

Crude Oil and other Tankers at the Trans Mountain Westridge Marine Terminal in Burrard Inlet, Burnaby, B.C.¹

by

David J. Huntley², [October 1, 2020](#)

[Changes from the August 1, 2020, report are in this colour.](#)



The Cabo de Hornos at the Westridge Marine Terminal loading oil to be taken to St. John, New Brunswick via the Panama Canal. Photo taken on June 19 or 20, 2020, copied from the Cenovus web site. Also visible is the construction of new berths. The two large and one small green storage tanks are for jet fuel. The dock at the far right and nearby storage tanks belong to Shell Canada Products; an ATB is at that dock.

¹ I produced this report because the information in it seems not to be readily available publicly. When Trans Mountain was asked for some of this information, the company refused to provide it and the National Energy Board would not force them to provide it (see letter by Robyn Allan to the NEB of September 8, 2018, A6H4A3). When I asked the Vancouver Fraser Port Authority for some data I was told “We cannot give out our corporate information”.

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Summary:

This report provides baseline information needed in order to evaluate the effects of the proposed increase of tanker traffic in the Salish Sea that would accompany the Trans Mountain Expansion Project. It is also relevant to the financial viability of that project.

It demonstrates that the existing terminal could handle many more tankers than it has. It can handle as many as 10 per month, possibly more. The claims from Alberta and Ottawa about a lack of access to tidewater and world prices are without merit since there is and has been guaranteed access to tidewater that is and has been severely underutilized. Only 29 tankers have gone to China since 2014, ten of them in the last four months of 2018 when the price of Alberta oil was exceptionally low, and eight in April, May and June 2020 when the price of all oil was exceptionally low.

This report demonstrates that the Trans Mountain claim and commonly-referred-to existing five tankers per month is incorrect. The actual number varies, but since 2011 has always averaged fewer than 5 per month; for example in 2016 and 2017 the rate was between 1 and 2 per month. For 2018 it was 3.6 per month. For 2019 it was 1 per month. For the first **nine** months of 2020 it was **2.2** per month.

Each of the planned new Westridge delivery lines are expected to provide a significantly larger flow rate. These bring into question the need for 3 berths instead of the present single berth; two berths should more than suffice. The blocking of marine traffic by the proposed third berth is unnecessary.

Nearly all the tankers fall into one of two sizes, large (L) ~ 110,000 t dwt and small (S) ~ 75,000 t dwt, with none in between. The proportion of larger tankers has been decreasing in favour of smaller tankers, though in late 2018, 2019 and 2020 this trend reversed with the advent of some L tankers shipping to Asia.

Tanker numbers

The following table shows how many tankers per year have been loaded. Most, but not all, were crude-oil tankers.

These numbers do not include tankers for which the draught was smaller on leaving the Westridge terminal than arriving at it, presumably from having offloaded jet fuel. Details are provided in the tables in the Appendix; most of those tankers come from South Korea; occasionally one comes from Japan or Taiwan.

The last column shows the amount of oil delivered to the Westridge Marine Terminal¹

year	CRED	TMX #	number	my number	barrels per day
1974			64		
1976			0		
			see text below		
1988			15		
2005	22				
2006	28	27			25,239
2007	37	36	38		38,365
2008	42	40	40		42,806
2009	65	65	65		74,799
2010	69	69	71		79,238
2011		32	34	31	44,243
2012		51	51	50	60,835
2013		49	48	48	58,005
2014		40	40	41	55,474
2015		30	32	29	37,903
2016		15	15	15	22,888
2017		18	18	18	28,651
2018		43		43	60,108
2019				12	
2020 Jan-Sept				20	

The figures for “number” are obtained as follows: for a few years before 2006 the average rate was 24 per year. This and the data for 1974 and 1976 are from the Port of Vancouver². The figure of 15 for 1988 is from Svend Robinson (House of Commons debates April 10, 1989). Data for 2007-2015 are from Robyn Allan³, estimated from the amount of crude oil delivered to the Westridge Marine Terminal. The figure of 15 for 2016 is from the Globe and Mail, June 16, 2017.⁴ The figure of 18 for 2017 is from Robyn Allan (private communication).

The figures for CRED are from the CRED BC report⁵

The figures for TMX # are from a Trans Mountain submission to the NEB⁶

The “my number” figures for March 2017 and later are from my observations using the Marine Traffic and Vessel Finder web sites, supplemented with occasional visual verification. Earlier data are derived from the Pacific Pilotage Authority spreadsheets of pilotage data.

Now to misleading information about the numbers. The application for the Trans Mountain expansion was made in late 2013. The numbers commonly quoted from them are an increase from 5 per month to 34 per month, an increase of a factor of 7. In the two years before the application there never were five per month (ie 60 per year) as claimed. This is still true when allowance is made for the tankers offloading jet fuel. It is particularly distressing that Trans Mountain continues to advertize five tankers per month⁷.

For each of 2016 and 2017 there were ≤ 1.5 crude oil tankers per month loading at the Westridge terminal. If Trans Mountain were to load 400 a year that would be an increase of a factor of about 24.

For 2018 the rate of crude-oil tankers averaged under 4 per month. Until July 2018 they all went to the USA (with one exception to South Korea). Between August and December 2018 twelve tankers went to China, one to South Korea, and one to the USA; this was a new pattern, as there was nothing like it before this in my record.

In 2019 there were 12 tanker loadings, i.e. an average of 1 per month.

In 2020

no tankers loaded in January,

five loaded in February, four in March, two in April, five in May, three in June,

none in July and August, and one in September.

Tankers to Asia:

The numbers of tankers loading at the Westridge terminal and going to China were:

year	number	year	number
2014	1	Jan-Mar 2019	0
2015	4	Apr-Aug 2019	3
2016	0	Sept-Nov 2019	0
2017	0	Dec 2019	1
Jan-June 2018	0	Jan-March 2020	2
July-Dec 2018	12	Apr-June 2020	8

The numbers for 2014-2017 were deduced from a Statistics Canada spreadsheet⁸ listing exports to China by month from 2014 to November 2018 and matching them to tankers listed in the Appendix. Numbers from March 2017 to the present were obtained from my observations using the Vessel Finder and Marine Traffic web sites. Duplicate information where these overlap is consistent.

The sudden increase in the last half of 2018 appears to be associated with the unusually low price of Canadian oil at this time, which came to an abrupt end when the Premier of Alberta ordered a reduction in oil production. The sudden increase in the [spring of 2020](#), appears to be due to the exceptionally low price of oil during this time.

The Muse Stancil report⁹ shows that there are also potential markets in Japan, South Korea and Taiwan. The annual ‘Statistics Overview’ of the Port of Vancouver¹⁰ for 2008-2017 show no shipments to these countries. They do show shipments to Singapore in 2008, 2009 and 2010, Malaysia in 2009, 2010 and 2013 and India in 2013.

Two tankers went to South Korea in 2018 and one in 2019. In 2020 one went to Sikka in north-west India, and one went to New Brunswick. Since February 2017 all the other tankers went to the USA or to China.

The claims by the Premier of Alberta and the Prime Minister that a new pipeline to tidewater is needed to access the world market and higher world prices is shown to be false. As is shown later the Westridge terminal can load over 100 large tankers per year or over 200 small tankers per year. The existing pipeline and Westridge terminal are capable of supplying world markets with far more oil than they have been doing, at least since 2014.

Note that “in 2011 the National Energy Board approved Trans Mountain’s request for 79,000 barrels a day of guaranteed tidewater access.” This is enough for more than four large tankers a month or over 50 large tankers a year. Access to tidewater has not been a problem^{11 12}. It seems that the entire pipeline is not fully utilized; in the first quarter of 2019 utilization was 75-85 %¹³ even though Trans Mountain claims it is always oversubscribed¹⁴.

A wealth of AIS information on departures from the Westridge Marine terminal between January 2013 to February 2018 has been obtained by Greenpeace.¹⁵ These data are used to show graphically

the routes of all tankers, including those offloading jet fuel, and for articulated tugs and barges leaving the Westridge terminal.

Much information about barges carrying oil in the Salish Sea to refineries, and exports of crude oil from Washington State, is available in a 2016 report by Fred Felleman for Friends of the Earth.¹⁶

Tanker sizes

I classify the tankers by deadweight into four classes: L, M, S and VS, where

L means 100,000 - 120,000 tonnes (median 110,000 t)
M means 80,000 - 100,000 t (there are no tankers in this size range in my record)
S means 60,000 - 80,000 t (median 74,000 t)
VS means < 60,000 t

The S tankers are classified as Panamax and have a beam of 32.2 m, the largest that could transit the Panama Canal until June 2016, after which wider tankers could be accommodated.

The L tankers are within the Aframax classification which also includes the M and some S. Aframax ships deadweights range from 70,000 to 120,000 tons, with a capacity of up to 750,000 barrels of oil.¹⁷

The numbers of each are:

year	VS	S	M	L	total	% L
2011	0	7	0	24	31	77
2012	1	23	0	26	50	52
2013	1	19	0	28	48	58
2014	0	18	0	23	41	56
2015	0	18	0	11	29	38
2016	0	11	0	4	15	27
2017	0	11	0	7	18	39
2018	2	16	0	25	43	58
2019	0	6	0	6	12	50

There was a gradual decrease in the proportion of the large (L) tankers from 2011-2017. In late 2018 this trend reversed, the result of several L tankers going to China.

Loading time

Tanker loading time can be evaluated in two ways.

(1) The capacity of the tanker divided by the capacity of the Westridge Delivery line (the pipeline from the Burnaby Mountain storage terminal to the Westridge terminal).

(2) The length of time a tanker spends at the Westridge terminal.

Both are pursued here.

(1) The maximum deadweight (effectively cargo) capacity of the largest (L) tankers attending the Westridge terminal is 120,000 tonnes, a capacity of 750,000 barrels of oil¹⁸. The median deadweight of those attending the terminal is 110,000 tonnes.

The depth of the 2nd Narrows limits 120,000 t tankers to 80 % of capacity¹⁹, i.e. about 600,000 barrels of oil.” The actual volume of oil loaded into L tankers is about 550,000 barrels.²⁰

Volume 4A of the 2013 application states “Line 1 has been designed so that it will have a sustainable annual pipeline capacity of approximately 55,640 m³/d (350,000 bbl/d), based on an assumed slate of light crude oils and refined products. Line 1 will also be capable of transporting heavy crude oil at a reduced capacity.”²¹

The capacity of the existing main Trans Mountain pipeline is approximately 300,000 barrels per day²²; it is 400,000 barrels/day of light oil²³.

Thus, if a largest tanker were to be fed directly from the main pipeline it would take two days to fill it. This provides an upper limit on the tanker loading rate - one L tanker every two days.

There is no storage facility for oil at the Westridge terminal (the three large tanks there are just for jet fuel), but there is storage at the Burnaby Mountain terminal, the current capacity of which is 1.6 million barrels in 13 tanks²⁴, enough to load 2.6 L tankers. We need, therefore, to enquire as to the capacity of the Westridge Delivery Line which feeds tankers from these tanks.

“The existing 609.6 mm (NPS 24) delivery line has a capacity of 4,635 m³/hour (700,000 bbl/d) only in light oil service.”²⁵

During the July 2007 rupture of the pipeline in Burnaby the flow rate of crude oil to an oil tanker increased from 3160 to 3260 cubic metres per hour.²⁶ The first figure is 19,900 barrels per hour (480,000 bbl/d). This oil was not dilbit (bitumen diluted with condensate). It was a mixture of bitumen and synthetic oil, known as synbit²⁷.

The 2018 average capacity of the line from the Burnaby Mountain terminal to the Westridge terminal is 17,000 barrels per hour, which is 408,000 barrels per day.²⁸

The variation in these three figures presumably reflects mainly the different viscosities of the different oils which can vary over two orders of magnitude²⁹.

Dividing the tanker capacity of 600,000 barrels by the lowest flow rate of 400,000 barrels per day we arrive at a maximum loading time of 1.5 days.

The corresponding figures for the smaller (S) tankers are about 400,000 barrels and 1 day to load.

Allowing for time to change tankers and maintenance, one can imagine one large tanker being loaded every 3 days or less. That is a rate of at least 120 tankers per year.

(2) How fast does Kinder Morgan load tankers now?

Some recent actual times spent at the Kinder Morgan dock are: with increases in draught in brackets:

L tankers

May 12-14, 2018:	Aqualeader	51 hr	(3.5 m)
May 29-31, 2018:	Aristoklis	49 hr.	(3.6 m)
June 12-14, 2018:	Aqualegacy	21.5 hr	(3.5 m)
June 18-20, 2018:	Tavropos	52 hr	(3.3 m)
July 2-3, 2018:	Serene Sea	38.5 hr	(4.2 m)
July 20-22, 2018:	British Robin	49.3 hr	(3.8 m)
July 25-27, 2018:	Aristoklis	47 hr	(3.9 m)
Aug 12-13, 2018:	Dubai Attraction	31 hr	(1.0 m)
Aug 22-24, 2018:	Thomas Zafiras	59 hr	(2.8m)
Sept 1-3, 2018:	Aristaios	50 hr	(3.5 m)
Sept 21-23, 2018:	Dubai Attraction	46.5 hr	(3.1 m)
Sept 27-29, 2018:	British Rigour	49.3 hr	(3.9 m)
Oct 13-15, 2018:	Nord Tulip	43.5 hr	(3.3 m)

S tankers

Mar 8-9, 2018:	Xanthos	26 hr	(3.3 m)
Apr 5-6, 2018:	Selecao	28.5 hr	(2.2 m)
Apr 11-12, 2018:	Persepolis	28 hr	(2.6 m)
Apr 27-28, 2018:	Seaways Luzon	29 hr	(1.9 m)
May 9-10, 2018:	Seaway Visayas	28.5 hr	(2.1 m)
May 19-20, 2018:	Kerala	24 hr	(2.3 m)
Oct 9-10, 2018:	Energy Commander	29 hr	(3.8 m)

Note that all loadings take under 2½ days, and for the S tankers the times are just over 1 day. In 2015 all loadings were under 2 days (40 h or less).

Kinder Morgan's projected rate for 3 Aframax berths is 400 tankers per year.³⁰ That is 133 tankers per year per berth, which is one tanker every 2.74 days per berth.

I conclude that a rate of one tanker loaded every 3 days per berth is practical, and that one tanker loaded in under 2 days is practical for smaller tankers.

Based on the figure of one tanker every 3 days 120 tankers can be loaded in a year. Recognizing that some time must be allowed for maintenance and that some, maybe half, the tankers are of the smaller variety and only take just over a day to load, it is evident that there is considerable unused tanker

loading capacity at the Westridge terminal. It has been rare for Kinder Morgan to exceed 50 % of its loading capacity, and in 2016, 2017 and 2019 it was using less than 15 % of its loading capacity.

(3) How fast could tankers be loaded in the future?

“Line 2 has been designed so that it will have a sustainable annual average pipeline capacity of approximately 85,850 m³/d (540,000 bbl/d), based on an assumed slate of heavy crude oils. Line 2 will also be capable of transporting light crude oils, if necessary.

Line 1 and Line 2 combined will be able to provide a batched transportation service for a variety of crude oil types and products, with a combined sustainable annual average capacity of approximately 141,500 m³/d (890,000 bbl/d)”.³¹

Thus if tankers were to be directly loaded from Lines 1 and 2 it would take 600,000 bbl / 890,000 bbl/d = 0.67 days to load one L tanker. This is an average rate of 1.5 L tankers per day, and an overall upper limit.

The actual figure will be less because:

- (a) some oil is diverted to Washington State by pipeline at Sumas.
- (b) some oil is diverted by pipeline to the Parkland refinery in Burnaby
- (c) some product is delivered to other facilities in Burnaby

This figure arises from the limitations of Lines 1 and 2. Because tankers are loaded from the Burnaby Mountain storage tanks, we must enquire how fast this process could be. It is apparent from the above that the existing loading times are limited by the flow rate in the Westridge Delivery Line. What about the three new lines through the Burnaby Mountain tunnel?

The planned three new delivery lines are each larger than the one existing single line, 30 inches in diameter vs 24 inches. For one line, this is a 56 % increase in cross section. For all three lines the increase is a factor of 4.7, and will permit a much higher flow rate. There is a second effect, namely that the new lines through Burnaby Mountain go directly uniformly downhill, with a gradient of 4.2 %³², from the Burnaby Mountain storage tanks to the Westridge terminal, in comparison to the present line which has a complicated path under city streets. Each of these three lines will have a capacity of 700,000 barrels/day³³ Thus it will be possible to load one large tanker in less than one day using one of the new delivery lines, or less than half a day using two of them. Thus there is no need for three berths; one may suffice, and two berths certainly will.

Can the oil be delivered to the tankers? Yes. Trans Mountain’s response to an information request from the National Energy Board provides the details³⁴. The plan is to make three new berths, each with three loading arms, each loading arm capable of delivering 26,000 barrels of oil per hour (624,000 bbl/day). With three loading arms one of the L tankers could thus be loaded with 600,000 barrels in one-third of a day. But, the plan is to use only two arms, the third arm being a spare. The plan is to use each arm at only approximately 56 % of capacity, which brings the loading rate to 700,000 barrels per day, or about 20 hours to load an L tanker, and about half that for an S tanker. Once again we find that one berth may suffice and two berths certainly will.

This issue is addressed in a statement in the Muse-Stancil report regarding the Expanded Trans Mountain Pipeline “The Westridge dock loading capacity is 99,400 m³/d (625 kb/d)”.³⁵ This report appears to be ill informed.

There is no need for three berths.

This is a topic that the national Energy Board should pursue in light of the obstruction to marine traffic that the new berths present.³⁶

This conclusion was contested by Trans Mountain in its reply evidence to NS NOPE and referred to its responses to Information Requests from the Vancouver Port Authority. There is actually no discussion of this issue in those responses³⁷.

(4) Tanker Traffic

We are occasionally told things like “Oil tanker activity associated with the Trans Mountain Expansion Project represents a small portion of current and future overall vessel movement in the Port [of Vancouver] and the Strait of Juan de Fuca”.³⁸ This is not relevant to the marine traffic through Second Narrows, near the eastern end of Burrard Inlet where there are strong tidal currents, a highway bridge and a railway bridge. There are restrictions on tankers and freighters traveling through here with regards to vertical clearance (2 m), breadth of tanker, under keel clearance (10 % of static draft, currently 13.5 m for loaded tankers), rail bridge lift span elevated, stemming a current of 1 or 2 knots, at a maximum speed of 6 knots; most tanker transits are restricted to daylight hours with specified visibility³⁹. The addition of one large (L) tanker transit each way each day will be a substantial increase, it will be something like a doubling of tanker and freighter transits through Second Narrows⁴⁰. How this will be accommodated I do not know, but it may restrict other marine traffic. This issue is discussed in a Trans Mountain response to an information request from Port Metro Vancouver⁴¹, in which the numbers of transit windows by month are presented.

(5) Oil and bitumen

Oil and gas consist mainly of hydrocarbons, compounds of carbon and hydrogen of various complexity. The simplest is methane, CH₄, a gas under normal conditions. C₆H₆ is benzene, a liquid, which can cause cancer. Compounds with much large numbers of carbon and hydrogen atoms are extremely viscous and somewhat solid under normal conditions - they are called bitumen or tar, though they are sometimes referred to as oil.

Each oil production facility produces oil with different compositions. Different refineries are set up to process oil with particular compositions, If a refinery is going to process a different oil it has to try it out first and may purchase it at a discount⁴². Western Canada Select (WCS) is a mixture of bitumen from different bitumen sands and diluted to a specified composition and density. An extensive description is provided by an article in Oil Sands Magazine⁴³

The amount of oil flowing in various pipelines is provided on a monthly basis on the Canada Energy Regulator web site⁴⁴. “Heavy oil” and “light oil” are shown separately. This permits one to deduce which kind of oil some of the tankers loaded, and this is now indicated in the tables [when possible](#).

Concluding remarks

- (1) There is much unused loading capacity at the existing Westridge Marine Terminal.
- (2) The design of the Trans Mountain Expansion includes three berths at the Westridge Marine terminal. Two berths will be more than sufficient.
- (3) Construction of the third berth was scheduled to start in 2019. The [Canada Energy Regulator](#) should order it to be postponed indefinitely.
- (4) It is clear that Trans Mountain's often stated figure of five tankers per month is incorrect. From 2011 to the present the average rate has been approximately 3 tankers per month.

This paper is a work in progress. Further tanker data for 2020 will be added as it becomes available, as will other relevant information. Please advise me at huntley@sfu.ca if you find any errors, additional relevant information, or explanations needed.

Acknowledgements:

I am very grateful for help from Robyn Allan, Nelson Bennett, Ted Fullerton and the Pacific Pilotage Authority.

Appendix: Details of tankers by year.

Tables: tankers arriving at and leaving from the Trans Mountain Corporation Westridge Marine terminal in Burnaby, B.C. Unless otherwise indicated they are crude oil tankers

All data before late February 2017 are from the Pacific Pilotage Authority (PPA) except for the tanker sizes which were obtained from the Marine Traffic or Vessel Finder web sites..

After late February 2017 data are from the PPA and from the Automatic Information system (AIS) as provided by the MarineTraffic.com and VesselFinder.com web sites, supplemented occasionally by my visual observations.

I have often seen AIS report an incorrect destination; for example one tanker went south to California stating all the way that it was going to the Indian Arm anchorage (in Burrard Inlet).

There have been at least five occasions when a tanker at the Trans Mountain dock disappeared from AIS. It turned up again when the tanker left the terminal.

Tankers for which the draught was less after leaving the terminal than on arrival are not included as they are presumed to have offloaded something, probably jet fuel, which is stored in the two large tanks at the Westridge terminal. These storage tanks do not have the capacity of one tanker and thus one sees a tanker making two, three or even four trips to the terminal over a period of a few days. These tankers are listed in the notes to each table.

I do not know the rôle that the ballast plays in the draughts.

A blank in the table indicates I do not know.

Non-crude oil tankers may not have loaded crude oil

I have classed tankers according to size by DWT in tonnes as follows:

L = 100,000 - 120,000 t,

M = 80,000 - 100,000 t, (there are none in this size range)

S = 60,000 - 80,000 t,

VS = < 60,000 t.

These tables do not capture all exports from the Westridge terminal by articulated tugs and barges (ATBs). An ATB is a tug pushing an attached barge. The barge has a large notch in its stern. Pins at the bow of the tug attach it to this notch, allowing rotational motion. These barges have significant capacities which can be found on the owners' data sheets. These ATBs can be followed using AIS and are in the Pacific Pilotage Authority database. The destinations of the ones I have observed have been Washington or California. Their capacities are, from data sheets:

Nancy Peterkin: barge name Kirby 185-01; 185,000 bbl, 26,655 MT dwt

ATB Vision 650-10: 27,465 MT dwt

Gulf Reliance: barge 650-2; 155,000 bbl

Bill Gobel: barge; 80,000 bbl

The Black Hawk tug, IMO # 7021962, was acquired by the Sauce Brothers Ocean Towing Company in 2012. Although it is an ATB tug, it is also used for towing barges such as the Commencement Bay (see below).

Also not captured by the tables are exports from the Westridge terminal by barges towed by tugs. These are effectively impossible to track because the barges do not use AIS, and relevant data are hard to find. The 2016 report by Felleman⁴⁵ shows the amount of diluted tar sands bitumen shipped this way by Sause Brothers barges from the Westridge terminal to the U.S. Oil refinery in Tacoma Washington from 2010 to 2014. It varied between 1.6 and 2.7 million barrels per year.

Two barges towed by the Joseph Sauce are:

Drakes Bay, capacity 16,053 short tons = 14,567 tonnes

Commencement Bay, capacity 13,705 short tons = 12,433 tonnes.

The Joseph Sauce is in the PPA database.



Figure 2: An ATB at the Westridge Marine Terminal.
(Photo from Kinder Morgan via Focus on Victoria, date unknown)

The following abbreviations are used

WMT = Westridge Marine Terminal. (I used Westridge or KM in earlier reports)

PPA = Pacific Pilotage Authority

COT = crude oil tanker

C/OT = chemical/oil tanker

C/OPT = chemical/oil-products tanker

OPT = oil products tanker

CLM = Port Angeles

LB = Long Beach, California

bbbl = U.S. barrel

kb = thousand U.S. barrels

h = heavy oil

lt = light oil

2011

	Tanker	size	left WMT	draughts (m)	
				before	after
1	Sunlight Venture	S	Jan 7	7.2	10.9
2	Zirku	L	Jan 13	8.2	12.86
3	Chantal	S	Jan 29	8.6	11.05
4	SPT Conqueror	L	Feb 7	8.9	12.8
5	Carmel	L	Feb 15	8.6	11.65
6	Omega King	S	Feb 24	8.3	10.4
7	Carmel	L	Mar 4	8.7	11.25
8	Carmel	L	Mar 28	8.7	11.85
9	Chemtrans Star	S	Apr 7	8.2	11.5
10	Amba Bhavanee	L	Apr 14	8.7	11.8
11	British Oak	L	May 2	8.2	13
12	Zaliv Amurskiy	L	May 10	10.4	12.8
13	Bunga Kelana 10	L	May 12	8.5	11.3
14	Chantal	S	May 30	8.55	12.75
15	Fedor	S	June 7	9.88	11.95
16	Amba Bhargavi	L	June 13	8.5	12.15
17	Zaliv Amerika	L	July 3	10.8	13
18	Valdarno	L	July 15	8	13
19	Valdarno	L	Aug 3	8	12.72
20	Carmel	L	Aug 12	8.65	12.45
21	Zaliv Amerika	L	Sep 3	9.3	13
22	Carmel	L	Sep 13	8.5	13
23	Sanko Breeze	L	Sep 27	8.5	12.9
24	Carmel	L	Oct 7	8.3	12.5
25	Alkyonis	S	Oct 31	8.2	9
26	Carmel	L	Nov 5	8.5	12.5
27	Nissos Kythnos	L	Nov 12	8.2	11.4
28	Carmel	L	Nov 27	8.5	9.7
29	Adele Marina Rizzo	L	Dec 5	8.5	12.4
30	Carmel	L	Dec 14	8.5	12.38
31	Aqualeader	L	Dec 30	8.4	10.9

2011 tanker notes:

Not included are the following tankers for which the draught was smaller after leaving the Westridge terminal and thus I deduce offloaded something, presumably jet fuel: Eagle Melbourne (OPT, Apr 26), Mercini Lady (O/CT, June 1), Sunlight Express (July 5), Vinalines Glory (O/CT Aug 5 and Oct 25)), Overseas Long Beach (O/CT, Oct 5 and Nov 3).

The Omega King, Fedor, and Adele Marina Rizzo were oil products tankers and may not have loaded crude oil.

2012

	Tanker	size	left WMT	draughts (m)	
				before	after
1	Eser K	L	Jan 13	8	10.75
2	Energy Conqueror	S	Feb 1	8	9.35
3	Everest Spirit	L	Feb 2	9.1	11.75
4	Action	L	Feb 18	9.66	12
5	Golden State	VS	Feb 27	7.8	11.9
6	Yasa Golden Dardanelles	L	Mar 3	8	10.5
7	Cabo Hellas	S	Mar 6	8.4	10.5
8	Eser K	L	Mar 14	8	12.2
9	Voidomatis	S	Mar 25	7.5	10.7
10	Eser K	L	Apr 3	8	11.9
11	Voidomatis	S	Apr 10	7.5	10.7
12	Nassau Spirit	L	Apr 15	8.5	12.85
13	Seaservice	L	Apr 24	8.7	12.6
14	Alqadisya	L	May 4	9.6	12.85
15	British Laurel	L	May 11	8.5	9.85
16	Alpine Penelope	S	May 15	9.28	11.15
17	Zaliv Amerika	L	May 24	8.6	12.45
18	Overseas Sophie	L	May 31	9	9.4
19	Alpine Penelope	S	June 7	8.71	10.79
20	Aqualiberty	L	June 10	8.32	12
21	Chemtrans Ray	S	June 15	9	10.4
22	New Conquest	S	June 24	8.5	11
23	Aqualoyalty	L	June 29	8.5	8.45
24	New Advance	L	July 5	8.9	9.28
25	Aqualegend	L	July 9	8.2	11.55
26	Marka	S	July 14	8.2	11.6
27	Oracle	L	July 27	7.95	13
28	Aqualegend	L	Aug 3	8.28	12.1
29	Overseas Mindoro	S	Aug 9	8.2	10.75
30	Overseas Visayas	S	Aug 15	8.3	11.65
31	HS Carmen	L	Aug 23	9	9
32	Marka	S	Sep 4	9.4	10.5
33	Yasa Golden Horn	L	Sep 5	8.02	8.8
34	King Darius	S	Sep 14	8.2	11.75
35	Overseas Silvermar	S	Sep 24	8.6	9.9
36	BW Seine	S	Oct 1	8.2	11.75
37	Aqualiberty	L	Oct 7	8.3	11.6
38	King Darius	S	Oct 14	8.2	11.7
39	Zaliv Amurskiy	L	Oct 20	8.55	12.85
40	Cabo Sounion	S	Nov 3	9.5	11.1
41	Avor	L	Nov 7	8.2	12
42	SCF Prime	S	Nov 14	8.2	11.55

43	BW Seine	S	Nov 21	8.4	11.23
44	Chantal	S	Nov 25	8	8
45	Riga	S	Dec 1	8.1	10.05
46	SCF Prime	S	Dec 4	8.4	11.8
47	Aqualegacy	L	Dec 9	8	11.6
48	British Oak	L	Dec 15	8.1	9.2
49	Erik Spirit	L	Dec 19	8.5	9.51
50	Ice Blade	S	Dec 28	8.34	11.3

2012 tanker notes:

Not included are the Golden State, an O/CT which left on Feb 6, Overseas Los Angeles (C/OPT, Mar 8), Maersk Bering (O/CT, Mar 19), Kamome Victoria (OPT, Apr 13), Overseas Los Angeles (C/OPT, June 12) and Zaliv Amurskiy (COT, Sept 28); on leaving their draughts were lower than on arrival, indicating that they offloaded something, presumably jet fuel.

All in the table were crude oil tankers except the Golden State (O/CT), Marka (O/CT), BW Seine (OPT), Cabo Sounion (OPT), Riga (OPT) and Ice Blade (OPT). These may not have loaded crude oil.

The Aqualoyalty, HS Carmen and Chantal draughts did not change from arrival to departure. I do not know whether this is real or not. These figures from the PPA are determined by the pilots and should be reliable (they are independent of AIS).



Figure 3: The Aqualegend at the Kinder Morgan Westridge dock on July 8, 2012.
Photo by David Huntley.

2013

	Tanker	size	leave WMT	draughts (m)		destination
				before	after	
1	Summit Europe	S	Jan 6	8.3	10.5	
2	Avor	L	Jan 9	8.2	12.05	
3	British Oak	L	Jan 14	8.1	10.4	
4	Action	L	Jan 28	9.07	12.4	
5	SCF Prime	S	Feb 4	8.5	10.6	
6	Avor	L	Feb 11	8.25	11.7	
7	New Award	L	Feb 14	9.8	11.95	
8	Antipolis	S	Feb 23	9.26	10.54	
9	Overseas Rosemar	S	Feb 27	8.6	11.1	
10	British Beech	L	Mar 7	9.75	10.2	
11	Avor	L	Mar 11	8.2	10.9	
12	Action	L	Mar16	8.3	12.1	
13	Eser K	L	Mar 26	8	12.32	
14	Spike	L	Apr 6	8	11.75	
15	London Star	S	Apr 12	8.35	11.68	
16	Neapolis	S	Apr 16	8.34	11.39	
17	Aqualegend	L	Apr 29	8.4	8.86	
18	Overseas Luzon	S	May 4	9.2	11.4	
19	Smart Lady	L	May 13	8.1	11.6	Long Beach
20	Nave Ariadne	S	May 27	8.7	11.1	Los Angeles
21	Smart Lady	L	May 30	8.1	8.6	
22	Summit Europe	S	Jun 6	8.25	11.45	Vendovi
23	Aqualiberty	L	Jun 12	8.66	12.06	Long Beach
24	Smart Lady	L	Jun 24	8.6	12.3	Ningbo
25	Stena Callas	S	July 4	8	9.6	
26	Aqualegacy	L	July 9	8.3	9.75	Long Beach
27	Chemtrans Star	S	July 12	8.7	9.5	
28	DS Promoter	S	Aug 1	8	10.1	Long Beach
29	New Constellation	S	Aug 5	8.2	12.14	Los Angeles
30	Overseas Pearlmar	S	Aug 10	8.1	9.42	Los Angeles
31	World Harmony	S	Aug 15	8.5	11.7	El Secundo
32	Sanko Breeze	L	Aug 29	9.41	10.12	
33	Dubai Glamour ^a	L	Sep 6	8.5	11.1	
34	Summit Europe	S	Sep 15	8.4	10.95	
35	Despina	S	Sep 24	8.5	12.05	
36	Aqualiberty	L	Oct 2	8.5	8.59	
37	Despina	S	Oct 8	8.5	11.92	
38	Aqualiberty	L	Oct 10	8.5	8.81	
39	Yasa Golden Horn	L	Oct 14	8	10	
40	Pichincha	L	Oct 31	9.5	12.06	
41	Nedas	S	Nov 7	7.7	10.4	
42	Mitera Marigo	L	Nov 19	9.1	12.8	
43	Eagle Phoenix	L	Nov 29	8.5	11.3	
44	Overseas Nikiski	VS	Dec 4	8.8	10.5	

45	Yasa Golden Bosphorus	L	Dec 12	7.7	7.9
46	Smart Lady	L	Dec 17	8.1	9
47	Yasa Golden Bosphorus	L	Dec 19	7.7	9.5
48	Smart Lady	L	Dec 26	8.1	10

2013 tanker notes:

Not included is the Nave Ariadne which left on May 10, having spent 15 hours at the Westridge terminal; its draught reduced from 9.2 to 8.94 m, indicating it had offloaded something, perhaps jet fuel. Time for all the other tankers at the terminal varied from 20 h to 45 h.

All were crude-oil tankers except for the Antipolis, Neapolis and Summit Europe which are oil-products tankers, and the Overseas Nikiski which is an oil/chemical tanker. These may not have loaded crude oil.

The increase in draught was small for the British Beech, Aqualegend, Smart Lady (May 30), Aqualiberty (Oct 2), and Yasa Golden Bosphorus (Dec 12). I do not know why; they all spent little time at the terminal: 21-26 hours.

The large tankers took longer to load than the small ones on average. The small ones typically took 25 hours and the large ones 30 hours. There was much scatter with the standard deviation being about 5 hours.

Destinations are from my notes obtained from the Marine Traffic web site.

note a: A brief video of the Dubai Glamour moving through Second Narrows is included at about 52 minutes in the video “This Living Salish Sea” by Sarama, available at <http://livingsalishsea.ca/wp/> Accessed September 25, 2019

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2014 tanker notes:

Not included is the Sea Victory (S, O/CT, July 1-3), for which the draught decreased from 10.5 to 8 m, presumably indicating it offloaded jet fuel.

The Overseas Visayas, Cabo Sounion, Moonlight Venture, and Energy Century were oil products tankers and therefore may not have loaded crude oil.

b: The Pacific Bridge is shown just after 46 minutes on Sarama’s video “This Living Salish Sea” available at <http://livingsalishsea.ca/wp/> accessed September 25, 2019.

2014

	Tanker	size	leave WMT	draughts (m)	
				before	after
1	DHT Sophie	L	Jan 5	8.5	10.75
2	Eser K	L	Jan 15	8.1	10.7
3	Eser K	L	Jan 25	10.7	11.6
4	New Activity	L	Jan 29	8.47	12.05
5	Antipolis	S	Feb 1	8.25	10.79
6	Yasa Golden Horn	L	Feb 7	8	10.65
7	Overseas Visayas	S	Feb 14	8.2	10.1
8	DS Promoter	S	Mar 1	8	9.7
9	Overseas Visayas	S	Mar 3	8.2	9.3
10	FSL Shanghai	L	Mar 12	8	11.45
11	Eser K	L	Mar 19	8	12
12	FSL Shanghai	L	Mar 29	8	11.8
13	Nave Ariadne	S	Apr 15	8.7	11.15
14	Cabo Sounion	S	Apr 22	8.5	11
15	Ambelos	L	May 1	7.9	8.7
16	Eser K	L	May 7	8.2	11.78
17	Yasa Golden Horn	L	May 17	8	9
18	Moon Lady	L	May 27	8.1	12.45
19	Moonlight Venture	S	May 31	7.5	11.7
20	Eser K	L	June 7	8.2	11.55
21	Moonlight Venture	S	June 16	7.5	11.1
22	Zaliv Amerika	L	June 22	8.5	13
23	Energy Century	S	July 4	9.2	10.9
24	DS Progress	S	July 5	8	11.8
25	Yasa Golden Horn	L	July 15	8	11.71
26	FSL Shanghai	L	July 22	8	12.6
27	Overseas Goldmar	S	July 30	8.6	9.5
28	Moonlight Venture	S	Aug 8	7.5	12
29	Xanthos	S	Aug 16	8	11.6
30	Aqualegacy	L	Aug 23	8.7	12
31	Yasa Golden Horn	L	Sep 3	8	11.75
32	Blue Sun	L	Sep 15	8.4	12.5
33	DHT Sophie	L	Oct 13	8.4	11.9
34	Pacific Bridge ^b	L	Oct 30	8	9
35	New Constellation	S	Nov 10	8.4	12.1
36	Ratna Shalini	L	Nov 18	9.1	13
37	New Constellation	S	Nov 27	8.4	13
38	Aqualegend	L	Dec 7	8.85	11.9
39	Nave Cetus	S	Dec 15	8.5	10.3
40	Overseas Luzon	S	Dec 17	9	11.8
41	Overseas Leyte	S	Dec 30	8.6	9.5

notes for the 2014 tankers are on the previous page.

2015

	Crude Oil Tanker	size	leave WMT	draughts (m)	
				before	after
1	Eser K	L	Jan 6	8	12.1
2	New Constellation	S	Jan 20	8.4	11.7
3	Nave Cetus	S	Jan 29	8.4	10.2
4	Shanghai Dawn	L	Feb 2	8.5	12.48
5	New Constellation	L	Feb 6	8.4	12.05
6	DHT Sophie	L	Feb 15	8.4	11.8
7	Nedas	S	Mar 7	8	9.9
8	Energy Champion	S	Mar 8	8	12
9	New Constellation	L	Mar 13	8.4	12.2
10	Megacore Philomena	S	Apr 9	8	11.14
11	Yasa Golden Horn	L	Apr19	8	11.56
12	Pichincha	L	Apr 29	10.16	13
13	Genmar Companion	S	May 6	9	11.5
14	Evrotas	S	May 8	8	10.6
15	Yasa Golden Horn	L	May 19	8	8.7
16	Gulf Stream	S	June 4	8.5	11.55
17	DS Promoter	S	June 13	7.9	9.5
18	Gulf Stream	S	June 21	8	10.7
19	Overseas Pearlmar	S	July 10	8.5	11.3
20	DS Promoter	S	July 15	7.8	11.31
21	Larvik	S	Aug 11	6.8	10.9
22	Chantal	S	Sept 13	8.1	10.5
23	Chantal	S	Sept 29	8.1	11
24	FSL Hong Kong	L	Oct 18	8	9
25	Maya	S	Oct 25	8	10
26	World Harmony	S	Nov 14	8	13.04
27	Jasmin Joy	L	Dec 2	8	12.65
28	Phoenix Concord	L	Dec 21	9.2	12.6
29	Chantal	S	Dec 28	8.2	11.05

2015 tanker notes:

Not included is the Keros (S, COT) which left on March 19, having spent only 19 hours at the Westridge terminal; its draught reduced from 8.5 m to 8.2 m, indicating it had offloaded something, perhaps jet fuel. Also not included is the Prime Express (VS, OPT) which left on Dec 30 with its draught reduced from 9.6 to 7.5 m. Time for all the other tankers at the terminal varied from 24 h to 40 h.

All were crude-oil tankers except the Gulf Stream and Maya, which were oil products tankers.

2016

	Tanker	size	leave WMT	draughts (m)	
				before	after
1	Chantal	S	Jan 19	8.15	11.4
2	Aqualeader*	L	Mar 7	8.5	8.7
3	Chantal	S	Mar 12	8.2	11.2
4	SCF Pacifica	S	Mar 29	8	10.1
5	Kerala	S	Apr 7	8.57	11.7
6	New Constellation	S	Apr20	8.7	12.2
7	Eser K	L	May 19	8.1	11.75
8	Overseas Visayas	S	Jul 17	8.7	11.17
9	Overseas Visayas	S	Aug 10	8.7	10.36
10	Eser K*	L	Oct 5	8.8	8.8
11	Energy Commander	S	Oct 25	8.3	11.4
12	World Harmony	S	Nov 4	8.5	11.5
13	FSL Hong Kong	L	Nov 11	7.85	11.95
14	Overseas Luzon	S	Dec 15	8	11.7
15	Overseas Rubymar	S	Dec 23	8.5	11.55

2016 tanker notes:

There were three other tankers that attended the Westridge terminal during 2016; They were chemical/oil products tankers for which their draughts were reduced at the terminal, presumably from offloading jet fuel (STI Benicia and Silver Eburna in February, and UACC Mansouria in July).

* The Aqualeader (March) draught did not change significantly. Photographs on the Marine Traffic web site by Rick Voice show only a small increase in draught, consistent with these values. The Eser K (October) draught did not change indicating it loaded little if any oil; supporting photographic evidence would be good to have.

2017

	Tanker	size	from	arrive WMT	leave WMT	draughts/m		destination	got there?
						before	after		
1	Gulf Stream	S		Jan-06	Jan-07	8.2	11.5		
2	Eser K	L		Feb-03	Feb-04	9.2	10.8		
3	Aqualegend	L		Feb-13	Feb-15	8.2	11.75		
4	Keros	S		Feb-27	Feb-28	8.3	10.8	Richmond	
5	Energy Commander	S	Santa Cruz MX	Mar-13	Mar-14	8.15	10.9	Long Beach	
6	Kerala	S	Martinez	Apr-05	Apr-06	8.6	11.7	El Segundo	
7	Nestos	S	Lazaro Cardenas	Apr-12	Apr-13	7.1	8.7	El Segundo	Yes
8	Pacific Treasures	L	Martinez	May-01	May-03	8.5	12.6	Houston	
9	Overseas Raymar	S	Martinez	May-15	May-16	8.7	11.2	Long Beach	Yes
10	New Conquest	S	Los Angeles	Jun-06	Jun-07	8.4	11.3	Long Beach	Yes
11	Aristaios	L	Nikiski, Alaska	Jul-15	Jul-16	8.7	9.15	Long Beach	
12	Energy Century	S	Los Angeles	Aug-04	Aug-05	9.05	11.45	Long Beach	
13	Gulf Pearl	S	Los Angeles	Sep-12	Sep-13	8.22	11.5	Los Angeles	note a
14	SCF Provider	S	Long Beach	Sep-20	Sep-21	8	11.5	Long Beach	note a
15	Oklahoma	L	Long Beach	Nov-15	Nov-17	8.9	12.1	Long Beach	Yes
16	Aqualiberty	L	Martinez	Dec-04	Dec-06	8.2	11.5	Port Angeles & LB	note a
17	Selecao	S	Long Beach	Dec-11	Dec-13	8.35	11.05	CLM to Seattle!?	note b
18	Oklahoma	L	Martinez	Dec-29	Dec-31	8.7	11.67	San Francisco	

2017 tanker notes:

All tankers loaded heavy oil. There were also about 34 tugs and barges; these loaded heavy and light oil. Where I know their destinations they went to Anacortes (9), Cherry Point (8) or Ferndale (1).

Data for the first three tankers and all draughts are from the Pacific Pilotage Authority.

The Gulf Stream, Energy Century and Gulf Pearl increased in draught, but may not have loaded crude oil as they were oil products tankers.

The Eser K is featured in a documentary on the crude-oil tanker traffic in the Globe and Mail. See <https://www.theglobeandmail.com/news/british-columbia/kinder-morgan-trans-mountain-pipeline-bc-coast/article35043172/> accessed April 27, 2018.

Not included are the Orwell (VS, O/CT, Sept, 2017), the Cape Tampa (S, COT, Oct 2017) and the Torm Emilie (S, OPT, Dec 2017), which made more than one visit to the Westridge terminal.

note a: the tanker was noticed going south down the west coast of North America

note b: the tanker was noticed west of Oregon, going south

2018

	Tanker	size	from	arrive WMT	leave WMT	oil type	draughts/m before after	destination	got there?
1	Seaways Visayas	S	Martinez	Jan-3	Jan-04	h	8.7 11.6	Long Beach	
2	Gulf Pearl	S	Martinez	Jan-23	Jan-24	h	8.1 11.7	Long Beach	
3	Xanthos	S		Jan-29	Jan-30	h	7.6 11.6	San Francisco	
4	Cabo de Hornos	S	Martinez	Feb-1	Feb-2	h	8 11.8	Long Beach	
5	Cabo Froward	S		Feb-10	Feb-11	h	8.1 10.2	Long Beach	
6	Aquapuelche	L	Anegasaki	Feb-13	Feb-14	h	8.7 11.78	El Segundo	Yes/LB
7	Christina Kirk	VS		Feb-17	Feb-18	h	8.2 8.5	San Francisco	
8	Tavropos	S	USA west coast	Feb-26	Feb-27	h	7.6 9.5	P lightering area ^a	
9	Aquatravesia	L	San Francisco	Feb-28	Mar-01	h	9.92 11.5	Long Beach	Yes
10	Pamisos	L	Los Angeles	Mar-05	Mar-06	h	8.2 11.6	Balboa	Yes
11	Xanthos	S	Anacortes	Mar-08	Mar-09	h	7.4 10.7	Long Beach	Yes
12	Cabo de Hornos	S	Los Angeles	Mar-12	Mar-13	h	8 10.6	San Francisco	
13	Pacific Jewels	L	Martinez	Mar-30	Apr-02	h	8.6 11.95	PA BLB (Balboa)	Yes
14	Selecao	S	San Francisco	Apr-05	Apr-06	h	8.5 10.7	PA BLB	Yes
15	Solomon Sea ^b	L	Cherry Point	Apr-08	Apr-10	h	8.2 12.6	Victoria Pilot ST	Daesan
16	Persepolis	S	Salina Cruz	Apr-11	Apr-12	h	9.17 11.8	Long Beach	Yes
17	Seavoyager	L	Marsden Pt. NZ	Apr-16	Apr-18	h	8 13.1	PA BLB	?
18	Seaways Luzon	S	San Francisco	Apr-27	Apr-28	h	8.4 10.3	Long Beach	LA, LB
19	American Freedom	VS	Drift River, AK	Apr-30	May-1	h	10.25 11.7	Long Beach	
20	Cabo Kamui	S	Long Beach	May-06	May-07	h	8.65 11.8	Long Beach	LB
21	Seaways Visayas	S	San Francisco	May-09	May-10	h	8.9 11.34	San Francisco	Y
22	Aqualeader	L	Singapore	May-12	May-14	h	8.6 12.1	Los Angeles	Y
23	Kerala	S	San Francisco	May-19	May-20	h	8.5 10.8	San Francisco	Y
24	Aristoklis	L	San Francisco	May-29	May-31	h	8.7 12.25	Long Beach	
25	Aqualegacy	L	Long Beach	June-12	June-14	h	8.3 12.22	see note c	
26	Tavropos	S	Long Beach	June-17	June-19	lt	8 10.8	San Francisco	
27	Serene Sea ^d	L	Martinez	July-2	July-3	h	8.1 12.3	Huizhou	Y July 30
28	British Robin	L	Cherry Point	July-20	July-22	h	8.4 12.2	Port Angeles, Balboa	Y
29	Aristoklis	L	San Francisco	July-25	July-27	h	8.9 12.75	Qingdao	Y
30	Dubai Attraction	L	Cherry Point (e)	Aug-12	Aug-13	h	8.2 9.2	El Segundo	Y (LB)
31	Thomas Zafiras	L	San Francisco	Aug-22	Aug-24	h	9 11.8	Balboa	Nederland, Texas
32	Aristaios	L	San Francisco	Sep-01	Sep-03	h	9 12.5	Qingdao	Yantai

33	Dubai Attraction	L	San Francisco	Sep-21	Sep-23	h	8.2	11.3	Zhoushan	Y
34	British Rigour	L	Martinez	Sep-27	Sep-29	h	8.7	12.6	Qingdao	Rizhao
35	Energy Commander	S	Long Beach	Oct-9	Oct-10	h	8	11.8	Yosu, S.Korea	CLM,-note f
36	Nordtulip	L	Cherry Point	Oct-13	Oct-15	h	8.8	12.1	Rizhao	Y
37	Torm Ingeborg	L	Long Beach	Oct-19	Oct-21	h	8.2	12.6	Qingdao	Yantai
38	Victory Venture	L	Cherry Point	Nov-8	Nov-9	h	9	12.2	Rizhao	Dongjia Kouju
39	Texas Star	L	Nakhodka	Nov-15	Nov-16	h	8	9.6	Long Beach	Y
40	Mare Tirrenum	L	Singapore	Nov-22	Nov-24	h	8.7	12.5	Qingdao	Zhanjiang
41	Leyla K	L	Anegasaki	Nov-29	Dec-1	h	8	12.5	Longkou	Tangshan
42	Riverside	L	Longkou	Dec 18	Dec-20	h	8.6	12.8	Yantai	Dongjia Kouju
43	Green Attitude	L	Longkou	Dec 28	Dec-29	h	8.6	11.9	Qingdao	Dongjia Kouju
<u>ATB or tug^b</u>										
1	Joseph Sauce			Jan 16	Jan 17	h	4.28 m			
2	Nancy Peterkin			Jan 27	Jan-28	h	5.8 m	5.95 m		
3	Nancy Peterkin			Feb 23	Feb-24	h	6.5 m	9.09 m	Anacortes	
4	Nancy Peterkin			Mar 28	Mar-29	h	5.79 m	6.5 m	Anacortes	
5	Joseph Sauce			Mar 30	Mar-30	h	4 m	4.32 m		
6	Vision		Anacortes	May 2	May-2	h	6.4 m	7.62 m	William Pt. anchorage	
7	Nancy Peterkin		Anacortes	May 8	May-8	h	5.8 m	5.79 m		
8	Bill Gobel		Anacortes	May 26	May-27	h			Port Angeles	
9	Nancy Peterkin		Anacortes	July 10	July-11	see g	5.79 m	5.79 m		
10	Nancy Peterkin		San Francisco	July 28	July-29	see g	5.79 m	9.16 m	Martinez	
11	Joseph Sauce			Aug 11		h	4.8 m			
12	Nancy Peterkin			Sep 5	Sep-6	h	5.75 m	9.14 m		
13	Gulf Reliance		Anacortes	Oct 10	Oct-11	h	6.4 m	6.4 m	Victoria Pilot Stn.	
14	Gulf Reliance		Anacortes	Nov 3	Nov-4	h	5.8 m	6.7 m	Port Angeles	
15	Gulf Reliance		San Francisco	Dec 4	Dec-5	h	6.4 m	8.9 m	San Francisco	
16	Vision			Dec 30	Dec-31	h	6.4 m	6.4 m		

2018 tanker and tug notes

The tanker data are from my AIS observations. The tug data are all from PPA data, except those in italics which are from my AIS. It is evident that not all are accompanied by pilots.

Trans Mountain reported ⁴⁶ the "... pipeline is used to move approximately 300,000 barrels per day of different grades or varieties of petroleum.". In 2018 "53 % of the product in the pipeline was shipped to Puget Sound .. to serve refineries in Anacortes, Cherry Point

and Ferndale. Twenty-four percent of the product was transported to Burnaby Terminal to serve local refining and fuel needs and for temporary storage, 21 per cent went to Westridge Terminal for export by vessel and two per cent ended up at our Kamloops terminal to be transported within BC for local use.” From this I deduce that 23 million barrels was shipped from Westridge; dividing by 43 tankers yields an average of 470,000 barrels per tanker after allowing for the amount shipped by ATBs.

Not included are the following for which the draught decreased between arrival and leaving, indicating something was offloaded, presumably jet fuel: Maersk Tokyo (VS, O/CT, Jan 22 and Jan 27), Christina Kirk (VS, OPT, Feb 9 and Feb 18), Torm Amalie (VS, C/OPT, Mar 23), Antipolis (S, COT, Apr 3), Fulham Road (S, OPT, Apr 20), Justice Victoria (S, OPT, May 6), Hermione (S, COT, May 23), Gulf Crystal (S, OPT, June 11), Torm Emilie (S, OPT, June 21), STI Leblon (VS, O/CT, July 6), Theodosia (S, OPT, July 19-24), Nave Rigel (COT, Aug 17-18), Strimon (Aug 29-Sept 5), STI Battery (Sept 16-26), Maersk Tianjin (COPT, Oct 12-25), Strimon (C/OPT, Nov 11-20), High Challenge (C/OPT, VS, Dec 4, Dec 13), Elan Vital (COT, S, Dec. 23).

The following in the table were not crude oil tankers and thus may not have loaded crude oil: Gulf Pearl (OPT, Jan 24), Cabo de Hornos (OPT, Feb 2), Cabo Froward (OPT, Feb 11 and Mar 13), Christina Kirk (OPT, Feb 18), American Freedom (O/CT, May 1),

The tanker draughts in this table from August onwards are my observations from the Vessel Finder and Marine Traffic web sites. All earlier draughts are from the Pacific Pilotage spreadsheets.

(a) March 6: Next information was that it was off Baja California heading south to Balboa, Panama, with a smaller draught.

(b) The Solomon Sea actually arrived before the Pacific Jewels and the Selecao, waiting in English Bay and Indian Arm. It left Juan de Fuca going west and was out of range for weeks. It was detected in Daesan on May 3, then east of Shanghai on May 6, but has since disappeared from AIS. All this time it said it was going to Victoria Pilot ST.

The Solomon Sea is the tanker shown in Bob Bossin’s video “We don’t want your pipeline”
<https://www.youtube.com/watch?v=2bKxATTtVaM>

(c) The Aqualegacy was leaving in the Juan de Fuca Strait, but turned around between Port Angeles and Victoria and went to Anacortes. There its draught decreased from 12.2 m to 9.2 m and later to 8.8 m. On July 3 it was at the entrance to Juan de Fuca Strait ‘for orders’; It was then 20 nm off Ozette, then SW of Bamfield. It hung around this area until July 9 when it left for Port Allen, LA. On July 14 it was ~150 km W of Ensenada, Mexico, adjacent to the Sonangol Maiombe which had a draught of 15.4 m. They separated, the Aqualegacy with a draught of 11.2 m then went to San Francisco.

(d) The Serene Sea was the crude oil tanker that could not leave when Greenpeace activists hung themselves from the 2nd Narrows road bridge. This is the first crude oil tanker to go to China since I have been keeping a record.

(e) The Dubai Attraction came from SW of the entrance to Juan de Fuca Strait; it did not come directly from Cherry Point.

(f) I had trouble following the Energy Commander as there seems to be no AIS reporting of ships near the coast of most of South Korea. On Oct 28 it was in the strait between Hokkaido and Honshu. On Oct 31 it was south of Busan. On Nov 19 Vessel Finder reported its last port was Deogyang on Nov 12. On Nov 20 it was anchored off Vanino, Russia.

(g) One Nancy Peterkin trip was heavy oil and one was light oil.

2019

	Tanker	size	from	arrive WMT	leave WMT	oil type	draughts/m before	draughts/m after	destination	got there?
1	Selecao ^a	S	San Francisco	Jan 13	Jan 14	h	8.5 m	10.1 m	Long Beach	Y
2	Seaways Jademar	S	Los Angeles	Feb 19	Feb 21	lt	8.4 m	10.5 m	USRD4 (Rodeo)	Y
3	Andes	S	Singapore	Mar 17	Mar 19	lt	8.5 m	10.3 m	San Francisco	
4	Erik Spirit	L	Kashima, Ibaraki	Apr 1	Apr 3	h	8.5 m	12.2 m	Qingdao	Zhanjiang
5	Selini	S	Los Angeles	Apr 8	Apr 9	h	8.2 m	12 m	Long Beach	Y
6	Ambelos	L	Gwangyang	May 2	May 3	h	8.0 m	11.6 m	Qingdao	Dongiangkou
7	Seavoyager	L	Ferndale	June 28	June 30	h	8 m	12.8 m	Shandong	Lanshan
8	Nordbay ^c	L	Martinez	Aug 14	Aug 15	h	9 m	7.7m?	Yeosu	note d
9	Limerick Spirit	L	Rodeo, California	Sep 13	Sep 16	h	8.5 m	12.6 m	Long Beach	Y
10	Ice Fighter ^e	S	Long Beach	Nov 25	Nov 26	h	7.5 m	11.6 m	Long Beach	Y
11	Socrates	S	Long Beach	Dec 7	Dec 8	h	8 m	11.2 m	San Francisco	Y
12	Victory Venture	L	Brisbane	Dec 20	Dec 22	h	9.5 m	12.8 m	Ningbo	Tianjin Xingang
ATB or tug^b										
1	Nancy Peterkin		Port Angeles	Jan 23	Jan 24	lt	5.56 m	8.7 m	Martinez	
2	Nancy Peterkin		Port Angeles	Feb 23	Feb 24	h	5.79 m	8.08 m	Martinez	
3	Joseph Sauce		Tacoma	Mar 30		lt				
4	Joseph Sauce			Apr 18	Apr 18	lt	4.57 m	4.57 m		
5	Nancy Peterkin		Anacortes	Apr 27	Apr 28	lt	5.79 m	8.44 m	Martinez	
6	Nancy Peterkin		Richmond (USA)	June 2	June 3	h	5.79 m	6 m	Martinez	
7	Black Hawk			June 23	June 23		4.57			
	note f			July		h				
8	Bill Gobel		Seattle	Aug 10	Aug 11	lt			Port Angeles	
9	Nancy Peterkin		Chevron Anacortes	Oct 24	Oct 25	lt	5.79 m	5.79 m	Anacortes	Y
10	Nancy Peterkin		Martinez	Nov 15	Nov 16	lt	5.79 m	6 m	Martinez, SFO	
11	Nancy Peterkin		Martinez	Dec 5	Dec 6	h	5.8 m	5.79 m	Martinez	Y

2019 tanker notes:

All tanker, ATB and tug information are from AIS except as indicated below. Oil type is shown as heavy (hv) or light (lt).

Data for the Joseph Sauce on April 18 and Black Hawk on June 23, and all draughts are from the PPA data base. The Joseph Sauce on March 30 and Bill Gobel on August 10-11 are not in the PPA data base.

Oil Type is deduced from the oil flow data on the CER web site and the above tanker and tug data, as heavy (*hv*) or light (*lt*).

(a) I saw the Selecao leaving, and it did not look full.

(b) For an ATB or tug I assume it loaded oil, but have no evidence for that other than it makes sense.

(c) The Nordbay drifted in the ocean west of the Strait of Juan de Fuca from August 7-12, perhaps just waiting.

(d) Vessel Finder reported it as at Portugal!. The Marine Traffic web site reported it as 40 km SE of Yeosu with a draught of 11.6 m on Sept 8, draught of 9.3 m on Sept 10.

(e) The Ice Fighter detoured to the south of San Clemente Is., at one point slowing down there, as though the bridge crew fell asleep.

(f) The CER shows about 150,000 bbl of heavy oil delivered to Westridge in July, but neither the PPA nor I noted any vessel there.

The Andes was an oil products tanker.

Not included are the following for which the draught decreased between arrival and leaving, indicating something was offloaded, presumably jet fuel: Cape Tampa (COT, S, Jan 16, Jan 22), Atlantic Harmony (C/OPT, VS, Feb 13, Feb 17), Maersk Murotsu (OPT, VS, March 9). Selini COT, S, March 23), Dong-A Krios (C/OPT, VS, Apr 5), Torm Thyra (C/OPT, VS, Apr 21, Apr 26), Atlantic Crown (C/OPT, VS, May 1), Torm Freya (C/OPT, VS, May 17), Sven (C/OPT, VS, May 22; STI Topaz (C/OPT, VS, June 4); STI Excellence (COT, S, June 21, July 3, July 11, July 21); Cielo di Houston (OPT, S, July 31); Konstantin Jacob (OPT, S, Aug 9, Aug 22); Challenge Peak (OPT, VS, Sept 4); Maersk Teesport (C/OPT, VS, Sept 18, Sept 27), Torm Resilience (OPT, VS, Oct 13, Oct 15), Kanala (OPT, VS, Oct 22), Hellas Fighter (C/OPT, VS, Nov 9), Torm Kansas (C/OPT, VS, Nov 24), Torm Republican, (C/OPT, VS, Dec 15), Energy Centurion (COT, S, Dec 28).



Figure 4: The Aristoklis at the Kinder Morgan Westridge dock on May 29, 2018. Some of the construction for the planned new docks is also seen. The two green tanks are for storing imported jet fuel. Photo by The Canadian Press/Jonathan_Hayward.

2020

	Tanker	size	from	arrive WMT	leave WMT	oil type	draughts/m before	after	stated destination	got there?
1	Aristoklis	L	Martinez	Feb 1	Feb 5		9 m	12.5 m	Long Beach	Y
2	Salamina	S	Martinez	Feb 7	Feb 8		8.2 m	11.3 m	Vancouver	note b
3	Mare Oriens	L	Qingdao	Feb 13	Feb 15		8 m	13.3 m	For orders	Tianjin Xingang ^e
4	Mitera Marigo	L	Long Beach	Feb 19	Feb 20		8.4 m	8.5 m ^c	San Francisco	Y
5	Salamina	S	Rodeo	Feb 27	Feb 28		8.2 m	10.9 m ^d	San Francisco	Y
6	Yang Li Hu	L	Lanshan	Mar 1	Mar 4		9.3 m	13.2 m	note g	Sikka
7	Mitera Marigo	L	California	Mar 16	Mar 18		8.5 m	12.8 m	Tianjing Xingang	Qingdao
8	Seaways Samar	S	Long Beach	Mar 20	Mar 21		8.8 m	10.1 m	San Francisco	Y
9	Salamina	S	Benicia	Mar 25	Mar 26		8.2 m	11 m	San Francisco	note f
10	Victory Venture	L	Tanjung Pelepas	Apr 5	Apr 7		9.3 m	11.6 m ^h	El Segundo	Long Beach
11	Yang Ning Hu	L	Lanshan	Apr 18	Apr 20		9.4 m	13.2 m	Qingdao	Longkou
12	Shanghai Dawn ⁱ	L	Longkou	May 1	May 3	h	8 m	12.9 m	Qingdao	Laizhou
13	Maria Princess	L	Busan	May 14	May 16	h	8.3 m	12.2 m	Qingdao	Zhanjiang
14	Axel Spirit	L	Hong Kong	May 19	May 21	h	8.8 m	11.9 m	China	Yantai
15	Glifa	L	Singapore, Dalian	May 25	May 27	h	8.5 m	12.5 m	China	Laizhou
16	Green Aura	L	Kozmino, Kikuma	May 28	May 30	h	8.5 m	12.1 m	Qingdao	Qingdao
17	Yamoto Spirit	L	Qingdao	June 4	June 6?	h	8.5 m	12.4 m	China	Dalian
18	Stavanger Falcon	L	Pasir Gudang	June 8 9?	June 11	h	7.9 m	12.5 m	For orders	Zhanjiang
19	Cabo de Hornos	S	Ferndale	June 19	June 20	h	9 m	11.4 m	Balboa	St. John, NB
20	Selini	S	Cherry Point	Sept 22	Sept 23		7.2 m	11.1 m	San Francisco	Y
<u>ATB or tug</u>										
1	Nancy Peterkin		Martinez	Jan 6	Jan 7	h			Martinez	note a
2	Vision			Feb 5	Feb 6					Anacortes
3	Nancy Peterkin		Tacoma	Mar 19	Mar 20				Martinez	San Francisco
4	Nancy Peterkin		Port Angeles	Apr 10	Apr 11			8.8 m	Martinez	Y
5	Nancy Peterkin		Martinez	Apr 22	Apr 23		5.8 m	8.8 m	Martinez	
6	Nancy Peterkin		Martinez	May 6	May 7	h	5.8 m	8.8 m	Port Angeles-Martinez	
7	Tecumseh (tug) ^j			July 13	July 13				Tacoma	Y
8	Nancy Peterkin ^k		Port Angeles	Aug 2	Aug 9		9.3 m	9.2 m	San Francisco	Y

2020 tanker notes: All information is from AIS except as noted.

In February, March and April both light and heavy oil were exported in roughly equal amounts. I cannot allocate them.

note a: It went to Parkland in Burnaby, then to Port Angeles with destination Martinez

note b: It went past Victoria, turned around, skirted Port Angeles and parked north of Anacortes, destination Port Angeles.

note c: I saw it leaving and it looked close to empty.

note d: I saw it leaving and it did not look full, maybe 3/4 full.

note e: The Mare Oriens arrived at Tianjin Xingang on March 9; as of March 31 it was still anchored there, still loaded.

According to Vessel Finder it docked there on April 8.

note f: The Salamina disappeared. It was west of San Francisco on March 29, and on April 1 its stated destination is Long Beach.

note g: Before the Yang Li Hu left Westridge its destination was shown as Sika (sic). The following day when it left its destination was shown as Singapore, where it arrived on March 31. It spent about 12 hours there and left, stated destination being India. It arrived at Sikka, NW India, on April 10.

note h: The Victory Venture did not look full, maybe 60 %?

note i: On May 19 I found the Shanghai Dawn had a new name, SXCNGXAI DAWN. By May 23 it had reverted to its earlier name, and was moored at Laizhou.

note j: The Tecumseh is a US-flagged tug. It was accompanied by the Canadian tug Seaspan Raven from Westridge to an Indian Arm anchorage and then to West Vancouver, where they parted company. All this is evidence that a barge was loaded with oil at Westridge and taken to Tacoma.

note k. I do not know what it was doing here for a week. What did it bring? It may have taken oil to San Francisco.

The Yang Li Hu, Yang Ning Hu and Cabo de Hornos are listed as oil products tankers.

For February and March I cannot allocate the oil type. About 38 % was light oil and 62 % was heavy oil.

Not included are the following for which the draught decreased between arrival and leaving, indicating something was offloaded, presumably jet fuel: Seaways Skopelos (C/OPT, VS, Jan 11), STI Milwaukee (COPT, VS, Jan 23), Silver Amanda (C/OPT, VS Feb 12), Marlin Ammolite (C/OPT, VS, Feb 25), Ardmore Engineer (C/OPT, VS, Mar 12), Ivy Express (C/OPT, VS, Mar 29), Seaways Luzon (COT, S, Apr 9), [Overseas Gulf Coast \(C/OPT, VS, Aug 25\)](#)

End notes

To access a Canada Energy Regulator document enter the document identifier or key words into the form at <https://apps.cer-rec.gc.ca/REGDOCS/Home/Index>

1. [Trans Mountain Responses to Information Request No. 1 regarding NEB reconsideration](#) from the District of North Vancouver, December 2016. Canada Energy Regulator document A6Q5Z8.
2. Vancouver Port Authority Notice to Residents and Businesses. Project Update and FAQs; Proposed Westridge Marine Terminal Dredge Project, Berth 61 (765 Bayview Street, Burnaby) Undated, but page 3 states “Mailed November 29, 2005.”
3. Robyn Allan: “Submission to Ministerial Panel for Trans Mountain Expansion Project”, September 28, 2016, <http://robynallan.com/wp-content/uploads/2016/10/05/Economist-Robyn-Allans-Submission-To-The-Ministerial-Panel-September-28-2016.pdf> page 13. Accessed March 12, 2018 and December 1, 2018. or: “Need for, Commercial Feasibility, and Economic Impact of the Trans Mountain Expansion Project” prepared for the Tseil-Waututh Nation, November 25, 2016. <https://twnsacredtrust.ca/wp-content/uploads/2016/11/TWN-GIC-Allan-Report-2016.11.25-2.pdf> page 16, accessed December 1, 2018.
4. Trans Mountain pipeline’s necessity questioned as tanker traffic slumps. <https://www.theglobeandmail.com/news/alberta/trans-mountains-necessity-questioned-as-tanker-traffic-slumps/article35347374/> accessed April 15, 2018.
5. “Assessing the risks of Kinder Morgan’s proposed new Trans Mountain pipeline” Conversations for Responsible Economic Development (CRED BC). May 2013, page 11. Port of Vancouver data and Kinder Morgan correspondence.
6. Trans Mountain responses to an information request from the City of Burnaby, National Energy Board document A6Q5Z6, page 4, December 2018. Also in the response to the District of North Vancouver Information Request No.1, p.1, December 2018.
7. See Burnaby Now September 21, 2018, p.3 and October 3, 2018, p.7 confirming that the figure was provided by Trans Mountain. See also “Westridge Marine Terminal Upgrade and Expansion Project Update” June 2017 circulated notice.
8. Oil exports to China were obtained from Statistics Canada spreadsheet CRO0172265.xlsx kindly provided by Nelson Bennett, a reporter for Business in Vancouver.
9. Muse Stancil “North East Asia Overview” pages 21-30.
10. Port of Vancouver annual “Statistics Overview”.
11. Robyn Allan “What Hike in Crude Exports”, Vancouver Sun April 8, 2019, page A9.
12. Robyn Allan and Marc Eliesen “The Case for Regulatory Oversight to Address Market Failure”, June 27, 2019; a submission to the B.C. Utilities Commission Inquiry into Gasoline and Diesel Prices in British Columbia, pages 31-35.

- https://www.bcuc.com/Documents/Proceedings/2019/DOC_54384_C1-2-Allan-Eliesen-Submitting-Report.pdf accessed July 1, 2019.
13. Allan and Eliesen supra p.35.
 14. The electronic newsletter “Trans Mountain Today” gives regular updates on its ‘apportionment’, the excess of requests above capacity. The discrepancy is due to barrels requested that do not actually exist.
 15. “Tar Sands Tanker Superhighway Threatens Pacific Coast Waters” Greenpeace 06-26-2018, <https://www.greenpeace.org/usa/wp-content/uploads/2018/07/227a9d44-tar-sands-web-mech.pdf> accessed July 1, 2019
 16. Fred Felleman for Friends of the Earth, April 2016. “Tar Sands/Dilbit Crude Oil Movements within the Salish Sea”. 62 pp.
https://1bps6437gg8c169i0y1drtgz-wpengine.netdna-ssl.com/wp-content/uploads/2017/legacy/Tar_Sands_Report.pdf accessed July 1, 2019.
 17. <http://alloiltank.com/oil-tanker-ship/> accessed March 12, 2018.
 18. <http://alloiltank.com/oil-tanker-ship/> accessed March 12, 2018.
 19. Port of Vancouver, accessed October 31, 2018.
<https://www.portvancouver.com/about-us/topics-of-interest/petroleum-products-and-tanker-safety/>
 20. The figure of 550,000 barrels is derived from the volumes exported to China as stated in the Statistics Canada spreadsheet referred to above. At the NEB hearing on August 22, 2011, Mr. Rinne stated “Six hundred thousand (600,000) barrels is a notional loading. They typically load to the lower volume than that, ...” NEB document A2C3T4 at paragraph 283.
 21. <https://apps.neb-one.gc.ca/REGDOCS/Item/View/2392972>
B2-1 - V4A_1.0_TO_3.4.4.1.1_PROJ_DESIG_ENGIN - A3S0Y8
Section 3..1.3 System Capacity (note that Line 1 is the existing pipeline).
A detailed discussion of the pipeline capacity is to be found in the Affidavit by Robyn Allan of November 16, 2017 regarding NEB Hearing Order MH-081-2017.
 22. Trans Mountain Pipeline ULC Notice of Civil Claim in the Supreme Court of British Columbia, Court File No. VLC-S-S-183541 08-Mar-18, paragraph 10.
 23. Allan and Eliesen supra p.31. The figure of 300,000 bbl/day is for a mixture of 80 % light crude and 20 % heavy crude; for 100 % light crude the figure is 400,000 bbl/day
 24. Kinder Morgan poster at a presentation on Apr 3, 2014,
 25. Trans Mountain Pipeline ULC. Application to the NEB for the ‘Westridge Delivery Line Relocation’, Technical Description, page 1. December 21, 2017. NEB file A5Y 6S7.
 26. Transportation Safety Board report P07H0040 July 24, 2007, page 6.

27. Stantec report: Summary of Clean up and Effects of the 2007 Spill of Oil from Trans Mountain Pipeline to Burrard Inlet, July 2012, Project No. 1231-10505.
<https://s3-us-west-2.amazonaws.com/transmountain-craftcms/documents/1374960812-2012-Summary-2007-Spill-Clean-Up---Effects-REV2.pdf?mtime=20170622172931> accessed Aug 1, 2019. Albion heavy synthetic oil is a mixture of synthetic oil and bitumen, known as synbit.

28. “The average loading rate for the Westridge feeder line is approximately 17,000 barrels per hour.” e-mail from Tascha at info@transmountain.com April 12, 2018, 12:01 pm.

29. From Trans Mountain Pipeline ULC Tolls Applying on Petroleum Tariff No.101 issued March 31, 2017; accessed March 12, 2018.

<u>petroleum</u>	<u>density (g/cm³)</u>	<u>viscosity (cSt)</u>	<u>toll surcharge</u>
light	< 0.880	< 30	-
medium	0.880-0.903	30-99	5 %
heavy	0.904-0.926	100-249	15 %
super heavy	0.927-0.940	250-350	20 %

30. “Oil tanker calls to Westridge are expected to increase from about one per week at present to slightly more than one per day when the Expansion Project is complete in late 2019. An estimated 350 additional tankers will call on Westridge each year.” Trans Mountain web site <https://www.transmountain.com/news/2016/oil-tankers-part-of-forecasted-overall-growth-in-vessel-traffic-in-port-of-vancouver> accessed March 18, 2018. Note that the figure of ‘one per week’ is now incorrect; the actual figure now is about 15 per year, or one per 3.5 weeks. In 2019 the rate was one per month.

31. <https://apps.neb-one.gc.ca/REGDOCS/Item/View/2392972>
 B2-1 - V4A_1.0_TO_3.4.4.1.1_PROJ_DESIG_ENGIN - A3S0Y8
 Section 3..1.3 System Capacity (note that Line 1 is the existing pipeline and Line 2 is the proposed new pipeline).

32. Trans Mountain drawing number M002 - XD13010 15/03/27

33. [Trans Mountain document A3S0Z0 p.5](#). Note that in this document only two lines have this capacity, but in a later application all three lines through the Burnaby Mountain tunnel have this capacity.

34. Trans Mountain Response to NEB IR No.2
https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2487413/B239%2D13_%2D_Trans_Mountain_Response_to_NEB_IR_No._2_%2D_A3Z4T9.pdf?nodeid=2487205&vernum=-2
 NEB document A3Z4T9, accessed March 2, 2020. page 445

35. Market Prospects and Benefits Analysis of the Trans Mountain Expansion Project for Trans Mountain Pipeline (ULC), September 2015, Muse Stancil. National Energy Board document AHT6E8. page 38. Here it is stated that this information was provided by Trans Mountain.

36. The planned new berths extend about 30 % of the way across Burrard Inlet. Elimination of the third berth will be a significant improvement.

37. The reply evidence to NS Nope is on page 35 of NEB document A6L9U8. The responses to information request from Vancouver Fraser Port Authority is NEB document A4H8W5.

38.

<https://www.transmountain.com/news/2016/oil-tankers-part-of-forecasted-overall-growth-in-vessel-traffic-in-port-of-vancouver> accessed March 18, 2018.

39. It is difficult to find out what the Port of Vancouver actual rules are. There appear to be two sets, one the public used to see on the Port's web site, and the operating rules which are less restrictive. Some indication of the latter can be found in the "Port Information Guide", Port of Vancouver, May 2018.

<https://www.portvancouver.com/wp-content/uploads/2015/03/Port-of-Vancouver-Port-Information-Guide.pdf>

40. In order to determine this figure I needed to know the rate at which other large ships transit 2nd Narrows. From March 21 to May 11, 2018, i.e. 51 days, the following arrived:
10 crude oil tankers, 33 Chemical/Oil Products tankers, 2 oil products tankers, 9 Bulk Carriers; the total is 54. This is very slightly over one per day. There were also 10 pusher tugs with barges, and an unknown number of regular tugs, some with barges, and pleasure boats.

41.

<https://docs2.neb-one.gc.ca/ll-eng/llisapi.dll?func=ll&objId=2686589&objaction=download&viewType=1>

42. Rex Tillerson: pages 6-7 of

<https://corporate.exxonmobil.com/-/media/Global/Files/investor-relations/analyst-meetings/2015-Analyst-Meeting-transcript.pdf>

43. <https://www.oilsandsmagazine.com/technical/western-canadian-select-wcs>

44. <https://www.cer-rec.gc.ca/nrg/ntgrtd/pplnprtl/pplnprfls/crdl/trnsmntn-eng.html>

45. Felleman, 2016, supra, Figure 9.

46. "Where Does the Product Go?" Trans Mountain Today, February 7, 2019, accessed that day.
<https://www.transmountain.com/news/2019/where-does-the-product-go>