DEPARTMENT OF ECOLOGY
State of Washington

Crude Oil Movement by Rail and Pipeline

Quarterly Report: January 1, 2020 through March 31, 2020

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Spill Prevention, Preparedness, and Response Program
Washington State Department of Ecology
Olympia, Washington

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Table of Contents

Page

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 9
Crude Oil Movement by Vessel 10
An Overview of Crude Oil Movement in Washington 11
Contact Information 13
Appendix A – Washington Railroad Routes 14
Appendix B – API Gravity and Crude Oil Types 15

List of Figures and Tables

Page

Figures

Figure 1: Weekly total volumes of crude oil by rail for the 1st Quarter of 2020 7

Figure 2: Crude oil movement by route for the 1st Quarter of 2020 8

Figure 3: 12-month crude oil movement by mode 11

Figure 4: Quarterly crude oil movement by mode, April 2017 – March 2020 12

Tables

Table 1: Crude oil movement by rail 3

Table 2: Crude oil movement by pipeline 9

Table 3: Crude oil movement by vessel 10

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 January 1, 2020 through March 31, 2020.

[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 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 January 1, 2020 through March 31, 2020, representing the 1st Quarter of 2020. 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 1st Quarter of 2020 starting at calendar week 1 and ending at calendar week 14.

Table 1: Crude oil movement by rail

Calendar week 1

Week 1 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 Crude	136,535	200
1A, 2, 3, 4	North Dakota	Light Crude	260,000	382
1A, 2, 3, 4, 5	North Dakota	Light Crude	284,715	418
5	Saskatchewan	Light Crude	64,127	94
Weekly totals			**745,377**	**1,094**

Calendar week 2

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	272,917	401
1A, 2, 3, 4	North Dakota	Light Crude	390,000	573
1A, 2, 3, 4, 5	North Dakota	Light Crude	496,534	730
1B, 2, 3	Alberta	Heavy Crude	106,162	156
Weekly totals			**1,265,613**	**1,860**

Calendar week 3

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	275,801	405
1A, 2, 3, 4	North Dakota	Light Crude	455,000	669
1A, 2, 3, 4, 5	North Dakota	Light Crude	618,662	909
1B, 2, 3	Alberta	Heavy Crude	62,999	92
Weekly totals			**1,412,462**	**2,075**

Calendar week 4

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	206,873	304
1A, 2, 3, 4	North Dakota	Light Crude	260,000	382
1A, 2, 3, 4, 5	North Dakota	Light Crude	475,028	698
1B, 2, 3	Alberta	Heavy Crude	59,315	87
Weekly totals			**1,001,216**	**1,471**

Calendar week 5

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	340,151	500
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	913,288	1,343
1B, 2, 3	Alberta	Heavy Crude	64,063	94
Weekly totals			**1,642,502**	**2,414**

Calendar week 6

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	136,102	200
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	699,853	1,029
1B, 2, 3	Alberta	Heavy Crude	122,830	180
Weekly totals			**1,283,785**	**1,886**

Calendar week 7

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota		70,526	103
1A, 2, 3	North Dakota	Light Crude	138,100	203
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	488,558	718
1B, 2, 3	Alberta	Heavy Crude	124,561	183
Weekly totals			**1,146,745**	**1,684**

Calendar week 8

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	273,792	402
1A, 2, 3, 4	North Dakota	Light Crude	325,243	478
1A, 2, 3, 4, 5	North Dakota	Light Crude	701,461	1,031
1B, 2, 3	Alberta	Heavy Crude	61,349	90
5	Saskatchewan	Light Crude	64,334	94
Weekly totals			**1,426,179**	**2,095**

Calendar week 9

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	205,287	301
1A, 2, 3, 4	North Dakota	Light Crude	318,828	468
1A, 2, 3, 4, 5	North Dakota	Light Crude	776,163	1,141
1B, 2, 3	Alberta	Heavy Crude	63,851	93
5	Saskatchewan	Light Crude	64,203	94
Weekly totals			**1,428,332**	**2,097**

Calendar week 10

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	209,781	308
1A, 2, 3, 4	North Dakota	Light Crude	325,208	478
1A, 2, 3, 4, 5	North Dakota	Light Crude	697,571	1,025
1A, 2, 3, 4, 5	Saskatchewan	Light Crude	70,213	103
1B, 2, 3	Alberta	Heavy Crude	125,210	184
Weekly totals			**1,427,983**	**2,098**

Calendar week 11

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	273,041	401
1A, 2, 3, 4	North Dakota	Light Crude	191,164	281
1A, 2, 3, 4, 5	North Dakota	Light Crude	642,598	944
1B, 2, 3	Alberta	Heavy Crude	61,407	90
Weekly totals			**1,168,210**	**1,716**

Calendar week 12

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	207,742	305
1A, 2, 3, 4	North Dakota	Light Crude	391,328	575
1A, 2, 3, 4, 5	North Dakota	Light Crude	488,454	718
1B, 2, 3	Alberta	Heavy Crude	63,214	92
5	Saskatchewan	Light Crude	128,021	188
Weekly totals			**1,278,759**	**1,878**

Calendar week 13

Route Segments	Region of Origin	Crude Type	Volume (bbls)	Est # Cars
1A, 2, 3	North Dakota	Light Crude	208,812	307
1A, 2, 3, 4	North Dakota	Light Crude	325,000	477
1A, 2, 3, 4, 5	North Dakota	Light Crude	706,884	1,039
1B, 2, 3	Alberta	Heavy Crude	125,319	184
5	Saskatchewan	Light Crude	65,690	96
Weekly totals			**1,431,705**	**2,103**

Calendar week 14

Week 14 consists of only three 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 Crude	135,553	199
1A, 2, 3, 4	North Dakota	Light Crude	130,000	191
1A, 2, 3, 4, 5	North Dakota	Light Crude	142,026	208
1B, 2, 3	Alberta	Heavy Crude	63,611	93
Weekly totals			**471,190**	**691**

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.*

2020 Quarter 1 total volume (bbls): 17,130,058

A summary of the data shows:

- Three regions of origin were reported: North Dakota, Alberta, and Saskatchewan.
- Two types of crude oil were reported: light and heavy.
- 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 17,130,058 barrels (719,462,436 gallons).
- The average weekly volume of crude oil transported by rail was 1,317,697 barrels (55,343,264 gallons).
- The total number of rail cars moving crude oil by rail was 25,162 cars.
- The average number of rail cars per week moving crude oil by rail was 1,936 cars.
- 93.56 percent of crude oil transported by rail was light crude.
  6.44 percent of crude rail transported by rail was heavy crude.
- North Dakota was the region of origin for 90.89 percent of crude oil transported by rail.
  Alberta was the region of origin for 6.44 percent of crude oil transported by rail.
  Saskatchewan was the region of origin for 2.67 percent of crude oil transported by rail.

Figure 1 shows the weekly total volumes of crude transported by rail for each calendar week in the 1st Quarter of 2020.

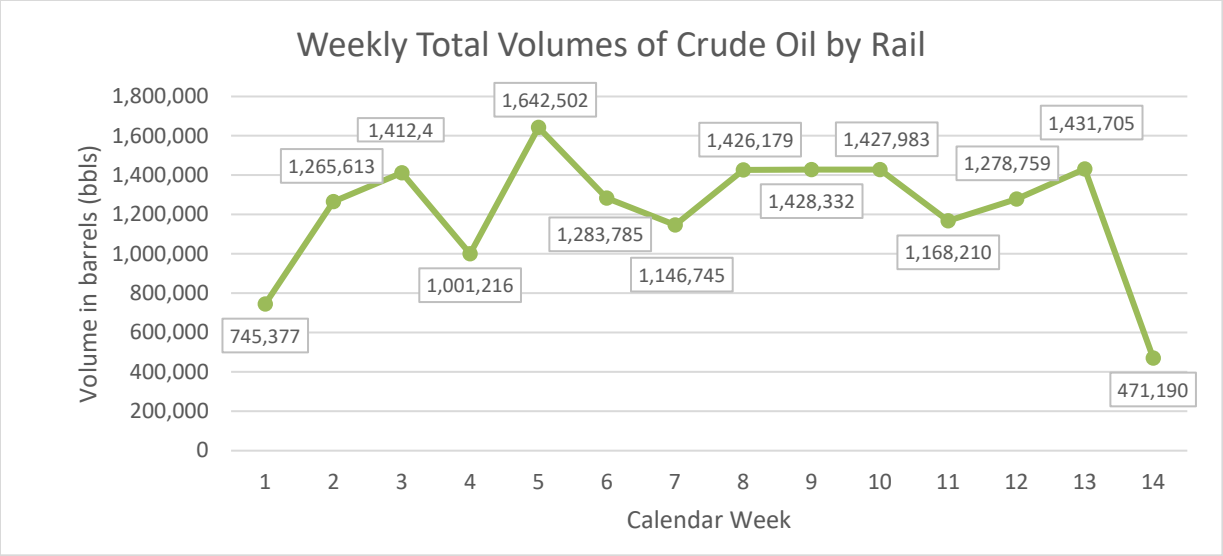


Figure 1: Weekly total volumes of crude oil by rail for the 1st Quarter of 2020

Note: *Week 1 consists of only 4 days of reported ANT volumes due to the dates of the reporting period. Week 14 consists of only 3 days of reported ANT volumes due to the dates of the reporting period.*

The lowest weekly volume was 1,001,216 barrels (42,051,072 gallons) in Week 4. The highest weekly volume of crude transported by rail was 1,642,502 barrels (68,985,084 gallons) in Week 5.

Figure 2 displays crude transported by rail, by route, for the 1st Quarter of 2020.

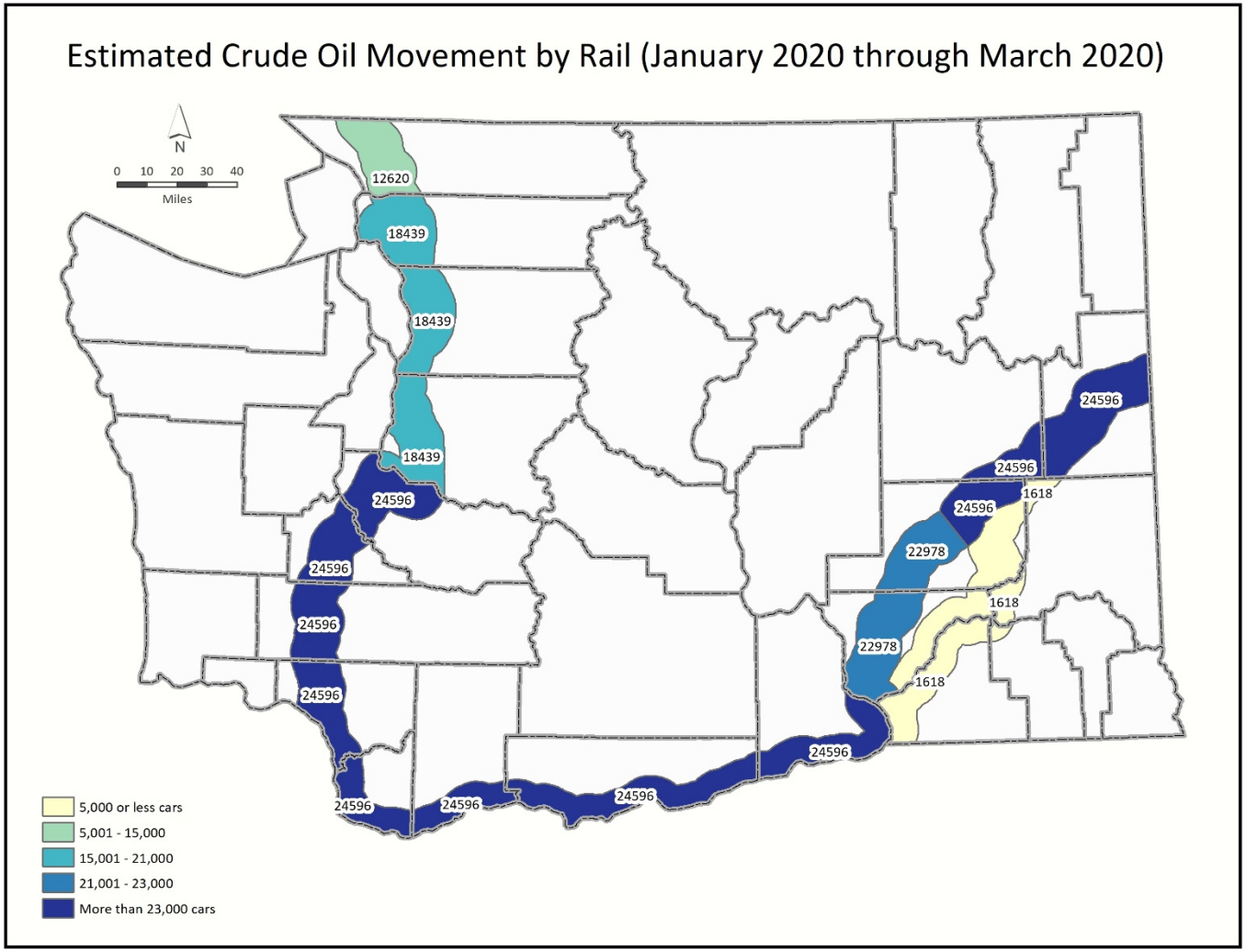


Figure 2: Crude oil movement by route for the 1st Quarter of 2020

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, 2019 through December 31, 2019. 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)
July 1, 2019 – December 31, 2019	Alberta	37,924,846
July 1, 2019 – December 31, 2019	British Columbia	16,053

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, 2021 through June 30, 2021 and must be submitted to Ecology by July 31, 2021.

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 January 1, 2020 through March 31, 2020, 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.

[2] Chapter 173-185 WAC, Oil Movement by Rail and Pipeline Notification
[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 January 1, 2020 through March 31, 2020. 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	19,104,350	802,382,694
Outbound	1,114,000	46,788,000
Total	**20,218,350**	**849,170,694**

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 57 total vessel transfers of crude oil (inbound or outbound).
- The average volume of crude oil transferred to or from vessels per week was 1,555,258 barrels (65,320,823 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 April 1, 2019 through March 31, 2020.[5]

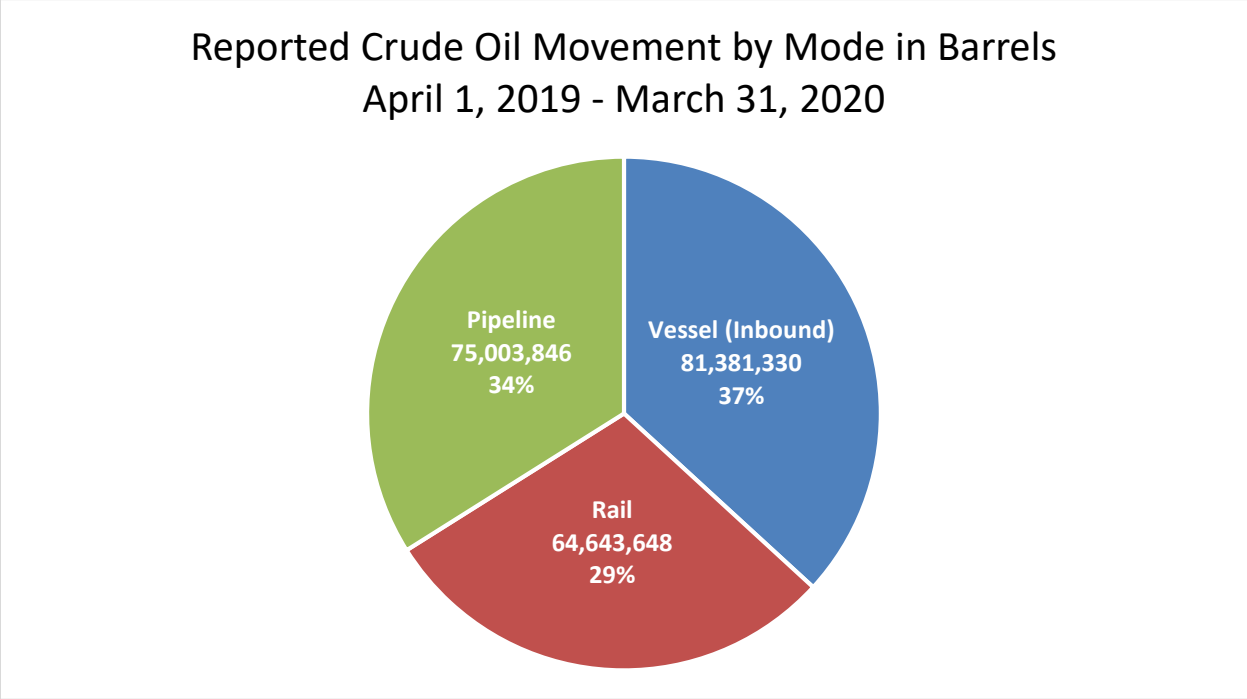
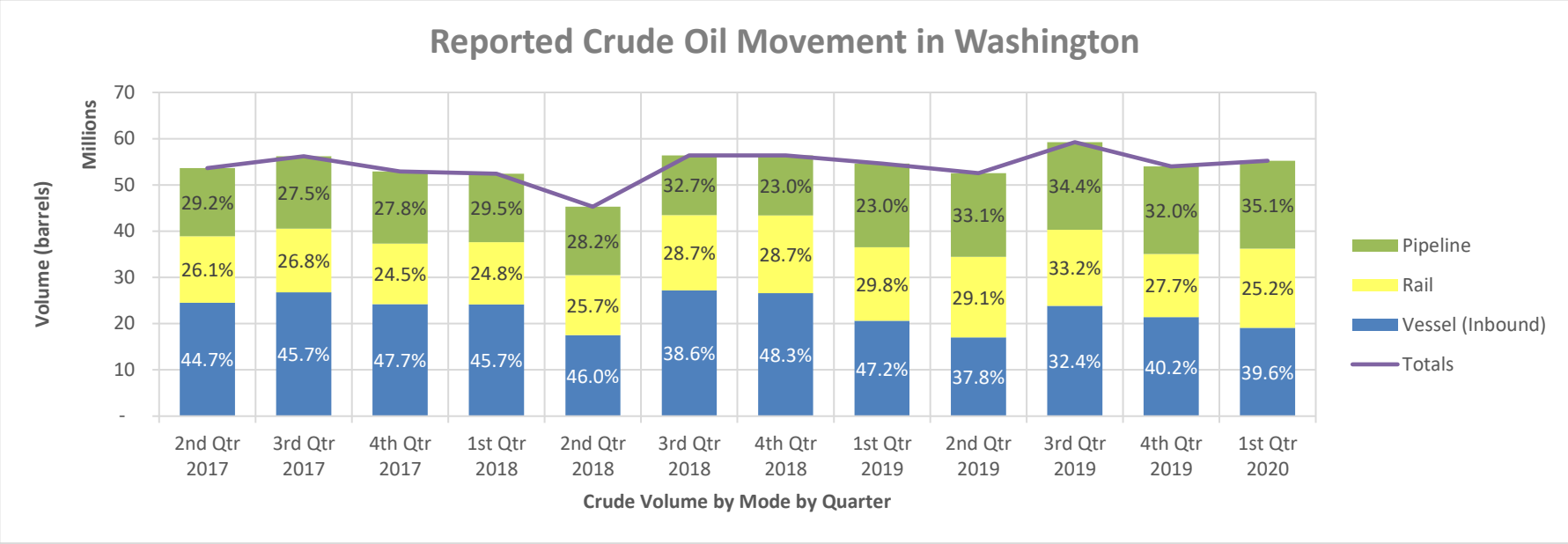


Figure 3: 12-month crude oil movement by mode

Between April 1, 2019 and March 31, 2020, vessels were responsible for 37 percent of reported crude oil movement into the state, rail was responsible for 29 percent, and pipeline for 34 percent.

[5] The most recent biannual notices from pipelines were submitted to Ecology for the period from July 1, 2019 through December 31, 2019. The next biannual notices submitted by pipelines will cover the period from January 1, 2021 through June 30, 2021, and must be submitted to Ecology by July 31, 2021.

Figure 4 shows crude oil movement, by mode, covering the period of April 1, 2017 through March 31, 2020.



Mode	3rd Qtr 2017	4th Qtr 2017	1st Qtr 2018	2nd Qtr 2018	3rd Qtr 2018	4th Qtr 2018	1st Qtr 2019	2nd Qtr 2019	3rd Qtr 2019	4th Qtr 2019	1st Qtr 2020
Vessel (Inbound)	47.7%	45.7%	46.0%	38.6%	48.3%	47.2%	37.8%	32.4%	40.2%	39.6%	34.6%
Rail	24.5%	24.8%	25.7%	28.7%	28.7%	29.8%	29.1%	33.2%	27.7%	25.2%	31.0%
Pipeline	27.8%	29.5%	28.2%	32.7%	23.0%	23.0%	33.1%	34.4%	32.0%	35.1%	34.4%

**Note*: *The most recent biannual notices from pipelines were submitted to Ecology for the period from July 1, 2019, through December 31, 2019. 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, April 2017 – March 2020

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

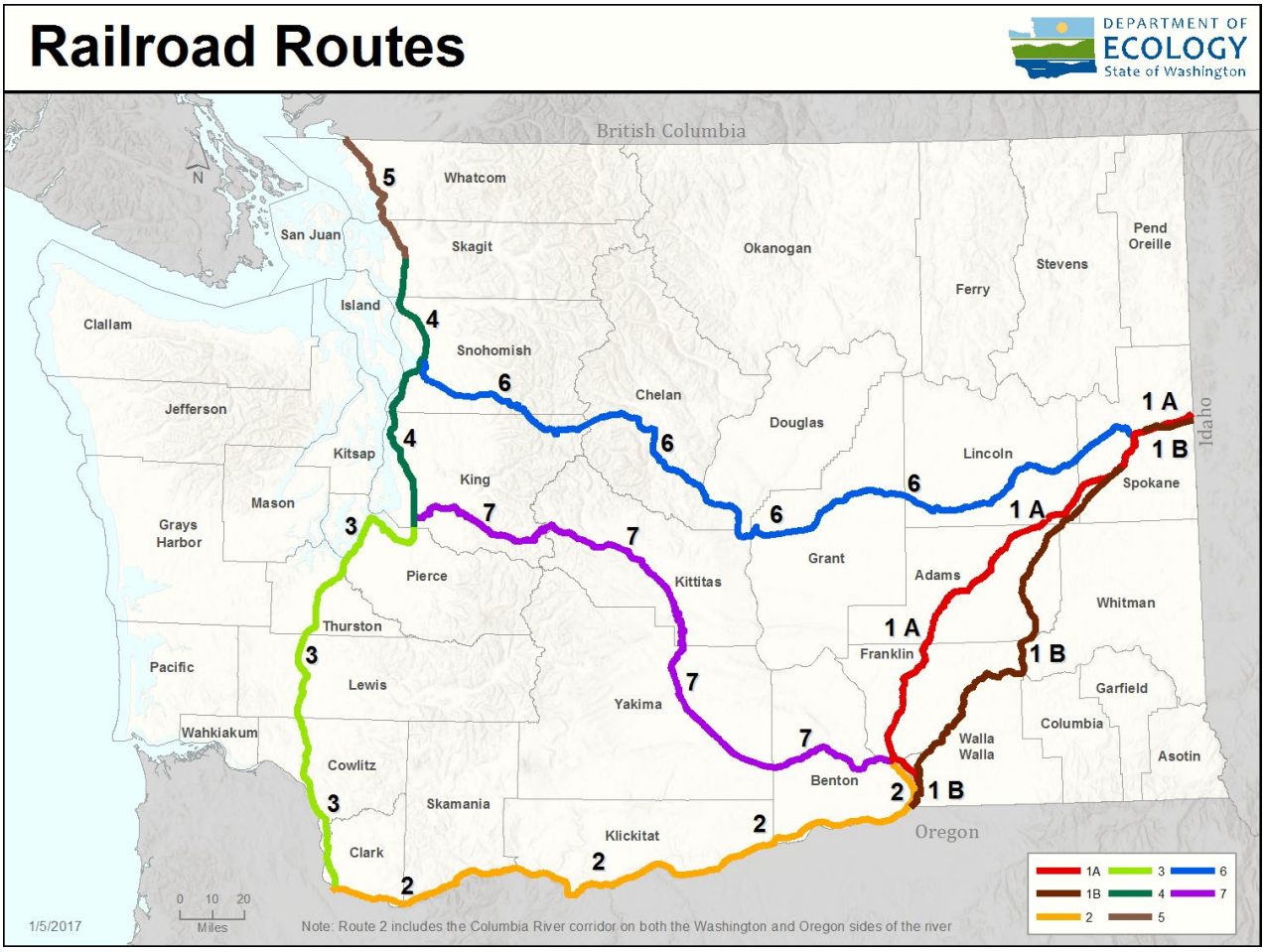

Figure 5: Railroad routes in Washington

Appendix B – API Gravity and Crude Oil Types

Information reported by facilities on scheduled crude oil deliveries includes the gravity 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 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