



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

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

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*Quarterly Report: April 1, 2022, through  
June 30, 2022*

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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 April 1, 2022, through June 30, 2022.

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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 the gravity, sulfur content, and vapor pressure 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 and sulfur content definitions 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, 2022, through June 30, 2022, representing the 2<sup>nd</sup> Quarter of 2022. 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 (combining API gravity range and sulfur content)
- Route volume
- Estimated number of railcars per route delivering crude oil (assumes each car holds 680 bbls)

Fourteen calendar weeks are reported in the 2<sup>nd</sup> Quarter of 2022, starting at calendar week 14 and ending at calendar week 27.



**Table 1: Crude oil movement by rail****Calendar week 14**

Week 14 consists of only two days of reported ANT volumes due to the dates of the reporting period.

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	203,323	299
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	69,420	102
5	Alberta	Light Sweet Crude	65,742	96
<b>Weekly totals</b>			<b>338,485</b>	<b>497</b>

**Calendar week 15**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	142,284	209
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	355,145	522
4, 5	British Columbia	Heavy Sour Crude	119,332	175
5	Alberta	Light Sweet Crude	195,714	287
<b>Weekly totals</b>			<b>812,475</b>	<b>1,193</b>

**Calendar week 16**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	345,668	508
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	288,040	423
4, 5	British Columbia	Heavy Sour Crude	60,157	88
4, 5	British Columbia	Medium Sour Crude	59,040	86
5	Alberta	Light Sweet Crude	133,012	195
<b>Weekly totals</b>			<b>885,917</b>	<b>1,300</b>

**Calendar week 17**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	141,474	208
4, 5	British Columbia	Medium Sour Crude	59,281	87
<b>Weekly totals</b>			<b>200,755</b>	<b>295</b>

**Calendar week 18**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	343,509	505
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	286,225	420
4, 5	British Columbia	Heavy Sour Crude	59,973	88
5	Alberta	Light Sweet Crude	65,849	96
<b>Weekly totals</b>			<b>755,556</b>	<b>1,109</b>

**Calendar week 19**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	214,196	314
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	278,929	410
4, 5	British Columbia	Heavy Sour Crude	117,037	172
4, 5	British Columbia	Medium Sour Crude	60,197	88
5	Alberta	Light Sweet Crude	66,289	97
<b>Weekly totals</b>			<b>736,648</b>	<b>1,081</b>

**Calendar week 20**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	203,577	299
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	282,944	416
4, 5	British Columbia	Heavy Sour Crude	59,292	87
5	Alberta	Light Sweet Crude	198,345	291
<b>Weekly totals</b>			<b>744,158</b>	<b>1,093</b>

**Calendar week 21**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	142,876	210
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	213,982	314
4, 5	British Columbia	Heavy Sour Crude	59,040	86
5	Alberta	Light Sweet Crude	198,151	291
<b>Weekly totals</b>			<b>614,049</b>	<b>901</b>

**Calendar week 22**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	274,868	404
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	429,934	632
4, 5	British Columbia	Heavy Sour Crude	118,865	174
5	Alberta	Light Sweet Crude	197,608	290
<b>Weekly totals</b>			<b>1,021,275</b>	<b>1,500</b>

**Calendar week 23**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	132,435	194
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	284,078	417
4, 5	British Columbia	Heavy Sour Crude	119,144	175
5	Alberta	Light Sweet Crude	198,251	291
<b>Weekly totals</b>			<b>733,908</b>	<b>1,077</b>

**Calendar week 24**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	346,135	509
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	280,610	412
4, 5	British Columbia	Heavy Sour Crude	117,596	172
5	Alberta	Light Sweet Crude	199,679	293
<b>Weekly totals</b>			<b>944,020</b>	<b>1,386</b>

**Calendar week 25**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	141,941	208
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	495,774	729
4, 5	British Columbia	Heavy Sour Crude	119,141	175
5	Alberta	Light Sweet Crude	266,524	391
<b>Weekly totals</b>			<b>1,023,380</b>	<b>1,503</b>

**Calendar week 26**

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	203,185	298
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	426,098	626
4, 5	British Columbia	Heavy Sour Crude	58,529	86
5	Alberta	Light Sweet Crude	199,378	293
<b>Weekly totals</b>			<b>887,190</b>	<b>1,303</b>

**Calendar week 27**

Week 27 consists of only four days of reported ANT volumes due to the dates of the reporting period.

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	71,044	104
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	72,381	106
4, 5	British Columbia	Heavy Sour Crude	60,469	88
5	Alberta	Light Sweet Crude	132,459	194
<b>Weekly totals</b>			<b>336,353</b>	<b>492</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.*

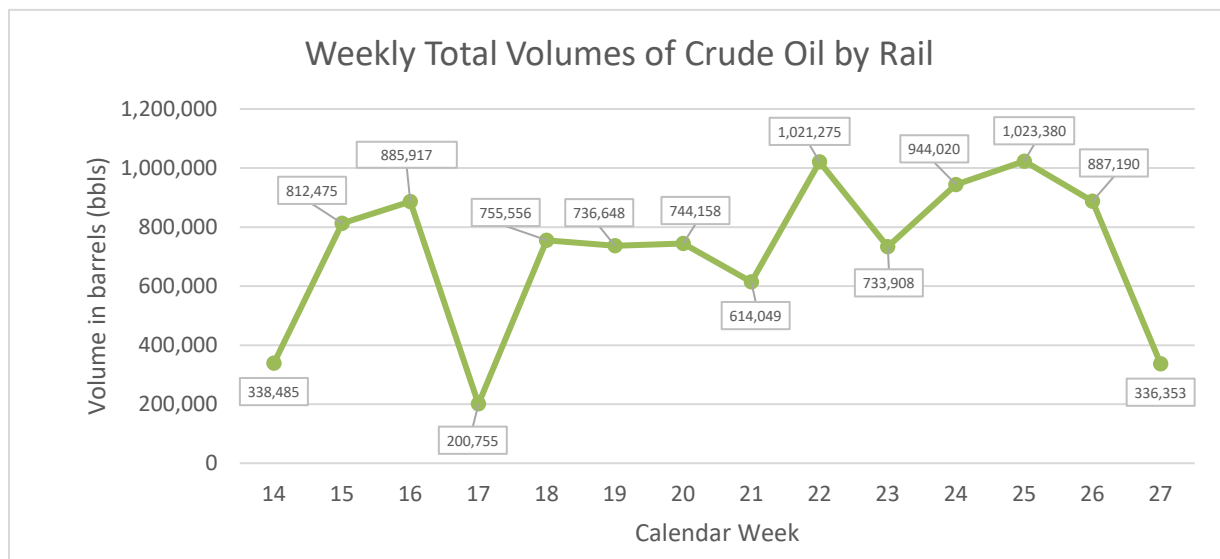
**2022 Quarter 2 total volume (bbls): 10,034,169**

A summary of the data shows:

- Three regions of origin were reported: North Dakota, Alberta, and British Columbia.
- Three types of crude oil were reported: light, heavy, and medium.
- Routes 1A and 2 through 5 were used to transport crude by rail.
- The total volume of crude oil transported by rail during the quarter was 10,034,169 barrels (421,435,098 gallons).
- The average weekly volume of crude oil transported by rail was 771,859 barrels (32,418,084 gallons).

- The total number of rail cars moving crude oil by rail was 14,730 cars.
- The average number of rail cars per week moving crude oil by rail was 1,133 cars.
- 87.57 percent of crude oil transported by rail was light crude.  
1.78 percent of crude oil transported by rail was medium crude.  
10.65 percent of crude rail transported by rail was heavy crude.
- 87.57 percent of crude oil transported by rail was sweet crude.  
12.43 percent of crude oil transported by rail was sour crude.
- North Dakota was the region of origin for 66.47 percent of crude oil transported by rail.  
Alberta was the region of origin for 21.10 percent of crude oil transported by rail.  
British Columbia was the region of origin for 12.43 percent of crude oil transported by rail.
- Crude oil originating in North Dakota had reported vapor pressure ranging from 4.6 to 11.8 pounds per square inch.  
Crude oil originating in Alberta had reported vapor pressure ranging from 10.4 to 13.0 pounds per square inch.  
Crude oil originating in British Columbia had reported vapor pressure ranging from 7.0 to 11.2 pounds per square inch.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 2<sup>nd</sup> Quarter of 2022.



*Note: Week 14 consists of only 2 days of reported ANT volumes due to the dates of the reporting period. Week 17 consists of only 5 days of reported ANT volumes due to the dates of the reporting period.*

**Figure 1: Weekly total volumes of crude oil by rail for the 2<sup>nd</sup> Quarter of 2022**

The lowest weekly volume was 200,755 barrels (8,431,710 gallons) in Week 17. The highest weekly volume of crude transported by rail was 1,023,380 barrels (42,981,960 gallons) in Week 25.

Figure 2 displays crude transported by rail, by route, for the 2<sup>nd</sup> Quarter of 2022.

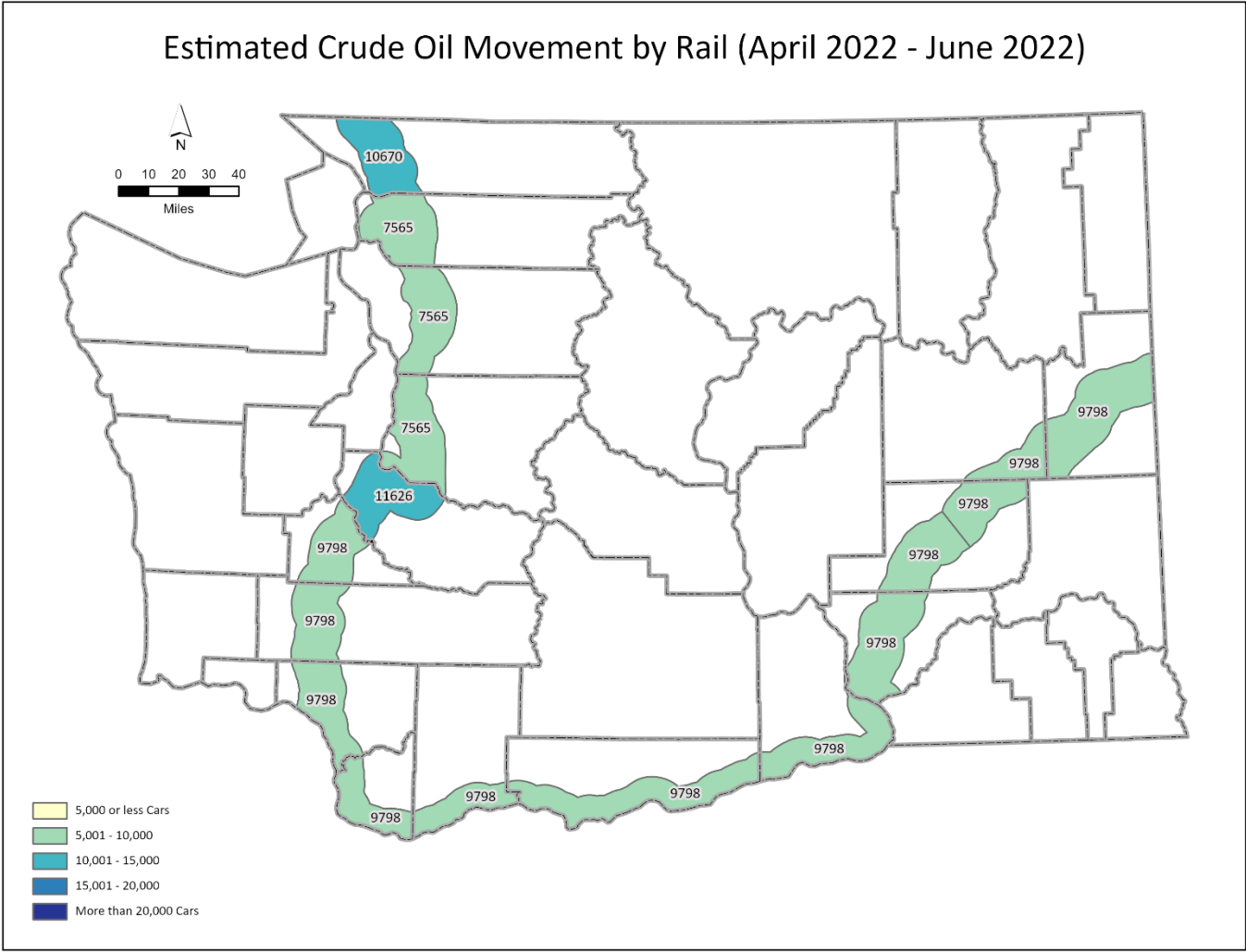


Figure 2: Crude oil movement by route for the 2<sup>nd</sup> Quarter of 2022

## 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, 2022, through June 30, 2022. 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/Province of Origin	Mean API Gravity & Range	Sulfur Content	Volume (bbls)
January 1, 2022 – June 30, 2022	Alberta	23.1 (Medium)	Sour (>0.5%)	272,337
January 1, 2022 – June 30, 2022	Alberta	22.1 (Heavy)	Sour (>0.5%)	4,730,517
January 1, 2022 – June 30, 2022	Alberta	41.2 (Light)	Sour (>0.5%)	9,807,615
January 1, 2022 – June 30, 2022	Alberta	37.5 (Light)	Sweet (≤0.5%)	20,989,306

*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, 2022 through December 31, 2022 and must be submitted to Ecology by January 31, 2023.

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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 April 1, 2022, through June 30, 2022, 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.

## 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 April 1, 2022, through June 30, 2022. 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	22,038,785	925,628,970
Outbound	501,000	21,042,000
<b>Total</b>	<b>22,539,785</b>	<b>946,670,970</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 56 total vessel transfers of crude oil (inbound or outbound).
- The average volume of crude oil transferred to or from vessels per week was 1,733,830 barrels (72,820,844 gallons).

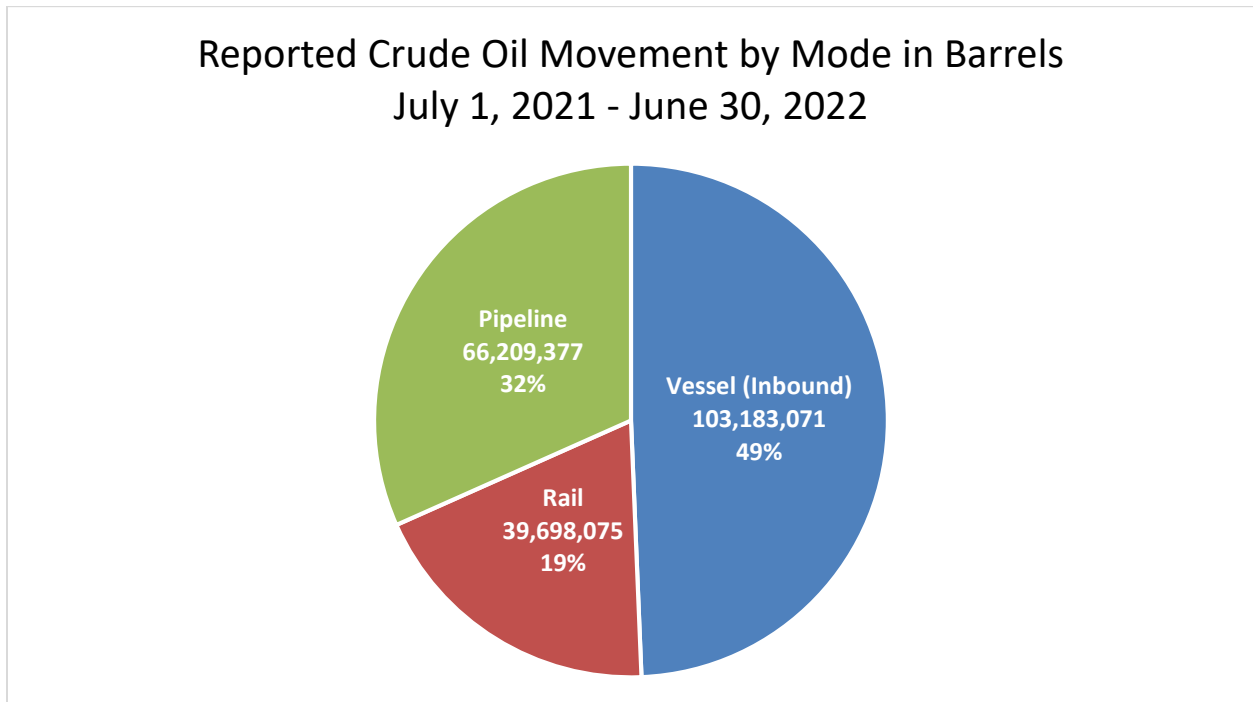
<sup>3</sup> Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

<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 July 1, 2021, through June 30, 2022.<sup>5</sup>



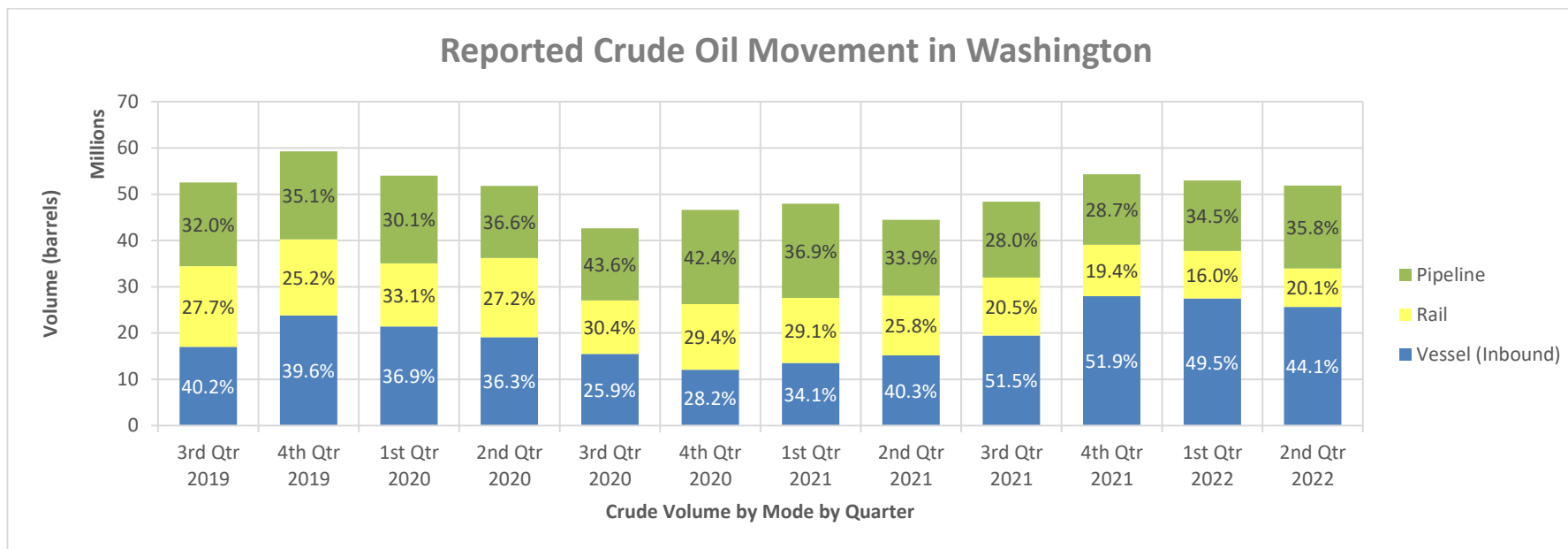
**Figure 3: 12-month crude oil movement by mode**

Between July 1, 2021 and June 30, 2022, vessels were responsible for 49 percent of reported crude oil movement into the state, rail was responsible for 19 percent, and pipeline for 32 percent.

<sup>5</sup> The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2022, through June 30, 2022. The next biannual notices submitted by pipelines will cover the period from July 1, 2022, through December 31, 2022, and must be submitted to Ecology by January 31, 2023.



Figure 4 shows crude oil movement, by mode, covering the period of July 1, 2019, through June 30, 2022.



Mode	3 <sup>rd</sup> Qtr 2019	4 <sup>th</sup> Qtr 2019	1 <sup>st</sup> Qtr 2020	2 <sup>nd</sup> Qtr 2020	3 <sup>rd</sup> Qtr 2020	4 <sup>th</sup> Qtr 2020	1 <sup>st</sup> Qtr 2021	2 <sup>nd</sup> Qtr 2021	3 <sup>rd</sup> Qtr 2021	4 <sup>th</sup> Qtr 2021	1 <sup>st</sup> Qtr 2022	2 <sup>nd</sup> Qtr 2022
Vessel (Inbound)	40.2%	39.6%	36.9%	36.3%	25.9%	28.2%	34.1%	40.3%	51.5%	51.9%	49.5%	44.1%
Rail	27.7%	25.2%	33.1%	27.2%	30.4%	29.4%	29.1%	25.8%	20.5%	19.4%	16.0%	20.1%
Pipeline	32.0%	35.1%	30.1%	36.6%	43.6%	42.4%	36.9%	33.9%	28.0%	28.7%	34.5%	35.8%

**Figure 4: Quarterly crude oil movement by mode, July 2019 – June 2022**

*\*Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2022, through June 30, 2022.*

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

## Contact Information

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# Appendix A – Washington Railroad Routes

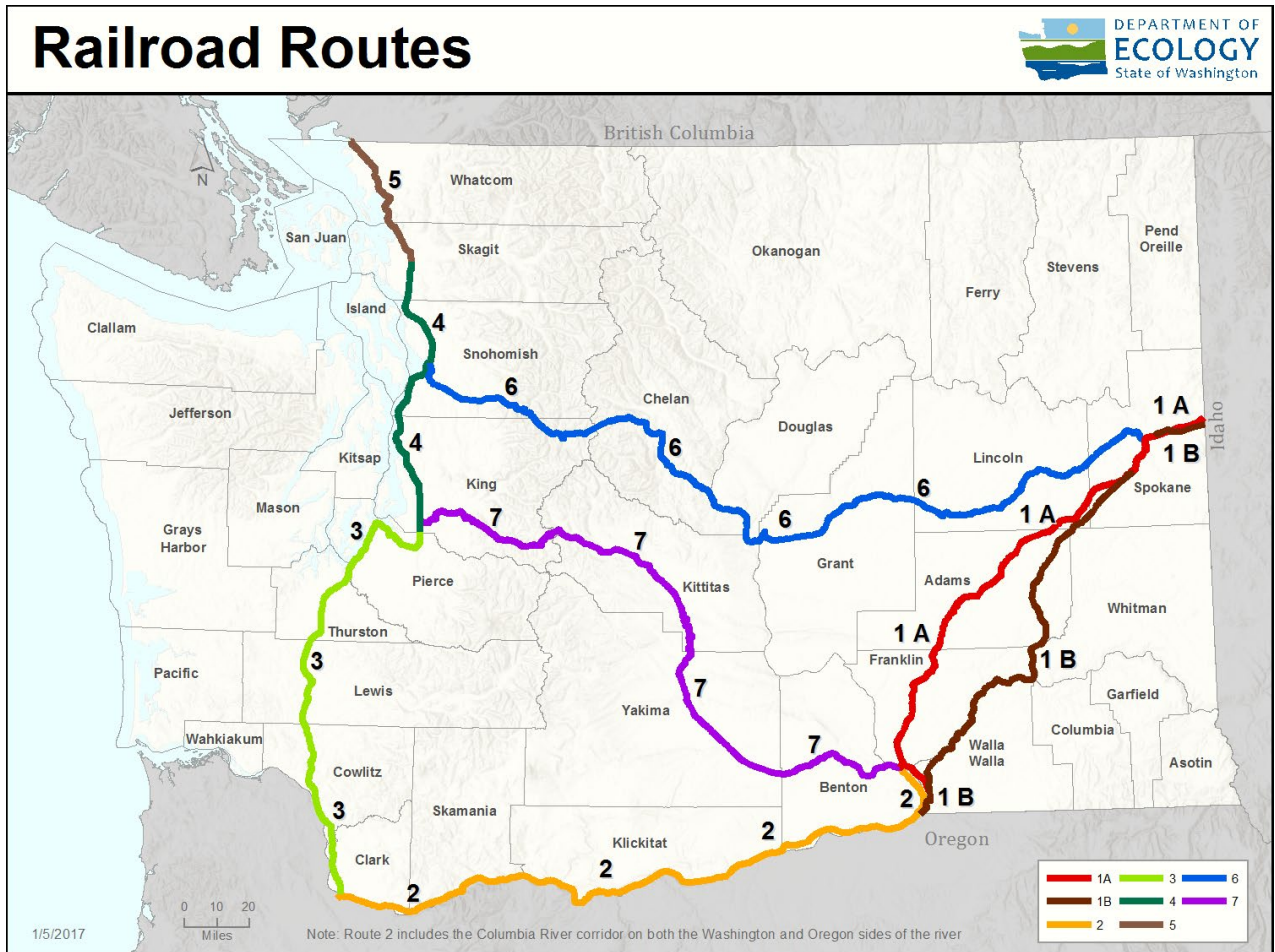


Figure 5: Railroad routes in Washington

## Appendix B – API Gravity and Crude Oil Types

Information reported by facilities on scheduled crude oil deliveries includes the gravity and sulfur content of the oil. Ecology uses the standard American Petroleum Institute gravity (API gravity) ranges in combination with the sulfur content to define the crude type in the ANT database.

Sulfur content is measured as the percent of sulfur, by weight, of the crude oil. Oil is categorized by its sulfur content as either sweet or sour. Sour crudes contain greater than 0.5% sulfur. Sweet crudes have less than or equal to 0.5% sulfur.

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**

<b>Crude Type</b>	<b>API Gravity Range</b>
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