

DEPARTMENT OF
ECOLOGY
State of Washington

Crude Oil Movement by Rail and Pipeline

Quarterly Report: April 1, 2017 through June 30, 2017

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Spill Prevention, Preparedness, and Response Program
Washington State Department of Ecology
Olympia, Washington

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Introduction

To enhance crude oil spill preparedness and response in Washington State, on August 24, 2016, Ecology adopted the rule, [Oil Movement by Rail and Pipeline Notification](#). The rule establishes reporting standards for facilities that receive crude oil by rail and pipelines that transport crude oil in or through the state.¹ Additionally, the rule identifies reporting standards for Ecology to share information with emergency responders, local governments, tribes, and the public.

This rule is the result of 2015 Legislative direction to provide a better understanding of the changing risk picture for crude oil transported in Washington State as a result of the introduction of crude oil transport by rail and the associated changes in both the volume and properties of crude moving through Washington.

Timely notice of oil movement information is necessary for emergency responders and planners to effectively prepare for and respond to oil spills and other incidents associated with transporting crude oil by rail and pipeline. Providing adequate information about the dates, routes, and properties of crude oil can help protect people living and working near railroads and pipelines, the economy, and environmental resources of Washington State.

Ecology is required to publish information collected under the rule to its website on a quarterly basis. The quarterly reports provide:

- Aggregated information on crude oil transported by rail to facilities in Washington.
- Information about crude oil movement by pipeline in or through the state.
- Reported spills during transport and delivery of crude by rail and pipeline.
- Volume of crude oil transported by vessel.

The reports are intended to inform the public about the nature of crude oil movement through their communities.

The reporting period for this quarterly report is April 1, 2017 through June 30, 2017.

¹ Chapter 173-185 WAC

Crude Oil by Rail Summary

Movement of crude oil by rail in Washington State began in 2012 and has continued to increase since that time. Rail routes transporting crude oil enter the state from Idaho near Spokane and from British Columbia near Bellingham, and we continue to monitor other potential routes. Large segments of the rail routes travel along the I-5 corridor, and cross or run next to major waterways, including the Columbia River and Puget Sound. (See [Appendix A](#) for a map of railroad routes in the state.)

Capturing information on the properties of crude oil, the volume transported, and the routes used to transport it allows for proper planning, placement of resources, and opportunities to provide detailed information to responders in the event of a spill, ensuring a more effective overall response. The rule directs Ecology to gather this information by requiring facilities receiving crude oil by rail to report all scheduled crude oil deliveries to be received by the facility each week for the succeeding seven-day period. Facilities enter this information into Ecology's Advance Notice of Transfer (ANT) database.

Information reported by facilities on scheduled crude oil deliveries includes the region of origin of crude oil, the railroad route taken to the facility within the state (if known), scheduled time and volume in barrels (bbls) of the delivery, and gravity of the oil. Ecology uses the standard American Petroleum Institute (API) gravity ranges to define the Crude Type in the ANT database. (See [Appendix B](#) for the API gravity definition and Crude Type ranges.)

Ecology is required to aggregate the information provided on a statewide basis by route, week, and type of crude oil. Aggregate information from the ANT database is provided in [Table 1](#) for the period April 1, 2017 through June 30, 2017, representing the 2nd quarter of 2017. Each week is numbered by calendar week and is aggregated by route and type of crude. The information provided includes:

- Total weekly volume in barrels (bbls) of crude oil transported by rail
- Route
- Region of origin
- Crude type
- Route volume
- Estimated number of railcars per route delivering crude oil (assumes each car holds 680 bbls)

Fourteen calendar weeks are reported in the 2nd quarter of 2017 starting at calendar week 13 and ending at calendar week 26.

Table 1: Crude Oil Movement by Rail**Week 13**

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
13	1A, 2, 3, 4	North Dakota	Light Crude	63,000	92
	2, 3, 4, 5	Alberta	Light Crude	58,000	85
	Weekly totals:			121,000	177

* Week 13 contains only one day of reported ANT volumes due to the dates of the reporting period.

Week 14

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
14	1A, 2, 3	North Dakota	Light Crude	131,346	193
	1A, 2, 3, 4	North Dakota	Light Crude	449,000	660
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	126,055	185
	4, 5	Alberta	Medium Crude	61,696	90
	Weekly totals:			1,268,597	1,864

Week 15

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
15	1A, 2, 3	North Dakota	Light Crude	127,306	187
	1A, 2, 3, 4	North Dakota	Light Crude	382,000	561
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	62,725	92
	4, 5	Alberta	Medium Crude	123,616	181
	Weekly totals:			1,196,147	1,757

Week 16

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
16	1A, 2, 3	North Dakota	Light Crude	197,719	290
	1A, 2, 3, 4	North Dakota	Light Crude	382,000	561
	1A, 2, 3, 4, 5	North Dakota	Light Crude	357,500	525
	1B, 2, 3	North Dakota	Light Crude	121,918	179
	4, 5	Alberta	Medium Crude	61,644	90
	Weekly totals:			1,120,781	1,645

Week 17

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
17	1A, 2, 3, 4	North Dakota	Light Crude	378,000	555
	1A, 2, 3, 4, 5	North Dakota	Light Crude	578,500	850
	1B, 2, 3	North Dakota	Light Crude	63,974	94
	4, 5	Alberta	Medium Crude	62,000	91
	Weekly totals:			1,082,474	1,590

Week 18

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
18	1A, 2, 3	North Dakota	Light Crude	69,112	101
	1A, 2, 3, 4	North Dakota	Light Crude	382,000	561
	1A, 2, 3, 4, 5	North Dakota	Light Crude	507,000	745
	1B, 2, 3	North Dakota	Light Crude	64,308	94
	4, 5	Alberta	Medium Crude	61,501	90
Weekly totals:				1,083,921	1,591

Week 19

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
19	1A, 2, 3	North Dakota	Light Crude	68,014	100
	1A, 2, 3, 4	North Dakota	Light Crude	254,000	373
	1A, 2, 3, 4, 5	North Dakota	Light Crude	577,500	849
	4, 5	Alberta	Heavy Crude	75,916	111
Weekly totals:				975,430	1,433

Week 20

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
20	1A, 2, 3	North Dakota	Light Crude	64,989	95
	1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	128,320	188
Weekly totals:				1,018,809	1,496

Week 21

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
21	1A, 2, 3	North Dakota	Light Crude	130,265	191
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	577,500	849
	4, 5	Alberta	Heavy Crude	61,387	90
Weekly totals:				1,159,152	1,703

Week 22

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
22	1A, 2, 3	North Dakota	Light Crude	64,915	95
	1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
	1A, 2, 3, 4, 5	North Dakota	Light Crude	650,500	956
	1B, 2, 3	North Dakota	Light Crude	127,821	187
	4, 5	Alberta	Heavy Crude	61,174	89
Weekly totals:				1,359,410	1,996

Week 23

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
23	1A, 2, 3	North Dakota	Light Crude	64,214	94
	1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
	1A, 2, 3, 4, 5	North Dakota	Light Crude	357,500	525
	1B, 2, 3	North Dakota	Light Crude	63,960	94
	4, 5	Alberta	Heavy Crude	61,379	90
Weekly totals:				872,053	1,280

Week 24

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
24	1A, 2, 3	North Dakota	Light Crude	64,914	95
	1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
	1A, 2, 3, 4, 5	North Dakota	Light Crude	507,000	745
	Weekly totals:				1,026,914

Week 25

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
25	1A, 2, 3	North Dakota	Light Crude	64,604	95
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	442,000	650
	1B, 2, 3	North Dakota	Light Crude	63,766	93
	4, 5	Alberta	Heavy Crude	61,186	89
Weekly totals:				1,021,556	1,500

Week 26

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
26	1A, 2, 3	North Dakota	Light Crude	129,999	191
	1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
	1A, 2, 3, 4, 5	North Dakota	Light Crude	507,000	745
	1B, 2, 3	North Dakota	Light Crude	64,000	94
	4, 5	Alberta	Heavy Crude	62,000	91
Weekly totals:				1,087,999	1,598

Note: The data provided in Table 1 was reported to Ecology by the receiving facility into the ANT database as required by Chapter 173-185 WAC. Ecology cannot confirm the data or verify its accuracy.

Quarter 2 Total Volume (bbls): 14,394,243

A summary of the data shows:

- Two regions of origin were reported: Alberta and North Dakota.
- Three types of crude oil were reported: heavy, medium, and light.
- Routes 1A, 1B, and 2 through 5 were used to transport crude by rail.
- The total volume of crude oil transported by rail during the quarter was 14,394,243 barrels (604,558,206 gallons).
- The average weekly volume of crude oil transported by rail was 1,107,249 barrels (46,504,477 gallons).²
- The total number of rail cars moving crude oil by rail was 21,139 cars.
- The average number of rail cars per week moving crude oil by rail was 1,626 cars.³
- 2.7% of crude oil transported by rail was heavy crude, 2.6% was medium crude, and 94.8% was light crude.
- Alberta was the region of origin for 6% of crude oil transported by rail, while North Dakota was the region of origin for 94% of crude oil transported by rail.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 2nd quarter of 2017.

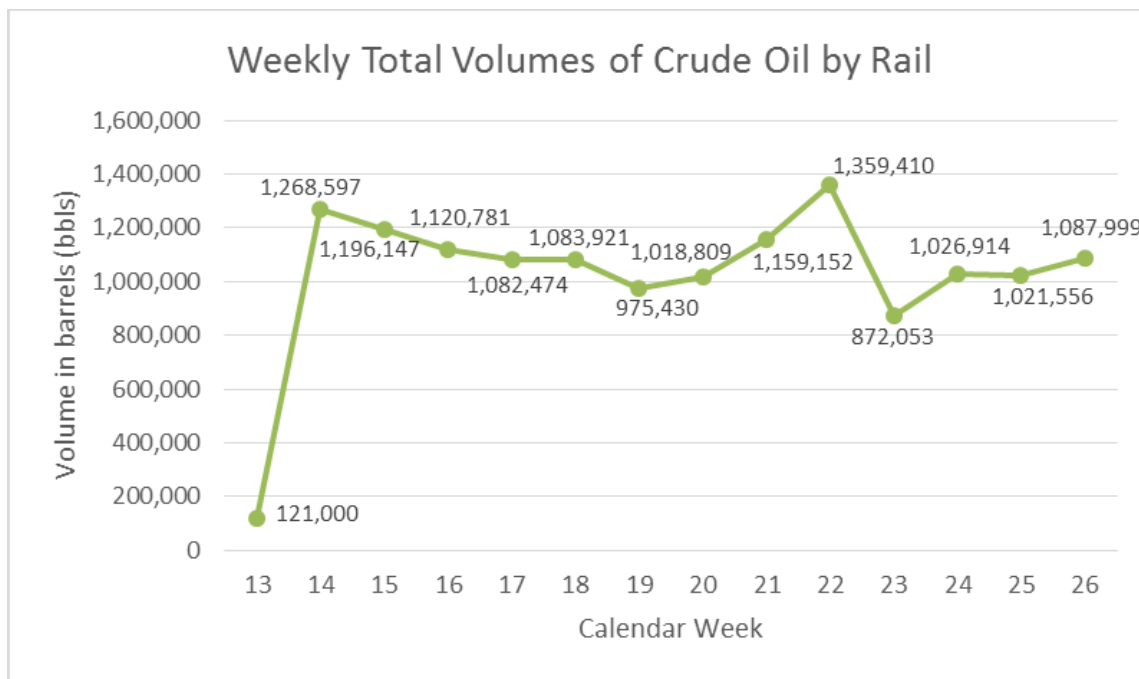


Figure 1: Weekly Total Volumes of Crude Oil by Rail for the 2nd Quarter of 2017

² The quarterly average was calculated using 13 calendar weeks instead of 14 calendar weeks because Calendar Week 13 contains only one day of reported ANT volumes due to the dates of the reporting period.

³ The quarterly average was calculated using 13 calendar weeks instead of 14 calendar weeks because Calendar Week 13 contains only one day of reported ANT volumes due to the dates of the reporting period.

The lowest weekly volume that included a full week of reported advance notice of transfers was 872,053 barrels (36,626,226 gallons) in Week 23. The highest weekly volume of crude transported by rail was 1,359,410 barrels (57,095,220 gallons) in Week 22.

Crude Oil by Pipeline Summary

Pipelines exist inland and may be located near waterbodies and populated areas. Knowing the types and quantities of crude oil transported through pipelines in Washington State helps Ecology properly plan for and execute a rapid, aggressive, and well-coordinated response to a spill.

Under the rule, transmission pipelines that transport crude oil in or through the state must provide Ecology biannual notice of all crude oil transported in or through the state.⁴ Biannual notice must be submitted each year by July 31 for the period from January 1 through June 30 and by January 31 for the period from July 1 through December 31. Biannual notice provided by pipelines includes contact information for the pipeline and the total volume of crude oil transported in or through the state during the reporting period by state or province of origin.

The first biannual notices from pipelines were submitted to Ecology by January 31, 2017, and covered the period from July 1, 2016 through December 31, 2016. [Table 2](#) below provides the total volume of crude oil transported in or through the state by pipelines during this period.

Table 2: Crude Oil Movement by Pipeline

State or Providence of Origin	Volume (bbls)
Alberta	33,213,696

Note: The data provided in Table 2 was reported to Ecology by the pipelines transporting crude oil in or through the state, as required by Chapter 173-185 WAC. Ecology cannot confirm the data or verify its accuracy.

The next biannual notices from pipelines will cover the period from January 1, 2017 through June 30, 2017 and must be submitted to Ecology by July 31, 2017.

⁴ Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

Crude Oil Spills – Rail and Pipeline

Oil spills can have significant impacts to the public, environment, and economy. Ecology strives to protect Washington’s environment, economy, and public health and safety through a comprehensive spill prevention, preparedness, and response program.

The rule directs Ecology to provide the number and volume of spills to the environment during the transport and delivery of crude oil by rail and pipeline in each quarterly report.⁵ For the period of April 1, 2017 through June 30, 2017, zero crude oil spills to the environment were reported. In the event there are spills to report in the future, Ecology will provide this information and include the date of the spill, the county where the spill occurred, the source, material, and volume of the spill.

⁵ Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

Crude Oil Movement by Vessel

In 2006, the state adopted rules for advance notice of oil transfers for vessels and facilities. Ecology has been receiving advance notice of transfer data for all transfers to or from vessels in Washington State since that time.

In order to provide a full picture of crude oil movement in Washington State, a summary of crude oil movement by vessel is provided below, which is in addition to the requirement for this quarterly report as described in the rule.⁶

Table 3 below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of April 1, 2017 through June 30, 2017. Inbound vessel transfers refers to crude oil movement from vessels to facilities, while outbound vessel transfers refers to crude oil movement from facilities to vessels.

Table 3: Crude Oil Movement by Vessel

Vessel Transfers	Volume (bbls)
Inbound	24,505,437
Outbound	1,051,500

Note: The data provided in Table 3 was reported to Ecology into the ANT database as required by Chapter 173-180 WAC and Chapter 173-184 WAC. Ecology cannot confirm the data or verify its accuracy.

Table 3 shows that 24,505,437 barrels (1,029,228,350 gallons) of crude oil were transferred inbound from vessels to facilities, while 1,051,500 barrels (44,163,000 gallons) of crude oil were transferred outbound from facilities to vessels. The total volume from all vessel transfers of crude oil for the 2nd quarter of 2017 was 25,556,937 barrels (1,073,391,350 gallons).

⁶ Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

An Overview of Crude Oil Movement in Washington

A broad view of crude oil movement in Washington State can be seen when comparing the movement of crude oil transported into the state by vessel, rail, and pipeline.

Figure 2 shows the estimated percentage of crude oil transported by vessel (inbound only), rail, and pipeline for three quarters, covering the period of October 1, 2016 through June 30, 2017*.

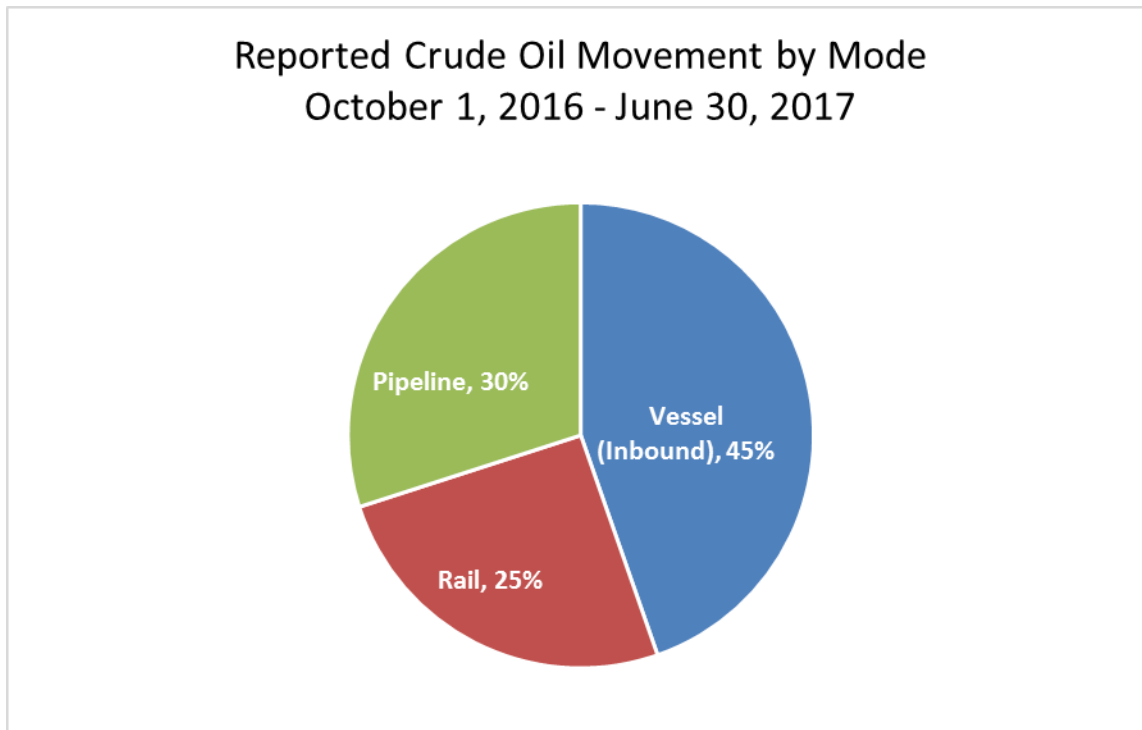


Figure 2: Reported Crude Oil Movement by Mode

**Note: Because pipelines provided biannual notice containing six months of data from July 1, 2016 through December 31, 2016, and the next biannual notice is not due until July 31, 2017, Ecology assumed oil moved by pipeline is relatively consistent each month for the purpose of Figure 2. Based on that assumption, Ecology calculated an estimate for crude oil movement by pipeline for the period.*

Between October 1, 2016 and June 30, 2017, vessels were responsible for 45% of reported crude oil movement into the state, while rail was responsible for 25% and pipeline for 30%.

Ecology will continue to receive information about crude oil movement and use the data to summarize trends and changes over time.

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Appendix A – Washington Railroad Routes

Railroad Routes



Appendix B – API Gravity and Crude Oil Types

Information reported by facilities on scheduled crude oil deliveries includes the gravity of the oil. Ecology uses the standard American Petroleum Institute gravity (API gravity) ranges to define the Crude Type in the ANT database.

API gravity is the measure of the density of petroleum liquid in relation to the density of water and is used to classify oils as light, medium, heavy and extra heavy. The lower the API gravity, the more likely it is to sink in water. Crude Type by API gravity is shown in the table below.

Table 4: Crude Type by API Gravity

Crude Type	API Gravity Range
Light Crude	31.2-50 API
Medium Crude	22.3-31.1 API
Heavy Crude	10-22.2 API
Extra Heavy Crude	0-9.9 API