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; n/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	290.000	80	20	232.000	58.000
	large	407.774	80	20	326.219	81.555
	sub-total	**707.699**			**566.219**	**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**			**566.219**	**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	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	0.000	95	5	0.000	0.000
	medium	0.000	80	20	0.000	0.000
	large	221.815	80	20	177.452	44.363
	sub-total	**221.815**			**177.452**	**44.363**
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	0.485
	medium	0.000	80	20	0.000	0.000
	large	0.000	80	20	0.000	0.000
	sub-total	**9.711**			**9.226**	**0.485**
Total		**231.526**			**186.678**	**44.848**

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	8.704	95	5	8.269	0.435
	large	2.123	95	5	2.017	0.106
	sub-total	**2.827**			**2.827**	**0.149**
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		**2.827**			**2.827**	**0.149**

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	17.189	95	5	16.325	0.864
	large	35.268	95	5	33.504	1.764
	sub-total	**52.457**			**49.829**	**2.628**
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**			**50.188**	**2.646**

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	0.000	80	20	0.000	0.000
	medium	1.547	80	20	1.237	0.309
	large	0.406	80	20	0.325	0.081
	sub-total	**1.547**			**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		**1.547**			**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)
	1017.318	**838.936**	**148.382**

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/n)		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	23.20
Total	**630**			**31.50**

Crossing Type: Paved Road Crossings

Pipeline Diameter Category	Total Number of Crossings (#)	Special Treatment Assumption (% A/n)		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/n)		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	52	50	50	26.00
large	132	50	50	66.00
Total	**184**			**137.00**

Crossing Type: Railway Crossings

Pipeline Diameter Category	Total Number of Crossings (#)	Special Treatment Assumption (% A/n)		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 # of Crossings (#), as applicable	Subtotal ($)	Base Case 2021 Unit Cost ($/km)	Assumed Pipeline Length (km) or # of Crossings (#), as applicable	Subtotal ($)	Base Case 2021 Unit Cost ($/km)	Assumed Pipeline Length (km) or # of Crossings (#), as applicable	Subtotal ($)	
Land Access and Clearup		$4,000	10.689	$45,356	$4,000	265.743	$1,062,970	$4,000	721.446	$2,925,945	$4,029,272
Pipeline Purging and Clearing	oil	$3,000	0.000	$0	$8,000	0.000	$0	$12,000	0.000	$0	$0
	gas	$3,000	10.689	$32,067	$8,000	265.743	$2,125,944	$12,000	721.446	$17,303,063	$19,429,062
	other commodity	$4,000	10.689	$42,758	$7,000	0.000	$0	$10,000	0.000	$0	$42,758
Pipeline Abandonment in Place		$12,000	9.585	$115,016	$17,000	215.950	$3,671,145	$20,000	613.402	$12,268,035	$16,054,194
Pipeline Removal		$40,000	0.504	$40,358	$50,000	49.793	$2,958,579	$150,000	118.085	$17,728,640	$21,728,576
Remediation	oil	$10,000	0.000	$0	$10,000	0.000	$0	$10,000	0.000	$0	$0
	gas	$10,000	10.689	$106,891	$15,000	265.743	$3,986,145	$20,000	721.446	$14,428,920	$18,521,955
	other commodity	$5,000	10.689	$53,446	$5,000	0.000	$0	$5,000	0.000	$0	$53,446
Reclamation and Restoration	pipe assumed to be abandoned in place	$10,000	9.585	$95,847	$10,000	215.950	$2,159,497	$10,000	613.402	$6,134,016	$8,389,360
	pipe assumed to be removed	$40,000	0.504	$20,178	$50,000	49.793	$2,758,605	$150,000	118.085	$8,263,824	$11,042,608
Special Treatment - Crossings	water crossings	$20,000	0.15	$6,000	$40,000	0.00	$0	$150,000	10.50	$1,575,000	$1,575,000
	paved road crossings	$50,000	0.00	$0	$100,000	4.00	$400,000	$200,000	9.00	$1,800,000	$2,200,000
	railway crossings	$20,000	0.00	$0	$50,000	4.00	$200,000	$75,000	9.00	$675,000	$875,000
Total							**$26,169,712**			**$92,854,858**	**$119,427,226**

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	$55,000	27	$1,350,000
	Meter station	$100,000	19	$1,800,000
	Compressor Station	$1,000,000	5	$10,000,000
	Pump station	$250,000	0	$0
	Oil terminal & storage facilities	$500,000	0	$0
	Processing plant	$1,000,000	2	$0
	Other: River	$25,000	0	$0
	Sub-total			$15,150,000
Above Ground Facility Remediation	Valve with above ground appurtenances	$12,000	27	$324,000
	Meter station	$60,000	19	$1,140,000
	Compressor Station	$480,000	5	$2,400,000
	Pump station	$100,000	0	$0
	Processing & storage facilities	$200,000	0	$0
	Processing plant	$500,000	0	$0
	Other: River	$0,000	0	$0
	Sub-total			$3,864,000
Above Ground Facility Reclamation and Restoration	Valve with above ground appurtenances	$15,000	27	$405,000
	Meter station	$30,000	19	$570,000
	Compressor Station	$300,000	5	$1,500,000
	Pump station	$75,000	0	$0
	Oil terminal & storage facilities	$500,000	0	$0
	Processing plant	$500,000	0	$0
	Other: River	$15,000	0	$0
	Sub-total			$2,475,000
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 - 500 km in length	10		**$0**
	for pipeline systems >500 km in length	5		**$7,300,556**
Contingency		25		**$36,503,781**
5% of Overall Engineering and Project Management Costs Allocated to Engagement Activities with Indigenous Peoples				$1,216,759
5% of Overall Engineering and Project Management Costs Allocated to Engagement Activities with landowners and other stakeholders				$1,216,759

Step 6 - Calculation of Provisions for Abandoned Pipelines

Monitoring Provision	Cost calculations by pipeline diameter category																								
	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 ($)	Sub-total ($)	
Monitoring Provision	$400	$0	0	80	9.585	$306,709	$0	**$306,709**	$400	$150	5	80	215.950	$6,910,391	**$13,820,781**	$400	$150	5	80	613.402	$19,628,853	$19,628,853	**$39,257,705**	**$53,385,196**	

Unforeseen Event Provision	Cost calculations by pipeline diameter category																								
	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 assumed to be 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 Assumed to be 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 assumed to be abandoned in place (km)	Sub-total ($)										
	$50,000	0.5	80	9.585	$12,268	$75,000	0.5	80	215.950	$1,727,599	$125,000	0.5	80	613.402	$4,244,118										**$3,983,984**

Part B - Calculation of ACE for already abandoned pipelines

Step 1 - Calculation of Provisions for Abandoned Pipelines

Monitoring Provision	Cost calculations by pipeline diameter category								
	very small (steel)								
	Base Case 2021 Costs and Assumptions								Total Cost ($)
	Annual cost of administrative activities and signage maintenance ($/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 ($)	Sub-total ($)	
	$400	$0	0	80	5.035	$161,135	$0	**$161,135**	**$161,135**

Unforeseen Event	Cost calculations by pipeline diameter category					
	very small (steel)					
	Base Case 2021 Costs and Assumptions					Total Cost ($)
	Cost to Address Single Event ($/event)	Assumed Number of Unforeseen Events per year per 100 km	Annuity factor applied	Length of pipeline abandoned in place (km)	Sub-total ($)	
	$6,000	0.5	80	5.035	$2,417	**$2,417**

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