

**Attachment 2.1(a)**

**Quantitative Financial Outlook**

Trans Mountain Pipeline System  
Quantitative Financial Outlook  
CA\$ millions

**KEY ASSUMPTIONS**

**CASE**

**CER 2.1(a)**

		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Year																						
Months	Commencement May 1, 2024	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4
Capacity Utilization %	CER IR 2.14b)	83%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
Revenue - Committed	Preliminary Interim Tolls	1,638	2,484	2,544	2,607	2,678	2,742	2,808	2,878	2,956	3,027	3,100	3,178	3,264	3,342	3,423	3,337	3,341	3,421	3,503	3,591	1,207
Revenue - Uncommitted	Preliminary Interim Tolls	91	665	681	698	717	734	752	771	792	811	830	851	874	895	916	1,144	1,277	1,308	1,339	1,373	461
Revenue Sharing - Shippers	TSA Schedules Section 3.2	(0)	(220)	(225)	(230)	(237)	(242)	(248)	(254)	(261)	(268)	(274)	(281)	(288)	(295)	(302)	(307)	(313)	(321)	(329)	(337)	(113)
Revenue Sharing - Other	BC Condition 5 Agreement	(17)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(14)
<b>Revenue, net of Sharing</b>		<b>1,712</b>	<b>2,888</b>	<b>2,958</b>	<b>3,033</b>	<b>3,116</b>	<b>3,192</b>	<b>3,270</b>	<b>3,353</b>	<b>3,445</b>	<b>3,528</b>	<b>3,614</b>	<b>3,707</b>	<b>3,807</b>	<b>3,900</b>	<b>3,995</b>	<b>4,132</b>	<b>4,263</b>	<b>4,366</b>	<b>4,472</b>	<b>4,584</b>	<b>1,541</b>
Pipeline Operating Costs		131	178	174	180	187	189	192	198	204	208	214	221	227	234	241	249	256	264	272	280	96
Salaries, Wages and Administration		177	205	212	214	219	227	236	245	254	264	274	284	295	306	318	330	342	355	369	383	132
Taxes other than Income Tax		71	82	84	87	89	92	95	97	100	103	106	109	113	116	119	123	127	130	134	138	47
<b>Expenses (excluding power)</b>		<b>378</b>	<b>465</b>	<b>470</b>	<b>481</b>	<b>495</b>	<b>508</b>	<b>523</b>	<b>540</b>	<b>559</b>	<b>575</b>	<b>594</b>	<b>614</b>	<b>635</b>	<b>656</b>	<b>679</b>	<b>701</b>	<b>725</b>	<b>750</b>	<b>775</b>	<b>801</b>	<b>276</b>
<b>EBITDA</b>		<b>1,335</b>	<b>2,423</b>	<b>2,488</b>	<b>2,552</b>	<b>2,621</b>	<b>2,684</b>	<b>2,747</b>	<b>2,813</b>	<b>2,886</b>	<b>2,953</b>	<b>3,020</b>	<b>3,092</b>	<b>3,172</b>	<b>3,243</b>	<b>3,316</b>	<b>3,430</b>	<b>3,537</b>	<b>3,616</b>	<b>3,697</b>	<b>3,783</b>	<b>1,265</b>
Depreciation	Approved Depreciation Rates	542	815	817	818	819	821	822	823	825	827	828	830	832	833	835	835	833	835	837	839	280
Interest		1,058	1,663	1,571	1,511	1,444	1,364	1,277	1,181	1,073	962	882	842	815	788	761	734	707	680	654	627	200
Taxes		-	-	-	-	-	-	-	238	289	310	329	344	357	369	378	385	390	394	398	400	134
<b>Net Income</b>		<b>(190)</b>	<b>(55)</b>	<b>101</b>	<b>223</b>	<b>358</b>	<b>500</b>	<b>648</b>	<b>570</b>	<b>699</b>	<b>855</b>	<b>982</b>	<b>1,076</b>	<b>1,168</b>	<b>1,253</b>	<b>1,342</b>	<b>1,477</b>	<b>1,608</b>	<b>1,707</b>	<b>1,808</b>	<b>1,918</b>	<b>651</b>
Net Rate Base, End of Year	Existing Pipeline + Expansion	34,969	34,545	33,783	33,020	32,257	31,494	30,734	29,975	29,217	28,460	27,702	26,945	26,188	25,432	24,677	23,922	23,170	22,420	21,669	20,919	20,171
Total Debt, End of Year	Credit Facility, TMP Finance Loans	27,171	26,660	25,793	24,804	23,679	22,413	21,003	19,434	17,684	16,026	15,236	14,820	14,404	13,988	13,572	13,157	12,744	12,331	11,918	11,506	11,094
Debt Capitalization	Debt / Net Rate Base	78%	77%	76%	75%	73%	71%	68%	65%	61%	56%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%
Annual Effective Interest Rate		6.2%	6.2%	6.0%	6.0%	6.0%	5.9%	5.9%	5.8%	5.8%	5.7%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.4%	5.4%	5.4%	5.3%
Equity, End of Year	Net Rate Base - Debt	7,799	7,885	7,990	8,217	8,578	9,081	9,730	10,542	11,533	12,434	12,466	12,125	11,785	11,445	11,104	10,765	10,427	10,089	9,751	9,414	9,077
Return on Equity Rate	Net Income / Equity	-3.7%	-0.4%	0.7%	1.5%	2.5%	3.5%	4.7%	4.2%	5.3%	6.7%	7.9%	8.9%	9.9%	10.9%	12.1%	13.7%	15.4%	16.9%	18.5%	20.4%	21.5%
20 Year Simple Average ROE		<b>8.6%</b>																				
EBITDA		1,335	2,423	2,488	2,552	2,621	2,684	2,747	2,813	2,886	2,953	3,020	3,092	3,172	3,243	3,316	3,430	3,537	3,616	3,697	3,783	1,265
Less: Sustaining Capital		86	50	50	51	53	54	60	62	63	65	67	69	71	74	76	78	78	80	82	85	87
Less: Working Capital Deficiency		190	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cash Available for Debt Service		1,370	2,173	2,438	2,501	2,569	2,630	2,687	2,751	2,823	2,888	2,953	3,023	3,101	3,170	3,240	3,352	3,460	3,536	3,614	3,698	1,177
Less: Interest		1,058	1,663	1,571	1,511	1,444	1,364	1,277	1,181	1,073	962	882	842	815	788	761	734	707	680	654	627	200
Less: Debt Repayment		-	510	867	990	1,125	1,266	1,410	1,570	1,750	1,658	790	416	416	416	416	415	414	413	413	412	412
<b>Cash Available after Debt Service</b>		<b>(0)</b>	<b>0</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>(0)</b>	<b>268</b>	<b>1,281</b>	<b>1,764</b>	<b>1,869</b>	<b>1,966</b>	<b>2,064</b>	<b>2,203</b>	<b>2,339</b>	<b>2,443</b>	<b>2,548</b>	<b>2,659</b>	<b>565</b>
Debt to EBITDA	Debt / EBITDA	n/a	11.0x	10.4x	9.7x	9.0x	8.4x	7.6x	6.9x	6.1x	5.4x	5.0x	4.8x	4.5x	4.3x	4.1x	3.8x	3.6x	3.4x	3.2x	3.0x	n/a
Debt Service Coverage	EBITDA / (Interest + Principal Repayment)	n/a	1.1x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.1x	1.8x	2.5x	2.6x	2.7x	2.8x	3.0x	3.2x	3.3x	3.5x	3.6x	n/a

**Attachment 2.1(b.2)**

**Quantitative Financial Outlook**

Trans Mountain Pipeline System  
Quantitative Financial Outlook  
CA\$ millions

**KEY ASSUMPTIONS**

**CASE**

**CER 2.1(b.2)**

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Months	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4
Capacity Utilization %	89%	89%	89%	89%	89%	89%	89%	89%	89%	94%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
Revenue - Committed	1,638	2,484	2,544	2,607	2,678	2,742	2,808	2,878	2,956	3,027	3,100	3,178	3,264	3,342	3,423	3,337	3,341	3,421	3,503	3,591	1,207	
Revenue - Uncommitted	263	398	408	418	429	440	450	462	474	486	721	851	874	895	916	1,144	1,277	1,308	1,339	1,373	461	
Revenue Sharing - Shippers	(57)	(95)	(97)	(100)	(102)	(104)	(107)	(109)	(112)	(114)	(214)	(281)	(288)	(295)	(302)	(307)	(313)	(321)	(329)	(337)	(113)	
Revenue Sharing - Other	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(14)	
<b>Revenue, net of Sharing</b>	<b>1,827</b>	<b>2,771</b>	<b>2,838</b>	<b>2,909</b>	<b>2,988</b>	<b>3,061</b>	<b>3,135</b>	<b>3,214</b>	<b>3,302</b>	<b>3,381</b>	<b>3,565</b>	<b>3,707</b>	<b>3,807</b>	<b>3,900</b>	<b>3,995</b>	<b>4,132</b>	<b>4,263</b>	<b>4,366</b>	<b>4,472</b>	<b>4,584</b>	<b>1,541</b>	
Pipeline Operating Costs	131	178	174	180	187	189	192	198	204	208	214	221	227	234	241	249	256	264	272	280	96	
Salaries, Wages and Administration	177	205	212	214	219	227	236	245	254	264	274	284	295	306	318	330	342	355	369	383	132	
Taxes other than Income Tax	71	82	84	87	89	92	95	97	100	103	106	109	113	116	119	123	127	130	134	138	47	
<b>Expenses (excluding power)</b>	<b>378</b>	<b>465</b>	<b>470</b>	<b>481</b>	<b>495</b>	<b>508</b>	<b>523</b>	<b>540</b>	<b>559</b>	<b>575</b>	<b>594</b>	<b>614</b>	<b>635</b>	<b>656</b>	<b>679</b>	<b>701</b>	<b>725</b>	<b>750</b>	<b>775</b>	<b>801</b>	<b>276</b>	
<b>EBITDA</b>	<b>1,449</b>	<b>2,305</b>	<b>2,367</b>	<b>2,428</b>	<b>2,493</b>	<b>2,553</b>	<b>2,612</b>	<b>2,674</b>	<b>2,743</b>	<b>2,806</b>	<b>2,971</b>	<b>3,092</b>	<b>3,172</b>	<b>3,243</b>	<b>3,316</b>	<b>3,430</b>	<b>3,537</b>	<b>3,616</b>	<b>3,697</b>	<b>3,783</b>	<b>1,265</b>	
Depreciation	542	815	817	818	819	821	822	823	825	827	828	830	832	833	835	835	833	835	837	839	280	
Interest	1,056	1,658	1,574	1,523	1,465	1,395	1,319	1,235	1,141	1,037	930	852	815	788	761	734	707	680	654	627	200	
Taxes	-	-	-	-	-	-	-	238	289	310	329	344	357	369	378	385	390	394	398	400	134	
<b>Net Income</b>	<b>(73)</b>	<b>(169)</b>	<b>(24)</b>	<b>87</b>	<b>209</b>	<b>337</b>	<b>471</b>	<b>378</b>	<b>488</b>	<b>633</b>	<b>884</b>	<b>1,066</b>	<b>1,168</b>	<b>1,253</b>	<b>1,342</b>	<b>1,477</b>	<b>1,608</b>	<b>1,707</b>	<b>1,808</b>	<b>1,918</b>	<b>651</b>	
Net Rate Base, End of Year	34,969	34,545	33,782	33,019	32,256	31,494	30,733	29,975	29,216	28,459	27,702	26,945	26,188	25,432	24,677	23,922	23,170	22,420	21,669	20,919	20,171	
Total Debt, End of Year	27,052	26,655	25,913	25,059	24,084	22,980	21,747	20,370	18,831	17,191	15,535	14,820	14,404	13,988	13,572	13,157	12,744	12,331	11,918	11,506	11,094	
Debt Capitalization	77%	77%	77%	76%	75%	73%	71%	68%	64%	60%	56%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	
Annual Effective Interest Rate	6.2%	6.2%	6.0%	6.0%	6.0%	5.9%	5.9%	5.9%	5.8%	5.8%	5.7%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.4%	5.4%	5.4%	5.3%	
Equity, End of Year	7,917	7,889	7,870	7,960	8,173	8,513	8,985	9,604	10,385	11,268	12,167	12,125	11,785	11,445	11,104	10,765	10,427	10,089	9,751	9,414	9,077	
Return on Equity Rate	-1.4%	-1.1%	-0.2%	0.6%	1.4%	2.4%	3.4%	2.8%	3.7%	4.9%	7.1%	8.8%	9.9%	10.9%	12.1%	13.7%	15.4%	16.9%	18.5%	20.4%	21.5%	
20 Year Simple Average ROE	<b>8.2%</b>																					
EBITDA	1,449	2,305	2,367	2,428	2,493	2,553	2,612	2,674	2,743	2,806	2,971	3,092	3,172	3,243	3,316	3,430	3,537	3,616	3,697	3,783	1,265	
Less: Sustaining Capital	86	50	50	51	53	54	60	62	63	65	67	69	71	74	76	78	78	80	82	85	87	
Less: Working Capital Deficiency	307	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cash Available for Debt Service	1,485	2,056	2,317	2,377	2,441	2,498	2,552	2,612	2,679	2,741	2,903	3,023	3,101	3,170	3,240	3,352	3,460	3,536	3,614	3,698	1,177	
Less: Interest	1,056	1,658	1,574	1,523	1,465	1,395	1,319	1,235	1,141	1,037	930	852	815	788	761	734	707	680	654	627	200	
Less: Debt Repayment	-	397	743	854	976	1,103	1,233	1,377	1,539	1,641	1,655	716	416	416	416	415	414	413	413	412	412	
<b>Cash Available after Debt Service</b>	<b>0</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>-</b>	<b>(0)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>64</b>	<b>318</b>	<b>1,455</b>	<b>1,869</b>	<b>1,966</b>	<b>2,064</b>	<b>2,204</b>	<b>2,339</b>	<b>2,443</b>	<b>2,548</b>	<b>2,659</b>	<b>565</b>	
Debt to EBITDA	n/a	11.6x	10.9x	10.3x	9.7x	9.0x	8.3x	7.6x	6.9x	6.1x	5.2x	4.8x	4.5x	4.3x	4.1x	3.8x	3.6x	3.4x	3.2x	3.0x	n/a	
Debt Service Coverage	n/a	1.1x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.1x	2.0x	2.6x	2.7x	2.8x	3.0x	3.2x	3.3x	3.5x	3.6x	n/a	

**Attachment 2.1(b.3)**

**Quantitative Financial Outlook**

Trans Mountain Pipeline System  
Quantitative Financial Outlook  
CA\$ millions

**KEY ASSUMPTIONS**

**CASE**

**CER 2.1(b.3)**

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Months	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4
Capacity Utilization %	79%	79%	79%	79%	79%	79%	79%	79%	79%	79%	91%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
Revenue - Committed	1,638	2,484	2,544	2,607	2,678	2,742	2,808	2,878	2,956	3,027	3,100	3,178	3,264	3,342	3,423	3,337	3,341	3,421	3,503	3,591	1,207	
Revenue - Uncommitted	-	-	-	-	-	-	-	-	-	-	558	851	874	895	916	1,144	1,277	1,308	1,339	1,373	461	
Revenue Sharing - Shippers	-	-	-	-	-	-	-	-	-	-	(178)	(281)	(288)	(295)	(302)	(307)	(313)	(321)	(329)	(337)	(113)	
Revenue Sharing - Other	(17)	(25)	(25)	(25)	(25)	(25)	(25)	(25)	(25)	(25)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(14)	
<b>Revenue, net of Sharing</b>	<b>1,622</b>	<b>2,459</b>	<b>2,519</b>	<b>2,582</b>	<b>2,653</b>	<b>2,717</b>	<b>2,783</b>	<b>2,853</b>	<b>2,931</b>	<b>3,002</b>	<b>3,438</b>	<b>3,707</b>	<b>3,807</b>	<b>3,900</b>	<b>3,995</b>	<b>4,132</b>	<b>4,263</b>	<b>4,366</b>	<b>4,472</b>	<b>4,584</b>	<b>1,541</b>	
Pipeline Operating Costs	131	178	174	180	187	189	192	198	204	208	214	221	227	234	241	249	256	264	272	280	96	
Salaries, Wages and Administration	177	205	212	214	219	227	236	245	254	264	274	284	295	306	318	330	342	355	369	383	132	
Taxes other than Income Tax	71	82	84	87	89	92	95	97	100	103	106	109	113	116	119	123	127	130	134	138	47	
<b>Expenses (excluding power)</b>	<b>378</b>	<b>465</b>	<b>470</b>	<b>481</b>	<b>495</b>	<b>508</b>	<b>523</b>	<b>540</b>	<b>559</b>	<b>575</b>	<b>594</b>	<b>614</b>	<b>635</b>	<b>656</b>	<b>679</b>	<b>701</b>	<b>725</b>	<b>750</b>	<b>775</b>	<b>801</b>	<b>276</b>	
<b>EBITDA</b>	<b>1,244</b>	<b>1,994</b>	<b>2,048</b>	<b>2,101</b>	<b>2,158</b>	<b>2,209</b>	<b>2,260</b>	<b>2,313</b>	<b>2,372</b>	<b>2,427</b>	<b>2,843</b>	<b>3,092</b>	<b>3,172</b>	<b>3,243</b>	<b>3,316</b>	<b>3,430</b>	<b>3,537</b>	<b>3,616</b>	<b>3,697</b>	<b>3,783</b>	<b>1,265</b>	
Depreciation	542	815	817	818	819	821	822	823	825	827	828	830	832	833	835	835	833	835	837	839	280	
Interest	1,060	1,684	1,621	1,594	1,562	1,521	1,477	1,426	1,369	1,304	1,219	1,109	994	878	780	730	703	677	650	623	199	
Taxes	-	-	-	-	-	-	-	238	289	310	329	344	357	369	378	385	390	394	398	400	134	
<b>Net Income</b>	<b>(283)</b>	<b>(505)</b>	<b>(389)</b>	<b>(311)</b>	<b>(224)</b>	<b>(133)</b>	<b>(39)</b>	<b>(174)</b>	<b>(110)</b>	<b>(14)</b>	<b>467</b>	<b>809</b>	<b>989</b>	<b>1,163</b>	<b>1,323</b>	<b>1,481</b>	<b>1,611</b>	<b>1,710</b>	<b>1,812</b>	<b>1,922</b>	<b>652</b>	
Net Rate Base, End of Year	34,969	34,544	33,782	33,019	32,256	31,493	30,732	29,974	29,215	28,458	27,702	26,945	26,188	25,432	24,677	23,922	23,170	22,420	21,669	20,919	20,171	
Total Debt, End of Year	27,265	27,204	26,827	26,371	25,829	25,195	24,472	23,647	22,707	21,649	20,092	18,266	16,553	14,684	13,572	13,157	12,744	12,331	11,918	11,506	11,094	
Debt Capitalization	78%	79%	79%	80%	80%	80%	80%	79%	78%	76%	73%	68%	63%	58%	55%	55%	55%	55%	55%	55%	55%	
Annual Effective Interest Rate	6.2%	6.2%	6.0%	6.0%	6.0%	6.0%	5.9%	5.9%	5.9%	5.9%	5.8%	5.8%	5.7%	5.6%	5.5%	5.5%	5.4%	5.4%	5.4%	5.3%	5.3%	
Equity, End of Year	7,705	7,340	6,954	6,647	6,427	6,297	6,260	6,327	6,509	6,809	7,610	8,680	9,636	10,748	11,104	10,765	10,427	10,089	9,751	9,414	9,077	
Return on Equity Rate	-5.5%	-3.2%	-2.6%	-2.1%	-1.5%	-0.9%	-0.3%	-1.3%	-0.8%	-0.1%	3.7%	6.7%	8.4%	10.2%	11.9%	13.8%	15.5%	17.0%	18.6%	20.4%	21.6%	
20 Year Simple Average ROE	<b>6.2%</b>																					
EBITDA	1,244	1,994	2,048	2,101	2,158	2,209	2,260	2,313	2,372	2,427	2,843	3,092	3,172	3,243	3,316	3,430	3,537	3,616	3,697	3,783	1,265	
Less: Sustaining Capital	86	50	50	51	53	54	60	62	63	65	67	69	71	74	76	78	78	80	82	85	87	
Less: Working Capital Deficiency	97	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cash Available for Debt Service	1,279	1,744	1,998	2,050	2,105	2,155	2,200	2,251	2,309	2,361	2,776	3,023	3,101	3,170	3,240	3,352	3,460	3,536	3,614	3,698	1,177	
Less: Interest	1,060	1,684	1,621	1,594	1,562	1,521	1,477	1,426	1,369	1,304	1,219	1,109	994	878	780	730	703	677	650	623	199	
Less: Debt Repayment	-	60	377	456	543	634	723	825	940	1,058	1,557	1,826	1,713	1,869	1,112	415	414	413	413	412	412	
<b>Cash Available after Debt Service</b>	<b>0</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>87</b>	<b>394</b>	<b>423</b>	<b>1,348</b>	<b>2,207</b>	<b>2,343</b>	<b>2,447</b>	<b>2,552</b>	<b>2,663</b>	<b>567</b>	
Debt to EBITDA	n/a	13.6x	13.1x	12.6x	12.0x	11.4x	10.8x	10.2x	9.6x	8.9x	7.1x	5.9x	5.2x	4.5x	4.1x	3.8x	3.6x	3.4x	3.2x	3.0x	n/a	
Debt Service Coverage	n/a	1.1x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.1x	1.2x	1.2x	1.8x	3.0x	3.2x	3.3x	3.5x	3.7x	n/a	

**Attachment 2.1(f)**

**Sensitivity Analysis (As-Built Costs Exceeding Estimate)**

Trans Mountain Pipeline System  
Quantitative Financial Outlook  
CA\$ millions

**KEY ASSUMPTIONS**

**CASE**

**CER 2.1(f)**

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Months	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4
Capacity Utilization %	83%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
Revenue - Committed	1,709	2,591	2,654	2,721	2,794	2,861	2,930	3,003	3,085	3,159	3,235	3,316	3,406	3,488	3,571	3,480	3,484	3,568	3,655	3,746	1,259	
Revenue - Uncommitted	95	694	711	729	748	766	785	804	826	846	866	887	911	933	955	1,193	1,332	1,364	1,397	1,432	481	
Revenue Sharing - Shippers	(0)	(229)	(235)	(240)	(247)	(253)	(259)	(265)	(272)	(279)	(286)	(293)	(301)	(308)	(315)	(320)	(327)	(335)	(343)	(351)	(118)	
Revenue Sharing - Other	(17)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(14)	
<b>Revenue, net of Sharing</b>	<b>1,787</b>	<b>3,014</b>	<b>3,088</b>	<b>3,167</b>	<b>3,253</b>	<b>3,332</b>	<b>3,414</b>	<b>3,500</b>	<b>3,596</b>	<b>3,684</b>	<b>3,773</b>	<b>3,869</b>	<b>3,975</b>	<b>4,071</b>	<b>4,169</b>	<b>4,311</b>	<b>4,447</b>	<b>4,555</b>	<b>4,667</b>	<b>4,785</b>	<b>1,608</b>	
Pipeline Operating Costs	131	178	174	180	187	189	192	198	204	208	214	221	227	234	241	249	256	264	272	280	96	
Salaries, Wages and Administration	177	205	212	214	219	227	236	245	254	264	274	284	295	306	318	330	342	355	369	383	132	
Taxes other than Income Tax	71	82	84	87	89	92	95	97	100	103	106	109	113	116	119	123	127	130	134	138	47	
<b>Expenses (excluding power)</b>	<b>378</b>	<b>465</b>	<b>470</b>	<b>481</b>	<b>495</b>	<b>508</b>	<b>523</b>	<b>540</b>	<b>559</b>	<b>575</b>	<b>594</b>	<b>614</b>	<b>635</b>	<b>656</b>	<b>679</b>	<b>701</b>	<b>725</b>	<b>750</b>	<b>775</b>	<b>801</b>	<b>276</b>	
<b>EBITDA</b>	<b>1,409</b>	<b>2,549</b>	<b>2,618</b>	<b>2,686</b>	<b>2,758</b>	<b>2,824</b>	<b>2,891</b>	<b>2,960</b>	<b>3,037</b>	<b>3,109</b>	<b>3,179</b>	<b>3,255</b>	<b>3,340</b>	<b>3,415</b>	<b>3,491</b>	<b>3,610</b>	<b>3,722</b>	<b>3,806</b>	<b>3,892</b>	<b>3,983</b>	<b>1,332</b>	
Depreciation	542	815	817	818	819	821	822	823	825	827	828	830	832	833	835	835	833	835	837	839	280	
Interest	1,057	1,653	1,552	1,483	1,405	1,313	1,214	1,103	986	905	870	843	816	789	762	735	708	681	654	627	200	
Taxes	-	-	-	-	-	-	-	238	289	310	329	344	357	369	378	385	390	394	398	400	134	
<b>Net Income</b>	<b>(114)</b>	<b>80</b>	<b>249</b>	<b>385</b>	<b>534</b>	<b>690</b>	<b>855</b>	<b>796</b>	<b>937</b>	<b>1,066</b>	<b>1,152</b>	<b>1,238</b>	<b>1,335</b>	<b>1,424</b>	<b>1,516</b>	<b>1,656</b>	<b>1,791</b>	<b>1,896</b>	<b>2,003</b>	<b>2,118</b>	<b>718</b>	
Net Rate Base, End of Year	34,969	34,545	33,783	33,020	32,257	31,494	30,734	29,975	29,217	28,460	27,702	26,945	26,188	25,432	24,677	23,922	23,170	22,420	21,669	20,919	20,171	
Total Debt, End of Year	27,094	26,448	25,433	24,281	22,981	21,524	19,907	18,112	16,325	15,653	15,236	14,820	14,404	13,988	13,572	13,157	12,744	12,331	11,918	11,506	11,094	
Debt Capitalization	77%	77%	75%	74%	71%	68%	65%	60%	56%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	
Annual Effective Interest Rate	6.2%	6.2%	6.0%	6.0%	5.9%	5.9%	5.9%	5.8%	5.7%	5.7%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.4%	5.4%	5.4%	5.3%	
Equity, End of Year	7,875	8,097	8,350	8,739	9,276	9,970	10,826	11,863	12,892	12,807	12,466	12,125	11,785	11,445	11,104	10,765	10,427	10,089	9,751	9,414	9,077	
Return on Equity Rate	-2.2%	0.5%	1.6%	2.6%	3.7%	4.9%	6.2%	5.9%	7.1%	8.3%	9.2%	10.2%	11.3%	12.4%	13.7%	15.4%	17.2%	18.8%	20.5%	22.5%	23.7%	
20 Year Simple Average ROE	<b>10.2%</b>																					
EBITDA	1,409	2,549	2,618	2,686	2,758	2,824	2,891	2,960	3,037	3,109	3,179	3,255	3,340	3,415	3,491	3,610	3,722	3,806	3,892	3,983	1,332	
Less: Sustaining Capital	86	50	50	51	53	54	60	62	63	65	67	69	71	74	76	78	78	80	82	85	87	
Less: Working Capital Deficiency	266	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cash Available for Debt Service	1,444	2,299	2,568	2,635	2,706	2,770	2,831	2,898	2,974	3,043	3,112	3,185	3,268	3,341	3,415	3,532	3,644	3,726	3,809	3,898	1,245	
Less: Interest	1,057	1,653	1,552	1,483	1,405	1,313	1,214	1,103	986	905	870	843	816	789	762	735	708	681	654	627	200	
Less: Debt Repayment	-	646	1,015	1,152	1,301	1,457	1,617	1,795	1,787	672	417	416	416	416	416	415	414	413	413	412	412	
<b>Cash Available after Debt Service</b>	<b>(0)</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>-</b>	<b>(0)</b>	<b>-</b>	<b>0</b>	<b>200</b>	<b>1,466</b>	<b>1,825</b>	<b>1,926</b>	<b>2,036</b>	<b>2,136</b>	<b>2,238</b>	<b>2,382</b>	<b>2,523</b>	<b>2,632</b>	<b>2,742</b>	<b>2,859</b>	<b>633</b>	
Debt to EBITDA	n/a	10.4x	9.7x	9.0x	8.3x	7.6x	6.9x	6.1x	5.4x	5.0x	4.8x	4.6x	4.3x	4.1x	3.9x	3.6x	3.4x	3.2x	3.1x	2.9x	n/a	
Debt Service Coverage	n/a	1.1x	1.0x	1.0x	1.0x	1.0x	1.0x	1.0x	1.1x	2.0x	2.5x	2.6x	2.7x	2.8x	3.0x	3.1x	3.3x	3.5x	3.6x	3.8x	n/a	



**Attachment 2.5(a)**

**Table 1 and 2 Breakdown**

Table 1 Breakdown

		Pipeline Construction Scopes							Total Uncapped Scopes			
		Cash Cost	AFUDC				Total		Cost	AFUDC		Total
		Period \$CAD millions	Period \$CAD millions	Cumulative \$CAD millions	Period % of Total	Cumulative % of Total	Period \$CAD millions	Period % of Total	Period \$CAD millions	Period \$CAD millions	Cumulative \$CAD millions	Period \$CAD millions
2015	Incurred	-	-	-	0%	0%	-	0%	57	6	6	62
2016	Incurred	-	-	-	0%	0%	-	0%	27	5	11	32
2017	Incurred	27	1	1	8%	4%	28	31%	82	9	20	91
2018	Incurred	32	4	5	19%	12%	36	23%	134	21	41	155
2019	Incurred	17	6	10	15%	13%	22	6%	325	37	78	362
2020	Incurred	159	8	18	14%	14%	167	44%	322	56	134	378
2021	Incurred	749	35	53	36%	23%	784	81%	875	98	232	972
2022	Incurred	2,371	146	199	65%	44%	2,517	92%	2,564	225	457	2,748
<b>Jan - May 2023</b>	<b>Incurred</b>	<b>1,676</b>	<b>134</b>	<b>333</b>	<b>76%</b>	<b>53%</b>	<b>1,810</b>	<b>90%</b>	<b>1,859</b>	<b>175</b>	<b>632</b>	<b>2,016</b>
Jun 23 to Complete	Remaining Balance	1,719	252	585	80%	62%	1,971	87%	1,983	314	946	2,270
		<b>6,750</b>	<b>585</b>				<b>7,335</b>	<b>81%</b>	<b>8,226</b>	<b>946</b>		<b>9,087</b>

### Table 2 Breakdown

		Other Uncapped Scope								Total Uncapped Scopes				
		Cash Cost	Firm Service Credits	AFUDC				Total		Cash Cost	Firm Service Credits	AFUDC		Total
		Period \$CAD millions	Period \$CAD millions	Period \$CAD millions	Cumulative \$CAD millions	Period % of Total	Cumulative % of Total	Period \$CAD millions	Period % of Total	Period \$CAD millions	Period \$CAD millions	Period \$CAD millions	Cumulative \$CAD millions	Period \$CAD millions
2015	Incurred	57	-	6	6	100%	100%	62	100%	57	-	6	6	62
2016	Incurred	27	-	5	11	100%	100%	32	100%	27	-	5	11	32
2017	Incurred	54	-	9	19	92%	96%	63	69%	82	-	9	20	91
2018	Incurred	102	-	17	36	81%	88%	119	77%	134	-	21	41	155
2019	Incurred	308	-	31	68	85%	87%	340	94%	325	-	37	78	362
2020	Incurred	163	-	48	116	86%	86%	212	56%	322	-	56	134	378
2021	Incurred	125	-	63	179	64%	77%	188	19%	875	-	98	232	972
2022	Incurred	192	(41)	79	258	35%	56%	231	8%	2,564	(41)	225	457	2,748
<b>Jan - May 2023</b>	<b>Incurred</b>	<b>183</b>	<b>(18)</b>	<b>41</b>	<b>299</b>	<b>24%</b>	<b>47%</b>	<b>206</b>	<b>10%</b>	<b>1,859</b>	<b>(18)</b>	<b>175</b>	<b>632</b>	<b>2,016</b>
Jun 23 to Complete	Remaining Balance	264	(27)	62	361	20%	38%	299	13%	1,983	(27)	314	946	2,270
		1,476	(85)	361				1,752	19%	8,226	(85)	946		9,087

**Attachment 2.5(b)**

**CPCN Cost Estimate Report**

**PRIVILEGED AND CONFIDENTIAL**



**TRANS**MOUNTAIN

**TRANS MOUNTAIN EXPANSION PROJECT**

**CPCN COST ESTIMATE REPORT**

**LEVEL 1**

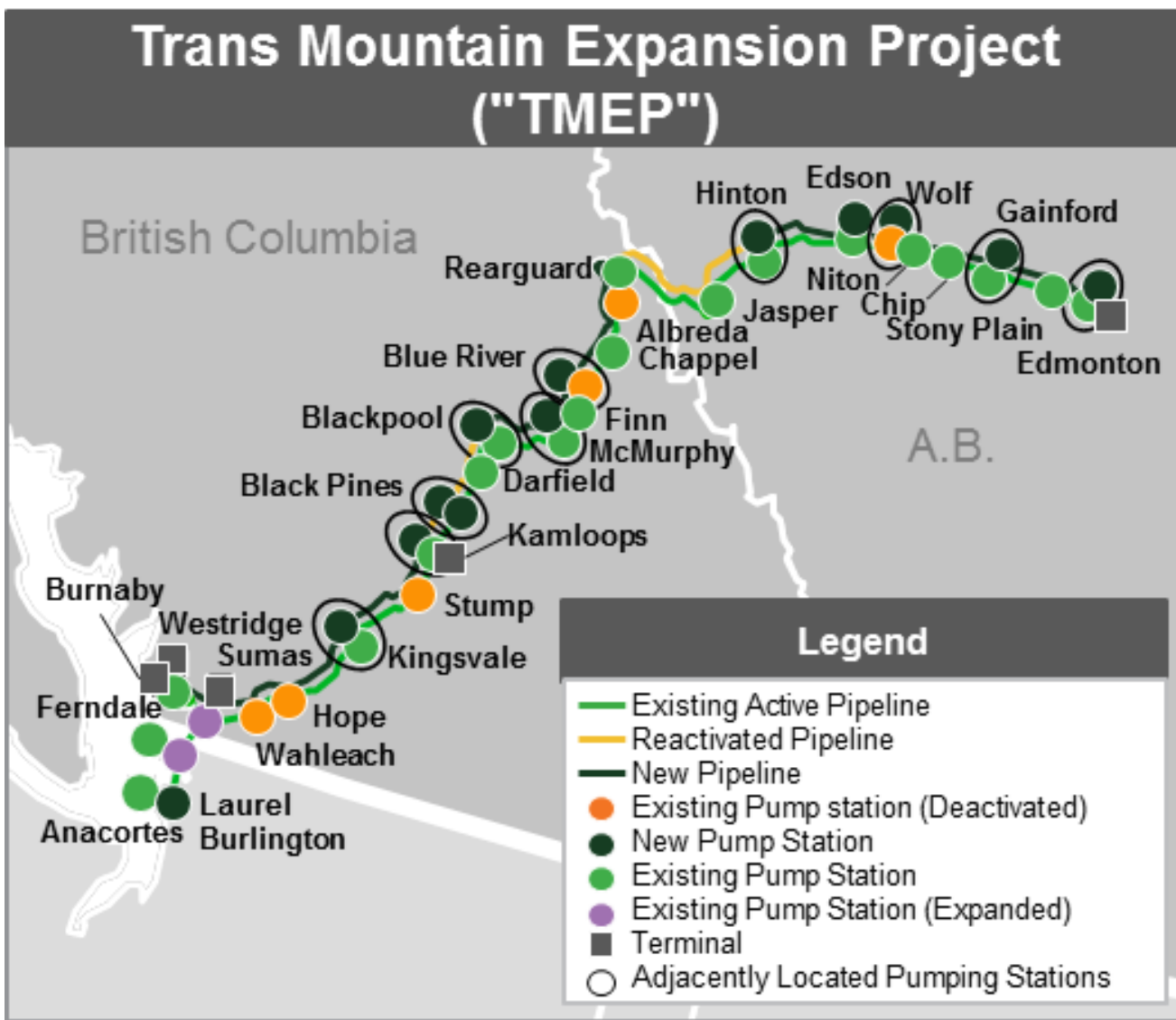
**February 3, 2017**

**KINDER MORGAN**  
CANADA INC.

 <b>TRANSMOUNTAIN</b>	<b>Trans Mountain Expansion Project</b>  CPCN Cost Estimate Report	Date:	02-03-2017
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**DISCLAIMER:**


**This Report is being provided for informational purposes only and is not intended to supplement or modify the information that will be made available to a Shipper through an audit initiated pursuant to Section 6.1(c) of the Facility Support Agreement. The dollar amounts provided in each of the line items detailing the Cost Estimate, Capped Costs and Uncapped Costs described in Table 1.0.1 – CPCN Cost Estimate and each of the tables detailing the cost components for each of the items are indicative and provided for informational purposes only and may be less or greater than such described amounts, based upon the actual costs incurred, provided that for determining the Commencement Date Toll the aggregate Capped Costs shall not exceed the Total Estimate amount provided for the Capped Costs in Table 1.0.1 – CPCN Cost Estimate which amount is fixed as of the date of this Report and represents the maximum amount of the aggregate Capped Costs. Nothing in this Report shall amend, modify or otherwise alter the obligations, terms or conditions set out in the Facility Support Agreement or Transportation Service Agreement.**



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 <b>TRANSMOUNTAIN</b>	<b>Trans Mountain Expansion Project</b> CPCN Cost Estimate Report	Date:	02-03-2017
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## INTERPRETATION

The use of the word "**include**", "**includes**" or "**including**" means "including without limitation."

All dollar amounts referred to in this Agreement are in Canadian dollars, unless otherwise indicated herein.

### Acronyms

AESO.....Alberta Electric System Operator

AFE.....Authorization for Expenditure coding used on the Trans Mountain Expansion Project

BCEAO.....British Columbia Environmental Assessment Office

CPCN.....Certificate of Public Conveyance and Necessity

ENGO's.....Environment Non-Government Organization

EPC.....Engineering, Procurement and Construction

FEED.....Front End Engineering Design

FSA.....Facilities Support Agreement

GCC.....General Construction Contract

ILI.....In Line Inspection

IOS.....Individual Ownership Sketches

IT.....Information Technology

ITS..... Incentive Toll Settlement approved by the NEB

HR.....Human Resources

bbl..... barrels

Line 1.....existing pipeline (with exception of some segments included with Line 2)

Line 2.....new pipeline including some segments of existing Line 1

MT.....metric tonne

NEB.....National Energy Board

NPS24.....Nominal Pipe Size 24 inch

NPS 36.....Nominal Pipe Size 36 inch

NPS 42.....Nominal Pipe Size 42 inch

NTS..... Negotiated Toll Settlement approved by the NEB

RoW.....Right of Way

SCADA.....Supervisory Control and Data Acquisition

SCM.....Supply Chain Management

SE&C.....Stakeholder Engagement and Communications

SME.....Subject Matter Experts

TIC.....Total Installed Cost

TMEP.....Trans Mountain Expansion Project

VP.....Vice President

WCMRC.....West Coast Marine Response Corporation

## 1.0 SUMMARY

This report has been prepared by Trans Mountain for the purposes of providing shippers supporting information for the CPCN Cost Estimate and the shipper audit pursuant to the applicable sections in Article 6 of the FSA.

The CPCN Cost Estimate is shown in the table below along with the Revised Toll and a forecast of annual spending for TMEP. The line items shown are consolidated from individual Authorizations For Expenditure (AFEs) which Trans Mountain has used to organize the estimate and to facilitate reporting on major scope items.

The details supporting the CPCN Cost Estimate have been organized into multiple levels of increasing detail. This Level 1 report provides the highest level summary of the cost items. The Level 2 detail which supports this report consists of a binders and an electronic SharePoint site organized to support each AFE and has been provided for the shipper audit.

**Table 1.0.1 CPCN Cost Estimate**

Item	CPCN Cost Estimate (\$M)			Estimate - To March 31, 2017 (\$M)	Remaining
	Cost Estimate	Capped Costs	Uncapped Costs		
Project Management (including Regulatory)	520.7	520.7	-	208.4	312.4
Engineering (including Survey & Environment)	509.4	509.4	-	280.7	228.7
Pipeline Materials	668.1	240.9	427.2	0.4	667.7
Land (RoW)	356.5	259.5	97.0	71.3	285.2
Pipeline Construction & Inspection	3,267.6	2,315.9	951.6	10.7	3,256.8
Facilities (including Terminals & Stations)	1,893.7	1,893.7	-	28.4	1,865.3
Commissioning (including Loop Reactivation)	84.9	84.9	-	-	84.9
Other	307.3	15.8	291.4	96.2	211.0
<b>Subtotal</b>	<b>7,608.1</b>	<b>5,840.7</b>	<b>1,767.3</b>	<b>696.1</b>	<b>6,912.0</b>
Firm Service Fee Credit	(189.8)	(189.8)	-	(110.9)	(78.8)
<b>Total Estimate</b>	<b>7,418.3</b>	<b>5,651.0</b>	<b>1,767.3</b>	<b>585.2</b>	<b>6,833.2</b>

**Table 1.0.2 Revised Tolls**

Receipt Point	Delivery Point	Contract Term	Fixed Toll Component (\$CDN/bbl)	
			Volume < 75,000 bpd	Volume ≥75,000 bpd
Edmonton	Kamloops	15YR	4.11	3.80
Edmonton	Kamloops	20YR	3.70	3.42
Edmonton	Burnaby	15YR	5.76	5.33
Edmonton	Burnaby	20YR	5.18	4.79
Edmonton	Westridge	15YR	6.32	5.85
Edmonton	Westridge	20YR	5.69	5.26
Edmonton	Sumas	15YR	5.50	5.09
Edmonton	Sumas	20YR	4.95	4.58

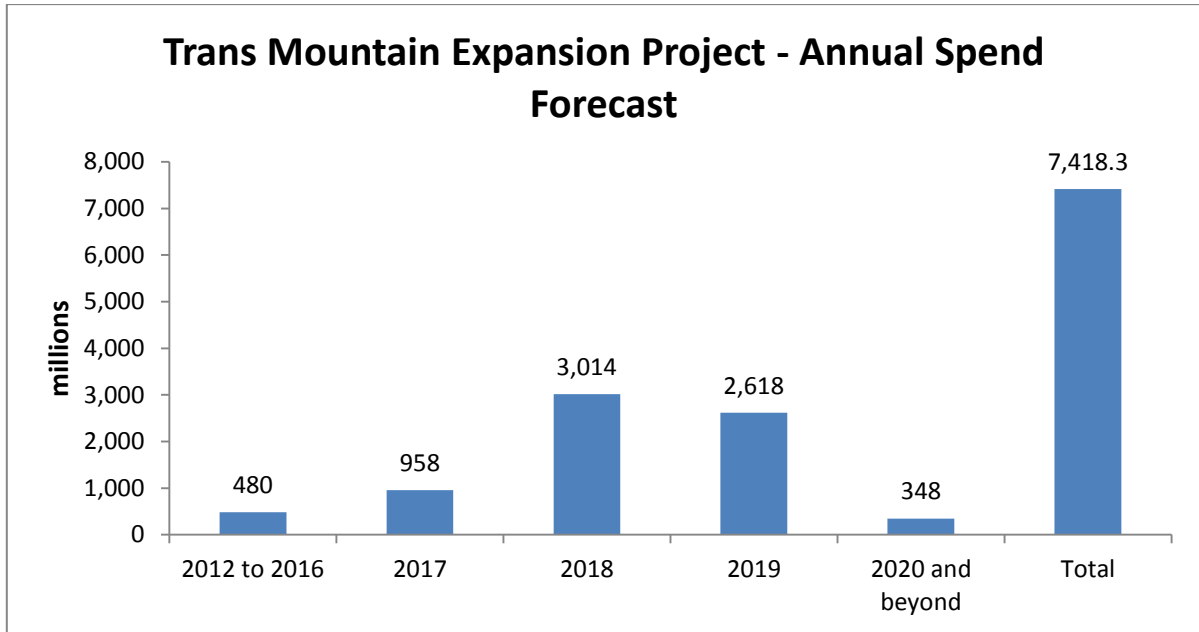


Figure 1.0.1 TMEP – Annual Spend Forecast

### 1.1 How this Report is Organized

This Level 1 Report provides an overview of the CPCN Cost Estimate starting with a discussion of each AFE, followed by information on project execution and cost control strategies and the cost estimate risk assessment process used to establish the P95 estimate.

The report concludes with more detailed discussion of the Uncapped Costs and provides the Revised Tolls calculated in accordance with the FSA.

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## 2.0 CPCN COST ESTIMATE

Each of the AFEs relates to a major scope of work with individual budgets and estimates that have been prepared from a variety of sources, including internal estimates, contractor estimates, bid results and executed agreements. Each of these is discussed in more detail in this section.

All costs associated with the completion of the pipeline, facilities and ancillary services will be included within the estimate. For purposes of the CPCN Cost Estimate; costs extending beyond the first year of service have been truncated and accrued into 2020, the final year of the estimate. In practice some AFEs will remain open beyond 2020 to allow the tracking of actual costs to the project.

The currency of account is CAD. All foreign currency costs are converted into CAD at the exchange rate determined to be relevant at time of estimates. Variations in the exchange rate have been addressed through cost and schedule risk assessment analysis.

The CPCN Cost Estimate shown in Table 1.0.1 is presented in the same format as the Initial Cost Estimate provided in Schedule B of the FSA. Each line item of the estimate is consolidated from individual AFEs which Trans Mountain has used to organize the estimate and to facilitate reporting on major scope items.

Table 2.0.1 on the following page provides a consolidated list of the AFEs and the Code identifier showing their relationship to the line items of the CPCN Cost Estimate. In the Sections 2.0.1 through 2.0.11 that follow, each of these AFEs is grouped by the Code identifier and discussed in more detail.

**Table 2.0.1 TMEP AFEs**

Description	AFE	Code	Category
Project Management - TMEP Dedicated Resources	13900	PM	Capped
Project Management - Corporate Support Staff	13901	PM	Capped
Program Management - Regulatory & SE&C	13902	PM	Capped
Program Management - Legal	13903	PM	Capped
Program Management - Marine & Emergency Response	13904	PM	Capped
Program Management - Safety & Security	13905	PM	Capped
Program Management - Employment and Training	13906	PM	Capped
Program Management – Regulatory Compliance	13907	PM	Capped
Program Management - Procurement	13908	PM	Capped
Program Management - Cost Control	13909	PM	Capped
Permitting	13914	PM	Capped
IT Infrastructure	13919	PM	Capped
Program Management - Environment	13910	Eng	Capped
Pipeline - Engineering, Survey, & Geotechnical	13911	Eng	Capped
System & Facilities - Engineering & Geotechnical	13912	Eng	Capped
Pipeline - Materials	13920	Pipe Mat	Capped +
Pipeline - Land & ROW	13921	Land	Capped +
Pipeline - AB Spread 1 – 49.159km	13922	Pipeline	Capped
Pipeline - AB Spread 2 – 289.402km	13923	Pipeline	Capped
Pipeline - BC Spread 3 and 4 – 274.860km	13924	Pipeline	Capped
Pipeline - BC Spread 5a and 6 – 252.215km	13926	Pipeline	Capped
Pipeline - BC Spread 5b – 84.308km	13927	Pipeline	Uncapped
Pipeline - BC Spread 7 and Tunnel – 38.310km	13928	Pipeline	Uncapped
Lower Mainland EPC Common Costs	13935	Facilities	Capped
Facilities - Pump Station & Ancillary Group A	13941	Facilities	Capped
Facilities - Pump Station & Ancillary Group B	13942	Facilities	Capped
Facilities - Pump Station & Ancillary Group C	13943	Facilities	Capped
Facilities - Pump Station & Ancillary Group D	13944	Facilities	Capped
Facilities - Edmonton Terminal	13945	Facilities	Capped
Facilities - Sumas Terminal	13946	Facilities	Capped
Facilities - Burnaby Terminal	13947	Facilities	Capped
Facilities - Westridge Marine Terminal	13948	Facilities	Capped
Facilities - Mainline Block Valves	13949	Facilities	Capped
Facilities - Utility Power	13950	Facilities	Capped
Pipeline - Reactivation	13930	Comm.	Capped
Line Fill, Wet Commissioning, & Start-up	13951	Comm.	Capped
Aboriginal Accommodation Agreements	13960	Other	Uncapped
Community Investment Agreements	13961	Other	Uncapped
Miscellaneous Construction	13962	Other	Capped
Firm Service Credit Fees	13964	Firm	Capped

## 2.1 Project Management (Including Regulatory)

The Project Management category (identifier code PM) includes the following AFEs:


**Table 2.1.1 Project Management (Including Regulatory) AFEs (\$520.7M)**

Description	AFE	Code	Category
Project Management - TMEP Dedicated Resources	13900	PM	Capped
Project Management - Corporate Support Staff	13901	PM	Capped
Program Management - Regulatory & SE&C	13902	PM	Capped
Program Management - Legal	13903	PM	Capped
Program Management - Marine & Emergency Response	13904	PM	Capped
Program Management - Safety & Security	13905	PM	Capped
Program Management - Employment and Training	13906	PM	Capped
Program Management – Regulatory Compliance	13907	PM	Capped
Program Management - Procurement	13908	PM	Capped
Program Management - Cost Control	13909	PM	Capped
Permitting	13914	PM	Capped
IT Infrastructure	13919	PM	Capped

The Project Management (Including Regulatory) CPCN Cost Estimate includes the following costs:

**Table 2.1.2 Project Management CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Project Management - TMEP Dedicated Resources	130.441	130.441	
Project Management - Corporate Support	78.130	78.130	
Program Management - Regulatory & SE&C	60.510	60.510	
Program Management - Legal	44.400	44.400	
Program Management - Marine & Emergency Response	24.831	24.831	
Program Management - Safety & Security	17.739	17.739	
Program Management - Employment and Training	4.874	4.874	
Regulatory Compliance	6.420	6.420	
Program Management - Procurement	13.982	13.982	
Program Management - Cost Control	15.833	15.833	
Permitting	2.058	2.058	
IT Infrastructure	7.223	7.223	
<b>Subtotal</b>	<b>406.441</b>	<b>406.441</b>	-
Escalation	7.572	7.572	
<b>Subtotal before Contingency and AFUDC</b>	<b>414.014</b>	<b>414.014</b>	-
Contingency	19.034	19.034	
AFUDC	87.693	87.693	
<b>Total</b>	<b>520.741</b>	<b>520.741</b>	-

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### **2.1.1 Project Management – TMEP Dedicated Resources (\$130.4M)**

Project Management - TMEP Dedicated Staff includes dedicated employees of TMEP and senior individuals required to support the execution of TMEP. The following major categories are included within this AFE:

- Pipeline Leads and Management
- Facilities Leads and Management
- Direct Reports to VP
- Lower Mainland Leads and Management
- Dedicated Employees Employee Travel
- Project Bonus Plan
- Pre-development Spending

### **2.1.2 Project Management – Corporate Support Staff (\$78.1M)**

Corporate Support includes non-dedicated employees, internal contractors, office expenses and overhead costs. The following major categories are included within this AFE:

- Consultants
- Non-Spread/Facility Infrastructure
- Non-Dedicated Employee Internal Time
- HR & IT Support Costs
- Pre-Operating Internal Time
- Pre-Operating Property Taxes

### **2.1.3 Program Management – Regulatory and SEC (\$60.5M)**

Stakeholder Engagement & Communications (SE&C) is responsible for strategic planning and implementation specific to TMEP public engagement initiatives. These Initiatives include Government Relations, Media Relations, Communications, Stakeholder Engagement and Consultation, Internal Communications, Online and Digital Communications, Advertising, Social Media and Community Relations.

### **2.1.4 Program Management – Legal (\$44.4M)**

Legal includes support of the various legal matters encountered on TMEP. The following major categories are included within this AFE:

- General
- Procurement
- Land
- Regulatory
- Financing

### **2.1.5 Program Management Marine & Emergency Response (\$24.8M)**

Marine includes those items required to satisfy NEB Condition requirements and to implement systems and processes improvements required to safely and efficiently transport product from the Westridge Marine Terminal. Marine does not include

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costs and expenses incurred by WCMRC for marine spill response enhancements, for extended tug escorts, nor does it include costs for marine terminal facilities.

Emergency Response includes those items required to satisfy NEB Condition requirements, land based emergency response plans, marine based emergency response plans and specific emergency response equipment to be deployed along the pipeline and at the terminal locations.

### **2.1.6 Program Management – Safety and Security (\$17.7M)**

Safety includes support for the TMEP Health and Safety program activities. This includes the use of 3rd Party specialists such as occupational health monitors, avalanche evaluation specialists, traffic and access control audit and evaluation specialists, Project ground disturbance management, or incident investigative services. It may include shared, non-spread specific, field administrative services for Safety Inspectors. Health and Safety equipment required, primarily shared equipment for communication purposes, but may also include Owner-required signage, will be incorporated into this AFE. It is anticipated, with to be determined milestone objectives, that safety awards will also be covered under this AFE.

Security includes support for the project by TMEP Security program activities. Typical costs will include Project and site security managers, Level 2 security provider and potential for enhanced police services in targeted areas of construction.

### **2.1.7 Program Management – Employment and Training (\$4.9M)**

Employment and Training manage the promotion of employment and training opportunities with the Project, to manage the TMEP Training Program for Aboriginal Peoples, to work with Project construction contractors on the inclusion of Aboriginal, local and regional community members in training and employment opportunities and to manage all employment and training related regulatory filings (and other requirements) in compliance with the NEB and BCEAO. The following major categories are included within this AFE:


- Employment and Training Team
- Employment and Training Programs

### **2.1.8 Program Management – Regulatory Compliance (\$6.4M)**

Support for TMEP regulatory compliance with Canadian federal permitting requirements and NEB conditions. The following major categories are included within this AFE:

- Regulatory Compliance
- Compliance
- NEB Commitments
- NEB Conditions
- Variance and Other Applications
- Federal Permitting



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### **2.1.9 Program Management – Procurement (\$14.0M)**

Procurement support of TMEP owners team procurement activities. The following major categories are included within this AFE:

- SCM Services
- Pipelines
- Facilities
- Lower Mainland BC

### **2.1.10 Program Management – Cost Control (\$15.8M)**

Cost Control includes support of TMEP project controls, document control and stakeholder record of consultation activities. In addition the project controls team will support the internal, external and shipper reporting requirements. The following major categories are included within this AFE:

- Cost Control
- Requisition/Invoice Analysts
- Document Analysts
- Schedulers
- StakeTracker Data Entry
- Software and Support

### **2.1.11 Program Management – Environment (\$144.3M)**

Program Management – Environment main objective is to meet regulatory requirements prior to, during and post-construction. This will include the following tasks: obtaining provincial and federal approvals/permits (e.g. Federal Fisheries Act, provincial archaeology permits, etc.); support for pre-construction activities (e.g. pre-construction environmental surveys, communications with the construction team, education of the construction team on environmental sensitivities and mitigation measures, etc.); fulfilling commitments made during the application process; drafting, communicating and finalizing plans to meet the NEB conditions; providing and managing resource specialist advice and providing oversight of environmental inspection during construction; reclamation planning and execution; and planning, executing and reporting on post-construction environmental monitoring.

### **2.1.12 Permitting (\$2.1M)**

Permitting includes support for the filing of various provincial permits within the latter portion of 2016 and the 2017 calendar year. The following major categories are included within this AFE:

- BC - Oil and Gas Commission
- BC – Minister of Environment
- BC – Minister of Transportation
- BC – Minister of Lands, Forestry and Natural Resources
- AB – Alberta Environment and Parks
- AB – Aboriginal Consultation Office

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**2.1.13 IT Infrastructure (\$7.2M)**

IT Infrastructure includes support of the system requirements of the TMEP team including software and support, Site internet and connectivity, SCADA systems and all other hardware requirements for the TMEP team.

## 2.2 Engineering (Including Survey and Environment) (\$509.4M)

The Engineering category (identifier code Eng) includes the following AFEs:

**Table 2.2.1 Engineering AFEs**

Description	AFE	Code	Category
Program Management - Environment	13910	Eng	Capped
Pipeline - Engineering, Survey, & Geotechnical	13911	Eng	Capped
System & Facilities - Engineering & Geotechnical	13912	Eng	Capped

The Engineering CPCN Cost Estimate includes the following costs:

**Table 2.2.2 Engineering CPCN Cost Estimate**

	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
<b>(CAD Millions)</b>			
Program Management - Environment	144.301	144.301	
Pipeline - Engineering, Survey, & Geotechnical	156.499	156.499	
System & Facilities - Engineering & Geotechnical	89.987	89.987	
<b>Subtotal</b>	<b>390.787</b>	<b>390.787</b>	<b>-</b>
Escalation	6.672	6.672	
<b>Subtotal before Contingency and AFUDC</b>	<b>397.460</b>	<b>397.460</b>	<b>-</b>
Contingency	9.558	9.558	
AFUDC	102.355	102.355	
<b>Total</b>	<b>509.373</b>	<b>509.373</b>	<b>-</b>

### 2.2.1 Pipeline – Engineering, Survey and Geotechnical (\$156.5M)

Pipeline – Engineering, Survey and Geotechnical includes the costs and expenses related to the geotechnical investigations, routing survey work and assistance in regulatory proceedings for technical matters related to the Line 2 pipeline & reactivation work for FEED, detailed engineering/design, third party engineering support through construction and legal survey costs associated with pipeline activities.

### 2.2.2 System & Facilities – Engineering & Geotechnical (\$90.0M)

System & Facilities – Engineering, Survey and Geotechnical includes the costs and expenses related to the geotechnical investigations, facility survey work, and assistance in regulatory proceedings for technical matters related to the Edmonton Terminal, Pump Stations, Sumas Terminal, Burnaby Terminal, Westridge Terminal. Power Lines & Power/Automation/Communication of/with Main Line Block Valve Stations for FEED, detailed engineering/design, third party engineering support through construction and legal survey costs associated with these activities.

### 2.3 Pipeline Materials (\$668.1M)

The Pipeline Materials category (identifier code Pipe Mat) includes the following AFEs:

**Table 2.3.1 Pipeline Materials AFEs**

Description	AFE	Code	Category
Pipeline - Materials	13920	Pipe Mat	Capped + Uncapped

Pipe material includes check valves, gate valves, valve assembly, bare pipe, freight and coating of line pipe and induction bends.

The Pipeline Materials CPCN Cost Estimate includes the following costs:

**Table 2.3.2 Pipeline Materials CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Check Valves	10.449	10.449	
Gate Valves	13.640	13.640	
Valve Assembly	12.851	12.851	
Induction Bends	14.082	14.082	
Provincial Sales Taxes	25.115	25.115	
Other - Pipe Related	15.863	15.863	
Bare Pipe	363.961		363.961
Coating	36.383	36.383	
Freight	78.604	78.604	
<b>Total</b>	<b>570.947</b>	<b>206.986</b>	<b>363.961</b>
Escalation	10.633	3.928	6.705
<b>Subtotal before Contingency and AFUDC</b>	<b>581.580</b>	<b>210.914</b>	<b>370.666</b>
Contingency	29.079	10.546	18.533
AFUDC	57.403	19.394	38.009
<b>Total Estimate</b>	<b>668.062</b>	<b>240.853</b>	<b>427.209</b>

Additional supporting information regarding the uncapped component Bare Pipe is provided in Section 5.2 of this report.

## 2.4 Land (RoW) (\$356.5M)

The Land category (identifier code Land) includes the following AFEs:

**Table 2.4.1 Land AFEs**

Description	AFE	Code	Category
Pipeline - Land & ROW	13921	Land	Capped + Uncapped


The Land CPCN Cost Estimate includes the following costs:

**Table 2.4.2 Land CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Right of Way	95.394	73.772	21.622
Temporary Work Space	48.190	29.770	18.421
Other Compensation	23.925	14.608	9.317
Facilities, camps and stockpile sites	5.146	4.552	0.594
Exclusions to be allocated	31.748	17.094	14.654
Land Options and Other Fees	7.762	7.762	
Damages	42.913	32.183	10.730
Land & ROW Administration	23.658	23.658	
PPBOR Regulatory Notifications	1.000	1.000	
<b>Subtotal</b>	<b>279.736</b>	<b>204.399</b>	<b>75.337</b>
Escalation	5.032	3.644	1.387
<b>Subtotal before Contingency and AFUDC</b>	<b>284.767</b>	<b>208.043</b>	<b>76.724</b>
Contingency	20.784	14.603	6.180
AFUDC	50.950	36.807	14.143
<b>Total Estimate</b>	<b>356.501</b>	<b>259.453</b>	<b>97.048</b>

Land and Right of Way includes the acquisition of all land parcels required for the execution of construction at both pipeline and facilities locations. The following major categories are included within this AFE:

- Right of way Acquisition – Pipeline Spreads
- Temporary Work Space Acquisition – Pipeline Spreads
- Other Consideration for option payments and premiums
- Construction Yard and Pipe Storage Areas
- Shoofly access for construction
- Rail Sidings
- Pump Station Land acquisition
- Valve Site above ground facilities acquisition
- Power Line land and right of way acquisition
- Alberta Crown Land Payments
- BC Crown Land Payments
- Access Road Acquisition
- Timber Damage Payments
- Acquisition of Aboriginal land parcels

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- Reactivation temporary workspace
- Receipt of third party crossing agreements
- Municipal compensation
- Damages
- Land and Right of Administration

Additional supporting information regarding the uncapped components of Land & Right of Way is provided in Section 5.1 of this report.

## 2.5 Pipeline Construction and Inspection (\$3,267.6M)

The Pipeline Construction and Inspection category (identifier code Pipeline) includes the following AFEs:

**Table 2.5.1 Pipeline Construction and Inspection AFEs**

Description	AFE	Code	Category
Pipeline - AB Spread 1 – 49.159 km (\$111.2M)	13922	Pipeline	Capped
Pipeline - AB Spread 2 – 289.402 km(\$337.1M)	13923	Pipeline	Capped
Pipeline - BC Spread 3 and 4 – 274.860km (\$804.2M)	13924	Pipeline	Capped
Pipeline - BC Spread 5a and 6 – 252.215km (\$674.4M)	13926	Pipeline	Capped
Pipeline - BC Spread 5b – 84.308km (\$392.5M)	13927	Pipeline	Uncapped
Pipeline - BC Spread 7 and Tunnel – 38.310km (\$410.0M)	13928	Pipeline	Uncapped

The Pipeline Construction and Inspection CPCN Cost Estimate includes the following costs:

**Table 2.5.2 Pipeline Construction and Inspection CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Alberta, Spread 1	111.235	111.235	
Alberta, Spread 2	337.148	337.148	
British Columbia, Spread 3/4	804.173	804.173	
British Columbia, Spread 5a and 6	674.369	674.369	
British Columbia, Spread 5b	392.529		392.529
British Columbia, Spread 7	409.997		409.997
<b>Subtotal</b>	<b>2,729.450</b>	<b>1,926.925</b>	<b>802.525</b>
Escalation	96.132	66.374	29.758
<b>Subtotal before Contingency and AFUDC</b>	<b>2,825.582</b>	<b>1,993.299</b>	<b>832.284</b>
Contingency	203.615	166.143	37.472
AFUDC	238.373	156.494	81.880
<b>Total</b>	<b>3,267.571</b>	<b>2,315.936</b>	<b>951.635</b>

Pipeline spreads have been distinguished based on the following break points:

**Table 2.5.3 Pipeline Spread Break Points**

Spread	Start	End	Length (km)
	Spread Break Point Description	Spread Break Point Description	
1	Edmonton Terminal 110 m north of Baseline Road C/L	145 m west of Devonian Way (Hwy 60)	49.159
2A	145 m west of Devonian Way (Hwy 60)	50 m west of Range Road 91	98.756
2B	50 m west of Range Road 91	Edson Pump Station	98.498
2C	Edson Pump Station	Hinton Pump Station	92.149
Total Length - Alberta			338.561
<b><i>Hinton to Hargeaves Reactivation Segment</i></b>			
3A	45 m D/S of existing Hargreaves trap site	Boundary between Tract 793.05 and Tract 794	13.282
3B	Boundary between Tract 793.05 and Tract 794	East of Southern Yellowhead Hwy 5 crossing	23.135
3C	East of Southern Yellowhead Hwy 5 crossing	Blue River Pump Station (End NPS 42)	85.017
4A	Blue River Pump Station (Begin NPS 36)	Hwy 5 Crossing U/S of Vavenby	79.746
4B	Hwy 5 Crossing U/S of Vavenby	Darfield Pump Station	73.680
<b><i>Darfield to Black Pines Reactivation Segment</i></b>			
5A	Black Pines Pump Station	Old Coquihalla Summit Toll Booth	182.843
5B	Old Coquihalla Summit Toll Booth	Wahleach Pump Station	84.308
6	Wahleach Pump Station	Staging area 335 m east of 232 <sup>nd</sup> Street, Langley	69.372
7	Staging area 335 m east of 232 <sup>nd</sup> Street, Langley	Burnaby Terminal	34.935
Burnaby to Westridge *	Burnaby Terminal	Westridge Marine Terminal	3.375
Total Length - British Columbia			649.693
Total Length - Alberta and British Columbia			988.254
* Burnaby to Westridge includes multiple pipelines within the tunnel construction			

Additional supporting information regarding uncapped component Spreads 5B and 7 is provided in Section 5.3 of this report.



## 2.6 Facilities (Including Terminals and Stations) (\$1,893.7M)

The Facilities category (identifier code Facilities) includes the following AFEs:

**Table 2.6.1 Facilities AFEs**

Description	AFE	Code	Category
Lower Mainland EPC Common Costs	13935	Facilities	Capped
Facilities - Pump Station & Ancillary Group A	13941	Facilities	Capped
Facilities - Pump Station & Ancillary Group B	13942	Facilities	Capped
Facilities - Pump Station & Ancillary Group C	13943	Facilities	Capped
Facilities - Pump Station & Ancillary Group D	13944	Facilities	Capped
Facilities - Edmonton Terminal	13945	Facilities	Capped
Facilities - Sumas Terminal	13946	Facilities	Capped
Facilities - Burnaby Terminal	13947	Facilities	Capped
Facilities - Westridge Marine Terminal	13948	Facilities	Capped
Facilities - Mainline Block Valves	13949	Facilities	Capped
Facilities - Utility Power	13950	Facilities	Capped


The Facilities CPCN Cost Estimate includes the following costs:

**Table 2.6.2 Facilities CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
EPC Common Costs	10.900	10.900	
Pump Station & Ancillary Facilities	289.598	289.598	
Edmonton Terminal	223.822	223.822	
Sumas Terminal	31.150	31.150	
Burnaby Terminal	544.475	544.475	
Westridge Marine Terminal	516.440	516.440	
Remote Mainline Block Valves (RMVBVs)	27.286	27.286	
Utility Power	1.264	1.264	
<b>Subtotal</b>	<b>1,644.933</b>	<b>1,644.933</b>	-
Escalation	61.769	61.769	
<b>Subtotal before Contingency and AFUDC</b>	<b>1,706.702</b>	<b>1,706.702</b>	-
Contingency	28.175	28.175	
AFUDC	158.811	158.811	
<b>Total</b>	<b>1,893.688</b>	<b>1,893.688</b>	-

### 2.6.1 Lower Mainland EPC Common Costs (\$10.9M)

Lower Mainland EPC Common Costs includes activities relating to the development of an EPC contract for the construction of the Lower Mainland facilities including Westridge Marine Terminal, Burnaby Terminal, Sumas Terminal, Tunnel and Spread 7. Scope of work for this category includes preliminary engineering support and oversight, estimating, execution planning and scheduling up to March 31, 2017.

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### **2.6.2 Facilities – Pump Station & Ancillary Facilities Group A to D (\$289.6M)**

Facilities – Pump Station & Ancillary Facilities Group A to D includes thirty new pumps and installed spare at Kamloops installed in eleven new pump houses on eleven sites for Line 2 between Strathcona County and Kingsvale, including the Line 2 initiating pump station at the Edmonton Terminal; two relocated pumps from the existing Hope pump station to Black Pines installed in a new pump house for Line 1; installation of sending and receiving traps for Line 1 / Line 2; new pump stations will include sump tank and sump pump; skid mounted electrical switchgear building; variable frequency drive building; electrical substation; electrical building; operator building; and a communication building.

### **2.6.3 Facilities – Edmonton Terminal (\$223.8M)**

Facilities – Edmonton Terminal includes construction at the Edmonton Terminal; four new tanks with a total capacity of 970,000 bbl; a new west tank valve manifold; and a new delivery manifold with integration into existing Legacy and ETE manifolds; a new electrical substation and switchyard; and enhanced fire water and foam systems and emergency equipment.

In addition to the construction scope, two Edmonton Terminal tanks currently used for merchant service will be transferred to regulated service pursuant to an agreed to methodology approved by the NEB in Order XO-T246-04-2008.

### **2.6.4 Facilities – Sumas Terminal (\$31.2M)**

Facilities – Sumas Terminal includes the addition of one new tank with 175,000 bbl with integration into existing manifold and enhancement of fire water and foam systems and emergency equipment.

### **2.6.5 Facilities – Burnaby Terminal (\$544.5M)**

Facilities – Burnaby Terminal includes construction at the Burnaby Terminal will include; fourteen news tanks with a total capacity of 3,630,000 bbl; new tank and delivery manifolds integrated into existing manifolds; significant excavation and embankment scope for the six tanks in the north area, six tanks in the east area and two tanks in the central area; enhanced fire water and foam systems and emergency equipment.

### **2.6.6 Facilities – Westridge Marine Terminal (\$516.4M)**

Facilities – Westridge Marine Terminal includes construction at Westridge Marine Terminal; the offshore and onshore and facilities to support three new mooring berths; the loading platforms and access trestles; foreshore development; new metering and vapor recovery equipment; a utility berth; a manifold; storm water treatment equipment; enhanced fire water and foam systems and emergency equipment; upgrade and widening of the existing access road.

### **2.6.7 Facilities – Mainline Block Valves (\$27.3M)**

Facilities – Mainline Block Valves includes surface facilities for main line block valves including power supply, emergency power and communication equipment.

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**2.6.8 Facilities – Utility Power (\$1.3M)**

Facilities – Utility Power includes studies completed by local utilities (BC Hydro in British Columbia and AESO in Alberta); any owner contributions required by the local utilities for power upgrades in Edmonton, Burnaby and Westridge terminals and at pump stations in Wolf, Edson, Black Pines and Kingsvale.

## 2.7 Commissioning (Including Loop Activation) (\$84.9M)

The Commissioning category (identifier code Comm) includes the following AFEs:

**Table 2.7.1 Commissioning AFEs**

Description	AFE	Code	Category
Pipeline - Reactivation	13930	Comm	Capped
Line Fill, Wet Commissioning, & Start-up	13951	Comm	Capped

The Commissioning CPCN Cost Estimate includes the following costs:

**Table 2.7.2 Commissioning CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Reactivation	60.000	60.000	
Commissioning	10.595	10.595	
<b>Subtotal</b>	<b>70.595</b>	<b>70.595</b>	<b>-</b>
Escalation	2.542	2.542	
<b>Subtotal before Contingency and AFUDC</b>	<b>73.137</b>	<b>73.137</b>	<b>-</b>
Contingency	5.446	5.446	
AFUDC	6.306	6.306	
<b>Total</b>	<b>84.888</b>	<b>84.888</b>	<b>-</b>

### 2.7.1 Pipeline – Reactivation (\$60.0M)

Pipeline – Reactivation includes the reactivation activities necessary to return two existing deactivated NPS24 pipeline segments into service consisting of one section between Hinton and Hargreaves 150 km in length, one section between Darfield and Black Pines 42 km in length; all resources for planning, management and quality inspection of the work; pipeline modifications necessary to conduct ILI; land use and access improvements; ILI utilizing four technologies; nitrogen supply and services to propel ILI tools; ILI digs and pipeline repairs; removal of 21 pipeline sleeves; natural hazard mitigation at 21 locations; ten new valve installations; automation of four existing valves and refurbishment of 16 existing valves; engineering assessment and third party certification; and hydrostatic testing.

### 2.7.2 Line Fill, Wet Commissioning, & Start-up (\$10.6M)

Line Fill, Wet Commissioning, & Start-up includes the line fill, wet commissioning of the pipeline segments and facilities and start-up; any commissioning materials, equipment and support.

## 2.8 Other (\$307.3M)

The Other category (identifier code Other) includes the following AFEs:

**Table 2.8.1 Other AFEs**

Description	AFE	Code	Category
Aboriginal Accommodation Agreements	13960	Other	Uncapped
Community Investment Agreements	13961	Other	Uncapped
Miscellaneous Construction	13962	Other	Capped

The Other CPCN Cost Estimate includes the following costs:

**Table 2.8.2 Other CPCN Cost Estimate**


(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Aboriginal Accommodation Agreements	216.956		216.956
Community Investment Agreements	17.805		17.805
Miscellaneous Construction	13.596	13.596	
<b>Subtotal</b>	<b>248.357</b>	<b>13.596</b>	<b>234.761</b>
Escalation	-	-	-
<b>Subtotal before Contingency and AFUDC</b>	<b>248.357</b>	<b>13.596</b>	<b>234.761</b>
Contingency	13.445	1.073	12.373
AFUDC	45.462	1.149	44.313
<b>Total</b>	<b>307.264</b>	<b>15.817</b>	<b>291.447</b>

### 2.8.1 Aboriginal Accommodation Agreements (\$217.0M)

Aboriginal Accommodation Agreements include studies and agreements required to satisfy the consultation requirements of the Crown related to overall project development and execution of TMEP. Categories within this AFE include::

- Aboriginal Engagement Team
- Capacity Funding
- Traditional Land Use Studies
- Traditional Marine Use Studies
- Traditional Ecological Knowledge
- Mutual Benefits Agreements (including indenture settlements)

Additional supporting information regarding this uncapped component is provided in Section 5.4 of this report.

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**2.8.2 Community Investment Agreements (\$17.8M)**

Community Investment Agreements include three significant program areas intended to drive a net benefit for the project. These three areas include:

- Community programs/infrastructure
- Environmental stewardship
- Education

Additional supporting information regarding this uncapped component is provided in Section 5.5 of this report.

**2.8.3 Miscellaneous Construction (\$13.6M)**

Miscellaneous Construction includes costs required to cover the following items on TMEP:

- Course of Construction (Builder’s Risk) Insurance
- Construction Liability Wrap-up Insurance
- Letter of Credit Fees

## 2.9 Firm Service Fee Credit (\$189.8M)

The Firm Service Fee Credit includes the following AFEs:

**Table 2.9.1 Firm Service Fee Credit AFEs**

Description	AFE	Code	Category
Firm Service Credit Fees	13964	Firm	Capped

The Firm Service Fee Credit CPCN Cost Estimate includes the following costs:


**Table 2.9.2 Firm Service CPCN Cost Estimate**

(CAD Millions)	Total CPCN Cost Estimate	Capped - CPCN Cost Estimate	Uncapped - CPCN Cost Estimate
Firm 50 Funds	(189.691)	(189.691)	
<b>Subtotal</b>	<b>(189.691)</b>	<b>(189.691)</b>	-
Escalation	-	-	
<b>Subtotal before Contingency and AFUDC</b>	<b>(189.691)</b>	<b>(189.691)</b>	-
Contingency	-	-	
AFUDC	(0.065)	(0.065)	
<b>Total</b>	<b>(189.756)</b>	<b>(189.756)</b>	-

On November 29, 2010, Trans Mountain applied to the Board, under Part IV of the National Energy Board Act, requesting approval of Firm Service on the Trans Mountain pipeline system with respect to certain capacity to the Westridge Marine Terminal. As part of the implementation of Firm Service, 4,300 cubic metres per day (m3/d) have been allocated to Firm Service Shippers.

Two projects were designated for the use of Firm Service Fees. One regulated tank at the Edmonton Facility utilized Firm Service Fees. And the second was the Trans Mountain Expansion Project. According to the TSAs for the Firm Service Contracts the term is for a period of 10 years or such time as when the TMEP is completed.

For the purpose of the TMEP estimate the application of Firm Service Fees against the TMEP project are expected to end at in-service of December 31, 2019.

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## 2.10 Contingency

Contingency amounts used in the CPCN Cost estimate were derived through the risk assessment process which is described in Section 4.0 of this report.



## 2.11 Allowance for Funds Used During Construction

Allowance for Funds Used During Construction (“AFUDC”) is the weighted average cost of equity and debt applicable to the current Trans Mountain pipeline operations in accordance with the NEB approved ITS/NTS parameters agreed to between Trans Mountain and shippers. AFUDC costs have been calculated in the CPCN estimate to December 31, 2019 for all AFEs based on the expected in-service date and according to the following formula:

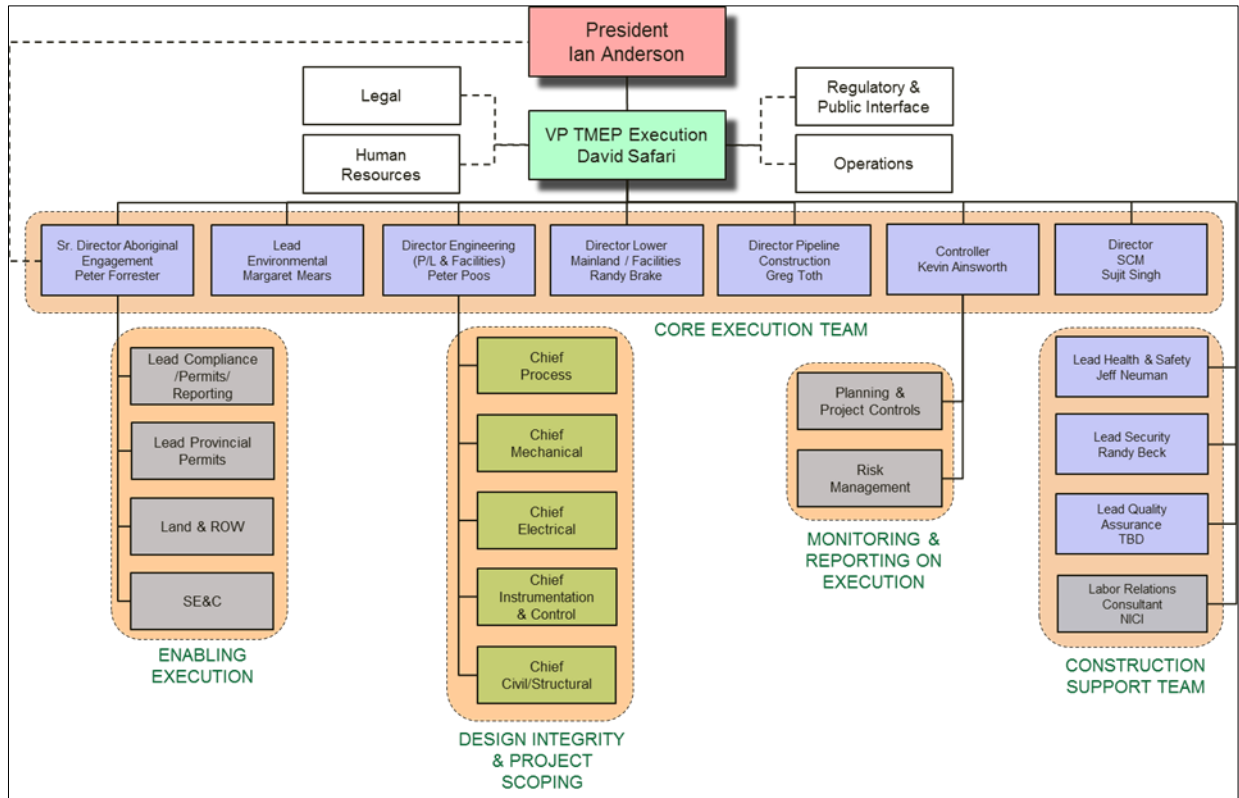
**Table 2.11.1 Allowance for Funds Used During Construction**

Description	Weighting	Rate	Weighted Rate
<b>2012</b>			
Equity	45%	10.0%	4.50%
Debt	55%	6.0%	3.30 %
Total	<b>100%</b>	<b>NA</b>	<b>7.800%</b>
<b>2013 - 2015</b>			
Equity	45%	9.5%	4.275%
Debt	55%	5.5%	3.025%
Total	<b>100%</b>	<b>NA</b>	<b>7.300%</b>
<b>2016 - 2019</b>			
Equity	45%	9.5%	4.275%
Debt	55%	5.0%	2.75%
Total	<b>100%</b>	<b>NA</b>	<b>7.025%</b>

### 3.0 PROJECT EXECUTION COST CONTROL AND REPORTING

Efficient and effective execution of the project requires a management and reporting structure based on the functional areas of responsibility. This ensures each category has a single responsible individual for an AFE and project directors or other executives have functional responsibility over groupings of AFEs.

The Level 1 organization chart for the project is shown below:



**Figure 3.0.1 TMEP Organizational Chart**

TMEP will be executed using the categories shown in the tables below. These tables also show the mapping of AFEs and Capped and Uncapped costs in each category.

**Table 3.0.1 TMEP Pipelines AFEs**

Description	AFE	Code	Category
<b>PIPELINES:</b>			
Pipeline - Engineering, Survey, & Geotechnical	13911	Eng	Capped
Pipeline - Materials	13920	Pipe Mat	Capped +
Pipeline - AB Spread 1 – 49.159km	13922	Pipeline	Capped
Pipeline - AB Spread 2 – 289.402km	13923	Pipeline	Capped
Pipeline - BC Spread 3 and 4 – 274.860km	13924	Pipeline	Capped
Pipeline - BC Spread 5A and 6 – 252.215km	13926	Pipeline	Capped
Pipeline - BC Spread 5B – 84.308km	13927	Pipeline	Uncapped
Pipeline - Reactivation	13930	Comm.	Capped

**Table 3.0.2 TMEP Facilities AFEs**

Description	AFE	Code	Category
<b>FACILITIES:</b>			
System & Facilities - Engineering & Geotechnical	13912	Eng	Capped
Facilities - Pump Station & Ancillary Group A	13941	Facilities	Capped
Facilities - Pump Station & Ancillary Group B	13942	Facilities	Capped
Facilities - Pump Station & Ancillary Group C	13943	Facilities	Capped
Facilities - Pump Station & Ancillary Group D	13944	Facilities	Capped
Facilities - Edmonton Terminal	13945	Facilities	Capped
Facilities - Mainline Block Valves	13949	Facilities	Capped
Facilities - Utility Power	13950	Facilities	Capped
Line Fill, Wet Commissioning, & Start-up	13951	Comm.	Capped

**Table 3.0.3 TMEP Other Execution AFEs**

Description	AFE	Code	Category
<b>LOWER MAINLAND:</b>			
Pipeline - BC Spread 7 and Tunnel – 38.310km (\$412.0M)	13928	Pipeline	Uncapped
Lower Mainland EPC Common Costs	13935	Facilities	Capped
Facilities - Sumas Terminal	13946	Facilities	Capped
Facilities - Burnaby Terminal	13947	Facilities	Capped
Facilities - Westridge Marine Terminal	13948	Facilities	Capped

**Table 3.0.4 TMEP Other Project Costs AFEs**

Description	AFE	Code	Category
<b>OTHER EXECUTION:</b>			
Project Management - TMEP Dedicated Resources	13900	PM	Capped
Program Management - Safety & Security	13905	PM	Capped
Program Management – Regulatory Compliance	13907	PM	Capped
Program Management - Procurement	13908	PM	Capped
Program Management - Cost Control	13909	PM	Capped
Permitting	13914	PM	Capped
IT Infrastructure	13919	PM	Capped
Program Management - Environment	13910	Eng	Capped
Pipeline - Land & ROW	13921	Land	Capped +

**Table 3.0.5 TMEP Other Project Costs AFEs**

Description	AFE	Code	Category
<b>OTHER PROJECT COSTS:</b>			
Project Management - Corporate Support Staff	13901	PM	Capped
Program Management - Regulatory & SE&C	13902	PM	Capped
Program Management - Legal	13903	PM	Capped
Program Management - Marine & Emergency Response	13904	PM	Capped
Program Management - Employment and Training	13906	PM	Capped
Aboriginal Accommodation Agreements	13960	Other	Uncapped
Community Investment Agreements	13961	Other	Uncapped
Miscellaneous Construction	13962	Other	Capped
Firm Service Credit Fees	13964	Firm	Capped

### 3.1 Contracting Strategies

The contracting strategy to be employed for TMEP is based on the principles of EPC contracts and GCC contracts with both types of contracts being applied to the various scopes of work as indicated in the following figure:

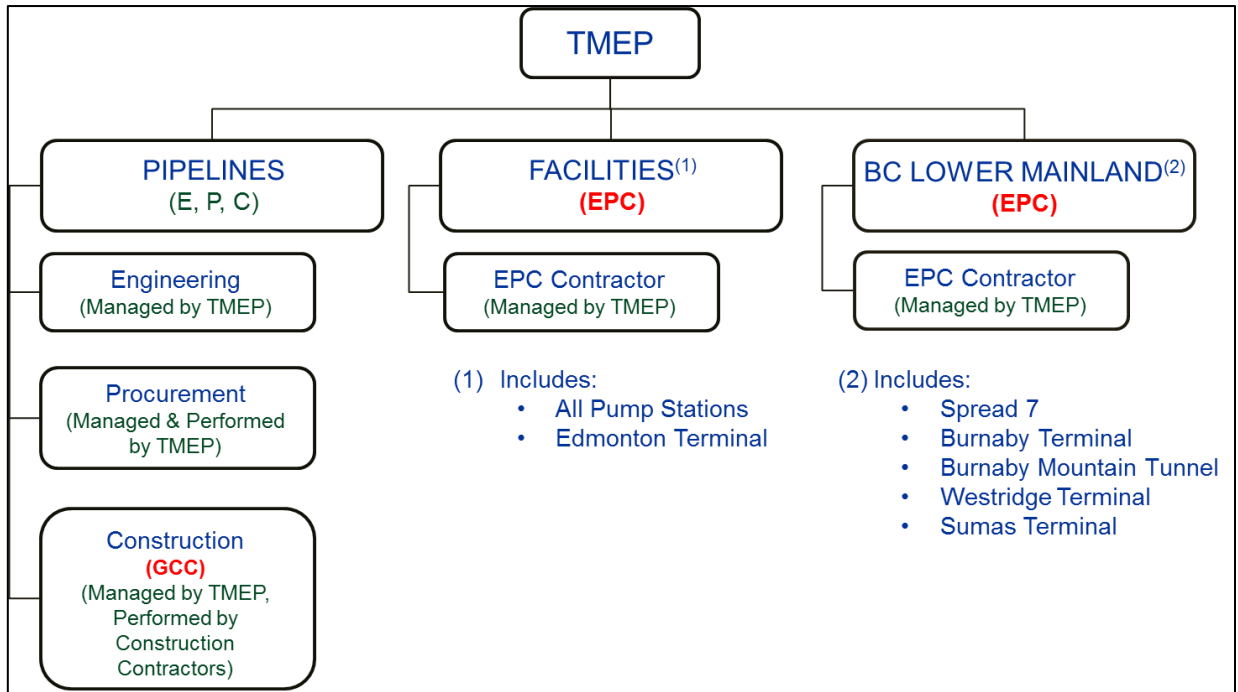



Figure 3.1.1 Contracting Strategy

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### 3.2 EPC and GCC Contracts

EPC contracts provide the benefit of having a single contractor responsible for integrating the complete execution scope of a project from engineering, through to procurement and construction with a focus on completing construction in the timeframe and on the dates defined for the project (i.e. Construction Driven Focus).

GCC contracts provide the benefit of having a construction contractor responsible for the complete integration and management of construction activities (including management of construction subcontractors) with a focus on completing construction in the timeframe and on the dates defined for the project. For GCC contracts typically the Owner is responsible for managing the completion of engineering, procurement of bulk materials such as pipe and valves that would be free issued to the GCC, and management of the interface between engineering, procurement and construction.

Within the strategy of EPC and GCC the types of contracts will be Open Book Converted Lump Sum (OBCLS) or Fixed Fee with Target Price (FFTP). Under both scenarios costs estimates will be developed based on full disclosure of the detail estimate build-up to TMEP. The basis of these estimates will include:

- Detailed Scope of Work and Quantities
- Detailed Project and Construction Execution Plans
- Detailed Execution Schedule with Identified Milestones

Under both contract types (OBCLS and FFTP) incentives for contractors to increase their profit margins are inherently built in by ensuring that Lump Sum Prices or Target Prices are not exceeded. This will be accomplished primarily through improvements in productivity during execution and ensuring efficient and effective management and integration of the project.

The above strategies were selected based on the following:

#### **GCC**

- Engineering for the pipeline spreads was well advanced at the time of selecting this strategy.
- This strategy removes the responsibility of managing the interfaces between various contractors and subcontractors during construction from the Owner to construction contractors that are qualified and experienced in construction and construction management.
- As the pipeline spreads will require a number of GCCs to complete the project (4 GCCs for 6 spreads) purchase of pipe material and valves by the Owner provides benefits in terms of cost, quality, and delivery of the material.

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### EPC

- Engineering for the facilities was in the preliminary stages at the time of selecting this strategy.
- This strategy removes the responsibility of managing the interfaces between various contractors and subcontractors during engineering, procurement and construction from the Owner to EPC contractors that are qualified and experienced in full execution of EPC projects.
- For BC Lower Mainland the TMEP execution team decided to add Spread 7 and the Burnaby Mountain Tunnel to the EPC scope as Spread 7 is more of an infrastructure project rather than a pipeline project due to the fact that it will be constructed in a heavily urbanized area (four municipal districts with varying bylaw requirements, high density of utility crossings, construction through busy city streets, etc.).

Additional information describing the contracting strategies for the uncapped pipeline Spreads 5B and 7 can be found in Section 5.3.

#### 4.0 CPCN COST ESTIMATE RISK ASSESSMENT

The CPCN Cost Estimate represents the 95<sup>th</sup> percentile expected cost of TMEP. It has been developed using quantitative risk analysis based on a Monte Carlo simulation of the base costs estimates for TMEP.

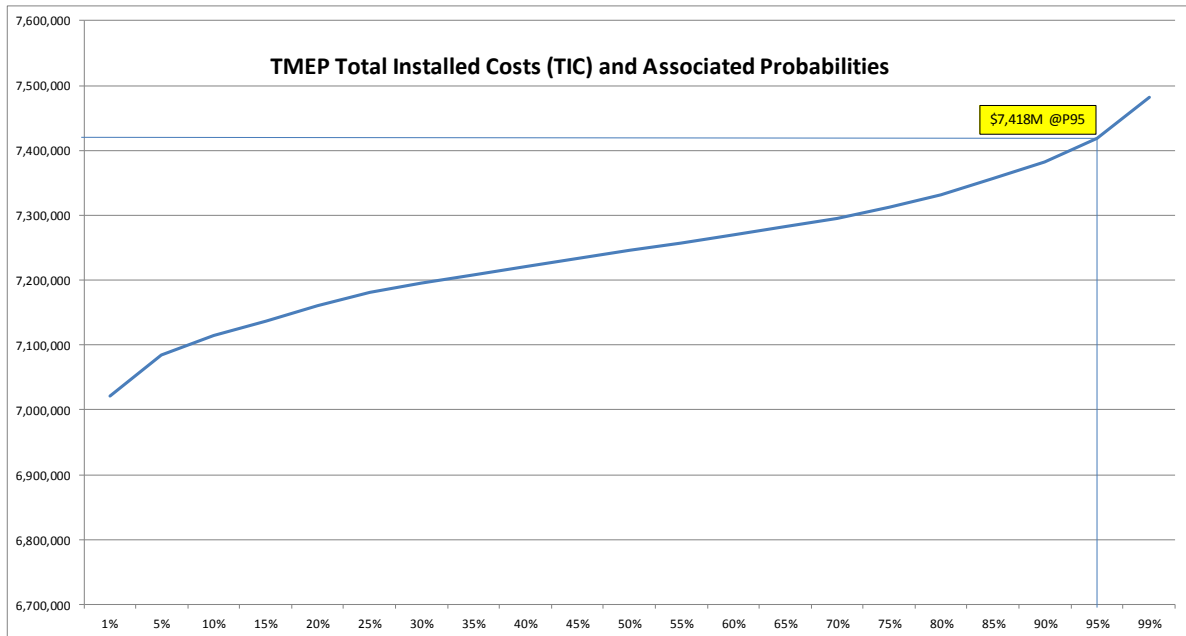
For this analysis, AFEs were grouped to develop four separate base cost estimates for Pipeline, Lower Mainland, Pump Stations and Edmonton Terminal (Facilities) and Execution Support. The overall Class designation of the AFEs is Class II/III.

**Table 4.0.1 AFEs Class Designation**

Project Scope & Subproject	Percent Engineering Complete	Class	AACE Estimate Accuracy
Lower Mainland	40%	III	+10% / -10%
Pipeline	90%	II	+5% / - 5%
Facilities	50%	III	+10% / -10%
Execution Support	90%	III	+10% / -10%

Risks associated with elements of each of the four base cost estimate groups were reviewed and considered by SMEs to establish probabilities for each element. Estimates received from contractors were broken down into three cost categories: (i) materials & equipment; (ii) labour cost; and (iii) subcontractors' costs. With cost risk probabilities assigned to each category, the Monte Carlo simulation model was then used to determine the overall probability of exceedance for the consolidated estimate.

The discussions with SMEs were held in a workshop format to solicit their options of risk impacts. Individual or group meetings with group leads were also conducted.. The SMEs opinions were translated into probability density functions derived from the best, worst and likely case scenarios for each element. These were then used as inputs to the model for simulation. The Monte Carlo simulation results in a cumulative distribution function showing the probability associated with TIC. The cumulative distribution function for the CPCN Cost Estimate is shown in the figure below.



**Figure 4.0.1 Monte Carlo Simulation for CPCN Cost Estimate**

The cumulative distribution function is then used to determine the appropriate amount of contingency required to ensure the 95<sup>th</sup> percentile estimate. The contingency amounts derived from the cumulative distribution function are provided in Table 4.0.2 – CPCN Cost Estimate Contingency Cumulative Distribution Results below. The contingency amounts derived for each of the base estimates were then allocated to each of the constituent AFEs.

**Table 4.0.2 CPCN Cost Estimate Contingency Cumulative Distribution Results**

Project Scope & Subproject	Base Cost Estimate	Contingency & Escalation	AFUDC	CPCN P95 Estimate
Lower Mainland	1,566,290	68,481	184,322	1,819,093
Pipeline	3,106,899	333,987	299,561	3,740,447
Facilities	589,223	42,253	39,809	671,285
Execution	889,144	74,767	223,596	1,187,507
<b>Total</b>	<b>6,151,556</b>	<b>519,488</b>	<b>747,288</b>	<b>7,418,332</b>



## 5.0 UNCAPPED COSTS

The Uncapped Costs with Escalation, Contingency and AFUDC include the following:

**Table 5.0.1 Uncapped Costs**

	Base Cost	Escalation	Contingency	AFUDC	Total
(CAD Millions)	Uncapped				
Land and Right of Way	75.337	1.387	6.180	14.143	97.048
Pipeline Materials	363.961	6.705	18.533	38.009	427.209
British Columbia, Spread 5b	392.529	14.831	34.294	35.997	477.650
British Columbia, Spread 7	409.997	14.927	3.178	45.883	473.985
Aboriginal Accomodation Agreements	216.956	-	10.938	43.195	271.090
Community Investment Agreements	17.805	-	1.434	1.118	20.357
<b>Total</b>	<b>1,476.584</b>	<b>37.851</b>	<b>74.558</b>	<b>178.345</b>	<b>1,767.339</b>

## 5.1 Land (RoW)


The uncapped costs for land and right of way include the following: 34.935 km of the Spread 7 lands to Burnaby Terminal; 3.375 km of lands from Burnaby Terminal to Westridge Marine Terminal; and all other land acquisition costs for stockpile sites, laydown yards, access or other requirements within Spread 7.

The following table outlines the various compensation amounts included in the estimate for Spread 7.

**Table 5.1.1 Compensation for Spread 7**

	Total IOS Acre	Total Payments	Average Payment/Acre
TWS	122.39	\$ 18,421,000	\$ 150,507
ROW	53.57	\$ 21,622,000	\$ 403,623
Other Compensation		\$ 9,317,000	
Damages		\$ 10,730,000	
Facilities and other items		\$ 15,248,000	
<b>Total</b>	<b>175.96</b>	<b>\$ 75,337,000</b>	

Wherever appropriate, land values are based off of appraisal reports by independent valuers and acreages per Individual Ownership Sketches by parcel. In total, 132 parcels are to be acquired in Spread 7 and 3 parcels have been acquired to date.

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## 5.2 Pipe Materials

The uncapped costs for pipe material costs include: bare pipe and costs for double-jointing where necessary. All other costs associated with the pipe including marine transportation, freight, PST and coating are included in the capped costs category. The CPCN Cost Estimate includes 301,472 MT of bare pipe with an average price of CAD \$1,207/MT.

Pipe Material bids from June 2015 were allowed to lapse and as such renegotiation of pipe supply with vendors commenced in late 2016 and continues through Q1 2017. It is anticipated that the pipe order will be placed late early Q2/2017 and the pricing included in the CPCN Cost Estimate reflects the updated pricing under the current negotiations.

## 5.3 Pipeline Construction and Inspection

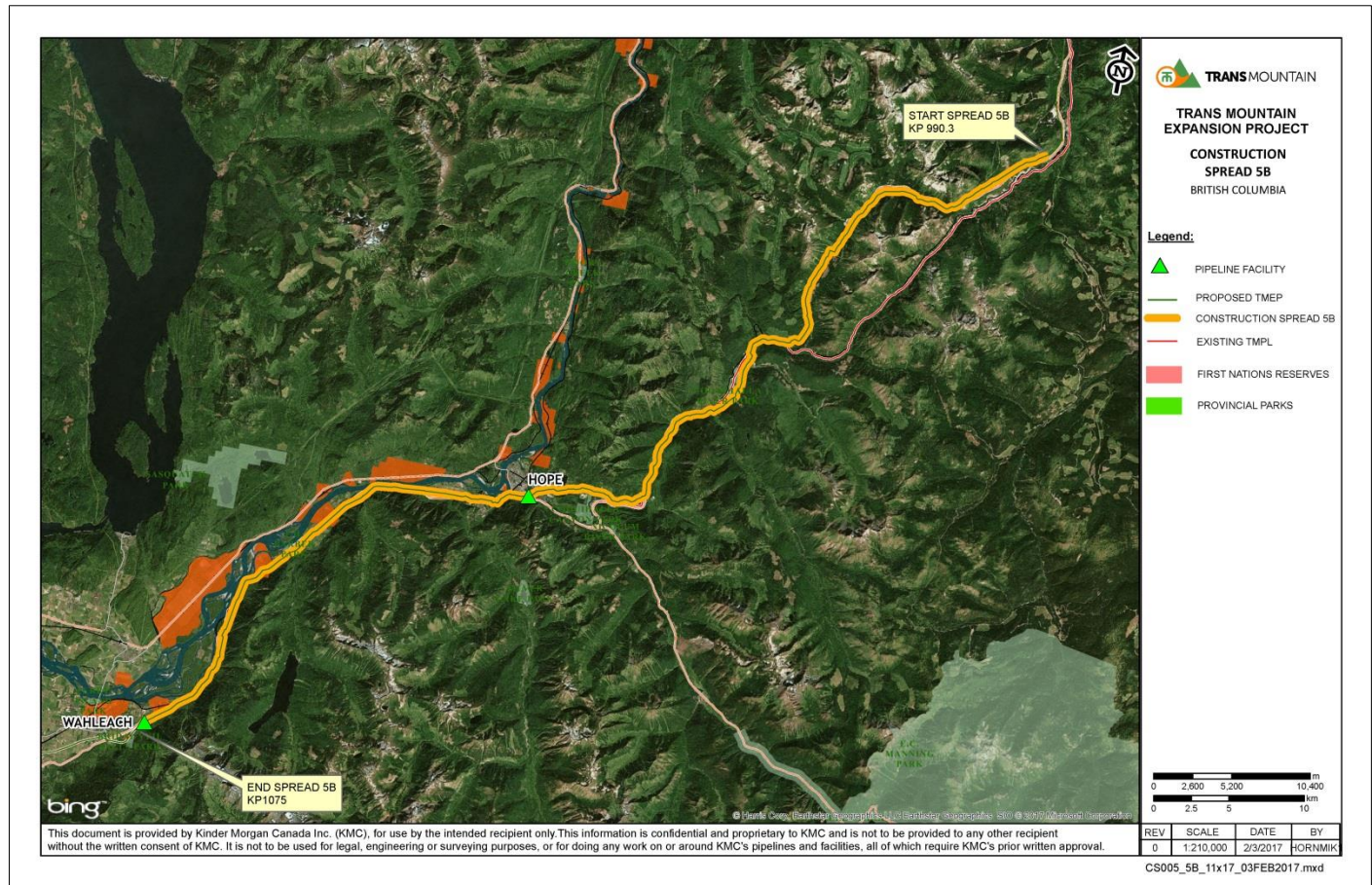
The uncapped spreads for the TMEP are Spread 5b (which will be executed under a GCC contracting strategy) and Spread 7 (including Burnaby Mountain Tunnel and transfer lines from Burnaby Terminal to Westridge Terminal to be executed under the BC Lower Mainland EPC contracting Strategy).

### 5.3.1 Spread 5B

Spread 5B is approximately 85 kilometers in length extending from the former Coquihalla Toll Booth along Highway 5 in British Columbia through to Wahleach Station located east of Hope along Highway 1. Spread 5B traverses the Pacific Coast mountain range, and is characterized as mountainous construction. The pipeline follows an existing linear corridor that includes segments of Highway 5 and Highway 3, the Spectra natural gas pipeline, the existing Trans Mountain pipeline, and the existing TELUS fibre optic line. Spread 5B includes five HDDs, 106 stream crossings, and approximately 700 pipeline tie-ins. The complex terrain and proximity to infrastructure is reflected in the estimated construction productivities that range from 150 meters per day for one third of the spread, to 250 to 500 meters per day for the remaining two thirds.

Engineering for Spread 5B is well advanced and will be at the IFC level of completion prior to the GCC contract being awarded. The GCC contracting strategy will ensure full integration of construction and construction management with the selected GCC contractor. Prior to awarding a GCC contract the GCC contractor will develop detailed construction execution plans, schedules, and cost estimates for the scope.

Macro-Spiecapag (Macro) is the contractor that has been selected for this Spread 5B. Macro provided the best technical and commercial proposal commensurate with the complexity of Spread 5B. The contractor cost estimate of \$348,000,000 includes baselay and Major Crossings HDDs and equates to an average price of \$4,100,000 per kilometer.



**Figure 5.3.1 Spread 5B**

### 5.3.2 Spread 7

Spread 7 is approximately 35km long. The uncapped Spread 7 construction is part of the larger EPC contract for the BC Lower Mainland scope of work which also includes the capped Burnaby Terminal and Westridge Marine Terminal work.

Spread 7 passes through some generally open sections including rural farms, acreages at the western end of the spread. The pipeline crosses through greenbelts including 2 golf courses and parallels existing linear infrastructure including power and railway lines minor and major arterial roads. It will parallel and cross the Fraser River and travel through industrial and residential areas.

Spread 7 has 640 utility crossings. 19% of the length will be completed using trenchless construction including the major crossing of the Fraser River near the Port Mann bridge (note: Trans Mountain successfully completed an HDD replacement of the existing pipeline in this area more than 10 years ago). Spread 7 crosses through four municipalities requiring the construction activities to adapt to the bylaw requirements of each including noise and traffic control. Planning for all components of this

Spread 7 and the other Lower Mainland work includes additional public safety and security precautions.

Engineering for Spread 7 is well advanced and will be at the IFC level of completion prior to the EPC contract being awarded.

The joint venture of Kiewit/Ledcor (KLTP) is the selected EPC contractor for the BC Lower Mainland including this Spread 7. KLTP has been working under MoU for the last year to develop detailed construction execution plans for Spread 7 and the Tunnel. KLTP has reviewed all details of Spread 7 including utility crossings, access, etc. and has developed construction methodologies, construction execution plans and quantities around all of these details.

The cost estimate for the pipeline component of the Spread 7 (excluding the tunnel) is \$334,500,000 including baselay, indirects and Major Crossings (HDDs), and equates to an average price of \$9,600,000 per kilometer.

The Burnaby Tunnel is included as part of Spread 7. The subcontractor for Tunnel construction has been selected and has been working with Kiewit/Ledcor to develop detailed construction execution plans.

Spread 7 also includes the construction of a 2.6 km long tunnel to accommodate the 3 delivery lines from the Burnaby storage Terminal to the Westridge Marine Terminal for tanker loadings. The total length of the delivery lines is 3.4 km. The cost estimate for the tunnel and installation of these lines is \$75,455,000 or approximately \$22,200,000 per kilometer.

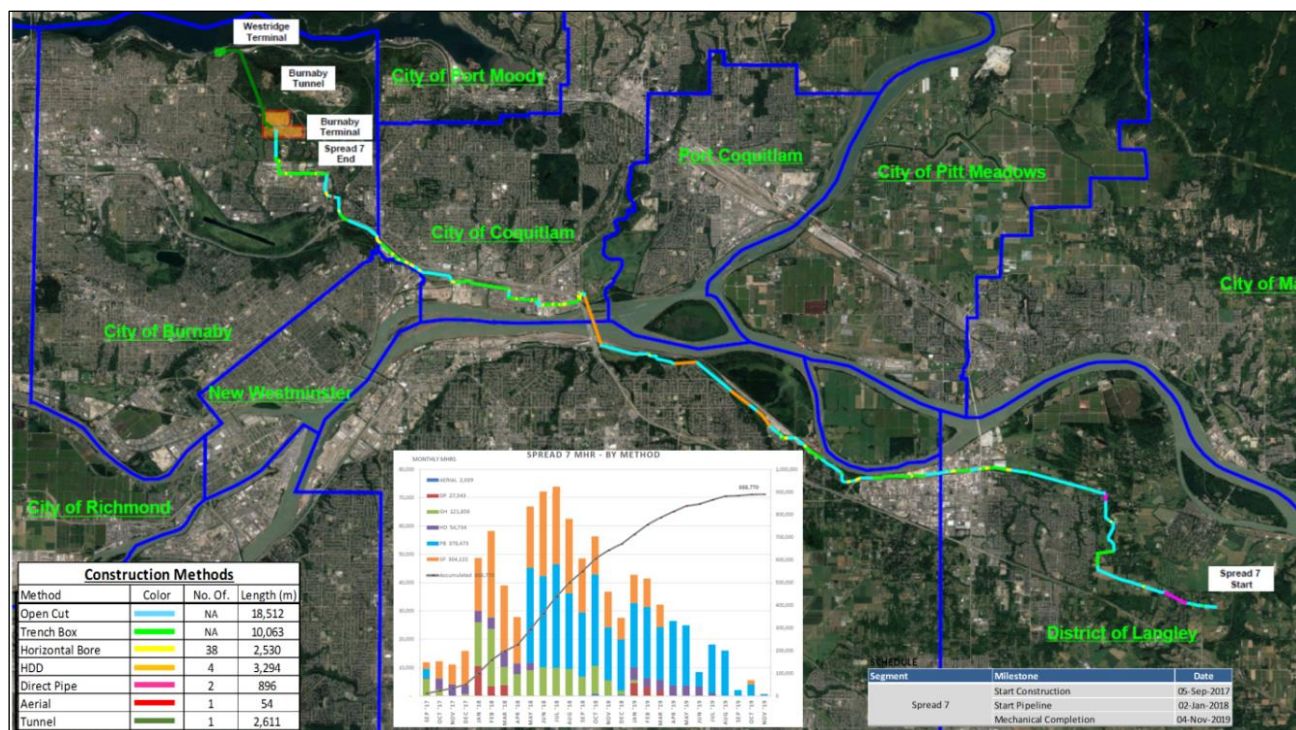
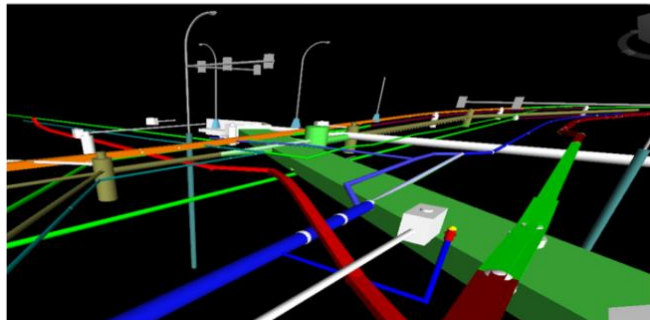


Figure 5.3.2 Spread 7

- Spread 7 has 640 Utility Crossings (~ 24% of the required Crossing Agreements of the entire TMEP Pipeline)
- Trenchless Construction is 19% of the 35.3km
- Highly-congested urban construction
  - 4 municipalities – variable and restrictive bylaw requirements
  - Traffic control – public safety and security
  - Density of existing utility crossings
  - 171 properties requiring access.
  - Construction through active business areas/facilities (Lafarge Cement Plant)
  - Narrow Right of Way/Construction Access
  - Majority of alignment adjacent to existing major infrastructure (utility, railway, & highway)
  - Variety of land types – Wetlands to busy commercial streets
  - Critical Habitat – Species at Risk (Surrey, Coquitlam)

Example of existing underground utility as-built (one intersection) **United Blvd, Coquitlam BC**



**Figure 5.3.3 Spread 7 Highlights**

## 5.4 Aboriginal Accommodation Agreements

The table below shows the items included in the Aboriginal Accommodation Agreements AFE and the current status of the program:

**Table 5.4.1 Aboriginal Accommodation Agreements**

Description	Total (\$)	Incurred and Committed (\$)	Remaining (\$)
Aboriginal Engagement Team	18,278,000	10,001,000	8,277,000
Capacity Funding	14,087,000	13,987,000	100,000
Traditional Ecological	4,215,000	4,078,000	137,000
Traditional Land/Marine Use	7,666,000	7,321,000	345,000
Training and Sponsorships	2,289,000	2,224,000	65,000
Legacy Settlements	3,357,000	3,056,000	301,000
Mutual Benefit Agreements	167,064,000	142,224,000	24,840,000
<b>Total</b>	<b>216,956,000</b>	<b>182,891,000</b>	<b>34,065,000</b>

The Aboriginal engagement team will continue for the duration of TMEP. Capacity Funding, Traditional Ecological Knowledge, Traditional Land and Marine Use studies were mainly completed in the regulatory stage of TMEP and are largely complete.

To date Trans Mountain has executed 48 Mutual Benefit Agreements. Four additional agreements are in negotiations and are expected to be concluded. The cost for the 48 completed agreements and the 4 expected agreements totaling 52 is included in the table above.

## 5.5 Community Investment Agreements

Trans Mountain has signed 23 of the expected 26 Community Investment Agreements and 8 of the 12 Education agreements. None of the Environmental Stewardship agreements have yet been signed. The cost estimate includes all forecasted agreements. It is not forecasted that the City of Burnaby or Metro Vancouver will enter into agreements.

**Table 5.5.1 Community Investment Programs**

Description	Total Forecast Agreements	Signed Agreements	Cost of Signed Agreements	TIC
Community Investment Agreements	26	23	8,505,000	10,505,000
Environmental	2-5	0	0	4,500,000
Education	12	8	950,000	2,800,000
<b>Total</b>	<b>42-45</b>	<b>31</b>	<b>9,455,000</b>	<b>17,805,000</b>

## 6.0 REVISED TOLL

The Revised Toll is calculated in accordance with the formula set out in Section 3.2(b) of the Facility Support Agreement. The Revised Toll is determined as the amount of the Fixed Toll component of the Indicative Toll for the applicable Service Option plus or minus \$0.07 per barrel for every \$100 million dollar (\$100,000,000), or portion thereof, increase or decrease, respectively in the CPCN Cost Estimate from the Initial Cost Estimate, as distance adjusted for destinations other than Burnaby. The data points for the calculation are described in the following sections:

### 6.1 Fixed Toll Component

The Fixed Toll component of the Indicative Toll can be found in Schedule B, Firm Service Tolls of the Facility Support Agreement. For reference, per Schedule B, the Fixed Toll component per the Indicative Toll Estimate for Edmonton to Burnaby, 15 year term, no volume discount is \$4.33.

### 6.2 Service Option and Distance Adjustments

The Service Options are outlined in Schedule A and are summarized below including the distance associated with each Service Option and the respective distance adjusted toll adjustment factor.

**Table 6.2.1 Service Options**

Service Options		Distance (km)	Distance %	\$0.07/\$100million distance adjusted toll adjustment factor
Receipt Point	Delivery Point			
Edmonton	Kamloops	819.0	71.3%	\$0.0499
Edmonton	Sumas	1095.6	95.4%	\$0.0668
Edmonton	Burnaby	1148.8	100%	\$0.07
Edmonton	Westridge	1152.9	100.4%	\$0.0702
Kamloops	Sumas	271.0	23.6%	\$0.0165
Kamloops	Burnaby	324.3	28.2%	\$0.0198

### 6.3 Initial Cost Estimate

The Initial Cost Estimate is detailed in Schedule B of the FSA and summarized as follows:

**Table 6.3.1 Initial Cost Estimate**

	Initial Cost Estimate (\$M)	Capped Cost (\$M)	Uncapped Cost (\$M)
Total Initial Cost Estimate	\$5,370.0	\$4,245.6	\$1,124.4

#### 6.4 Revised Toll Determination

The following table provides the calculation of the Revised Toll for the 15 Year Term in accordance with Section 3.2 (b) of the Facility Support Agreement.

**Table 6.4.1 Revised Toll Determination for 15 Year Term**

TOTAL (CAPPED AND UNCAPPED)					
Service Option		Indicative Toll Estimate Fixed Component	CPCN Cost Estimate minus Initial Cost Estimate	\$0.07/\$100 million distance adjusted toll factor	Revised Toll 15YR
		A	B	C	<b>A+((BxC)/100)</b>
Edmonton	Kamloops	\$3.09	\$2,048.3	\$0.0499	<b>\$4.11</b>
Edmonton	Sumas	\$4.13	\$2,048.3	\$0.0668	<b>\$5.50</b>
Edmonton	Burnaby	\$4.33	\$2,048.3	\$0.07	<b>\$5.76</b>
Edmonton	Westridge	\$4.88	\$2,048.3	\$0.0702	<b>\$6.32</b>
Kamloops	Sumas	\$1.02	\$2,048.3	\$0.0165	<b>\$1.36</b>
Kamloops	Burnaby	\$1.22	\$2,048.3	\$0.0198	<b>\$1.62</b>

The Revised Toll for the 20 Year Term is determined by applying a 10% discount to the 15 Year Revised Toll. Service Options with a total Contract Volume greater than or equal to 75,000 barrels per day receive a further 7.5% discount for the respective Contract Term. The determination of the Revised Tolls for the 20 Year Term and for the Volume Discount are provided below:

**Table 6.4.2 Revised Toll Determination for 20 Year Term and Volume Discount**

TOTAL (CAPPED AND UNCAPPED)					
Service Option		Revised Toll 15YR	Revised Toll 20 YR	Revised Toll 15 YR ≥75,000 bpd	Revised Toll 20 YR ≥75,000 bpd
		A	$A - (A \times 10\%) = B$	$A - (A \times 7.5\%)$	$B - (B \times 7.5\%)$
Edmonton	Kamloops	<b>\$4.11</b>	\$3.70	\$3.80	\$3.42
Edmonton	Sumas	<b>\$5.50</b>	\$4.95	\$5.09	\$4.58
Edmonton	Burnaby	<b>\$5.76</b>	\$5.18	\$5.33	\$4.79
Edmonton	Westridge	<b>\$6.32</b>	\$5.69	\$5.85	\$5.26
Kamloops	Sumas	<b>\$1.36</b>	\$1.22	\$1.26	\$1.13
Kamloops	Burnaby	<b>\$1.62</b>	\$1.46	\$1.50	\$1.35



**Table 6.4.3 Revised 15 Year Toll Split Between Capped and Uncapped Capital Cost**

Capital Cost					
Service Option			Total	Capped	Uncapped
Initial Capital Cost Estimate (\$000s)			\$5,370.0	\$4,245.6	\$1,124.4
Increase (Decrease) (\$000s)			\$2,048.3	\$1,405.4	\$642.9
Increase (Decrease) (% of total)				68.6%	31.4%
CPCN Capital Cost Estimate (\$000s)			\$7,418.3	\$5,651.0	\$1,767.3
Tolls					
Edmonton	Kamloops	Initial Toll	\$3.09	\$2.44	\$0.65
		Increase	\$1.02	\$0.70	\$0.32
		<b>Revised Toll</b>	<b>\$4.11</b>	<b>\$3.14</b>	<b>\$0.97</b>
Edmonton	Sumas	Initial Toll	\$4.13	\$3.27	\$0.86
		Increase	\$1.37	\$0.94	\$0.43
		<b>Revised Toll</b>	<b>\$5.50</b>	<b>\$4.21</b>	<b>\$1.29</b>
Edmonton	Burnaby	Initial Toll	\$4.33	\$3.42	\$0.91
		Increase	\$1.43	\$0.98	\$0.45
		<b>Revised Toll</b>	<b>\$5.76</b>	<b>\$4.40</b>	<b>\$1.36</b>
Edmonton	Westridge	Initial Toll	\$4.88	\$3.86	\$1.02
		Increase	\$1.44	\$0.99	\$0.45
		<b>Revised Toll</b>	<b>\$6.32</b>	<b>\$4.85</b>	<b>\$1.47</b>
Kamloops	Sumas	Initial Toll	\$1.02	\$0.81	\$0.21
		Increase	\$0.34	\$0.23	\$0.11
		<b>Revised Toll</b>	<b>\$1.36</b>	<b>\$1.04</b>	<b>\$0.32</b>
Kamloops	Burnaby	Initial Toll	\$1.22	\$0.96	\$0.26
		Increase	\$0.40	\$0.27	\$0.13
		<b>Revised Toll</b>	<b>\$1.62</b>	<b>\$1.23</b>	<b>\$0.39</b>

**Table 6.4.4 Revised Tolls Split Between Capped and Uncapped**

Service Option			Total	Capped	Uncapped
Edmonton	Kamloops	<b>Revised Toll</b> <b>15 YR</b>	<b>\$4.11</b>	<b>\$3.14</b>	<b>\$0.97</b>
		Revised Toll 20 YR	\$3.70	\$2.83	\$0.87
		Revised Toll 15 Yr =>75,000bpd	\$3.80	\$2.90	\$0.90
		Revised Toll 20 YR =>75,000bpd	\$3.42	\$2.62	\$0.80
Edmonton	Sumas	<b>Revised Toll</b> <b>15 YR</b>	<b>\$5.50</b>	<b>\$4.21</b>	<b>\$1.29</b>
		Revised Toll 20 YR	\$4.95	\$3.79	\$1.16
		Revised Toll 15 Yr =>75,000bpd	\$5.09	\$3.90	\$1.19
		Revised Toll 20 YR =>75,000bpd	\$4.58	\$3.51	\$1.07
Edmonton	Burnaby	<b>Revised Toll</b> <b>15 YR</b>	<b>\$5.76</b>	<b>\$4.40</b>	<b>\$1.36</b>
		Revised Toll 20 YR	\$5.18	\$3.96	\$1.22
		Revised Toll 15 Yr =>75,000bpd	\$5.33	\$4.07	\$1.26
		Revised Toll 20 YR =>75,000bpd	\$4.79	\$3.66	\$1.13
Edmonton	Westridge	<b>Revised Toll</b> <b>15 YR</b>	<b>\$6.32</b>	<b>\$4.85</b>	<b>\$1.47</b>
		Revised Toll 20 YR	\$5.69	\$4.37	\$1.32
		Revised Toll 15 Yr =>75,000bpd	\$5.85	\$4.49	\$1.36
		Revised Toll 20 YR =>75,000bpd	\$5.26	\$4.04	\$1.22
Kamloops	Sumas	<b>Revised Toll</b> <b>15 YR</b>	<b>\$1.36</b>	<b>\$1.04</b>	<b>\$0.32</b>
		Revised Toll 20 YR	\$1.22	\$0.94	\$0.29
		Revised Toll 15 Yr =>75,000bpd	\$1.26	\$0.96	\$0.30
		Revised Toll 20 YR =>75,000bpd	\$1.13	\$0.87	\$0.26

Kamloops	Burnaby	Revised Toll 15 YR	<b>\$1.62</b>	<b>\$1.23</b>	<b>\$0.39</b>
		Revised Toll 20 YR	\$1.46	\$1.11	\$0.35
		Revised Toll 15 Yr =>75,000bpd	\$1.50	\$1.14	\$0.36
		Revised Toll 20 YR =>75,000bpd	\$1.35	\$1.03	\$0.32

**Attachment 2.8(b)**

**December 2023 Scorecards**

Score Legend	
Exceeds	Exceeding benchmark met or trending to exceed No risk / low risk to meet benchmark next period
On track	Benchmark is met. No risk / low risk to meet benchmark next period
At Risk	Benchmark at risk, remains within threshold. Medium to high probability of achieving target within the next period.
High risk	Benchmark and threshold are missed High risks identified. Low probability of achieving benchmark/threshold within the next period.

Working as one team, we will create long-term benefits for Canadians by building a world-class project.

December 2023 TMEP Project Scorecard													
Key Performance Areas	Strategic Objective	Metric	Format	Exceeds	Benchmark	Threshold	Overall Project Score	Sp. 5B			Sp. 7A	Sp. 7B	Highlights of the period
								KBTP	MIDWEST	MACRO	MICHELS		
Safety	We value the health and safety and wellness of everyone working on or touched by our project.	Lost Time Injuries - LTIF	Rate	0.03	0.21	0.84	0.05	0.05			0.00	0.00	<p>Overall, the Project continues to meet its safety lagging indicators and leading indicators are on target.</p> <p>In the month of December there was 1 recordable incident and no lost time incidents. The PTD and YTD for TRIF and LTIF remain within target.</p> <p>The LIF continues to drop as exposed hours for the project decrease. The Contractor LIF remains well above the target (The contractor LIF decreased from 1.96 to 1.82).</p> <p>LTIF, TRIF &amp; LIF are all YTD values. As LIF is determined by contractor, we cannot break it down by spread.</p> <p>KBTP and Midwest are Safety stats are captured together as the exposed hours are not tracked separately.</p>
		Recordable Injuries - TRIF	Rate	0.49	1	1.5	0.50	0.11			0.50	0.95	
		Contractor Safety Leading Indicator Frequency -LIF	Rate	N/A	≥ 0.45	N/A	1.82	N/A	N/A	N/A	N/A	N/A	
		Security - Protestors activity and security issues impact on project cost/schedule/performance	Impact	Favorable impact	No material impact	Manageable impact	On Track						
Environment	We are committed to the environment protection and deliver on our commitments.	Construction-related reportable spill rate	Rate	0.5	1	1.5	0.00	0.00			0.00	0.00	<p>No construction-related reportable spills this period.</p> <p>KBTP and Midwest are Environmental stats are captured together as the exposed hours are not tracked separately.</p>
		Environment Leading Indicator Frequency	Rate	N/A	≥ 0.25	N/A	0.27	0.20			0.02	0.07	
Prevention	We protect the operating assets of ours and those of other companies	Damage to TM Assets > \$5k	Expense	0	\$100K	\$500K	On Track	\$ -			\$ -	There were no TMEP DP Incidents costing over \$5000 in December 2023.	
Quality	We effectively manage quality and follow requirements to ensure the long-term integrity of the pipeline	Weld Repair Rate	%	3.0%	5.0%	7.0%	4.7%	17.6%	0.0%	1.7%	1.1%	0.0%	<p>Overall project weld repair rate is 4.7%. Scope specific repair rates for the period were; Pipeline 9.0%, Facilities 0.0% and Lower Mainland 0.0%.</p> <p>Weld repair rate has remained consistent through Q4, with a limited quantity of welds compared to earlier phases of the project.</p>

The Big Green Light

Score Legend	
Exceeds	Exceeding benchmark met or trending to exceed No risk / low risk to meet benchmark next period.
On track	Benchmark is met. No risk / low risk to meet benchmark next period.
At Risk	Benchmark at risk, remains within threshold. Medium to high probability of achieving target within the next period.
High risk	Benchmark and threshold are missed. High risks identified. Low probability of achieving benchmark/threshold within the next period.

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December 2023 TMEP Project Scorecard													
Key Performance Areas	Strategic Objective	Metric	Format	Exceeds	Benchmark	Threshold	Overall Project Score	Sp. 5B			Sp. 7A	Sp. 7B	Highlights of the period
								KBTP	MIDWEST	MACRO	MICHELS		
Regulatory	We are compliant with regulations, conditions, permits and work with our regulators to advance the project effectively	Overall schedule impact of late Provincial permits	time	zero	two weeks	four weeks	On Track						TMEP continues to work with all Regulators to ensure adherence to conditions and requirements. Provincial Permitting – Permitting is currently on track with all remaining permits anticipated within the timeline allowed.
		Overall schedule impact of archaeology permits	time	zero	two weeks	four weeks	On Track						Archaeology and Indigenous Relations Team (IRT) - Issuance of all Outstanding STSA SHIP Permits (Spreads 6) IRT Completed final negotiations with the STSA board in early June which resulted in the issuance of all outstanding SHIP permits. Final outstanding SHIP permit was received on October 12th with no remaining permits outstanding.
Relationships	We aim for meaningful participation from Indigenous partners and support local communities	Local funding of charities*, towns and municipalities (per year)	\$	1 million	500,000	250,000	On Track						TMEP is on track for community investment goals and will continue our partnerships with municipalities and Indigenous groups.
		Overall schedule impact of Stakeholder Relations and Indigenous Relations issues	time	zero	two weeks	four weeks	On Track						No schedule changes were experienced due to stakeholder relations issues during this reporting period. IRT was able to manage Indigenous engagement issues to maintain schedule in December.

Score Legend	
Exceeds	Exceeding benchmark met or trending to exceed No risk / low risk to meet benchmark next period
On track	Benchmark is met. No risk / low risk to meet benchmark next period
At Risk	Benchmark at risk, remains within threshold. Medium to high probability of achieving target within the next period.
High risk	Benchmark and threshold are missed High risks identified. Low probability of achieving benchmark/threshold within the next period.

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December 2023 TMEP Project Scorecard													
Key Performance Areas	Strategic Objective	Metric	Format	Exceeds	Benchmark	Threshold	Overall Project Score	Sp. 5B			Sp. 7A	Sp. 7B	Highlights of the period
								KBTP	MIDWEST	MACRO	MICHELS		
Cost	We continuously monitor and manage cost efficiently and effectively	Project remains on budget.	Overall Project CPI	1	0.9	0.75	0.97					N/A	Period Overall CPI from Dashboards. Spread 5B Cost performance is a joint effort between three contractors (KBTP, KMID, and Macro). Spread 6 Cost performance is a joint effort between two contractors (Banister and Michels).
	Schedule	We plan our activities and monitor and manage the schedule	Remains consistent with 2022 Plan / Schedule	SPI	1	0.9	0.75	0.99					N/A
Integration	We enable the successful integration of the expansion project for operation.	Leave to Open applications submitted by YE 2023	#	31	30	29	High Risk						
		Project Records Turnover (TMEP to Operations)	%	75% by YE 2024	50% by YE 2024	25% by YE 2024	On Track						Asset Turnover by YE = 92% Dry Commissioning by YE = 79% Wet Commissioning by YE = 21%
		Asset turnover to Operations	% complete	99%	90%	75%	On Track						Asset turnover to Operations, Dry Commissioning and Wet Commissioning progress measurements are based on a weighted scale that accounts for Pump Stations, Ancillary facilities, Terminals, RMLBVs, and Pipeline assets.
		Dry Commissioning	% complete	99%	95%	75%	At Risk						
Wet Commissioning	% complete	99%	30%	25%	High Risk								
People	We create an inclusive and respectful workplace where success is celebrated and rewarded	Adecco contractors turnover rate	Rate per month	N/A	N/A	N/A	11.1%						Adecco contractors turnover rate for December is 11.1%. This includes both TMC1 and TMEP contractors. Total YTD is 65.1%. Not applicable due to demob across multiple spreads
		FRA's field contractors attrition rate	Rate per month	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not applicable due to demob across multiple spreads.
Culture & Collaboration	We collectively seek solutions that promote continuous improvement and instill pride from everyone working on the project	Kemita moments – at least one success or lesson is shared per week through meetings	Number	N/A	1 per week	N/A	On Track						Kemita moments have been implemented across all work fronts. A SharePoint folder is updated containing all Kemita moments and Kemita moments have been implemented in the monthly Sponsor meetings.
		a. 1 recognition per week on success b. 1 walkdown bi-weekly to recognize/observe identify CI's or any gaps in meeting our commitment statement and values c. Executive & Senior leadership presence at sites	Number per leader		a. 1 per week b. 1 bi-weekly c. At least once a month		On Track						

Other

### TMEP Status at Completion

Areas	Reasoning	Status	Previous	Metrics
Safety	Overall, the Project continues to meet its safety lagging indicators and leading indicators are on target. In the month of November there were 3 recordable incidents including 1 lost time incident. There was a slight increase in recordable and lost time incidents in November. The PTD and YTD for TRIF and LTIF remain within target.	Green	Green	Green
Quality	Overall project weld repair rate is 4.7%. Scope specific repair rates for the period were; Pipeline 6.6%, Facilities 0.0%, and Lower Mainland 0.0%. Weld repair rate has remained consistent through Q4, with a limited quantity of welds compared to earlier phases of the project.	Green	Red	Green
Environment	Archaeology and watercourses continue to be a risk that the Project is following closely. Reclamation program complete for 2023 in Spreads 2-5A. Ornamental landscaping ongoing in Spreads 5B, 6 and 7. 2024 contracts in place and planning underway. Ongoing preparation for demobilizations and ramp down execution for internal and field staff. Continued spring/winter preparedness planning with execution and contractors including installation of mitigation measures and monitoring of areas using risk-based model.	Green	Green	Green
Prevention	One incident on Spread 5A occurred that involved damage to TM assets over \$5000 in the month of November.	Green	Green	Green
Relationships	TMEP is on track for community investment goals and will continue our partnerships with municipalities and Indigenous groups. No schedule changes were experienced due to stakeholder relations issues during this reporting period. IRT was able to manage Indigenous engagement issues to maintain schedule in November.	Green	Green	Green
Regulatory	TMEP continues to work with all Regulators to ensure adherence to conditions and requirements. Permitting is currently on track with all remaining permits anticipated within the timeline allowed. IRT Completed final negotiations with the STSA board in early June which resulted in the issuance of all outstanding SHIP permits. Final outstanding SHIP permit was received on October 12th with no remaining permits outstanding. We remain concerned in the CER's ability to process remaining LTO applications in a timely fashion, given the number remaining as well as commencement date toll as well as Mountain 3 variance applications.	Yellow	Green	Green
Cost	TMEP has identified \$796 in cost pressures offset by \$619M of savings. The majority of the pressures are located in Spread 6 and Lower Mainland, along with Owner Managed Execution costs associated with these Areas.	Red	Red	Green
Schedule	The latest Schedule Risk Assessment results show that Jacko Lake and Mountain 3 are the main drivers of the Projects Schedule and will push completion into 2024. Jacko Lake has been approved for open-cut method expediting MC and Mountain 3 alternate contingency has been denied, with appeal process initiated.	Red	Red	Green



**Attachment 2.15(a)**

**Edmonton to Asia Transportation Comparison**

Table 2.15 - 1 Heavy Crude Oil Transportation Costs via Trans Mountain to China, California, and Puget Sound  
(Canadian Dollars per Barrel, Unless Noted)

	<i>Trans Mountain to China</i>			<i>Trans Mountain to California</i>			<i>Trans Mountain to Puget Sound</i>		
	<i>Edmonton to Tsingtao</i>	<i>Edmonton to Tsingtao</i>	<i>Edmonton to Tsingtao</i>	<i>Edmonton to Long Beach</i>	<i>Edmonton to Long Beach</i>	<i>Edmonton to Long Beach</i>	<i>Edmonton to PS</i>	<i>Edmonton to PS</i>	<i>Edmonton to PS</i>
	<i>Existing Spot</i>	<i>Expanded Spot</i>	<i>Expanded Contract</i>	<i>Existing Spot</i>	<i>Expanded Spot</i>	<i>Expanded Contract</i>	<i>Existing Spot</i>	<i>Expanded Spot</i>	<i>Expanded Contract</i>
	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>	<i>\$CA/B</i>
Jan-21	6.42	15.94	13.27	4.87	14.39	11.72	3.01	11.84	9.27
Feb-21	6.74	16.27	13.60	5.04	14.56	11.89	3.03	11.86	9.28
Mar-21	7.79	17.32	14.64	5.47	14.99	12.32	3.03	11.86	9.28
Apr-21	7.46	16.99	14.32	5.33	14.85	12.18	3.02	11.85	9.28
May-21	8.61	17.01	14.34	6.46	14.86	12.19	3.98	11.84	9.26
Jun-21	8.56	16.96	14.29	6.47	14.86	12.19	3.99	11.85	9.27
Jul-21	8.65	17.05	14.38	6.51	14.91	12.24	4.01	11.87	9.29
Aug-21	9.44	17.85	15.17	6.81	15.21	12.54	4.01	11.86	9.29
Sep-21	9.05	17.46	14.78	6.68	15.08	12.41	4.02	11.88	9.30
Oct-21	9.38	17.79	15.11	6.83	15.23	12.56	4.02	11.88	9.30
Nov-21	9.62	18.03	15.35	6.90	15.29	12.62	4.01	11.87	9.30
Dec-21	9.60	18.01	15.33	6.88	15.28	12.61	4.02	11.87	9.30
Jan-22	9.71	18.43	15.69	7.01	15.72	12.98	4.04	12.17	9.53
Feb-22	9.71	18.42	15.68	7.04	15.75	13.01	4.06	12.19	9.55
Mar-22	11.79	20.50	17.76	7.94	16.65	13.91	4.08	12.22	9.58
Apr-22	12.83	21.54	18.80	8.34	17.04	14.31	4.07	12.21	9.57
May-22	14.01	22.40	19.66	9.03	17.41	14.67	4.37	12.23	9.59
Jun-22	14.08	22.46	19.72	9.06	17.44	14.70	4.37	12.23	9.59
Jul-22	14.45	22.83	20.09	9.13	17.51	14.77	4.39	12.25	9.61
Aug-22	16.38	24.76	22.02	9.89	18.27	15.53	4.38	12.24	9.60
Sep-22	16.65	25.04	22.30	9.97	18.35	15.61	4.39	12.25	9.61
Oct-22	15.71	24.10	21.36	9.58	17.96	15.22	4.40	12.26	9.62
Nov-22	18.12	26.51	23.77	10.53	18.90	16.17	4.38	12.24	9.60
Dec-22	20.85	29.23	26.49	11.59	19.97	17.23	4.38	12.23	9.60
Jan-23	20.45	29.15	26.34	10.36	19.05	16.25	4.38	12.52	9.82
Feb-23	16.97	25.67	22.86	9.24	17.94	15.13	4.39	12.53	9.83
Mar-23	16.93	25.63	22.82	9.24	17.93	15.12	4.40	12.55	9.84
Apr-23	16.49	25.19	22.39	9.12	17.81	15.01	4.40	12.55	9.84
May-23	14.92	23.58	20.77	9.28	17.93	15.13	4.30	12.54	9.83
Jun-23	14.30	22.96	20.15	9.06	17.71	14.91	4.29	12.53	9.82
Jul-23	13.03	21.69	18.88	8.43	17.08	14.28	4.38	12.62	9.91
Aug-23	12.74	21.40	18.59	8.39	17.04	14.24	4.39	12.63	9.93
Sep-23	13.47	22.13	19.32	8.02	16.67	13.86	4.41	12.65	9.94
Oct-23	15.10	23.76	20.95	8.31	16.96	14.16	4.40	12.64	9.94
Nov-23	15.62	24.28	21.47	8.98	17.64	14.83	4.38	12.62	9.92
Dec-23	15.14	23.81	21.00	9.43	18.08	15.28	4.37	12.61	9.90
<b>Average</b>									
2021	8.44	17.22	14.55	6.19	14.96	12.29	3.68	11.86	9.29
2022	14.53	23.02	20.28	9.09	17.58	14.84	4.28	12.23	9.59
2023	15.43	24.10	21.30	8.99	17.65	14.85	4.37	12.58	9.88

Table 2.15 - 2 Heavy Crude Oil Transportation Cost via Trans Mountain to Tsingtao (China)  
(Canadian Dollars per Barrel, Unless Noted)

	Pipeline Toll Case			Vessel Freight							Physical Loss & Insurance			Working Capital			Pipeline Toll Case								
	Edmonton/ Westridge	Edmonton/ Westridge	Edmonton/ Westridge	Worldscale Vancouver	Short Load Correction	Vancouver to Tsingtao	Worldscale Indonesia Japan 80	Enhanced Response Capital Recovery Fee	Total Shipping Cost	Existing Spot	Expanded Spot	Expanded Contract	Pipeline Loss Allowance	Total Transit Time	Existing Spot Capital	Expanded Spot Capital	Expanded Contract Capital	Edmonton to Tsingtao Existing	Edmonton to Tsingtao Expanded	Edmonton to Tsingtao Contract					
	Spot \$/B	Spot \$/B	Contract \$/B	\$/MT	\$/MT	Miles	%	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	Days	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B					
Jan-21	2.85	12.31	9.66					2.45	0.14	0.29	0.29	0.02	3.18	0.24	0.29	0.27	0.03	25	0.11	0.13	0.13	6.42	16.94	19.27	
Feb-21	2.85	12.31	9.66					2.69	0.14	0.29	0.29	0.02	3.43	0.29	0.34	0.32	0.04	25	0.13	0.15	0.15	6.74	18.27	19.80	
Mar-21	2.85	12.31	9.66					3.70	0.14	0.29	0.29	0.02	4.44	0.32	0.36	0.35	0.04	25	0.15	0.17	0.16	7.79	17.82	18.84	
Apr-21	2.85	12.31	9.66					3.39	0.14	0.29	0.29	0.02	4.12	0.31	0.35	0.34	0.04	25	0.14	0.16	0.16	7.48	18.99	14.32	
May-21	3.96	12.31	9.66					3.42	0.14	0.29	0.29	0.02	4.15	0.31	0.35	0.34	0.04	25	0.14	0.16	0.16	8.81	17.91	14.54	
Jun-21	3.96	12.31	9.66					3.32	0.14	0.29	0.29	0.02	4.05	0.34	0.38	0.37	0.04	25	0.16	0.17	0.17	8.68	16.98	14.29	
Jul-21	3.96	12.31	9.66					3.39	0.14	0.29	0.29	0.02	4.12	0.36	0.39	0.38	0.04	25	0.16	0.18	0.18	8.86	17.06	14.38	
Aug-21	3.96	12.31	9.66					4.21	0.14	0.29	0.29	0.02	4.94	0.34	0.38	0.37	0.04	25	0.16	0.17	0.17	9.44	17.86	16.17	
Sep-21	3.96	12.31	9.66					3.77	0.14	0.29	0.29	0.02	4.50	0.37	0.41	0.40	0.04	25	0.17	0.19	0.18	9.06	17.48	14.78	
Oct-21	3.96	12.31	9.66					4.05	0.14	0.29	0.29	0.02	4.78	0.40	0.44	0.43	0.05	25	0.19	0.20	0.20	9.38	17.78	16.11	
Nov-21	3.96	12.31	9.66					4.35	0.14	0.29	0.29	0.02	5.08	0.36	0.40	0.39	0.04	25	0.17	0.18	0.18	9.82	18.03	16.36	
Dec-21	3.96	12.31	9.66					4.35	0.14	0.29	0.29	0.02	5.09	0.35	0.39	0.38	0.04	25	0.16	0.18	0.17	9.80	18.01	16.33	
Jan-22	3.96	12.62	9.90					4.34	0.14	0.29	0.29	0.02	5.07	0.43	0.47	0.46	0.05	25	0.20	0.21	0.21	9.71	18.43	16.89	
Feb-22	3.96	12.62	9.90					4.26	0.14	0.29	0.29	0.02	5.00	0.47	0.51	0.50	0.06	25	0.22	0.23	0.23	9.71	18.42	16.88	
Mar-22	3.96	12.62	9.90					6.19	0.14	0.29	0.29	0.02	6.93	0.57	0.61	0.60	0.07	25	0.26	0.28	0.27	11.79	20.60	17.78	
Apr-22	3.96	12.62	9.90					7.27	0.14	0.29	0.29	0.02	8.00	0.55	0.59	0.57	0.07	25	0.25	0.27	0.26	12.83	21.64	18.80	
May-22	4.29	12.62	9.90					8.07	0.14	0.29	0.29	0.02	8.80	0.58	0.62	0.61	0.07	25	0.27	0.28	0.28	14.91	22.40	18.88	
Jun-22	4.29	12.62	9.90					8.13	0.14	0.29	0.29	0.02	8.86	0.59	0.62	0.61	0.07	25	0.27	0.29	0.28	14.08	22.48	18.72	
Jul-22	4.29	12.62	9.90					8.65	0.14	0.29	0.29	0.02	9.39	0.49	0.53	0.51	0.06	25	0.22	0.24	0.24	14.46	22.83	20.09	
Aug-22	4.29	12.62	9.90					10.60	0.14	0.29	0.29	0.02	11.33	0.48	0.51	0.50	0.05	25	0.22	0.24	0.23	16.38	24.78	22.02	
Sep-22	4.29	12.62	9.90					10.94	0.14	0.29	0.29	0.02	11.67	0.44	0.48	0.46	0.05	25	0.20	0.22	0.21	18.86	26.04	22.30	
Oct-22	4.29	12.62	9.90					10.03	0.14	0.29	0.29	0.02	10.76	0.42	0.46	0.45	0.05	25	0.19	0.21	0.20	16.71	24.10	21.98	
Nov-22	4.29	12.62	9.90					12.46	0.14	0.29	0.29	0.02	13.20	0.41	0.44	0.43	0.04	25	0.19	0.20	0.20	18.12	28.61	23.77	
Dec-22	4.29	12.62	9.90					15.22	0.14	0.29	0.29	0.02	16.96	0.38	0.42	0.41	0.04	25	0.18	0.19	0.19	20.86	29.23	26.49	
Jan-23	4.29	12.94	10.15					14.81	0.14	0.26	0.29	0.02	15.52	0.41	0.45	0.44	0.04	25	0.19	0.21	0.20	20.46	28.16	26.34	
Feb-23	4.29	12.94	10.15					11.31	0.14	0.26	0.29	0.02	12.02	0.42	0.46	0.45	0.05	25	0.19	0.21	0.20	18.97	26.87	22.88	
Mar-23	4.29	12.94	10.15					11.26	0.14	0.26	0.29	0.02	11.97	0.43	0.46	0.45	0.05	25	0.20	0.21	0.21	18.83	26.83	22.82	
Apr-23	4.29	12.94	10.15					10.78	0.14	0.26	0.29	0.02	11.49	0.45	0.49	0.48	0.05	25	0.21	0.23	0.22	18.48	26.18	22.39	
May-23	4.33	12.94	10.15					9.23	0.14	0.26	0.29	0.02	9.94	0.41	0.45	0.44	0.05	25	0.19	0.21	0.20	14.92	23.68	20.77	
Jun-23	4.33	12.94	10.15					8.61	0.14	0.26	0.29	0.02	9.32	0.41	0.45	0.44	0.05	25	0.19	0.21	0.20	14.30	22.98	20.16	
Jul-23	4.33	12.94	10.15					7.31	0.14	0.26	0.29	0.02	8.02	0.43	0.47	0.46	0.05	25	0.20	0.22	0.21	13.03	21.89	18.88	
Aug-23	4.33	12.94	10.15					7.01	0.14	0.26	0.29	0.02	7.72	0.44	0.48	0.46	0.05	25	0.20	0.22	0.21	12.74	21.40	18.69	
Sep-23	4.33	12.94	10.15					7.67	0.14	0.26	0.29	0.02	8.38	0.48	0.52	0.50	0.06	25	0.22	0.24	0.23	13.47	22.15	18.32	
Oct-23	4.33	12.94	10.15					9.37	0.14	0.26	0.29	0.02	10.08	0.44	0.48	0.46	0.05	25	0.20	0.22	0.21	16.18	23.78	20.96	
Nov-23	4.33	12.94	10.15					9.59	0.14	0.26	0.29	0.02	10.69	0.38	0.42	0.41	0.04	25	0.18	0.19	0.19	16.62	24.28	21.47	
Dec-23	4.33	12.94	10.15					9.51	0.14	0.26	0.29	0.02	10.22	0.38	0.42	0.41	0.04	25	0.17	0.19	0.19	16.14	23.81	21.00	
<b>Average</b>																									
2021	3.59	12.31	9.66					3.59	0.14	0.29	0.29	0.02	4.32	0.33	0.37	0.36	0.04	25	0.15	0.17	0.17	8.44	17.22	14.66	
2022	4.18	12.62	9.90					8.85	0.14	0.29	0.29	0.02	9.58	0.48	0.52	0.51	0.06	25	0.22	0.24	0.23	14.63	23.02	20.28	
2023	4.32	12.94	10.15					9.74	0.14	0.26	0.29	0.02	10.45	0.42	0.46	0.45	0.05	25	0.19	0.21	0.21	16.43	24.10	21.30	

Table 2.15 - 3 Heavy Crude Oil Transportation Cost via Trans Mountain to Long Beach (California)  
(Canadian Dollars per Barrel, Unless Noted)

	Pipeline Toll Case			Vessel Freight							Physical Loss & Insurance				Working Capital			Pipeline Toll Case						
	Edmonton/ Westridge	Edmonton/ Westridge	Edmonton/ Westridge	Worldscale Vancouver	Short Load Correction	Vancouver to Long Beach	Worldscale Indonesia Japan (1) 80	Vessel Total	Escort Tugs	Bulk Oil Cargo Fee	Enhanced Response Capital Recovery Fee	Total Shipping Cost	Existing Spot	Expanded Spot	Expanded Contract	Pipeline Loss Allowance	Total Transit Days	Existing Spot Working Capital	Expanded Spot Working Capital	Expanded Contract Working Capital	Edmonton to Long Beach	Edmonton to Long Beach	Edmonton to Long Beach	
	Existing Spot \$/B	Expanded Spot \$/B	Expanded Contract \$/B	\$/AMT	\$/AMT	Miles	%	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	Days	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	2.85	12.31	9.66					0.96	0.14	0.29	0.29	0.02	1.70	0.24	0.28	0.27	0.03	14	0.06	0.07	0.07	4.87	14.39	11.72
Feb-21	2.85	12.31	9.66					1.06	0.14	0.29	0.29	0.02	1.80	0.29	0.33	0.32	0.04	14	0.07	0.08	0.08	6.94	14.68	11.89
Mar-21	2.85	12.31	9.66					1.46	0.14	0.29	0.29	0.02	2.19	0.31	0.35	0.34	0.04	14	0.08	0.09	0.09	6.47	14.99	12.52
Apr-21	2.85	12.31	9.66					1.34	0.14	0.29	0.29	0.02	2.07	0.30	0.34	0.33	0.04	14	0.08	0.09	0.09	6.33	14.86	12.18
May-21	3.96	12.31	9.66					1.35	0.14	0.29	0.29	0.02	2.08	0.30	0.34	0.33	0.04	14	0.08	0.09	0.08	6.48	14.88	12.19
Jun-21	3.96	12.31	9.66					1.31	0.14	0.29	0.29	0.02	2.04	0.33	0.37	0.36	0.04	14	0.09	0.10	0.09	6.47	14.88	12.19
Jul-21	3.96	12.31	9.66					1.33	0.14	0.29	0.29	0.02	2.07	0.35	0.39	0.37	0.04	14	0.09	0.10	0.10	6.61	14.91	12.24
Aug-21	3.96	12.31	9.66					1.66	0.14	0.29	0.29	0.02	2.39	0.33	0.37	0.36	0.04	14	0.09	0.09	0.09	6.81	16.21	12.64
Sep-21	3.96	12.31	9.66					1.48	0.14	0.29	0.29	0.02	2.22	0.36	0.40	0.39	0.04	14	0.09	0.10	0.10	6.88	16.08	12.41
Oct-21	3.96	12.31	9.66					1.59	0.14	0.29	0.29	0.02	2.33	0.39	0.43	0.42	0.05	14	0.10	0.11	0.11	6.83	16.23	12.68
Nov-21	3.96	12.31	9.66					1.71	0.14	0.29	0.29	0.02	2.45	0.35	0.39	0.38	0.04	14	0.09	0.10	0.10	6.90	16.29	12.62
Dec-21	3.96	12.31	9.66					1.71	0.14	0.29	0.29	0.02	2.45	0.34	0.38	0.36	0.04	14	0.09	0.10	0.09	6.88	16.28	12.61
Jan-22	3.96	12.62	9.90					1.74	0.14	0.29	0.29	0.02	2.47	0.42	0.46	0.44	0.05	14	0.11	0.12	0.11	7.91	16.72	12.88
Feb-22	3.96	12.62	9.90					1.71	0.14	0.29	0.29	0.02	2.44	0.46	0.50	0.49	0.06	14	0.12	0.13	0.12	7.94	16.76	13.01
Mar-22	3.96	12.62	9.90					2.48	0.14	0.29	0.29	0.02	3.21	0.55	0.59	0.58	0.07	14	0.14	0.15	0.15	7.94	16.86	13.81
Apr-22	3.96	12.62	9.90					2.91	0.14	0.29	0.29	0.02	3.65	0.53	0.57	0.55	0.07	14	0.14	0.15	0.14	8.34	17.04	14.31
May-22	4.29	12.62	9.90					3.23	0.14	0.29	0.29	0.02	3.97	0.56	0.60	0.59	0.07	14	0.14	0.15	0.15	8.95	17.41	14.87
Jun-22	4.29	12.62	9.90					3.25	0.14	0.29	0.29	0.02	3.99	0.56	0.60	0.59	0.07	14	0.14	0.15	0.15	9.06	17.44	14.79
Jul-22	4.29	12.62	9.90					3.46	0.14	0.29	0.29	0.02	4.20	0.47	0.50	0.49	0.06	14	0.12	0.13	0.13	9.13	17.61	14.77
Aug-22	4.29	12.62	9.90					4.24	0.14	0.29	0.29	0.02	4.98	0.45	0.49	0.47	0.05	14	0.12	0.12	0.12	8.89	18.27	16.63
Sep-22	4.29	12.62	9.90					4.38	0.14	0.29	0.29	0.02	5.11	0.41	0.45	0.44	0.05	14	0.11	0.11	0.11	8.97	18.36	16.81
Oct-22	4.29	12.62	9.90					4.01	0.14	0.29	0.29	0.02	4.75	0.39	0.43	0.42	0.05	14	0.10	0.11	0.11	8.68	17.98	16.22
Nov-22	4.29	12.62	9.90					4.59	0.14	0.29	0.29	0.02	5.73	0.37	0.41	0.40	0.04	14	0.10	0.11	0.10	10.63	18.90	16.17
Dec-22	4.29	12.62	9.90					6.10	0.14	0.29	0.29	0.02	6.83	0.34	0.38	0.37	0.04	14	0.09	0.10	0.09	11.59	19.97	17.23
Jan-23	4.29	12.94	10.15					4.86	0.14	0.26	0.29	0.02	5.57	0.36	0.40	0.39	0.04	14	0.09	0.10	0.10	10.38	19.66	16.26
Feb-23	4.29	12.94	10.15					3.71	0.14	0.26	0.29	0.02	4.42	0.39	0.42	0.41	0.05	14	0.10	0.11	0.11	9.24	17.84	16.13
Mar-23	4.29	12.94	10.15					3.69	0.14	0.26	0.29	0.02	4.40	0.39	0.43	0.42	0.05	14	0.10	0.11	0.11	9.24	17.93	16.12
Apr-23	4.29	12.94	10.15					3.54	0.14	0.26	0.29	0.02	4.25	0.42	0.46	0.45	0.05	14	0.11	0.12	0.12	9.12	17.81	16.91
May-23	4.33	12.94	10.15					3.70	0.14	0.26	0.29	0.02	4.42	0.39	0.42	0.41	0.05	14	0.10	0.11	0.11	9.28	17.93	16.13
Jun-23	4.33	12.94	10.15					3.48	0.14	0.26	0.29	0.02	4.19	0.39	0.43	0.41	0.05	14	0.10	0.11	0.11	8.98	17.71	14.81
Jul-23	4.33	12.94	10.15					2.82	0.14	0.26	0.29	0.02	3.53	0.41	0.45	0.44	0.05	14	0.11	0.12	0.11	8.43	17.08	14.28
Aug-23	4.33	12.94	10.15					2.77	0.14	0.26	0.29	0.02	3.48	0.42	0.46	0.44	0.05	14	0.11	0.12	0.11	8.39	17.04	14.24
Sep-23	4.33	12.94	10.15					2.35	0.14	0.26	0.29	0.02	3.06	0.45	0.49	0.48	0.06	14	0.12	0.13	0.12	8.02	16.87	13.88
Oct-23	4.33	12.94	10.15					2.71	0.14	0.26	0.29	0.02	3.42	0.41	0.45	0.43	0.05	14	0.10	0.11	0.11	8.51	16.96	14.18
Nov-23	4.33	12.94	10.15					3.46	0.14	0.26	0.29	0.02	4.17	0.35	0.39	0.38	0.04	14	0.09	0.10	0.10	8.88	17.84	14.83
Dec-23	4.33	12.94	10.15					3.90	0.14	0.26	0.29	0.02	4.61	0.35	0.39	0.38	0.04	14	0.09	0.10	0.10	8.43	18.08	16.28
Average																								
2021	3.59	12.31	9.66					1.41	0.14	0.29	0.29	0.02	2.15	0.32	0.36	0.35	0.04	14	0.08	0.09	0.09	6.19	14.98	12.29
2022	4.18	12.62	9.90					3.54	0.14	0.29	0.29	0.02	4.28	0.46	0.50	0.48	0.06	14	0.12	0.13	0.12	8.09	17.68	14.84
2023	4.32	12.94	10.15					3.42	0.14	0.26	0.29	0.02	4.13	0.39	0.43	0.42	0.05	14	0.10	0.11	0.11	8.99	17.86	14.86

Note:  
(1) Began using Vancouver to USWC %WG effective May 2023

**Table 2.15 - 4 Heavy Crude Oil Transportation Cost via Trans Mountain to Anacortes (Puget Sound)**  
(Canadian Dollars per Barrel, Unless Noted)

	Pipeline Toll Case					Total Transit Time Days	Working Capital			Pipeline Toll Case		
	Edmonton/ Sumas Existing Spot \$/CA/B	Edmonton/ Sumas Expanded Spot \$/CA/B	Edmonton/ Sumas Expanded Contract \$/CA/B	Puget Sound PL Sumas to Anacortes \$/CA/B	Pipeline Loss Allowance \$/CA/B		Existing Spot Working Capital \$/CA/B	Expanded Spot Working Capital \$/CA/B	Expanded Contract Working Capital \$/CA/B	Edmonton to PS Existing Spot \$/CA/B	Edmonton to PS Expanded Spot \$/CA/B	Edmonton to PS Expanded Contract \$/CA/B
	Jan-21	2.39	11.21	8.64	0.55		0.03	11	0.05	0.05	0.05	3.01
Feb-21	2.39	11.21	8.64	0.55	0.04	11	0.06	0.06	0.06	3.03	11.86	9.28
Mar-21	2.39	11.21	8.64	0.54	0.04	11	0.06	0.07	0.07	3.03	11.86	9.28
Apr-21	2.39	11.21	8.64	0.54	0.04	11	0.06	0.07	0.06	3.02	11.85	9.28
May-21	3.36	11.21	8.64	0.52	0.04	11	0.06	0.07	0.06	3.98	11.84	9.26
Jun-21	3.36	11.21	8.64	0.53	0.04	11	0.07	0.07	0.07	3.99	11.85	9.27
Jul-21	3.36	11.21	8.64	0.54	0.04	11	0.07	0.08	0.07	4.01	11.87	9.29
Aug-21	3.36	11.21	8.64	0.54	0.04	11	0.06	0.07	0.07	4.01	11.86	9.29
Sep-21	3.36	11.21	8.64	0.55	0.04	11	0.07	0.08	0.08	4.02	11.88	9.30
Oct-21	3.36	11.21	8.64	0.54	0.05	11	0.08	0.08	0.08	4.02	11.88	9.30
Nov-21	3.36	11.21	8.64	0.54	0.04	11	0.07	0.08	0.07	4.01	11.87	9.30
Dec-21	3.36	11.21	8.64	0.55	0.04	11	0.07	0.07	0.07	4.02	11.87	9.30
Jan-22	3.36	11.49	8.85	0.54	0.05	11	0.08	0.09	0.09	4.04	12.17	9.53
Feb-22	3.36	11.49	8.85	0.55	0.06	11	0.09	0.10	0.09	4.06	12.19	9.55
Mar-22	3.36	11.49	8.85	0.55	0.07	11	0.11	0.12	0.11	4.08	12.22	9.58
Apr-22	3.36	11.49	8.85	0.55	0.07	11	0.10	0.11	0.11	4.07	12.21	9.57
May-22	3.64	11.49	8.85	0.55	0.07	11	0.11	0.12	0.11	4.37	12.23	9.59
Jun-22	3.64	11.49	8.85	0.55	0.07	11	0.11	0.12	0.11	4.37	12.23	9.59
Jul-22	3.64	11.49	8.85	0.61	0.06	11	0.09	0.10	0.09	4.39	12.25	9.61
Aug-22	3.64	11.49	8.85	0.61	0.05	11	0.09	0.09	0.09	4.38	12.24	9.60
Sep-22	3.64	11.49	8.85	0.63	0.05	11	0.08	0.08	0.08	4.39	12.25	9.61
Oct-22	3.64	11.49	8.85	0.64	0.05	11	0.07	0.08	0.08	4.40	12.26	9.62
Nov-22	3.64	11.49	8.85	0.63	0.04	11	0.07	0.08	0.07	4.38	12.24	9.60
Dec-22	3.64	11.49	8.85	0.64	0.04	11	0.06	0.07	0.07	4.38	12.23	9.60
Jan-23	3.64	11.78	9.07	0.63	0.04	11	0.07	0.08	0.07	4.38	12.52	9.82
Feb-23	3.64	11.78	9.07	0.63	0.05	11	0.07	0.08	0.08	4.39	12.53	9.83
Mar-23	3.64	11.78	9.07	0.64	0.05	11	0.07	0.08	0.08	4.40	12.55	9.84
Apr-23	3.64	11.78	9.07	0.63	0.05	11	0.08	0.09	0.09	4.40	12.55	9.84
May-23	3.54	11.78	9.07	0.63	0.05	11	0.07	0.08	0.08	4.30	12.54	9.83
Jun-23	3.54	11.78	9.07	0.62	0.05	11	0.07	0.08	0.08	4.29	12.53	9.82
Jul-23	3.54	11.78	9.07	0.70	0.05	11	0.08	0.09	0.08	4.38	12.62	9.91
Aug-23	3.54	11.78	9.07	0.72	0.05	11	0.08	0.09	0.09	4.39	12.63	9.93
Sep-23	3.54	11.78	9.07	0.72	0.06	11	0.09	0.10	0.09	4.41	12.65	9.94
Oct-23	3.54	11.78	9.07	0.73	0.05	11	0.08	0.09	0.08	4.40	12.64	9.94
Nov-23	3.54	11.78	9.07	0.73	0.04	11	0.07	0.07	0.07	4.38	12.62	9.92
Dec-23	3.54	11.78	9.07	0.71	0.04	11	0.07	0.07	0.07	4.37	12.61	9.90
<b>Average</b>												
2021	3.04	11.21	8.64	0.54	0.04	11	0.06	0.07	0.07	3.68	11.86	9.29
2022	3.54	11.49	8.85	0.59	0.06	11	0.09	0.10	0.09	4.28	12.23	9.59
2023	3.58	11.78	9.07	0.68	0.05	11	0.08	0.08	0.08	4.37	12.58	9.88

Table 2.15 - 5 Heavy Crude Oil Transportation Costs via Trans Mountain to China, California, and Puget Sound  
(U.S. Dollars per Barrel, Unless Noted)

	<i>Trans Mountain to China</i>			<i>Trans Mountain to California</i>			<i>Trans Mountain to Puget Sound</i>		
	<i>Edmonton to Tsingtao</i>	<i>Edmonton to Tsingtao</i>	<i>Edmonton to Tsingtao</i>	<i>Edmonton to Long Beach</i>	<i>Edmonton to Long Beach</i>	<i>Edmonton to Long Beach</i>	<i>Edmonton to PS</i>	<i>Edmonton to PS</i>	<i>Edmonton to PS</i>
	<i>Existing Spot \$/B</i>	<i>Expanded Spot \$/B</i>	<i>Expanded Contract \$/B</i>	<i>Existing Spot \$/B</i>	<i>Expanded Spot \$/B</i>	<i>Expanded Contract \$/B</i>	<i>Existing Spot \$/B</i>	<i>Expanded Spot \$/B</i>	<i>Expanded Contract \$/B</i>
Jan-21	5.04	12.53	10.43	3.83	11.31	9.21	2.37	9.31	7.28
Feb-21	5.31	12.81	10.71	3.97	11.46	9.36	2.39	9.34	7.31
Mar-21	6.20	13.77	11.65	4.35	11.92	9.79	2.41	9.43	7.38
Apr-21	5.97	13.60	11.46	4.27	11.89	9.75	2.42	9.48	7.42
May-21	7.10	14.03	11.83	5.33	12.26	10.05	3.28	9.76	7.64
Jun-21	7.00	13.88	11.69	5.29	12.16	9.98	3.27	9.70	7.59
Jul-21	6.90	13.61	11.48	5.20	11.90	9.77	3.20	9.47	7.42
Aug-21	7.49	14.16	12.04	5.40	12.07	9.95	3.18	9.41	7.37
Sep-21	7.15	13.78	11.67	5.27	11.90	9.79	3.17	9.37	7.34
Oct-21	7.54	14.30	12.15	5.50	12.25	10.10	3.23	9.55	7.48
Nov-21	7.66	14.34	12.21	5.49	12.17	10.04	3.19	9.44	7.39
Dec-21	7.51	14.07	11.98	5.38	11.94	9.85	3.14	9.28	7.27
Jan-22	7.70	14.61	12.44	5.56	12.46	10.29	3.20	9.65	7.56
Feb-22	7.63	14.49	12.33	5.54	12.38	10.23	3.19	9.59	7.51
Mar-22	9.31	16.20	14.03	6.27	13.15	10.99	3.23	9.65	7.57
Apr-22	10.16	17.06	14.89	6.60	13.50	11.33	3.23	9.67	7.58
May-22	10.90	17.43	15.29	7.03	13.55	11.42	3.40	9.52	7.46
Jun-22	10.99	17.53	15.39	7.07	13.61	11.47	3.41	9.54	7.48
Jul-22	11.16	17.64	15.52	7.06	13.53	11.41	3.39	9.47	7.43
Aug-22	12.67	19.16	17.04	7.65	14.13	12.02	3.39	9.47	7.43
Sep-22	12.50	18.80	16.74	7.49	13.77	11.72	3.30	9.20	7.21
Oct-22	11.47	17.59	15.59	7.00	13.11	11.11	3.21	8.95	7.02
Nov-22	13.48	19.71	17.67	7.83	14.06	12.02	3.26	9.10	7.14
Dec-22	15.34	21.51	19.49	8.53	14.69	12.68	3.22	9.00	7.06
Jan-23	15.24	21.72	19.63	7.72	14.20	12.11	3.26	9.33	7.32
Feb-23	12.62	19.08	17.00	6.87	13.34	11.25	3.26	9.32	7.31
Mar-23	12.37	18.73	16.68	6.75	13.10	11.05	3.22	9.17	7.19
Apr-23	12.23	18.68	16.60	6.76	13.21	11.13	3.26	9.31	7.30
May-23	11.04	17.44	15.37	6.86	13.26	11.19	3.18	9.27	7.27
Jun-23	10.76	17.28	15.17	6.82	13.33	11.22	3.23	9.43	7.39
Jul-23	9.86	16.41	14.29	6.38	12.93	10.80	3.31	9.55	7.50
Aug-23	9.45	15.87	13.79	6.22	12.64	10.56	3.26	9.37	7.36
Sep-23	9.95	16.35	14.28	5.92	12.32	10.24	3.26	9.34	7.35
Oct-23	11.01	17.32	15.28	6.06	12.37	10.32	3.21	9.22	7.24
Nov-23	11.39	17.71	15.66	6.55	12.87	10.82	3.20	9.21	7.23
Dec-23	11.27	17.72	15.63	7.02	13.46	11.37	3.25	9.39	7.37
<b>Average</b>									
2021	6.74	13.74	11.61	4.94	11.94	9.80	2.94	9.46	7.41
2022	11.11	17.64	15.54	6.97	13.49	11.39	3.29	9.40	7.37
2023	11.43	17.86	15.78	6.66	13.08	11.01	3.24	9.32	7.32

Table 2.15 - 6 Heavy Crude Oil Transportation Cost via Trans Mountain to Tsingtao (China)  
 (U.S. Dollars per Barrel, Unless Noted)

	Pipeline Toll Case			Vessel Freight							Physical Loss & Insurance				Working Capital			Pipeline Toll Case						
	Edmonton/ Westridge Existing Spot \$/B	Edmonton/ Westridge Expanded Spot \$/B	Edmonton/ Westridge Expanded Contract \$/B	Worldscale Vancouver to Tsingtao \$/MT	Short Load Correction \$/MT	Vancouver to Tsingtao Miles	Worldscale Indonesia Japan 80 %	Vessel Total \$/B	Escort Tugs \$/B	Bulk Oil Cargo Fee \$/B	Enhanced Response Recovery Fee \$/B	GI/F2 \$/B	Total Shipping Cost \$/B	Existing Spot \$/B	Expanded Spot \$/B	Expanded Contract \$/B	Pipeline Loss Allowance \$/B	Total Transit Time Days	Existing Spot Working Capital \$/B	Expanded Spot Working Capital \$/B	Expanded Contract Working Capital \$/B	Edmonton to Tsingtao Existing Spot \$/B	Edmonton to Tsingtao Expanded Spot \$/B	Edmonton to Tsingtao Expanded Contract \$/B
Jan-21	2.24	9.68	7.59				1.92	0.11	0.22	0.23	0.02	2.50	0.19	0.23	0.22	0.02	25	0.09	0.10	0.10	6.04	12.63	10.43	
Feb-21	2.24	9.70	7.60				2.12	0.11	0.22	0.23	0.02	2.70	0.23	0.26	0.26	0.03	25	0.11	0.12	0.12	6.31	12.81	10.71	
Mar-21	2.27	9.79	7.68				2.95	0.11	0.23	0.23	0.02	3.53	0.25	0.29	0.29	0.03	25	0.12	0.13	0.13	6.20	13.77	11.86	
Apr-21	2.28	9.85	7.73				2.71	0.11	0.23	0.23	0.02	3.30	0.25	0.28	0.27	0.03	25	0.11	0.13	0.13	6.97	13.80	11.48	
May-21	3.27	10.15	7.96				2.82	0.12	0.24	0.24	0.02	3.42	0.26	0.29	0.28	0.03	25	0.12	0.13	0.13	7.10	14.03	11.83	
Jun-21	3.24	10.08	7.90				2.71	0.11	0.23	0.24	0.02	3.31	0.28	0.31	0.30	0.03	25	0.13	0.14	0.14	7.00	13.88	11.88	
Jul-21	3.16	9.83	7.71				2.70	0.11	0.23	0.23	0.02	3.29	0.29	0.32	0.31	0.03	25	0.13	0.14	0.14	6.80	13.81	11.48	
Aug-21	3.15	9.77	7.66				3.34	0.11	0.23	0.23	0.02	3.92	0.27	0.30	0.29	0.03	25	0.12	0.14	0.13	7.48	14.18	12.04	
Sep-21	3.13	9.72	7.62				2.97	0.11	0.23	0.23	0.02	3.55	0.29	0.32	0.31	0.04	25	0.13	0.15	0.14	7.16	13.78	11.87	
Oct-21	3.19	9.90	7.77				3.25	0.11	0.23	0.23	0.02	3.85	0.32	0.35	0.34	0.04	25	0.15	0.16	0.16	7.64	14.30	12.16	
Nov-21	3.15	9.80	7.68				3.46	0.11	0.23	0.23	0.02	4.05	0.29	0.32	0.31	0.03	25	0.13	0.15	0.14	7.88	14.34	12.21	
Dec-21	3.10	9.62	7.55				3.40	0.11	0.22	0.23	0.02	3.98	0.27	0.30	0.29	0.03	25	0.13	0.14	0.13	7.61	14.07	11.98	
Jan-22	3.14	10.00	7.85				3.44	0.11	0.23	0.23	0.02	4.02	0.34	0.37	0.36	0.04	25	0.16	0.17	0.17	7.70	14.81	12.44	
Feb-22	3.12	9.93	7.78				3.35	0.11	0.23	0.23	0.02	3.93	0.37	0.40	0.39	0.05	25	0.17	0.18	0.18	7.63	14.48	12.33	
Mar-22	3.13	9.97	7.82				4.89	0.11	0.23	0.23	0.02	5.47	0.45	0.48	0.47	0.05	25	0.21	0.22	0.22	8.31	16.20	14.03	
Apr-22	3.14	9.99	7.84				5.75	0.11	0.23	0.23	0.02	6.34	0.43	0.46	0.45	0.05	25	0.20	0.21	0.21	10.18	17.08	14.98	
May-22	3.34	9.82	7.70				6.28	0.11	0.22	0.23	0.02	6.85	0.45	0.48	0.47	0.05	25	0.21	0.22	0.22	10.80	17.43	16.29	
Jun-22	3.35	9.85	7.73				6.34	0.11	0.22	0.23	0.02	6.92	0.46	0.49	0.48	0.05	25	0.21	0.22	0.22	10.80	17.53	16.39	
Jul-22	3.32	9.75	7.65				6.68	0.11	0.22	0.22	0.01	7.25	0.38	0.41	0.40	0.04	25	0.17	0.19	0.18	11.18	17.84	16.62	
Aug-22	3.32	9.77	7.66				8.20	0.11	0.22	0.22	0.01	8.77	0.37	0.40	0.39	0.04	25	0.17	0.18	0.18	12.87	18.18	17.04	
Sep-22	3.22	9.48	7.43				8.21	0.11	0.21	0.22	0.01	8.76	0.33	0.36	0.35	0.04	25	0.15	0.16	0.16	12.60	18.80	16.74	
Oct-22	3.13	9.21	7.23				7.32	0.10	0.21	0.21	0.01	7.85	0.31	0.33	0.33	0.03	25	0.14	0.15	0.15	11.47	17.69	16.69	
Nov-22	3.19	9.38	7.36				9.27	0.10	0.21	0.22	0.01	9.81	0.30	0.33	0.32	0.03	25	0.14	0.15	0.15	16.48	19.71	17.87	
Dec-22	3.16	9.29	7.28				11.20	0.10	0.21	0.21	0.01	11.74	0.28	0.31	0.30	0.03	25	0.13	0.14	0.14	16.54	21.51	19.48	
Jan-23	3.20	9.64	7.56				11.03	0.10	0.19	0.22	0.01	11.56	0.30	0.33	0.32	0.03	25	0.14	0.15	0.15	16.24	21.72	19.83	
Feb-23	3.19	9.62	7.54				8.41	0.10	0.19	0.22	0.01	8.93	0.31	0.34	0.33	0.03	25	0.14	0.16	0.15	12.82	18.08	17.00	
Mar-23	3.14	9.46	7.42				8.23	0.10	0.19	0.21	0.01	8.75	0.31	0.34	0.33	0.03	25	0.14	0.16	0.15	12.37	18.73	16.88	
Apr-23	3.18	9.59	7.52				7.99	0.10	0.19	0.22	0.01	8.52	0.34	0.37	0.36	0.04	25	0.15	0.17	0.16	12.23	18.88	16.80	
May-23	3.20	9.57	7.50				6.83	0.10	0.19	0.21	0.01	7.36	0.30	0.33	0.32	0.03	25	0.14	0.15	0.15	11.04	17.44	16.37	
Jun-23	3.25	9.74	7.64				6.48	0.11	0.20	0.22	0.01	7.02	0.31	0.34	0.33	0.03	25	0.14	0.15	0.15	10.78	17.28	16.17	
Jul-23	3.28	9.79	7.68				5.53	0.11	0.20	0.22	0.01	6.07	0.33	0.36	0.35	0.04	25	0.15	0.16	0.16	9.88	16.41	14.29	
Aug-23	3.21	9.59	7.52				5.20	0.10	0.19	0.22	0.01	5.73	0.32	0.35	0.34	0.04	25	0.15	0.16	0.16	9.46	16.87	13.78	
Sep-23	3.20	9.56	7.50				5.67	0.10	0.19	0.21	0.01	6.19	0.35	0.38	0.37	0.04	25	0.16	0.18	0.17	9.86	16.36	14.28	
Oct-23	3.16	9.43	7.40				6.83	0.10	0.19	0.21	0.01	7.35	0.32	0.35	0.34	0.04	25	0.15	0.16	0.16	11.01	17.32	16.28	
Nov-23	3.16	9.44	7.40				7.28	0.10	0.19	0.21	0.01	7.80	0.28	0.31	0.30	0.03	25	0.13	0.14	0.14	11.38	17.71	16.88	
Dec-23	3.22	9.63	7.55				7.08	0.10	0.19	0.22	0.01	7.61	0.28	0.31	0.30	0.03	25	0.13	0.14	0.14	11.27	17.72	16.83	
Average																								
2021	2.87	9.82	7.71				2.86	0.11	0.23	0.23	0.02	3.45	0.27	0.30	0.29	0.03	25	0.12	0.14	0.13	6.74	13.74	11.81	
2022	3.21	9.70	7.61				6.74	0.11	0.22	0.22	0.01	7.31	0.37	0.40	0.39	0.04	25	0.17	0.18	0.18	11.11	17.84	16.64	
2023	3.20	9.59	7.52				7.21	0.10	0.19	0.21	0.01	7.74	0.31	0.34	0.33	0.04	25	0.14	0.16	0.15	11.43	17.88	16.78	

Table 2.15 - 7 Heavy Crude Oil Transportation Cost via Trans Mountain to Long Beach (California)  
(U.S. Dollars per Barrel, Unless Noted)

	Pipeline Toll Case			Vessel Freight							Physical Loss & Insurance				Working Capital			Pipeline Toll Case						
	Edmonton/ Westridge	Edmonton/ Westridge	Edmonton/ Westridge	Worldscale Vancouver	Short Load Correction	Vancouver to Long Beach	Worldscale Japan (1) #0	Vessel Total	Escort Tugs	Bulk Oil Cargo Fee	Enhanced Response Capital Recovery Fee	Total Shipping Cost	Existing Spot	Expanded Spot	Expanded Contract	Pipeline Loss Allowance	Total Transit Days	Existing Spot Working Capital	Expanded Spot Working Capital	Expanded Contract Working Capital	Edmonton to Long Beach	Edmonton to Long Beach	Edmonton to Long Beach	
	Existing Spot \$/B	Expanded Spot \$/B	Expanded Contract \$/B	\$/MT	\$/MT	Miles	%	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	2.24	9.68	7.59					0.76	0.11	0.22	0.23	0.02	1.34	0.19	0.22	0.21	0.02	14	0.05	0.06	0.05	3.83	11.31	9.21
Feb-21	2.24	9.70	7.60					0.84	0.11	0.22	0.23	0.02	1.41	0.23	0.26	0.25	0.03	14	0.06	0.07	0.06	3.97	11.48	9.38
Mar-21	2.27	9.79	7.68					1.16	0.11	0.23	0.23	0.02	1.74	0.25	0.28	0.27	0.03	14	0.06	0.07	0.07	4.36	11.82	9.79
Apr-21	2.28	9.85	7.73					1.07	0.11	0.23	0.23	0.02	1.66	0.24	0.27	0.27	0.03	14	0.06	0.07	0.07	4.27	11.89	9.76
May-21	3.27	10.15	7.96					1.11	0.12	0.24	0.24	0.02	1.72	0.25	0.28	0.27	0.03	14	0.06	0.07	0.07	6.33	12.28	10.66
Jun-21	3.24	10.08	7.90					1.07	0.11	0.23	0.24	0.02	1.67	0.27	0.30	0.29	0.03	14	0.07	0.08	0.08	6.29	12.18	9.98
Jul-21	3.16	9.83	7.71					1.06	0.11	0.23	0.23	0.02	1.65	0.28	0.31	0.30	0.03	14	0.07	0.08	0.08	6.20	11.90	9.77
Aug-21	3.15	9.77	7.66					1.21	0.11	0.23	0.23	0.02	1.90	0.26	0.29	0.28	0.03	14	0.07	0.08	0.07	6.40	12.67	9.86
Sep-21	3.13	9.72	7.62					1.17	0.11	0.23	0.23	0.02	1.75	0.29	0.32	0.31	0.04	14	0.07	0.08	0.08	6.27	11.90	9.79
Oct-21	3.19	9.90	7.77					1.28	0.11	0.23	0.23	0.02	1.87	0.32	0.35	0.34	0.04	14	0.08	0.09	0.09	6.60	12.26	10.10
Nov-21	3.15	9.80	7.68					1.36	0.11	0.23	0.23	0.02	1.95	0.28	0.31	0.30	0.03	14	0.07	0.08	0.08	6.48	12.17	10.04
Dec-21	3.10	9.62	7.55					1.34	0.11	0.22	0.23	0.02	1.91	0.26	0.29	0.28	0.03	14	0.07	0.08	0.07	6.38	11.94	9.86
Jan-22	3.14	10.00	7.85					1.38	0.11	0.23	0.23	0.02	1.96	0.33	0.36	0.35	0.04	14	0.08	0.09	0.09	6.68	12.48	10.29
Feb-22	3.12	9.93	7.78					1.34	0.11	0.23	0.23	0.02	1.92	0.36	0.39	0.38	0.05	14	0.09	0.10	0.10	6.64	12.38	10.23
Mar-22	3.13	9.97	7.82					1.96	0.11	0.23	0.23	0.02	2.54	0.44	0.47	0.46	0.05	14	0.11	0.12	0.12	8.27	13.16	10.88
Apr-22	3.14	9.99	7.84					2.30	0.11	0.23	0.23	0.02	2.89	0.42	0.45	0.44	0.05	14	0.11	0.12	0.11	8.80	13.60	11.33
May-22	3.34	9.82	7.70					2.51	0.11	0.22	0.23	0.02	3.09	0.44	0.47	0.46	0.05	14	0.11	0.12	0.12	7.93	13.66	11.42
Jun-22	3.35	9.86	7.73					2.54	0.11	0.22	0.23	0.02	3.11	0.44	0.47	0.46	0.05	14	0.11	0.12	0.12	7.87	13.61	11.47
Jul-22	3.32	9.75	7.65					2.68	0.11	0.22	0.22	0.01	3.24	0.36	0.39	0.38	0.04	14	0.09	0.10	0.10	7.98	13.63	11.41
Aug-22	3.32	9.77	7.66					3.28	0.11	0.22	0.22	0.01	3.85	0.35	0.38	0.37	0.04	14	0.09	0.10	0.09	7.86	14.13	12.02
Sep-22	3.22	9.48	7.43					3.29	0.11	0.21	0.22	0.01	3.84	0.31	0.34	0.33	0.04	14	0.08	0.09	0.08	7.48	13.77	11.72
Oct-22	3.13	9.21	7.23					2.93	0.10	0.21	0.21	0.01	3.47	0.29	0.31	0.31	0.03	14	0.07	0.08	0.08	7.90	13.11	11.11
Nov-22	3.19	9.38	7.36					3.71	0.10	0.21	0.22	0.01	4.26	0.28	0.30	0.30	0.03	14	0.07	0.08	0.08	7.83	14.88	12.82
Dec-22	3.16	9.29	7.28					4.48	0.10	0.21	0.21	0.01	5.03	0.25	0.28	0.27	0.03	14	0.06	0.07	0.07	8.63	14.88	12.88
Jan-23	3.20	9.64	7.56					3.62	0.10	0.19	0.22	0.01	4.15	0.27	0.30	0.29	0.03	14	0.07	0.08	0.07	7.72	14.20	12.11
Feb-23	3.19	9.62	7.54					2.76	0.10	0.19	0.22	0.01	3.29	0.29	0.32	0.31	0.03	14	0.07	0.08	0.08	8.87	13.34	11.26
Mar-23	3.14	9.46	7.42					2.70	0.10	0.19	0.21	0.01	3.22	0.29	0.31	0.31	0.03	14	0.07	0.08	0.08	8.76	13.10	11.06
Apr-23	3.18	9.59	7.52					2.62	0.10	0.19	0.22	0.01	3.15	0.31	0.34	0.33	0.04	14	0.08	0.09	0.09	8.78	13.21	11.13
May-23	3.20	9.57	7.50					2.74	0.10	0.19	0.21	0.01	3.27	0.29	0.31	0.30	0.03	14	0.07	0.08	0.08	8.88	13.28	11.19
Jun-23	3.26	9.74	7.64					2.62	0.11	0.20	0.22	0.01	3.16	0.29	0.32	0.31	0.03	14	0.07	0.08	0.08	8.82	13.33	11.22
Jul-23	3.28	9.79	7.68					2.14	0.11	0.20	0.22	0.01	2.67	0.31	0.34	0.33	0.04	14	0.08	0.09	0.08	8.38	12.93	10.80
Aug-23	3.21	9.59	7.52					2.05	0.10	0.19	0.22	0.01	2.58	0.31	0.34	0.33	0.04	14	0.08	0.09	0.08	8.22	12.84	10.68
Sep-23	3.20	9.56	7.50					1.73	0.10	0.19	0.21	0.01	2.26	0.34	0.36	0.36	0.04	14	0.09	0.09	0.09	8.82	12.82	10.24
Oct-23	3.16	9.43	7.40					1.97	0.10	0.19	0.21	0.01	2.49	0.30	0.33	0.32	0.04	14	0.08	0.08	0.08	8.98	12.87	10.32
Nov-23	3.16	9.44	7.40					2.52	0.10	0.19	0.21	0.01	3.04	0.26	0.29	0.28	0.03	14	0.07	0.07	0.07	8.66	12.87	10.82
Dec-23	3.22	9.63	7.55					2.90	0.10	0.19	0.22	0.01	3.43	0.26	0.29	0.28	0.03	14	0.07	0.08	0.07	7.92	13.48	11.37
Average																								
2021	2.87	9.82	7.71					1.13	0.11	0.23	0.23	0.02	1.71	0.26	0.29	0.28	0.03	14	0.07	0.07	0.07	4.94	11.94	8.80
2022	3.21	9.70	7.61					2.70	0.11	0.22	0.22	0.01	3.27	0.35	0.38	0.37	0.04	14	0.09	0.10	0.10	8.97	13.48	11.38
2023	3.20	9.59	7.52					2.53	0.10	0.19	0.21	0.01	3.06	0.29	0.32	0.31	0.04	14	0.08	0.08	0.08	8.88	13.08	11.01

Note:  
(1) Began using Vancouver to USWC %WB effective May 2023



**Table 2.15 - 8 Heavy Crude Oil Transportation Cost via Trans Mountain to Anacortes (Puget Sound)**  
(U.S. Dollars per Barrel, Unless Noted)

	Pipeline Toll Case					Total Transit Time Days	Working Capital			Pipeline Toll Case		
	Edmonton/ Sumas Existing Spot \$/B	Edmonton/ Sumas Expanded Spot \$/B	Edmonton/ Sumas Expanded Contract \$/B	Puget Sound PL Sumas to Anacortes \$/B	Pipeline Loss Allowance \$/B		Existing Spot Working Capital \$/B	Expanded Spot Working Capital \$/B	Expanded Contract Working Capital \$/B	Edmonton to PS Existing Spot \$/B	Edmonton to PS Expanded Spot \$/B	Edmonton to PS Expanded Contract \$/B
	Jan-21	1.88	8.81	6.79	0.43		0.02	11	0.04	0.04	0.04	2.37
Feb-21	1.88	8.83	6.80	0.43	0.03	11	0.04	0.05	0.05	2.39	9.34	7.31
Mar-21	1.90	8.91	6.87	0.43	0.03	11	0.05	0.05	0.05	2.41	9.43	7.38
Apr-21	1.91	8.97	6.91	0.43	0.03	11	0.05	0.05	0.05	2.42	9.48	7.42
May-21	2.77	9.24	7.12	0.43	0.03	11	0.05	0.05	0.05	3.28	9.76	7.64
Jun-21	2.75	9.17	7.07	0.43	0.03	11	0.05	0.06	0.06	3.27	9.70	7.59
Jul-21	2.68	8.95	6.89	0.43	0.03	11	0.05	0.06	0.06	3.20	9.47	7.42
Aug-21	2.67	8.89	6.85	0.43	0.03	11	0.05	0.06	0.05	3.18	9.41	7.37
Sep-21	2.65	8.85	6.82	0.43	0.04	11	0.06	0.06	0.06	3.17	9.37	7.34
Oct-21	2.70	9.01	6.94	0.43	0.04	11	0.06	0.07	0.07	3.23	9.55	7.48
Nov-21	2.67	8.92	6.87	0.43	0.03	11	0.05	0.06	0.06	3.19	9.44	7.39
Dec-21	2.63	8.76	6.75	0.43	0.03	11	0.05	0.06	0.06	3.14	9.28	7.27
Jan-22	2.66	9.11	7.02	0.43	0.04	11	0.06	0.07	0.07	3.20	9.65	7.56
Feb-22	2.64	9.03	6.96	0.43	0.05	11	0.07	0.08	0.07	3.19	9.59	7.51
Mar-22	2.65	9.08	6.99	0.43	0.05	11	0.09	0.09	0.09	3.23	9.65	7.57
Apr-22	2.66	9.10	7.01	0.43	0.05	11	0.08	0.09	0.09	3.23	9.67	7.58
May-22	2.83	8.94	6.89	0.43	0.05	11	0.08	0.09	0.09	3.40	9.52	7.46
Jun-22	2.84	8.97	6.91	0.43	0.05	11	0.09	0.09	0.09	3.41	9.54	7.48
Jul-22	2.81	8.88	6.84	0.47	0.04	11	0.07	0.07	0.07	3.39	9.47	7.43
Aug-22	2.81	8.89	6.85	0.47	0.04	11	0.07	0.07	0.07	3.39	9.47	7.43
Sep-22	2.73	8.63	6.65	0.47	0.04	11	0.06	0.06	0.06	3.30	9.20	7.21
Oct-22	2.65	8.39	6.46	0.47	0.03	11	0.05	0.06	0.06	3.21	8.95	7.02
Nov-22	2.70	8.54	6.58	0.47	0.03	11	0.05	0.06	0.06	3.26	9.10	7.14
Dec-22	2.68	8.45	6.51	0.47	0.03	11	0.05	0.05	0.05	3.22	9.00	7.06
Jan-23	2.71	8.77	6.76	0.47	0.03	11	0.05	0.06	0.05	3.26	9.33	7.32
Feb-23	2.70	8.76	6.75	0.47	0.03	11	0.05	0.06	0.06	3.26	9.32	7.31
Mar-23	2.66	8.61	6.63	0.47	0.03	11	0.05	0.06	0.06	3.22	9.17	7.19
Apr-23	2.70	8.73	6.73	0.47	0.04	11	0.06	0.07	0.06	3.26	9.31	7.30
May-23	2.62	8.71	6.71	0.47	0.03	11	0.05	0.06	0.06	3.18	9.27	7.27
Jun-23	2.67	8.86	6.83	0.47	0.03	11	0.06	0.06	0.06	3.23	9.43	7.39
Jul-23	2.68	8.91	6.87	0.53	0.04	11	0.06	0.07	0.06	3.31	9.55	7.50
Aug-23	2.63	8.73	6.73	0.53	0.04	11	0.06	0.07	0.06	3.26	9.37	7.36
Sep-23	2.62	8.70	6.70	0.53	0.04	11	0.07	0.07	0.07	3.26	9.34	7.35
Oct-23	2.58	8.58	6.61	0.53	0.04	11	0.06	0.06	0.06	3.21	9.22	7.24
Nov-23	2.59	8.59	6.62	0.53	0.03	11	0.05	0.05	0.05	3.20	9.21	7.23
Dec-23	2.64	8.77	6.76	0.53	0.03	11	0.05	0.06	0.05	3.25	9.39	7.37
<b>Average</b>												
2021	2.42	8.94	6.89	0.43	0.03	11	0.05	0.06	0.05	2.94	9.46	7.41
2022	2.72	8.83	6.81	0.45	0.04	11	0.07	0.07	0.07	3.29	9.40	7.37
2023	2.65	8.73	6.72	0.50	0.04	11	0.06	0.06	0.06	3.24	9.32	7.32

Table 2.15 - 9 Heavy Crude Oil Transportation Cost via Alternative Transportation Options  
(Canadian Dollars per Barrel, Unless Noted)

	Puget Sound						California						China						
	Enbridge			Keystone			Enbridge			Keystone			Enbridge			Keystone			
	Max LIT Contract Transport Cost \$CA/B	Min LIT Contract Transport Cost \$CA/B	LIT Spot Transport Cost \$CA/B	Heavy "A" Transport Cost \$CA/B	Heavy "B" Transport Cost \$CA/B	LIT Spot Transport Cost \$CA/B	Max LIT Contract Transport Cost \$CA/B	Min LIT Contract Transport Cost \$CA/B	LIT Spot Transport Cost \$CA/B	Heavy "A" Transport Cost \$CA/B	Heavy "B" Transport Cost \$CA/B	LIT Spot Transport Cost \$CA/B	Max LIT Contract Transport Cost \$CA/B	Min LIT Contract Transport Cost \$CA/B	LIT Spot Transport Cost \$CA/B	Heavy "A" Transport Cost \$CA/B	Heavy "B" Transport Cost \$CA/B	LIT Spot Transport Cost \$CA/B	
Jan-21	16.25	15.18	20.09	22.56	17.37	17.83	16.06	14.98	19.91	22.08	16.89	17.15	16.16	15.09	20.00	22.50	17.30	17.57	
Feb-21	16.66	15.59	20.49	23.04	17.85	21.62	16.47	15.40	20.32	22.51	17.32	21.09	16.09	15.03	19.93	22.50	17.31	21.08	
Mar-21	17.74	16.88	21.54	24.11	18.97	20.79	17.39	16.33	21.20	23.39	18.26	20.07	16.13	15.07	19.92	22.52	17.38	19.19	
Apr-21	16.72	15.67	20.49	23.06	17.96	19.74	16.42	15.36	20.20	22.41	17.30	19.08	15.90	14.85	19.67	22.27	17.16	18.95	
May-21	16.52	15.49	20.17	22.78	17.82	19.48	16.20	15.18	19.88	22.12	17.16	18.82	15.42	14.40	19.08	21.71	16.75	18.41	
Jun-21	16.25	15.22	19.93	22.56	17.56	19.26	15.98	14.95	19.68	21.91	16.92	18.61	15.37	14.35	19.06	21.72	16.72	18.41	
Jul-21	16.66	15.60	20.44	23.04	17.92	17.83	16.39	15.33	20.19	22.38	17.26	17.17	15.71	14.66	19.50	22.12	17.00	16.91	
Aug-21	17.25	16.18	21.05	23.82	18.48	18.40	16.81	15.75	20.83	22.81	17.66	17.59	15.76	14.69	19.56	22.16	17.01	16.93	
Sep-21	17.43	16.36	21.25	23.85	18.68	18.61	17.11	16.03	20.95	23.12	17.95	17.88	16.29	15.22	20.11	22.74	17.57	17.50	
Oct-21	17.76	16.72	21.52	24.18	19.09	18.98	17.42	16.37	21.19	23.39	18.30	18.20	16.81	15.76	20.56	23.25	18.17	18.06	
Nov-21	17.94	16.88	21.73	24.33	19.20	19.11	17.50	16.43	21.31	23.49	18.36	18.27	17.00	15.94	20.79	23.42	18.28	18.20	
Dec-21	18.21	17.13	22.07	24.64	19.41	19.37	17.76	16.68	21.64	23.80	18.57	18.53	16.82	15.75	20.88	23.27	18.05	18.01	
Jan-22	18.39	17.26	21.59	25.26	19.18	19.02	18.01	16.88	21.23	24.42	18.34	18.18	17.17	16.05	20.38	24.08	18.00	17.84	
Feb-22	19.07	17.94	22.30	26.01	19.89	19.75	18.75	17.61	22.00	25.18	19.06	18.92	17.37	16.24	20.60	24.35	18.22	18.08	
Mar-22	20.85	19.72	24.06	27.87	21.77	21.62	20.26	19.13	23.49	26.88	20.58	20.43	18.33	17.21	21.55	25.40	19.30	19.15	
Apr-22	22.32	21.19	25.53	29.31	23.23	23.08	21.52	20.39	24.74	27.92	21.84	21.69	19.40	18.27	22.61	26.43	20.35	20.19	
May-22	22.13	20.98	25.39	29.20	23.02	22.90	21.20	20.05	24.48	27.66	21.47	21.36	18.40	17.25	21.66	25.51	19.33	19.21	
Jun-22	22.30	21.16	25.56	29.37	23.21	23.08	21.37	20.22	24.64	27.82	21.65	21.53	18.69	17.55	21.95	25.80	19.63	19.51	
Jul-22	23.78	22.63	27.07	30.79	24.57	24.47	22.67	21.51	25.97	29.15	22.92	22.82	20.05	18.89	23.33	27.08	20.85	20.75	
Aug-22	25.74	24.59	29.03	32.74	26.52	26.41	24.26	23.10	27.56	30.73	24.51	24.41	20.90	19.75	24.19	27.91	21.70	21.59	
Sep-22	25.64	24.46	29.03	32.79	26.39	26.36	24.06	22.87	27.46	30.73	24.33	24.30	22.49	21.30	25.87	26.66	23.26	23.23	
Oct-22	26.31	25.09	29.79	33.54	26.96	27.00	24.89	23.66	28.38	31.64	25.07	25.10	24.26	23.04	27.74	31.51	24.93	24.96	
Nov-22	30.69	29.49	34.00	37.40	30.93	30.92	28.80	27.80	32.13	35.05	28.59	28.58	26.78	25.58	30.09	33.50	27.04	27.03	
Dec-22	29.63	28.42	32.99	36.33	29.80	29.82	27.20	25.98	30.57	33.48	26.95	26.97	23.81	22.60	27.16	30.51	23.98	24.00	
Jan-23	27.28	26.08	30.58	34.06	27.61	27.70	24.83	23.63	28.15	31.18	24.73	24.81	21.88	20.66	25.17	28.65	22.20	22.29	
Feb-23	26.38	25.18	29.70	33.20	26.74	26.83	24.83	23.43	27.96	30.99	24.53	24.62	22.56	21.36	25.67	29.39	22.93	23.02	
Mar-23	29.72	28.50	33.09	36.68	30.11	30.25	28.00	26.77	31.39	34.48	27.91	28.04	25.27	24.05	28.64	32.24	25.67	25.81	
Apr-23	24.56	23.36	27.89	31.49	25.01	25.11	22.94	21.73	26.28	29.38	22.90	23.00	22.94	21.63	26.16	29.79	23.31	23.41	
May-23	28.02	26.82	31.31	34.94	28.45	28.55	26.28	25.07	29.58	32.73	26.24	26.34	21.86	20.65	25.14	28.78	22.28	22.39	
Jun-23	25.23	24.05	28.46	32.09	25.70	25.77	23.61	22.42	26.85	30.01	23.63	23.69	22.06	20.88	25.28	28.94	22.65	22.61	
Jul-23	23.87	22.63	26.02	31.29	23.33	23.38	22.66	21.41	24.82	29.60	21.64	21.69	21.82	20.58	23.98	29.27	21.31	21.36	
Aug-23	23.70	22.43	25.90	31.20	23.08	23.18	22.52	21.25	24.73	29.54	21.42	21.52	22.33	21.06	24.53	29.86	21.74	21.84	
Sep-23	22.48	21.21	24.69	30.03	21.88	21.99	21.58	20.31	23.80	28.61	20.47	20.57	21.85	20.57	24.05	29.43	21.28	21.39	
Oct-23	25.65	24.36	27.89	33.21	24.96	25.10	24.51	23.22	26.76	31.59	23.34	23.48	23.90	22.61	26.14	31.49	23.24	23.38	
Nov-23	27.54	26.25	29.78	35.06	26.81	26.95	25.92	24.62	28.16	32.99	24.74	24.88	24.77	23.48	27.00	32.30	24.05	24.19	
Dec-23	26.08	24.82	28.32	33.51	25.42	25.51	24.19	22.92	26.44	31.19	23.10	23.19	22.75	21.48	24.98	30.19	22.10	22.19	
Average																			
2021	17.11	16.06	20.90	23.48	18.36	19.24	16.79	15.73	20.59	22.78	17.66	18.54	16.12	15.07	19.91	22.51	17.39	18.27	
2022	23.90	22.74	27.19	30.88	24.62	24.54	22.75	21.58	26.05	29.21	22.94	22.86	20.64	19.48	23.93	27.65	21.38	21.30	
2023	25.88	24.64	28.63	33.06	25.76	25.86	24.31	23.07	27.08	31.02	23.72	23.82	22.82	21.59	25.58	30.03	22.72	22.82	

Table 2.16-10 Heavy Crude Oil Transportation Cost via Enbridge to Anacortes (Puget Sound)  
(Canadian Dollars per Barrel, Unless Noted)

	Pipeline Toll Cans						Afters Freight										Physical Loss & Insurance				Working Capital			Edmonton to Anacortes - Heavy				
	Edmonton to Houston LIT Fee	Edmonton to Houston LIT Fee	Edmonton to Houston LIT 2nd	Edmonton to Houston LIT 2nd	Edmonton to Houston LIT 2nd	Edmonton to Houston Unconven LIT	Houston to Chicago Grande (Panama) SMT	Houston to Chicago Grande (Panama) Mtn	Worldscale Carb/OC 70 %	Trans-Panama Pipeline Fee SMT	Charco Azul (Panama) to Anacortes SMT	Charco Azul (Panama) to Anacortes Mtn	Worldscale Indonesia Japan 18	Total Afters Freight SMT	Houston Misc. Fee SMT	Houston Terminal Storage Fee SMT	Houston to Anacortes Cost SMT	Max LIT Contract SMT	Min LIT Contract SMT	LIT Spot SMT	Pipeline Loss Allowance SMT	Total Transit Time Days	Max LIT Contract	Min LIT Contract	LIT Spot	Max LIT Contract	Min LIT Contract	LIT Spot
	15 yr Heavy SCA	15 yr Heavy SCA	15 yr Heavy SCA	15 yr Heavy SCA	20 yr Heavy SCA	Heavy SCA	SCA/MT	(Panama) Mtn	%	Fee SMT	(Panama) SMT	(Panama) Mtn	%	SCA/MT	Fee SMT	Fee SMT	Cost SMT	SCA/MT	SCA/MT	SCA/MT	SCA/MT	Days	SCA/MT	SCA/MT	SCA/MT	SCA/MT	SCA/MT	SCA/MT
Jan-21	10.18	9.90	10.98	10.52	10.22	14.82				1.27			3.98	0.34	0.64	4.94	0.29	0.28	0.31	0.05	51	0.27	0.27	0.29	18.28	15.18	20.69	
Feb-21	10.16	9.89	10.95	10.50	10.20	14.79				1.27			4.34	0.34	0.63	5.31	0.34	0.33	0.38	0.06	51	0.32	0.31	0.33	19.86	15.99	20.49	
Mar-21	10.08	9.79	10.85	10.43	10.08	14.64				1.28			5.51	0.34	0.63	6.48	0.36	0.36	0.38	0.08	51	0.34	0.34	0.36	17.74	16.60	21.54	
Apr-21	10.00	9.73	10.78	10.33	10.03	14.55				1.25			4.58	0.33	0.62	5.54	0.35	0.35	0.37	0.08	51	0.33	0.33	0.35	18.72	15.87	20.49	
May-21	9.70	9.44	10.46	10.03	9.73	14.12				1.21			4.72	0.32	0.61	5.95	0.35	0.34	0.37	0.06	51	0.33	0.32	0.34	18.52	15.49	20.17	
Jun-21	9.77	9.51	10.54	10.10	9.81	14.23				1.22			4.33	0.33	0.61	5.77	0.36	0.37	0.40	0.07	51	0.35	0.35	0.37	18.28	15.22	19.93	
Jul-21	10.02	9.75	10.81	10.38	10.06	14.59				1.25			4.43	0.34	0.63	5.39	0.30	0.39	0.41	0.07	51	0.37	0.36	0.38	18.86	15.60	20.44	
Aug-21	10.08	9.81	10.87	10.42	10.12	14.88				1.28			4.97	0.34	0.63	5.94	0.38	0.37	0.39	0.07	51	0.35	0.35	0.37	17.28	16.18	21.65	
Sep-21	10.14	9.88	10.93	10.48	10.17	14.75				1.27			5.05	0.34	0.63	6.02	0.41	0.41	0.43	0.07	51	0.38	0.38	0.40	17.43	16.36	21.25	
Oct-21	9.95	9.68	10.73	10.28	9.98	14.48				1.24			5.57	0.33	0.62	6.53	0.44	0.44	0.46	0.08	51	0.41	0.41	0.43	17.78	16.72	21.52	
Nov-21	10.05	9.79	10.84	10.39	10.09	14.64				1.28			5.99	0.34	0.63	6.93	0.40	0.40	0.42	0.07	51	0.38	0.37	0.39	17.94	16.88	21.73	
Dec-21	10.23	9.98	11.04	10.59	10.27	14.90				1.28			5.74	0.34	0.64	6.72	0.38	0.38	0.41	0.07	51	0.38	0.38	0.38	18.21	17.13	22.57	
Jan-22	10.65	10.38	11.48	11.01	10.69	14.69				1.28			5.30	0.34	0.63	6.38	0.47	0.48	0.48	0.09	51	0.44	0.43	0.45	18.30	17.26	21.59	
Feb-22	10.73	10.44	11.58	11.09	10.77	14.81				1.27			5.93	0.34	0.64	6.90	0.51	0.51	0.53	0.10	51	0.48	0.48	0.49	19.07	17.94	22.30	
Mar-22	10.88	10.40	11.52	11.04	10.72	14.74				1.27			7.95	0.34	0.63	8.62	0.61	0.61	0.62	0.12	51	0.57	0.57	0.58	20.05	18.72	24.68	
Apr-22	10.88	10.37	11.50	11.02	10.70	14.70				1.28			6.18	0.34	0.63	10.15	0.59	0.58	0.60	0.11	51	0.55	0.55	0.57	22.32	21.19	25.53	
May-22	10.85	10.56	11.70	11.21	10.89	14.97				1.29			6.73	0.34	0.64	9.71	0.62	0.62	0.63	0.12	51	0.58	0.58	0.59	22.13	20.98	25.39	
Jun-22	10.82	10.52	11.67	11.18	10.85	14.92				1.28			6.94	0.34	0.64	9.92	0.62	0.62	0.64	0.12	51	0.58	0.58	0.60	22.30	21.16	25.58	
Jul-22	10.62	10.63	11.78	11.29	10.96	15.07				1.29			10.40	0.35	0.65	11.39	0.53	0.53	0.55	0.10	51	0.50	0.49	0.51	23.78	22.63	27.07	
Aug-22	10.91	10.61	11.78	11.27	10.95	15.05				1.29			12.40	0.35	0.65	13.39	0.52	0.51	0.53	0.09	51	0.49	0.48	0.50	23.74	24.89	28.03	
Sep-22	11.24	10.94	12.13	11.62	11.28	15.51				1.33			11.95	0.36	0.67	12.97	0.48	0.48	0.50	0.08	51	0.45	0.44	0.46	25.64	24.46	29.03	
Oct-22	11.98	11.26	12.47	11.66	11.61	15.95				1.37			12.39	0.37	0.66	13.31	0.47	0.46	0.48	0.08	51	0.44	0.43	0.45	26.31	25.09	29.79	
Nov-22	11.80	11.50	12.69	12.18	11.84	16.01				1.34			16.44	0.38	0.67	17.47	0.46	0.46	0.48	0.07	51	0.43	0.43	0.45	30.69	29.49	34.00	
Dec-22	11.93	11.62	12.83	12.31	11.97	16.18				1.36			15.29	0.38	0.68	16.33	0.42	0.42	0.44	0.06	51	0.40	0.39	0.41	29.83	28.42	32.99	
Jan-23	11.78	11.47	12.67	12.16	11.82	15.98				1.34			13.08	0.38	0.67	14.11	0.44	0.43	0.46	0.07	51	0.41	0.41	0.43	27.28	26.06	30.58	
Feb-23	11.80	11.50	12.69	12.18	11.84	16.01				1.35			12.13	0.38	0.67	13.16	0.48	0.48	0.48	0.08	51	0.43	0.43	0.45	28.38	25.18	29.70	
Mar-23	11.82	11.61	12.83	12.31	11.97	16.20				1.37			15.29	0.37	0.68	16.34	0.48	0.48	0.50	0.08	51	0.45	0.45	0.47	29.72	28.50	33.09	
Apr-23	11.75	11.45	12.65	12.13	11.79	15.97				1.35			10.32	0.38	0.67	11.36	0.49	0.49	0.51	0.09	51	0.46	0.45	0.47	24.56	23.36	27.89	
May-23	11.78	11.47	12.68	12.17	11.82	15.98				1.35			13.78	0.38	0.68	14.81	0.47	0.48	0.49	0.08	51	0.44	0.44	0.45	28.02	26.82	31.31	
Jun-23	11.58	11.28	12.46	11.98	11.62	15.89				1.33			11.23	0.38	0.68	12.25	0.48	0.45	0.47	0.08	51	0.43	0.43	0.44	25.23	24.03	28.46	
Jul-23	12.10	11.79	13.02	12.48	12.14	16.17				1.32			8.28	0.35	0.65	10.31	0.49	0.47	0.49	0.08	51	0.45	0.44	0.46	23.97	22.63	26.62	
Aug-23	12.34	12.02	13.29	12.75	12.35	15.48				1.35			8.83	0.38	0.67	9.88	0.48	0.48	0.50	0.08	51	0.48	0.45	0.48	23.70	22.43	25.90	
Sep-23	12.39	12.08	13.34	12.79	12.43	15.54				1.35			7.52	0.38	0.68	8.56	0.52	0.51	0.53	0.09	51	0.49	0.48	0.50	22.48	21.21	24.69	
Oct-23	12.55	12.23	13.52	12.97	12.60	15.75				1.37			10.53	0.37	0.69	11.59	0.48	0.48	0.50	0.08	51	0.48	0.45	0.48	25.68	24.36	27.89	
Nov-23	12.55	12.22	13.51	12.98	12.59	15.74				1.37			12.40	0.37	0.69	13.55	0.44	0.43	0.45	0.07	51	0.41	0.40	0.42	27.54	26.25	29.78	
Dec-23	12.29	11.97	13.23	12.70	12.34	15.47				1.34			11.33	0.38	0.67	12.37	0.43	0.42	0.44	0.07	51	0.40	0.40	0.41	28.08	24.82	28.32	
Average																												
2021	10.03	9.76	10.82	10.38	10.06	14.80				1.25			4.90	0.34	0.63	5.87	0.37	0.37	0.39	0.07	51	0.35	0.35	0.37	17.11	16.06	20.90	
2022	11.08	10.77	11.93	11.43	11.10	15.22				1.30			10.38	0.35	0.65	11.36	0.53	0.52	0.54	0.09	51	0.49	0.49	0.51	23.99	22.74	27.19	
2023	12.07	11.75	12.99	12.46	12.11	15.75				1.36			11.32	0.38	0.67	12.36	0.47	0.46	0.48	0.08	51	0.44	0.44	0.45	25.88	24.64	28.63	

Note:  
(1) Began using Vancouver to USWC % WS effective May 2023

Table 2.16 - 11 Heavy Crude Oil Transportation Cost via Keystone to Anacortes (Puget Sound)  
(Canadian Dollars per Barrel, Unless Noted)

Canadian Exchange Rate C\$/US\$	Pipeline											Altramex Freight				Physical Loss & Insurance			Working Capital			Edmonton to Anacortes - Heavy															
	Edmonton to Hardisty Heavy EC\$/B	Edmonton to Hardisty Heavy EC\$/B	Hardisty to Hardisty Heavy "A" EC\$/B	Hardisty to Hardisty Heavy "A" EC\$/B	Hardisty to Hardisty Heavy "A" EC\$/B	Hardisty to Hardisty Heavy "A" EC\$/B	Hardisty to Hardisty Heavy "A" EC\$/B	Hardisty to Hardisty Heavy "B" EC\$/B	Hardisty to Hardisty Heavy "B" EC\$/B	Hardisty to Hardisty Heavy "B" EC\$/B	Hardisty to Hardisty Heavy "B" EC\$/B	Edmonton to Hardisty Heavy "B" EC\$/B	Edmonton to Hardisty Heavy "B" EC\$/B	Houston to Chiquiqui Grande (Panama) EC\$/B	Houston to Chiquiqui Grande (Panama) EC\$/B	Trans-Panama Pipeline Fee EC\$/B	Charco Azul (Panama) to Anacortes EC\$/B	Charco Azul (Panama) to Anacortes EC\$/B	Worldscale Indonesia Japan 80 %	Total Freight EC\$/B	Houston Mic. Fee EC\$/B	Houston Terminal Storage Fee EC\$/B	Houston to Anacortes Cost EC\$/B	Heavy "A" \$/B	Heavy "B" \$/B	LT Spot \$/B	Pipeline Loss Allowance \$/B	Total Transit Time Days	Heavy "A" Workin Capital \$/B	Heavy "B" Workin Capital \$/B	LT Spot Workin Capital \$/B	Heavy "A" Transort Cost \$/B	Heavy "B" Transort Cost \$/B	LT Spot Transort Cost \$/B			
Jan-21	1.27	5.94	0.94	16.53	2.83	66.31	13.41	16.90	15.06	2.30	41.90	8.48	11.81	11.13	12.08																						
Feb-21	1.27	5.94	0.94	16.53	2.83	66.31	13.39	16.96	15.06	2.30	41.90	8.46	11.80	14.80	15.55																						
Mar-21	1.26	5.94	0.94	16.53	2.83	66.31	13.28	16.83	15.06	2.30	41.90	8.38	11.71	12.57	13.52																						
Apr-21	1.25	5.94	0.94	16.53	2.83	66.31	13.17	16.75	15.06	2.30	41.90	8.32	11.68	12.50	13.44																						
May-21	1.21	5.94	0.94	16.53	2.83	66.31	12.78	16.36	15.06	2.30	41.90	8.08	11.42	12.13	13.07																						
Jun-21	1.22	5.94	0.94	16.53	2.83	66.31	12.88	16.45	15.06	2.30	41.90	8.14	11.48	12.22	13.16																						
Jul-21	1.25	5.94	0.94	16.53	2.83	66.31	13.21	16.79	15.06	2.30	41.90	8.35	11.88	10.85	11.59																						
Aug-21	1.28	5.94	0.94	16.53	2.83	66.31	13.29	16.86	15.06	2.30	41.90	8.39	11.73	10.71	11.66																						
Sep-21	1.27	5.94	0.94	16.53	2.83	66.31	13.36	16.93	15.06	2.30	41.90	8.44	11.78	10.77	11.71																						
Oct-21	1.24	5.94	0.94	16.53	2.83	66.31	13.11	16.86	15.06	2.30	41.90	8.28	11.82	10.57	11.52																						
Nov-21	1.26	5.94	0.94	16.53	2.83	66.31	13.25	16.92	15.06	2.30	41.90	8.37	11.71	10.68	11.63																						
Dec-21	1.28	5.94	0.94	16.53	2.83	66.31	13.49	17.06	15.06	2.30	41.90	8.52	11.88	10.87	11.82																						
Jan-22	1.26	5.94	0.94	16.53	2.83	71.30	14.30	17.87	15.06	2.30	42.31	8.49	11.82	10.72	11.87																						
Feb-22	1.27	5.94	0.94	16.53	2.83	71.30	14.41	17.90	15.06	2.30	42.31	8.55	11.89	10.81	11.75																						
Mar-22	1.27	5.94	0.94	16.53	2.83	71.30	14.35	17.92	15.06	2.30	42.31	8.51	11.85	10.78	11.70																						
Apr-22	1.26	5.94	0.94	16.53	2.83	71.30	14.32	17.89	15.06	2.30	42.31	8.49	11.83	10.73	11.68																						
May-22	1.29	5.94	0.94	16.53	2.83	71.30	14.57	18.14	15.06	2.30	42.31	8.64	11.98	10.62	11.87																						
Jun-22	1.28	5.94	0.94	16.53	2.83	71.30	14.53	18.10	15.06	2.30	42.31	8.62	11.96	10.69	11.84																						
Jul-22	1.29	5.94	0.94	16.53	2.83	71.30	14.67	18.24	15.06	2.30	42.31	8.71	12.04	11.00	11.95																						
Aug-22	1.29	5.94	0.94	16.53	2.83	71.30	14.65	18.22	15.06	2.30	42.31	8.69	12.03	10.96	11.93																						
Sep-22	1.33	6.91	1.05	16.53	2.83	71.30	15.10	18.78	15.06	2.30	42.31	8.96	12.40	11.52	12.37																						
Oct-22	1.37	6.93	1.05	16.53	2.83	71.30	15.53	19.21	15.06	2.30	42.31	9.22	12.86	11.85	12.70																						
Nov-22	1.34	6.83	1.05	16.53	2.83	71.30	15.25	18.93	15.06	2.30	42.31	9.05	12.50	11.43	12.49																						
Dec-22	1.36	6.93	1.05	16.53	2.83	71.30	15.41	19.06	15.06	2.30	42.31	9.14	12.59	11.55	12.61																						
Jan-23	1.34	6.83	1.05	16.53	2.83	71.78	15.32	19.00	15.06	2.30	42.79	9.13	12.58	11.61	12.68																						
Feb-23	1.35	6.86	1.06	16.53	2.83	71.78	15.35	19.04	15.06	2.30	42.79	9.15	12.60	11.63	12.69																						
Mar-23	1.37	6.92	1.05	16.53	2.83	71.78	15.61	19.29	15.06	2.30	42.79	9.31	12.75	11.83	12.80																						
Apr-23	1.35	6.82	1.05	16.53	2.83	71.78	15.39	19.07	15.06	2.30	42.79	9.17	12.62	11.68	12.72																						
May-23	1.35	6.82	1.05	16.53	2.83	71.78	15.43	19.11	15.06	2.30	42.79	9.20	12.64	11.69	12.75																						
Jun-23	1.33	6.92	1.05	16.53	2.83	71.78	15.36	19.05	15.06	2.30	42.79	9.04	12.676	11.49	12.65																						
Jul-23	1.32	3.90	0.83	16.53	2.83	79.39	16.68	19.94	15.06	2.30	42.79	8.99	12.62	11.43	12.66																						
Aug-23	1.35	3.90	0.83	16.53	2.83	79.39	17.02	20.26	15.06	2.30	42.79	9.17	12.20	11.99	12.30																						
Sep-23	1.35	3.90	0.83	16.53	2.83	79.39	17.08	20.35	15.06	2.30	42.79	9.21	12.23	11.71	12.34																						
Oct-23	1.37	3.90	0.83	16.53	2.83	79.39	17.31	20.58	15.06	2.30	42.79	9.33	12.36	11.87	12.50																						
Nov-23	1.37	3.90	0.83	16.53	2.83	79.39	17.30	20.57	15.06	2.30	42.79	9.33	12.35	11.88	12.49																						
Dec-23	1.34	4.01	0.84	16.53	2.83	79.39	16.95	20.22	15.06	2.30	42.79	9.14	12.17	11.62	12.26																						
Average																																					
2021	1.25	5.94	0.94	16.53	2.83	66.31	13.22	16.79	15.06	2.30	41.90	8.35	11.80	11.62	12.58																						
2022	1.30	6.17	0.98	16.53	2.83	71.30	14.78	18.37	15.06	2.30	42.31	8.76	12.13	11.08	12.05																						
2023	1.35	5.51	0.84	16.53	2.83	75.59	16.22	19.60	15.06	2.30	42.79	9.18	12.42	11.67	12.52																						

Note:  
(1) Began using Vancouver to USWGC NWS effective May 2023

Table 2.15-12 Heavy Crude Oil Transportation Cost via Enbridge to California (Long Beach)  
(Canadian Dollars per Barrel, Unless Noted)

	Pipeline Toll Case						Aframax Freight					Physical Loss & Insurance			Working Capital			Edmonton to Long Beach - Heavy										
	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Houston to Chirique	Houston to Chirique	Trans-Panama	Charco Azul	Charco Azul	Worldscale	Total	Houston	Houston	Houston	Max LJT	Min LJT	LJT	Pipeline	Total	Max LJT	Min LJT	LJT	Max LJT	Min LJT	LJT	
	LJT 1st	LJT 1st	LJT 2nd	LJT 2nd	LJT 2nd	LJT 2nd	Grande	Grande	Pipeline	(Panama)	(Panama)	Indonesia	Aframax	Misc.	Terminal	to	Contract	Contract	Spot	Loss	Transit	Working	Working	Working	Transport	Transport	Transport	
15 yr	15 yr	15 yr	15 yr	20 yr	LJT	(Panama)	(Panama)	Fees	to	to	Japan <sup>(1)</sup>	Freight	Fees	Storage Fee	Long Beach	Max LJT	Min LJT	LJT	Allowance	Time	Capital	Capital	Capital	Cost	Cost	Cost		
Heavy	Heavy	Heavy	Heavy	Heavy	Heavy	(\$/AMT)	Miles	Worldscale	Long Beach	Long Beach	80	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	Days	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	\$/Barrel	
Jan-21	10.18	9.90	10.98	10.52	10.22	14.82			1.27				3.51	0.34	0.64	4.48	0.29	0.28	0.30	0.05	47	0.25	0.24	0.26	16.06	14.98	19.91	
Feb-21	10.16	9.89	10.95	10.50	10.20	14.79			1.27				3.84	0.34	0.63	4.82	0.34	0.33	0.35	0.06	47	0.29	0.29	0.31	16.47	15.40	20.32	
Mar-21	10.06	9.79	10.85	10.40	10.09	14.64			1.26				4.83	0.34	0.63	5.79	0.36	0.36	0.38	0.06	47	0.31	0.31	0.33	17.39	16.33	21.20	
Apr-21	10.00	9.73	10.78	10.33	10.03	14.55			1.25				3.95	0.33	0.62	4.91	0.35	0.34	0.37	0.06	47	0.30	0.30	0.32	16.42	15.36	20.20	
May-21	9.70	9.44	10.46	10.03	9.73	14.12			1.21				4.09	0.32	0.61	5.02	0.35	0.34	0.36	0.06	47	0.30	0.30	0.31	16.20	15.18	19.88	
Jun-21	9.77	9.51	10.54	10.10	9.81	14.23			1.22				3.72	0.33	0.61	4.66	0.38	0.37	0.39	0.07	47	0.32	0.32	0.34	15.98	14.95	19.68	
Jul-21	10.02	9.75	10.81	10.36	10.06	14.59			1.25				3.81	0.34	0.63	4.77	0.39	0.39	0.41	0.07	47	0.34	0.33	0.35	16.39	15.33	20.19	
Aug-21	10.08	9.81	10.87	10.42	10.12	14.68			1.26				4.19	0.34	0.63	5.16	0.37	0.37	0.39	0.07	47	0.32	0.32	0.34	16.81	15.75	20.63	
Sep-21	10.14	9.86	10.93	10.48	10.17	14.75			1.27				4.35	0.34	0.63	5.33	0.41	0.40	0.42	0.07	47	0.35	0.35	0.37	17.11	16.03	20.95	
Oct-21	9.95	9.68	10.73	10.28	9.98	14.48			1.24				4.82	0.33	0.62	5.78	0.44	0.43	0.45	0.08	47	0.38	0.37	0.39	17.42	16.37	21.19	
Nov-21	10.05	9.79	10.84	10.39	10.09	14.64			1.26				4.86	0.34	0.63	5.82	0.40	0.39	0.42	0.07	47	0.34	0.34	0.36	17.50	16.43	21.31	
Dec-21	10.23	9.96	11.04	10.58	10.27	14.90			1.28				4.94	0.34	0.64	5.92	0.39	0.38	0.40	0.07	47	0.33	0.33	0.35	17.76	16.68	21.64	
Jan-22	10.65	10.36	11.49	11.01	10.69	14.69			1.26				4.59	0.34	0.63	5.56	0.46	0.46	0.48	0.09	47	0.40	0.40	0.41	18.01	16.88	21.23	
Feb-22	10.73	10.44	11.58	11.09	10.77	14.81			1.27				5.14	0.34	0.64	6.12	0.51	0.50	0.52	0.10	47	0.44	0.44	0.45	18.75	17.61	22.00	
Mar-22	10.68	10.40	11.52	11.04	10.72	14.74			1.27				6.51	0.34	0.63	7.48	0.60	0.60	0.62	0.12	47	0.52	0.52	0.53	20.26	19.13	23.49	
Apr-22	10.66	10.37	11.50	11.02	10.70	14.70			1.26				7.84	0.34	0.63	8.81	0.58	0.58	0.60	0.11	47	0.50	0.50	0.52	21.52	20.39	24.74	
May-22	10.85	10.56	11.70	11.21	10.89	14.97			1.29				7.24	0.34	0.64	8.23	0.61	0.61	0.63	0.12	47	0.53	0.53	0.54	21.20	20.05	24.48	
Jun-22	10.82	10.52	11.67	11.18	10.85	14.92			1.28				7.44	0.34	0.64	8.42	0.62	0.61	0.63	0.12	47	0.53	0.53	0.55	21.37	20.22	24.64	
Jul-22	10.92	10.63	11.78	11.29	10.96	15.07			1.29				8.81	0.35	0.65	9.80	0.52	0.52	0.54	0.10	47	0.45	0.45	0.47	22.67	21.51	25.97	
Aug-22	10.91	10.61	11.76	11.27	10.95	15.05			1.29				10.45	0.35	0.65	11.44	0.51	0.51	0.53	0.09	47	0.44	0.44	0.45	24.26	23.10	27.56	
Sep-22	11.24	10.94	12.13	11.62	11.28	15.51			1.33				9.94	0.36	0.67	10.96	0.47	0.47	0.49	0.08	47	0.41	0.40	0.42	24.06	22.87	27.46	
Oct-22	11.56	11.25	12.47	11.95	11.61	15.95			1.37				10.41	0.37	0.69	11.46	0.46	0.45	0.48	0.08	47	0.40	0.39	0.41	24.89	23.66	28.38	
Nov-22	11.80	11.50	12.69	12.18	11.84	16.01			1.34				14.15	0.36	0.67	15.18	0.45	0.45	0.47	0.07	47	0.39	0.39	0.40	28.80	27.60	32.13	
Dec-22	11.93	11.62	12.83	12.31	11.97	16.18			1.36				12.49	0.36	0.68	13.53	0.41	0.40	0.42	0.06	47	0.35	0.35	0.37	27.20	25.98	30.57	
Jan-23	11.78	11.47	12.67	12.16	11.82	15.98			1.34				10.25	0.36	0.67	11.28	0.43	0.42	0.44	0.07	47	0.37	0.36	0.38	24.83	23.63	28.15	
Feb-23	11.80	11.50	12.69	12.18	11.84	16.01			1.35				9.97	0.36	0.67	11.00	0.45	0.45	0.47	0.08	47	0.39	0.39	0.40	24.63	23.43	27.96	
Mar-23	11.92	11.61	12.83	12.31	11.97	16.20			1.37				13.14	0.37	0.68	14.19	0.47	0.47	0.49	0.08	47	0.41	0.40	0.42	28.00	26.77	31.39	
Apr-23	11.75	11.45	12.65	12.13	11.79	15.97			1.35				8.26	0.36	0.67	9.30	0.48	0.48	0.50	0.09	47	0.42	0.41	0.43	22.94	21.73	26.28	
May-23	11.78	11.47	12.68	12.17	11.82	15.96			1.35				11.62	0.36	0.68	12.66	0.46	0.46	0.48	0.08	47	0.40	0.39	0.41	26.28	25.07	29.58	
Jun-23	11.58	11.28	12.46	11.96	11.62	15.69			1.33				9.20	0.36	0.66	10.22	0.45	0.45	0.47	0.08	47	0.39	0.38	0.40	23.61	22.42	26.85	
Jul-23	12.10	11.78	13.02	12.49	12.14	15.17			1.32				7.65	0.35	0.66	8.67	0.47	0.47	0.48	0.08	47	0.41	0.40	0.42	22.66	21.41	24.82	
Aug-23	12.34	12.02	13.29	12.75	12.39	15.48			1.35				7.22	0.36	0.67	8.25	0.48	0.47	0.49	0.08	47	0.41	0.41	0.42	22.52	21.25	24.73	
Sep-23	12.39	12.06	13.34	12.79	12.43	15.54			1.35				6.15	0.36	0.68	7.19	0.51	0.51	0.52	0.09	47	0.44	0.44	0.45	21.58	20.31	23.80	
Oct-23	12.55	12.23	13.52	12.97	12.60	15.75			1.37				8.96	0.37	0.69	10.01	0.48	0.47	0.49	0.08	47	0.41	0.41	0.42	24.51	23.22	26.76	
Nov-23	12.55	12.22	13.51	12.96	12.59	15.74			1.37				10.48	0.37	0.69	11.53	0.43	0.42	0.44	0.07	47	0.37	0.36	0.38	25.92	24.62	28.16	
Dec-23	12.29	11.97	13.23	12.70	12.34	15.47			1.34				9.06	0.36	0.67	10.10	0.42	0.41	0.43	0.07	47	0.36	0.36	0.37	24.19	22.92	26.44	
<b>Average</b>																												
2021	10.03	9.76	10.82	10.36	10.06	14.60			1.25				4.24	0.34	0.63	5.20	0.37	0.37	0.39	0.07	47	0.32	0.32	0.33	16.79	15.73	20.59	
2022	11.06	10.77	11.93	11.43	11.10	15.22			1.30				8.75	0.35	0.65	9.75	0.52	0.51	0.53	0.09	47	0.45	0.44	0.46	22.75	21.58	26.05	
2023	12.07	11.75	12.99	12.46	12.11	15.75			1.35				9.33	0.36	0.67	10.37	0.46	0.46	0.47	0.08	47	0.40	0.39	0.41	24.31	23.07	27.08	

Note:  
(1) Began using Vancouver to USWC %WS effective May 2023



Table 2.15-14 Heavy Crude Oil Transportation Cost via Enbridge to China (Tsingtao)  
(Canadian Dollars per Barrel, Unless Noted)

	Pipeline Toll Case						VLCC Freight						Physical Loss & Insurance				Working Capital			Edmonton to Tsingtao - Heavy						
	Edmonton to Houston LJT 1st 15 yr Heavy \$CA/B	Edmonton to Houston LJT 1st 15 yr Heavy \$CA/B	Edmonton to Houston LJT 2nd 15 yr Heavy \$CA/B	Edmonton to Houston LJT 2nd 15 yr Heavy \$CA/B	Edmonton to Houston LJT 2nd 20 yr Heavy \$CA/B	Edmonton to Houston Uncomm LJT Heavy \$CA/B	USGC Aframax Reverse Lightering Lump Sum \$CA	Tanker GC to China (STS) 270k lump sum \$CA	VLCC Freight \$CA/B	Lightering (100%) \$CA/B	Houston to Tsingtao Miles	Houston Demurrage (Ten Days) \$CA/B	Houston Misc. Fees \$CA/B	Houston Terminal Storage Fee \$CA/B	Houston to Tsingtao Cost \$CA/B	Max LJT Contract \$CA/B	Min LJT Contract \$CA/B	LJT Spot \$CA/B	Pipeline Loss Allowance \$CA/B	Total Transit Time Days	Max LJT Contract Working Capital \$CA/B	Min LJT Contract Working Capital \$CA/B	LJT Spot Working Capital \$CA/B	Max LJT Contract Transport Cost \$CA/B	Min LJT Contract Transport Cost \$CA/B	LJT Spot Transport Cost \$CA/B
	Jan-21	10.18	9.90	10.98	10.52	10.22	14.82						0.34	0.64	4.77	0.29	0.28	0.30	0.02	75	0.39	0.39	0.42	16.16	15.09	20.00
Feb-21	10.16	9.89	10.85	10.50	10.20	14.79						0.34	0.63	4.66	0.33	0.33	0.35	0.03	75	0.46	0.45	0.48	16.09	15.03	19.93	
Mar-21	10.06	9.79	10.85	10.40	10.09	14.64						0.34	0.63	4.77	0.36	0.35	0.37	0.03	75	0.49	0.48	0.51	16.13	15.07	19.92	
Apr-21	10.00	9.73	10.78	10.33	10.03	14.55						0.33	0.62	4.62	0.35	0.34	0.36	0.03	75	0.48	0.47	0.50	15.90	14.85	19.67	
May-21	9.70	9.44	10.46	10.03	9.73	14.12						0.32	0.61	4.46	0.34	0.34	0.36	0.03	75	0.47	0.47	0.49	15.42	14.40	19.08	
Jun-21	9.77	9.51	10.54	10.10	9.81	14.23						0.33	0.61	4.30	0.37	0.37	0.39	0.03	75	0.51	0.51	0.54	15.37	14.35	19.06	
Jul-21	10.02	9.75	10.81	10.36	10.06	14.59						0.34	0.63	4.35	0.39	0.38	0.41	0.04	75	0.53	0.53	0.56	15.71	14.66	19.50	
Aug-21	10.08	9.81	10.87	10.42	10.12	14.68						0.34	0.63	4.35	0.37	0.36	0.39	0.03	75	0.51	0.50	0.53	15.76	14.69	19.56	
Sep-21	10.14	9.86	10.93	10.48	10.17	14.75						0.34	0.63	4.78	0.40	0.40	0.42	0.04	75	0.55	0.55	0.58	16.29	15.22	20.11	
Oct-21	9.95	9.68	10.73	10.28	9.98	14.48						0.33	0.62	5.46	0.44	0.43	0.45	0.04	75	0.60	0.59	0.62	16.81	15.76	20.56	
Nov-21	10.05	9.79	10.84	10.39	10.09	14.64						0.34	0.63	5.58	0.40	0.39	0.41	0.04	75	0.54	0.54	0.57	17.00	15.94	20.79	
Dec-21	10.23	9.96	11.04	10.58	10.27	14.90						0.34	0.64	5.24	0.38	0.38	0.40	0.03	75	0.52	0.52	0.55	16.82	15.75	20.68	
Jan-22	10.85	10.36	11.49	11.01	10.69	14.69						0.34	0.63	5.03	0.46	0.46	0.48	0.04	75	0.63	0.63	0.65	17.17	16.05	20.38	
Feb-22	10.73	10.44	11.58	11.09	10.77	14.81						0.34	0.64	5.08	0.50	0.50	0.52	0.05	75	0.69	0.68	0.71	17.37	16.24	20.60	
Mar-22	10.88	10.40	11.52	11.04	10.72	14.74						0.34	0.63	5.97	0.60	0.59	0.61	0.06	75	0.82	0.81	0.84	18.33	17.21	21.55	
Apr-22	10.66	10.37	11.50	11.02	10.70	14.70						0.34	0.63	7.09	0.57	0.57	0.59	0.05	75	0.79	0.78	0.81	19.40	18.27	22.61	
May-22	10.85	10.56	11.70	11.21	10.89	14.97						0.34	0.64	5.85	0.60	0.60	0.62	0.06	75	0.83	0.82	0.85	18.40	17.25	21.66	
Jun-22	10.82	10.52	11.67	11.18	10.85	14.92						0.34	0.64	6.17	0.61	0.60	0.62	0.06	75	0.83	0.82	0.85	18.69	17.55	21.95	
Jul-22	10.92	10.63	11.78	11.29	10.96	15.07						0.35	0.65	7.54	0.51	0.51	0.53	0.05	75	0.71	0.70	0.73	20.05	18.89	23.33	
Aug-22	10.91	10.61	11.76	11.27	10.95	15.05						0.35	0.65	8.44	0.50	0.49	0.51	0.05	75	0.68	0.67	0.70	20.90	19.75	24.19	
Sep-22	11.24	10.94	12.13	11.62	11.28	15.51						0.36	0.67	9.70	0.46	0.46	0.48	0.04	75	0.64	0.63	0.66	22.49	21.30	25.87	
Oct-22	11.56	11.25	12.47	11.95	11.61	15.95						0.37	0.69	11.14	0.46	0.45	0.47	0.04	75	0.63	0.62	0.65	24.26	23.04	27.74	
Nov-22	11.80	11.50	12.69	12.18	11.84	16.01						0.36	0.67	13.46	0.44	0.44	0.46	0.04	75	0.61	0.60	0.63	26.78	25.58	30.09	
Dec-22	11.93	11.62	12.83	12.31	11.97	16.18						0.36	0.68	10.42	0.39	0.39	0.41	0.03	75	0.54	0.53	0.56	23.81	22.60	27.16	
Jan-23	11.78	11.47	12.67	12.16	11.82	15.98						0.36	0.67	8.80	0.41	0.41	0.43	0.04	75	0.57	0.56	0.59	21.86	20.66	25.17	
Feb-23	11.80	11.50	12.69	12.18	11.84	16.01						0.36	0.67	9.23	0.44	0.44	0.46	0.04	75	0.61	0.60	0.63	22.56	21.36	25.87	
Mar-23	11.92	11.61	12.83	12.31	11.97	16.20						0.37	0.68	11.79	0.46	0.45	0.48	0.04	75	0.63	0.63	0.66	25.27	24.05	28.64	
Apr-23	11.75	11.45	12.65	12.13	11.79	15.97						0.36	0.67	9.51	0.48	0.47	0.50	0.04	75	0.60	0.59	0.62	22.84	21.63	26.16	
May-23	11.78	11.47	12.68	12.17	11.82	15.96						0.36	0.68	8.55	0.44	0.43	0.46	0.04	75	0.61	0.60	0.63	21.86	20.65	25.14	
Jun-23	11.58	11.28	12.46	11.96	11.62	15.69						0.36	0.66	8.97	0.44	0.44	0.46	0.04	75	0.61	0.60	0.63	22.06	20.88	25.28	
Jul-23	12.10	11.79	13.02	12.49	12.14	15.17						0.35	0.66	8.14	0.47	0.46	0.48	0.04	75	0.64	0.64	0.66	21.82	20.58	23.98	
Aug-23	12.34	12.02	13.29	12.75	12.39	15.48						0.36	0.67	8.37	0.48	0.47	0.49	0.04	75	0.66	0.65	0.67	22.33	21.06	24.53	
Sep-23	12.39	12.06	13.34	12.79	12.43	15.54						0.36	0.68	7.79	0.51	0.51	0.52	0.05	75	0.71	0.70	0.72	21.85	20.57	24.05	
Oct-23	12.55	12.23	13.52	12.97	12.60	15.75						0.37	0.69	9.72	0.48	0.47	0.49	0.04	75	0.65	0.65	0.67	23.90	22.61	26.14	
Nov-23	12.55	12.22	13.51	12.96	12.59	15.74						0.37	0.69	10.67	0.42	0.41	0.43	0.03	75	0.58	0.57	0.59	24.77	23.48	27.00	
Dec-23	12.29	11.97	13.23	12.70	12.34	15.47						0.36	0.67	8.93	0.41	0.41	0.42	0.03	75	0.57	0.56	0.58	22.75	21.48	24.98	
Average																										
2021	10.03	9.76	10.82	10.36	10.06	14.60						0.34	0.63	4.78	0.37	0.36	0.38	0.03	75	0.5	0.5	0.53	16.12	15.07	19.91	
2022	11.06	10.77	11.93	11.43	11.10	15.22						0.36	0.65	7.99	0.51	0.50	0.52	0.05	75	0.7	0.7	0.72	20.64	19.48	23.93	
2023	12.07	11.75	12.99	12.46	12.11	15.75						0.36	0.67	9.19	0.45	0.45	0.47	0.04	75	0.6	0.6	0.64	22.82	21.59	25.58	





**Table 2.15 - 16 Heavy Crude Oil Transportation Cost via Alternative Transportation Options**  
(U.S. Dollars per Barrel, Unless Noted)

	Puget Sound						California						China					
	Enbridge			Keystone			Enbridge			Keystone			Enbridge			Keystone		
	Max IJT	Min IJT	IJT	Heavy "A"	Heavy "B"	IJT	Max IJT	Min IJT	IJT	Heavy "A"	Heavy "B"	IJT	Max IJT	Min IJT	IJT	Heavy "A"	Heavy "B"	IJT
	Contract	Contract	Spot	Transport	Transport	Transport	Contract	Contract	Spot	Transport	Transport	Transport	Contract	Contract	Spot	Transport	Transport	Transport
Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost
\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	12.77	11.93	15.79	17.73	13.65	13.86	12.62	11.77	15.65	17.36	13.27	13.48	12.70	11.86	15.72	17.68	13.60	13.80
Feb-21	13.12	12.28	16.14	18.14	14.06	17.02	12.97	12.13	16.00	17.72	13.64	16.61	12.67	11.83	15.69	17.72	13.63	16.60
Mar-21	14.11	13.27	17.13	19.18	15.09	16.53	13.83	12.98	16.86	18.60	14.52	15.96	12.82	11.98	15.84	17.91	13.82	15.26
Apr-21	13.38	12.54	16.40	18.46	14.37	15.80	13.14	12.29	16.17	17.93	13.84	15.27	12.72	11.88	15.74	17.82	13.73	15.16
May-21	13.62	12.78	16.64	18.79	14.70	16.07	13.36	12.51	16.39	18.24	14.15	15.52	12.71	11.87	15.73	17.90	13.81	15.18
Jun-21	13.30	12.45	16.31	18.46	14.37	15.76	13.08	12.23	16.11	17.93	13.84	15.23	12.58	11.74	15.60	17.77	13.68	15.07
Jul-21	13.30	12.45	16.31	18.39	14.30	14.23	13.08	12.24	16.11	17.86	13.77	13.70	12.54	11.70	15.56	17.66	13.57	13.50
Aug-21	13.68	12.84	16.70	18.75	14.66	14.60	13.34	12.49	16.37	18.10	14.02	13.96	12.50	11.66	15.52	17.58	13.50	13.43
Sep-21	13.75	12.91	16.77	18.82	14.74	14.69	13.50	12.65	16.53	18.25	14.16	14.11	12.86	12.01	15.87	17.95	13.86	13.81
Oct-21	14.28	13.44	17.30	19.44	15.35	15.26	14.01	13.16	17.04	18.81	14.72	14.63	13.51	12.67	16.53	18.69	14.61	14.52
Nov-21	14.27	13.43	17.29	19.36	15.27	15.21	13.92	13.07	16.95	18.69	14.60	14.54	13.52	12.68	16.54	18.63	14.55	14.48
Dec-21	14.23	13.39	17.25	19.26	15.17	15.14	13.88	13.04	16.91	18.60	14.52	14.49	13.15	12.31	16.17	18.19	14.11	14.08
Jan-22	14.57	13.68	17.11	20.02	15.20	15.08	14.28	13.38	16.83	19.36	14.54	14.41	13.61	12.72	16.15	19.09	14.27	14.14
Feb-22	15.00	14.10	17.54	20.45	15.64	15.53	14.75	13.85	17.30	19.80	14.99	14.88	13.66	12.77	16.20	19.15	14.33	14.22
Mar-22	16.47	15.58	19.01	22.02	17.20	17.08	16.01	15.11	18.56	21.07	16.26	16.14	14.48	13.59	17.02	20.07	15.25	15.13
Apr-22	17.67	16.78	20.21	23.21	18.40	18.27	17.04	16.14	19.59	22.11	17.30	17.17	15.36	14.47	17.90	20.93	16.11	15.99
May-22	17.22	16.32	19.76	22.72	17.91	17.82	16.50	15.60	19.05	21.52	16.71	16.62	14.32	13.42	16.86	19.85	15.04	14.95
Jun-22	17.40	16.51	19.94	22.92	18.11	18.01	16.68	15.78	19.23	21.71	16.90	16.80	14.59	13.70	17.13	20.14	15.32	15.23
Jul-22	18.38	17.49	20.92	23.79	18.98	18.90	17.52	16.62	20.07	22.52	17.71	17.63	15.49	14.60	18.03	20.92	16.11	16.04
Aug-22	19.92	19.03	22.46	25.33	20.52	20.44	18.77	17.88	21.32	23.78	18.97	18.89	16.18	15.29	18.72	21.60	16.79	16.71
Sep-22	19.25	18.36	21.79	24.62	19.82	19.79	18.06	17.17	20.62	23.07	18.27	18.24	16.89	15.99	19.43	22.27	17.46	17.44
Oct-22	19.21	18.32	21.75	24.48	19.68	19.70	18.17	17.27	20.72	23.10	18.30	18.32	17.71	16.82	20.25	23.00	18.20	18.22
Nov-22	22.82	21.92	25.28	27.81	23.00	22.99	21.41	20.52	23.89	26.06	21.26	21.25	19.91	19.02	22.38	24.91	20.10	20.10
Dec-22	21.80	20.91	24.27	26.73	21.93	21.94	20.01	19.12	22.49	24.63	19.83	19.84	17.52	16.63	19.99	22.45	17.64	17.66
Jan-23	20.32	19.43	22.79	25.38	20.57	20.64	18.50	17.60	20.98	23.23	18.42	18.49	16.29	15.40	18.75	21.35	16.54	16.61
Feb-23	19.61	18.72	22.08	24.68	19.88	19.95	18.31	17.42	20.79	23.04	18.23	18.30	16.77	15.88	19.24	21.85	17.05	17.11
Mar-23	21.72	20.83	24.19	26.81	22.01	22.11	20.46	19.57	22.94	25.20	20.40	20.50	18.47	17.58	20.93	23.57	18.76	18.86
Apr-23	18.22	17.32	20.68	23.35	18.55	18.62	17.01	16.12	19.49	21.79	16.98	17.06	16.93	16.04	19.40	22.09	17.29	17.36
May-23	20.73	19.84	23.16	25.84	21.04	21.12	19.44	18.55	21.88	24.21	19.41	19.48	16.17	15.28	18.60	21.29	16.48	16.56
Jun-23	18.99	18.10	21.42	24.15	19.34	19.39	17.77	16.88	20.21	22.59	17.78	17.83	16.60	15.71	19.03	21.78	16.97	17.02
Jul-23	18.06	17.12	19.69	23.68	17.66	17.69	17.15	16.20	18.78	22.40	16.38	16.41	16.51	15.57	18.14	22.15	16.13	16.16
Aug-23	17.58	16.64	19.21	23.14	17.12	17.19	16.70	15.76	18.34	21.91	15.89	15.96	16.56	15.62	18.19	22.14	16.12	16.20
Sep-23	16.61	15.67	18.24	22.19	16.17	16.25	15.95	15.00	17.58	21.14	15.12	15.20	16.14	15.20	17.77	21.75	15.73	15.81
Oct-23	18.70	17.76	20.33	24.21	18.20	18.30	17.87	16.93	19.51	23.03	17.01	17.12	17.42	16.48	19.05	22.96	16.94	17.04
Nov-23	20.09	19.15	21.72	25.57	19.55	19.66	18.90	17.96	20.54	24.07	18.05	18.15	18.07	17.13	19.70	23.56	17.54	17.64
Dec-23	19.42	18.48	21.08	24.95	18.93	19.00	18.01	17.06	19.68	23.22	17.20	17.27	16.93	15.99	18.60	22.48	16.46	16.52
<b>Average</b>																		
2021	13.65	12.81	16.67	18.73	14.64	15.35	13.39	12.55	16.43	18.17	14.09	14.79	12.86	12.02	15.88	17.96	13.87	14.57
2022	18.31	17.42	20.84	23.68	18.87	18.80	17.43	16.54	19.97	22.40	17.58	17.52	15.81	14.92	18.34	21.20	16.39	16.32
2023	19.17	18.26	21.21	24.50	19.08	19.16	18.01	17.09	20.06	22.98	17.57	17.65	16.91	15.99	18.95	22.25	16.83	16.91

Table 2.16-17 Heavy Crude Oil Transportation Cost via Enbridge to Anacortes (Puget Sound)  
(U.S. Dollars per Barrel, Unless Noted)

	Pipeline Toll Case							Aramco Freight							Physical Loss & Insurance					Working Capital			Edmonton to Anacortes - Heavy						
	Edmonton to Houston LIT 1st		Edmonton to Houston LIT 2nd		Edmonton to Houston LIT 3rd		Edmonton to Houston LIT Uncon	Houston to Chicago Grande (Panama) \$/MT	Houston to Chicago Grande (Panama) \$/Mtu	Worldscale Carb/OC 70 %	Trans-Panama Pipeline Fees \$/B	Cherco Asal (Panama) to Anacortes \$/MT	Cherco Asal (Panama) to Anacortes \$/Mtu	Worldscale Indonesia Japan (1) %	Total Aramco Freight \$/B	Houston Misc. Fees \$/B	Houston Terminal Storage Fee \$/B	Houston to Anacortes Cost \$/B	Max LIT Contract \$/B	Min LIT Contract \$/B	LIT Spot \$/B	Flowline Loss Allowance \$/B	Total Transit Time Days	Max LIT Contract \$/B	Min LIT Contract \$/B	LIT Spot \$/B	Max LIT Contract \$/B	Min LIT Contract \$/B	LIT Spot \$/B
	15 yr Heavy \$/B	15 yr Heavy \$/B	15 yr Heavy \$/B	15 yr Heavy \$/B	20 yr Heavy \$/B	20 yr Heavy \$/B	LIT Heavy \$/B																						
Jan-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.11	0.27	0.50	3.88	0.23	0.22	0.34	0.04	51	0.21	0.21	0.23	12.77	11.93	15.79		
Feb-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.42	0.27	0.50	4.19	0.27	0.26	0.28	0.05	51	0.25	0.25	0.26	13.12	12.28	16.14		
Mar-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			4.38	0.27	0.50	5.15	0.29	0.29	0.30	0.05	51	0.27	0.27	0.28	14.11	13.27	17.13		
Apr-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.86	0.27	0.50	4.43	0.28	0.28	0.30	0.05	51	0.26	0.26	0.28	13.38	12.54	16.40		
May-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.89	0.27	0.50	4.06	0.29	0.28	0.30	0.05	51	0.27	0.27	0.28	13.62	12.78	16.64		
Jun-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.54	0.27	0.50	4.31	0.31	0.31	0.32	0.06	51	0.29	0.29	0.30	13.30	12.45	16.31		
Jul-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.54	0.27	0.50	4.30	0.31	0.31	0.33	0.06	51	0.29	0.29	0.31	13.30	12.45	16.31		
Aug-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.94	0.27	0.50	4.71	0.30	0.30	0.31	0.05	51	0.29	0.29	0.29	13.68	12.84	16.70		
Sep-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.98	0.27	0.50	4.75	0.32	0.32	0.34	0.06	51	0.30	0.30	0.32	13.75	12.91	16.77		
Oct-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			4.48	0.27	0.50	5.25	0.35	0.35	0.37	0.07	51	0.33	0.33	0.35	14.28	13.44	17.30		
Nov-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			4.51	0.27	0.50	5.27	0.32	0.32	0.33	0.06	51	0.30	0.30	0.31	14.27	13.43	17.29		
Dec-21	8.00	7.78	8.03	8.27	8.03	11.04				1.00			4.49	0.27	0.50	5.26	0.30	0.30	0.32	0.05	51	0.29	0.29	0.30	14.23	13.39	17.25		
Jan-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			4.27	0.27	0.50	5.04	0.37	0.37	0.38	0.07	51	0.35	0.34	0.36	14.67	13.88	17.11		
Feb-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			4.86	0.27	0.50	5.43	0.40	0.40	0.41	0.06	51	0.38	0.37	0.39	15.00	14.10	17.54		
Mar-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.04	0.27	0.50	6.81	0.48	0.48	0.49	0.03	51	0.45	0.45	0.46	16.47	15.58	19.01		
Apr-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			7.27	0.27	0.50	8.03	0.47	0.46	0.48	0.00	51	0.44	0.43	0.45	17.67	16.78	20.21		
May-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.79	0.27	0.50	7.98	0.48	0.48	0.49	0.00	51	0.45	0.45	0.46	17.22	16.32	19.79		
Jun-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.97	0.27	0.50	7.74	0.49	0.48	0.50	0.00	51	0.48	0.45	0.47	17.40	16.51	19.94		
Jul-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.04	0.27	0.50	6.80	0.41	0.41	0.42	0.07	51	0.39	0.38	0.40	16.38	15.49	18.82		
Aug-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.59	0.27	0.50	7.38	0.40	0.40	0.41	0.07	51	0.38	0.37	0.39	16.92	16.03	19.46		
Sep-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.97	0.27	0.50	8.74	0.39	0.39	0.37	0.06	51	0.34	0.33	0.35	16.28	15.39	18.79		
Oct-22	8.44	8.21	9.10	8.72	8.47	11.04				1.00			6.95	0.27	0.50	8.71	0.34	0.34	0.35	0.06	51	0.32	0.32	0.33	16.21	15.32	18.72		
Nov-22	8.77	8.55	9.44	9.08	8.81	11.00				1.00			12.22	0.27	0.50	12.99	0.34	0.34	0.35	0.05	51	0.32	0.32	0.33	22.82	21.92	26.28		
Dec-22	8.77	8.55	9.44	9.08	8.81	11.00				1.00			11.25	0.27	0.50	12.02	0.31	0.31	0.32	0.05	51	0.29	0.29	0.30	21.80	20.91	24.27		
Jan-23	8.77	8.55	9.44	9.08	8.81	11.00				1.00			9.74	0.27	0.50	10.51	0.33	0.32	0.34	0.05	51	0.31	0.30	0.32	20.32	19.43	22.79		
Feb-23	8.77	8.55	9.44	9.08	8.81	11.00				1.00			8.02	0.27	0.50	9.79	0.34	0.34	0.38	0.06	51	0.32	0.32	0.33	19.61	18.72	22.08		
Mar-23	8.71	8.49	9.38	9.00	8.75	11.84				1.00			11.18	0.27	0.50	11.95	0.35	0.35	0.36	0.06	51	0.33	0.33	0.34	21.72	20.83	24.19		
Apr-23	8.71	8.49	9.38	9.00	8.75	11.84				1.00			7.65	0.27	0.50	8.42	0.36	0.36	0.38	0.06	51	0.34	0.34	0.35	18.22	17.32	20.68		
May-23	8.71	8.49	9.38	9.00	8.75	11.81				1.00			10.19	0.27	0.50	10.96	0.35	0.34	0.38	0.06	51	0.33	0.32	0.34	20.73	19.84	23.18		
Jun-23	8.71	8.49	9.38	9.00	8.75	11.81				1.00			9.45	0.27	0.50	9.22	0.35	0.34	0.36	0.06	51	0.32	0.32	0.33	19.99	19.10	21.42		
Jul-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00			7.03	0.27	0.50	7.80	0.36	0.36	0.37	0.06	51	0.34	0.34	0.35	18.06	17.12	19.89		
Aug-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00			6.55	0.27	0.50	7.31	0.36	0.36	0.37	0.06	51	0.34	0.33	0.34	17.58	16.64	19.21		
Sep-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00			6.55	0.27	0.50	6.32	0.38	0.38	0.39	0.07	51	0.36	0.36	0.37	16.81	15.87	18.24		
Oct-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00			7.68	0.27	0.50	8.45	0.35	0.35	0.38	0.06	51	0.33	0.33	0.34	18.70	17.76	20.33		
Nov-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00			6.11	0.27	0.50	6.88	0.32	0.31	0.33	0.05	51	0.30	0.29	0.30	20.08	19.15	21.72		
Dec-23	9.15	8.91	9.85	9.45	9.19	11.52				1.00			6.44	0.27	0.50	6.21	0.32	0.31	0.33	0.05	51	0.30	0.29	0.31	19.42	18.48	21.08		
Average																													
2021	8.00	7.78	8.03	8.27	8.03	11.04				1.00			3.91	0.27	0.50	4.68	0.30	0.29	0.31	0.05	51	0.29	0.28	0.29	13.65	12.81	16.67		
2022	8.50	8.27	9.16	8.79	8.53	11.00				1.00			7.92	0.27	0.50	8.69	0.41	0.40	0.42	0.07	51	0.38	0.38	0.39	18.31	17.42	20.84		
2023	8.94	8.71	9.63	9.24	8.98	11.67				1.00			6.38	0.27	0.50	6.15	0.35	0.34	0.36	0.06	51	0.33	0.32	0.34	19.17	18.26	21.21		

Note:  
(1) Began using Vancouver to USWC % WS effective May 2023



Table 2.15-19 Heavy Crude Oil Transportation Cost via Enbridge to California (Long Beach)  
(U.S. Dollars per Barrel, Unless Noted)

	Pipeline Toll Case						Aframax Freight					Physical Loss & Insurance			Working Capital			Edmonton to Long Beach - Heavy											
	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Edmonton to Houston	Houston to Chirique Grande (Panama)	Houston to Chirique Grande (Panama)	Worldscale Carib/GC 70	Trans-Panama Pipeline Fees	Charco Azul (Panama) to Long Beach	Charco Azul (Panama) to Long Beach	Worldscale Indonesia Japan <sup>(1)</sup>	Total Aframax Freight	Houston Misc. Fees	Houston Terminal Storage Fee	Houston to Long Beach Cost	Max LJT Contract	Min LJT Contract	LJT Spot	Pipeline Loss Allowance	Total Transit Days	Max LJT Contract Working Capital	Min LJT Contract Working Capital	LJT Spot Working Capital	Max LJT Contract Transport Cost	Min LJT Contract Transport Cost	LJT Spot Transport Cost	
	15 yr Heavy	15 yr Heavy	15 yr Heavy	15 yr Heavy	20 yr Heavy	20 yr Heavy	\$/MT	Miles	%	\$/B	\$/MT	Miles	%	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				2.76	0.27	0.50	3.52	0.23	0.22	0.24	0.04	47	0.19	0.19	0.21	12.62	11.77	15.65	
Feb-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.03	0.27	0.50	3.79	0.26	0.26	0.28	0.05	47	0.23	0.23	0.24	12.97	12.13	16.00	
Mar-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.84	0.27	0.50	4.61	0.29	0.28	0.30	0.05	47	0.25	0.24	0.26	13.83	12.98	16.86	
Apr-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.16	0.27	0.50	3.93	0.28	0.28	0.29	0.05	47	0.24	0.24	0.25	13.14	12.29	16.17	
May-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.37	0.27	0.50	4.14	0.29	0.28	0.30	0.05	47	0.25	0.24	0.26	13.36	12.51	16.39	
Jun-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.04	0.27	0.50	3.81	0.31	0.30	0.32	0.06	47	0.27	0.26	0.28	13.08	12.23	16.11	
Jul-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.04	0.27	0.50	3.81	0.31	0.31	0.33	0.06	47	0.27	0.27	0.28	13.08	12.24	16.11	
Aug-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.33	0.27	0.50	4.09	0.30	0.29	0.31	0.05	47	0.26	0.25	0.27	13.34	12.49	16.37	
Sep-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.44	0.27	0.50	4.20	0.32	0.32	0.34	0.06	47	0.28	0.27	0.29	13.50	12.65	16.53	
Oct-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.88	0.27	0.50	4.65	0.35	0.35	0.37	0.07	47	0.30	0.30	0.32	14.01	13.16	17.04	
Nov-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.87	0.27	0.50	4.63	0.32	0.31	0.33	0.06	47	0.27	0.27	0.29	13.92	13.07	16.95	
Dec-21	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.86	0.27	0.50	4.63	0.30	0.30	0.32	0.05	47	0.26	0.25	0.27	13.88	13.04	16.91	
Jan-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				3.64	0.27	0.50	4.41	0.37	0.36	0.38	0.07	47	0.32	0.31	0.33	14.28	13.38	16.83	
Feb-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				4.04	0.27	0.50	4.81	0.40	0.40	0.41	0.08	47	0.35	0.34	0.36	14.75	13.85	17.30	
Mar-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				5.14	0.27	0.50	5.91	0.48	0.47	0.49	0.09	47	0.41	0.41	0.42	16.01	15.11	18.56	
Apr-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				6.21	0.27	0.50	6.98	0.46	0.46	0.47	0.09	47	0.40	0.40	0.41	17.04	16.14	19.59	
May-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				5.64	0.27	0.50	6.40	0.48	0.47	0.49	0.09	47	0.41	0.41	0.42	16.50	15.60	19.05	
Jun-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				5.81	0.27	0.50	6.57	0.48	0.48	0.49	0.09	47	0.42	0.41	0.43	16.68	15.78	19.23	
Jul-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				6.81	0.27	0.50	7.57	0.41	0.40	0.42	0.07	47	0.35	0.35	0.36	17.52	16.62	20.07	
Aug-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				8.08	0.27	0.50	8.85	0.40	0.39	0.41	0.07	47	0.34	0.34	0.35	18.77	17.88	21.32	
Sep-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				7.46	0.27	0.50	8.23	0.35	0.35	0.37	0.06	47	0.31	0.30	0.32	18.06	17.17	20.62	
Oct-22	8.44	8.21	9.10	8.72	8.47	11.64				1.00				7.60	0.27	0.50	8.37	0.34	0.33	0.35	0.06	47	0.29	0.29	0.30	18.17	17.27	20.72	
Nov-22	8.77	8.55	9.44	9.06	8.81	11.90				1.00				10.52	0.27	0.50	11.29	0.34	0.33	0.35	0.05	47	0.29	0.29	0.30	21.41	20.52	23.89	
Dec-22	8.77	8.55	9.44	9.06	8.81	11.90				1.00				9.19	0.27	0.50	9.96	0.30	0.30	0.31	0.05	47	0.26	0.26	0.27	20.01	19.12	22.49	
Jan-23	8.77	8.55	9.44	9.06	8.81	11.90				1.00				7.64	0.27	0.50	8.41	0.32	0.31	0.33	0.05	47	0.27	0.27	0.28	18.50	17.60	20.98	
Feb-23	8.77	8.55	9.44	9.06	8.81	11.90				1.00				7.41	0.27	0.50	8.18	0.34	0.33	0.35	0.06	47	0.29	0.29	0.30	18.31	17.42	20.79	
Mar-23	8.71	8.49	9.38	9.00	8.75	11.84				1.00				9.61	0.27	0.50	10.37	0.35	0.34	0.36	0.06	47	0.30	0.30	0.31	20.46	19.57	22.94	
Apr-23	8.71	8.49	9.38	9.00	8.75	11.84				1.00				6.13	0.27	0.50	6.90	0.36	0.35	0.37	0.06	47	0.31	0.30	0.32	17.01	16.12	19.49	
May-23	8.71	8.49	9.38	9.00	8.75	11.81				1.00				8.59	0.27	0.50	9.36	0.34	0.34	0.35	0.06	47	0.29	0.29	0.30	19.44	18.55	21.88	
Jun-23	8.71	8.49	9.38	9.00	8.75	11.81				1.00				6.92	0.27	0.50	7.69	0.34	0.34	0.35	0.06	47	0.29	0.29	0.30	17.77	16.88	20.21	
Jul-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00				5.79	0.27	0.50	6.56	0.36	0.35	0.37	0.06	47	0.31	0.31	0.32	17.15	16.20	18.78	
Aug-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00				5.35	0.27	0.50	6.12	0.36	0.35	0.36	0.06	47	0.31	0.30	0.31	16.70	15.76	18.34	
Sep-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00				4.54	0.27	0.50	5.31	0.38	0.38	0.39	0.07	47	0.33	0.32	0.33	15.95	15.00	17.58	
Oct-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00				6.53	0.27	0.50	7.30	0.35	0.35	0.36	0.06	47	0.30	0.30	0.31	17.87	16.93	19.51	
Nov-23	9.15	8.91	9.85	9.45	9.19	11.48				1.00				7.65	0.27	0.50	8.41	0.31	0.31	0.32	0.05	47	0.27	0.27	0.28	18.90	17.96	20.54	
Dec-23	9.15	8.91	9.85	9.45	9.19	11.52				1.00				6.75	0.27	0.50	7.52	0.31	0.31	0.32	0.05	47	0.27	0.27	0.28	18.01	17.06	19.68	
<b>Average</b>																													
2021	8.00	7.78	8.63	8.27	8.03	11.64				1.00				3.38	0.27	0.50	4.15	0.30	0.29	0.31	0.05	47	0.26	0.25	0.27	13.39	12.55	16.43	
2022	8.50	8.27	9.16	8.78	8.53	11.69				1.00				6.68	0.27	0.50	7.45	0.40	0.40	0.41	0.07	47	0.34	0.34	0.35	17.43	16.54	19.97	
2023	8.94	8.71	9.63	9.24	8.98	11.67				1.00				6.91	0.27	0.50	7.68	0.34	0.34	0.35	0.06	47	0.30	0.29	0.30	18.01	17.09	20.06	

Note:  
(1) Began using Vancouver to USWC %WS effective May 2023



Table 2.15-21 Heavy Crude Oil Transportation Cost via Enbridge to China (Tsingtao)  
(U.S. Dollars per Barrel, Unless Noted)

	Pipeline Toll Case						VLCC Freight					Physical Loss & Insurance				Working Capital			Edmonton to Tsingtao - Heavy								
	Edmonton to Houston LJT 1st	Edmonton to Houston LJT 1st	Edmonton to Houston LJT 2nd	Edmonton to Houston LJT 2nd	Edmonton to Houston LJT 2nd	Edmonton to Houston Uncomm	USGC Aframax Reverse	Tanker USGC to China (STS) 270k lump sum	VLCC Freight	Lightering (100%)	Houston to Tsingtao Miles	Houston Demurrage (Ten Days)	Houston Misc. Fees	Houston Terminal Storage Fee	Houston to Tsingtao Cost	Max LJT Contract	Min LJT Contract	LJT Spot	Pipeline Loss Allowance	Total Transit Time Days	Max LJT Contract Working Capital	Min LJT Contract Working Capital	LJT Spot Working Capital	Max LJT Contract Transport Cost	Min LJT Contract Transport Cost	LJT Spot Transport Cost	
	15 yr Heavy \$/B	15 yr Heavy \$/B	15 yr Heavy \$/B	15 yr Heavy \$/B	20 yr Heavy \$/B	LJT Heavy \$/B	Lightering Lump Sum \$	(\$)	\$/B	\$/B	Miles	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	Days	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	
Jan-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.75	0.23	0.22	0.24	0.02	75	0.31	0.30	0.33	12.70	11.86	15.72
Feb-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.67	0.26	0.26	0.28	0.02	75	0.36	0.36	0.38	12.67	11.83	15.69
Mar-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.79	0.28	0.28	0.30	0.03	75	0.39	0.38	0.41	12.82	11.98	15.84
Apr-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.70	0.28	0.27	0.29	0.02	75	0.38	0.38	0.40	12.72	11.88	15.74
May-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.68	0.28	0.28	0.30	0.03	75	0.39	0.38	0.41	12.71	11.87	15.73
Jun-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.52	0.31	0.30	0.32	0.03	75	0.42	0.41	0.44	12.58	11.74	15.60
Jul-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.47	0.31	0.31	0.32	0.03	75	0.43	0.42	0.44	12.54	11.70	15.56
Aug-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.45	0.29	0.29	0.31	0.03	75	0.40	0.40	0.42	12.50	11.66	15.52
Sep-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.77	0.32	0.31	0.33	0.03	75	0.44	0.43	0.46	12.86	12.01	15.87
Oct-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	4.39	0.35	0.35	0.36	0.03	75	0.48	0.48	0.50	13.51	12.67	16.33
Nov-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	4.44	0.32	0.31	0.33	0.03	75	0.43	0.43	0.45	13.52	12.68	16.54
Dec-21	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	4.09	0.30	0.29	0.31	0.03	75	0.41	0.40	0.43	13.15	12.31	16.17
Jan-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	3.99	0.37	0.36	0.38	0.03	75	0.50	0.50	0.52	13.61	12.72	16.15
Feb-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	4.00	0.40	0.39	0.41	0.04	75	0.54	0.54	0.56	13.66	12.77	16.20
Mar-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	4.72	0.47	0.47	0.48	0.05	75	0.65	0.64	0.66	14.48	13.59	17.02
Apr-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	5.62	0.46	0.45	0.47	0.04	75	0.63	0.62	0.64	15.36	14.47	17.90
May-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	4.55	0.47	0.46	0.48	0.05	75	0.64	0.64	0.66	14.32	13.42	16.86
Jun-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	4.82	0.47	0.47	0.48	0.05	75	0.65	0.64	0.66	14.59	13.70	17.13
Jul-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	5.82	0.40	0.39	0.41	0.04	75	0.54	0.54	0.56	15.49	14.60	18.03
Aug-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	6.53	0.38	0.38	0.39	0.03	75	0.53	0.52	0.54	16.18	15.29	18.72
Sep-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	7.29	0.35	0.34	0.36	0.03	75	0.48	0.47	0.49	16.89	15.99	19.43
Oct-22	8.44	8.21	9.10	8.72	8.47	11.64								0.27	0.50	8.13	0.33	0.33	0.34	0.03	75	0.46	0.45	0.47	17.71	16.82	20.25
Nov-22	8.77	8.55	9.44	9.06	8.81	11.90								0.27	0.50	10.01	0.33	0.32	0.34	0.03	75	0.45	0.45	0.47	19.91	19.02	22.38
Dec-22	8.77	8.55	9.44	9.06	8.81	11.90								0.27	0.50	7.67	0.29	0.29	0.30	0.02	75	0.40	0.39	0.41	17.52	16.63	19.99
Jan-23	8.77	8.55	9.44	9.06	8.81	11.90								0.27	0.50	6.41	0.31	0.30	0.32	0.03	75	0.42	0.42	0.44	16.29	15.40	18.75
Feb-23	8.77	8.55	9.44	9.06	8.81	11.90								0.27	0.50	6.86	0.33	0.33	0.34	0.03	75	0.45	0.45	0.47	16.77	15.88	19.24
Mar-23	8.71	8.49	9.38	9.00	8.75	11.84								0.27	0.50	8.81	0.34	0.33	0.35	0.03	75	0.46	0.46	0.48	18.47	17.58	20.83
Apr-23	8.71	8.49	9.38	9.00	8.75	11.84								0.27	0.50	7.05	0.36	0.35	0.37	0.03	75	0.46	0.46	0.48	16.93	16.04	19.40
May-23	8.71	8.49	9.38	9.00	8.75	11.81								0.27	0.50	6.33	0.33	0.32	0.34	0.03	75	0.45	0.44	0.46	16.17	15.28	18.60
Jun-23	8.71	8.49	9.38	9.00	8.75	11.81								0.27	0.50	6.75	0.33	0.33	0.34	0.03	75	0.46	0.45	0.47	16.60	15.71	19.03
Jul-23	9.15	8.91	9.85	9.45	9.19	11.48								0.27	0.50	6.16	0.35	0.35	0.36	0.03	75	0.49	0.48	0.50	16.51	15.57	18.14
Aug-23	9.15	8.91	9.85	9.45	9.19	11.48								0.27	0.50	6.21	0.35	0.35	0.36	0.03	75	0.49	0.48	0.50	16.56	15.62	18.19
Sep-23	9.15	8.91	9.85	9.45	9.19	11.48								0.27	0.50	5.75	0.38	0.38	0.39	0.03	75	0.52	0.52	0.53	16.14	15.20	17.77
Oct-23	9.15	8.91	9.85	9.45	9.19	11.48								0.27	0.50	7.08	0.35	0.34	0.35	0.03	75	0.48	0.47	0.49	17.42	16.48	19.05
Nov-23	9.15	8.91	9.85	9.45	9.19	11.48								0.27	0.50	7.78	0.31	0.30	0.31	0.03	75	0.42	0.42	0.43	18.07	17.13	19.70
Dec-23	9.15	8.91	9.85	9.45	9.19	11.52								0.27	0.50	6.65	0.31	0.30	0.31	0.03	75	0.42	0.42	0.43	16.93	15.99	18.60
Average																											
2021	8.00	7.78	8.63	8.27	8.03	11.64								0.27	0.50	3.81	0.29	0.29	0.31	0.03	75	0.4	0.4	0.42	12.86	12.02	15.88
2022	8.50	8.27	9.16	8.78	8.53	11.69								0.27	0.50	6.09	0.39	0.39	0.40	0.04	75	0.5	0.5	0.55	15.81	14.92	18.34
2023	8.94	8.71	9.63	9.24	8.98	11.67								0.27	0.50	6.80	0.34	0.33	0.35	0.03	75	0.5	0.5	0.48	16.91	15.99	18.95



Table 2.15-23 Delivered Crude Oil Costs  
(Canadian Dollars per Barrel, Unless Noted)

	General Parameters									Enbridge Edmonton to		Arab Heavy to Northern China					Delivered Price \$CA/B	
	Oil Pollution Liability Premium	Insurance & Loss Percent	Duty		Mexico		Fees			WCS Hardisty \$CA/B	Hardisty Heavy \$CA/B	WCS Edmonton \$CA/B	Arab Heavy (to Asia) FOB \$CA/B	Fateh Terminal to Tsingdao (Qingdao) Worldscale \$CA/MT	260000 dwt Percent Worldscale	Freight \$CA/B		Insurance & Fees \$CA/B
			API-25 \$CA/B	APP-25 \$CA/B	API-25 \$CA/B	APP-25 \$CA/B	Federal Spill Tax \$CA/B	State Spill Tax \$CA/B	Dock Charge \$CA/B									
Jan-21	0.000	0.45%	0.067	0.134	0.000	0.000	0.11	0.03	0.05		0.94					1.14	0.37	
Feb-21	0.000	0.45%	0.067	0.133	0.000	0.000	0.11	0.03	0.05		0.94					1.02	0.41	
Mar-21	0.000	0.45%	0.067	0.132	0.000	0.000	0.11	0.03	0.05		0.94					0.95	0.42	
Apr-21	0.000	0.45%	0.066	0.131	0.000	0.000	0.11	0.02	0.05		0.94					1.07	0.41	
May-21	0.000	0.45%	0.064	0.127	0.000	0.000	0.11	0.02	0.05		0.94					1.06	0.42	
Jun-21	0.000	0.45%	0.065	0.128	0.000	0.000	0.11	0.02	0.05		0.94					0.99	0.45	
Jul-21	0.000	0.45%	0.066	0.132	0.000	0.000	0.11	0.03	0.05		0.94					1.00	0.47	
Aug-21	0.000	0.45%	0.067	0.132	0.000	0.000	0.11	0.03	0.05		0.94					1.00	0.46	
Sep-21	0.000	0.45%	0.067	0.133	0.000	0.000	0.11	0.03	0.05		0.94					1.17	0.47	
Oct-21	0.000	0.45%	0.066	0.131	0.000	0.000	0.11	0.02	0.05		0.94					1.34	0.51	
Nov-21	0.000	0.45%	0.067	0.132	0.000	0.000	0.11	0.03	0.05		0.94					1.38	0.51	
Dec-21	0.000	0.45%	0.068	0.134	0.000	0.000	0.12	0.03	0.05		0.94					1.31	0.49	
Jan-22	0.000	0.45%	0.067	0.132	0.000	0.000	0.11	0.03	0.05		0.94					1.27	0.54	
Feb-22	0.000	0.45%	0.067	0.134	0.000	0.000	0.11	0.03	0.05		0.94					1.23	0.59	
Mar-22	0.000	0.45%	0.067	0.133	0.000	0.000	0.11	0.03	0.05		0.94					1.55	0.71	
Apr-22	0.000	0.45%	0.067	0.133	0.000	0.000	0.11	0.03	0.05		0.94					1.78	0.68	
May-22	0.000	0.45%	0.068	0.135	0.000	0.000	0.12	0.03	0.05		0.94					1.50	0.71	
Jun-22	0.000	0.45%	0.068	0.135	0.000	0.000	0.12	0.03	0.05		0.94					1.67	0.74	
Jul-22	0.000	0.45%	0.069	0.136	0.000	0.000	0.12	0.03	0.05		0.94					2.12	0.69	
Aug-22	0.000	0.45%	0.068	0.136	0.000	0.000	0.12	0.03	0.05		0.94					2.49	0.66	
Sep-22	0.000	0.45%	0.071	0.140	0.000	0.000	0.12	0.03	0.05		1.05					3.16	0.63	
Oct-22	0.000	0.45%	0.073	0.144	0.000	0.000	0.12	0.03	0.05		1.05					3.56	0.65	
Nov-22	0.000	0.45%	0.071	0.141	0.000	0.000	0.12	0.03	0.05		1.05					4.29	0.60	
Dec-22	0.000	0.45%	0.072	0.143	0.000	0.000	0.12	0.03	0.05		1.05					2.93	0.53	
Jan-23	0.000	0.45%	0.071	0.141	0.000	0.000	0.12	0.03	0.05		1.05					2.19	0.54	
Feb-23	0.000	0.45%	0.071	0.141	0.000	0.000	0.12	0.03	0.05		1.06					2.66	0.55	
Mar-23	0.000	0.45%	0.073	0.144	0.000	0.000	0.12	0.03	0.05		1.05					4.02	0.56	
Apr-23	0.000	0.45%	0.071	0.142	0.000	0.000	0.12	0.03	0.05		1.05					2.98	0.58	
May-23	0.000	0.45%	0.072	0.142	0.000	0.000	0.12	0.03	0.05		1.05					2.14	0.52	
Jun-23	0.000	0.45%	0.070	0.140	0.000	0.000	0.12	0.03	0.05		1.05					2.65	0.52	
Jul-23	0.000	0.45%	0.070	0.139	0.000	0.000	0.12	0.03	0.05		0.63					2.32	0.55	
Aug-23	0.000	0.45%	0.071	0.142	0.000	0.000	0.12	0.03	0.05		0.63					2.03	0.60	
Sep-23	0.000	0.45%	0.072	0.142	0.000	0.000	0.12	0.03	0.05		0.63					1.97	0.64	
Oct-23	0.000	0.45%	0.073	0.144	0.000	0.000	0.12	0.03	0.05		0.63					2.41	0.63	
Nov-23	0.000	0.45%	0.073	0.144	0.000	0.000	0.12	0.03	0.05		0.63					3.21	0.60	
Dec-23	0.000	0.45%	0.071	0.141	0.000	0.000	0.12	0.03	0.05		0.64					2.60	0.54	
Average																		
2021							0.11	0.03	0.05		0.94					1.12	0.45	
2022							0.12	0.03	0.05		0.98					2.30	0.64	
2023							0.12	0.03	0.05		0.84					2.60	0.57	



Table 2.15-23 Delivered Crude Oil Costs  
(Canadian Dollars per Barrel, unless Noted)

	Castilla Blend to California											Oriente to California					Napo to California						
	Castilla Blend FOB \$CA/B	Covenas to Chiriqui Grande (Panama) \$CA/MT	Covenas to Chiriqui Grande (Panama) miles	Worldscale Carib/GC 70 %	Trans-Panama Pipeline Fees \$CA/B	Charco Azul (Panama) to Long Beach \$CA/MT	Charco Azul (Panama) to Long Beach Miles	Freight \$CA/B	Insurance & Fees \$CA/B	Trans-Panama Pipeline Loss Allowance \$CA/B	Delivered Price \$CA/B	Oriente FOB \$CA/B	Esmeraldas to Long Beach Worldscale \$CA/MT	Worldscale Ecuador to USWC %	Freight \$CA/B	Insurance & Fees \$/B	Delivered Price \$CA/B	Napo FOB \$CA/B	Esmeraldas to Long Beach Worldscale \$CA/MT	Worldscale Ecuador to USWC %	Freight \$CA/B	Insurance & Fees \$CA/B	Delivered Price \$CA/B
Jan-21					1.27			3.43	0.50	0.03													
Feb-21					1.27			3.85	0.54	0.04													
Mar-21					1.26			4.87	0.56	0.04													
Apr-21					1.25			3.51	0.54	0.04													
May-21					1.21			3.77	0.55	0.04													
Jun-21					1.22			3.16	0.57	0.04													
Jul-21					1.25			3.25	0.58	0.04													
Aug-21					1.26			3.30	0.56	0.04													
Sep-21					1.27			3.94	0.59	0.04													
Oct-21					1.24			4.60	0.63	0.05													
Nov-21					1.26			4.41	0.62	0.05													
Dec-21					1.28			4.53	0.60	0.04													
Jan-22					1.26			3.95	0.65	0.05													
Feb-22					1.27			5.01	0.70	0.05													
Mar-22					1.27			6.00	0.80	0.06				4.59	0.63						4.79	0.61	
Apr-22					1.26			7.60	0.78	0.06				5.12	0.62						5.34	0.60	
May-22					1.29			5.84	0.80	0.06				5.85	0.66						6.11	0.65	
Jun-22					1.28			6.16	0.84	0.07				6.06	0.66						6.32	0.67	
Jul-22					1.29			8.26	0.77	0.06				6.12	0.60						6.39	0.59	
Aug-22					1.29			9.72	0.75	0.06				6.90	0.58						7.20	0.57	
Sep-22					1.33			8.49	0.72	0.05				8.52	0.57						8.89	0.54	
Oct-22					1.37			10.05	0.74	0.05				8.82	0.59						9.21	0.56	
Nov-22					1.34			15.02	0.73	0.05				9.10	0.56						9.50	0.53	
Dec-22					1.36			9.74	0.64	0.04				2.47	0.52						13.02	0.50	
Jan-23					1.34			6.88	0.64	0.05				2.84	0.53						13.40	0.50	
Feb-23					1.35			8.06	0.65	0.05				1.95	0.53						12.47	0.48	
Mar-23					1.37			13.87	0.68	0.05				2.37	0.52						12.61	0.48	
Apr-23					1.35			5.37	0.67	0.05				2.21	0.56						12.74	0.52	
May-23					1.35			11.07	0.66	0.04				1.87	0.49						12.39	0.46	
Jun-23					1.33			7.22	0.63	0.04				1.49	0.47						11.99	0.46	
Jul-23					1.32			6.01	0.66	0.05				1.43	0.52						11.82	0.51	
Aug-23					1.35			5.32	0.70	0.05				1.59	0.57						12.10	0.55	
Sep-23					1.35			4.40	0.74	0.06				1.55	0.62						12.05	0.60	
Oct-23					1.37			8.63	0.74	0.05				1.71	0.61						12.22	0.58	
Nov-23					1.37			9.59	0.69	0.05				1.72	0.56						12.23	0.53	
Dec-23					1.34			5.95	0.63	0.05				1.47	0.52						11.67	0.48	
Average																							
2021					1.25			3.88	0.57	0.04													
2022					1.30			7.99	0.74	0.06													
2023					1.35			7.70	0.67	0.05				1.85	0.54						12.36	0.51	

Table 2.15-23 Delivered Crude Oil Costs  
(Canadian Dollars per Barrel, unless Noted)

	ANS to Puget Sound							Delivered Price \$/B
	Alaskan North Slope (CIF Long Beach)	Valdez to Long Beach Worldscale	Worldscale Estimated Jones Act 80 %	Freight Valdez to Long Beach \$/B	Calculated ANS FOB \$/B	Valdez to Anacortes Worldscale	Freight Valdez to Anacortes \$/B	
	\$/B	\$/MT	%	\$/B	\$/B	\$/MT	\$/B	
Jan-21				1.45			1.18	
Feb-21				1.60			1.30	
Mar-21				2.20			1.78	
Apr-21				2.01			1.63	
May-21				2.03			1.64	
Jun-21				1.97			1.60	
Jul-21				2.01			1.63	
Aug-21				2.50			2.02	
Sep-21				2.24			1.81	
Oct-21				2.40			1.95	
Nov-21				2.58			2.09	
Dec-21				2.58			2.09	
Jan-22				2.59			2.08	
Feb-22				2.55			2.03	
Mar-22				3.70			2.95	
Apr-22				4.34			3.46	
May-22				4.82			3.84	
Jun-22				4.86			3.87	
Jul-22				5.17			4.12	
Aug-22				6.33			5.04	
Sep-22				6.53			5.20	
Oct-22				5.99			4.77	
Nov-22				7.45			5.93	
Dec-22				9.10			7.24	
Jan-23				9.30			7.32	
Feb-23				7.10			5.59	
Mar-23				7.07			5.56	
Apr-23				6.77			5.33	
May-23				7.09			5.58	
Jun-23				6.67			5.25	
Jul-23				5.40			4.25	
Aug-23				5.30			4.17	
Sep-23				4.49			3.54	
Oct-23				5.18			4.08	
Nov-23				6.62			5.21	
Dec-23				7.46			5.87	
Average								
2021				2.13			1.73	
2022				5.28			4.21	
2023				6.54			5.14	

Note:  
(1) Began

Table 2.15-24 Delivered Crude Oil Costs  
(U.S. Dollars per Barrel, Unless Noted)

	General Parameters										Enbridge Edmonton to WCS Hardisty \$/B	Enbridge Edmonton to WCS Hardisty \$/B	Arab Heavy to Northern China					Delivered Price \$/B
	Insurance		Duty				Fees			Arab Heavy (to Asia) FOB \$/B			Fateh Terminal to Tsingtao (Qingdao) Worldscale \$/MT		260000 dwt Percent Worldscale	Freight \$/B	Insurance & Fees \$/B	
	Oil Pollution Liability Premium	Insurance & Loss Percent	API<25 \$/B	API>25 \$/B	Mexico API<25 \$/B	Mexico API>25 \$/B	Federal Spill Tax \$/B	State Spill Tax \$/B	Dock Charge \$/B									
Jan-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.74				0.89	0.29		
Feb-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.74				0.81	0.32		
Mar-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				0.75	0.33		
Apr-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.76				0.85	0.33		
May-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.78				0.88	0.35		
Jun-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.77				0.81	0.37		
Jul-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				0.80	0.38		
Aug-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				0.79	0.36		
Sep-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				0.92	0.37		
Oct-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.78				1.08	0.41		
Nov-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				1.10	0.41		
Dec-21	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.74				1.02	0.38		
Jan-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				1.00	0.43		
Feb-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.74				0.97	0.47		
Mar-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				1.22	0.56		
Apr-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.75				1.41	0.54		
May-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.73				1.17	0.55		
Jun-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.74				1.30	0.58		
Jul-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.73				1.04	0.53		
Aug-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.73				1.93	0.51		
Sep-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.79				2.38	0.47		
Oct-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.77				2.60	0.47		
Nov-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.78				3.19	0.45		
Dec-22	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.78				2.16	0.39		
Jan-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.79				1.83	0.40		
Feb-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.79				1.97	0.41		
Mar-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.77				2.94	0.41		
Apr-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.78				2.21	0.43		
May-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.78				1.58	0.39		
Jun-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.79				1.99	0.39		
Jul-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.48				1.76	0.42		
Aug-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.47				1.51	0.44		
Sep-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.47				1.46	0.47		
Oct-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.46				1.76	0.46		
Nov-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.46				2.34	0.43		
Dec-23	0.000	0.45%	0.053	0.105	0.000	0.000	0.09	0.02	0.04		0.47				1.94	0.40		
<b>Average</b>																		
2021							0.09	0.02	0.04		0.75				0.89	0.36		
2022							0.09	0.02	0.04		0.75				1.75	0.50		
2023							0.09	0.02	0.04		0.83				1.92	0.42		

Table 2.15-24 Delivered Crude Oil Costs  
(U.S. Dollars per Barrel, Unless Noted)

	Castilla Blend to California											Oriente to California					Napo to California							
	Castilla Blend	Covenas to Chiriqui Grande (Panama)	Covenas to Chiriqui Grande (Panama)	Worldscale Carib/GC 70	Trans-Panama Pipeline Fees	Charco Azul (Panama) to Long Beach	Charco Azul (Panama) to Long Beach	Freight	Insurance & Fees	Trans-Panama Pipeline Loss Allowance	Delivered Price	Oriente FOB	Esmeraldas to Long Beach	Worldscale Ecuador to USWC	Freight	Insurance & Fees	Delivered Price	Napo FOB	Esmeraldas to Long Beach	Worldscale Ecuador to USWC	Freight	Insurance & Fees	Delivered Price	
	FOB \$/B	\$/MT	(Panama) miles	%	\$/B	\$/MT	Miles	\$/B	\$/B	\$/B	\$/B	\$/B	\$/MT	%	\$/B	\$/B	\$/B	\$/B	Worldscale	USWC	\$/B	\$/B	\$/B	
Jan-21					1.00			2.69	0.39	0.03														
Feb-21					1.00			3.03	0.42	0.03														
Mar-21					1.00			3.87	0.44	0.03														
Apr-21					1.00			2.81	0.43	0.03														
May-21					1.00			3.11	0.45	0.03														
Jun-21					1.00			2.59	0.47	0.03														
Jul-21					1.00			2.59	0.46	0.03														
Aug-21					1.00			2.61	0.45	0.03														
Sep-21					1.00			3.11	0.47	0.03														
Oct-21					1.00			3.70	0.51	0.04														
Nov-21					1.00			3.51	0.49	0.04														
Dec-21					1.00			3.54	0.47	0.03														
Jan-22					1.00			3.13	0.51	0.04														
Feb-22					1.00			3.94	0.55	0.04														
Mar-22					1.00			4.74	0.63	0.05				3.63	0.50						3.79	0.48		
Apr-22					1.00			6.01	0.62	0.05				4.06	0.49						4.23	0.48		
May-22					1.00			4.55	0.62	0.05				4.55	0.51						4.75	0.50		
Jun-22					1.00			4.81	0.65	0.05				4.73	0.54						4.93	0.52		
Jul-22					1.00			6.38	0.59	0.05				4.73	0.46						4.94	0.45		
Aug-22					1.00			7.52	0.58	0.04				5.34	0.45						5.57	0.44		
Sep-22					1.00			6.37	0.54	0.04				6.40	0.43						6.67	0.41		
Oct-22					1.00			7.34	0.54	0.04				6.44	0.43						6.72	0.41		
Nov-22					1.00			11.16	0.54	0.04				6.77	0.42						7.06	0.40		
Dec-22					1.00			7.17	0.47	0.03				9.18	0.38						9.58	0.36		
Jan-23					1.00			5.13	0.48	0.03				9.57	0.39						9.98	0.37		
Feb-23					1.00			5.99	0.48	0.03				8.89	0.39						9.27	0.36		
Mar-23					1.00			10.14	0.50	0.03				9.04	0.38						9.44	0.35		
Apr-23					1.00			3.98	0.49	0.04				9.05	0.41						9.44	0.39		
May-23					1.00			8.19	0.49	0.03				8.78	0.36						9.16	0.34		
Jun-23					1.00			5.43	0.47	0.03				8.65	0.36						9.02	0.35		
Jul-23					1.00			4.55	0.50	0.04				8.65	0.40						9.02	0.39		
Aug-23					1.00			3.94	0.52	0.04				8.60	0.43						8.97	0.41		
Sep-23					1.00			3.25	0.54	0.04				8.54	0.46						8.91	0.44		
Oct-23					1.00			6.29	0.54	0.04				8.54	0.44						8.91	0.42		
Nov-23					1.00			6.99	0.50	0.04				8.55	0.41						8.92	0.39		
Dec-23					1.00			4.43	0.47	0.03				8.54	0.39						8.91	0.36		
Average																								
2021					1.00			3.10	0.46	0.03														
2022					1.00			6.09	0.57	0.04														
2023					1.00			5.69	0.50	0.04				8.78	0.40						9.16	0.38		

Table 2.15-24 Delivered Crude Oil Costs  
(U.S. Dollars per Barrel, unless Noted)

	ANS to Puget Sound							Delivered Price \$/B
	Alaskan North Slope (CIF Long Beach) \$/B	Valdez to Long Beach Worldscale \$/MT	Worldscale Estimated Jones Act 80 %	Freight Valdez to Long Beach \$/B	Calculated ANS FOB \$/B	Valdez to Anacortes Worldscale \$/MT	Freight Valdez to Anacortes \$/B	
Jan-21				1.14			0.93	
Feb-21				1.26			1.02	
Mar-21				1.75			1.42	
Apr-21				1.61			1.31	
May-21				1.67			1.36	
Jun-21				1.61			1.31	
Jul-21				1.61			1.30	
Aug-21				1.98			1.61	
Sep-21				1.77			1.43	
Oct-21				1.93			1.57	
Nov-21				2.06			1.67	
Dec-21				2.02			1.64	
Jan-22				2.05			1.64	
Feb-22				2.00			1.60	
Mar-22				2.92			2.33	
Apr-22				3.44			2.74	
May-22				3.75			2.99	
Jun-22				3.79			3.02	
Jul-22				3.99			3.18	
Aug-22				4.90			3.90	
Sep-22				4.91			3.91	
Oct-22				4.37			3.48	
Nov-22				5.54			4.41	
Dec-22				6.69			5.33	
Jan-23				6.93			5.45	
Feb-23				5.28			4.15	
Mar-23				5.17			4.07	
Apr-23				5.02			3.95	
May-23				5.24			4.13	
Jun-23				5.02			3.95	
Jul-23				4.09			3.22	
Aug-23				3.93			3.09	
Sep-23				3.32			2.61	
Oct-23				3.78			2.97	
Nov-23				4.83			3.80	
Dec-23				5.56			4.37	
<b>Average</b>								
2021				1.70			1.38	
2022				4.03			3.21	
2023				4.85			3.81	

Note:  
(1) Begar















Table 2.15-27 Destination California WCS Netback Comparison  
(Canadian Dollars per Barrel, Unless Noted)

	Delivered Crude Price (Long Beach)			Refining Value over (under) WCS						Shipping Costs: Edmonton to California								
	Castilla \$/B	Napo \$/B	Oriente \$/B	Castilla Minimum Refining Value \$/B	Castilla Maximum Refining Value \$/B	Napo Minimum Refining Value \$/B	Napo Maximum Refining Value \$/B	Oriente Minimum Refining Value \$/B	Oriente Maximum Refining Value \$/B	Trans Mountain to California			Enbridge to California			Keystone to California		
										Edmonton to Long Beach Existing Spot \$/B	Edmonton to Long Beach Expanded Spot \$/B	Edmonton to Long Beach Expanded Contract \$/B	Max IJT Contract Transport Cost \$/B	Min IJT Contract Transport Cost \$/B	IJT Spot Transport Cost \$/B	Heavy "A" Transport Cost \$/B	Heavy "B" Transport Cost \$/B	IJT Spot Transport Cost \$/B
Jan-21				0.25	1.53	-1.27	0.25	4.14	9.42	4.87	14.39	11.72	16.06	14.98	19.91	22.08	16.89	17.15
Feb-21				0.25	1.52	-1.27	0.25	4.13	9.40	5.04	14.56	11.89	16.47	15.40	20.32	22.51	17.32	21.09
Mar-21				0.25	1.51	-1.26	0.25	4.09	9.30	5.47	14.99	12.32	17.39	16.33	21.20	23.39	18.26	20.07
Apr-21				0.25	1.50	-1.25	0.25	4.06	9.25	5.33	14.85	12.18	16.42	15.36	20.20	22.41	17.30	19.08
May-21				0.24	1.46	-1.21	0.24	3.94	8.97	6.46	14.86	12.19	16.20	15.18	19.88	22.12	17.16	18.82
Jun-21				0.24	1.47	-1.22	0.24	3.97	9.04	6.47	14.86	12.19	15.98	14.95	19.68	21.91	16.92	18.61
Jul-21				0.25	1.50	-1.25	0.25	4.07	9.27	6.51	14.91	12.24	16.39	15.33	20.19	22.38	17.26	17.17
Aug-21				0.25	1.51	-1.26	0.25	4.10	9.33	6.81	15.21	12.54	16.81	15.75	20.63	22.81	17.66	17.59
Sep-21				0.25	1.52	-1.27	0.25	4.12	9.38	6.68	15.08	12.41	17.11	16.03	20.95	23.12	17.95	17.88
Oct-21				0.25	1.49	-1.24	0.25	4.04	9.20	6.83	15.23	12.56	17.42	16.37	21.19	23.39	18.30	18.20
Nov-21				0.25	1.51	-1.26	0.25	4.09	9.30	6.90	15.29	12.62	17.50	16.43	21.31	23.49	18.36	18.27
Dec-21				0.26	1.54	-1.28	0.26	4.16	9.47	6.88	15.28	12.61	17.76	16.68	21.64	23.80	18.57	18.53
Jan-22				0.25	1.51	-1.26	0.25	4.10	9.34	7.01	15.72	12.98	18.01	16.88	21.23	24.42	18.34	18.18
Feb-22				0.25	1.53	-1.27	0.25	4.13	9.41	7.04	15.75	13.01	18.75	17.61	22.00	25.18	19.06	18.92
Mar-22				0.25	1.52	-1.27	0.25	4.11	9.37	7.94	16.65	13.91	20.26	19.13	23.49	26.68	20.58	20.43
Apr-22				0.25	1.52	-1.26	0.25	4.10	9.34	8.34	17.04	14.31	21.52	20.39	24.74	27.92	21.84	21.69
May-22				0.26	1.54	-1.29	0.26	4.18	9.51	9.03	17.41	14.67	21.20	20.05	24.48	27.66	21.47	21.36
Jun-22				0.26	1.54	-1.28	0.26	4.16	9.48	9.06	17.44	14.70	21.37	20.22	24.64	27.82	21.65	21.53
Jul-22				0.26	1.55	-1.29	0.26	4.21	9.58	9.13	17.51	14.77	22.67	21.51	25.97	29.15	22.92	22.82
Aug-22				0.26	1.55	-1.29	0.26	4.20	9.56	9.89	18.27	15.53	24.26	23.10	27.56	30.73	24.51	24.41
Sep-22				0.27	1.60	-1.33	0.27	4.33	9.86	9.97	18.35	15.61	24.06	22.87	27.46	30.73	24.33	24.30
Oct-22				0.27	1.64	-1.37	0.27	4.45	10.14	9.58	17.96	15.22	24.89	23.66	28.38	31.64	25.07	25.10
Nov-22				0.27	1.61	-1.34	0.27	4.37	9.95	10.53	18.90	16.17	28.80	27.60	32.13	35.05	28.59	28.58
Dec-22				0.27	1.63	-1.36	0.27	4.42	10.06	11.59	19.97	17.23	27.20	25.98	30.57	33.48	26.95	26.97
Jan-23				0.27	1.61	-1.34	0.27	4.36	9.93	10.36	19.05	16.25	24.83	23.63	28.15	31.18	24.73	24.81
Feb-23				0.27	1.61	-1.35	0.27	4.37	9.95	9.24	17.94	15.13	24.63	23.43	27.96	30.99	24.53	24.62
Mar-23				0.27	1.64	-1.37	0.27	4.45	10.12	9.24	17.93	15.12	28.00	26.77	31.39	34.48	27.91	28.04
Apr-23				0.27	1.62	-1.35	0.27	4.38	9.98	9.12	17.81	15.01	22.94	21.73	26.28	29.38	22.90	23.00
May-23				0.27	1.62	-1.35	0.27	4.39	10.00	9.28	17.93	15.13	26.28	25.07	29.58	32.73	26.24	26.34
Jun-23				0.27	1.59	-1.33	0.27	4.32	9.83	9.06	17.71	14.91	23.61	22.42	26.85	30.01	23.63	23.69
Jul-23				0.26	1.59	-1.32	0.26	4.29	9.78	8.43	17.08	14.28	22.66	21.41	24.82	29.60	21.64	21.69
Aug-23				0.27	1.62	-1.35	0.27	4.38	9.98	8.39	17.04	14.24	22.52	21.25	24.73	29.54	21.42	21.52
Sep-23				0.27	1.62	-1.35	0.27	4.40	10.02	8.02	16.67	13.86	21.58	20.31	23.80	28.61	20.47	20.57
Oct-23				0.27	1.65	-1.37	0.27	4.46	10.15	8.31	16.96	14.16	24.51	23.22	26.76	31.59	23.34	23.48
Nov-23				0.27	1.65	-1.37	0.27	4.46	10.14	8.98	17.64	14.83	25.92	24.62	28.16	32.99	24.74	24.88
Dec-23				0.27	1.61	-1.34	0.27	4.37	9.94	9.43	18.08	15.28	24.19	22.92	26.44	31.19	23.10	23.19
Average																		
2021				0.25	1.50	-1.25	0.25	4.07	9.28	6.19	14.96	12.29	16.79	15.73	20.59	22.78	17.66	18.54
2022				0.26	1.56	-1.30	0.26	4.23	9.63	9.09	17.58	14.84	22.75	21.58	26.05	29.21	22.94	22.86
2023				0.27	1.62	-1.35	0.27	4.39	9.99	8.99	17.65	14.85	24.31	23.07	27.08	31.02	23.72	23.82

Table 2.15-27 Destination California WCS Netback Comparison  
(Canadian Dollars per Barrel, unless Noted)

	WCS Netback: Edmonton to California with Reference Castilla (Minimum Refining Value)									WCS Netback: Edmonton to California with Reference Castilla (Maximum Refining Value)								
	Trans Mountain to California			Enbridge to California			Keystone to California			Trans Mountain to California			Enbridge to California			Keystone to California		
	Edmonton to PS	Edmonton to PS	Edmonton to PS	Max IJT Contract	Min IJT Contract	IJT Spot	Heavy "A" Transport	Heavy "B" Transport	IJT Spot	Edmonton to PS	Edmonton to PS	Edmonton to PS	Max IJT Contract	Min IJT Contract	IJT Spot	Heavy "A" Transport	Heavy "B" Transport	IJT Spot
	Existing	Expanded	Expanded	Transport	Transport	Transport	Cost	Cost	Cost	Existing	Expanded	Expanded	Transport	Transport	Transport	Transport	Transport	Transport
	Spot	Spot	Contract	Cost	Cost	Cost	Cost	Cost	Cost	Spot	Spot	Contract	Cost	Cost	Cost	Cost	Cost	Cost
	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B	\$CA/B
Jan-21																		
Feb-21																		
Mar-21																		
Apr-21																		
May-21																		
Jun-21																		
Jul-21																		
Aug-21																		
Sep-21																		
Oct-21																		
Nov-21																		
Dec-21																		
Jan-22																		
Feb-22																		
Mar-22																		
Apr-22																		
May-22																		
Jun-22																		
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Jan-23																		
Feb-23																		
Mar-23																		
Apr-23																		
May-23																		
Jun-23																		
Jul-23																		
Aug-23																		
Sep-23																		
Oct-23																		
Nov-23																		
Dec-23																		
Average	2021																	
	2022																	
	2023																	





Table 2.15-28 Destination China WCS Netback Comparison  
(Canadian Dollars per Barrel, Unless Noted)

Date	Refining Value over WCS			Shipping Costs: Edmonton to China									WCS Netback: Edmonton to China with Reference Crude Arab Heavy (Minimum Refining Value)									WCS Netback: Edmonton to China with Reference Crude Arab Heavy (Maximum Refining Value)								
	Arab Heavy Refining Value over WCS (min) \$CA/B	Arab Heavy Refining Value over WCS (max) \$CA/B	Arab Heavy Refining Value over WCS (avg) \$CA/B	Trans Mountain to China			Enbridge to China			Keystone to China			Trans Mountain to China			Enbridge to China			Keystone to China			Trans Mountain to China			Enbridge to China			Keystone to China		
				Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Contract	Max IJT Contract	Min IJT Contract	IJT Spot	Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Contract	Max IJT Contract	Min IJT Contract	IJT Spot	Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Contract	Max IJT Contract	Min IJT Contract	IJT Spot	Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Contract	Max IJT Contract	Min IJT Contract	IJT Spot	Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Contract
	Value over WCS (min) \$CA/B	Value over WCS (max) \$CA/B	Value over WCS (avg) \$CA/B	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost	Contract Cost	Contract Cost	Spot Cost
Jan-21	3.50	5.73	6.42	15.94	13.27	16.16	15.09	20.00	22.50	17.30	17.57																			
Feb-21	3.49	5.71	6.74	16.27	13.60	16.09	15.03	19.93	22.50	17.31	21.08																			
Mar-21	3.46	5.66	7.79	17.32	14.64	16.13	15.07	19.92	22.52	17.38	19.19																			
Apr-21	3.44	5.62	7.46	16.99	14.32	15.90	14.85	19.67	22.27	17.16	18.95																			
May-21	3.33	5.46	8.61	17.01	14.34	15.42	14.40	19.08	21.71	16.75	18.41																			
Jun-21	3.36	5.50	8.56	16.96	14.29	15.37	14.35	19.06	21.72	16.72	18.41																			
Jul-21	3.45	5.64	8.65	17.05	14.38	15.71	14.66	19.50	22.12	17.00	16.91																			
Aug-21	3.47	5.67	9.44	17.85	15.17	15.76	14.59	19.56	22.16	17.01	16.93																			
Sep-21	3.44	5.70	9.05	17.46	14.78	16.29	15.22	20.11	22.74	17.57	17.50																			
Oct-21	3.42	5.60	9.38	17.79	15.11	16.81	15.76	20.56	23.25	18.17	18.06																			
Nov-21	3.46	5.66	9.62	18.03	15.35	17.00	15.94	20.79	23.42	18.28	18.20																			
Dec-21	3.52	5.76	9.60	18.01	15.33	16.82	15.75	20.68	23.27	18.05	18.01																			
Jan-22	3.47	5.68	9.71	18.43	15.69	17.17	16.05	20.38	24.08	18.00	17.84																			
Feb-22	3.50	5.72	9.71	18.42	15.68	17.37	16.24	20.60	24.35	18.22	18.08																			
Mar-22	3.48	5.70	11.79	20.50	17.76	18.33	17.21	21.55	25.40	19.30	19.15																			
Apr-22	3.47	5.68	12.83	21.54	18.80	19.40	18.27	22.61	26.43	20.35	20.19																			
May-22	3.53	5.78	14.01	22.40	19.66	18.40	17.25	21.66	25.51	19.33	19.21																			
Jun-22	3.52	5.77	14.08	22.46	19.72	18.69	17.55	21.95	25.80	19.63	19.51																			
Jul-22	3.56	5.82	14.45	22.83	20.09	20.05	18.89	23.33	27.08	20.85	20.75																			
Aug-22	3.55	5.81	16.38	24.76	22.02	20.90	19.75	24.19	27.91	21.70	21.59																			
Sep-22	3.66	5.99	16.65	25.04	22.30	22.49	21.30	25.87	29.66	23.26	23.23																			
Oct-22	3.77	6.17	15.71	24.10	21.36	24.26	23.04	27.74	31.51	24.93	24.96																			
Nov-22	3.70	6.05	18.12	26.51	23.77	26.78	25.58	30.09	33.50	27.04	27.03																			
Dec-22	3.74	6.12	20.85	29.23	26.49	23.81	22.80	27.16	30.51	23.98	24.00																			
Jan-23	3.69	6.04	20.45	29.15	26.34	21.86	20.66	25.17	28.65	22.20	22.29																			
Feb-23	3.70	6.05	16.97	25.67	22.86	22.56	21.36	25.87	29.39	22.93	23.02																			
Mar-23	3.76	6.16	16.93	25.63	22.82	25.27	24.05	26.64	32.24	25.67	25.81																			
Apr-23	3.71	6.07	16.49	25.19	22.39	22.84	21.63	26.16	29.79	23.31	23.41																			
May-23	3.72	6.08	14.92	23.58	20.77	21.86	20.65	25.14	28.78	22.28	22.39																			
Jun-23	3.65	5.98	14.30	22.96	20.15	22.05	20.88	25.28	28.94	22.55	22.61																			
Jul-23	3.63	5.95	13.03	21.69	18.88	21.82	20.58	23.98	29.27	21.31	21.36																			
Aug-23	3.71	6.07	12.74	21.40	18.59	22.33	21.06	24.53	29.86	21.74	21.84																			
Sep-23	3.72	6.09	13.47	22.13	19.32	21.85	20.57	24.05	29.43	21.28	21.39																			
Oct-23	3.77	6.17	15.10	23.76	20.95	23.90	22.61	26.14	31.49	23.24	23.38																			
Nov-23	3.77	6.17	15.62	24.28	21.47	24.77	23.48	27.00	32.30	24.05	24.19																			
Dec-23	3.69	6.04	15.14	23.81	21.00	22.75	21.48	24.98	30.19	22.10	22.19																			
Average																														
2021	3.45	5.64	8.44	17.22	14.55	16.12	15.07	19.91	22.51	17.39	18.27																			
2022	3.58	5.86	14.53	23.02	20.28	20.64	19.48	23.93	27.65	21.38	21.30																			
2023	3.71	6.07	15.43	24.10	21.30	22.82	21.59	25.58	30.03	22.72	22.82																			





Table 2.15-29 Summary WCS Netback Comparison  
 (U.S. Dollars per Barrel, unless Noted)

	WCS Netback: Edmonton to California with Reference Castilla (Minimum Refining Value over WCS)									WCS Netback: Edmonton to California with Reference Castilla (Maximum Refining Value over WCS)								
	Trans Mountain to California			Enbridge to California			Keystone to California			Trans Mountain to California			Enbridge to California			Keystone to California		
	Edmonton to Long Beach	Edmonton to Long Beach	Edmonton to Long Beach	Max LJT Contract	Min LJT Contract	LJT Spot	Heavy "A" Transport	Heavy "B" Transport	LJT Spot	Edmonton to Long Beach	Edmonton to Long Beach	Edmonton to Long Beach	Max LJT Contract	Min LJT Contract	LJT Spot	Heavy "A" Transport	Heavy "B" Transport	LJT Spot
	Existing Spot	Expanded Spot	Expanded Contract	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Existing Spot	Expanded Spot	Expanded Contract	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost
\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	[REDACTED]																	
Feb-21	[REDACTED]																	
Mar-21	[REDACTED]																	
Apr-21	[REDACTED]																	
May-21	[REDACTED]																	
Jun-21	[REDACTED]																	
Jul-21	[REDACTED]																	
Aug-21	[REDACTED]																	
Sep-21	[REDACTED]																	
Oct-21	[REDACTED]																	
Nov-21	[REDACTED]																	
Dec-21	[REDACTED]																	
Jan-22	[REDACTED]																	
Feb-22	[REDACTED]																	
Mar-22	[REDACTED]																	
Apr-22	[REDACTED]																	
May-22	[REDACTED]																	
Jun-22	[REDACTED]																	
Jul-22	[REDACTED]																	
Aug-22	[REDACTED]																	
Sep-22	[REDACTED]																	
Oct-22	[REDACTED]																	
Nov-22	[REDACTED]																	
Dec-22	[REDACTED]																	
Jan-23	[REDACTED]																	
Feb-23	[REDACTED]																	
Mar-23	[REDACTED]																	
Apr-23	[REDACTED]																	
May-23	[REDACTED]																	
Jun-23	[REDACTED]																	
Jul-23	[REDACTED]																	
Aug-23	[REDACTED]																	
Sep-23	[REDACTED]																	
Oct-23	[REDACTED]																	
Nov-23	[REDACTED]																	
Dec-23	[REDACTED]																	
Average	[REDACTED]																	
2021	[REDACTED]																	
2022	[REDACTED]																	
2023	[REDACTED]																	

Table 2.15-29 Summary WCS Netback Comparison  
 (U.S. Dollars per Barrel, unless Noted)

	WCS Netback: Edmonton to California with Reference NAPO Crude (Minimum Refining Value over WCS)									WCS Netback: Edmonton to California with Reference NAPO Crude (Maximum Refining Value over WCS)									
	Trans Mountain to California			Enbridge to California			Keystone to California			Trans Mountain to California			Enbridge to California			Keystone to California			
	Edmonton to Long Beach	Edmonton to Long Beach	Edmonton to Long Beach	Max LJT Contract	Min LJT Contract	LJT Spot	Heavy "A" Transport	Heavy "B" Transport	LJT Spot	Edmonton to Long Beach	Edmonton to Long Beach	Edmonton to Long Beach	Max LJT Contract	Min LJT Contract	LJT Spot	Heavy "A" Transport	Heavy "B" Transport	LJT Spot	
	Existing	Expanded	Expanded	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Existing	Expanded	Expanded	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost	Transport Cost
Spot	Spot	Contract	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	Spot	Spot	Contract	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21																			
Feb-21																			
Mar-21																			
Apr-21																			
May-21																			
Jun-21																			
Jul-21																			
Aug-21																			
Sep-21																			
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Nov-22																			
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Apr-23																			
May-23																			
Jun-23																			
Jul-23																			
Aug-23																			
Sep-23																			
Oct-23																			
Nov-23																			
Dec-23																			
Average																			
2021																			
2022																			
2023																			







Table 2.15-31 Destination California WCS Netback Comparison  
(U.S. Dollars per Barrel, Unless Noted)

	Delivered Crude Price (Long Beach)			Refining Value over (under) WCS						Shipping Costs: Edmonton to California								
	Castilla \$/B	Napó \$/B	Oriente \$/B	Castilla Minimum Refining Value \$/B	Castilla Maximum Refining Value \$/B	Napó Minimum Refining Value \$/B	Napó Maximum Refining Value \$/B	Oriente Minimum Refining Value \$/B	Oriente Maximum Refining Value \$/B	Trans Mountain to California			Enbridge to California			Keystone to California		
										Edmonton to Long Beach Existing Spot \$/B	Edmonton to Long Beach Expanded Spot \$/B	Edmonton to Long Beach Expanded Contract \$/B	Max LJT Contract Transport Cost \$/B	Min LJT Contract Transport Cost \$/B	LJT Spot Transport Cost \$/B	Heavy "A" Transport Cost \$/B	Heavy "B" Transport Cost \$/B	LJT Spot Transport Cost \$/B
Jan-21				0.20	1.20	-1.00	0.20	3.25	7.40	3.83	11.31	9.21	12.62	11.77	15.65	17.36	13.27	13.48
Feb-21				0.20	1.20	-1.00	0.20	3.25	7.40	3.97	11.46	9.36	12.97	12.13	16.00	17.72	13.64	16.61
Mar-21				0.20	1.20	-1.00	0.20	3.25	7.40	4.35	11.92	9.79	13.83	12.98	16.86	18.60	14.52	15.96
Apr-21				0.20	1.20	-1.00	0.20	3.25	7.40	4.27	11.89	9.75	13.14	12.29	16.17	17.93	13.84	15.27
May-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.33	12.26	10.05	13.36	12.51	16.39	18.24	14.15	15.52
Jun-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.29	12.16	9.88	13.08	12.23	16.11	17.93	13.84	15.23
Jul-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.20	11.90	9.77	13.08	12.24	16.11	17.86	13.77	13.70
Aug-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.40	12.07	9.85	13.34	12.49	16.37	18.10	14.02	13.96
Sep-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.27	11.90	9.79	13.50	12.65	16.53	18.25	14.16	14.11
Oct-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.50	12.25	10.10	14.01	13.16	17.04	18.81	14.72	14.63
Nov-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.49	12.17	10.04	13.92	13.07	16.95	18.69	14.60	14.54
Dec-21				0.20	1.20	-1.00	0.20	3.25	7.40	5.38	11.94	9.85	13.88	13.04	16.91	18.60	14.52	14.49
Jan-22				0.20	1.20	-1.00	0.20	3.25	7.40	5.56	12.46	10.29	14.28	13.38	16.83	19.36	14.54	14.41
Feb-22				0.20	1.20	-1.00	0.20	3.25	7.40	5.54	12.38	10.23	14.75	13.85	17.30	19.80	14.99	14.88
Mar-22				0.20	1.20	-1.00	0.20	3.25	7.40	6.27	13.15	10.99	16.01	15.11	18.56	21.07	16.26	16.14
Apr-22				0.20	1.20	-1.00	0.20	3.25	7.40	6.60	13.50	11.33	17.04	16.14	19.59	22.11	17.30	17.17
May-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.03	13.55	11.42	16.50	15.60	19.05	21.52	16.71	16.62
Jun-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.07	13.61	11.47	16.68	15.78	19.23	21.71	16.90	16.80
Jul-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.06	13.53	11.41	17.52	16.62	20.07	22.52	17.71	17.63
Aug-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.65	14.13	12.02	18.77	17.88	21.32	23.78	18.97	18.89
Sep-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.49	13.77	11.72	18.06	17.17	20.62	23.07	18.27	18.24
Oct-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.00	13.11	11.11	18.17	17.27	20.72	23.10	18.30	18.32
Nov-22				0.20	1.20	-1.00	0.20	3.25	7.40	7.83	14.06	12.02	21.41	20.52	23.89	26.06	21.26	21.25
Dec-22				0.20	1.20	-1.00	0.20	3.25	7.40	8.53	14.69	12.68	20.01	19.12	22.49	24.63	19.83	19.84
Jan-23				0.20	1.20	-1.00	0.20	3.25	7.40	7.72	14.20	12.11	18.50	17.60	20.98	23.23	18.42	18.49
Feb-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.87	13.34	11.25	18.31	17.42	20.79	23.04	18.23	18.30
Mar-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.75	13.10	11.05	20.46	19.57	22.94	25.20	20.40	20.50
Apr-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.76	13.21	11.13	17.01	16.12	19.49	21.79	16.98	17.06
May-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.86	13.26	11.19	19.44	16.55	21.88	24.21	19.41	19.48
Jun-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.82	13.33	11.22	17.77	16.88	20.21	22.59	17.78	17.83
Jul-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.38	12.93	10.80	17.15	16.20	18.78	22.40	16.38	16.41
Aug-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.22	12.64	10.56	16.70	15.76	18.34	21.91	15.89	15.96
Sep-23				0.20	1.20	-1.00	0.20	3.25	7.40	5.92	12.32	10.24	15.95	15.00	17.58	21.14	15.12	15.20
Oct-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.06	12.37	10.32	17.87	16.93	19.51	23.03	17.01	17.12
Nov-23				0.20	1.20	-1.00	0.20	3.25	7.40	6.55	12.87	10.82	18.90	17.96	20.54	24.07	18.05	18.15
Dec-23				0.20	1.20	-1.00	0.20	3.25	7.40	7.02	13.46	11.37	18.01	17.06	19.68	23.22	17.20	17.27
Average																		
2021				0.20	1.20	-1.00	0.20	3.25	7.40	4.94	11.94	9.80	13.39	12.55	16.43	18.17	14.09	14.79
2022				0.20	1.20	-1.00	0.20	3.25	7.40	6.97	13.49	11.39	17.43	16.54	19.97	22.40	17.58	17.52
2023				0.20	1.20	-1.00	0.20	3.25	7.40	6.66	13.08	11.01	18.01	17.09	20.06	22.98	17.57	17.65

Table 2.15-31 Destination California WCS Netback Comparison  
 (U.S. Dollars per Barrel, unless Noted)

	WCS Netback: Edmonton to California with Reference Castilla (Minimum Refining Value)									WCS Netback: Edmonton to California with Reference Castilla (Maximum Refining Value)								
	Trans Mountain to California			Enbridge to California			Keystone to California			Trans Mountain to California			Enbridge to California			Keystone to California		
	Edmonton to PS Existing Spot	Edmonton to PS Expanded Spot	Edmonton to PS Expanded Contract	Max LJT Contract Cost	Min LJT Contract Cost	LJT Spot Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	LJT Spot Cost	Edmonton to PS Existing Spot	Edmonton to PS Expanded Spot	Edmonton to PS Expanded Contract	Max LJT Contract Cost	Min LJT Contract Cost	LJT Spot Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	LJT Spot Cost
	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	[REDACTED]																	
Feb-21	[REDACTED]																	
Mar-21	[REDACTED]																	
Apr-21	[REDACTED]																	
May-21	[REDACTED]																	
Jun-21	[REDACTED]																	
Jul-21	[REDACTED]																	
Aug-21	[REDACTED]																	
Sep-21	[REDACTED]																	
Oct-21	[REDACTED]																	
Nov-21	[REDACTED]																	
Dec-21	[REDACTED]																	
Jan-22	[REDACTED]																	
Feb-22	[REDACTED]																	
Mar-22	[REDACTED]																	
Apr-22	[REDACTED]																	
May-22	[REDACTED]																	
Jun-22	[REDACTED]																	
Jul-22	[REDACTED]																	
Aug-22	[REDACTED]																	
Sep-22	[REDACTED]																	
Oct-22	[REDACTED]																	
Nov-22	[REDACTED]																	
Dec-22	[REDACTED]																	
Jan-23	[REDACTED]																	
Feb-23	[REDACTED]																	
Mar-23	[REDACTED]																	
Apr-23	[REDACTED]																	
May-23	[REDACTED]																	
Jun-23	[REDACTED]																	
Jul-23	[REDACTED]																	
Aug-23	[REDACTED]																	
Sep-23	[REDACTED]																	
Oct-23	[REDACTED]																	
Nov-23	[REDACTED]																	
Dec-23	[REDACTED]																	
Average	[REDACTED]																	
2021	[REDACTED]																	
2022	[REDACTED]																	
2023	[REDACTED]																	



Table 2.15-31 Destination California WCS Netback Comparison  
 (U.S. Dollars per Barrel, unless Noted)

	WCS Netback: Edmonton to California with Reference NAPO Crude (Minimum Refining Value)									WCS Netback: Edmonton to California with Reference NAPO Crude (Maximum Refining Value)								
	Trans Mountain to California			Enbridge to California			Keystone to California			Trans Mountain to California			Enbridge to California			Keystone to California		
	Edmonton to PS Existing Spot	Edmonton to PS Expanded Spot	Edmonton to PS Expanded Contract	Max LJT Contract Cost	Min LJT Contract Cost	LJT Spot Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	LJT Spot Cost	Edmonton to PS Existing Spot	Edmonton to PS Expanded Spot	Edmonton to PS Expanded Contract	Max LJT Contract Cost	Min LJT Contract Cost	LJT Spot Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	LJT Spot Cost
	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21	[REDACTED]																	
Feb-21	[REDACTED]																	
Mar-21	[REDACTED]																	
Apr-21	[REDACTED]																	
May-21	[REDACTED]																	
Jun-21	[REDACTED]																	
Jul-21	[REDACTED]																	
Aug-21	[REDACTED]																	
Sep-21	[REDACTED]																	
Oct-21	[REDACTED]																	
Nov-21	[REDACTED]																	
Dec-21	[REDACTED]																	
Jan-22	[REDACTED]																	
Feb-22	[REDACTED]																	
Mar-22	[REDACTED]																	
Apr-22	[REDACTED]																	
May-22	[REDACTED]																	
Jun-22	[REDACTED]																	
Jul-22	[REDACTED]																	
Aug-22	[REDACTED]																	
Sep-22	[REDACTED]																	
Oct-22	[REDACTED]																	
Nov-22	[REDACTED]																	
Dec-22	[REDACTED]																	
Jan-23	[REDACTED]																	
Feb-23	[REDACTED]																	
Mar-23	[REDACTED]																	
Apr-23	[REDACTED]																	
May-23	[REDACTED]																	
Jun-23	[REDACTED]																	
Jul-23	[REDACTED]																	
Aug-23	[REDACTED]																	
Sep-23	[REDACTED]																	
Oct-23	[REDACTED]																	
Nov-23	[REDACTED]																	
Dec-23	[REDACTED]																	
Average	[REDACTED]																	
2021	[REDACTED]																	
2022	[REDACTED]																	
2023	[REDACTED]																	



Table 2.15-32 Destination China WCS Netback Comparison  
(U.S. Dollars per Barrel, Unless Noted)

	Refining Value over WCS			Shipping Costs: Edmonton to China									WCS Netback: Edmonton to China with Reference Crude Arab Heavy (Minimum Refining Value)									WCS Netback: Edmonton to China with Reference Crude Arab Heavy (Maximum Refining Value)									
	Arab Heavy Value over (Talinqiao) \$/B	Arab Heavy Refining Value over WCS (min) \$/B	Arab Heavy Refining Value over WCS (max) \$/B	Trans Mountain to China			Enbridge to China			Keystone to China			Trans Mountain to China			Enbridge to China			Keystone to China			Trans Mountain to China			Enbridge to China			Keystone to China			
				Edmonton to China Existing	Edmonton to China Expanded	Edmonton to China Expanded	Max IJT Contract Transport Cost	Min IJT Contract Transport Cost	IJT Spot Transport Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	IJT Spot Transport Cost	Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Expanded	Max IJT Contract Transport Cost	Min IJT Contract Transport Cost	IJT Spot Transport Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	IJT Spot Transport Cost	Edmonton to PS Existing	Edmonton to PS Expanded	Edmonton to PS Expanded	Max IJT Contract Transport Cost	Min IJT Contract Transport Cost	IJT Spot Transport Cost	Heavy "A" Transport Cost	Heavy "B" Transport Cost	IJT Spot Transport Cost	
				\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B	\$/B
Jan-21		2.75	4.50	5.04	12.53	10.43	12.70	11.86	15.72	17.68	13.60	13.80																			
Feb-21		2.75	4.50	5.31	12.81	10.71	12.67	11.83	15.69	17.72	13.63	16.50																			
Mar-21		2.75	4.50	6.20	13.77	11.65	12.82	11.98	15.84	17.91	13.82	15.26																			
Apr-21		2.75	4.50	5.97	13.60	11.46	12.72	11.88	15.74	17.82	13.73	15.16																			
May-21		2.75	4.50	7.10	14.03	11.83	12.71	11.87	15.73	17.90	13.81	15.18																			
Jun-21		2.75	4.50	7.00	13.88	11.69	12.58	11.74	15.60	17.77	13.68	15.07																			
Jul-21		2.75	4.50	6.90	13.61	11.48	12.54	11.70	15.56	17.66	13.57	13.50																			
Aug-21		2.75	4.50	7.49	14.16	12.04	12.50	11.56	15.52	17.59	13.50	13.43																			
Sep-21		2.75	4.50	7.15	13.78	11.67	12.86	12.01	15.87	17.95	13.86	13.81																			
Oct-21		2.75	4.50	7.54	14.30	12.15	13.51	12.67	16.53	18.69	14.61	14.52																			
Nov-21		2.75	4.50	7.66	14.34	12.21	13.52	12.68	16.54	18.63	14.55	14.48																			
Dec-21		2.75	4.50	7.51	14.07	11.98	13.15	12.31	16.17	18.19	14.11	14.08																			
Jan-22		2.75	4.50	7.70	14.61	12.44	13.61	12.72	16.15	19.09	14.27	14.14																			
Feb-22		2.75	4.50	7.63	14.49	12.33	13.66	12.77	16.20	19.15	14.33	14.22																			
Mar-22		2.75	4.50	9.31	16.20	14.03	14.48	13.59	17.02	20.07	15.25	15.13																			
Apr-22		2.75	4.50	10.16	17.06	14.89	15.36	14.47	17.90	20.93	16.11	15.99																			
May-22		2.75	4.50	10.90	17.43	15.29	14.32	13.42	16.86	19.85	15.04	14.95																			
Jun-22		2.75	4.50	10.99	17.53	15.39	14.59	13.70	17.13	20.14	15.32	15.23																			
Jul-22		2.75	4.50	11.15	17.64	15.52	15.49	14.50	18.03	20.92	16.11	16.04																			
Aug-22		2.75	4.50	12.67	19.16	17.04	16.18	15.29	18.72	21.60	16.79	16.71																			
Sep-22		2.75	4.50	12.50	18.80	16.74	16.89	15.99	19.43	22.27	17.46	17.44																			
Oct-22		2.75	4.50	11.47	17.59	15.59	17.71	16.82	20.25	23.00	18.20	18.22																			
Nov-22		2.75	4.50	13.48	19.71	17.67	19.91	19.02	22.38	24.91	20.10	20.10																			
Dec-22		2.75	4.50	15.34	21.51	19.49	17.52	16.63	19.99	22.45	17.64	17.66																			
Jan-23		2.75	4.50	15.24	21.72	19.63	16.29	15.40	18.75	21.95	16.54	16.61																			
Feb-23		2.75	4.50	12.62	19.08	17.00	16.77	15.88	19.24	21.85	17.05	17.11																			
Mar-23		2.75	4.50	12.37	18.73	16.68	18.47	17.58	20.93	23.57	18.76	18.86																			
Apr-23		2.75	4.50	12.23	18.68	16.60	16.93	16.04	19.40	22.09	17.29	17.36																			
May-23		2.75	4.50	11.04	17.44	16.37	16.17	15.28	18.60	21.29	16.48	16.56																			
Jun-23		2.75	4.50	10.76	17.28	15.17	16.60	15.71	19.03	21.78	16.97	17.02																			
Jul-23		2.75	4.50	9.86	16.41	14.29	16.51	15.57	18.14	22.15	16.13	16.16																			
Aug-23		2.75	4.50	9.45	15.87	13.79	16.56	15.62	18.19	22.14	16.12	16.20																			
Sep-23		2.75	4.50	9.95	16.35	14.28	16.14	15.20	17.77	21.75	15.73	15.81																			
Oct-23		2.75	4.50	11.01	17.32	15.28	17.42	16.48	19.05	22.96	16.94	17.04																			
Nov-23		2.75	4.50	11.39	17.71	15.66	18.07	17.13	19.70	23.56	17.54	17.64																			
Dec-23		2.75	4.50	11.27	17.72	15.63	16.93	15.99	18.60	22.48	16.46	16.52																			
Average																															
2021		2.75	4.50	6.74	13.74	11.61	12.86	12.02	15.88	17.96	13.87	14.57																			
2022		2.75	4.50	11.11	17.64	15.54	15.81	14.92	18.34	21.20	16.39	16.32																			
2023		2.75	4.50	11.43	17.86	15.78	16.91	15.99	18.95	22.25	16.83	16.91																			