



DEPARTMENT OF
ECOLOGY
State of Washington

Crude Oil Movement by Rail and Pipeline

*Quarterly Report: July 1, 2023, through
September 30, 2023*

October 2023
Publication 23-08-017

Publication and Contact Information

This report is available on the Department of Ecology's website at <https://apps.ecology.wa.gov/publications/SummaryPages/2308017.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

- 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 360-407-6831 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: July 1, 2023, through September 30, 2023

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	9
Crude Oil Spills – Rail and Pipeline.....	10
Crude Oil Movement by Vessel.....	11
An Overview of Crude Oil Movement in Washington.....	12
Contact Information	14
Appendix A – Washington Railroad Routes.....	15
Appendix B – API Gravity and Crude Oil Types.....	16

List of Figures and Tables

Page

Figures

Figure 1: Weekly total volumes of crude oil by rail for the 3 rd Quarter of 2023.....	7
Figure 2: Crude oil movement by route for the 3 rd Quarter of 2023.....	8
Figure 3: 12-month crude oil movement by mode.....	12
Figure 4: Quarterly crude oil movement by mode, October 2020 – September 2023.....	13
Figure 5: Railroad routes in Washington.....	15

Tables

Table 1: Crude oil movement by rail.....	3
Table 2: Crude oil movement by pipeline.....	9
Table 3: Crude oil movement by vessel.....	11
Table 4: Crude type by API gravity.....	16

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, 2023, through September 30, 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 July 1, 2023, through September 30, 2023, representing the 3rd 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 3rd Quarter of 2023 starting at calendar week 26 and ending at calendar week 39.

Table 1: Crude oil movement by rail**Calendar week 26**

Week 26 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	North Dakota	Light Sweet Crude	71,032	104
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	64,972	95
Weekly totals			136,004	199

Calendar week 27

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	70,223	103
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	282,538	415
4, 5	British Columbia	Heavy Sour Crude	119,649	175
5	Alberta	Heavy Sour Crude	58,753	86
Weekly totals			531,163	779

Calendar week 28

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	207,572	305
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	410,789	604
4, 5	British Columbia	Heavy Sour Crude	178,128	261
Weekly totals			796,489	1,170

Calendar week 29

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	265,993	391
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	483,688	711
5	Alberta	Heavy Sour Crude	58,445	85
Weekly totals			808,126	1,187

Calendar week 30

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	275,542	405
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	271,480	399
4, 5	British Columbia	Heavy Sour Crude	119,859	176
Weekly totals			666,881	980

Calendar week 31

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	137,178	201
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	618,049	908
5	Alberta	Heavy Sour Crude	56,031	82
Weekly totals			811,258	1,191

Calendar week 32

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	342,287	503
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	476,552	700
4, 5	British Columbia	Heavy Sour Crude	179,498	263
5	Alberta	Heavy Sour Crude	58,885	86
Weekly totals			1,057,222	1,552

Calendar week 33

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	142,071	208
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	539,905	793
4, 5	British Columbia	Heavy Sour Crude	116,397	171
Weekly totals			798,373	1,172

Calendar week 34

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	132,860	195
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	415,301	610
4, 5	British Columbia	Heavy Sour Crude	119,105	175
5	Alberta	Heavy Sour Crude	118,084	173
Weekly totals			785,350	1,153

Calendar week 35

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	278,508	409
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	411,450	605
4, 5	British Columbia	Heavy Sour Crude	176,209	259
5	Alberta	Heavy Sour Crude	59,010	86
Weekly totals			925,177	1,359

Calendar week 36

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	202,045	297
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	492,006	723
4, 5	British Columbia	Heavy Sour Crude	59,660	87
5	Alberta	Heavy Sour Crude	54,897	80
Weekly totals			808,608	1,187

Calendar week 37

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	206,497	303
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	546,957	804
4, 5	British Columbia	Heavy Sour Crude	59,499	87
5	Alberta	Heavy Sour Crude	58,998	86
Weekly totals			871,951	1,280

Calendar week 38

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Sweet Crude	142,096	208
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	546,232	803
4, 5	British Columbia	Heavy Sour Crude	118,326	174
5	Alberta	Heavy Sour Crude	116,535	171
Weekly totals			923,189	1,356

Calendar week 39

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3, 4, 5	North Dakota	Light Sweet Crude	412,638	606
4, 5	British Columbia	Heavy Sour Crude	118,342	174
5	Alberta	Heavy Sour Crude	58,796	86
Weekly totals			589,776	866

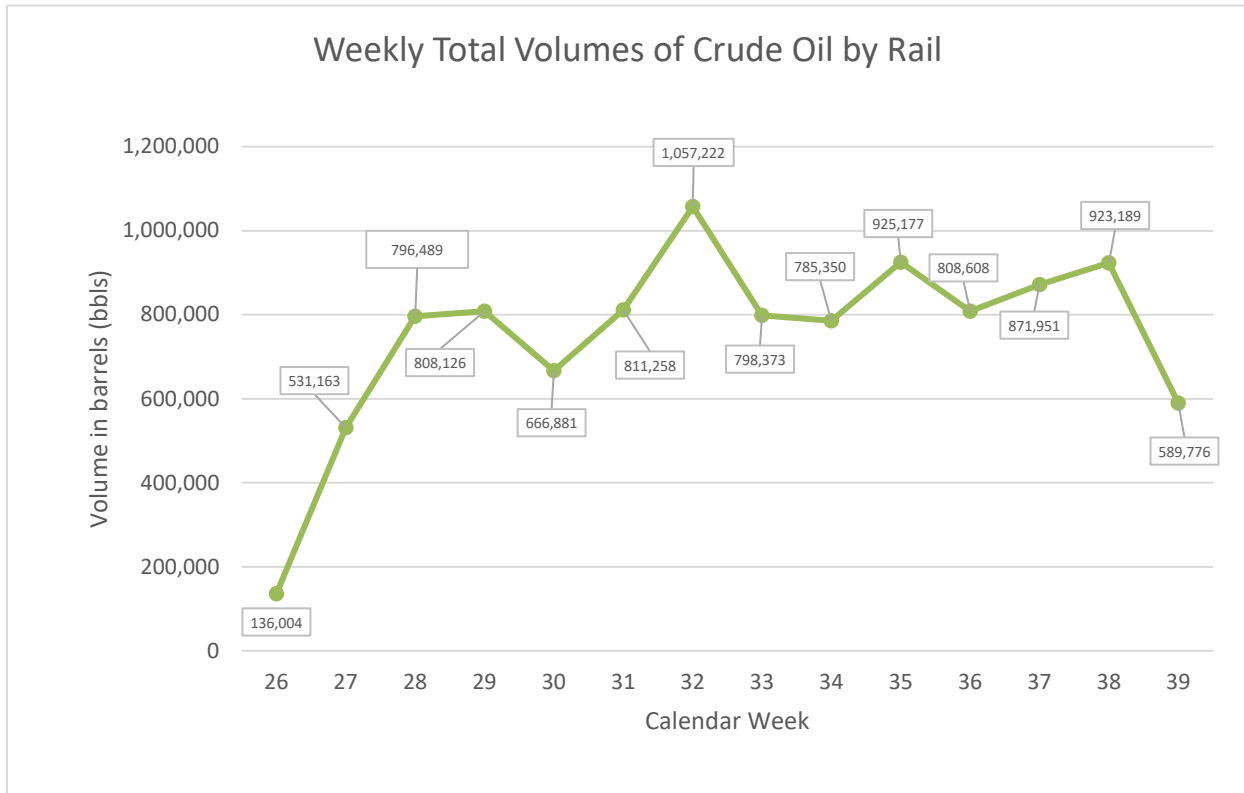
Note: The data provided in Table 1 was reported to Ecology by the receiving facility into the ANT database as required by Chapter 173-185 WAC. Ecology cannot confirm the data or verify its accuracy.

2023 Quarter 3 total volume (bbls): 10,509,567

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 10,509,567 barrels (441,401,814 gallons).
- The average weekly volume of crude oil transported by rail was 799,641 barrels (33,584,921 gallons).
- The total number of rail cars moving crude oil by rail was 15,431 cars.
- The average number of rail cars per week moving crude oil by rail was 1,174 cars.
- 80.37 percent of crude oil transported by rail was light crude.
19.63 percent of crude rail transported by rail was heavy crude.
- 80.37 percent of crude oil transported by rail was sweet crude.
19.63 percent of crude oil transported by rail was sour crude.
- North Dakota was the region of origin for 80.37 percent of crude oil transported by rail.
Alberta was the region of origin for 6.65 percent of crude oil transported by rail.
British Columbia was the region of origin for 12.99 percent of crude oil transported by rail.
- Crude oil originating in North Dakota had reported vapor pressure ranging from 2.7 to 10.2 pounds per square inch.
Crude oil originating in Alberta had reported vapor pressure ranging from 7.0 to 7.9 pounds per square inch.
Crude oil originating in British Columbia had reported vapor pressure ranging from 8.9 to 10.3 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 2023.



Note: Week 26 consists of only 1 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 3rd Quarter of 2023

The lowest weekly volume was 589,776 barrels (24,770,592 gallons) in Week 39. The highest weekly volume of crude transported by rail was 1,057,222 barrels (44,403,324 gallons) in Week 32.

Figure 2 displays crude transported by rail, by route, for the 3rd Quarter of 2023.

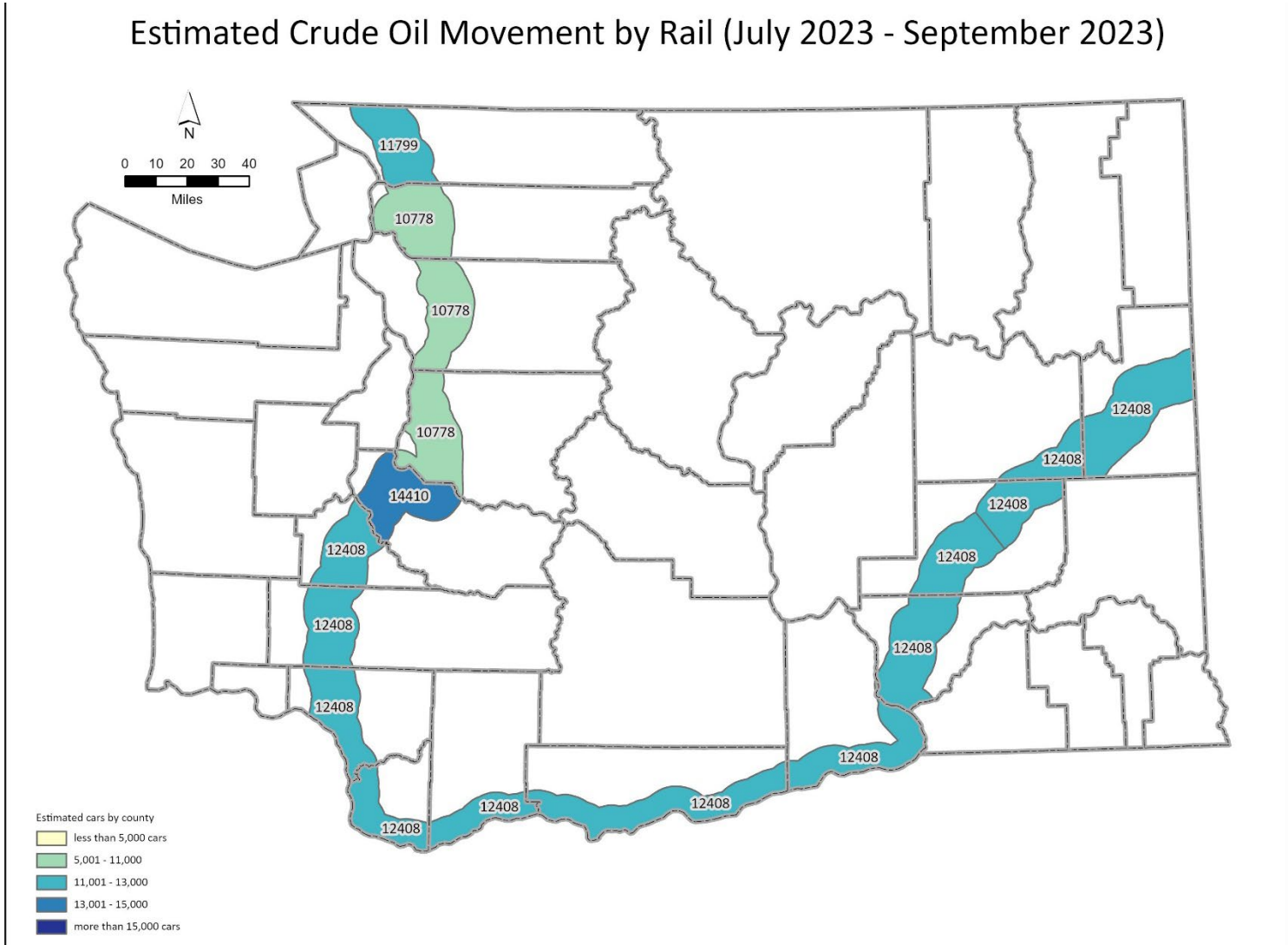


Figure 2: Crude oil movement by route for the 3rd Quarter of 2023

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, 2023, through June 30, 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)
January 1, 2023 – June 30, 2023	Alberta	42.7 (Light)	Sour (>0.5%)	12,498,258
January 1, 2023 – June 30, 2023	Alberta	21.1 (Heavy)	Sour (>0.5%)	3,394,988
January 1, 2023 – June 30, 2023	Alberta	38.7 (Light)	Sweet (≤0.5%)	25,815,681

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, 2023 through December 31, 2023 and must be submitted to Ecology by January 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 July 1, 2023, through September 30, 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.

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, 2023, through September 30, 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 3: Crude oil movement by vessel

Vessel transfers	Volume (bbls)	Volume (gallons)
Inbound	23,210,000	974,820,000
Outbound	165,000	6,930,000
Total	23,375,000	981,750,000

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 53 total vessel transfers of crude oil (inbound or outbound).
- The average volume of crude oil transferred to or from vessels per week was 1,778,533 barrels (74,698,370 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, 2022, through September 30, 2023.⁵

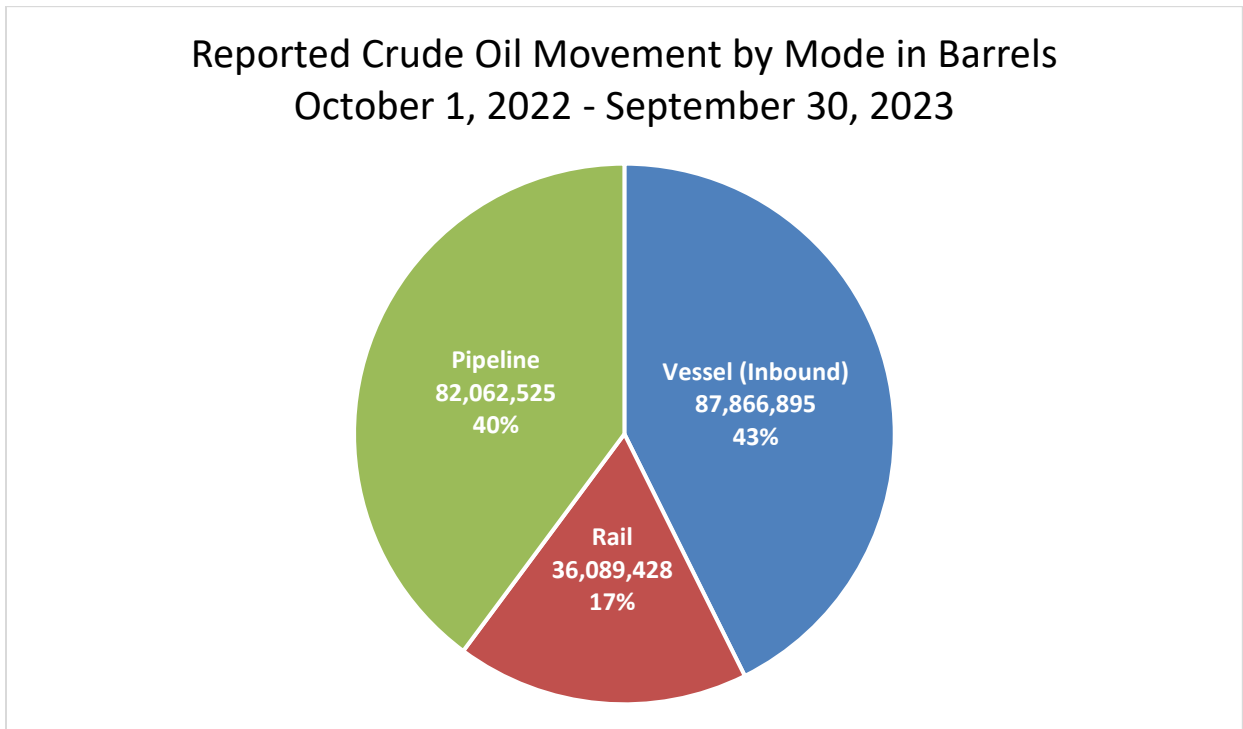
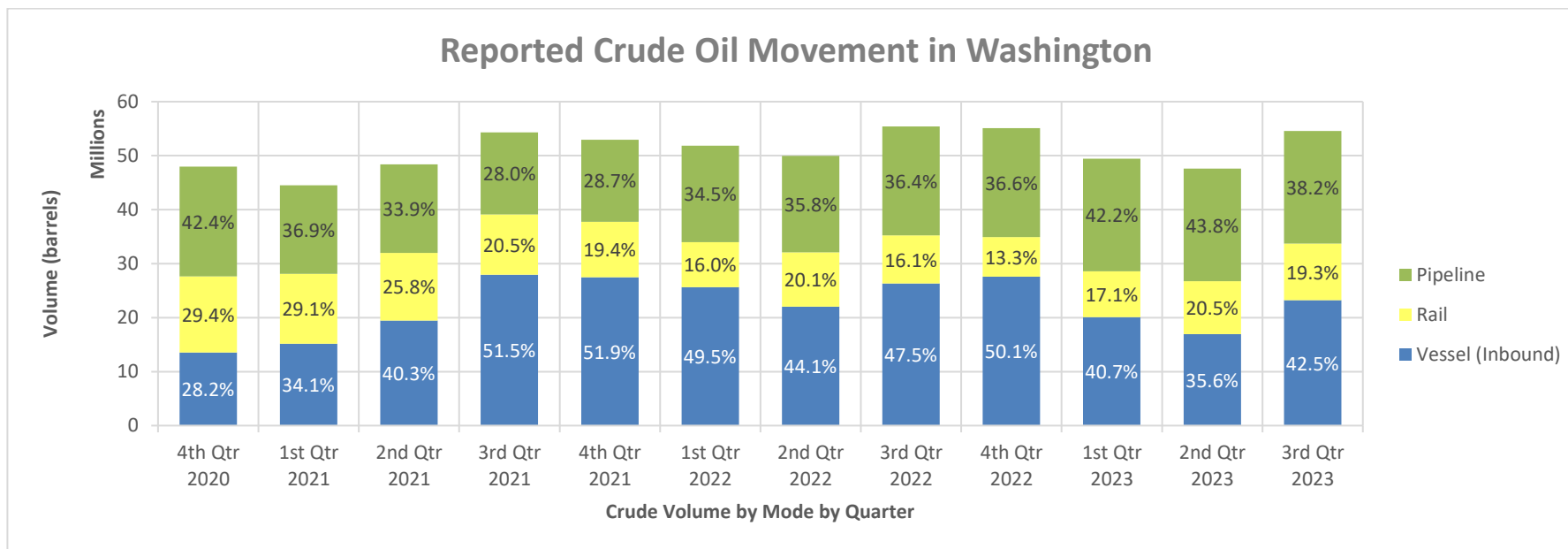


Figure 3: 12-month crude oil movement by mode

Between October 1, 2022 and September 30, 2023, vessels were responsible for 43 percent of reported crude oil movement into the state, rail was responsible for 17 percent, and pipeline for 40 percent.

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

Figure 4 shows crude oil movement, by mode, covering the period of October 1, 2020, through September 30, 2023.



Mode	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	4 th Qtr 2022	1 st Qtr 2023	2 nd Qtr 2023	3 rd Qtr 2023
Vessel (Inbound)	28.2%	34.1%	40.3%	51.5%	51.9%	49.5%	44.1%	47.5%	50.1%	40.7%	35.6%	42.5%
Rail	29.4%	29.1%	25.8%	20.5%	19.4%	16.0%	20.1%	16.1%	13.3%	17.1%	20.5%	19.3%
Pipeline	42.4%	36.9%	33.9%	28.0%	28.7%	34.5%	35.8%	36.4%	36.6%	42.2%	43.8%	38.2%

**Note: The most recent biannual notices from pipelines were submitted to Ecology for the period from January 1, 2023, through June 30, 2023. 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 2020 – September 2023

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

Contact Information

Eli Seely

Department of Ecology

Spills Program

P.O. Box 47600

Olympia, WA 98504-7600

Phone: (360) 480-3095

Email: eli.seely@ecy.wa.gov

Appendix A – Washington Railroad Routes

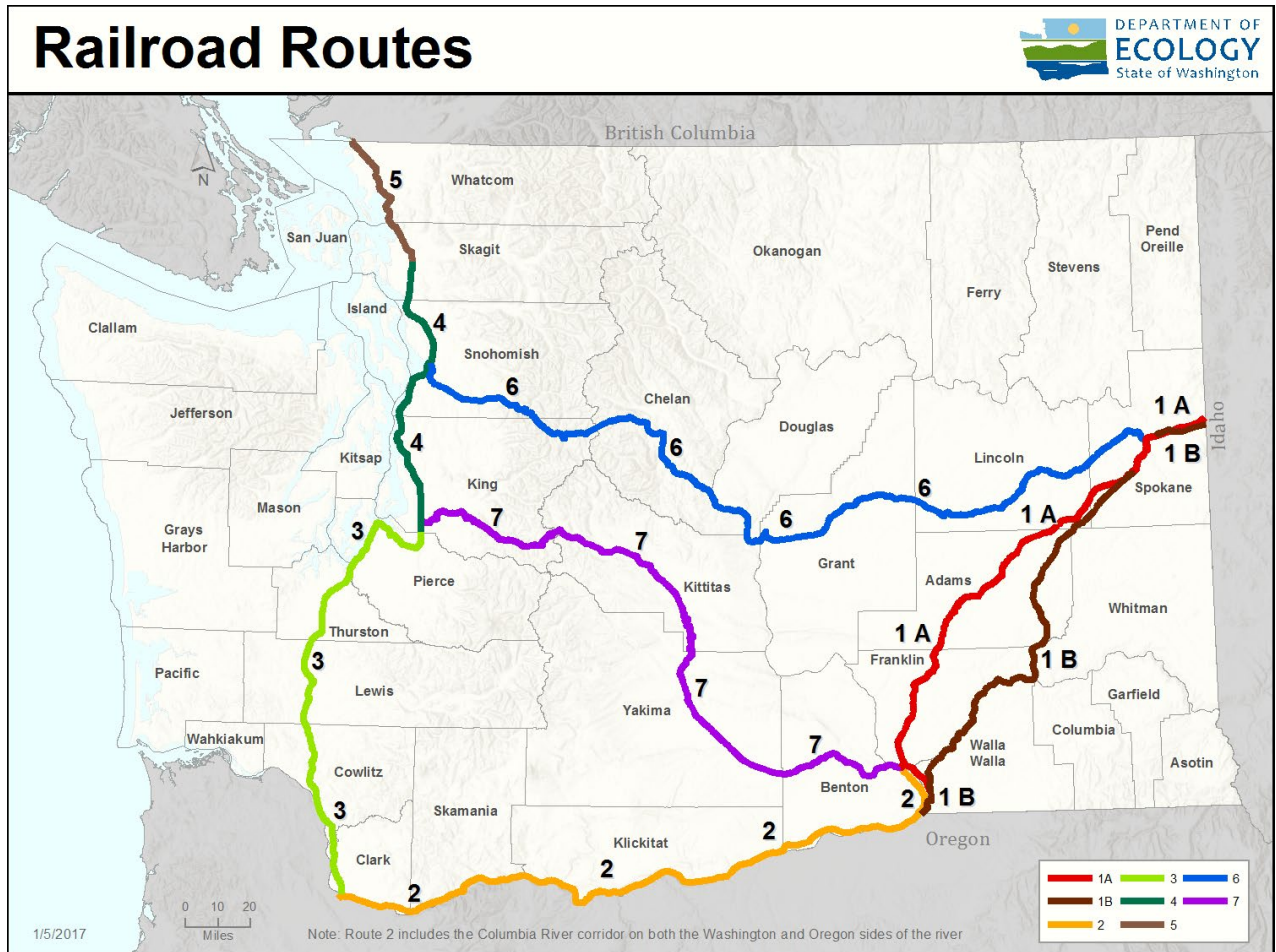


Figure 5: Railroad routes in Washington

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 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 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