



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

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

---

*Quarterly Report: April 1, 2018 through  
June 30, 2018*

July 2018  
Publication 18-08-011

# Publication and Contact Information

This report is available on the Department of Ecology's website at <https://fortress.wa.gov/ecy/publications/SummaryPages/1808011.html>

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.ecology.wa.gov](http://www.ecology.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

*To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 360-407-7455 or visit <https://ecology.wa.gov/accessibility>. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.*

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

---

*Quarterly Report: April 1, 2018 through June 30, 2018*

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

*This page is purposely left blank.*

# Table of Contents

	<u>Page</u>
List of Figures and Tables.....	ii
Introduction.....	1
Crude Oil by Rail Summary .....	2
Crude Oil by Pipeline Summary .....	8
Crude Oil Spills – Rail and Pipeline.....	9
Crude Oil Movement by Vessel.....	10
An Overview of Crude Oil Movement in Washington.....	11
Contact Information .....	13
Appendix A – Washington Railroad Routes.....	14
Appendix B – API Gravity and Crude Oil Types.....	15

# List of Figures and Tables

Page

## Figures

Figure 1: Weekly Total Volumes of Crude Oil by Rail for the 2nd Quarter of 2018..... 6  
Figure 2: Crude Oil Movement by Route for the 2nd Quarter of 2018 ..... 7  
Figure 3: 12-Month Crude Oil Movement by Mode ..... 11  
Figure 4: Quarterly Crude Oil Movement by Mode ..... 12

## Tables

Table 1: Crude Oil Movement by Rail ..... 3  
Table 2: Crude Oil Movement by Pipeline ..... 8  
Table 3: Crude Oil Movement by Vessel ..... 10  
Table 4: Crude Type by API Gravity..... 15

# 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 April 1, 2018 through June 30, 2018.

---

<sup>1</sup> Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

## 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 April 1, 2018 through June 30, 2018, representing the 2nd quarter of 2018. 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)

Thirteen calendar weeks are reported in the 2nd quarter of 2018 starting at calendar week 14 and ending at calendar week 26.

**Table 1: Crude Oil Movement by Rail****Calendar Week 14**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	136,379	200
1A, 2, 3, 4	North Dakota	Light Crude	464,100	682
1A, 2, 3, 4, 5	North Dakota	Light Crude	641,900	943
1B, 2, 3	Alberta	Medium Crude	123,180	181
<b>Weekly totals:</b>			<b>1,365,559</b>	<b>2,006</b>

**Calendar Week 15**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	265,902	391
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	215,000	316
1B, 2, 3	Alberta	Medium Crude	58,000	85
<b>Weekly totals:</b>			<b>863,902</b>	<b>1,269</b>

**Calendar Week 16**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	329,506	484
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude <sup>2</sup>	71,500	105
1A, 2, 3, 4, 5	North Dakota	Light Crude	69,000	101
1B, 2, 3	Alberta	Medium Crude	118,029	173
<b>Weekly totals:</b>			<b>913,035</b>	<b>1,340</b>

**Calendar Week 17**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	202,981	298
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	142,500	209
1B, 2, 3	Alberta	Medium Crude	59,006	86
5	Saskatchewan	Light Crude	59,000	86
<b>Weekly totals:</b>			<b>788,487</b>	<b>1,156</b>

**Calendar Week 18**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	194,275	285
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	214,000	314
1B, 2, 3	Alberta	Medium Crude	58,612	86
<b>Weekly totals:</b>			<b>791,887</b>	<b>1,162</b>

<sup>2</sup> The crude oil of this particular delivery had an API gravity of 51.0, just outside of the standard range for “light crude” (31.2-50 API).

**Calendar Week 19**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	64,760	95
1A, 2, 3, 4	North Dakota	Light Crude	260,000	382
1A, 2, 3, 4, 5	North Dakota	Light Crude	140,500	206
1B, 2, 3	Alberta	Heavy Crude	118,199	173
<b>Weekly totals:</b>			<b>583,459</b>	<b>856</b>

**Calendar Week 20**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	199,820	293
1A, 2, 3, 4	North Dakota	Light Crude	195,000	286
1A, 2, 3, 4, 5	North Dakota	Light Crude	437,500	643
1B, 2, 3	Alberta	Heavy Crude	117,071	172
<b>Weekly totals:</b>			<b>949,391</b>	<b>1,394</b>

**Calendar Week 21**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	134,320	197
1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
1A, 2, 3, 4, 5	North Dakota	Light Crude	363,500	534
1B, 2, 3	Alberta	Heavy Crude	58,449	85
<b>Weekly totals:</b>			<b>1,011,269</b>	<b>1,485</b>

**Calendar Week 22**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	198,817	292
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	428,100	629
1B, 2, 3	Alberta	Heavy Crude	58,793	86
1B, 2, 3	Alberta	Medium Crude	58,629	86
<b>Weekly totals:</b>			<b>1,069,339</b>	<b>1,570</b>

**Calendar Week 23**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	129,330	190
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	503,500	740
4, 5	Alberta	Heavy Crude	117,935	173
<b>Weekly totals:</b>			<b>1,140,765</b>	<b>1,676</b>

**Calendar Week 24**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	130,615	192
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	650,000	955
1B, 2, 3	Alberta	Heavy Crude	58,880	86
<b>Weekly totals:</b>			<b>1,229,495</b>	<b>1,806</b>

**Calendar Week 25**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	131,768	193
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	360,500	530
1B, 2, 3	Alberta	Heavy Crude	59,028	86
4, 5	Alberta	Heavy Crude	58,769	86
<b>Weekly totals:</b>			<b>935,065</b>	<b>1,372</b>

**Calendar Week 26**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	195,734	287
1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
1A, 2, 3, 4, 5	North Dakota	Light Crude	654,500	962
1B, 2, 3	Alberta	Heavy Crude	57,151	84
<b>Weekly totals:</b>			<b>1,362,385</b>	<b>2,002</b>

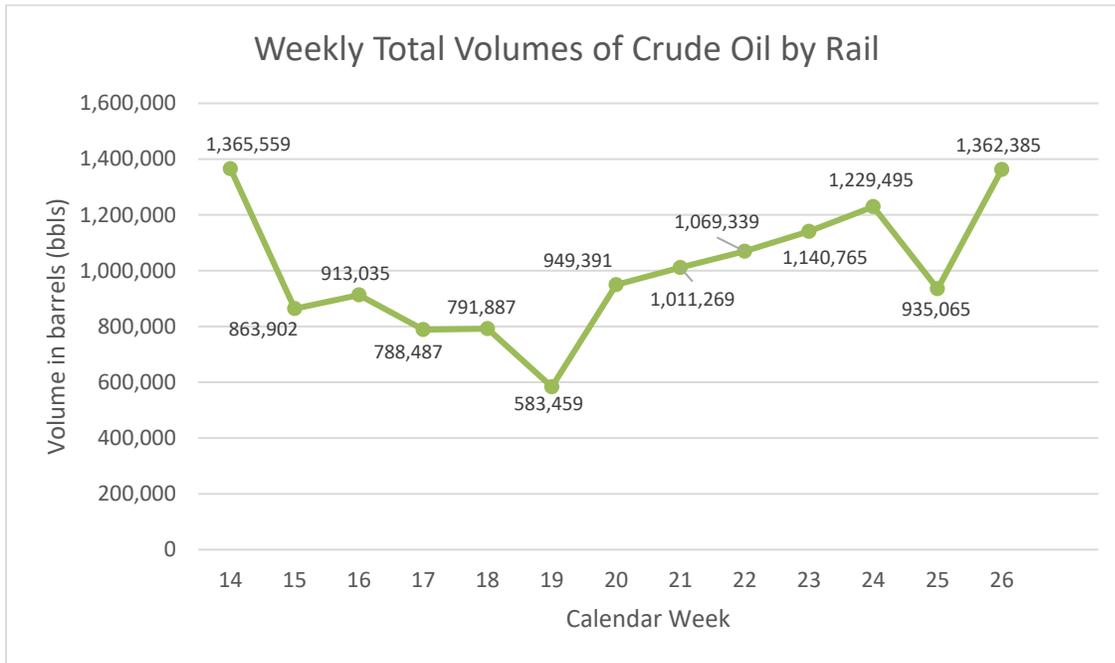
*Note: The data provided in Table 1 was reported to Ecology by the receiving facility into the ANT database as required by Chapter 173-185 WAC. Ecology cannot confirm the data or verify its accuracy.*

**2018 Quarter 2 Total Volume (bbls): 13,004,038**

A summary of the data shows:

- Three regions of origin were reported: North Dakota, Alberta, and Saskatchewan.
- 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 13,004,038 barrels (546,169,596 gallons).
- The average weekly volume of crude oil transported by rail was 1,000,311 barrels (43,013,046 gallons).
- The total number of rail cars moving crude oil by rail was 19,094 cars.
- The average number of rail cars per week moving crude oil by rail was 1,469 cars.
- 90.9% of crude oil transported by rail was light crude, 5.4% was heavy crude, and 3.7% was medium crude.
- North Dakota was the region of origin for 90.5% of crude oil transported by rail. Alberta was the region of origin for 9.1% of crude oil transported by rail, and Saskatchewan was the region of origin for 0.5% 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 2018.



**Figure 1: Weekly Total Volumes of Crude Oil by Rail for the 2nd Quarter of 2018**

The lowest weekly volume was 583,459 barrels (24,505,278 gallons) in Week 19. The highest weekly volume of crude transported by rail was 1,365,559 barrels (57,353,478 gallons) in Week 14.

Figure 2 displays crude transported by rail by route for the 2nd quarter of 2018.

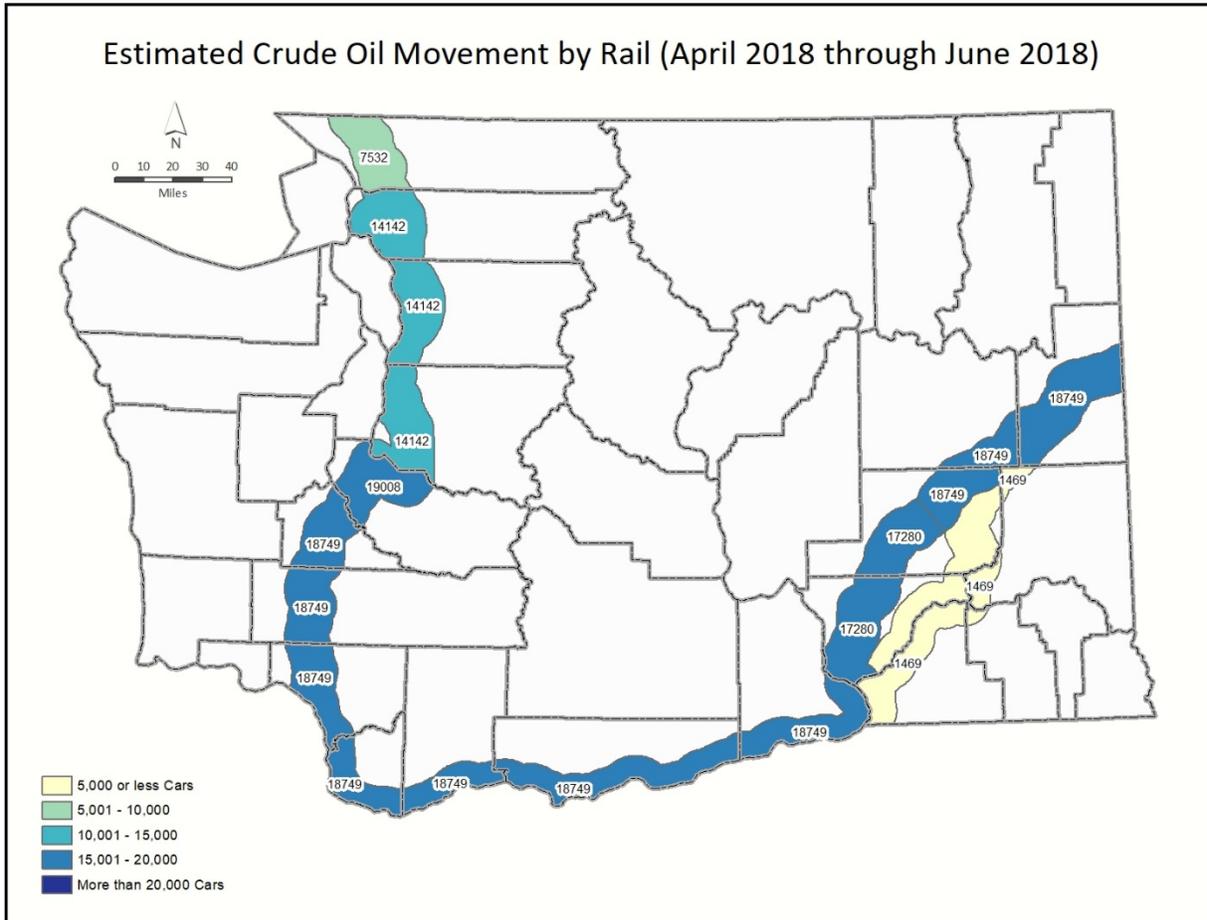


Figure 2: Crude Oil Movement by Route for the 2nd Quarter of 2018

# 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>3</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, 2018 through June 30, 2018. [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**

Period	State or Province of Origin	Volume (bbls)
January 1, 2018 – June 30, 2018	Alberta	29,581,760

*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, 2018 through December 31, 2018 and must be submitted to Ecology by January 31, 2019.

---

<sup>3</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 waters of the state during the transport and delivery of crude oil by rail and pipeline in each quarterly report.<sup>4</sup> For the period of April 1, 2018 through June 30, 2018, 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.

---

<sup>4</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>5</sup>

**Table 3** below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of April 1, 2018 through June 30, 2018. 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	17,494,030
Outbound	3,162,702

*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 2nd quarter of 2018 was 20,656,732 barrels (867,582,762 gallons).
- The total volume of crude oil transferred inbound from vessels to facilities was 17,494,030 barrels (734,749,296 gallons).
- The total volume of crude oil transferred outbound from facilities to vessels was 3,162,702 barrels (132,833,466 gallons).
- There were 82 total vessel transfers of crude oil (inbound or outbound).
- The average volume of crude oil transferred to or from vessels per week was 1,588,979 barrels (66,737,136 gallons).
- The 2nd quarter vessel inbound volume decreased from 24,135,617 barrels (1,013,695,930 gallons) in the 1st quarter. At this point in time, there is not enough data to establish an actual declining trend.

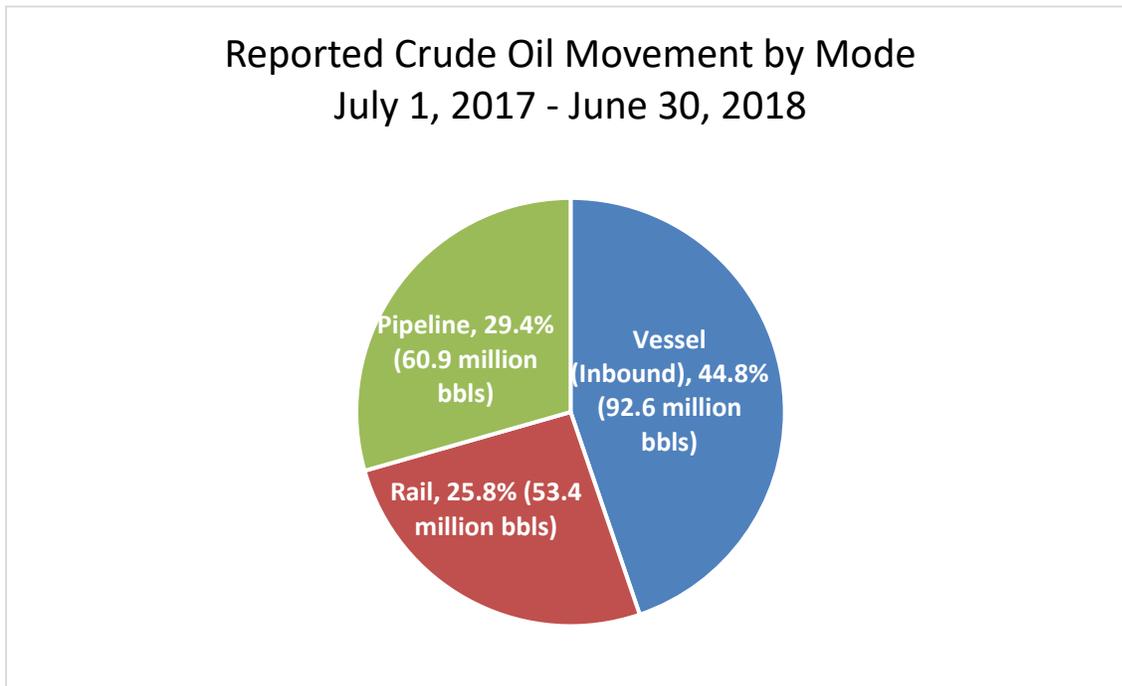
---

<sup>5</sup> 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 3 shows the estimated percentage of crude oil transported by vessel (inbound only), rail, and pipeline for the last four quarters, covering the period of July 1, 2017 through June 30, 2018.\*

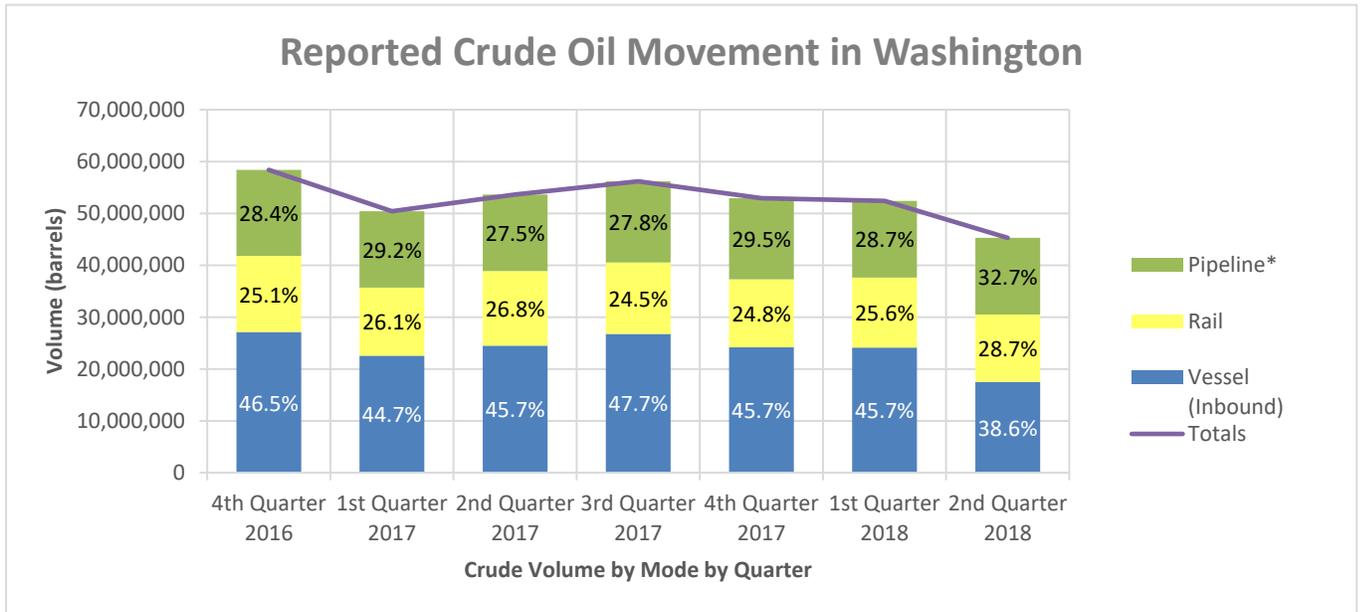


**Figure 3: 12-Month Crude Oil Movement by Mode**

*\*Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2018 through June 30, 2018. The next biannual notices submitted by pipelines will cover the period from July 1, 2018, through December 31, 2018, and must be submitted to Ecology by January 31, 2019.*

Between July 1, 2017 and June 30, 2018, vessels were responsible for 44.8% of reported crude oil movement into the state, while rail was responsible for 25.8% and pipeline for 29.4%.

Figure 4 shows crude oil movement by mode for each quarter that rail and pipeline crude oil data has been collected, covering the period of October 1, 2016 through June 30, 2018.



	4th Quarter 2016	1st Quarter 2017	2nd Quarter 2017	3rd Quarter 2017	4th Quarter 2017	1st Quarter 2018	2nd Quarter 2018
<b>Vessel (Inbound)</b>	27,148,953	22,555,211	24,505,437	26,776,022	24,187,493	24,135,617	17,494,030
<b>Rail</b>	14,637,205	13,142,580	14,394,243	13,763,218	13,106,567	13,498,971	13,004,038
<b>Pipeline*</b>	16,606,848	14,727,281	14,727,281	15,636,739	15,636,739	14,790,880	14,790,880
<b>Totals</b>	58,393,006	50,425,072	53,626,960	56,175,979	52,930,799	52,425,468	45,288,948

\*Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2018, through June 30, 2018. For previous quarters, Ecology estimated crude oil movement by pipeline for the period based on data provided in previous biannual notices.

**Figure 4: Quarterly Crude Oil Movement by Mode**

Ecology will continue to receive information about crude oil movement and use the data to summarize 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](mailto: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](mailto:kevin.truong@ecy.wa.gov)

# 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