the challenges of transporting energy products).

[28] *See Infra* Table A1.

railroads are adequate,[29] an industry survey to monitor whether tank cars used to transport crude oil are being modified to comply with new safety standards,[30] and a crude oil volatility study to determine the hazard of different types of crudes.[31] **PHMSA recommends further filling these gaps through additional data collection on exposure and changes to incident collection requirements so that more relevant data can be collected.**

[29] FAST Act Section 7310 (requiring the Secretary of Transportation to conduct a study on the levels and structure of insurance for railroad carriers that transport hazardous materials).
[30] FAST Act Section 7308 (requiring the U.S. Department of Transportation to assemble and collect data on rail tank cars transporting Class 3 flammable liquids).
[31] FAST Act Section 7309 (requiring the U.S. Department of Transportation to research and report on crude oil characteristics).

VI. Appendix A: Alternative Analysis including Water Shipments

Appendix A provides modified versions of Table 1 and Figures 1a, 1b, 2, and 3 (referenced as Table A1 and Figures A1a, A1b, A2, and A3), which include data points for crude oil transportation by water. PHMSA believes this modified data set is more suitable for a comprehensive safety analysis and that the addition of crude oil transportation by water will provide a complete picture of crude oil transportation.

Table A1: Volume of Crude Oil Shipped and Spilled by Pipeline, Water, Rail, and Truck

Volume of Crude Oil Shipped and Spilled by Mode (K gal)												
	PIPELINE			WATER			RAIL			TRUCK		
Year	Shipped	Spilled	% Spilled	Shipped	Spilled	% Spilled	Shipped	Spilled	% Spilled	Shipped	Spilled	% Spilled
2007	114,780,204	541	0.000471%	114,794,442	11	0.000009%	167,244	0	0.000001%	2,762,298	32	0.001165%
2008	112,789,656	2,196	0.001947%	109,599,546	4	0.000003%	181,944	81	0.044576%	2,909,970	19	0.000655%
2009	112,582,596	886	0.000787%	105,361,032	1	0.000001%	174,300	0	0.000001%	2,846,928	13	0.000440%
2010	118,125,966	2,211	0.001872%	105,330,414	5	0.000005%	181,776	5	0.002706%	3,034,080	25	0.000825%
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2014	144,549,762	740	0.000512%	91,028,280	3	0.000003%	6,613,278	58	0.000871%	6,403,110	105	0.001645%
2015	153,702,486	878	0.000571%	85,819,524	0	0.000000%	5,260,080	611	0.011623%	7,419,426	63	0.000850%
2016	156,398,382	1,781	0.001138%	83,989,878	0	0.000000%	5,093,382	42	0.000834%	6,899,676	23	0.000329%
TOTAL	1,298,630,088	13,161	0.001013%	992,473,944	37	0.000004%	23,052,960	1,751	0.007594%	47,894,868	521	0.001089%

Figure A1a: Volume of Crude Oil Shipped by Mode including Water

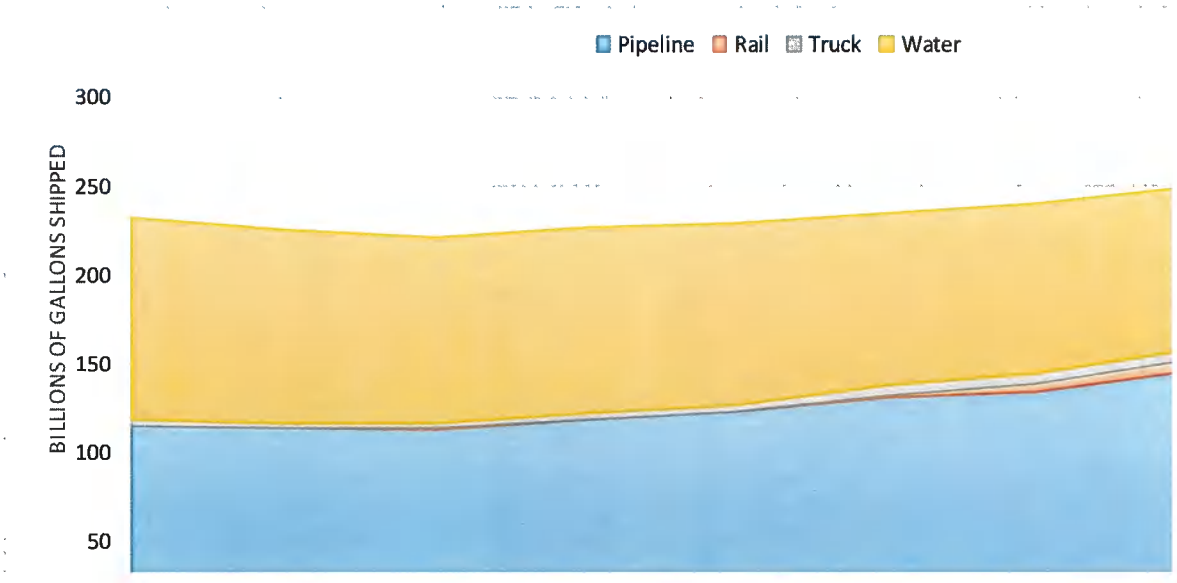


Figure A1b: Volume of Crude Oil Shipped by Mode including Water, Logarithmic Scale

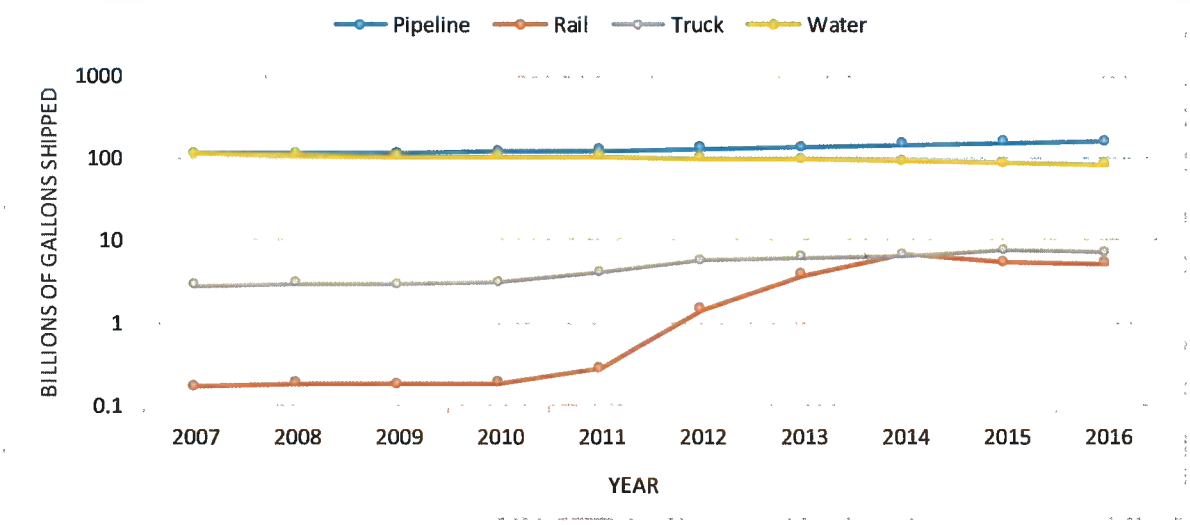


Figure A2: Volume of Crude Oil Spilled by Mode including Water

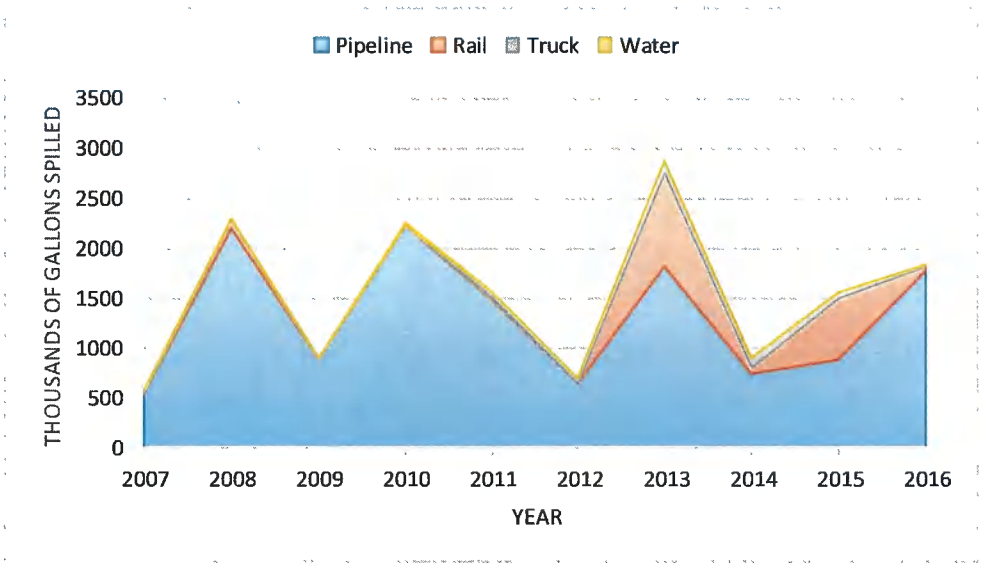
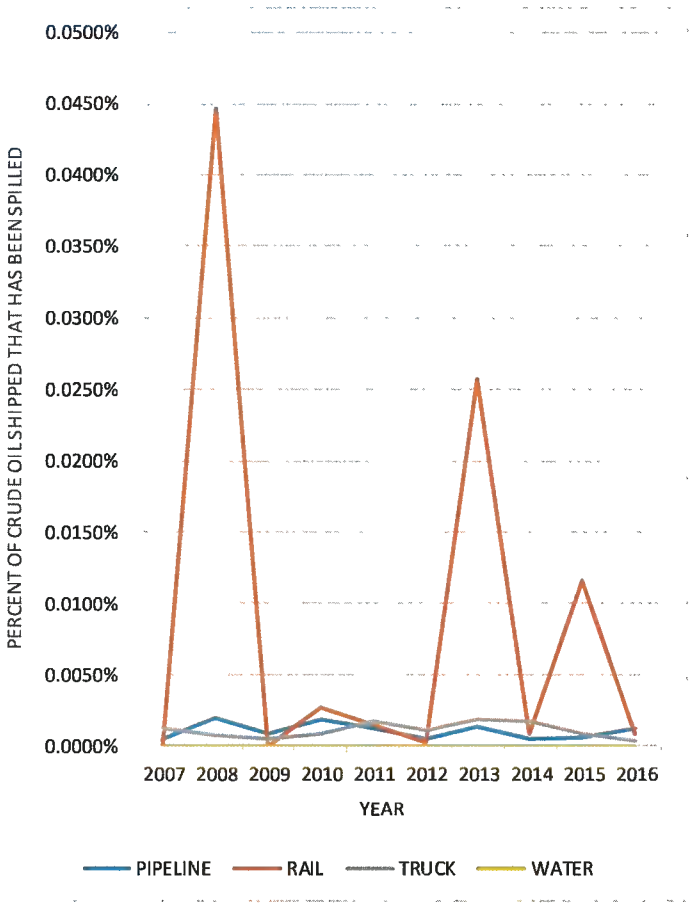


Figure A3: Percent Spilled by Mode including Water



VII. Appendix B: Methodology

Volume of Crude Oil Shipped

The volume of crude oil shipped is determined by summing fields in the EIA's "Refinery Receipts of Crude Oil by Method of Transportation" data product and then converting barrels to U.S. gallons using a 1 barrel to 42-gallon ratio. Modes in this report correspond to modes in the EIA dataset, with the exception of Water, which is the sum of the EIA Tanker and Barge categories.

Volume of Crude Oil Spilled and Human Consequence Data

Volume of crude oil spilled, serious injuries, and fatalities are determined by aggregating relevant PHMSA F 7000-1, U.S. Coast Guard (USCG) 2692, and DOT F 5800.1 filings.

Table A2: Data Source and Selection Criteria by Mode

	PIPELINE		WATER	RAIL	TRUCK
Source	FORM PHMSA F 7000-1[32]		USCG 2692[33]	FORM DOT F 5800.1[34]	
Years	2007-2009	2010-2016	2007-2016	2007-2016	2007-2016
Incident Selection Criteria	COMM = 'CRUDE OIL'	COMMODITY_RELEASED_TYPE = 'CRUDE OIL'	Type of Incident = 'VESSEL' AND Name of Material = 'OIL: CRUDE' AND Call Type = 'INC'	Mode of Transportation = 'Rail' AND Identification Number = 'UN1267'	Mode of Transportation = 'Highway' AND Identification Number = 'UN1267'
Fields used for Volume of Crude Oil Spilled	LOSS	UNINTENTIONAL_RELEASE_BBLS	Amount In Water	Quantity Released	Quantity Released
Fields used for Serious Injury Count	INJURE	INJURE	Number Hospitalized	Total Hazmat Hosp Injuries	Total Hazmat Hosp Injuries
Fields used for Fatality Count	FATAL	FATAL	Number Fatalities	Total Hazmat Fatalities	Total Hazmat Fatalities

[32] *Available at* https://www.phmsa.dot.gov/data-and-statistics/pipeline/source-data.
[33] *Available at* http://www.nrc.uscg.mil/.
[34] *Available at* https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics.

Percent Spilled

Percent spilled is calculated by dividing the volume of crude oil spilled by the volume of crude oil shipped.

Volume Shipped per Incident

Volume shipped per incident is calculated by dividing the volume of crude oil shipped by the count of incident filings found using the selection criteria in Table A2. For the rail and highway modes, multiple filings per incident may occur, so a count of distinct report numbers is used.

Uncertainty and Error

Sampling Error

The EIA Refinery Receipts are subject to uncertainty as a result of estimating totals from a sampled survey. Coefficients of variations are unavailable for these numbers, but the methodology is available online.[35]

Non-Sampling Error

Each of the five datasets used is subject to non-sampling error. Although every effort is made in processing and tabulation to minimize errors, these data are subject to non-sampling errors, such as the inability to obtain data for every variable from all units in the collection, inaccuracies in classification, nonresponse errors, misinterpretation of questions, mistakes in keying and coding, and coverage errors.

[35] https://www.eia.gov/petroleum/supply/monthly/pdf/psmnotes.pdf.

Public Law Source:

FY 2016 Senate Committee Report 114-75, pp. 90-91

Crude Oil Shipment Across Various Modes of Transportation.—In light of the drastic increase in the transportation of crude by rail from 9,500 carloads in 2008 to 650,000 carloads in 2014, and the recent catastrophic oil train derailments, including the disaster in Quebec, Canada in 2013 that claimed the lives of 47 people, the derailment of a train carrying 3 million gallons of crude oil in West Virginia, in February, and the March oil train derailment in Galena, Illinois, that narrowly avoided the Mississippi River, the Committee directs the Secretary to analyze the comparative safety of shipping oil by rail, pipeline, or truck and report to the House and Senate Committees on Appropriations within 90 days of enactment of this act. The report should include the total volume of oil spilled and the total volume of oil shipped by each mode of transportation over each of the past 10 years as well as future estimates of oil shipment volumes by each mode of transportation based on recent trends and current policy, including the Department's tank car rulemaking. The report should indicate to Congress the safest mode of transportation for the shipment of oil as well as necessary measures to improve the safety of each form of transportation.