

# History of Estimating Liability in Alberta

June 2024

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This document summarizes the development and implementation of liability estimation for oil and gas wells and facilities in Alberta from 2001 to 2022, including the major directives, bulletins, and initiatives that have shaped the regulatory landscape regarding the assessment and management of liabilities for regional abandonment and reclamation as well as site-specific liability assessment.

Over these two decades, Alberta has refined its approach to estimating and managing liabilities for oil and gas wells and facilities. Ongoing updates and industry engagement will ensure that the liability management framework remains robust and reflective of actual costs.

## **EUB 2001: Introduction of Site-Specific Liability Assessments and Deemed Liability**

The determination of costs for liability, both at a regional level and site-specific level, was introduced in 2001. Before then, the monthly corporate licensee liability rating and well screening ratio were determined using an inventory of wells and a formula, which was documented in *Interim Directive 2000-11: Energy Development Licence Transfer Requirements and Monthly Corporate Licensee Liability Rating*.

Under the Energy Utilities Board (EUB), site-specific liability assessments (SSLAs) were introduced in July 2001 in *Interim Directive 2001-4: Financial Security for Oilfield Waste Management Facilities*. The directive allowed approval holders to propose alternative amounts of financial security than what was outlined in the document by providing detailed site-specific cost information for a facility. This included costs for removing all product and fluid, ongoing site security and monitoring, maintaining utilities, and winterizing infrastructure.

In December 2001, *Interim Directive 2001-8: Reviewed Licensee Liability Rating (LLR) Program and Energy Development Licence Transfer Requirements* first introduced the licensee liability rating (LLR) program using the ratio of deemed assets to deemed liabilities. Appendix 3 contained the formula to calculate the LLR of all producer licensees and nonproducer licensees. Detailed information on the determination of deemed assets were found in appendix 4 for producer licensees and appendix 5 for nonproducer licensees.

The determination of deemed liabilities was the same for producer and nonproducer licensees and were contained in appendix 6 for wells. While the appendix did not specify the specific deemed liability costs, a well liability calculator was available on the EUB's website. The well liability took into consideration the depth of the well, the number of events requiring abandonment, the requirement for groundwater protection, and whether there was any gas migration or surface casing vent flows. It also considered wellbore configuration. There is no documentation on what cost parameters were used in the web-based well liability calculator. Appendix 8 included the reclamation liability of wells on a regional basis. The abandonment liability of a facility was determined by multiplying the facility with its well equivalent found in appendix 7. (For example, if the well equivalent was 5, and the facility abandonment cost parameter for each well equivalent was \$10 000, the liability would have been  $5 \times \$10\ 000$ , or \$50 000.)

In specific circumstances, the EUB would consider a request to conduct a detailed review of its LLR because the use of provincial and regional averages may not accurately reflect the deemed assets or deemed liabilities of some licensees.

During this time, *ID 2001-8* also defined "potential problem site." This type of site had "reclamation liability equal to or greater than four times the amount [of liability] normally calculated for that type of site in that reclamation cost area." Once these sites were designated as a "problem site," the monthly LLR assessment and any transfer application included the higher reclamation liability derived from a Phase 2 environmental site assessment cost estimate.

In March 2003, *General Bulletin 2003-37* announced potential requirements and guidelines for estimating site-specific suspension, abandonment, and reclamation costs for energy development projects. In August 2003, *Interim Directive 2003-02 Large Upstream Oil and Gas Facilities – Interim Transfer Review Process* was published and required an SSLA for specific facility types.

In November 2003, *Directive 001: Requirements for Site-Specific Liability Assessments in Support of the EUB's Liability Management Programs* was released, the goal of which being to improve the consistency of site-specific cost estimates that were submitted to the EUB.

In December 2003, *Bulletin 2003-39* announced the first survey asking licensees to submit a summary of costs for abandonment and reclamation costs over the past three years. The intent was to conduct the survey annually. Information was provided by 53 companies on more than 7000 wells. In June 2004, the

first editions of *Directive 011: Licensee Liability Rating (LLR) Program: Updated Industry Parameters and Liability Costs* and *Directive 006: Licensee Liability Rating (LLR) Program and Licence Transfer Process* were released. The data obtained from these 53 companies and the well abandonment cost parameters from the June 2004 edition of *Directive 011* can be found in appendix 1 of this document.

A subsequent cost survey asked licensees to submit a summary of costs for abandonment and reclamation costs for the previous five years; 28 companies provided information on approximately 2800 wells. A new edition of *Directive 011* was released in April 2005. The data obtained from these companies and the well abandonment cost parameters from the April 2005 edition of *Directive 011* can be found in appendix 2 of this document.

Cost surveys were again conducted in 2006 (included as appendix 3) where approximately 1800 well abandonments between 2001 and 2005 were assessed. Another cost survey was conducted in 2008 (included as appendix 4), where approximately 2100 wells abandonments were provided between 2003 and 2008. While the general trend showed a slight increase in costs, less than 10% of companies were providing information, and the information was not a good representation of industry costs. There were no updates to *Directive 011* resulting from these cost surveys between 2006 and 2008.

### **ERCB 2010–2012: Transition to Consultant Information**

The Energy Resources and Conservation Board (ERCB), another predecessor to the AER, was created in 2008 when the EUB was split into the ERCB and the Alberta Utilities Commission. In 2010, the ERCB, used a consultant that worked with the Orphan Well Association to provide well abandonment cost parameters for the years of 2010, 2011, and 2012. Updated cost tables were provided for each of those years by area, well configuration, and depth. Values for gas migration, surface casing vent flows, and groundwater protection costs were based on wells selected by the ERCB or using a generic well diagram to determine costs. These costs can be seen in appendix 5.

### **AER 2013–Present**

The AER was created in 2013 by the [Responsible Energy Development Act](#), and it took over all the energy regulatory functions of the ERCB. The AER decided to use the 2012 cost surveys to update *Directive 011* in phases over the next three years. This resulted in new editions of *Directive 011* in May 2013, August 2014, and August 2015.

In 2017, the Government of Alberta took the initiative to review liability management and gathered input from stakeholders throughout the province to help identify where changes may be required. That fall, the AER began discussions with the industry groups CAPP, EPAC, and PSAC (now called Enserva) to develop the Area-Based Closure (ABC) Program, where licensees would report on the cost of closure activity to help update the estimated liability in *Directive 011*.

The program was introduced in 2018 and was implemented for the 2019 calendar year, running from 2019 to 2021. Over these two years, approximately 60 licensees voluntarily committed to a closure target and reported their closure costs.

In 2022, the ABC program was replaced by closure quotas, which specify the minimum amount of money that licensees must spend on oil and gas closure work each year and encourages oil and gas companies to collaborate to increase efficiency of projects and complete more closure work.

The AER has collected closure spend reported by licensees for 2022 and 2023. As well, the OWA has provided their closure costs to the AER. In the 2024 assessment completed by the AER, more than 17 000 well abandonment costs were evaluated to provide more accurate values in *Directive 011*.

With annual closure costs submitted by industry and the OWA for well and facility abandonments, remediation, and reclamation, the AER will continue to evaluate updated costs as they become available for future revisions to *Directive 011*.

## Appendix 1 2001 to 2003 Industry Cost Surveys

50 companies provided information for the surveys, which included about 7200 well abandonments.

Area 1	Medicine Hat	512 wells submitted (Previously area 6)			
		1	2	3	4
	Depth	Empty/No perf	Empty/Perf	Tub.&Rods	Tub. only
1	0-1199	Current \$5,100 Service \$7,192 Survey \$15,690 (23 wells)	Current \$6,400 Service \$11,756 Survey \$18,694 (47 wells)	Current \$10,100 Service \$20,825 Survey \$20,071 (257 wells)	Current \$9,200 Service \$19,593 Survey \$17,514 (181 wells)
2	1200-1999	Current \$5,100 Service \$7,358 Survey \$ N/P	Current \$6,800 Service \$13,076 Survey \$28,847 (3 wells)	Current \$11,600 Service \$28,548 Survey \$ N/P	Current \$10,600 Service \$26,330 Survey \$51,000 (1 well)
3	2000-2499	Current \$5,700 Service \$8,042 Survey \$ N/P	Current \$7,500 Service \$14,535 Survey \$ N/P	Current \$15,300 Service \$32,300 Survey \$ N/P	Current \$14,500 Service \$30,058 Survey \$ N/P
4	2500-2999	Current \$6,700 Service \$9,125 Survey \$ N/P	Current \$8,000 Service \$16,243 Survey \$ N/P	Current \$19,800 Service \$40,691 Survey \$ N/P	Current \$18,800 Service \$38,207 Survey \$ N/P
5	3000+	Current \$6,700 Service \$9,125 Survey \$ N/P	Current \$8,000 Service \$16,243 Survey \$ N/P	Current \$19,800 Service \$40,691 Survey \$ N/P	Current \$18,800 Service \$38,207 Survey \$ N/P

  

Area 2	Calgary/ Edmonton	2228 wells submitted (Previously area 7 & 1)			
		1	2	3	4
	Depth	Empty/No perf	Empty/Perf	Tub.&Rods	Tub. only
1	0-1199	Current \$5,100 Service \$7,192 Survey \$5,878 (18 wells)	Current \$6,400 Service \$11,756 Survey \$17,559 (31 wells)	Current \$12,800 Service \$21,860 Survey \$18,910 (60 wells)	Current \$11,700 Service \$20,885 Survey \$23,068 (217 wells)
2	1200-1999	Current \$5,100 Service \$7,192 Survey \$34,323 (4 wells)	Current \$6,800 Service \$13,076 Survey \$26,424 (21 wells)	Current \$14,400 Service \$28,955 Survey \$33,273 (353 wells)	Current \$13,300 Service \$26,698 Survey \$34,545 (163 wells)
3	2000-2499	Current \$5,700 Service \$7,842 Survey \$3,583 (5 wells)	Current \$7,500 Service \$14,535 Survey \$42,889 (6 wells)	Current \$18,000 Service \$33,335 Survey \$25,938 (458 wells)	Current \$16,900 Service \$31,312 Survey \$26,300 (261 wells)
4	2500-2999	Current \$6,700 Service \$8,925 Survey \$ N/P	Current \$8,000 Service \$16,243 Survey \$35,880 (2 wells)	Current \$20,100 Service \$40,806 Survey \$70,901 (317 wells)	Current \$18,900 Service \$38,245 Survey \$71,143 (312 wells)
5	3000+	Current \$6,700 Service \$8,925 Survey \$ N/P	Current \$8,000 Service \$16,243 Survey \$ N/P	Current \$20,100 Service \$40,806 Survey \$ N/P	Current \$18,900 Service \$38,245 Survey \$ N/P

  

Area 3	Drayton Valley/ Grande Prairie	2054 wells submitted (Previously area 3, 8 and 1)			
		1	2	3	4
	Depth	Empty/No perf	Empty/Perf	Tub.&Rods	Tub. only
1	0-1199	Current \$5,700 Service \$8,608 Survey \$18,500 (4 wells)	Current \$6,800 Service \$13,256 Survey \$58,483 (4 wells)	Current \$13,800 Service \$25,993 Survey \$15,121 (52 wells)	Current \$12,800 Service \$24,640 Survey \$14,776 (51 wells)
2	1200-1999	Current \$5,700 Service \$8,808 Survey \$24,985 (8 wells)	Current \$6,800 Service \$14,576 Survey \$27,279 (19 wells)	Current \$16,400 Service \$35,853 Survey \$27,462 (346 wells)	Current \$12,700 Service \$31,135 Survey \$25,961 (339 wells)
3	2000-2499	Current \$5,700 Service \$9,008 Survey \$28,307 (3 wells)	Current \$7,600 Service \$16,076 Survey \$44,493 (37 wells)	Current \$20,200 Service \$41,077 Survey \$33,185 (364 wells)	Current \$19,300 Service \$36,232 Survey \$32,248 (356 wells)
4	2500-2999	Current \$5,700 Service \$9,208 Survey \$16,150 (3 wells)	Current \$8,900 Service \$18,451 Survey \$56,787 (8 wells)	Current \$22,200 Service \$47,843 Survey \$26,770 (180 wells)	Current \$20,700 Service \$42,935 Survey \$35,599 (181 wells)
5	3000+	Current \$5,700 Service \$9,408 Survey \$20,238 (2 wells)	Current \$9,700 Service \$21,618 Survey \$101,713 (15 wells)	Current \$25,900 Service \$55,928 Survey \$185,376 (65 wells)	Current \$24,600 Service \$51,363 Survey \$537,594 (20 wells)

  

Area 4	Lloydminster	629 wells submitted (Previously area 2)			
		1	2	3	4
	Depth	Empty/No perf	Empty/Perf	Tub.&Rods	Tub. only
1	0-1199	Current \$4,100 Service \$6,408 Survey \$73,878 (7 wells)	Current \$6,800 Service \$12,256 Survey \$41,438 (28 wells)	Current \$10,100 Service \$21,158 Survey \$18,935 (38 wells)	Current \$9,200 Service \$16,760 Survey \$42,461 (50 wells)
2	1200-1999	Current \$4,100 Service \$6,475 Survey \$ N/P	Current \$7,500 Service \$13,701 Survey \$20,907 (1 well)	Current \$11,600 Service \$31,313 Survey \$18,299 (252 wells)	Current \$10,600 Service \$29,018 Survey \$18,055 (1 well)
3	2000-2499	Current \$4,100 Service \$6,608 Survey N/P	Current \$8,000 Service \$15,076 Survey \$34,000 (1 well)	Current \$15,300 Service \$34,466 Survey N/P	Current \$14,500 Service \$32,558 Survey \$40,000 (1 well)
4	2500-2999	Current \$4,100 Service \$6,675 Survey N/P	Current \$8,700 Service \$16,868 Survey N/P	Current \$19,800 Service \$41,525 Survey \$25,900	Current \$18,800 Service \$39,040 Survey N/P
5	3000+	Current \$4,100 Service \$7,175 Survey N/P	Current \$9,300 Service \$19,785 Survey \$ N/P	Current \$25,900 Service \$53,863 Survey N/P	Current \$24,500 Service \$49,492 Survey N/P

  

Area 5	Athabasca/ Peace River	1206 wells submitted (Previously area 1 & 5)			
		1	2	3	4
	Depth	Empty/No perf	Empty/Perf	Tub.&Rods	Tub. only
1	0-1199	Current \$5,100 Service \$7,992 Survey \$6,518 (44 wells)	Current \$7,400 Service \$13,340 Survey \$25,854 (30 wells)	Current \$14,600 Service \$26,133 Survey \$25,000 (200 wells)	Current \$13,500 Service \$24,742 Survey \$25,877 (239 wells)
2	1200-1999	Current \$5,100 Service \$8,192 Survey \$2,115 (12 wells)	Current \$7,600 Service \$14,576 Survey \$26,507 (12 wells)	Current \$18,600 Service \$36,530 Survey \$26,049 (229 wells)	Current \$17,400 Service \$32,770 Survey \$23,861 (202 wells)
3	2000-2499	Current \$5,700 Service \$8,842 Survey N/P	Current \$8,300 Service \$16,035 Survey \$34,262 (1 well)	Current \$23,000 Service \$41,983 Survey \$60,130 (60 wells)	Current \$21,500 Service \$36,908 Survey \$30,070 (51 wells)
4	2500-2999	Current \$6,700 Service \$9,792 Survey N/P	Current \$8,900 Service \$17,785 Survey \$129,175 (2 wells)	Current \$25,800 Service \$49,057 Survey \$40,157 (59 wells)	Current \$24,400 Service \$44,187 Survey \$55,016 (59 wells)
5	3000+	Current \$7,800 Service \$10,817 Survey N/P	Current \$9,700 Service \$20,785 Survey N/P	Current \$30,400 Service \$57,487 Survey N/P	Service \$52,883 Survey \$153,101 (6 wells)

  

Area 6	High Level	636 wells submitted (Previously area 4)			
		1	2	3	4
	Depth	Empty/No perf	Empty/Perf	Tub.&Rods	Tub. only
1	0-1199	Current \$5,100 Service \$10,950 Survey \$5,155 (2 wells)	Current \$8,000 Service \$14,423 Survey \$21,735 (9 wells)	Current \$15,000 Service \$26,786 Survey \$15,000 (50 wells)	Current \$13,800 Service \$25,357 Survey \$16,050 (54 wells)
2	1200-1999	Current \$5,100 Service \$11,150 Survey N/P	Current \$8,700 Service \$16,093 Survey \$57,324 (7 wells)	Current \$18,900 Service \$37,978 Survey \$30,852 (105 wells)	Current \$17,700 Service \$34,218 Survey \$30,019 (101 wells)
3	2000-2499	Current \$5,700 Service \$11,550 Survey N/P	Current \$9,000 Service \$17,410 Survey \$107,994 (102 wells)	Current \$23,300 Service \$43,265 Survey \$25,096 (102 wells)	Current \$21,800 Service \$38,190 Survey \$25,880 (104 wells)
4	2500-2999	Current \$6,700 Service \$12,083 Survey N/P	Current \$9,900 Service \$19,693 Survey \$27,924 (2 wells)	Current \$25,900 Service \$50,595 Survey \$40,000 (50 wells)	Current \$24,400 Service \$45,687 Survey \$40,000 (50 wells)
5	3000+	Current \$7,800 Service \$12,583 Survey N/P	Current \$10,900 Service \$23,193 Survey \$ N/P	Current \$30,900 Service \$59,845 Survey N/P	Current \$29,400 Service \$55,203 Survey N/P

In addition, the companies provided the following information:

- Groundwater protection cost averaged at \$16 685 based on 1270 wells.
- Gas migration costs averaged at \$29 244 based on 448 wells.
- Surface casing vent flow costs averaged at \$33 350 based on 912 wells.

The June 2004 edition of *Directive 011* contained the following costs:

**Area 1. Medicine Hat (Previously Area 6)**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$5,100	\$11,800	\$17,500	\$20,100
1200-1999	\$5,100	\$13,100	\$26,300	\$28,500
2000-2499	\$5,100	\$14,500	\$30,000	\$32,300
2500-2999	\$5,100	\$16,200	\$38,200	\$40,700
3000 +	\$5,100	\$16,200	\$38,200	\$40,700

**Area 2. Calgary/Edmonton (Previously Areas 7 & 1)**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$5,100	\$11,800	\$20,900	\$21,900
1200-1999	\$5,100	\$13,100	\$26,700	\$29,000
2000-2499	\$5,100	\$14,500	\$31,300	\$33,300
2500-2999	\$5,100	\$16,200	\$38,200	\$40,800
3000 +	\$5,100	\$16,200	\$38,200	\$40,800

**Area 3. Drayton Valley/Grand Prairie (Previously Areas 3, 8 & 1)**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$5,100	\$13,300	\$14,800	\$15,100
1200-1999	\$5,100	\$14,600	\$26,000	\$27,500
2000-2499	\$5,100	\$16,100	\$32,200	\$33,200
2500-2999	\$5,100	\$18,500	\$35,600	\$47,800
3000 +	\$5,100	\$21,600	\$51,400	\$55,900

**Area 4. Lloydminster (Previously Area 2)**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$5,100	\$12,300	\$16,800	\$18,900
1200-1999	\$5,100	\$13,700	\$18,100	\$31,300
2000-2499	\$5,100	\$15,100	\$32,600	\$34,500
2500-2999	\$5,100	\$16,900	\$39,000	\$41,500
3000 +	\$5,100	\$19,800	\$49,500	\$53,900

**Area 5. Athabasca/Peace River (Previously Areas 1 & 5)**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$5,100	\$13,300	\$24,700	\$25,000
1200-1999	\$5,100	\$14,600	\$24,700	\$26,000
2000-2499	\$5,100	\$16,000	\$36,900	\$42,000
2500-2999	\$5,100	\$17,800	\$44,200	\$49,100
3000 +	\$5,100	\$20,800	\$52,900	\$57,500

**Area 6. High Level (Previously Area 4)**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$5,100	\$14,400	\$16,000	\$26,800
1200-1999	\$5,100	\$16,100	\$30,000	\$30,800
2000-2499	\$5,100	\$17,400	\$38,200	\$43,300
2500-2999	\$5,100	\$19,700	\$45,700	\$50,600
3000 +	\$5,100	\$23,200	\$55,200	\$59,800

Where applicable, the following parameters are to be applied:

- Groundwater protection cost \$16,700
- Vent flow repair cost \$32,000
- Gas migration cost \$32,000
- Multiple event sequence factor 0.25%

## Appendix 2 2004 Industry Cost Surveys

28 companies provided information for the surveys that covered about 2800 well abandonments. The “current” costs shown in the table below are from the June 2024 edition of *Directive 011*.

Area 1 Medicine Hat		79 wells submitted			
		1	2	4	3
	Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods
1	0-1199	Current \$5,100 Survey - None Service - \$6,345(12)	Current \$11,800 Survey \$12,819(17) Service \$11,515(2)	Current \$17,500 Survey \$24,969(30) Service \$30,016(1)	Current \$20,100 Survey \$18,735(30) Service - None
2	1200-1999	Current \$5,100 Survey - None Service - None	Current \$13,100 Survey \$34,716 (1) Service - None	Current \$26,300 Survey - None Service - None	Current \$28,500 Survey \$36,000(1) Service - None
3	2000-2499	Current \$5,100 Survey - None Service - None	Current \$14,500 Survey - None Service - None	Current \$30,000 Survey - None Service - None	Current \$32,300 Survey - None Service - None
4	2500-2999	Current \$5,100 Survey - None Service - None	Current \$16,200 Survey - None Service - None	Current \$38,200 Survey - None Service - None	Current \$40,700 Survey - None Service - None
5	3000+	Current \$5,100 Survey - None Service - None	Current \$16,200 Survey - None Service - None	Current \$38,200 Survey - None Service - None	Current \$40,700 Survey - None Service - None

Area 2 Calgary/ Edmonton		99 wells submitted			
		1	2	4	3
	Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods
1	0-1199	Current \$5,100 Survey \$5,638(2) Service \$6,330(1)	Current \$11,800 Survey \$12,683(3) Service - None	Current \$20,900 Survey \$18,021(13) Service - None	Current \$21,900 Survey \$30,959(21) Service - None
2	1200-1999	Current \$5,100 Survey - None Service \$56,190(1)	Current \$13,100 Survey \$34,406(9) Service - None	Current \$26,700 Survey \$30,779(14) Service - None	Current \$29,000 Survey \$59,640(16) Service \$43,334(1)
3	2000-2499	Current \$5,100 Survey - None Service 15,546(1)	Current \$14,500 Survey \$60,965(2) Service \$21,322(1)	Current \$31,300 Survey \$25,200(2) Service - None	Current \$33,300 Survey \$39,736(11) Service - None
4	2500-2999	Current \$5,100 Survey - None Service - None	Current \$16,200 Survey \$22,302(3) Service - None	Current \$38,200 Survey - None Service - None	Current \$40,800 Survey - None Service - None
5	3000+	Current \$5,100 Survey - None Service - None	Current \$16,200 Survey \$31,847 Service - None	Current \$38,200 Survey - None Service - None	Current \$40,800 Survey \$59,500(1) Service - None

Area 3 Drayton Valley/ Grande Prairie		80 wells submitted			
		1	2	4	3
	Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods
1	0-1199	Current \$5,100 Survey - None Service \$ - None	Current \$13,300 Survey \$47,149(7) Service - None	Current \$14,800 Survey \$24,435(1) Service - None	Current \$15,100 Survey \$23,100(1) Service - None
2	1200-1999	Current \$5,100 Survey - None Service \$36,235(1)	Current \$14,600 Survey \$37,960(11) Service - None	Current \$26,000 Survey \$58,842(4) Service - None	Current \$27,500 Survey \$32,038(3) Service - None
3	2000-2499	Current \$5,100 Survey - None Service - None	Current \$16,100 Survey \$46,761(12) Service - None	Current \$32,200 Survey \$53,659(6) Service \$21,860(1)	Current \$33,200 Survey - None Service - None
4	2500-2999	Current \$5,100 Survey - None Service \$23,143(1)	Current \$18,500 Survey \$34,928(5) Service - None	Current \$35,600 Survey \$48,123(2) Service - None	Current \$47,800 Survey \$26,955(3) Service - None
5	3000+	Current \$5,100 Survey - None Service - None	Current \$21,600 Survey \$112,062(4) Service - None	Current \$51,400 Survey \$47,353(3) Service - None	Current \$55,900 Survey \$18,672(1) Service - None

Area 4 Lloydminster		64 wells submitted			
		1	2	4	3
	Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods
1	0-1199	Current \$5,100 Survey - None Service \$ - None	Current \$12,300 Survey \$20,093(12) Service - None	Current \$16,800 Survey \$27,200(25) Service \$46,515(4)	Current \$18,900 Survey \$16,912(26) Service - None
2	1200-1999	Current \$5,100 Survey - None Service \$ - None	Current \$13,700 Survey - None Service - None	Current \$18,100 Survey - None Service - None	Current \$31,300 Survey - None Service - None
3	2000-2499	Current \$5,100 Survey - None Service \$ - None	Current \$15,100 Survey - None Service - None	Current \$32,600 Survey - None Service - None	Current \$34,500 Survey - None Service - None
4	2500-2999	Current \$5,100 Survey - None Service \$ - None	Current \$16,900 Survey - None Service - None	Current \$39,000 Survey - None Service - None	Current \$41,500 Survey - None Service - None
5	3000+	Current \$5,100 Survey - None Service - None	Current \$19,800 Survey - None Service - None	Current \$49,500 Survey - None Service - None	Current \$53,900 Survey - None Service - None

Area 5 Athabasca/ Peace River		110 wells submitted			
		1	2	4	3
	Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods
1	0-1199	Current \$5,100 Survey - None Service \$ - None	Current \$13,300 Survey \$32,058(41) Service - None	Current \$24,700 Survey \$26,507(41) Service - None	Current \$39,000 Survey \$27,200(26) Service - None
2	1200-1999	Current \$5,100 Survey - None Service \$ - None	Current \$14,600 Survey \$24,939(7) Service - None	Current \$24,700 Survey \$19,600(1) Service - None	Current \$26,000 Survey \$63,354(6) Service \$31,854(1)
3	2000-2499	Current \$5,100 Survey - None Service \$ - None	Current \$16,000 Survey - None Service - None	Current \$36,900 Survey \$31,750(2) Service - None	Current \$42,000 Survey \$65,600(7) Service - None
4	2500-2999	Current \$5,100 Survey - None Service \$ - None	Current \$17,800 Survey \$103,355(1) Service - None	Current \$44,200 Survey - None Service - None	Current \$49,100 Survey - None Service - None
5	3000+	Current \$5,100 Survey - None Service - None	Current \$20,800 Survey - None Service - None	Current \$52,900 Survey - None Service - None	Current \$57,500 Survey - None Service - None

Area 6 High Level		22 wells submitted			
		1	2	4	3
	Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods
1	0-1199	Current \$5,100 Survey - None Service \$ - None	Current \$14,400 Survey \$26,342(10) Service - None	Current \$16,000 Survey \$18,065(5) Service - None	Current \$26,800 Survey - None Service - None
2	1200-1999	Current \$5,100 Survey - None Service \$ - None	Current \$16,100 Survey - None Service - None	Current \$30,000 Survey - None Service - None	Current \$30,800 Survey \$96,903(2) Service - None
3	2000-2499	Current \$5,100 Survey - None Service \$ - None	Current \$17,400 Survey - None Service - None	Current \$38,200 Survey - None Service - None	Current \$43,300 Survey \$15,115(2) Service - None
4	2500-2999	Current \$5,100 Survey - None Service \$ - None	Current \$19,700 Survey \$69,453(3) Service - None	Current \$45,700 Survey - None Service - None	Current \$50,600 Survey - None Service - None
5	3000+	Current \$5,100 Survey - None Service - None	Current \$23,200 Survey - None Service - None	Current \$55,200 Survey - None Service - None	Current \$59,800 Survey - None Service - None

	Current	Survey Supplied	Service Companies
<b>Groundwater Protection Cost</b>	\$16,700.00	\$32,807 (45 wells)	\$79,868 (6 wells)
<b>Vent Flow/Gas Migration Cost</b>	\$32,000.00	\$57,795 (60 wells)	\$68,298 (6 wells)

The April 2005 edition of *Directive 011* contained the following costs:

**Area 1. Medicine Hat**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$7,200	\$13,700	\$20,600	\$21,200
1200-1999	\$7,200	\$14,200	\$21,700	\$26,000
2000-2499	\$7,600	\$15,200	\$29,300	\$30,300
2500-2999	\$8,300	\$17,000	\$32,300	\$35,000
3000 +	\$8,300	\$20,800	\$48,200	\$51,700

**Area 2. Calgary/Edmonton**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$7,200	\$13,700	\$20,600	\$21,200
1200-1999	\$7,200	\$14,200	\$21,700	\$26,000
2000-2499	\$7,600	\$15,200	\$29,300	\$30,300
2500-2999	\$8,300	\$17,000	\$32,300	\$35,000
3000 +	\$8,300	\$20,800	\$48,200	\$51,700

**Area 3. Drayton Valley/Grand Prairie**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$8,000	\$14,000	\$23,900	\$25,200
1200-1999	\$8,500	\$15,600	\$29,700	\$32,900
2000-2499	\$8,500	\$18,900	\$35,200	\$39,000
2500-2999	\$8,600	\$19,400	\$49,400	\$53,000
3000 +	\$8,800	\$24,300	\$54,700	\$60,000

**Area 4. Lloydminster**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$7,200	\$13,700	\$20,600	\$21,200
1200-1999	\$7,200	\$14,200	\$21,700	\$26,000
2000-2499	\$7,600	\$15,200	\$29,300	\$30,300
2500-2999	\$8,300	\$17,000	\$32,300	\$35,000
3000 +	\$8,300	\$20,800	\$48,200	\$51,700

**Area 5. Athabasca/Peace River**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$7,200	\$13,700	\$20,600	\$21,200
1200-1999	\$7,200	\$14,200	\$21,700	\$26,000
2000-2499	\$7,600	\$15,200	\$29,300	\$30,300
2500-2999	\$8,300	\$17,000	\$32,300	\$35,000
3000 +	\$8,300	\$20,800	\$48,200	\$51,700

**Area 6. High Level**

Depth (m)	Empty not perforated	Empty perforated	Tubing only	Tubing & rods
0-1199	\$10,800	\$15,000	\$23,900	\$25,100
1200-1999	\$11,200	\$17,000	\$33,200	\$36,400
2000-2499	\$11,500	\$18,200	\$35,000	\$38,600
2500-2999	\$12,000	\$20,000	\$44,900	\$49,100
3000 +	\$12,600	\$23,200	\$55,200	\$59,900

Where applicable, the following parameters are to be applied:

- Groundwater protection cost \$25,300
- Vent flow repair cost \$30,900
- Gas migration cost \$33,000
- Multiple event sequence factor 0.25%

### Appendix 3 2006 Industry Cost Surveys

The records do not indicate the number of companies that provided information, but data was submitted for approximately 1800 wells.

Area 1 Medicine Hat					
	1	2	4	3	
Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods	
1	0-1199	Current \$7,200 Survey - \$21,415 (26)	Current \$13,700 Survey \$18,505 (51)	Current \$20,600 Survey \$25,939 (194)	Current \$21,200 Survey \$22,120 (121)
2	1200-1999	Current \$7,200 Survey - \$34,716 (1)	Current \$14,200 Survey \$32,378 (7)	Current \$21,700 Survey - \$33,752 (8)	Current \$26,000 Survey \$61,638 (5)
3	2000-2499	Current \$7,600 Survey - None	Current \$15,200 Survey - None	Current \$29,300 Survey - \$20,989 (1)	Current \$30,300 Survey - \$40,891 (1)
4	2500-2999	Current \$8,300 Survey - None	Current \$17,000 Survey - None	Current \$32,300 Survey - None	Current \$35,000 Survey - None
5	3000+	Current \$8,300 Survey - None	Current \$20,800 Survey - None	Current \$48,200 Survey - None	Current \$51,700 Survey - None

Area 2 Calgary/ Edmonton					
	1	2	4	3	
Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods	
1	0-1199	Current \$7,200 Survey - \$14,533 (12)	Current \$13,700 Survey \$18,040 (39)	Current \$20,600 Survey \$24,365 (76)	Current \$21,200 Survey \$30,733 (87)
2	1200-1999	Current \$7,200 Survey - \$36,040 (5)	Current \$14,200 Survey \$28,426 (33)	Current \$21,700 Survey - 48,516 (72)	Current \$26,000 Survey \$38,772 (37)
3	2000-2499	Current \$7,600 Survey - \$55,455 (3)	Current \$15,200 Survey - \$40,678 (10)	Current \$29,300 Survey - \$72,914 (56)	Current \$30,300 Survey - \$82,6923 (24)
4	2500-2999	Current \$8,300 Survey - None	Current \$17,000 Survey - \$41,883 (5)	Current \$32,300 Survey - \$106,854 (7)	Current \$35,000 Survey - \$146,642 (4)
5	3000+	Current \$8,300 Survey - \$159,342 (2)	Current \$20,800 Survey - \$31847 (1)	Current \$48,200 Survey - \$19,900 (1)	Current \$51,700 Survey - \$104,400 (1)

Area 3 Drayton Valley/ Grande Prairie					
	1	2	4	3	
Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods	
1	0-1199	Current \$8,000 Survey - 26,082 (6)	Current \$14,000 Survey \$29,537 (13)	Current \$23,900 Survey \$19,448 (4)	Current \$5,200 Survey \$22,349 (3)
2	1200-1999	Current \$8,500 Survey - \$17,454 (6)	Current \$15,600 Survey \$34,331 (33)	Current \$29,700 Survey - \$52,333 (32)	Current \$32,900 Survey \$53,044 (15)
3	2000-2499	Current \$8,500 Survey - \$17,337 (4)	Current \$18,900 Survey -\$48,560 (46)	Current \$35,200 Survey - \$74,033 (22)	Current \$39,000 Survey - \$61,468 (13)
4	2500-2999	Current \$8,600 Survey - \$63,091 (3)	Current \$19,400 Survey - \$38,336 (14)	Current \$49,400 Survey - \$100,995 (5)	Current \$53,000 Survey - \$79,566 (5)
5	3000+	Current \$8,800 Survey - \$10,119 (2)	Current \$24,300 Survey - \$77,482 (13)	Current \$54,700 Survey - \$134,785 (11)	Current \$60,000 Survey - \$91,531 (5)

Area 4 Lloydminster					
	1	2	4	3	
Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods	
1	0-1199	Current \$7,200 Survey - \$12,751 (17)	Current \$13,700 Survey \$33,655 (45)	Current \$20,600 Survey \$28,510 (79)	Current \$21,200 Survey \$24,093 (193)
2	1200-1999	Current \$7,200 Survey - None	Current \$14,200 Survey \$68,569 (2)	Current \$21,700 Survey - \$3,678 (1)	Current \$26,000 Survey \$55,628 (2)
3	2000-2499	Current \$7,600 Survey - None	Current \$15,200 Survey - \$34,000 (1)	Current \$29,300 Survey - None	Current \$30,300 Survey - None
4	2500-2999	Current \$8,300 Survey - \$21,800 (1)	Current \$17,000 Survey - None	Current \$32,300 Survey - None	Current \$35,000 Survey - None
5	3000+	Current \$8,300 Survey - None	Current \$20,800 Survey - None	Current \$48,200 Survey - None	Current \$51,700 Survey - None

Area 5 Athabasca/ Peace River					
	1	2	4	3	
Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods	
1	0-1199	Current \$7,200 Survey - \$21,100 (34)	Current \$13,700 Survey \$32,064 (85)	Current \$20,600 Survey \$28,508 (121)	Current \$21,200 Survey \$39,000 (3)
2	1200-1999	Current \$7,200 Survey - \$30,617 (5)	Current \$14,200 Survey \$35,262 (19)	Current \$21,700 Survey - \$63,996 (3)	Current \$26,000 Survey \$48,203 (25)
3	2000-2499	Current \$7,600 Survey - None	Current \$15,200 Survey - \$29,726 (1)	Current \$29,300 Survey - \$38,596 (2)	Current \$30,300 Survey - \$52,621 (7)
4	2500-2999	Current \$8,300 Survey - \$14,316 (1)	Current \$17,000 Survey - None	Current \$32,300 Survey - \$40,975 (5)	Current \$35,000 Survey - \$48,921 (7)
5	3000+	Current \$8,300 Survey - None	Current \$20,800 Survey - None	Current \$48,200 Survey - \$54,060 (5)	Current \$51,700 Survey - None

Area 6 High Level					
	1	2	4	3	
Depth	Empty/No perf	Empty/Perf	Tub. only	Tub.&Rods	
1	0-1199	Current \$10,800 Survey - \$21,300(11)	Current \$15,000 Survey \$23,481 (22)	Current \$23,900 Survey \$29,201 (14)	Current \$25,100 Survey - None
2	1200-1999	Current \$11,200 Survey - None	Current \$17,000 Survey \$44,524 (5)	Current \$33,200 Survey - None	Current \$36,400 Survey \$80,364 (4)
3	2000-2499	Current \$11,500 Survey - None	Current \$18,200 Survey - \$56,905 (3)	Current \$35,000 Survey - \$101,550 (1)	Current \$38,600 Survey - \$62,858 (2)
4	2500-2999	Current \$12,000 Survey - None	Current \$20,000 Survey - \$65,978 (2)	Current \$44,900 Survey - None	Current \$49,100 Survey - None
5	3000+	Current \$12,600 Survey - None	Current \$23,200 Survey - None	Current \$55,200 Survey - None	Current \$59,900 Survey - None



## Appendix 4 2008 Industry Cost Surveys

The records do not indicate the number of companies that provided information, but data was submitted for approximately 2100 wells.

Abandonment Area: Medicine Hat

Depth Category	Empty Not Perforated	Empty Perforated	Tubing Only	Tubing and Rods
0-1199	\$ 57,595.24	\$ 45,450.40	\$ 40,371.06	\$ 47,298.30
(# of Wells)	40	125	147	145
1200-1999	\$ 39,570.83	\$ 60,814.32	\$ 59,236.42	\$ 61,429.04
(# of Wells)	2	17	11	7
2000-2499	\$ 149,421.00	\$ 30,693.00	\$ 84,435.00	
(# of Wells)		1	2	1
2500-2999		\$ 105,809.85		
(# of Wells)			1	
3000+				
(# of Wells)				

Abandonment Area: Calgary/Edmonton

Depth Category	Empty Not Perforated	Empty Perforated	Tubing Only	Tubing and Rods
0-1199	\$ 47,839.93	\$ 45,104.57	\$ 40,238.67	
(# of Wells)	11	54	98	
1200-1999	\$ 34,519.40	\$ 37,084.77	\$ 61,269.38	
(# of Wells)	10	49	68	
2000-2499	\$ 18,255.74	\$ 60,654.29	\$ 69,847.39	\$ 95,737.17
(# of Wells)	2	17	14	18
2500-2999		\$ 40,033.20	\$ 97,101.00	\$ 222,810.75
(# of Wells)		5	2	4
3000+	\$ 63,980.38	\$ 320,707.67	\$ 19,900.00	\$ 104,400.00
(# of Wells)	4	3	1	1

Abandonment Area: Drayton Valley/Grande Prairie

Depth Category	Empty Not Perforated	Empty Perforated	Tubing Only	Tubing and Rods
0-1199	\$ 60,507.24	\$ 67,013.45	\$ 75,474.36	\$ 90,246.75
(# of Wells)	15	22	14	4
1200-1999	\$ 33,045.74	\$ 48,428.08	\$ 80,232.77	\$ 120,418.02
(# of Wells)	7	64	29	14
2000-2499	\$ 34,026.59	\$ 59,536.33	\$ 132,683.16	\$ 144,277.85
(# of Wells)	12	61	22	31
2500-2999	\$ 32,376.13	\$ 61,938.44	\$ 139,863.33	\$ 83,484.00
(# of Wells)	2	19	3	6
3000+	\$ 92,616.09	\$ 148,977.92	\$ 230,760.84	\$ 100,008.33
(# of Wells)	3	21	14	3

Abandonment Area: Lloydminster

Depth Category	Empty Not Perforated	Empty Perforated	Tubing Only	Tubing and Rods
0-1199	\$ 47,340.43	\$ 53,591.41	\$ 48,166.89	\$ 43,843.35
(# of Wells)	51	69	89	187
1200-1999	\$ 74,065.03	\$ 35,021.68		\$ 55,628.17
(# of Wells)	1	3		2
2000-2499	\$ 21,800.00	\$ 56,738.50		
(# of Wells)	1	2		
2500-2999				
(# of Wells)				
3000+		\$ 188,057.42		
(# of Wells)		1		

Abandonment Area: Athabasca/Peace River

Depth Category	Empty Not Perforated	Empty Perforated	Tubing Only	Tubing and Rods
0-1199	\$ 43,190.02	\$ 46,422.00	\$ 51,051.52	\$ 39,000.00
(# of Wells)	42	121	125	3
1200-1999	\$ 44,442.33	\$ 55,303.31	\$ 74,637.34	\$ 70,251.72
(# of Wells)	6	29	6	20
2000-2499	\$ 85,096.22	\$ 59,764.25	\$ 98,079.70	
(# of Wells)		5	4	10
2500-2999		\$ 301,366.67	\$ 134,779.71	
(# of Wells)			3	7
3000+		\$ 76,322.49		
(# of Wells)			2	

Abandonment Area: High Level

Depth Category	Empty Not Perforated	Empty Perforated	Tubing Only	Tubing and Rods
0-1199	\$ 160,085.64	\$ 71,827.78	\$ 106,918.99	
(# of Wells)	12	79	26	
1200-1999	\$ 9,595.00	\$ 104,278.43	\$ 10,339.00	\$ 144,143.31
(# of Wells)	1	17	1	9
2000-2499	\$ 119,311.67	\$ 116,063.50	\$ 62,497.50	
(# of Wells)		3	4	2
2500-2999	\$ 76,503.67			
(# of Wells)		6		
3000+				
(# of Wells)				



## Appendix 5 Consultant Cost Surveys

The consultant provided updated tables for costs for 2010, 2011 and 2012. They determined costs for wells within each category and depth plus the service costs. Cost estimate numbers for groundwater protection, gas migration, and vent flows were prepared separately. The figures were generated generically based on an average cost for the entire province.

2010:

Area 1. Medicine Hat									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,200.00	8.93%	\$16,600.00	0.00%	\$30,800.00	-1.60%	\$38,800.00	-2.51%	Cut & Cap costs increased
1200 - 1999	\$12,800.00	8.47%	\$17,600.00	0.00%	\$35,250.00	-2.08%	\$42,400.00	-2.30%	Service rig costs less than 2000meters decreased
2000 - 2499	\$13,100.00	8.26%	\$17,750.00	-0.84%	\$52,850.00	-0.28%	\$63,700.00	-0.31%	Rig costs over 2000meters remained unchanged
2500 - 2999	\$13,500.00	8.00%	\$19,200.00	-1.03%	\$57,300.00	-0.35%	\$71,650.00	-0.35%	Electric wireline costs decreased by +/- 18%
3000 +	\$13,800.00	7.81%	\$22,250.00	-1.55%	\$73,500.00	-0.54%	\$96,200.00	-0.41%	

Area 2. Calgary/Edmonton									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,700.00	13.39%	\$17,100.00	3.01%	\$35,000.00	1.45%	\$42,650.00	1.07%	Cut & Cap costs increased
1200 - 1999	\$13,300.00	12.71%	\$18,100.00	2.84%	\$40,000.00	1.27%	\$47,650.00	0.95%	Service rig costs remained unchanged
2000 - 2499	\$13,600.00	12.40%	\$18,150.00	1.40%	\$55,500.00	0.36%	\$65,850.00	0.38%	Electric wireline costs decreased by +/- 18%
2500 - 2999	\$14,000.00	12.00%	\$19,500.00	0.52%	\$60,350.00	0.08%	\$74,700.00	0.13%	
3000 +	\$14,300.00	11.72%	\$22,775.00	-0.55%	\$77,725.00	-0.22%	\$100,425.00	-0.17%	

Area 3. Drayton Valley/Grande Prairie									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,900.00	13.16%	\$17,400.00	2.96%	\$38,500.00	1.32%	\$46,150.00	0.98%	Cut & Cap costs increased
1200 - 1999	\$13,500.00	12.50%	\$18,400.00	2.79%	\$46,900.00	1.08%	\$51,150.00	0.89%	Service rig costs remained unchanged
2000 - 2499	\$13,800.00	12.20%	\$20,450.00	1.24%	\$56,500.00	0.36%	\$66,850.00	0.38%	Electric wireline costs decreased by +/- 18%
2500 - 2999	\$14,200.00	11.81%	\$22,550.00	3.92%	\$61,350.00	0.08%	\$75,700.00	0.13%	
3000 +	\$14,500.00	11.54%	\$26,100.00	-0.38%	\$79,000.00	-0.13%	\$101,700.00	-0.10%	

Area 4. Lloydminster									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,200.00	8.93%	\$16,600.00	0.00%	\$30,500.00	-1.61%	\$39,200.00	-2.49%	Cut & Cap costs increased
1200 - 1999	\$12,800.00	8.47%	\$17,600.00	0.00%	\$35,250.00	-2.08%	\$42,400.00	-2.30%	Service rig costs less than 2000meters decreased
2000 - 2499	\$13,100.00	8.26%	\$17,750.00	-0.84%	\$52,850.00	-0.28%	\$63,700.00	-0.31%	Rig costs over 2000meters remained unchanged
2500 - 2999	\$13,500.00	8.00%	\$19,200.00	-1.03%	\$57,300.00	-0.35%	\$71,650.00	-0.35%	Electric wireline costs decreased by +/- 18%
3000 +	\$13,800.00	7.81%	\$22,250.00	-1.55%	\$73,500.00	-0.54%	\$96,200.00	-0.41%	

Area 5. Athabasca/Peace River									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,900.00	13.16%	\$17,500.00	3.55%	\$38,100.00	1.60%	\$45,250.00	1.23%	Cut & Cap costs increased
1200 - 1999	\$13,500.00	12.50%	\$18,400.00	2.79%	\$46,400.00	1.09%	\$50,650.00	0.90%	Service rig costs remained unchanged
2000 - 2499	\$13,800.00	12.20%	\$19,050.00	1.33%	\$56,250.00	0.45%	\$66,600.00	0.30%	Electric wireline costs decreased by +/- 18%
2500 - 2999	\$14,200.00	11.81%	\$20,500.00	0.49%	\$61,100.00	0.16%	\$75,450.00	0.07%	
3000 +	\$14,500.00	11.54%	\$23,800.00	-0.42%	\$78,250.00	-0.19%	\$101,450.00	-0.15%	

Area 6. High Level									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$16,600.00	6.41%	\$24,650.00	-0.60%	\$49,300.00	-0.40%	\$55,500.00	-0.36%	Cut & Cap costs increased
1200 - 1999	\$16,900.00	6.29%	\$25,050.00	-0.99%	\$55,500.00	-0.54%	\$60,950.00	-0.41%	Service rig costs remained unchanged
2000 - 2499	\$17,200.00	6.17%	\$25,850.00	-1.34%	\$63,800.00	-0.62%	\$74,950.00	-0.46%	Electric wireline costs decreased by +/- 18%
2500 - 2999	\$17,800.00	5.95%	\$26,475.00	-1.94%	\$69,625.00	-0.82%	\$86,175.00	-0.61%	
3000 +	\$18,200.00	5.81%	\$26,800.00	-2.55%	\$86,400.00	4.60%	\$112,600.00	-0.62%	3000+ meter gas well rig costs were incorrect last year

	2010 Costs	Cost Change	Comments
Gas Migration	\$51,200.00	1.39%	Cut & Cap costs increased
Vent Flow (Avg. 3 attempts)	\$124,400.00	2.64%	Service rig costs remained unchanged
Vent Flow (1st attempt)	\$47,700.00	1.49%	Electric wireline costs decreased by +/- 18%
Vent Flow (extra attempts)	\$38,300.00	3.23%	Cementing costs increased by +/- 23%
Groundwater protection	\$30,900.00	1.64%	

Note: There are no Cut & Cap costs included in the above Gas Migration, Vent Flow and Groundwater protection costs as they are covered in the well abandonment estimates.

2011:

Area 1. Medicine Hat									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,550.00	2.87%	\$17,400.00	4.82%	\$33,495.00	8.75%	\$42,490.00	9.51%	Service rig cost increased by ~13%
1200 - 1999	\$13,150.00	2.73%	\$18,450.00	4.83%	\$38,488.00	9.19%	\$46,385.00	9.40%	Trucking costs increased by ~20%
2000 - 2499	\$13,450.00	2.67%	\$18,635.00	4.99%	\$58,105.00	9.94%	\$70,210.00	10.22%	Electric wireline costs increased by ~10%
2500 - 2999	\$13,850.00	2.59%	\$20,105.00	4.71%	\$63,080.00	10.09%	\$79,140.00	10.45%	Equipment rentals increased by ~10%
3000 +	\$14,150.00	2.54%	\$23,215.00	4.34%	\$81,230.00	10.52%	\$106,650.00	10.86%	
Area 2. Calgary/Edmonton									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$13,050.00	2.76%	\$17,900.00	4.68%	\$38,235.00	9.24%	\$46,715.00	9.53%	Service rig cost increased by ~13%
1200 - 1999	\$13,650.00	2.63%	\$18,950.00	4.70%	\$43,840.00	9.60%	\$52,320.00	9.80%	Trucking costs increased by ~20%
2000 - 2499	\$13,950.00	2.57%	\$19,075.00	5.10%	\$60,945.00	9.81%	\$72,500.00	10.10%	Electric wireline costs increased by ~10%
2500 - 2999	\$14,350.00	2.50%	\$20,485.00	5.05%	\$66,360.00	9.96%	\$82,420.00	10.33%	Equipment rentals increased by ~10%
3000 +	\$14,650.00	2.45%	\$23,863.00	4.78%	\$85,878.00	10.49%	\$111,298.00	10.83%	
Area 3. Drayton Valley/Grande Prairie									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$13,250.00	2.71%	\$18,200.00	4.60%	\$42,190.00	9.58%	\$50,670.00	9.79%	Service rig cost increased by ~13%
1200 - 1999	\$13,850.00	2.59%	\$19,250.00	4.62%	\$51,470.00	9.74%	\$56,275.00	10.02%	Trucking costs increased by ~20%
2000 - 2499	\$14,150.00	2.54%	\$21,375.00	4.52%	\$62,045.00	9.81%	\$73,600.00	10.10%	Electric wireline costs increased by ~10%
2500 - 2999	\$14,550.00	2.46%	\$23,535.00	4.37%	\$67,460.00	9.96%	\$83,520.00	10.33%	Equipment rentals increased by ~10%
3000 +	\$14,850.00	2.41%	\$27,190.00	4.18%	\$87,305.00	10.51%	\$112,725.00	10.84%	
Area 4. Lloydminster									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,550.00	2.87%	\$17,400.00	4.82%	\$33,165.00	8.74%	\$42,930.00	9.52%	Service rig cost increased by ~13%
1200 - 1999	\$13,150.00	2.73%	\$18,450.00	4.83%	\$38,488.00	9.19%	\$46,385.00	9.40%	Trucking costs increased by ~20%
2000 - 2499	\$13,450.00	2.67%	\$18,635.00	4.99%	\$58,105.00	9.94%	\$70,210.00	10.22%	Electric wireline costs increased by ~10%
2500 - 2999	\$13,850.00	2.59%	\$20,105.00	4.71%	\$63,080.00	10.09%	\$79,135.00	10.45%	Equipment rentals increased by ~10%
3000 +	\$14,150.00	2.54%	\$23,215.00	4.34%	\$81,230.00	10.52%	\$106,650.00	10.86%	
Area 5. Athabasca/Peace River									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$13,250.00	2.71%	\$18,260.00	4.34%	\$41,750.00	9.58%	\$49,630.00	9.68%	Service rig cost increased by ~13%
1200 - 1999	\$13,850.00	2.59%	\$19,200.00	4.35%	\$50,920.00	9.74%	\$55,725.00	10.02%	Trucking costs increased by ~20%
2000 - 2499	\$14,150.00	2.54%	\$19,975.00	4.86%	\$61,795.00	9.86%	\$73,350.00	10.14%	Electric wireline costs increased by ~10%
2500 - 2999	\$14,550.00	2.46%	\$21,485.00	4.80%	\$67,210.00	10.00%	\$83,270.00	10.36%	Equipment rentals increased by ~10%
3000 +	\$14,850.00	2.41%	\$24,890.00	4.58%	\$86,455.00	10.49%	\$112,475.00	10.87%	
Area 6. High Level									
Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$17,050.00	2.71%	\$25,535.00	3.59%	\$54,190.00	9.92%	\$61,030.00	9.96%	Service rig cost increased by ~13%
1200 - 1999	\$17,350.00	2.66%	\$25,975.00	3.69%	\$61,080.00	10.05%	\$67,120.00	10.12%	Trucking costs increased by ~20%
2000 - 2499	\$17,650.00	2.62%	\$26,815.00	3.73%	\$70,215.00	10.05%	\$82,630.00	10.25%	Electric wireline costs increased by ~10%
2500 - 2999	\$18,250.00	2.53%	\$27,523.00	3.96%	\$76,743.00	10.22%	\$95,218.00	10.49%	Equipment rentals increased by ~10%
3000 +	\$18,650.00	2.47%	\$27,930.00	4.22%	\$95,530.00	10.57%	\$124,960.00	10.98%	
		2011 Costs	Cost Change	Comments					
Gas Migration		\$57,475.00	12.26%	Service rig cost increased by ~13%					
Vent Flow (Avg. 3 attempts)		\$140,165.00	12.67%	Remedial cementing costs increased by ~20%					
Vent Flow (1st attempt)		\$53,625.00	12.42%	Trucking costs increased by ~20%					
Vent Flow (extra attempts)		\$43,220.00	12.85%	Electric wireline costs increased by ~10%					
Groundwater protection		\$34,845.00	12.77%	Equipment rentals increased by ~10%					

Note: There are no Cut & Cap costs included in the above Gas Migration, Vent Flow and Groundwater protection costs as they are covered in the well abandonment estimates.

2012:

**Area 1. Medicine Hat**

Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,800.00	1.99%	\$17,975.00	3.30%	\$36,384.00	8.63%	\$45,993.00	8.24%	Service rig cost increased by ~5%
1200 - 1999	\$13,400.00	1.90%	\$19,060.00	3.31%	\$41,790.00	8.58%	\$50,227.00	8.28%	Trucking costs increased by ~20%
2000 - 2499	\$13,700.00	1.86%	\$19,273.00	3.42%	\$62,606.00	7.75%	\$75,506.00	7.54%	Electric wireline costs increased by ~5%
2500 - 2999	\$14,100.00	1.81%	\$20,757.00	3.24%	\$67,950.00	7.72%	\$85,003.00	7.41%	Equipment rentals increased by ~5%
3000 +	\$14,400.00	1.77%	\$23,910.00	2.99%	\$87,240.00	7.40%	\$114,236.00	7.11%	

**Area 2. Calgary/Edmonton**

Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$13,300.00	1.92%	\$18,476.00	3.22%	\$41,361.00	8.18%	\$50,455.00	8.01%	Service rig cost increased by ~5%
1200 - 1999	\$13,900.00	1.83%	\$19,562.00	3.23%	\$47,411.00	8.15%	\$56,505.00	8.00%	Trucking costs increased by ~20%
2000 - 2499	\$14,200.00	1.79%	\$19,741.00	3.49%	\$65,782.00	7.94%	\$78,105.00	7.73%	Electric wireline costs increased by ~5%
2500 - 2999	\$14,600.00	1.74%	\$21,194.00	3.46%	\$71,588.00	7.88%	\$88,642.00	7.55%	Equipment rentals increased by ~5%
3000 +	\$14,900.00	1.71%	\$24,646.00	3.28%	\$92,451.00	7.65%	\$119,446.00	7.32%	

**Area 3. Drayton Valley/Grande Prairie**

Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$13,500.00	1.89%	\$18,776.00	3.16%	\$45,513.00	7.88%	\$54,608.00	7.77%	Service rig cost increased by ~5%
1200 - 1999	\$14,100.00	1.81%	\$19,862.00	3.18%	\$55,568.00	7.96%	\$60,658.00	7.79%	Trucking costs increased by ~20%
2000 - 2499	\$14,400.00	1.77%	\$22,041.00	3.12%	\$67,020.00	8.02%	\$79,343.00	7.80%	Electric wireline costs increased by ~5%
2500 - 2999	\$14,800.00	1.72%	\$24,244.00	3.01%	\$72,836.00	7.97%	\$89,880.00	7.61%	Equipment rentals increased by ~5%
3000 +	\$15,100.00	1.68%	\$27,975.00	2.89%	\$94,077.00	7.76%	\$121,072.00	7.40%	

**Area 4. Lloydminster**

Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$12,800.00	1.99%	\$17,975.00	3.30%	\$36,037.00	8.66%	\$46,455.00	8.21%	Service rig cost increased by ~5%
1200 - 1999	\$13,400.00	1.90%	\$19,060.00	3.31%	\$41,790.00	8.58%	\$50,227.00	8.28%	Trucking costs increased by ~20%
2000 - 2499	\$13,700.00	1.86%	\$19,273.00	3.42%	\$62,606.00	7.75%	\$75,506.00	7.54%	Electric wireline costs increased by ~5%
2500 - 2999	\$14,100.00	1.81%	\$20,757.00	3.24%	\$67,950.00	7.72%	\$85,003.00	7.42%	Equipment rentals increased by ~5%
3000 +	\$14,400.00	1.77%	\$23,910.00	2.99%	\$87,240.00	7.40%	\$114,236.00	7.11%	

**Area 5. Athabasca/Peace River**

Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$13,800.00	1.89%	\$18,807.00	3.00%	\$45,051.00	7.91%	\$53,426.00	7.65%	Service rig cost increased by ~5%
1200 - 1999	\$14,100.00	1.81%	\$19,776.00	3.00%	\$54,991.00	7.99%	\$60,081.00	7.82%	Trucking costs increased by ~20%
2000 - 2499	\$14,400.00	1.77%	\$20,641.00	3.33%	\$66,719.00	7.97%	\$79,043.00	7.76%	Electric wireline costs increased by ~5%
2500 - 2999	\$14,800.00	1.72%	\$22,194.00	3.30%	\$72,526.00	7.91%	\$89,579.00	7.58%	Equipment rentals increased by ~5%
3000 +	\$15,100.00	1.68%	\$25,675.00	3.15%	\$93,056.00	7.64%	\$120,772.00	7.38%	

**Area 6. High Level**

Depth (m)	Empty not perforated	Cost Change	Empty Perforated	Cost Change	Tubing Only	Cost Change	Tubing & Rods	Cost Change	Comments
0 - 1199	\$17,400.00	2.05%	\$26,172.00	2.49%	\$58,482.00	7.92%	\$65,814.00	7.84%	Service rig cost increased by ~5%
1200 - 1999	\$17,700.00	2.02%	\$26,641.00	2.56%	\$65,957.00	7.98%	\$72,493.00	8.01%	Trucking costs increased by ~20%
2000 - 2499	\$18,000.00	1.98%	\$27,510.00	2.59%	\$75,769.00	7.91%	\$89,069.00	7.79%	Electric wireline costs increased by ~5%
2500 - 2999	\$18,600.00	1.92%	\$28,278.00	2.74%	\$82,789.00	7.88%	\$102,453.00	7.60%	Equipment rentals increased by ~5%
3000 +	\$19,000.00	1.88%	\$28,744.00	2.91%	\$102,708.00	7.51%	\$134,177.00	7.38%	

	2012 Costs	Cost Change	Comments
Gas Migration	\$67,868.00	18.08%	Service rig cost increased by ~5%
Vent Flow (Avg. 3 attempts)	\$169,309.00	20.79%	Remedial cementing costs increased by ~40%
Vent Flow (1st attempt)	\$63,825.00	19.02%	Trucking costs increased by ~20%
Vent Flow (extra attempts)	\$52,682.00	21.89%	Electric wireline costs increased by ~5%
Groundwater protection	\$46,288.00	32.84%	Equipment rentals increased by ~5%

Note: There are no Cut & Cap costs included in the above Gas Migration, Vent Flow and Groundwater protection costs as they are covered in the well abandonment estimates.