



DEPARTMENT OF
ECOLOGY
State of Washington

Crude Oil Movement by Rail and Pipeline

*Quarterly Report: July 1, 2022, through
September 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.¹ 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, 2022, through September 30, 2022.

¹ 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 July 1, 2022, through September 30, 2022, representing the 3rd 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 barrels)

Fourteen calendar weeks are reported in the 3rd Quarter of 2022 starting at calendar week 27 and ending at calendar week 40.

Table 1: Crude oil movement by rail**Calendar week 27**

Week 27 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	71,354	104
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	68,507	100
4, 5	British Columbia	Heavy Sour Crude	59,687	87
Weekly totals			199,548	291

Calendar week 28

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	345,676	508
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	350,220	515
4, 5	British Columbia	Heavy Sour Crude	119,607	175
5	Alberta	Heavy Sour Crude	232,258	341
Weekly totals			1,047,761	1,539

Calendar week 29

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	130,354	191
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	488,694	718
4, 5	British Columbia	Heavy Sour Crude	116,588	171
5	Alberta	Heavy Sour Crude	59,178	87
Weekly totals			794,814	1,167

Calendar week 30

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	71,039	104
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	356,316	523
4, 5	British Columbia	Heavy Sour Crude	59,598	87
5	Alberta	Heavy Sour Crude	175,496	258
Weekly totals			662,449	972

Calendar week 31

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	274,531	298
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	428,154	629
4, 5	British Columbia	Heavy Sour Crude	176,954	260
Weekly totals			879,639	1,292

Calendar week 32

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	211,905	311
1A, 2, 3, 4, 5	North Dakota	Light Sour Crude	74,211	109
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	427,096	628
4, 5	British Columbia	Heavy Sour Crude	58,559	86
Weekly totals			771,771	1,134

Calendar week 33

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	201,431	296
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	352,440	518
4, 5	British Columbia	Heavy Sour Crude	57,588	84
Weekly totals			611,459	898

Calendar week 34

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	202,217	297
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	70,265	103
5	Alberta	Heavy Sour Crude	118,055	173
Weekly totals			390,537	573

Calendar week 35

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	71,039	104
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	424,512	624
4, 5	British Columbia	Heavy Sour Crude	116,867	171
5	Alberta	Heavy Sour Crude	59,017	86
Weekly totals			671,435	985

Calendar week 36

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	267,461	393
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	211,003	310
4, 5	British Columbia	Heavy Sour Crude	117,656	173
5	Alberta	Heavy Sour Crude	118,003	173
Weekly totals			714,123	1,049

Calendar week 37

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	142,081	208
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	212,887	313
4, 5	British Columbia	Heavy Sour Crude	58,338	85
5	Alberta	Heavy Sour Crude	55,426	81
Weekly totals			468,732	687

Calendar week 38

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	268,413	394
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	209,745	308
5	Alberta	Heavy Sour Crude	59,099	86
Weekly totals			537,257	788

Calendar week 39

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	276,532	406
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	144,766	212
4, 5	British Columbia	Heavy Sour Crude	59,571	87
5	Alberta	Heavy Sour Crude	58,892	86
Weekly totals			539,761	791

Calendar week 40

Week 27 consists of only six 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	272,148	400
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	72,334	106
4, 5	British Columbia	Heavy Sour Crude	116,824	171
5	Alberta	Heavy Sour Crude	177,883	261
Weekly totals			639,189	938

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.

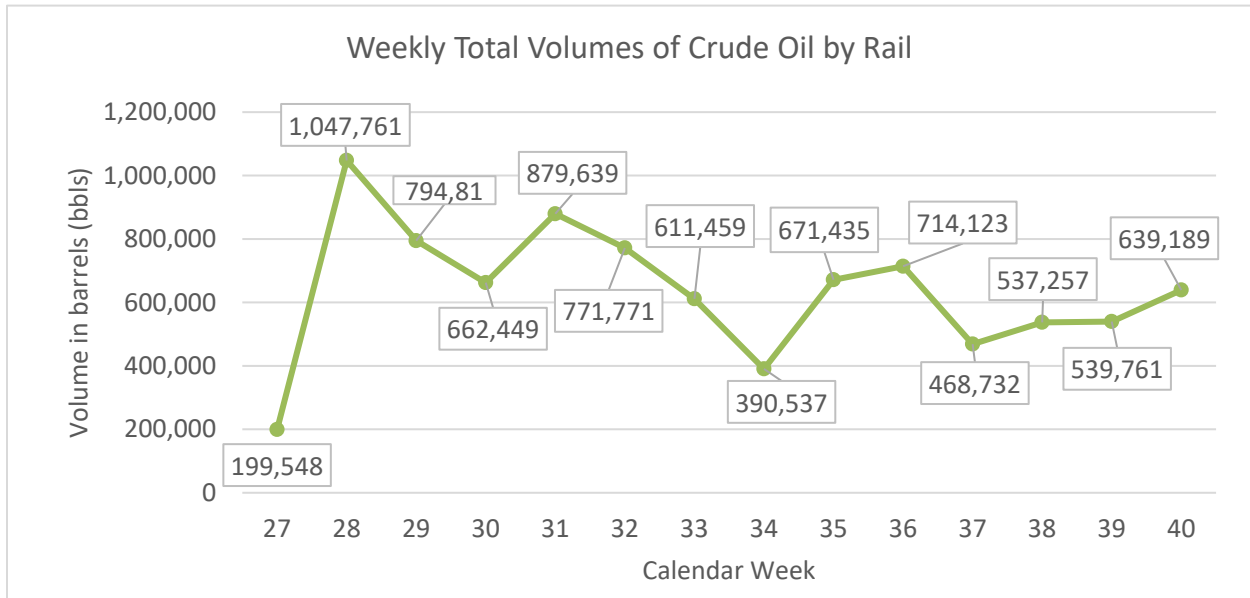
2022 Quarter 3 total volume (bbls): 8,928,475

A summary of the data shows:

- Three regions of origin were reported: North Dakota, British Columbia, and Alberta.
- Two types of crude oil were reported: light and heavy.
- 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 8,928,475 barrels (374,995,950 gallons).

- The average weekly volume of crude oil transported by rail was 679,340 barrels (28,532,301 gallons).
- The total number of rail cars moving crude oil by rail was 13,104 cars.
- The average number of rail cars per week moving crude oil by rail was 997 cars.
- 75.01 percent of crude oil transported by rail was light crude.
24.99 percent of crude rail transported by rail was heavy crude.
- 74.18 percent of crude oil transported by rail was sweet crude.
25.82 percent of crude oil transported by rail was sour crude.
- North Dakota was the region of origin for 75.01 percent of crude oil transported by rail.
British Columbia was the region of origin for 12.52 percent of crude oil transported by rail.
Alberta was the region of origin for 12.47 percent of crude oil transported by rail.
- Crude oil originating in North Dakota had reported vapor pressure ranging from 5.9 to 10.8 pounds per square inch.
Crude oil originating in British Columbia had reported vapor pressure ranging from 5.8 to 10.4 pounds per square inch.
Crude oil originating in Alberta had reported vapor pressure ranging from 7.3 to 8.3 pounds per square inch.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 3rd Quarter of 2022.



Note: Week 27 consists of only 2 days of reported ANT volumes due to the dates of the reporting period. Week 40 consists of only 6 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 3rd Quarter of 2022

The lowest weekly volume was 390,537 barrels (16,402,554 gallons) in Week 34. The highest weekly volume of crude transported by rail was 1,047,761 barrels (44,005,962 gallons) in Week 28.

Figure 2 displays crude transported by rail, by route, for the 3rd Quarter of 2022.

Estimated Crude Oil Movement by Rail (July 2022 - September 2022)

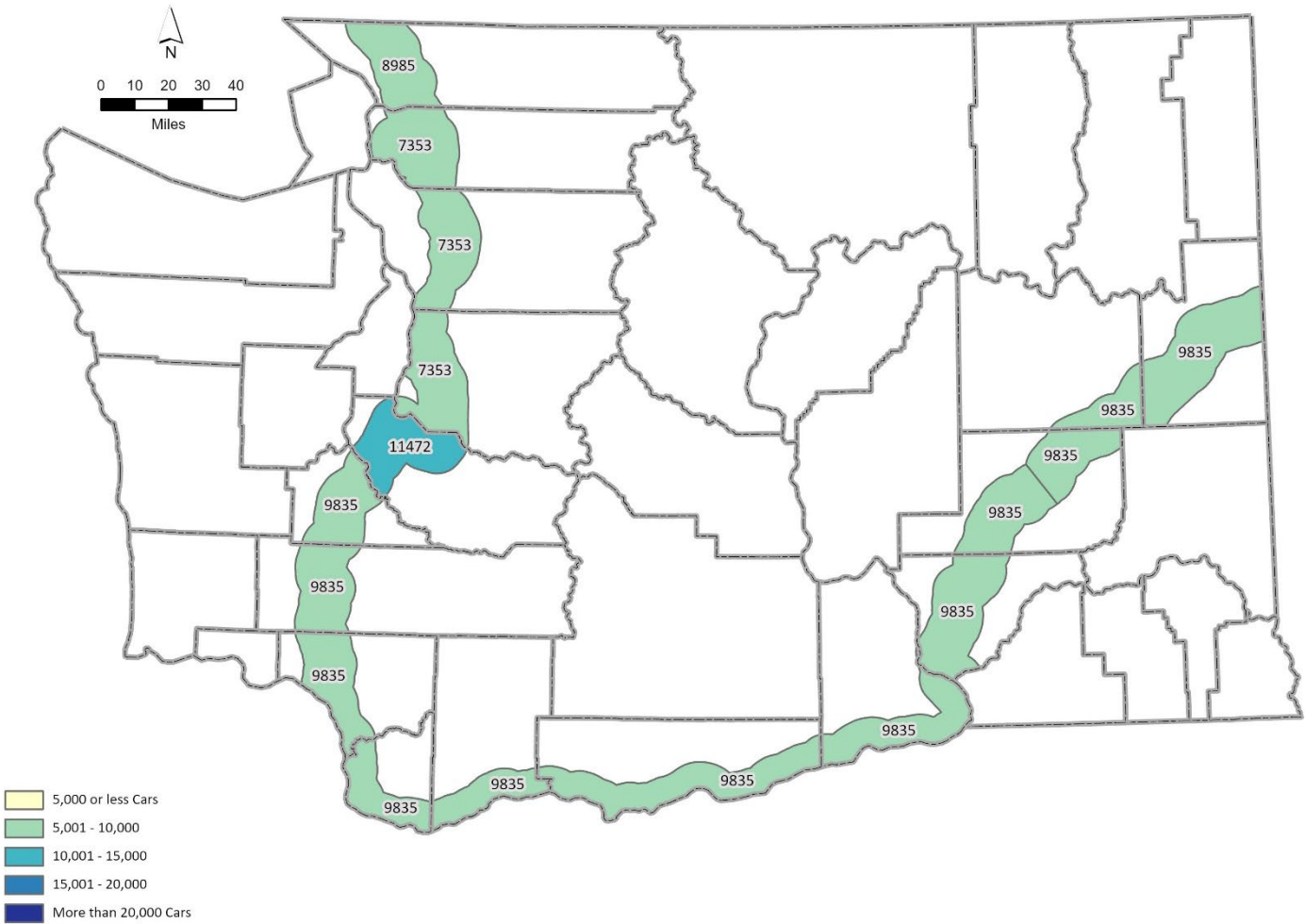


Figure 2: Crude oil movement by route for the 3rd Quarter of 2022

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.² 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.

² 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.³ For the period of July 1, 2022, through September 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.

³ 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.⁴

Table 3 below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of July 1, 2022, through September 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	26,309,357	1,104,992,994
Outbound	297,000	12,474,000
Total	26,606,357	1,117,466,994

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 62 total vessel transfers of crude oil (inbound or outbound).
- The average volume of crude oil transferred to or from vessels per week was 2,024,397 barrels (85,024,663 gallons).

⁴ 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, 2021, through September 30, 2022.⁵

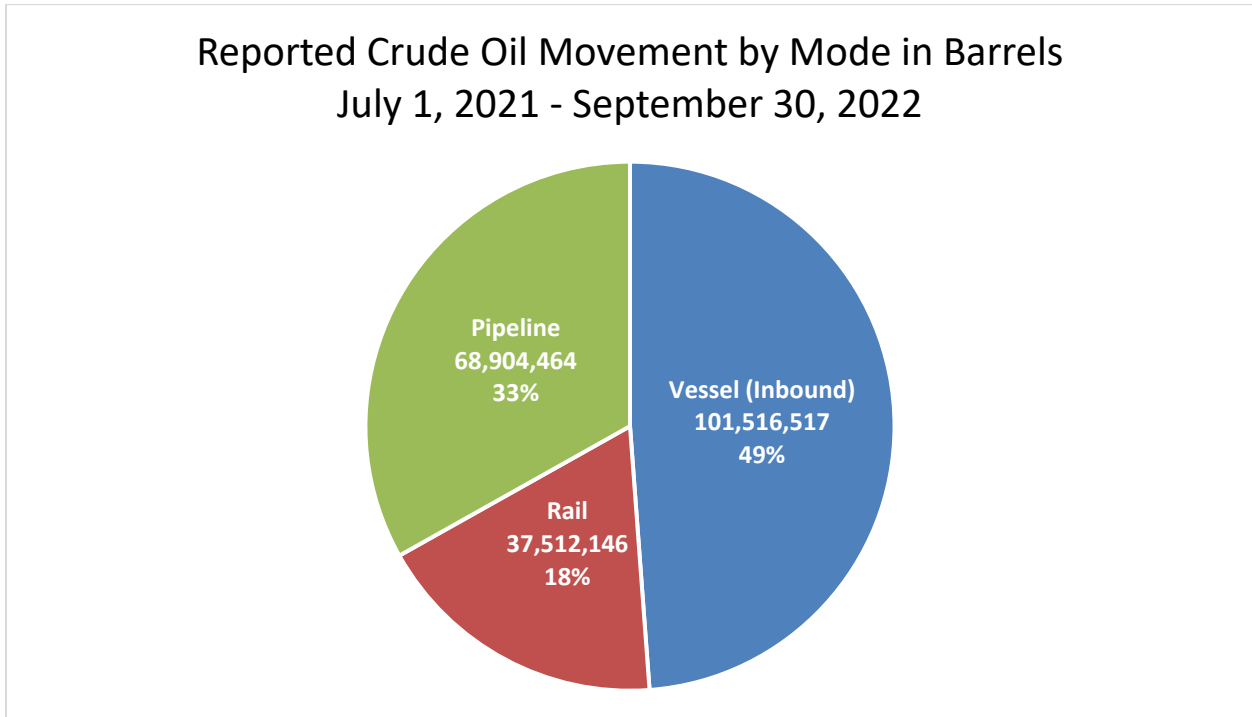
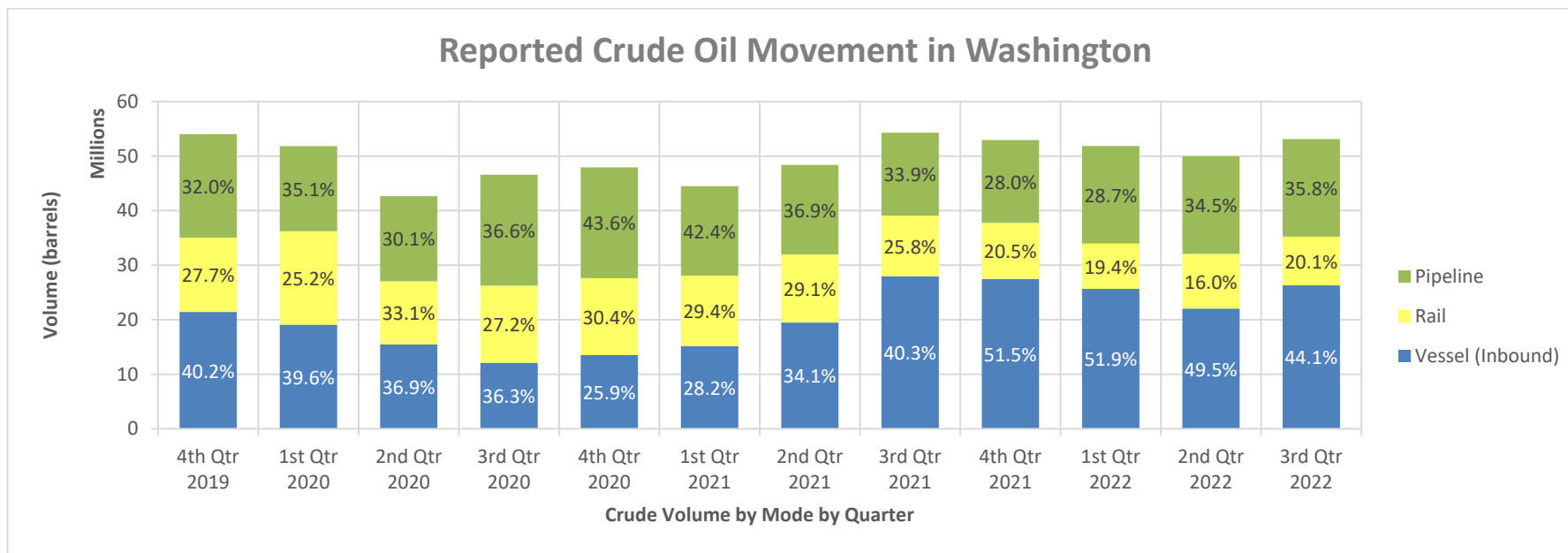


Figure 3: 12-month crude oil movement by mode

Between October 1, 2021 and September 30, 2022, vessels were responsible for 49 percent of reported crude oil movement into the state, rail was responsible for 18 percent, and pipeline for 33 percent.

⁵ 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 October 1, 2019, through September 30, 2022.



Mode	4 th Qtr 2019	1 st Qtr 2020	2 nd Qtr 2020	3 rd Qtr 2020	4 th Qtr 2020	1 st Qtr 2021	2 nd Qtr 2021	3 rd Qtr 2021	4 th Qtr 2021	1 st Qtr 2022	2 nd Qtr 2022	3 rd Qtr 2022
Vessel (Inbound)	39.6%	36.9%	36.3%	25.9%	28.2%	34.1%	40.3%	51.5%	51.9%	49.5%	44.1%	49.5%
Rail	25.2%	33.1%	27.2%	30.4%	29.4%	29.1%	25.8%	20.5%	19.4%	16.0%	20.1%	16.8%
Pipeline	35.1%	30.1%	36.6%	43.6%	42.4%	36.9%	33.9%	28.0%	28.7%	34.5%	35.8%	33.7%

**Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2022, through June 30, 2022. For more recent quarters, Ecology estimated crude oil movement by pipeline for the period based on data provided in that previous biannual notice.*

Figure 4: Quarterly crude oil movement by mode, October 2019 – September 2022

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

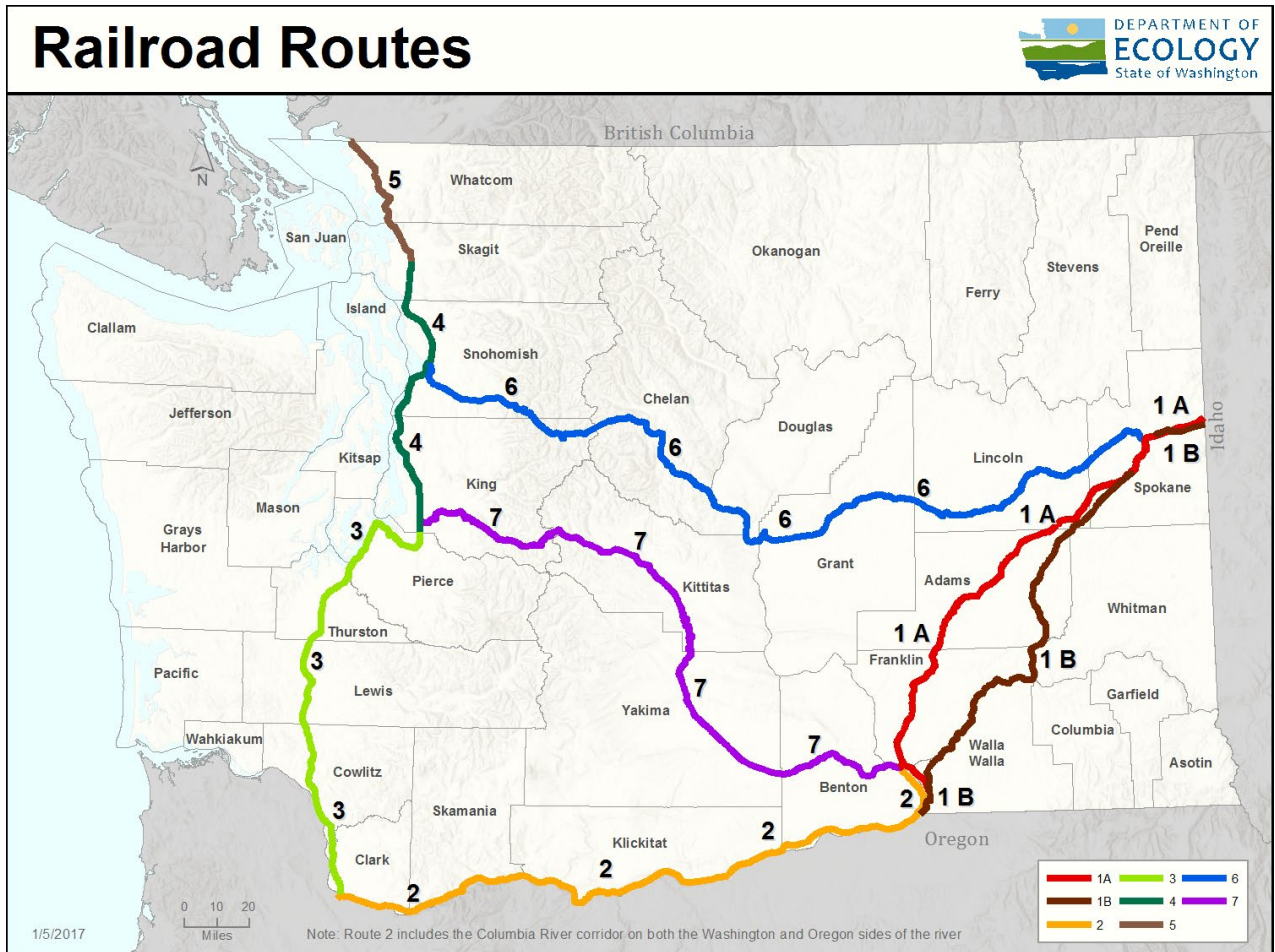


Figure 5: Railroad routes in Washington

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

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