Canada Energy Regulator | Régie de l'énergie du Canada

Company: Example
Total ACE: $253,347,195

Part A - Calculation of ACE for Pipelines and Above-Ground Facilities that are Operational and Decommissioned

Legend: A = abandoned in place, R = removed, A+ = abandoned in place with special treatment

Step 1 - Categorization of company's pipelines by land use and determination of the assumed lengths of pipeline to be abandoned in place and removed for purposes of calculating the ACE

Land Use: Agricultural Cropland

Commodity Type	Pipeline Diameter Category	Total Actual Pipeline Length (km)	Base Case 2021 Abandonment Method Assumption (% A:R)		Pipeline Length Assumed to be Abandoned in Place (km)	Pipeline Length Assumed to be Removed (km)
			A	R		
oil	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	0.000	80	20	0.000	0.000
	large	0.000	80	20	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
gas	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	7.000	95	5	0.000	0.000
	medium	707.699	80	20	566.159	141.540
	large	447.774	80	20	358.219	89.555
	sub-total	**707.699**			**566.159**	**141.540**
other commodity	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	0.000	80	20	0.000	0.000
	large	0.000	80	20	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
Total		**707.699**			**566.159**	**141.540**

Land Use: Grasslands and Shrublands

Commodity Type	Pipeline Diameter Category	Total Actual Pipeline Length (km)	Base Case 2021 Abandonment Method Assumption (% A:R)		Pipeline Length Assumed to be Abandoned in Place (km)	Pipeline Length Assumed to be Removed (km)
			A	R		
oil	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	0.000	90	10	0.000	0.000
	large	0.000	90	10	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
gas	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	6.771	90	10	6.094	0.677
	large	225.815	90	10	203.234	22.582
	sub-total	**232.586**			**209.327**	**23.259**
other commodity	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	9.711	95	5	9.226	0.486
	medium	0.000	90	10	0.000	0.000
	large	0.000	90	10	0.000	0.000
	sub-total	**9.711**			**9.226**	**0.486**
Total		**242.298**			**218.553**	**23.744**

Land Use: Forested Lands

Commodity Type	Pipeline Diameter Category	Total Actual Pipeline Length (km)	Base Case 2021 Abandonment Method Assumption (% A:R)		Pipeline Length Assumed to be Abandoned in Place (km)	Pipeline Length Assumed to be Removed (km)
			A	R		
oil	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	0.000	95	5	0.000	0.000
	large	0.000	95	5	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
gas	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	2.568	95	5	2.439	0.128
	large	2.253	95	5	2.141	0.113
	sub-total	**4.821**			**4.580**	**0.241**
other commodity	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	0.000	95	5	0.000	0.000
	large	0.000	95	5	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
Total		**4.821**			**4.580**	**0.241**

Land Use: Wetlands - Water

Commodity Type	Pipeline Diameter Category	Total Actual Pipeline Length (km)	Base Case 2021 Abandonment Method Assumption (% A:R)		Pipeline Length Assumed to be Abandoned in Place (km)	Pipeline Length Assumed to be Removed (km)
			A	R		
oil	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	0.000	95	5	0.000	0.000
	large	0.000	95	5	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
gas	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.000	95	5	0.000	0.000
	medium	17.089	95	5	16.235	0.854
	large	35.368	95	5	33.600	1.768
	sub-total	**52.457**			**49.835**	**2.621**
other commodity	very small (not steel)	0.000	95	5	0.000	0.000
	very small (steel)	0.000	95	5	0.000	0.000
	small	0.378	95	5	0.359	0.019
	medium	0.000	95	5	0.000	0.000
	large	0.000	95	5	0.000	0.000
	sub-total	**0.378**			**0.359**	**0.019**
Total		**52.834**			**50.194**	**2.640**

Land Use: Existing Developed Lands

Commodity Type	Pipeline Diameter Category	Total Actual Pipeline Length (km)	Base Case 2021 Abandonment Method Assumption (% A:R)		Pipeline Length Assumed to be Abandoned in Place (km)	Pipeline Length Assumed to be Removed (km)
			A	R		
oil	very small (not steel)	0.000	80	20	0.000	0.000
	very small (steel)	0.000	80	20	0.000	0.000
	small	0.000	80	20	0.000	0.000
	medium	0.000	80	20	0.000	0.000
	large	0.000	80	20	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
gas	very small (not steel)	0.000	80	20	0.000	0.000
	very small (steel)	0.000	80	20	0.000	0.000
	small	1.547	80	20	1.237	0.309
	medium	0.000	80	20	0.000	0.000
	large	0.406	80	20	0.325	0.081
	sub-total	**1.947**			**1.237**	**0.309**
other commodity	very small (not steel)	0.000	80	20	0.000	0.000
	very small (steel)	0.000	80	20	0.000	0.000
	small	0.000	80	20	0.000	0.000
	medium	0.000	80	20	0.000	0.000
	large	0.000	80	20	0.000	0.000
	sub-total	**0.000**			**0.000**	**0.000**
Total		**1.947**			**1.237**	**0.309**

Totals	Total Length of Pipeline System (km)			Total Assumed Pipeline Length to be Abandoned in Place (km)	Total Assumed Pipeline Length to be Removed (km)
	1807.318			**838.936**	**168.382**

Step 2 - Total number of crossings by crossing type and determination of the assumed number of crossings that will be abandoned in place with special treatment for the purposes of calculating the ACE

Crossing Type: Water Crossings

Pipeline Diameter Category	Total Number of Crossings (#)	Special Treatment Assumption (% A:A+)		Number of Crossings Assumed to have Special Treatment Applied (#)
		A+	A	
very small (not steel)	0	0	100	0.00
very small (steel)	0	0	100	0.00
small	3	5	95	3.15
medium	173	5	95	8.15
large	464	5	95	21.22
Total	**638**			**32.50**

Crossing Type: Paved Road Crossings

Pipeline Diameter Category	Total Number of Crossings (#)	Special Treatment Assumption (% A:A+)		Number of Crossings Assumed to have Special Treatment Applied (#)
		A+	A	
very small (not steel)	0	0	100	0.00
very small (steel)	0	0	100	0.00
small	0	0	100	0.00
medium	14	100	0	14.00
large	9	100	0	9.00
Total	**23**			**23.00**

Crossing Type: Unpaved Road Crossings

Pipeline Diameter Category	Total Number of Crossings (#)	Special Treatment Assumption (% A:A+)		Number of Crossings Assumed to have Special Treatment Applied (#)
		A+	A	
very small (not steel)	0	0	100	0.00
very small (steel)	0	0	100	0.00
small	0	0	100	0.00
medium	152	50	50	76.00
large	7	50	50	3.50
Total	**159**			**137.00**

Crossing Type: Railway Crossings

Pipeline Diameter Category	Total Number of Crossings (#)	Special Treatment Assumption (% A:A+)		Number of Crossings Assumed to have Special Treatment Applied (#)
		A+	A	
very small (not steel)	0	0	100	0.00
very small (steel)	0	0	100	0.00
small	0	0	100	0.00
medium	4	100	0	4.00
large	9	100	0	9.00
Total	**13**			**13.00**

Step 3 - Calculation of Pipeline Abandonment Activity Costs

Cost Categories		Cost Calculations by Pipeline Diameter Category									
		small			medium			large			Total Cost ($)
		Base Case 2021 Unit Cost ($/km)	Assumed Pipeline Length (km) or Number of Crossings (#), as applicable	Subtotal ($)	Base Case 2021 Unit Cost ($/km)	Assumed Pipeline Length (km) or Number of Crossings (#), as applicable	Subtotal ($)	Base Case 2021 Unit Cost ($/km)	Assumed Pipeline Length (km) or Number of Crossings (#), as applicable	Subtotal ($)	
Land Access and Cleanup		$4,000	0.000	$40,316	$4,000	0.000	$1,882,970	$4,000	0.000	$1,815,345	$4,038,672
Pipeline Purging and Cleaning	gas	$5,000	0.000	$0	$8,000	0.000	$0	$13,000	0.000	$0	$0
	oil	$4,000	0.000	$0	$7,000	265.743	$1,860,188	$10,000	731.486	$7,314,863	$9,175,052
	other commodity	$4,000	10.388	$45,258	$7,000	0.000	$0	$10,000	0.000	$0	$45,258
Pipeline Abandonment in Place		$12,000	9.585	$115,016	$17,000	215.950	$3,671,145	$20,000	613.402	$12,268,033	$16,054,194
Pipeline Removal		$40,000	0.000	$0	$60,000	53.987	$3,239,217	$80,000	153.351	$12,268,033	$15,507,250
	gas	$10,000	0.000	$0	$15,000	0.000	$0	$20,000	0.000	$0	$0
Remediation	oil	$5,000	0.000	$0	$5,000	265.743	$1,328,715	$5,000	731.486	$3,657,432	$4,986,145
	other commodity	$5,000	10.388	$50,448	$5,000	0.000	$0	$5,000	0.000	$0	$50,448
Reclamation and Revegetation	crop accessed to be abandoned in place	$10,000	9.585	$95,847	$10,000	215.950	$2,159,497	$10,000	613.402	$6,134,015	$8,389,360
	crop accessed to be removed	$20,000	0.000	$0	$30,000	53.987	$1,619,152	$40,000	153.351	$6,134,015	$7,753,167
Special Treatment - Crossings	water crossings	$40,000	9.15	$8,000	$80,000	4.55	$364,000	$120,000	18.20	$2,184,000	$2,574,000
	road crossings	$20,000	0.00	$0	$50,000	50.00	$2,500,000	$75,000	200.00	$15,000,000	$18,000,000
	railway crossings	$25,000	0.00	$0	$50,000	4.00	$200,000	$75,000	9.00	$675,000	$875,000
Total				**$408,554**			**$19,163,717**			**$62,854,858**	**$113,417,226**

Step 4 - Calculation of above-ground facility abandonment activity costs

Cost categories	Above ground facility type	Base Case 2021 Unit Cost ($/site)	Number of Facility Sites (#)	Total Cost ($)
Above Ground Facility Removal	Valve with above ground appurtenances	$50,000	27	$1,350,000
	Meter station	$200,000	19	$3,800,000
	Compressor Station	$1,000,000	1	$1,000,000
	Pump station	$250,000	0	$0
	Oil terminal & storage facilities	$1,000,000	0	$0
	Processing plant	$5,000,000	0	$0
	Other - River	$25,000	0	$0
	Sub-total			$6,150,000
Above Ground Facility Remediation	Valve with above ground appurtenances	$12,000	27	$324,000
	Meter station	$60,000	19	$1,140,000
	Compressor Station	$400,000	1	$2,400,000
	Pump station	$100,000	0	$0
	Oil terminal & storage facilities	$150,000	0	$0
	Processing plant	$500,000	0	$0
	Other - River	$6,000	0	$0
	Sub-total			$3,864,000
Above Ground Facility Reclamation and Revegetation	Valve with above ground appurtenances	$15,000	27	$405,000
	Meter station	$22,000	19	$421,000
	Compressor Station	$300,000	1	$1,500,000
	Pump station	$75,000	0	$0
	Oil terminal & storage facilities	$100,000	0	$0
	Processing plant	$500,000	0	$0
	Other - River	$10,000	0	$0
	Sub-total			$2,175,000
Total				**$26,584,000**

Step 5 - Calculation of Engineering and Project Management and Contingency costs

Cost Categories		Base Case 2021 Percentage (%)	Sum of the total abandonment activity costs calculated in Steps 3 and 4	Total Cost ($)
Engineering and Project Management	for pipeline systems < 50 km in length	15	$146,011,126	$0
	for pipeline systems > 50 km and < 500 km in length	10		$0
	for pipeline systems > 500 km in length	5		**$7,300,556**
Contingency		25		**$66,502,781**
10% of Overall Engineering and Project Management Costs Allocated to Engagement Activities with Indigenous Peoples				$730,056
50% of Overall Engineering and Project Management Costs Allocated to Engagement Activities with Landowners and other stakeholders				$3,650,278

Step 6 - Calculation of Provisions for Abandoned Pipelines

Cost calculations by pipeline diameter category

Monitoring Provision	small								medium								large								Total Cost ($)
	Base Case 2021 Costs and Assumptions								Base Case 2021 Costs and Assumptions								Base Case 2021 Costs and Assumptions								
	Annual cost of administrative activities and signage maintenance ($/km)	Cost of a single instance of monitoring patrols ($/km)	Assumed number of years between monitoring patrols	Annuity factor applied	Length of pipeline assumed to be abandoned in place (km)	Sub-total Administrative activities and signage maintenance ($)	Sub-total Monitoring patrols ($)	Sub-total ($)	Annual cost of administrative activities and signage maintenance ($/km)	Cost of a single instance of monitoring patrols ($/km)	Assumed number of years between monitoring patrols	Annuity factor applied	Length of pipeline assumed to be abandoned in place (km)	Sub-total Administrative activities and signage maintenance ($)	Sub-total Monitoring patrols ($)	Sub-total ($)	Annual cost of administrative activities and signage maintenance ($/km)	Cost of a single instance of monitoring patrols ($/km)	Assumed number of years between monitoring patrols	Annuity factor applied	Length of pipeline assumed to be abandoned in place (km)	Sub-total Administrative activities and signage maintenance ($)	Sub-total Monitoring patrols ($)	Sub-total ($)	
	$400	$0	0	80	9.585	$306,709	$0	**$306,709**	$400	$150	5	80	215.950	$6,910,391	$6,910,391	**$13,820,781**	$400	$150	5	80	613.402	$19,628,853	$19,628,853	**$39,257,705**	**$53,385,196**

Cost calculations by pipeline diameter category

Unforeseen Event Provision	small					medium					large					Total Cost ($)
	Base Case 2021 Costs and Assumptions					Base Case 2021 Costs and Assumptions					Base Case 2021 Costs and Assumptions					
	Cost to address an unforeseen event ($/event)	Assumed Number of Unforeseen Events per year per 100 km	Annuity factor applied	Length of pipeline abandoned in place (km)	Sub-total ($)	Cost to address an unforeseen event ($/event)	Assumed Number of Unforeseen Events per year per 100 km	Annuity factor applied	Length of Pipeline Abandoned in Place (km)	Sub-total ($)	Cost to address an unforeseen event ($/event)	Assumed Number of Unforeseen Events per year per 100 km	Annuity factor applied	Length of pipeline abandoned in place (km)	Sub-total ($)	
	$10,000	0.1	80	9.585	$12,268	$75,000	0.5	80	215.950	$1,727,598	$125,000	0.7	80	613.402	$8,244,318	**$9,983,984**

Part B - Calculation of ACE for already abandoned pipelines

Step 1 - Calculation of Provisions for Abandoned Pipelines

Cost calculations by pipeline diameter category

Monitoring Provision	very small (steel)							
	Base Case 2021 Costs and Assumptions							
	Annual cost of administrative activities and signage maintenance ($/km)	Cost of a single instance of monitoring patrols ($/km)	Assumed number of years between monitoring patrols	Annuity factor applied	Length of pipeline abandoned in place (km)	Sub-total Administrative activities and signage maintenance ($)	Sub-total Monitoring patrols ($)	Sub-total ($)	Total Cost ($)
	$400	$0	0	80	5.035	$161,135	$0	**$161,135**	**$161,135**

Cost calculations by pipeline diameter category

Unforeseen Event	very small (steel)					
	Base Case 2021 Costs and Assumptions					
	Cost to Address Single Event ($/event)	Assumed Number of Unforeseen Events per year per 100 km	Annuity factor applied	Length of pipeline abandoned in place (km)	Sub-total ($)	Total Cost ($)
	$6,000	0.1	80	5.035	$2,417	**$2,417**

Note - values in ACE tables may not sum due to rounding