



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

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

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*Quarterly Report: July 1, 2018 through  
September 30, 2018*

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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 July 1, 2018 through September 30, 2018.

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<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 July 1, 2018 through September 30, 2018, representing the 3rd 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)

Fourteen calendar weeks are reported in the 3rd quarter of 2018 starting at calendar week 27 and ending at calendar week 40.



**Table 1: Crude oil movement by rail**

Calendar week #	Route segments	Region of origin	Crude type	Volume (bbls)	Est # cars
<b>27</b>	1A, 2, 3	North Dakota	Light Crude	129,358	190
	1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
	1A, 2, 3, 4, 5	North Dakota	Light Crude	427,500	628
	1B, 2, 3	Alberta	Heavy Crude	117,840	173
	5	Saskatchewan	Light Crude	66,000	97
Week 27 totals			<b>1,065,698</b>	<b>1,565</b>	
<b>28</b>	1A, 2, 3	North Dakota	Light Crude	260,502	383
	1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
	1A, 2, 3, 4, 5	North Dakota	Light Crude	497,000	730
	Week 28 totals			<b>1,212,502</b>	<b>1,782</b>
<b>29</b>	1A, 2, 3	North Dakota	Light Crude	65,450	96
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	568,000	835
	1B, 2, 3	Alberta	Heavy Crude	118,195	173
	Week 29 totals			<b>1,141,645</b>	<b>1,677</b>
<b>30</b>	1A, 2, 3	North Dakota	Light Crude	198,950	292
	1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
	1A, 2, 3, 4, 5	North Dakota	Light Crude	493,000	725
	1B, 2, 3	Alberta	Heavy Crude	59,009	86
	5	Saskatchewan	Light Crude	69,000	101
Week 30 totals			<b>1,144,959</b>	<b>1,681</b>	
<b>31</b>	1A, 2, 3	North Dakota	Light Crude	197,759	290
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	848,500	1,247
	1B, 2, 3	Alberta	Heavy Crude	58,881	86
	Week 31 totals			<b>1,495,140</b>	<b>2,196</b>
<b>32</b>	1A, 2, 3	North Dakota	Light Crude	135,865	199
	1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
	1A, 2, 3, 4, 5	North Dakota	Light Crude	356,000	523
	1B, 2, 3	Alberta	Heavy Crude	116,655	171
	5	Saskatchewan	Light Crude	69,000	101
Week 32 totals			<b>1,002,520</b>	<b>1,471</b>	
<b>33</b>	1A, 2, 3	North Dakota	Light Crude	266,812	392
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	569,000	836
	1B, 2, 3	Alberta	Heavy Crude	58,539	86
	Week 33 totals			<b>1,284,351</b>	<b>1,887</b>

Calendar week #	Route segments	Region of origin	Crude type	Volume (bbls)	Est # cars
<b>34</b>	1A, 2, 3	North Dakota	Light Crude	198,552	291
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	637,000	936
	1B, 2, 3	Alberta	Heavy Crude	59,059	86
Week 34 totals			<b>1,284,611</b>	<b>1,886</b>	
<b>35</b>	1A, 2, 3	North Dakota	Light Crude	202,130	297
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	638,000	938
	1B, 2, 3	Alberta	Heavy Crude	116,649	171
	1B, 2, 3, 4, 5	North Dakota	Light Crude	71,500	105
Week 35 totals			<b>1,418,279</b>	<b>2,084</b>	
<b>36</b>	1A, 2, 3	North Dakota	Light Crude	265,103	389
	1A, 2, 3, 4	North Dakota	Light Crude	195,000	286
	1A, 2, 3, 4, 5	North Dakota	Light Crude	708,500	1,041
	1B, 2, 3	Alberta	Heavy Crude	58,982	86
Week 36 totals			<b>1,227,585</b>	<b>1,802</b>	
<b>37</b>	1A, 2, 3	North Dakota	Light Crude	133,600	196
	1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
	1A, 2, 3, 4, 5	North Dakota	Light Crude	774,500	1,138
	1B, 2, 3	Alberta	Heavy Crude	57,996	85
Week 37 totals			<b>1,356,096</b>	<b>1,992</b>	
<b>38</b>	1A, 2, 3	North Dakota	Light Crude	198,861	292
	1A, 2, 3, 4	North Dakota	Light Crude	260,000	382
	1A, 2, 3, 4, 5	North Dakota	Light Crude	638,000	938
	1B, 2, 3	Alberta	Heavy Crude	118,230	173
Week 38 totals			<b>1,215,091</b>	<b>1,785</b>	
<b>39</b>	1A, 2, 3	North Dakota	Light Crude	260,621	383
	1A, 2, 3, 4	North Dakota	Light Crude	65,000	95
	1A, 2, 3, 4, 5	North Dakota	Light Crude	776,000	1,141
	1B, 2, 3	Alberta	Heavy Crude	58,060	85
Week 39 totals			<b>1,159,681</b>	<b>1,704</b>	
<b>40</b>	1A, 2, 3	North Dakota	Light Crude	68,256	100
	1A, 2, 3, 4	North Dakota	Light Crude	65,000	95
	1A, 2, 3, 4, 5	North Dakota	Light Crude	71,500	105
Week 40 totals			<b>204,756</b>	<b>300</b>	
<b>Totals for quarter</b>				<b>16,212,914</b>	<b>23,812</b>

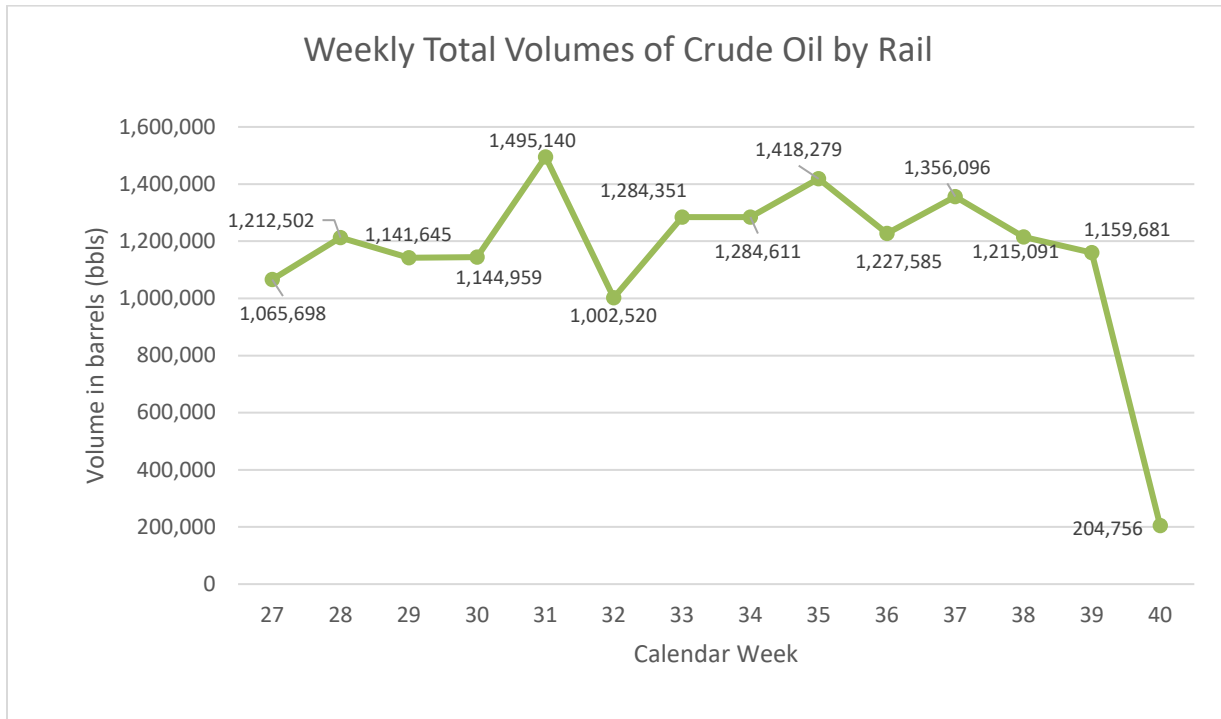
*Note: The data provided in Table 1 was reported to Ecology by the receiving facility into the ANT database as required by Chapter 173-185 WAC. Ecology cannot confirm the data or verify its accuracy.*

**2018 Quarter 3 total volume (bbls): 16,212,914**

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 16,212,914 barrels (680,942,388 gallons).
- The average weekly volume of crude oil transported by rail was 1,231,397 barrels (51,718,664 gallons). (Excludes Week 40, which consists of one day only.)
- The total number of rail cars moving crude oil by rail was 23,812 cars.
- The average number of rail cars per week moving crude oil by rail was 1,809 cars.
- 93.8% of crude oil transported by rail was light crude and 6.2% was heavy crude.
- North Dakota was the region of origin for 92.6% of crude oil transported by rail. Alberta was the region of origin for 6.1% of crude oil transported by rail, and Saskatchewan was the region of origin for 1.3% of crude oil transported by rail.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 3rd quarter of 2018.



**Figure 1: Weekly total volumes of crude oil by rail for the 3rd Quarter of 2018 (Week 40 consists of only one day of reported ANT volumes due to the dates of the reporting period)**

The lowest weekly volume was 1,002,520 barrels (42,105,840 gallons) in Week 32. The highest weekly volume of crude transported by rail was 1,495,140 barrels (62,795,880 gallons) in Week 31.

Figure 2 displays crude transported by rail by route for the 3rd quarter of 2018.

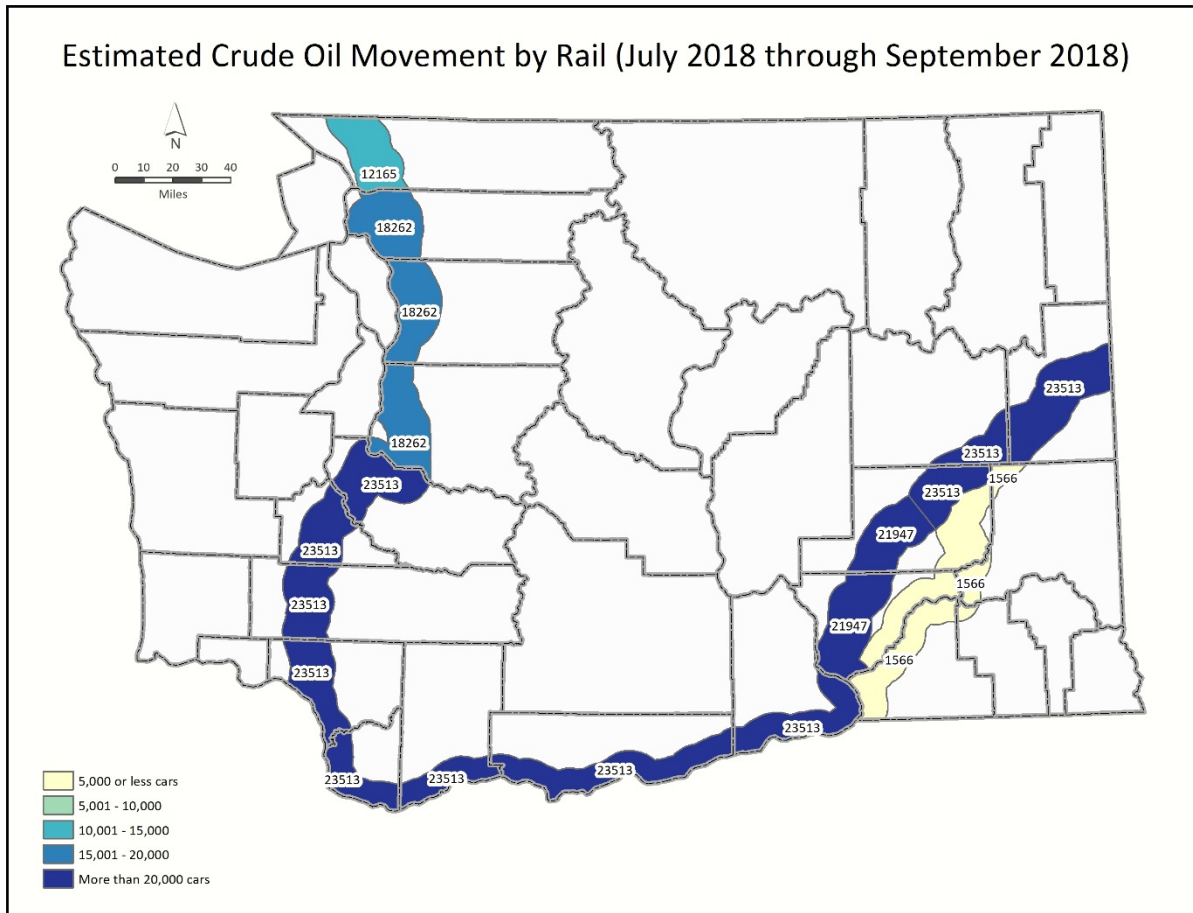


Figure 2: Crude oil movement by route for the 3rd Quarter of 2018

# 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>2</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.

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<sup>2</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>3</sup> For the period of July 1, 2018 through September 30, 2018, zero crude oil spills to the environment by rail or pipeline 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>3</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>4</sup>

Table 3 below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of July 1, 2018 through September 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)	Volume (gallons)
Inbound	27,230,515	1,143,681,612
Outbound	342,489	14,384,520
<b>Total</b>	<b>27,573,004</b>	<b>1,158,066,132</b>

*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 there were 87 total vessel transfers of crude oil (inbound or outbound).

The average volume of crude oil transferred to or from vessels per week was 1,969,500 barrels (73,833,888 gallons).

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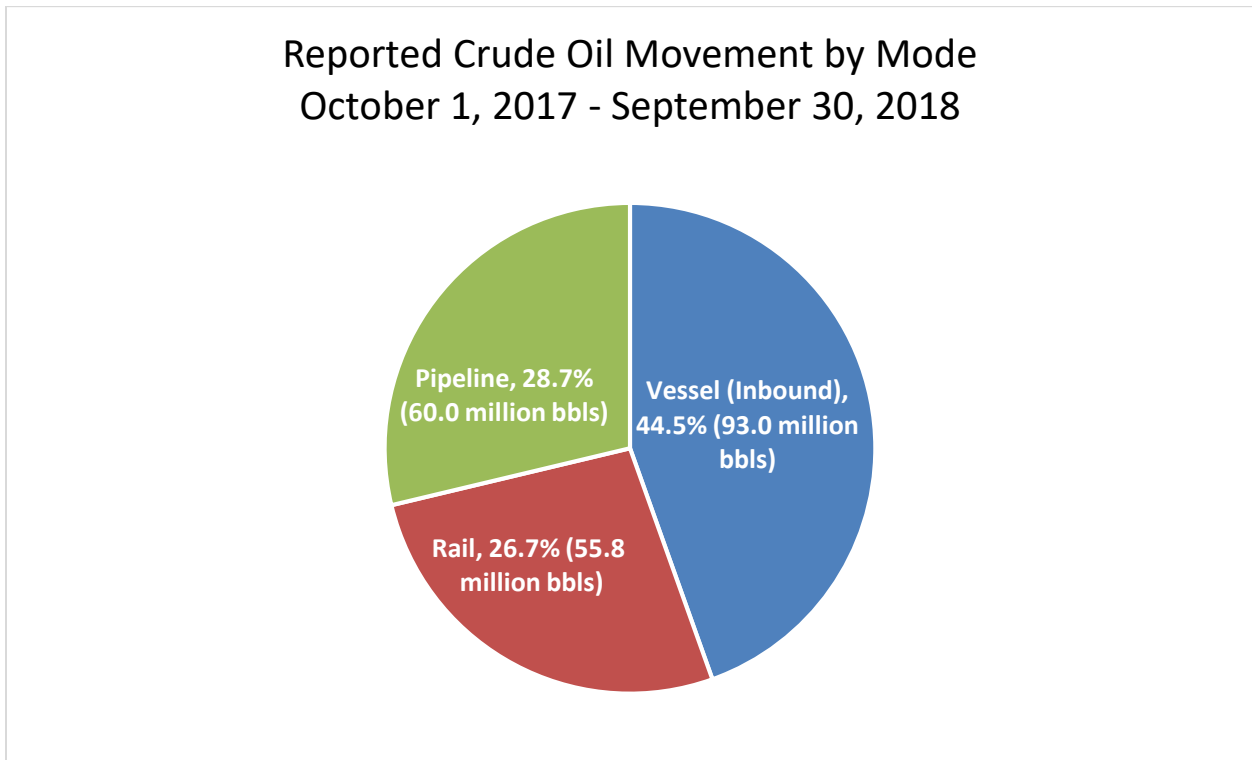
<sup>4</sup> Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification



# 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 October 1, 2017 through September 30, 2018.<sup>5</sup>



**Figure 3: 12-month crude oil movement by mode**

Between October 1, 2017 and September 30, 2018, vessels were responsible for 44.5% of reported crude oil movement into the state, while rail was responsible for 26.7% and pipeline for 28.7%.

<sup>5</sup> 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.

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 September 30, 2018.

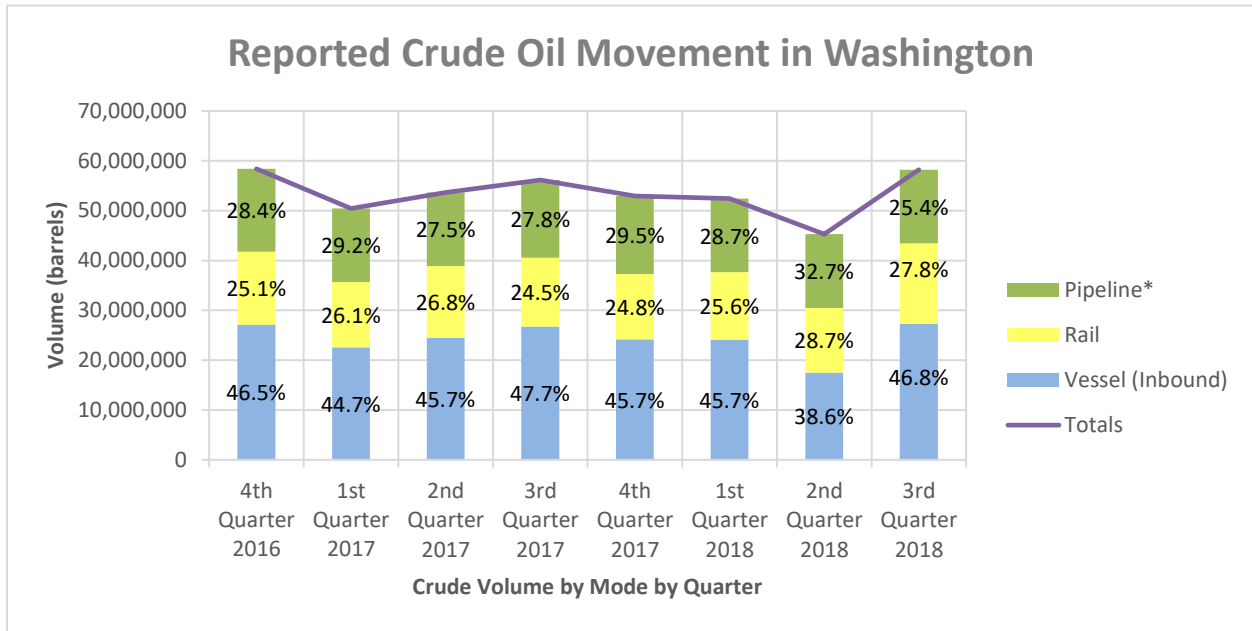


Figure 4: Quarterly crude oil movement by mode, October 2016–September 2018

\*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.

Table 4: Quarterly crude oil movement by mode, October 2016–September 2018

Mode and quantity	4th Quarter 2016	1st Quarter 2017	2nd Quarter 2017	3rd Quarter 2017	4th Quarter 2017	1st Quarter 2018	2nd Quarter 2018	3rd Quarter 2018
Vessel (Inbound), % of total	46.5%	44.7%	45.7%	47.7%	45.7%	46.0%	38.6%	46.8%
Vessel (Inbound), volume in barrels	27,148,953	22,555,211	24,505,437	26,776,022	24,187,493	24,135,617	17,494,030	27,230,515
Rail, % of total	25.1%	26.1%	26.8%	24.5%	24.8%	25.7%	28.7%	27.8%
Rail, volume in barrels	14,637,205	13,142,580	14,394,243	13,763,218	13,106,567	13,498,971	13,004,038	16,212,914
Pipeline, % of total*	28.4%	29.2%	27.5%	27.8%	29.5%	28.2%	32.7%	25.4%
Pipeline, volume in barrels*	16,606,848	14,727,281	14,727,281	15,636,739	15,636,739	14,790,880	14,790,880	14,790,880

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

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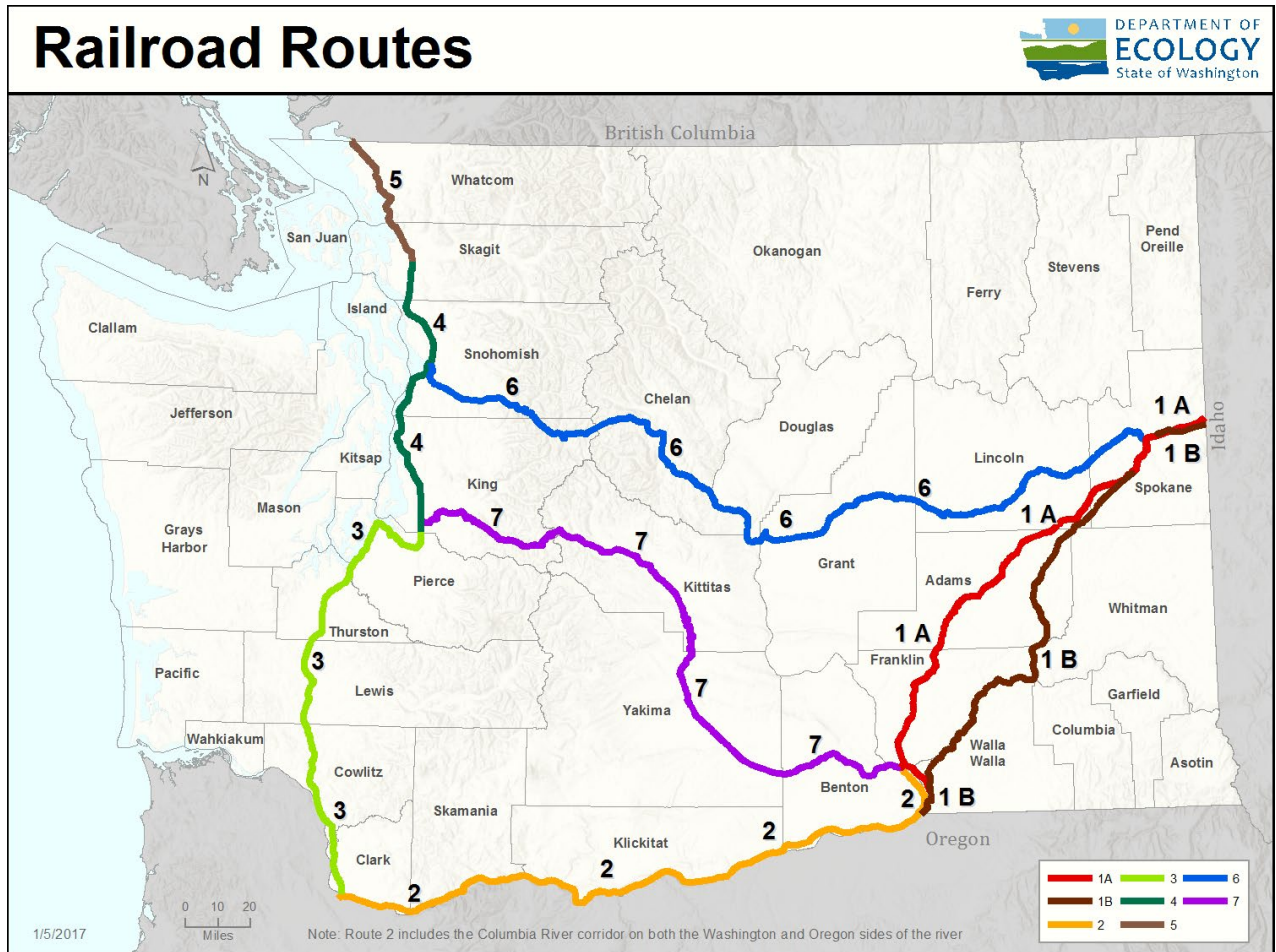
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# Appendix A – Washington Railroad Routes



## 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 5: 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