



DEPARTMENT OF
ECOLOGY
State of Washington

Crude Oil Movement by Rail and Pipeline

Quarterly Report: January 1, 2017 to March 31, 2017

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For more information contact:

Spill Prevention, Preparedness, and Response Program

P.O. Box 47600

Olympia, WA 98504-7600

Phone: (360) 407-7455

Washington State Department of Ecology - www.ecy.wa.gov

- Headquarters, Olympia (360) 407-6000
- Northwest Regional Office, Bellevue (425) 649-7000
- Southwest Regional Office, Olympia (360) 407-6300
- Central Regional Office, Union Gap (509) 575-2490
- Eastern Regional Office, Spokane (509) 329-3400

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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,¹ [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. 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 on crude oil movement by pipeline, and information on crude oil spilled during transport and delivery for rail and pipeline. In order to show a full picture of crude oil moving through the state, the quarterly reports also include the 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 January 1, 2017 to March 31, 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. Large portions of the rail routes travel along the I-5 corridor, and cross or run next to major waterways, including the Columbia River and the 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 rule² helps Ecology 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 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 below in [Table 1](#) for the period January 1, 2017 to March 31, 2017, representing the 1st 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) 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)

² Chapter 173-185 WAC

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

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1	1A, 2, 3	North Dakota	Light Crude	127,436	187
	1A, 2, 3, 4	North Dakota	Light Crude	453,000	666
	1A, 2, 3, 4, 5	North Dakota	Light Crude	366,000	538
	Weekly totals:			946,436	1,391

Week 2

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
2	1A, 2, 3	North Dakota	Light Crude	129,577	190
	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	63,779	93
	4, 5	Alberta	Heavy Crude	58,276	85
	Weekly totals:			991,132	1,454

Week 3

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
3	1A, 2, 3	North Dakota	Light Crude	64,843	95
	1A, 2, 3, 4	North Dakota	Light Crude	453,000	666
	1A, 2, 3, 4, 5	North Dakota	Light Crude	437,500	643
	4, 5	Alberta	Heavy Crude	60,156	88
	Weekly totals:			1,015,499	1,492

Week 4

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
4	1A, 2, 3	North Dakota	Light Crude	128,244	188
	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	64,354	94
	4, 5	Alberta	Medium Crude	123,382	181
	4, 5	North Dakota	Light Crude	57,902	85
	Weekly totals:			1,256,382	1,845

Week 5

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
5	1A, 2, 3	North Dakota	Light Crude	64,957	95
	1A, 2, 3, 4	North Dakota	Light Crude	323,000	475
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	121,639	178
	Weekly totals:			1,010,096	1,484

Week 6

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
6	1A, 2, 3	North Dakota	Light Crude	127,550	187
	1A, 2, 3, 4	North Dakota	Light Crude	319,000	469
	1A, 2, 3, 4, 5	North Dakota	Light Crude	357,500	525
	1B, 2, 3	North Dakota	Light Crude	64,000	94
	4, 5	Alberta	Heavy Crude	62,000	91
Weekly totals:				930,050	1,366

Week 7

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
7	1A, 2, 3	North Dakota	Light Crude	61,615	90
	1A, 2, 3, 4	North Dakota	Light Crude	386,000	567
	1A, 2, 3, 4, 5	North Dakota	Light Crude	214,500	315
	1B, 2, 3	North Dakota	Light Crude	58,500	86
	4, 5	Alberta	Medium Crude	61,664	90
Weekly totals:				782,279	1,148

Week 8

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
8	1A, 2, 3	North Dakota	Light Crude	128,956	189
	1A, 2, 3, 4	North Dakota	Light Crude	445,000	654
	1A, 2, 3, 4, 5	North Dakota	Light Crude	429,000	630
	1B, 2, 3	North Dakota	Light Crude	64,141	94
	4, 5	Alberta	Medium Crude	61,566	90
Weekly totals:				1,128,663	1,657

Week 9

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
9	1A, 2, 3, 4	North Dakota	Light Crude	256,000	376
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	123,562	181
	4, 5	Alberta	Heavy Crude	61,775	90
Weekly totals:				941,837	1,383

Week 10

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
10	1A, 2, 3	North Dakota	Light Crude	68,839	101
	1A, 2, 3, 4	North Dakota	Light Crude	252,000	370
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	64,244	94
	4, 5	Alberta	Medium Crude	61,773	90
Weekly totals:				947,356	1,391

Week 11

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
11	1A, 2, 3	North Dakota	Light Crude	189,682	278
	1A, 2, 3, 4	North Dakota	Light Crude	269,000	395
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	64,751	95
	4, 5	Alberta	Medium Crude	123,847	182
Weekly totals:				1,147,780	1,686

Week 12

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
12	1A, 2, 3	North Dakota	Light Crude	68,113	100
	1A, 2, 3, 4	North Dakota	Light Crude	319,000	469
	1A, 2, 3, 4, 5	North Dakota	Light Crude	500,500	736
	1B, 2, 3	North Dakota	Light Crude	63,725	93
	4, 5	Alberta	Medium Crude	91,916	135
Weekly totals:				1,043,254	1,533

Week 13

Calendar Week#	Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
13	1A, 2, 3	North Dakota	Light Crude	129,068	189
	1A, 2, 3, 4	North Dakota	Light Crude	323,000	475
	1A, 2, 3, 4, 5	North Dakota	Light Crude	429,000	630
	1B, 2, 3	North Dakota	Light Crude	59,073	86
	4, 5	Alberta	Medium Crude	61,675	90
Weekly totals:				1,001,816	1,470

Quarter 1 Total

	Volume (bbls)
Total for this Period:	13,142,580

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.

Thirteen weeks are reported in the 1st quarter of 2017 starting at calendar week one and ending at calendar week 13.

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 13,142,580 barrels (551,988,360 gallons).
- The average weekly volume of crude oil transported by rail was 1,010,968 barrels (42,460,643 gallons).
- The total number of rail cars moving crude oil by rail was 19,300 cars.
- The average number of rail cars per week moving crude oil by rail was 1,485 cars.
- 2% of crude oil transported by rail was heavy crude, 4% was medium crude, and 94% 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 1st quarter of 2017.

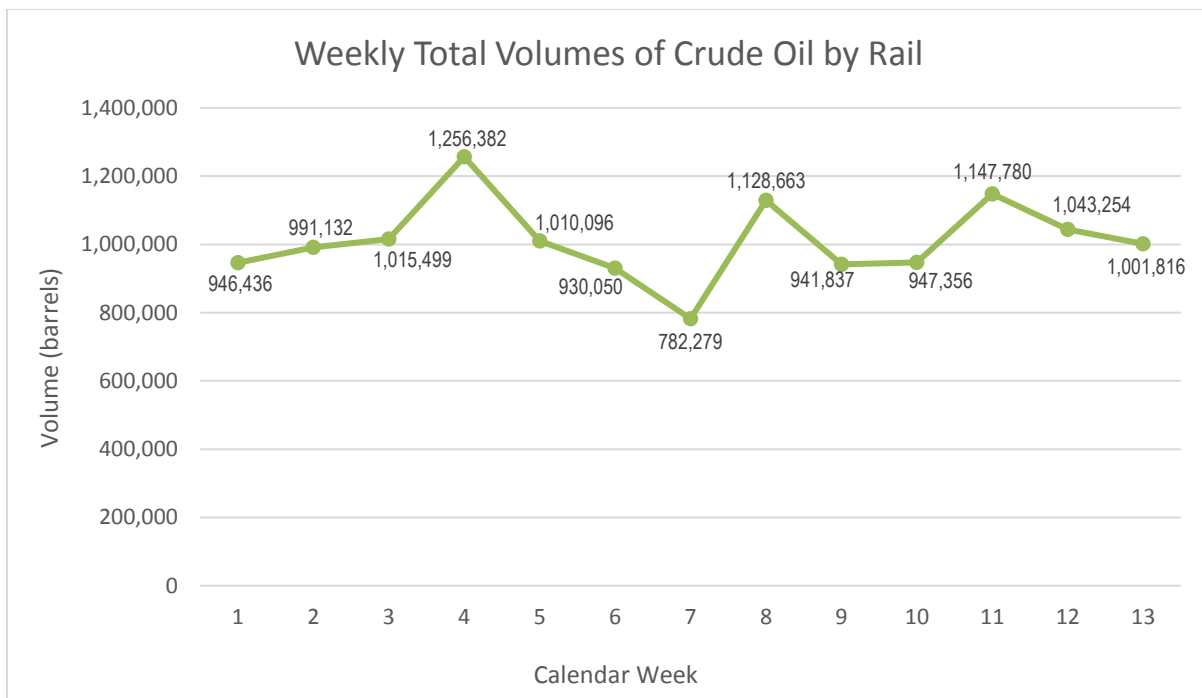


Figure 1: Weekly Total Volumes of Crude Oil by Rail for the 1st Quarter of 2017

The lowest weekly volume was 782,279 barrels (32,855,718 gallons) in week seven, while the highest weekly volume of crude transported by rail was 1,256,382 barrels (52,768,044 gallons) in week four.

Crude Oil by Pipeline Summary

Pipelines exist inland, and may be located near waterbodies and populated areas. Knowing how much and what types of crude oil are transported through pipelines in Washington State is an important part of the overall crude oil movement picture and helps Ecology properly plan for and execute a rapid, aggressive, and well-coordinated response to a spill.

Under the rule,³ 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. 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, Canada	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.

³ Chapter 173-185 WAC

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 and public health and safety through a comprehensive spill prevention, preparedness, and response program.

The rule⁴ specifies Ecology will 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. For the period of January 1, 2017 to March 31, 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.

⁴ Chapter 173-185 WAC

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.⁵

Table 3 below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of January 1, 2017 to March 31, 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	22,555,211
Outbound	1,223,746

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 22,555,211 barrels (947,318,847 gallons) of crude oil were transferred inbound from vessels to facilities, while 1,223,746 barrels (51,397,320 gallons) of crude oil were transferred outbound from facilities to vessels. The total volume from all vessel transfers of crude oil for the 1st quarter of 2017 was 23,778,956 barrels (998,716,167 gallons).

⁵ Chapter 173-185 WAC

A Broad View of Crude Oil Movement

A larger 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 side-by-side.

Figure 2 shows the estimated percentage of crude oil transported by vessel (inbound only), rail, and pipeline for two quarters, covering the period of October 1, 2016 to March 31, 2017*.

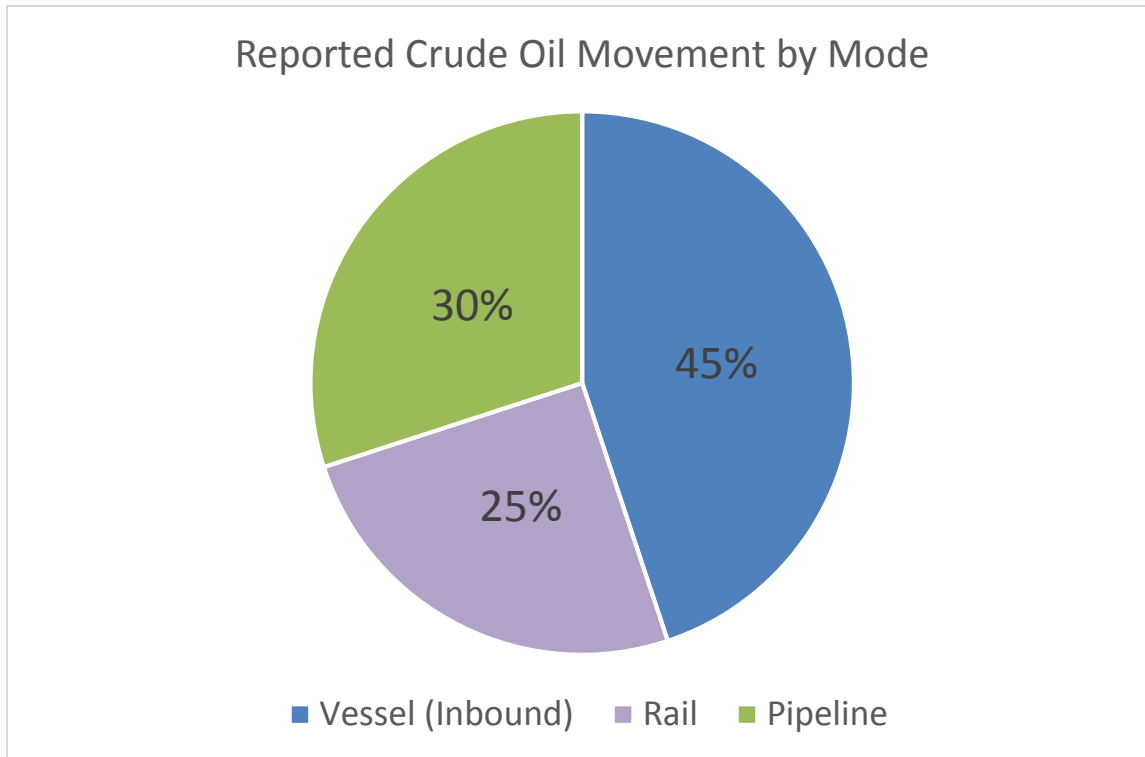


Figure 2: Reported Crude Oil Movement by Mode

**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 March 31, 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 analyze trends and changes over time.

Contact Information

Jack Barfield
Department of Ecology Spills Program
P.O. Box 47600
Olympia, WA 98504-7600
Phone: (360) 407-7483
Email: jack.barfield@ecy.wa.gov

Kevin Truong
Department of Ecology Spills Program
P.O. Box 47600
Olympia, WA 98504-7600
Phone: (360) 407-6950
Email: kevin.truong@ecy.wa.gov

Appendix A – Washington Railroad Routes

Railroad Routes



Appendix B – API Gravity and Crude Oil Types

Information reported by facilities on scheduled crude oil deliveries include 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