



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

# Crude Oil Movement by Rail and Pipeline

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*Quarterly Report: October 1, 2017 through  
December 31, 2017*

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# **Crude Oil Movement by Rail and Pipeline**

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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.<sup>1</sup> 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 October 1, 2017 through December 31, 2017.

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<sup>1</sup> 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 Ecology continues 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 October 1, 2017 through December 31, 2017, representing the 4<sup>th</sup> 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 4<sup>th</sup> quarter of 2017 starting at calendar week 40 and ending at calendar week 53.



**Table 1: Crude Oil Movement by Rail****Calendar Week 40**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	135,241	198
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	501,000	736
4, 5	Alberta	Heavy Crude	60,843	89
5	Alberta	Light Crude	71,500	105
<b>Weekly totals:</b>			<b>1,158,584</b>	<b>1,701</b>

**Calendar Week 41**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	136,502	200
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	286,000	420
1B, 2, 3	Alberta	Heavy Crude	58,603	86
1B, 2, 3	North Dakota	Light Crude	61,190	89
<b>Weekly totals:</b>			<b>867,295</b>	<b>1,272</b>

**Calendar Week 42**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	215,000	316
1B, 2, 3	Alberta	Heavy Crude	114,999	169
5	Alberta	Light Crude	143,000	210
<b>Weekly totals:</b>			<b>862,999</b>	<b>1,268</b>

**Calendar Week 43**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	201,012	295
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	424,500	624
1B, 2, 3	Alberta	Heavy Crude	58,706	86
4, 5	Saskatchewan	Light Crude	57,564	84
<b>Weekly totals:</b>			<b>1,131,782</b>	<b>1,662</b>

**Calendar Week 44**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	203,000	298
1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
1A, 2, 3, 4, 5	North Dakota	Light Crude	284,500	418
1B, 2, 3	Alberta	Heavy Crude	58,000	85
5	Saskatchewan	Light Crude	70,000	102
<b>Weekly totals:</b>			<b>1,070,500</b>	<b>1,572</b>

**Calendar Week 45**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	66,533	97
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	214,500	315
1B, 2, 3	Alberta	Heavy Crude	116,704	171
5	Saskatchewan	Light Crude	70,000	102
<b>Weekly totals:</b>			<b>792,737</b>	<b>1,162</b>

**Calendar Week 46**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	133,739	196
1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
1A, 2, 3, 4, 5	North Dakota	Light Crude	353,500	519
1B, 2, 3	Alberta	Heavy Crude	114,858	168
<b>Weekly totals:</b>			<b>1,057,097</b>	<b>1,552</b>

**Calendar Week 47**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	128,974	189
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	281,500	413
1B, 2, 3	Alberta	Heavy Crude	58,000	85
5	Saskatchewan	Light Crude	13,000	19
<b>Weekly totals:</b>			<b>871,474</b>	<b>1,279</b>

**Calendar Week 48**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	137,583	202
1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
1A, 2, 3, 4, 5	North Dakota	Light Crude	358,500	527
1B, 2, 3	Alberta	Heavy Crude	58,000	85
5	Saskatchewan	Light Crude	195,000	286
<b>Weekly totals:</b>			<b>1,204,083</b>	<b>1,769</b>

**Calendar Week 49**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	134,703	198
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	138,350	203
1B, 2, 3	Alberta	Heavy Crude	117,208	172
5	Saskatchewan	Light Crude	65,000	95
<b>Weekly totals:</b>			<b>780,261</b>	<b>1,145</b>

**Calendar Week 50**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	272,087	400
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	501,000	736
1B, 2, 3	Alberta	Heavy Crude	116,587	171
5	Saskatchewan	Heavy Crude	65,000	95
<b>Weekly totals:</b>			<b>1,344,674</b>	<b>1,975</b>

**Calendar Week 51**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	206,288	303
1A, 2, 3, 4	North Dakota	Light Crude	260,000	382
1A, 2, 3, 4, 5	North Dakota	Light Crude	283,800	417
1B, 2, 3	Alberta	Heavy Crude	119,340	175
<b>Weekly totals:</b>			<b>869,428</b>	<b>1,277</b>

**Calendar Week 52**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	202,984	298
1A, 2, 3, 4	North Dakota	Light Crude	195,000	286
1A, 2, 3, 4, 5	North Dakota	Light Crude	502,000	738
1B, 2, 3	Alberta	Heavy Crude	59,169	87
<b>Weekly totals:</b>			<b>959,153</b>	<b>1,409</b>

**Calendar Week 53**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3, 4	North Dakota	Light Crude	65,000	95
1A, 2, 3, 4, 5	North Dakota	Light Crude	71,500	105
<b>Weekly totals:</b>			<b>136,500</b>	<b>200</b>

\* Week 53 contains only one day of reported ANT volumes due to the dates of the reporting period.

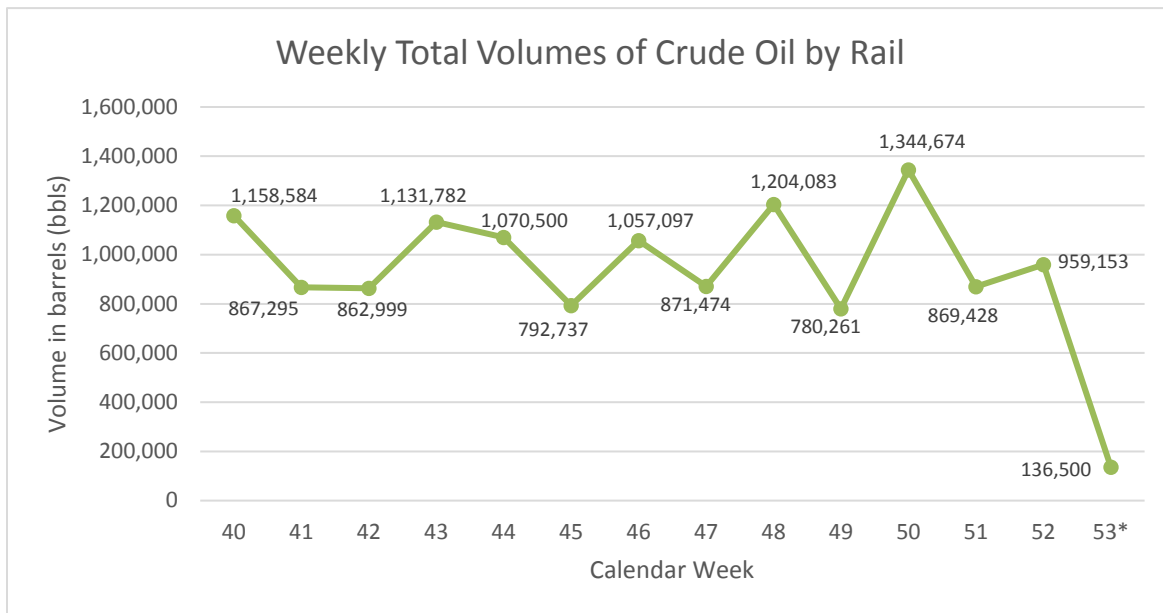
**Note:** The data provided in Table 1 was reported to Ecology by the receiving facility into the ANT database as required by Chapter 173-185 WAC. Ecology cannot confirm the data or verify its accuracy.

**Quarter 4 Total Volume (bbls): 13,106,567**

A summary of the data shows:

- Three regions of origin were reported: Alberta, North Dakota, and Saskatchewan.
- Two types of crude oil were reported: heavy 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 13,106,567 barrels (550,475,814 gallons).
- The average weekly volume of crude oil transported by rail was 1,008,197 barrels (42,344,293 gallons).<sup>2</sup>
- The total number of rail cars moving crude oil by rail was 19,243 cars.
- The average number of rail cars per week moving crude oil by rail was 1,480 cars.<sup>3</sup>
- 9.0% of crude oil transported by rail was heavy crude and 91.0% was light crude.
- North Dakota was the region of origin for 85.8% of crude oil transported by rail. Alberta was the region of origin for 10.1% of crude oil transported by rail, and Saskatchewan was the region of origin for 4.1% of crude oil transported by rail.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 4<sup>th</sup> quarter of 2017.



**Figure 1: Weekly Total Volumes of Crude Oil by Rail for the 4th Quarter of 2017**

\* Week 53 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 780,261 barrels (32,770,962 gallons) in Week 49. The highest weekly volume of crude transported by rail was 1,344,674 barrels (56,476,308 gallons) in Week 50.

<sup>2</sup> The quarterly average was calculated using 13 calendar weeks instead of 14 calendar weeks because Calendar Week 53 contains only one day of reported ANT volumes due to the dates of the reporting period.

<sup>3</sup> The quarterly average was calculated using 13 calendar weeks instead of 14 calendar weeks because Calendar Week 53 contains only one day of reported ANT volumes due to the dates of the reporting period.

# 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.<sup>4</sup> 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 most recent biannual notices from pipelines covered the period from January 1, 2017 through June 30, 2017. [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 Province of Origin	Volume (bbls)
Alberta	29,454,561

*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 July 1, 2017 through December 31, 2017 and must be submitted to Ecology by January 31, 2018.

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<sup>4</sup> 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.<sup>5</sup> For the period of October 1, 2017 through December 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.

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<sup>5</sup> 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.<sup>6</sup>

Table 3 below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of October 1, 2017 through December 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	24,187,493
Outbound	450,643

*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.*

A summary of vessel transfer data for the quarter shows:

- The total volume of crude oil transferred to or from vessels for the 4<sup>th</sup> quarter of 2017 was 24,638,136 barrels (1,034,801,720 gallons).
- The total volume of crude oil transferred inbound from vessels to facilities was 24,187,493 barrels (1,015,874,720 gallons).
- The total volume of crude oil transferred outbound from facilities to vessels was 450,643 barrels (18,927,000 gallons).
- There were 78 total vessel transfers of crude oil (inbound or outbound).
- The average volume of crude oil transferred to or from vessels per week was 1,895,241 barrels (79,600,132 gallons).<sup>7</sup>

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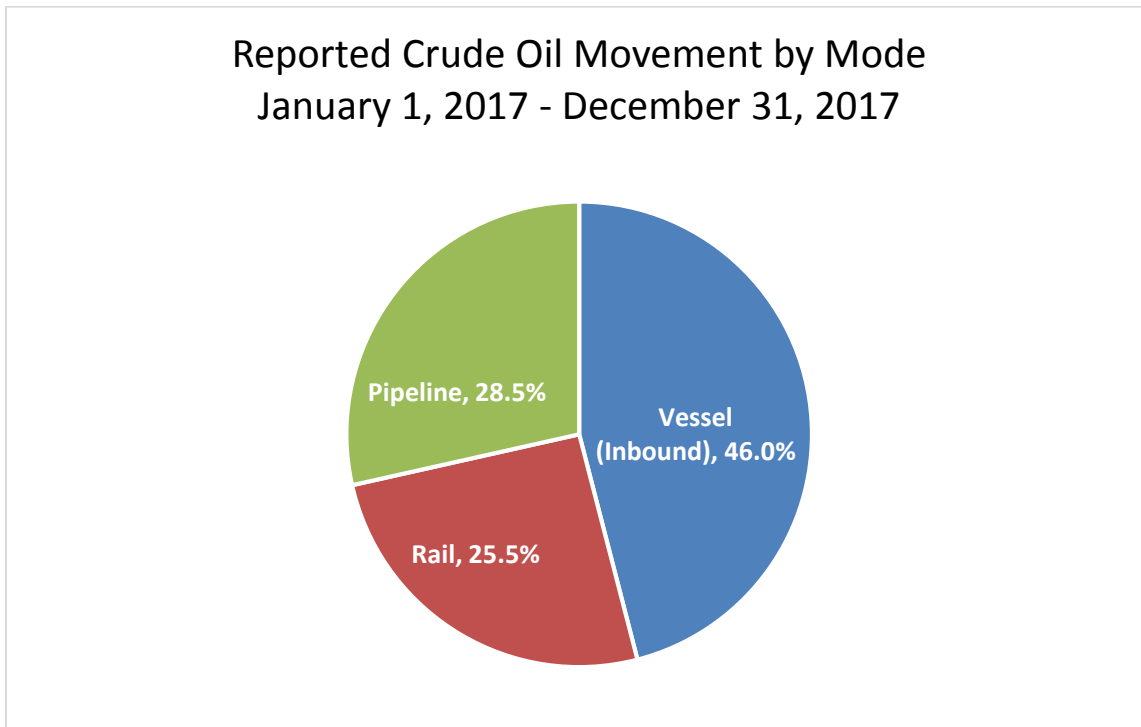
<sup>6</sup> Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

<sup>7</sup> The quarterly average was calculated using 13 calendar weeks instead of 14 calendar weeks because Calendar Week 53 contains only one day of reported ANT volumes due to the dates of the reporting period.

# 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 the last four quarters, covering the period of January 1, 2017 through December 31, 2017.\*



**Figure 2: Reported Crude Oil Movement by Mode**

*\*Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2017 through June 30, 2017. The next biannual notices submitted by pipelines will cover the period from July 1, 2017 through December 31, 2017 and must be submitted to Ecology by January 31, 2018. For Figure 2, Ecology estimated crude oil movement by pipeline for the period from January 1, 2017 through December 31, 2017 based on data provided in previous biannual notices.*

Between January 1, 2017 and December 31, 2017, vessels were responsible for 46.0% of reported crude oil movement into the state, while rail was responsible for 25.5% and pipeline for 28.5%.

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



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# Appendix A – Washington 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