



DEPARTMENT OF
ECOLOGY
State of Washington

Crude Oil Movement by Rail and Pipeline

*Quarterly Report: October 1, 2023, through
December 31, 2023*

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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 October 1, 2023, through December 31, 2023.

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 October 1, 2023, through December 31, 2023, representing the 4th Quarter of 2023. 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 4th Quarter of 2023 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 Sweet Crude	346,210	509
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	479,179	704
4, 5	British Columbia	Heavy Sour Crude	177,003	260
5	Alberta	Heavy Sour Crude	117,569	172
Weekly totals			1,119,961	1,645

Calendar week 41

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	208,015	305
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	537,015	789
4, 5	British Columbia	Heavy Sour Crude	118,841	174
5	Alberta	Heavy Sour Crude	58,958	86
Weekly totals			922,829	1,354

Calendar week 42

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	139,816	205
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	479,324	704
4, 5	British Columbia	Heavy Sour Crude	60,102	88
5	Alberta	Heavy Sour Crude	114,665	168
Weekly totals			793,907	1,165

Calendar week 43

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	205,126	301
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	351,064	516
4, 5	British Columbia	Heavy Sour Crude	60,038	88
5	Alberta	Heavy Sour Crude	57,037	83
Weekly totals			673,265	988

Calendar week 44

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	137,756	202
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	479,004	704
5	Alberta	Heavy Sour Crude	58,910	86
Weekly totals			675,670	992

Calendar week 45

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	276,974	407
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	484,721	712
4, 5	British Columbia	Heavy Sour Crude	119,820	176
5	Alberta	Heavy Sour Crude	116,799	171
Weekly totals			998,314	1,466

Calendar week 46

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	124,870	183
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	543,548	799
4, 5	British Columbia	Heavy Sour Crude	118,755	174
5	Alberta	Medium Sweet Crude	59,027	86
Weekly totals			846,200	1,242

Calendar week 47

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	135,202	198
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	410,027	602
4, 5	British Columbia	Heavy Sour Crude	60,019	88
Weekly totals			605,248	888

Calendar week 48

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	141,750	208
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	611,540	899
5	Alberta	Heavy Sour Crude	56,781	83
Weekly totals			810,071	1,190

Calendar week 49

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	200,116	294
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	337,613	496
4, 5	British Columbia	Heavy Sour Crude	60,122	88
5	Alberta	Medium Sweet Crude	118,608	174
Weekly totals			716,459	1,052

Calendar week 50

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	276,653	406
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	279,179	410
4, 5	British Columbia	Heavy Sour Crude	120,203	176
5	Alberta	Medium Sweet Crude	61,254	90
Weekly totals			737,289	1,082

Calendar week 51

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	141,658	208
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	476,789	701
4, 5	British Columbia	Heavy Sour Crude	60,157	88
5	Alberta	Medium Sweet Crude	60,289	88
Weekly totals			738,893	1,085

Calendar week 52

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	130,959	192
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	414,730	609
4, 5	British Columbia	Heavy Sour Crude	118,976	174
5	Alberta	Medium Sweet Crude	57,758	84
Weekly totals			722,423	1,059

Calendar week 53

Week 53 consists of only one day 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, 4, 5	North Dakota	Light Sweet Crude	138,446	203
5	Alberta	Medium Sweet Crude	58,270	85
Weekly totals			196,716	288

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.

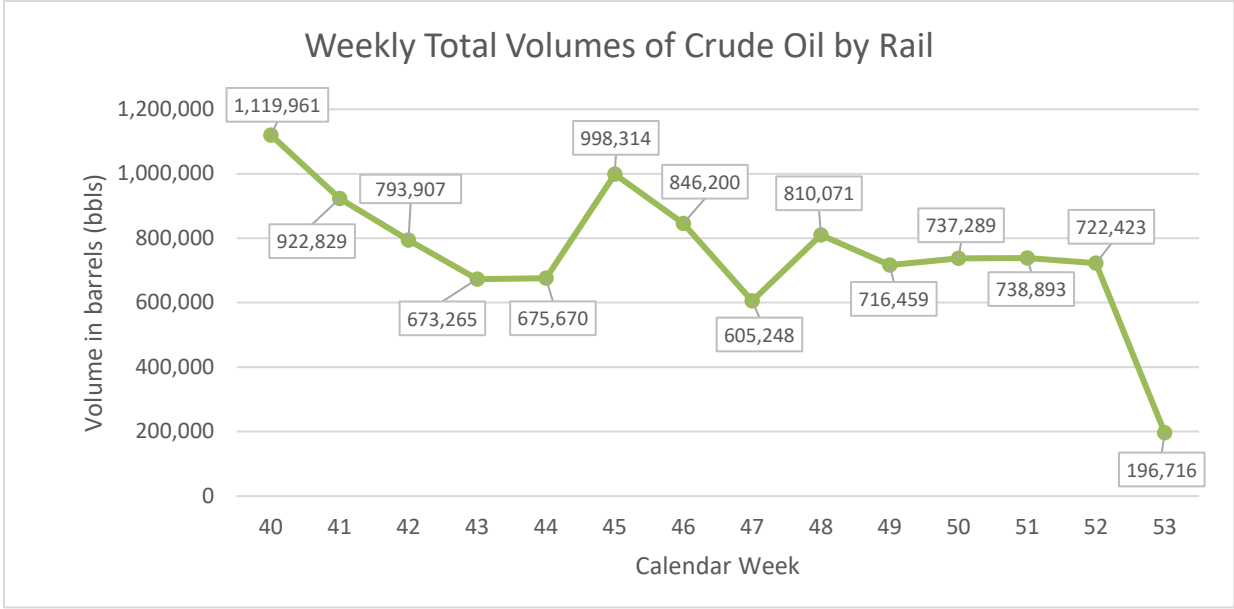
2023 Quarter 4 total volume (bbls): 10,557,245

A summary of the data shows:

- Three regions of origin were reported: North Dakota, British Columbia, and Alberta.
- Three types of crude oil were reported: light, medium, 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 10,557,245 barrels (443,404,290 gallons).
- The average weekly volume of crude oil transported by rail was 803,269 barrels (33,737,283 gallons).

- The total number of rail cars moving crude oil by rail was 15,496 cars.
- The average number of rail cars per week moving crude oil by rail was 1,179 cars.
- 80.39 percent of crude oil transported by rail was light crude.
3.93 percent of crude oil transported by rail was medium crude.
15.67 percent of crude rail transported by rail was heavy crude.
- 84.33 percent of crude oil transported by rail was sweet crude.
15.67 percent of crude oil transported by rail was sour crude.
- North Dakota was the region of origin for 80.39 percent of crude oil transported by rail.
British Columbia was the region of origin for 10.17 percent of crude oil transported by rail.
Alberta was the region of origin for 9.43 percent of crude oil transported by rail.
- Crude oil originating in North Dakota had reported vapor pressure ranging from 4.0 to 11.9 pounds per square inch.
Crude oil originating in British Columbia had reported vapor pressure ranging from 8.4 to 10.6 pounds per square inch.
Crude oil originating in Alberta had reported vapor pressure ranging from 6.3 to 7.4 pounds per square inch.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 4th Quarter of 2023.



Note: Week 53 consists of only one day of reported ANT volumes due to the dates of the reporting period.

Figure 1: Weekly total volumes of crude oil by rail for the 4th Quarter of 2023

The lowest weekly volume was 605,248 barrels (25,420,416 gallons) in Week 47. The highest weekly volume of crude transported by rail was 1,119,961 barrels (47,038,362 gallons) in Week 40.

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 July 1, 2023, through December 31, 2023. 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)
July 1, 2023 – December 31, 2023	Alberta	37.2 (Light)	Sweet ($\leq 0.5\%$)	27,138,560
July 1, 2023 – December 31, 2023	Alberta	36.5 (Light)	Sour ($> 0.5\%$)	10,988,672
July 1, 2023 – December 31, 2023	Alberta	21.4 (Heavy)	Sour ($> 0.5\%$)	4,161,542
July 1, 2023 – December 31, 2023	Alberta	22.9 (Medium)	Sour ($> 0.5\%$)	337,006

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 January 1, 2024, through June 30, 2024 and must be submitted to Ecology by July 31, 2024.

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 October 1, 2023, through December 31, 2023, 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.⁴

Table 3 below provides the total volume of crude oil in barrels of inbound and outbound vessel transfers for the period of October 1, 2023, through December 31, 2023. 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 4 below provides the region of origin of crude oil delivered on inbound vessel transfers.

³ Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

⁴ Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification

Table 3: Crude oil movement by vessel direction

Vessel transfers by direction	Volume (bbls)	Volume (gallons)
Inbound	27,261,447	1,144,980,774
Outbound	75,000	3,150,000
Total	27,336,447	1,148,130,774

Table 4: Inbound – vessel crude oil by region

Region of crude origin	Volume (bbls)	Volume (gallons)
US – Alaska North Slope	18,776,000	788,592,000
Argentina	3,549,447	149,076,774
Brazil	2,931,000	123,102,000
US – Bakken Formation	1,398,000	58,716,000
Canada	552,000	23,184,000
Nigeria	55,000	2,310,000
Total	27,261,447	1,144,980,774

Note: The data provided in Tables 3 and 4 were 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 2,079,947 barrels (87,357,776 gallons).
- 83.54 percent of crude oil inbound by vessel was light crude.
15.52 percent of crude oil inbound by vessel was medium crude.
0.94 percent of crude rail transported by rail was heavy crude.
- 65.25 percent of crude oil inbound by vessel was sour crude.
34.75 percent of crude oil inbound by vessel was sweet crude.

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 January 1, 2023, through December 31, 2023.⁵

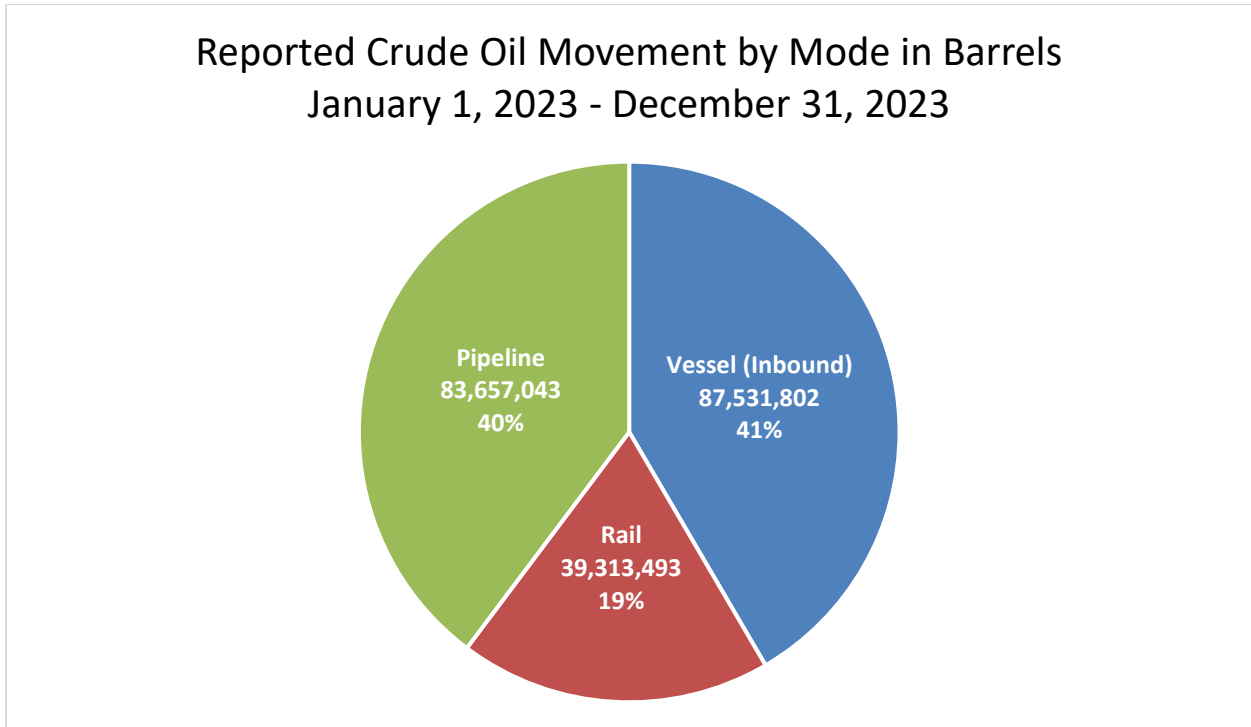
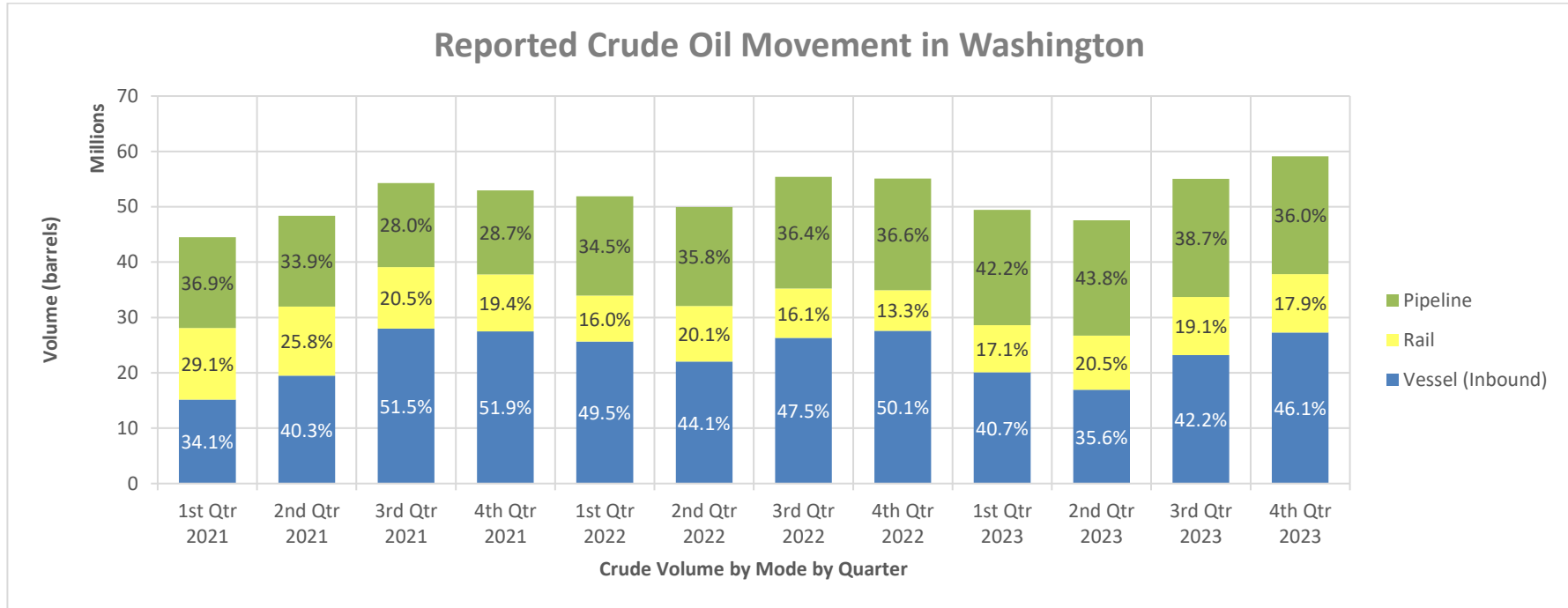


Figure 3: 12-month crude oil movement by mode

Between January 1, 2023, and December 31, 2023, vessels were responsible for 41 percent of reported crude oil movement into the state, rail was responsible for 19 percent, and pipeline for 40 percent.

⁵ The most recent biannual notices from pipelines were submitted to Ecology for the period from July 1, 2023, through December 31, 2023. The next biannual notices submitted by pipelines will cover the period from January 1, 2024, through June 30, 2024, and must be submitted to Ecology by July 31, 2024.

Figure 4 shows crude oil movement, by mode, covering the period of January 1, 2021, through December 31, 2023.



Mode	1 st Qtr 2021	2 nd Qtr 2017	3 rd Qtr 2017	4 th Qtr 2017	1 st Qtr 2018	2 nd Qtr 2018	3 rd Qtr 2018	4 th Qtr 2018	1 st Qtr 2019	2 nd Qtr 2019	3 rd Qtr 2019	4 th Qtr 2023
Vessel (Inbound)	34.1%	40.3%	51.5%	51.9%	49.5%	44.1%	47.5%	50.1%	40.7%	35.6%	42.2%	46.1%
Rail	29.1%	25.8%	20.5%	19.4%	16.0%	20.1%	16.1%	13.3%	17.1%	20.5%	19.1%	17.9%
Pipeline	36.9%	33.9%	28.0%	28.7%	34.5%	35.8%	36.4%	36.6%	42.2%	43.8%	38.7%	36.0%

**Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from July 1, 2023, through December 31, 2023.*

Figure 4: Quarterly crude oil movement by mode, January 2021 – December 2023

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

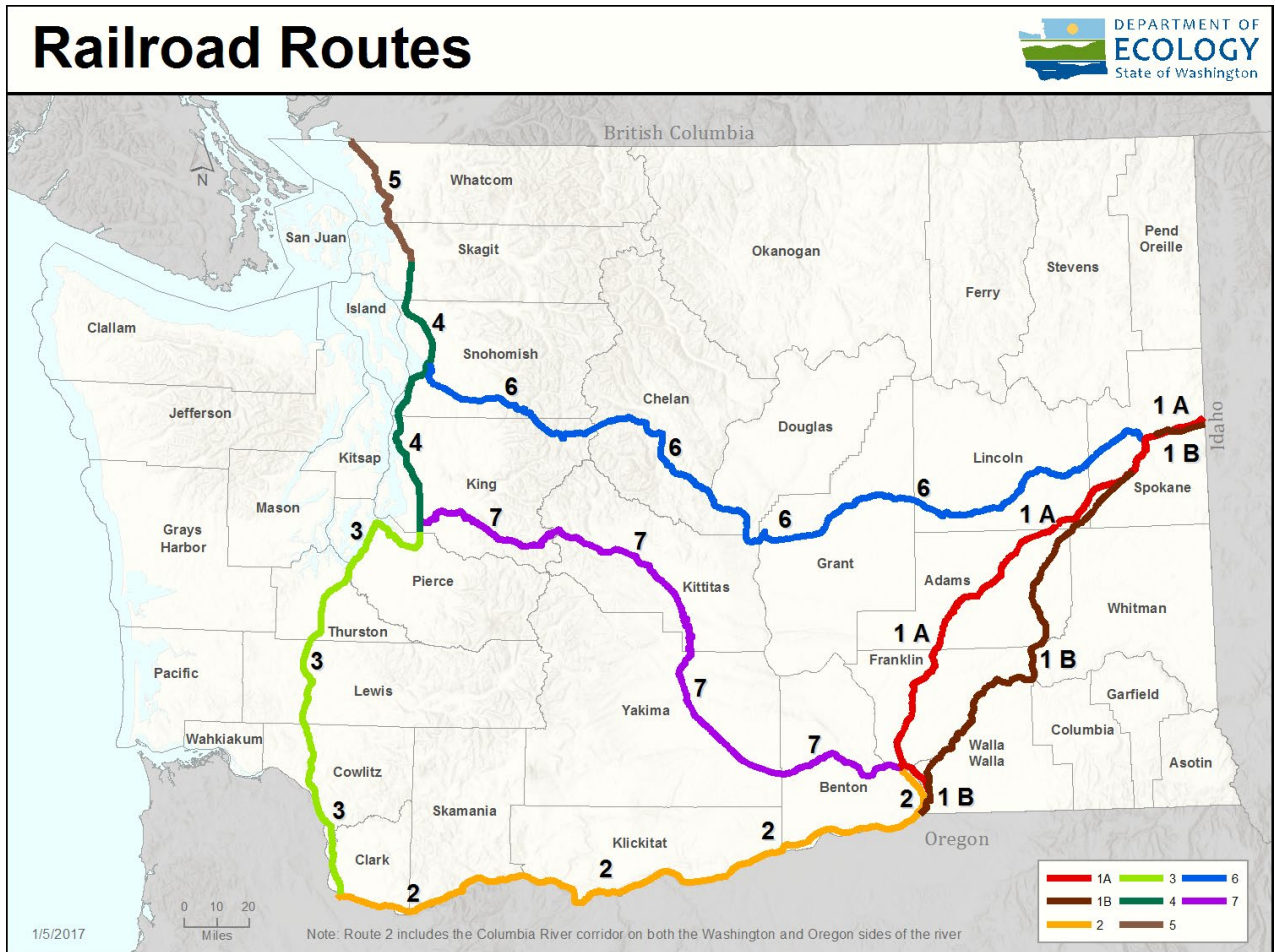


Figure 5: Railroad routes in Washington

Appendix B – API Gravity and Crude Oil Types

Information reported by facilities and vessels 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 percent sulfur. Sweet crudes have less than or equal to 0.5 percent 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 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