Environmental Scan – Pipeline Industry

Prepared for Portage College

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In the following report, Hanover Research provides Portage College with an environmental scan of the oil and gas pipeline industry in Alberta. This report examines student application, enrolment, and completion data, analyzes labour market projections, reviews recent job openings, and presents the results of interviews with industry experts.

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Executive Summary and Key Findings

Introduction

In this report, Hanover Research presents an environmental scan of Alberta's oil and gas pipeline industry. This report assesses student demand for academic programs associated with the pipeline industry, evaluates labour market supply and demand for pipeline-related occupations, and describes employer perspectives. Accordingly, this report comprises three sections:

- **Section I: Student Demand** assesses potential student demand for pipeline-related programs by examining recent application, enrolment, and completion data published by the Learners Enrolment Reporting System (LERS). This section examines student demand trends for academic fields in environmental sciences, engineering technology, construction, and mechanical technology.
- **Section II: Labour Market Analysis** evaluates labour market supply and demand for workers in occupations associated with the pipeline industry, including engineers, technicians, construction workers, and other positions. This section examines employment projections generated by the Government of Alberta, reviews reports regarding oil and gas industry trends, and presents a scan of employment opportunities listed on the job search engine Indeed.
- **Section III: Interviews with Industry Experts** presents the results of interviews conducted with hiring managers regarding workforce needs, hiring outlook, and interest in the Portage College Pipeline Training Centre. Participating pipeline companies include Access Pipeline, Inter Pipeline, Pure Technologies, and Wajax Equipment.

Key Findings

- **Application and enrolment data suggest Alberta institutions have not kept pace with rising student demand for engineering and engineering technology programs.** Applications to pipeline-related engineering programs increased by 19.2 percent annually from 2010 to 2014, while enrolments increased by only 2.6 percent annually. Application data suggest particularly strong student demand for technologically-focused programs in civil engineering, electrical engineering, biomedicine, instrumentation, industrial production, occupational safety, petroleum, construction engineering, surveying, and drafting.
- **Data suggest rapidly increasing student demand for academic programs in mechanical technology.** Alberta institutions may struggle to keep pace with rising student demand for mechanical technology programs in the coming years. Applications to agricultural mechanics, heavy equipment maintenance, industrial mechanics, and stationary energy sources operator programs increased by 23.9 percent in recent years, while enrolments remained essentially stagnant.

- **Employment projections forecast considerable labour shortages for pipeline-related science, engineering, and technical occupations.** Alberta faced a shortage of 1,049 workers in these occupations in 2013 and is projected to encounter a shortage of 3,624 by 2023. Labour market demand for scientists, engineers, and technicians is expected to increase by 10.1 percent over the next 10 years, while the supply of qualified candidates is expected to increase by only 6.6 percent.
- **Alberta had a surplus of pipeline-related construction workers and equipment operators in 2013, but this condition is projected to reverse over the next decade.** Employment projections indicate that Alberta's pipeline industry benefitted from a surplus of approximately 1,200 qualified construction workers and equipment operators in 2013. However, Alberta is expected to face a shortage of over 5,000 workers by 2023. The province is expected to encounter the greatest shortages for heavy equipment operators and truck drivers, although shortages are projected for many other positions as well.
- **Survey data suggest that 54 percent of Canadian employers in the oil and gas industry are concerned with labour shortages for many positions,** including contractors, operators, oil field services, project managers, drilling engineers, and estimators. Hiring managers in the industry indicated that companies expect to grow their workforces substantially in the near future but expect difficulty in attracting qualified candidates. Reports indicate that a considerable portion of Canada's oil and gas workforce is nearing retirement and too few young people are entering the field to keep pace with rising labour demand.
- **A review of recent job vacancies suggests that pipeline companies are most interested in hiring engineers and technicians.** Of the 490 job postings examined for this report, 16.3 percent included "engineering" in the job title and 10.0 percent included "technician" or "technologist." Job listings also included opportunities in sales, construction, and project management.
- **Pipeline companies seeking technicians typically prefer candidates with a technical diploma and hands-on work experience in the pipeline industry.** As such, graduates of Portage College's Pipeline Training Centre may enjoy favorable job prospects upon completion of the program. Some hiring managers at pipeline companies indicated that they favor candidates with several years of work experience over recent graduates, however.
- **Two pipeline companies that participated in this study – Access Pipeline and Inter Pipeline – demonstrated strong interest in a control room training program.** Human resources representatives for these companies suggested that finding qualified candidates with pipeline control room experience is challenging, especially because these occupations do not require certification. As such, employers indicated that potential applicants and current employees would benefit from additional training in this area. Although not listed among Portage College's proposed topics, **research also suggests that employers desire candidates with training in non-destructive testing (NDT) methods.**

Section I: Student Demand

In this section, Hanover Research assesses student demand for academic programs associated with the pipeline industry in Alberta. This section examines student application, enrolment, and completion statistics for relevant programs as reported to the Learners Enrolment Reporting System (LERS).

Methodology

LERS tracks application, enrolment, and completion statistics using a system of numeric codes known as the Classification of Instructional Programs – 2011 (CIP 2011). The CIP system was initially devised by the U.S. Government's National Center for Education Statistics (NCES) in the early 1980s as a means of tracking postsecondary educational attainment.[1] The classification scheme was adopted by Statistics Canada in 2000 and subsequently updated in 2011.

The CIP system is a three-tier hierarchical arrangement that uses successive levels of disaggregation to classify academic disciplines. The system uses two-digit codes to denote the broadest category of academic programs, or "Series," and four- and six-digit codes to further classify academic programs into "Subseries" and "Instructional Program Classes," respectively.

To inform the selection of CIP codes, Hanover referred to the Alberta Rural Development Network's report, *Preliminary Inventory of Training, Professional Programs, Infrastructure and Expertise Related to Pipeline Construction and Maintenance in Alberta's Post Secondary Sector*, which includes a directory of programs and courses in Alberta related to the pipeline industry.[2] Hanover linked each program in the directory to a six-digit CIP code, generating a list of 42 relevant academic fields. An inquiry into the LERS database revealed data for 32 of these academic fields, which are identified in Figure 1.1 on the following page. To present data concisely, Hanover assigned each field to one of four categories:

- Environmental Sciences
- Engineering and Engineering Technology
- Construction
- Mechanical Technology

[1] "Classification of Instructional Programs (CIP) Canada 2011." Statistics Canada. http://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVDPage1&db=imdb&dis=2&adm=8&TVD=127939

[2] "Preliminary Inventory of Training, Professional Programs, Infrastructure and Expertise Related to Pipeline Construction and Maintenance in Alberta's Post Secondary Sector." Alberta Rural Development Network, December 3, 2013, pp. 26-29. http://www.portagecollege.ca/Documents/News/PiplineReportUpdatedDec3%20FinalARDN.pdf

Figure 1.1: Relevant CIP Codes to the Pipeline Industry

CATEGORY	CIP CODE AND FIELD
Environmental Sciences	03.0101 -- Natural resources/conservation, general
	03.0104 -- Environmental Science
	03.0199 -- Natural resources conservation and research, other
	03.0201 -- Natural resources management and policy, general
	03.0601 -- Wildlife, fish and wildlands science and management
	45.0702 -- Geographic information science and cartography
Engineering & Engineering Technology	14.0901 -- Computer engineering, general
	14.1401 -- Environmental/environmental health engineering
	15.0201 -- Civil engineering technology/technician
	15.0303 -- Electrical, electronic and communications engineering technology/technician
	15.0401 -- Biomedical technology/technician
	15.0404 -- Instrumentation technology/technician
	15.0699 -- Industrial production technologies/technicians, other
	15.0701 -- Occupational safety and health technology/technician
	15.0903 -- Petroleum technology/technician
	15.1001 -- Construction engineering technology/technician
	15.1102 -- Surveying technology/surveying
	15.1301 -- Drafting and design technology/technician, general
	15.1302 -- CAD/CADD drafting and/or design technology/technician
Construction	46.0000 -- Construction trades, general
	46.0201 -- Carpentry/carpenter
	46.0302 -- Electrician
	46.0502 -- Pipefitting/pipefitter and sprinkler fitter
	46.0503 -- Plumbing technology/plumber
	48.0508 -- Welding technology/welder
	48.0703 -- Cabinetmaking and millwork
	49.0202 -- Construction/heavy equipment/earthmoving equipment operation
Mechanical Technology	01.0205 -- Agricultural mechanics and equipment/machine technology
	47.0302 -- Heavy equipment maintenance technology/technician
	47.0303 -- Industrial mechanics and maintenance technology
	47.0501 -- Stationary energy sources installer and operator

Source: Statistics Canada[3]

Examining application, enrolment, and degree completion trends over a five-year period allows for an estimate of potential student demand for pipeline training programs. For instance, if applications and enrolments have increased over time for a specific program in a particular geographic region, it is reasonable to infer growth in student demand in the region. Conversely, if applications and enrolments have declined over the period, it is likely that demand is also decreasing. Accordingly, this report approximates student demand for pipeline industry training programs using application data for the six-year period from 2009 to 2014, and enrolment and completions data for the five-year period from 2008 to 2013.

[3] "Classification of Instructional Programs (CIP) Canada 2011," Op. cit.

Limitations

The student demand data presented in this section must be interpreted with a degree of caution. The three types of data used to assess student demand – applications, enrolments, and completions – do not necessarily facilitate one-to-one comparisons. For instance, while application and completion data represent individuals in a single cohort, enrolment data may include first-, second-, third-, and fourth-year students. Additionally, because students may submit applications to multiple institutions, application data do not reflect the actual number of students who have applied to study in a field.

Lastly, in some instances enrolments and conferrals may reflect the availability of, rather than demand for, programs in a given field. Postsecondary institutions often react slowly to shifting student and workforce demands, and, as a result, existing academic programs may not meet the demands of the contemporary economy.[4]

Applications, Enrolments, and Completions

The following figures present application, enrolment, and completion data for academic fields related to the pipeline industry. For each field, this section presents raw data and the compound annual growth rate (CAGR), which provides a smoothed measurement of annual growth that disregards year-to-year fluctuations in the data. This section also presents the ratio of applications to enrolments for each field over a four year period (2010 to 2013). Given that students may submit applications to multiple institutions, ratio values are best understood relative to one another.

Environmental Sciences

Data suggest modestly increasing student demand for academic programs in the environmental sciences, including natural resources conservation and management and geographic information science. Between 2010 and 2014, applications to environmental science programs increased by 3.7 percent. From 2009 to 2013, enrolments increased by 6.2 percent annually, and completions increased by 6.4 percent annually (Figure 1.2 and 1.3).

Enrolments and completions in Natural Resources/Conservation, General (CIP 03.0101) increased dramatically from 2009 to 2014. Enrolment grew from 58 in 2009 to 212 in 2013 for an average annual growth rate of 38.3 percent. Completions increased by 80.7 percent annually, from six in 2009 to 64 in 2013. Applications have grown only slightly since 2010, however. The ratio of applications to enrolments from 2010 to 2013 was 1.1:1, suggesting that institutions adequately expanded natural resources/conservation programs to meet rising student demand.

[4] Kebbel, G. "Can Slow-Moving Universities Adapt Quickly Enough to Teach in the Digital Age." *Public Broadcasting Service,* August 28, 2013. http://www.pbs.org/mediashift/2013/08/can-slow-moving-universities-adapt-quickly-enough-to-teach-in-digital-age/

Figure 1.2: Applications and Enrolments for Environmental Sciences Fields, 2009-2014

Field	Applications/ Enrolments	Year						Total	CAGR	Ratio
		2009	2010	2011	2012	2013	2014			
03.0101: Natural resources/conservation, general	Applications	--	170	185	189	218	191	953	3.0%	1.10
	Enrolments	58	117	173	190	212	--	750	38.3%	
03.0104: Environmental science	Applications	--	477	419	593	638	606	2,733	6.2%	1.11
	Enrolments	460	474	453	463	523	--	2,373	3.3%	
03.0199: Natural resources conservation and research, other	Applications	--	135	107	133	125	119	619	-3.1%	0.56
	Enrolments	216	227	221	225	223	--	1,112	0.8%	
03.0201: Natural resources management and policy, general	Applications	--	151	162	154	133	163	763	1.9%	1.16
	Enrolments	119	114	123	133	146	--	635	5.2%	
03.0601: Wildlife, fish and wildlands science and management	Applications	--	84	84	88	79	85	420	0.3%	1.35
	Enrolments	57	60	48	71	70	--	306	5.3%	
45.0702: Geographic information science and cartography	Applications	--	170	147	157	160	211	845	5.6%	0.58
	Enrolments	220	253	287	281	265	--	1,306	4.8%	
Total	**Applications**	--	**1,187**	**1,104**	**1,314**	**1,353**	**1,375**	**6,333**	**3.7%**	**0.93**
	Enrolments	**1,130**	**1,245**	**1,305**	**1,363**	**1,439**	--	**6,482**	**6.2%**	

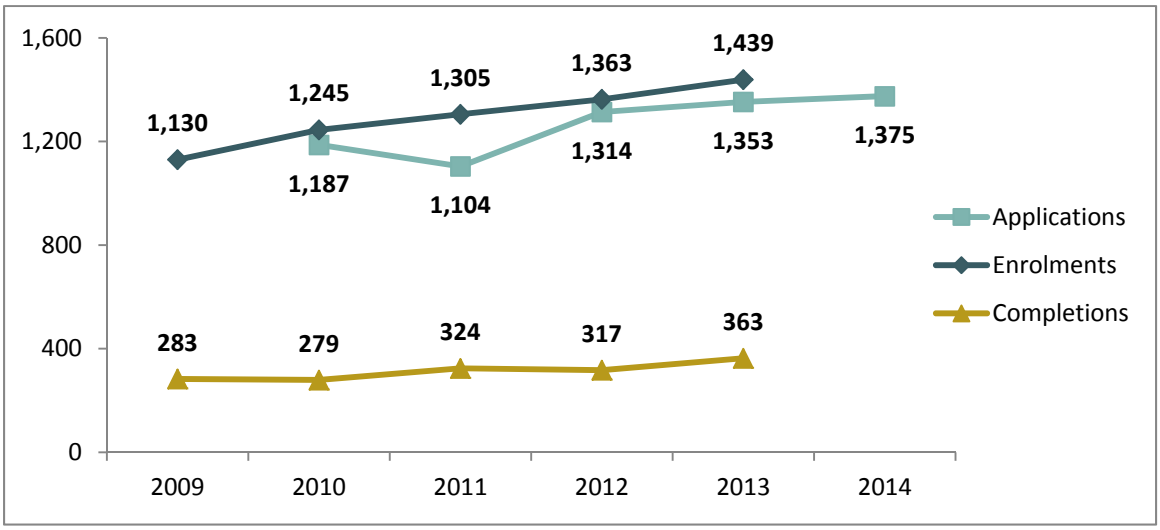
Source: LERS

Figure 1.3: Completions for Environmental Sciences Fields, 2009-2013

Field	Year					Total	CAGR
	2009	2010	2011	2012	2013		
03.0101: Natural resources/conservation, general	6	17	47	47	64	181	80.7%
03.0104: Environmental science	101	120	123	109	106	559	1.2%
03.0199: Natural resources conservation and research, other	77	64	69	69	72	351	-1.7%
03.0201: Natural resources management and policy, general	30	25	24	30	41	150	8.1%
03.0601: Wildlife, fish and wildlands science and management	26	24	22	26	30	128	3.6%
45.0702: Geographic information science and cartography	43	29	39	36	50	197	3.8%
Total	**283**	**279**	**324**	**317**	**363**	**1,566**	**6.4%**

Source: LERS

Figure 1.4: Applications, Enrolments, and Completions in Environmental Sciences Fields



Source: LERS

Engineering & Engineering Technology

Application and enrolment data suggest that Alberta institutions have not kept pace with rising student demand for engineering and engineering technology programs. Applications to engineering programs related to the pipeline industry increased by 19.2 percent annually from 2010 to 2014. Meanwhile, enrolments in these fields increased at an average annual rate of only 2.6 percent from 2009 to 2013. Completions also increased at a modest rate of 3.2 percent annually (Figures 1.5 and 1.6).

Application data suggest rapidly increasing student demand for academic programs in civil engineering, electrical engineering, biomedical, instrumentation, industrial production, occupational safety, petroleum, construction engineering, surveying, and drafting technologies. Aside from Instrumentation Technology (CIP 15.0404), however, enrolments in these fields have increased only slightly or decreased in recent years. These trends suggest the existence of unmet student demand for several engineering and engineering technology fields.

Figure 1.5: Applications and Enrolments for Engineering Fields, 2009-2014

Field	Applications/ Enrolments	Year						Total	CAGR	Ratio
		2009	*2010*	*2011*	*2012*	*2013*	*2014*			
14.0901: Computer engineering, general	Applications	--	161	125	117	91	94	588	-12.6%	0.74
	Enrolments	227	202	190	146	127	--	892	-13.5%	
14.1401: Environmental/ environmental health engineering	Applications	--	63	62	61	64	63	313	0.0%	0.50
	Enrolments	141	137	129	121	118	--	646	-4.4%	
15.0201: Civil engineering technology	Applications	--	746	769	767	917	1,354	4,553	16.1%	1.06
	Enrolments	692	695	634	815	888	--	3,724	6.4%	

Field	Applications/ Enrolments	Year						Total	CAGR	Ratio
		2009	2010	2011	2012	2013	2014			
15.0303: Electrical, electronic and communications engineering technology	Applications	--	749	782	739	950	1,414	4,634	17.2%	1.59
	Enrolments	572	511	527	496	491	--	2,597	-3.7%	
15.0401: Biomedical technology	Applications	--	118	132	132	160	246	788	20.2%	3.45
	Enrolments	45	37	42	38	40	--	202	-2.9%	
15.0404: Instrumentation technology	Applications	--	469	488	526	658	889	3,030	17.3%	0.44
	Enrolments	572	1,273	1,246	1,172	1,173	--	5,436	19.7%	
15.0699: Industrial production technologies, other	Applications	--	64	94	83	115	209	565	34.4%	1.83
	Enrolments	50	48	50	45	52	--	245	1.0%	
15.0701: Occupational safety and health technology	Applications	--	146	151	171	249	347	1,064	24.2%	2.62
	Enrolments	0	78	63	63	70	--	274	--	
15.0903: Petroleum technology	Applications	--	924	908	1,022	1,644	2,422	6,920	27.2%	1.50
	Enrolments	1,073	747	805	701	755	--	4,081	-8.4%	
15.1001: Construction engineering technology	Applications	--	176	226	273	263	387	1,325	21.8%	1.90
	Enrolments	132	124	129	124	117	--	626	-3.0%	
15.1102: Surveying technology/surveying	Applications	--	220	216	220	291	462	1,409	20.4%	0.59
	Enrolments	401	336	328	468	470	--	2,003	4.0%	
15.1301: Drafting and design technology, general	Applications	--	439	430	502	537	773	2,681	15.2%	0.96
	Enrolments	419	543	408	480	549	--	2,399	7.0%	
15.1302: CAD/CADD drafting and/or design technology	Applications	--	36	33	40	27	46	182	6.3%	0.04
	Enrolments	1,052	584	530	841	1,096	--	4,103	1.0%	
Total	**Applications**	**--**	**4,311**	**4,416**	**4,653**	**5,966**	**8,706**	**28,052**	**19.2%**	**0.89**
	Enrolments	**5,376**	**5,315**	**5,081**	**5,510**	**5,946**	**--**	**27,228**	**2.6%**	

Source: LERS

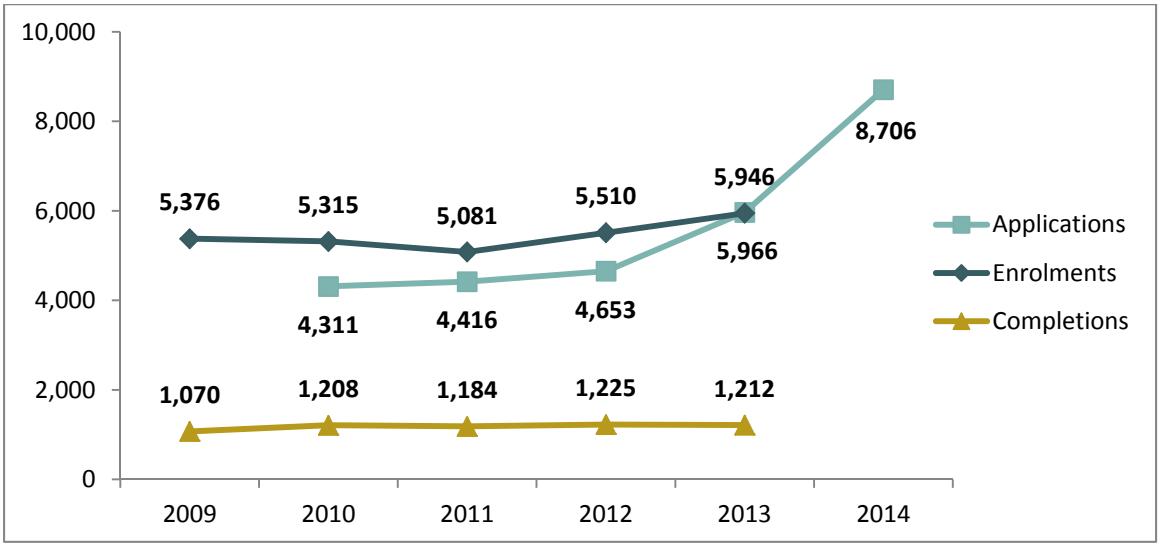
Figure 1.6: Completions for Engineering Fields, 2009-2013

Field	Year					Total	CAGR
	2009	2010	2011	2012	2013		
14.0901: Computer engineering, general	50	38	56	43	30	217	-12.0%
14.1401: Environmental/environmental health engineering	32	35	37	31	30	165	-1.6%
15.0201: Civil engineering technology	121	125	117	136	151	650	5.7%
15.0303: Electrical, electronic and communications engineering technology	160	144	166	187	167	824	1.1%
15.0401: Biomedical technology	22	17	18	17	15	89	-9.1%
15.0404: Instrumentation technology	270	399	392	349	323	1,733	4.6%
15.0699: Industrial production technologies, other	21	16	17	10	16	80	-6.6%
15.0701: Occupational safety and health technology	0	53	35	29	28	145	--
15.0903: Petroleum technology	193	157	152	200	187	889	-0.8%

Field	Year					Total	CAGR
	2009	*2010*	*2011*	*2012*	*2013*		
15.1001: Construction engineering technology	52	57	46	58	52	265	0.0%
15.1102: Surveying technology/surveying	79	84	80	75	88	406	2.7%
15.1301: Drafting and design technology, general	48	66	43	55	64	276	7.5%
15.1302: CAD/CADD drafting and/or design technology	22	17	25	35	61	160	29.0%
Total	**1,070**	**1,208**	**1,184**	**1,225**	**1,212**	**5,899**	**3.2%**

Source: LERS

Figure 1.7: Applications, Enrolments, and Completions in Engineering Fields



Source: LERS

Construction

Application data suggest increasing student demand for electrician and welder training programs and decreasing student demand for other construction fields. From 2010 to 2014, applications to Electrician (CIP 46.0302) programs increased by 18.8 percent annually, and applications to Welding Technology/Welder (CIP 48.0508) programs increased by 21 percent annually. In contrast, applications to Carpentry (CIP 46.0201), Plumbing Technology/Plumber (CIP 46.0503), Cabinetmaking and Millwork (CIP 48.0703), and Construction/Heavy Equipment/Earthmoving Equipment Operation (CIP 49.0202) programs decreased from 2009 to 2013. Overall, applications to construction programs increased while enrolments decreased. Given that the number of enrolled students exceeds the number applications by a wide margin, however, these data suggest that institutions are meeting student demand for construction programs (Figures 1.8 and 1.9).

Figure 1.8: Applications and Enrolments for Construction Fields, 2009-2014

Field	Applications/ Enrolments	Year						Total	CAGR	Ratio
		2009	2010	2011	2012	2013	2014			
46.0000: Construction trades, general	Applications	--	16	13	19	0	17	65	1.5%	0.62
	Enrolments	21	22	20	20	16	--	99	-6.6%	
46.0201: Carpentry	Applications	--	104	150	124	82	78	538	-6.9%	0.05
	Enrolments	2,499	2,154	2,426	2,138	2,007	--	11,224	-5.3%	
46.0302: Electrician	Applications	--	183	262	285	266	364	1,360	18.8%	0.04
	Enrolments	6,797	6,026	5,965	5,633	5,958	--	30,379	-3.2%	
46.0502: Pipefitting/pipefitter and sprinkler fitter	Applications	--	0	7	34	5	1	47	--	0.01
	Enrolments	1,973	1,672	1,571	1,574	1,728	--	8,518	-3.3%	
46.0503: Plumbing technology/plumber	Applications	--	65	58	46	47	54	270	-4.5%	0.03
	Enrolments	2,555	2,368	2,301	1,951	1,880	--	11,055	-7.4%	
48.0508: Welding technology/welder	Applications	--	238	250	313	476	510	1,787	21.0%	0.10
	Enrolments	4,530	3,458	2,686	2,689	3,542	--	16,905	-6.0%	
48.0703: Cabinetmaking and millwork	Applications	--	163	175	187	144	128	797	-5.9%	0.62
	Enrolments	310	289	282	267	235	--	1,383	-6.7%	
49.0202: Construction/heavy equipment/ earthmoving equipment operation	Applications	--	112	26	48	86	74	346	-9.8%	0.63
	Enrolments	82	73	38	113	208	--	514	26.2%	
Total	**Applications**	**--**	**881**	**941**	**1,056**	**1,106**	**1,226**	**5,210**	**8.6%**	**0.06**
	Enrolments	**18,767**	**16,062**	**15,289**	**14,385**	**15,574**	**--**	**80,077**	**-4.6%**	

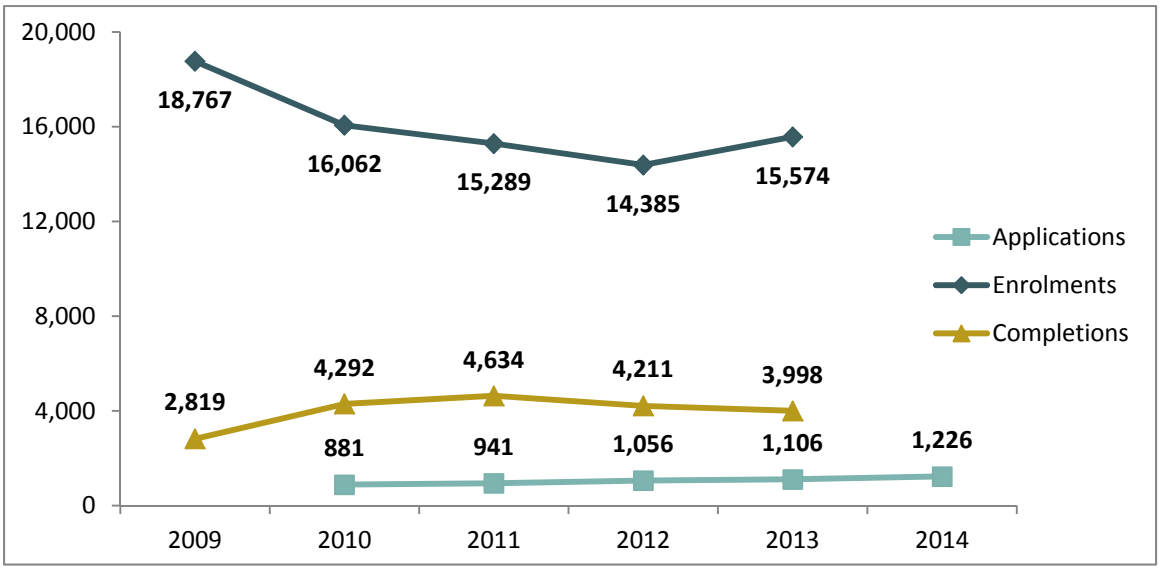
Source: LERS

Figure 1.9: Completions for Construction Fields, 2009-2013

Field	Year					Total	CAGR
	2009	2010	2011	2012	2013		
46.0000: Construction trades, general	13	9	1	15	11	49	-4.1%
46.0201: Carpentry	261	440	648	636	555	2,540	20.8%
46.0302: Electrician	832	1,384	1,633	1,484	1,447	6,780	14.8%
46.0502: Pipefitting/pipefitter and sprinkler fitter	375	398	553	490	488	2,304	6.8%
46.0503: Plumbing technology/plumber	287	488	651	550	523	2,499	16.2%
48.0508: Welding technology/welder	914	1,433	1,004	860	826	5,037	-2.5%
48.0703: Cabinetmaking and millwork	86	92	123	138	105	544	5.1%
49.0202: Construction/heavy equipment/earthmoving equipment operation	51	48	21	38	43	201	-4.2%
Total	**2,819**	**4,292**	**4,634**	**4,211**	**3,998**	**19,954**	**9.1%**

Source: LERS

Figure 1.10: Applications, Enrolments, and Completions in Construction Fields



Source: LERS

Mechanical Technology

Data indicate that applications to mechanical technology programs increased over the previous five years while enrolments remained stagnant. Application data suggest rapid growth in student demand for programs in Agricultural Mechanics and Equipment/Machine Technology (CIP 01.0205), Industrial Mechanics and Maintenance Technology (CIP 47.0303), and Stationary Energy Sources Installer and Operator (CIP 47.0501). Enrolments in these programs, however, have decreased or increased only modestly in recent years. Although the ratio of applications to enrolled students in mechanics and repair technology fields was 0.34 to 1 from 2010 to 2013, Alberta institutions may struggle to meet rising student demand in the coming years (Figures 1.11 and 1.12).

Figure 1.11: Applications and Enrolments for Mechanical Technology Fields, 2009-2014

Field	Applications/ Enrolments	Year						Total	CAGR	Ratio
		2009	*2010*	*2011*	*2012*	*2013*	*2014*			
01.0205: Agricultural mechanics and equipment/machine technology	Applications	--	124	309	312	293	380	1,418	32.3%	0.29
	Enrolments	994	712	764	1,012	1,067	--	4,549	1.8%	
47.0302: Heavy equipment maintenance technology	Applications	--	234	272	335	353	367	1,561	11.9%	0.11
	Enrolments	2,900	2,744	2,480	2,479	2,800	--	13,403	-0.9%	
47.0303: Industrial mechanics and maintenance technology	Applications	--	147	152	172	252	336	1,059	23.0%	0.15
	Enrolments	1,410	1,271	1,110	1,115	1,179	--	6,085	-4.4%	

Field	Applications/ Enrolments	Year						Total	CAGR	Ratio
		2009	2010	2011	2012	2013	2014			
47.0501: Stationary energy sources installer and operator	Applications	--	1,126	1,469	1,668	2,243	2,759	9,265	25.1%	0.69
	Enrolments	2,153	2,404	2,106	2,188	2,752	--	11,603	6.3%	
Total	**Applications**	**--**	**1,631**	**2,202**	**2,487**	**3,141**	**3,842**	**13,303**	**23.9%**	**0.34**
	Enrolments	**7,457**	**7,131**	**6,460**	**6,794**	**7,798**	**--**	**35,640**	**1.1%**	

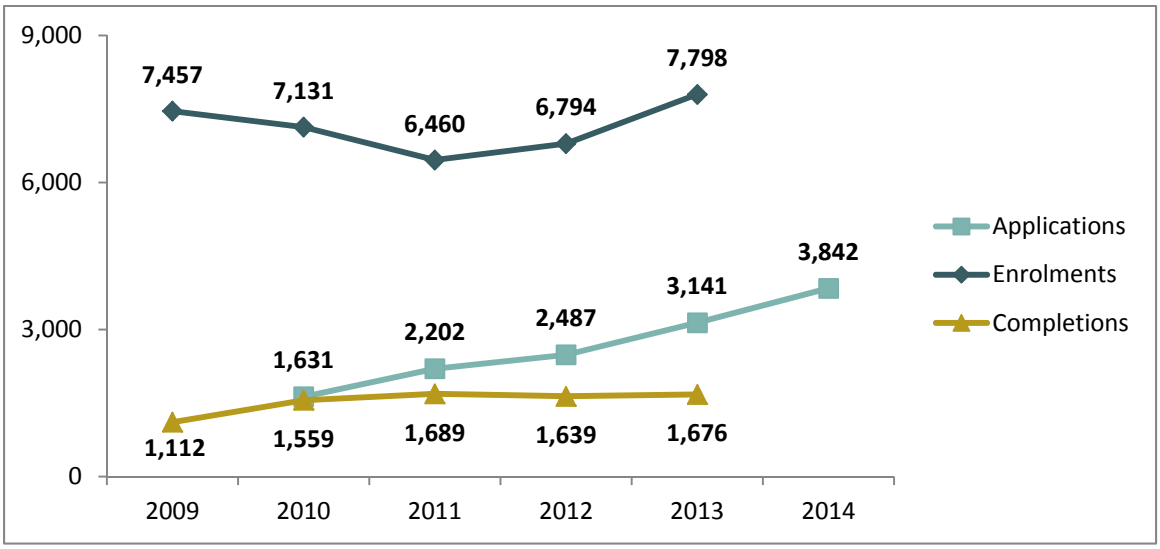
Source: LERS

Figure 1.12: Completions for Mechanics and Repair Technology Fields, 2009-2013

Field	Year					Total	CAGR
	2009	2010	2011	2012	2013		
01.0205: Agricultural mechanics and equipment/machine technology	50	73	55	54	74	306	10.3%
47.0302: Heavy equipment maintenance technology	400	661	758	728	657	3,204	13.2%
47.0303: Industrial mechanics and maintenance technology	275	324	387	309	373	1,668	7.9%
47.0501: Stationary energy sources installer and operator	387	501	489	548	572	2,497	10.3%
Total	**1,112**	**1,559**	**1,689**	**1,639**	**1,676**	**7,675**	**10.8%**

Source: LERS

Figure 1.13: Applications, Enrolments, and Completions in Construction Fields



Source: LERS

Section II: Labour Market Analysis

This section assesses labour market conditions in Alberta's pipeline industry. First, this section examines employment projections generated by the Government of Alberta for occupations associated with the pipeline industry. Then, this section summarizes results from recent reports and surveys to identify industry trends. Lastly, this section presents a scan of recent job vacancies listed on the job search engine Indeed.

Employment Projections

Methodology

The Government of Alberta tracks workforce and labour market statistics using a system of alpha-numeric codes known as the National Occupational Classification – Statistics 2001 (NOC-S 2001). Structurally similar to the CIP 2011 system described in the previous section, the NOC-S 2001 is based on the National Occupation Classification (NOC) system developed by Human Resources and Social Development Canada (HRSDC) and is designed to classify occupational information from statistical surveys and other sources.[5]

The NOC-S 2001 is a four-tier hierarchical arrangement that uses successive levels of disaggregation to classify occupations and industries. The system uses a single letter to denote the broadest categorization of occupations, or "Broad Occupational Categories," and a series of one-, two-, and three-digit extensions to narrow occupations to the more specific "Major Groups," "Minor Groups," and "Unit Groups."[6] For example, the occupation "Petroleum Engineer" is categorized in Broad Occupational Category C – Natural and Applied Sciences and Related Occupations; Major Group C0 – Professional Occupations in Natural and Applied Sciences; Minor Group C04 – Other Engineers; and Unit Group C045 – Petroleum Engineers.[7] A list of all NOC-S 2001 occupations assessed in this report is included as Figure 2.1 on the following page. The selection of occupations was derived from the Petroleum Labour Market Information's 2013 report titled *The Decade Ahead: Labour Market Outlook to 2022 for Canada's Oil and Gas Industry* (2013).[8]

[5] "National Occupational Classification (NOC) 2011: Introduction." Statistics Canada. http://www.statcan.gc.ca/subjects-sujets/standard-norme/noc-cnp/2011/introduction-eng.htm

[6] Ibid.

[7] "National Occupational Classification - Statistics (NOC-S) 2001 – Canada." Statistics Canada. http://www.statcan.gc.ca/subjects-sujets/standard-norme/soc-cnp/2001/noc2001-cnp2001-menu-eng.htm

[8] "The Decade Ahead: Labour Market Outlook to 2022 for Canada's Oil and Gas Industry." Petroleum Labour Market Information, 2013, pp. 48-49. http://www.iecbc.ca/sites/default/files/Enform%20Petroleum%20Labour%20Market%20Information%20canada_labour_market_outlook_to_2022_report_may_2013.pdf

Figure 2.1: Pipeline Industry Occupations

Broad Occupational Categories		Unit Group	
A	Management Occupations	A381	Primary Production Managers (Except Agriculture)
B	Business, Finance and Administrative Occupations	B315	Purchasing Agents and Officers
		B573	Production Clerks
C	Natural and Applied Sciences and Related Occupations	C013	Geologists, Geochemists and Geophysicists
		C031	Civil Engineers
		C032	Mechanical Engineers
		C033	Electrical and Electronics Engineers
		C034	Chemical Engineers
		C041	Industrial and Manufacturing Engineers
		C043	Mining Engineers
		C045	Petroleum Engineers
		C111	Chemical Technologists and Technicians
		C112	Geological and Mineral Technologists and Technicians
		C132	Mechanical Engineering Technologists and Technicians
		C133	Industrial Engineering and Manufacturing Technologists and Technicians
		C141	Electrical and Electronics Engineering Technologists and Technicians
		C143	Industrial Instrument Technicians and Mechanics
		C153	Drafting Technologists and Technicians
		C161	Nondestructive Testers and Inspectors
		C163	Inspectors in Public and Environmental Health and Occupational Health and Safety
E	Occupations in Social Science, Education, Government Service and Religion	E031	Natural and Applied Science Policy Researchers, Consultants and Program Officers
H	Trades, Transport and Equipment Operators and Related Occupations	H112	Steamfitters, Pipefitters and Sprinkler System Installers
		H143	Insulators
		H212	Industrial Electricians
		H221	Stationary Engineers and Auxiliary Equipment Operators
		H311	Machinists and Machining and Tooling Inspectors
		H326	Welders and Related Machine Operators
		H411	Construction Millwrights and Industrial Mechanics (Except Textile)
		H412	Heavy-Duty Equipment Mechanics
		H611	Heavy Equipment Operators (Except Crane)
		H621	Crane Operators
		H711	Truck Drivers
I	Occupations Unique to Primary Industry	I122	Supervisors, Oil and Gas Drilling and Service
		I132	Oil and Gas Well Drillers, Servicers, Testers and Related Workers
		I142	Oil and Gas Well Drilling Workers and Services Operators
		I215	Oil and Gas Drilling, Servicing and Related Labourers
J	Occupations Unique to Processing, Manufacturing and Utilities	J012	Supervisors, Petroleum, Gas and Chemical Processing and Utilities
		J112	Petroleum, Gas and Chemical Process Operators

Source: Statistics Canada[9]

[9] "National Occupational Classification - Statistics (NOC-S) 2001 – Canada," Op. cit.

To present data concisely, Hanover organized occupations into the following four categories, some of which include occupations from multiple Broad Occupational Categories:

- Management and Business Occupations
- Scientists, Engineers, and Technicians
- Construction Trades and Equipment Operators
- Occupations Specific to the Oil and Gas Industry

The statistics cited in this section are drawn from estimates and projections formulated by the Government of Alberta. In most instances, the methodology by which employment data have been collected, compiled, and analyzed is unavailable. Accordingly the figures referenced in this section are reproduced as reported by the Government of Alberta without further scrutiny by Hanover Research.

Management and Business Occupations

Employment projections suggest moderate growth for management and business occupations associated with the pipeline industry, with demand for workers outpacing supply (Figure 2.2). Projections indicate that Alberta will encounter a cumulative shortage of 567 employees in these occupations by 2023. In particular, demand for Primary Production Managers (NOC-S A381) is expected to increase by 5.7 percent by 2023 while supply is expected to increase by 1.3 percent, resulting in a projected shortage of 383 workers.

Figure 2.2: Labour Forecast for Management and Business Occupations, 2013-2023

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	*2018*	*2023*	*Number*	*Percent*
Primary Production Managers (Except Agriculture) (A381)	Demand Forecast	7,942	8,043	8,393	451	5.7%
	Supply Forecast	7,911	7,961	8,011	100	1.3%
	Cumulative Shortage	32	83	383	--	--
Purchasing Agents and Officers (B315)	Demand Forecast	7,012	7,387	7,780	768	11.0%
	Supply Forecast	7,041	7,338	7,694	653	9.3%
	Cumulative Shortage	71	149	186	--	--
Production Clerks (B573)	Demand Forecast	2,987	3,135	3,302	315	10.5%
	Supply Forecast	3,040	3,215	3,304	264	8.7%
	Cumulative Shortage	-53	-80	-2	--	--
Total	**Demand Forecast**	**17,941**	**18,565**	**19,475**	**1,534**	**8.6%**
	Supply Forecast	**17,992**	**18,514**	**19,009**	**1,017**	**5.7%**
	Cumulative Shortage	**50**	**152**	**567**	**--**	**--**

Source: Government of Alberta[10]

[10] "Alberta's Occupational Demand and Supply Outlook – 2013-2023." Government of Alberta, pp. 1-43. http://work.alberta.ca/documents/occupational-demand-and-supply-outlook-2013-2023.pdf

Scientists, Engineers, and Technicians

Employment projections forecast substantial labour shortages for science, engineering, and technical occupations associated with the pipeline industry (Figure 2.3). Projections indicate that Alberta faced a shortage of 1,049 workers in these occupations in 2013 and is expected to encounter a shortage of 3,624 by 2023. Demand for scientists, engineers, and technicians is expected to increase by 10.1 percent over the next 10 years, while the supply of workers is expected to increase by only 6.6 percent. Aside from Natural and Applied Science Policy Researchers, Consultants and Program Officers (NOC-S E031), the Government of Alberta predicts that each occupation in this category examined in this report will face a cumulative supply shortage in 2023.

The Government of Alberta has projected the steepest labour supply shortages for technicians, including Geological and Mineral Technologists and Technicians (NOC-S C112), Industrial Instrument Technicians and Mechanics (NOC-S C143), and Drafting Technologists and Technicians (NOC-S C153). The Government of Alberta predicts that each of these occupations will face a cumulative shortage of 200 workers or more in 2023 as demand outpaces supply. Demand for Geological and Mineral Technologists and Technicians (NOC-S C112), for instance, is projected to increase by 10.4 percent, while supply is projected to decrease by 1.5 percent, resulting in a net shortage of 483 workers. The province is also expected to face a shortage of 248 workers classified as Inspectors in Public and Environmental Health and Occupational Health and Safety (NOC-S C163) despite an increase in supply of 11.5 percent.

Shortages in the engineering occupations are also likely to affect the province. The province is projected to face the greatest supply shortages for Civil Engineers (NOC-S C031), Mechanical Engineers (NOC-S C032), and Petroleum Engineers (NOC-S C045). Demand for Petroleum Engineers (NOC-S C045) is projected to increase most dramatically, growing to 8.2 percent by 2023 while supply grows by only 3.3 percent. At these rates of growth, the province will face a cumulative shortage of approximately 500 petroleum engineers.

Figure 2.3: Labour Forecast for Scientists, Engineers, and Technicians, 2013-2023

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	*2018*	*2023*	*Number*	*Percent*
Geologists, Geochemists and Geophysicists (C013)	Demand Forecast	5,406	5,640	5,912	506	9.4%
	Supply Forecast	5,530	5,670	5,818	288	5.2%
	Cumulative Shortage	18	112	236	--	--
Civil Engineers (C031)	Demand Forecast	8,288	8,753	9,268	980	11.8%
	Supply Forecast	8,293	8,706	9,092	799	9.6%
	Cumulative Shortage	204	256	385	--	--
Mechanical Engineers (C032)	Demand Forecast	8,869	9,173	9,597	728	8.2%
	Supply Forecast	8,874	9,124	9,415	541	6.1%
	Cumulative Shortage	220	274	407	--	--

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	2018	2023	Number	Percent
Electrical and Electronics Engineers (C033)	Demand Forecast	4,750	4,912	5,147	397	8.4%
	Supply Forecast	4,752	4,886	5,049	297	6.3%
	Cumulative Shortage	118	146	218	--	--
Chemical Engineers (C034)	Demand Forecast	2,365	2,451	2,548	183	7.7%
	Supply Forecast	2,366	2,438	2,499	133	5.6%
	Cumulative Shortage	59	73	109	--	--
Mining Engineers (C043)	Demand Forecast	282	291	300	18	6.4%
	Supply Forecast	289	292	293	4	1.4%
	Cumulative Shortage	0	6	14	--	--
Petroleum Engineers (C045)	Demand Forecast	10,117	10,466	10,949	832	8.2%
	Supply Forecast	10,370	10,531	10,714	344	3.3%
	Cumulative Shortage	15	203	503	--	--
Chemical Technologists and Technicians (C111)	Demand Forecast	1,950	2,042	2,146	196	10.1%
	Supply Forecast	1,972	2,004	2,036	64	3.2%
	Cumulative Shortage	25	85	157	--	--
Geological and Mineral Technologists and Technicians (C112)	Demand Forecast	3,541	3,713	3,908	367	10.4%
	Supply Forecast	3,564	3,538	3,512	-52	-1.5%
	Cumulative Shortage	64	262	483	--	--
Mechanical Engineering Technologists and Technicians (C132)	Demand Forecast	1,307	1,378	1,444	137	10.5%
	Supply Forecast	1,331	1,350	1,380	49	3.7%
	Cumulative Shortage	12	64	100	--	--
Electrical and Electronics Engineering Technologists and Technicians (C141)	Demand Forecast	1,499	1,578	1,659	160	10.7%
	Supply Forecast	1,523	1,573	1,619	96	6.3%
	Cumulative Shortage	13	42	77	--	--
Industrial Instrument Technicians and Mechanics (C143)	Demand Forecast	4,142	4,331	4,490	348	8.4%
	Supply Forecast	4,210	4,319	4,382	172	4.1%
	Cumulative Shortage	36	116	212	--	--
Drafting Technologists and Technicians (C153)	Demand Forecast	6,021	6,287	6,606	585	9.7%
	Supply Forecast	5,977	6,167	6,366	389	6.5%
	Cumulative Shortage	189	265	385	--	--
Nondestructive Testers and Inspectors (C161)	Demand Forecast	3,888	4,070	4,269	381	9.8%
	Supply Forecast	3,974	4,106	4,270	296	7.4%
	Cumulative Shortage	9	59	94	--	--
Inspectors in Public and Environmental Health and Occupational Health and Safety (C163)	Demand Forecast	10,093	10,792	11,499	1,406	13.9%
	Supply Forecast	10,315	10,888	11,500	1,185	11.5%
	Cumulative Shortage	27	153	248	--	--
Natural and Applied Science Policy Researchers, Consultants and Program Officers (E031)	Demand Forecast	3,094	3,282	3,487	393	12.7%
	Supply Forecast	3,075	3,262	3,512	437	14.2%
	Cumulative Shortage	40	41	-4	--	--

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	2018	2023	Number	Percent
Total	Demand Forecast	75,612	79,159	83,229	7,617	10.1%
	Supply Forecast	76,415	78,854	81,457	5,042	6.6%
	Cumulative Shortage	1,049	2,157	3,624	--	--

Source: Government of Alberta[11]

Construction Trades and Equipment Operators

Construction trade and equipment operator occupations associated with the pipeline industry currently have a surplus of qualified candidates in Alberta, but this condition is projected to reverse in the coming years (Figure 2.4). Data indicate that the supply of construction workers and equipment operators exceeded market demand by approximately 1,200 employees in 2013. These occupations are projected to encounter a shortage of over 5,000 workers by 2023, however. This shortage results from rapidly increasing labour market demand coupled with modestly increasing supply.

The Government of Alberta forecasts particularly strong demand for Insulators (NOC-S H143), Welders and Related Machine Operators (NOC-S H326), Heavy-Duty Equipment Mechanics (NOC-S H412), and Heavy Equipment Operators (NOC-S H611). Demand for each of these occupations is projected to grow by 13 percent or more through 2023. The Government of Alberta also projects a cumulative shortage of 200 or more workers in each of the aforementioned occupations by 2023.

Of the construction trades and equipment operator occupations examined in this report, Heavy Equipment Operators (NOC-S H611) and Truck Drivers (H711) are projected to face the most dramatic labour shortages over the next decade. Although supply currently exceeds demand for both occupations, each is expected to face a shortage of over 1,500 workers by 2023.

Figure 2.4: Labour Forecast for Construction Trades and Equipment Operators, 2013-2023

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	2018	2023	Number	Percent
Steamfitters, Pipefitters and Sprinkler System Installers (H112)	Demand Forecast	7,573	8,112	8,469	896	11.8%
	Supply Forecast	8,058	8,268	8,551	493	6.1%
	Cumulative Shortage	-95	234	308	--	--
Insulators (H143)	Demand Forecast	3,452	3,794	3,989	537	15.6%
	Supply Forecast	3,623	3,730	3,861	238	6.6%
	Cumulative Shortage	-71	164	228	--	--
Industrial Electricians (H212)	Demand Forecast	6,039	6,263	6,483	444	7.4%
	Supply Forecast	6,103	6,116	6,285	182	3.0%
	Cumulative Shortage	36	247	298	--	--

[11] Ibid.

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	2018	2023	Number	Percent
Stationary Engineers and Auxiliary Equipment Operators (H221)	Demand Forecast	2,661	2,733	2,804	143	5.4%
	Supply Forecast	2,602	2,616	2,648	46	1.8%
	Cumulative Shortage	59	117	156	--	--
Machinists and Machining and Tooling Inspectors (H311)	Demand Forecast	7,681	7,930	8,319	638	8.3%
	Supply Forecast	7,843	8,009	8,189	346	4.4%
	Cumulative Shortage	-162	-79	130	--	--
Welders and Related Machine Operators (H326)	Demand Forecast	26,863	28,976	30,877	4,014	14.9%
	Supply Forecast	27,708	29,182	30,865	3,157	11.4%
	Cumulative Shortage	-445	194	412	--	--
Construction Millwrights and Industrial Mechanics (Except Textile) (H411)	Demand Forecast	11,860	12,286	12,856	996	8.4%
	Supply Forecast	12,197	12,552	12,849	652	5.3%
	Cumulative Shortage	-119	-48	225	--	--
Heavy-Duty Equipment Mechanics (H412)	Demand Forecast	14,998	15,838	17,057	2,059	13.7%
	Supply Forecast	15,424	16,181	17,048	1,624	10.5%
	Cumulative Shortage	-151	-68	284	--	--
Heavy Equipment Operators (Except Crane) (H611)	Demand Forecast	16,846	18,209	19,153	2,307	13.7%
	Supply Forecast	18,700	19,101	19,278	578	3.1%
	Cumulative Shortage	-154	808	1,575	--	--
Crane Operators (H621)	Demand Forecast	1,582	1,688	1,782	200	12.6%
	Supply Forecast	1,705	1,756	1,813	108	6.3%
	Cumulative Shortage	-23	32	69	--	--
Truck Drivers (H711)	Demand Forecast	43,241	44,042	47,699	4,458	10.3%
	Supply Forecast	45,423	47,002	48,113	2,690	5.9%
	Cumulative Shortage	-82	-860	1,686	--	--
Total	**Demand Forecast**	**142,796**	**149,871**	**159,488**	**16,692**	**11.7%**
	Supply Forecast	**149,386**	**154,513**	**159,500**	**10,114**	**6.8%**
	Cumulative Shortage	**-1,207**	**741**	**5,371**	**--**	**--**

Source: Government of Alberta[12]

Occupations Specific to the Oil and Gas Industry

Occupations specific to the oil and gas industry, such as well drillers, petroleum operators, and supervisors, are projected to face considerable labour supply shortages in the coming years (Figure 2.5). Like construction and equipment operator occupations, these occupations face rapidly increasing demand accompanied by modestly increasing supply over the next decade. Overall, the market for these occupations is projected to transition from a surplus of 683 workers in 2013 to a shortage of 3,809 workers in 2023. Demand for workers in occupations specific to the oil and gas industry is forecasted to increase by 7.3 percent by 2023, while supply is forecasted to increase by only 1.1 percent.

[12] Ibid.

Figure 2.5: Labour Forecast for Occupations Specific to the Oil and Gas Industry, 2013-2023

Unit Group (NOC-S 2001)	Measure	Year			Change, 2013-2023	
		2013	*2018*	*2023*	*Number*	*Percent*
Supervisors, Oil and Gas Drilling and Service (I122)	Demand Forecast	16,801	17,497	18,295	1,494	8.9%
	Supply Forecast	17,595	17,720	17,843	248	1.4%
	Cumulative Shortage	-329	242	917	--	--
Oil and Gas Well Drillers, Servicers, Testers and Related Workers (I132)	Demand Forecast	19,105	19,740	20,377	1,272	6.7%
	Supply Forecast	19,667	19,912	20,157	490	2.5%
	Cumulative Shortage	-43	347	739	--	--
Oil and Gas Well Drilling Workers and Services Operators (I142)	Demand Forecast	10,205	10,517	10,818	613	6.0%
	Supply Forecast	10,507	10,657	10,810	303	2.9%
	Cumulative Shortage	-25	137	285	--	--
Oil and Gas Drilling, Servicing and Related Labourers (I215)	Demand Forecast	5,393	5,621	5,849	456	8.5%
	Supply Forecast	6,560	6,399	6,082	-478	-7.3%
	Cumulative Shortage	-190	199	744	--	--
Supervisors, Petroleum, Gas and Chemical Processing and Utilities (J012)	Demand Forecast	3,866	3,959	4,054	188	4.9%
	Supply Forecast	3,901	3,971	4,045	144	3.7%
	Cumulative Shortage	-4	19	40	--	--
Petroleum, Gas and Chemical Process Operators (J112)	Demand Forecast	6,912	7,120	7,406	494	7.1%
	Supply Forecast	7,170	7,189	7,208	38	0.5%
	Cumulative Shortage	-92	97	364	--	--
Total	**Demand Forecast**	**62,282**	**64,454**	**66,799**	**4,517**	**7.3%**
	Supply Forecast	**65,400**	**65,848**	**66,145**	**745**	**1.1%**
	Cumulative Shortage	**-683**	**1,041**	**3,089**	**--**	**--**

Source: Government of Alberta[13]

Industry Trends

Survey data also suggest robust growth for Alberta's oil and gas industry. In response to a March 2014 survey administered by the Human Resources Institute of Alberta, 61 percent of oil and gas companies reported a net increase in employment over the last six months.[14] Additionally, 64 percent of respondents predicted that their company's hiring would increase over the next six months, and 40 percent of respondents predicted employment would increase by 5 percent or more.[15] Respondents from the oil and gas sector were more likely to report growth than respondents from any other industry.[16]

Other industry reports have pointed to growing concern regarding a potential shortage of skilled labour. A 2013 report by Hays Canada, an oil and gas industry recruitment company,

[13] Ibid.
[14] "Alberta HR Trends Report." *Human Resources Institute of Alberta,* March 2014, p. 3. http://origin.library.constantcontact.com/download/get/file/1101261529654-660/AB+HR+Trends+Report_Branded+FINAL.pdf
[15] Ibid., p. 5.
[16] Ibid., pp. 3-5.

found that **54 percent of Canadian employers in the industry expressed concern regarding skills shortages across a number of positions**, including contractors, operators, oil field services, project managers, drilling engineers, and estimators.[17] The Hays Canada report cited retirement rates as a major factor driving the labour shortage. Approximately 80 percent of Canada's oil and gas employees are over the age of 35, and 40 percent are over the age of 50. Although younger workers (under 35) make up over 30 percent of the oil and gas workforce worldwide, youth in Canada are not typically drawn to the industry.[18] A report in *Oilweek* suggests young peoples' concerns about negative environmental and social impacts may limit interest in the oil industry.[19]

In response to a 2014 survey of human resources managers in the Alberta oil and gas industry, 77 percent of respondents agreed that "a major HR concern for my company will be finding talent among technical and specialized workers."[20] Additionally, 70 percent of respondents indicated that finding talent among mid-level management would be a challenge. According to the executive director of the Petroleum Human Resources Council of Canada, Carla Campbell-Ott, hiring managers increasingly report difficulty identifying candidates with experience in petroleum. As such, employers may seek to address the skills shortage by finding mid-career workers from other industries with transferrable skills.[21] Employers also plan to attract new workers through competitive compensation. In 2013, 31 percent of employers expected to increase salaries by 5 to 10 percent, and 38 percent expected to increase salaries by up to 5 percent.[22]

Scan of Employment Opportunities

Methodology

To further describe the pipeline industry labour market, this sub-section summarizes job openings listed on the online job posting database and aggregator Indeed.[23] While this methodology precludes the long-term analysis of employment trends, it does permit a more detailed analysis of the current labour market by job type, employer, and location.

In April 2014, Hanover Research conducted a query of the Indeed database for "pipeline" job postings. Due to the volume of search results, the query was limited to jobs posted in the preceding 15 days. All duplicate postings were removed, which resulted in a total of 490 listings examined for this report.

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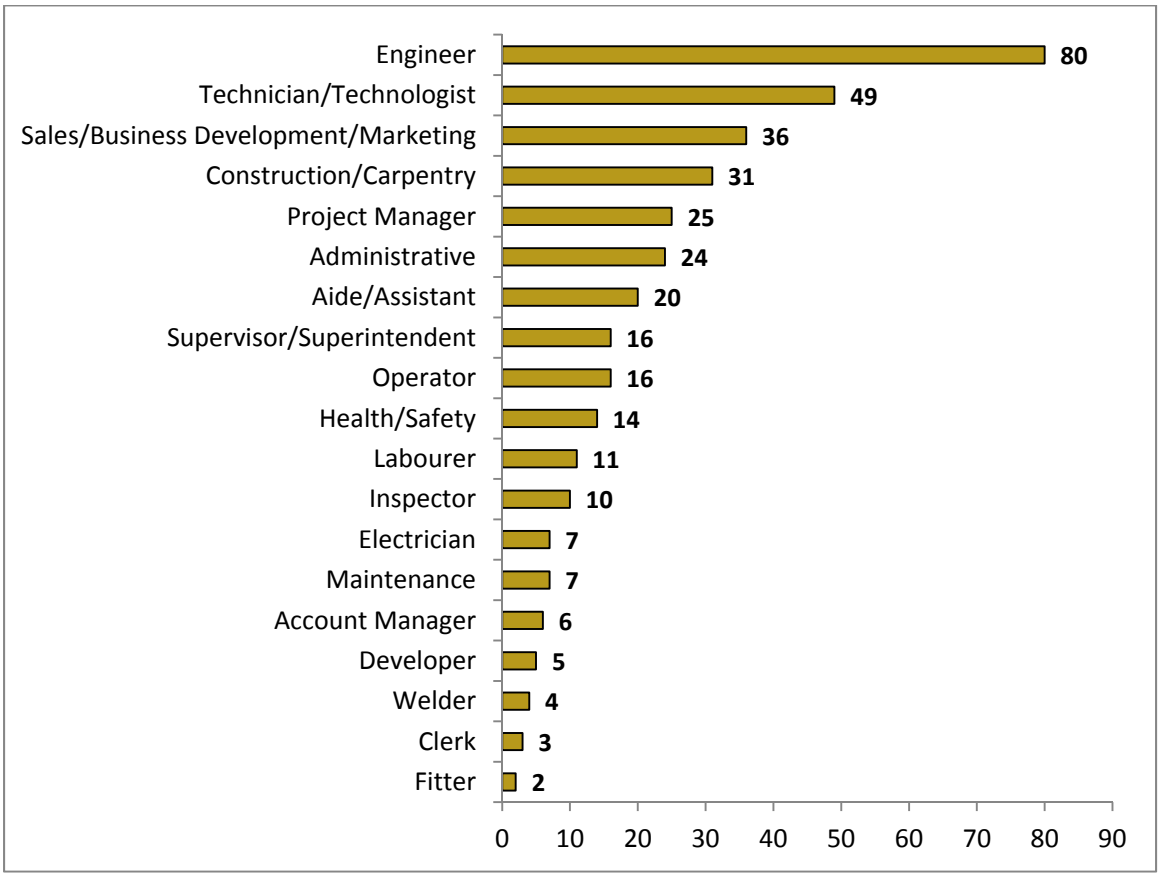
[17] "Canadian Oil and Gas Industry Optimistic About Growth, Anxious about Skills Shortages and its Ability to Attract Next Generation of Professionals." *The Wall Street Journal*, May 14, 2013. http://online.wsj.com/article/PR-CO-20130514-908948.html
[18] Ibid.
[19] R.P. Stastny "Cool Factor." *Oilweek*, October 3, 2013. http://www.oilweek.com/index.php/oil-and-gas-news/business/442-cool-factor
[20] "Alberta Oil's 2014 Human Resources Guide." *Alberta Oil Magazine.* http://www.albertaoilmagazine.com/2014/04/labor-labor-labor/
[21] Ibid.
[22] "Canadian Oil and Gas Industry," Op. cit.
[23] "Indeed." http://ca.indeed.com/

To identify common job types, Hanover searched job titles for relevant keywords, including "engineer," "technician," and "sales." Figure 2.6 describes the frequency with which each keyword appeared in a job posting, although, because some job titles contain multiple search terms, some job listings may be represented in multiple categories. Figure 2.7 presents detailed job descriptions of occupations that appeared most commonly on the Indeed listing. Hanover also identified the employers with the greatest number of vacancies listed (Figure 2.8). Lastly, Figure 2.9 presents a heat map of job openings, which was created by linking city names from Indeed with coordinate data from Infoplease.[24]

Job Types

The regional scan of employment opportunities suggests that engineers are the most sought after professionals in Alberta's pipeline industry. Of the 490 listings examined, 80 (16.3 percent) included "engineer" in the job title (Figure 2.6). Additional common job types included technicians, sales persons, construction workers, and project managers.

Figure 2.6: Common Pipeline-related Job Types



Source: Indeed

[24] "Latitude and Longitude." Infoplease. http://www.infoplease.com/atlas/latitude-longitude.html

Job Descriptions

Figure 2.7 examines the top five most common job types by presenting the full job title, job description, education requirements, and desired work experience for three representative listings.

A review of job descriptions suggests that engineering occupations typically require bachelor's or master's degrees, whereas technician occupations require technical diplomas. The listings for technician vacancies often require candidates to possess a technical certificate but do not typically identify a specific area of expertise. Interestingly, sales and business development positions also indicate that a technical diploma is beneficial.

Engineering occupations also typically require five or more years of professional experience. In contrast, job listings for technicians indicate that pipeline-related experience is preferred but not necessarily required. For instance, the Operations Technician opening indicates that "[p]reference will be given to candidates with related liquids pipeline field operations experience" and the Pipeline Technician opening indicates that "[s]ome related pipeline/ facility construction/ maintenance experience in the [o]il and [g]as Industry would be an asset" (Figure 2.7). Some listings for technical positions indicated a certain amount of work experience, such as three years, though this requirement was less common.

A review of the job descriptions for technicians suggests that the skills applicable to the installation, operation, and maintenance of pipeline systems are particularly valuable. Additionally, the descriptions indicate that technicians will be responsible for testing the performance and integrity of systems. For instance, the Operations Technician listing indicates that the employee will be responsible for performing "operational tasks such as equipment integrity checks, product quality control verification and measurement accuracy." Similarly, the Pipeline Testing Technologist listing indicates that the employee will be responsible for "using ultrasonic, radiographic, liquid penetrant, magnetic particle, eddy current and other non-destructive testing [NDT] methods" (Figure 2.7).

Figure 2.7: Job Descriptions of Common Job Types

Job Title	Job Description	Education Requirement	Desired Work Experience
Engineer			
Pipeline Engineer, Civil (Engineering Specialist)	This position is a technical role for the design of pipeline systems, the establishment of specifications and the procurement of materials and equipment. The Engineering Specialist will be supervised by a licensed Engineer.	Bachelor's degree (or equivalent) in Engineering (Civil or related discipline)	Minimum 7 years of pipeline and associated facilities design experience in the midstream/downstream oil and gas industry. Minimum 5 years of consulting engineering experience.

Job Title	Job Description	Education Requirement	Desired Work Experience
Pipeline Engineer – Intermediate	Under general supervision, perform and check most types of pipeline calculations and design using both computer-aided and manual design techniques. Provide assistance to the Lead Pipeline Engineer, as requested, in the areas of schedules, estimates, progress reports, meetings, procurement activities, etc.	BS in Engineering or equivalent	5 years of pipeline engineering experience
Reliability Engineering Specialist	Provide focused leadership and technical expertise in the development and execution of programs which directly contributes to company objectives in order to optimize asset reliability, establish redundancy principles and practices utilized for the design and operations of assets, analyze life cycle operation and maintenance costs and model/forecast unscheduled pipeline system downtime due to design, operation and risk variables.	Bachelor or Masters of Engineering or related degree	10-15 years progressive experience including significant experience in leadership roles
Technician/Technologist			
Pipeline Technician	The successful applicant will apply their pipeline skills and aptitude to install, operate and perform planned maintenance and corrective repairs on natural gas pipeline systems. This position operates and maintains assigned assets in a manner to meet operational needs in compliance with company and regulatory requirements.	Technical diploma or apprenticeship training would be considered an asset.	Some related pipeline/ facility construction/ maintenance experience in the Oil and Gas Industry would be an asset. Previous experience working with high pressure natural gas would be an asset.
Operations Technician	Responsible for the safe, accurate and efficient movement of petroleum products within the crude oil pipeline system. Perform operational tasks such as equipment integrity checks, product quality control verification and measurement accuracy with month-end cutoff and custody transfer ticketing.	Minimum Grade 12 diploma	Preference will be given to candidates with related liquids pipeline field operations experience
Pipeline Testing Technologist	Conduct tests to ensure quality or detect discontinuities (defects) using ultrasonic, radiographic, liquid penetrant, magnetic particle, eddy current and other non-destructive testing methods. Establish techniques for proper examination of objects under inspection, ensuring strict adherence to safety regulations	Technical or Trades Training	3+ years experience
Sales/Business Development/Marketing			
Technical Sales Engineer Pipeline Services	Promote and sell Process and Pipeline Services in a structured, planned manner, to increase existing market share and to establish new market segments.	Technical or Trades Training	3+ years experience

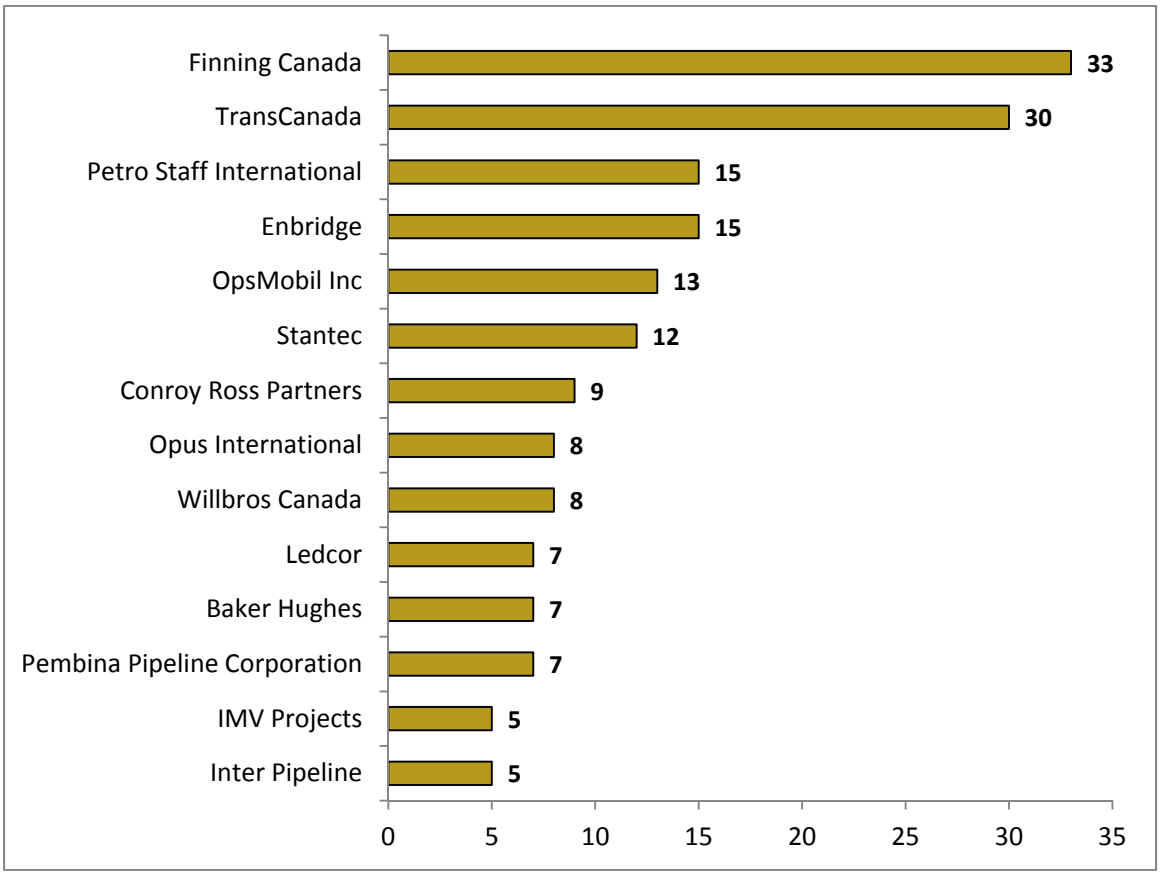
Job Title	Job Description	Education Requirement	Desired Work Experience
Technical Sales Representative	Reporting to the Sales Manager, the Sales Representative will be responsible for maintaining existing customer accounts and developing new business related to Rockwell Servicing Partnership operations.	Technology diploma or undergraduate degree.	Minimum 2 years' experience in Sales required.
Business Development Professional	Initiate sales to support increased revenue and profitability while ensuring client expectations are exceeded. Responsibilities include daily communication with new clients and their service requirements as well as create proposals, pricing and contracts to support a successful project.	Certifications in CGSB RT, UT and or an Engineering Degree/ Diploma preferred	Experience in NDT and or Engineering services in Power Generation or Oil & Gas preferred
Construction/Carpentry			
Construction Labourer	Load, unload and transport construction materials, Erect and dismantle concrete forms, scaffolding, ramps, catwalks shoring and barricades, Mix, pour and spread materials, Assist heavy equipment operators, Assist in aligning pipes during pipeline construction, etc.	n/a	n/a
Pipeline Construction Manager	The candidate will take a hands-on approach with ongoing supervision and management of all on-site construction activities and personnel across various projects. In conjunction with the Construction Superintendents, the candidate will help coordinate, direct, control and implement construction projects from start to finish.	Completion of Construction Management Certification or related courses an asset	Extensive experience in a leadership/managerial role working on pipeline construction projects is required
Carpenter	Determine specifications and calculate requirements; Prepare layouts; Measure, cut, shape, assemble and join mouldings, wood materials, drywall and plastics materials; etc.	Carpenter Trade Certification	5 years or more
Project Manager			
Project Manager – Pipeline	The Project Manager, working independently or with minimal direction/guidance, is responsible for the smooth functioning of day to day operations and the implementation of agreed upon project plans ensuring that projects are completed on time and within budget.	Completion of post-secondary education in Construction, Engineering or related discipline	3 to 6 years of related experience on a pipeline project
Contractor Project Manager	Responsible for managing and coordinating vendor's and Telco's, in collaboration with the pipeline construction team, EPC's, stakeholders and IS resources.	n/a	> 10 years
Project Manager	Responsible for planning, directing, and controlling the day to day operations within the fabrication shop/yard for the Edson Industrial Services division.	n/a	5-7 years direct work experience in a project management capacity including all aspects of process development and execution. Estimating experience required.

Source: Indeed

EMPLOYERS

Job listing data suggest that Finning Canada and TransCanada have the greatest number of pipeline-related vacancies in Alberta (Figure 2.8). Of the 490 job listings examined for this report, 33 (6.7 percent) were listed by Finning Canada and 30 (6.1 percent) were listed by TransCanada. Additional employers seeking to fill many positions include Petro Staff International, Enbridge, OpsMobil, and Stantec.

Figure 2.8: Common Employers of Pipeline-related Jobs

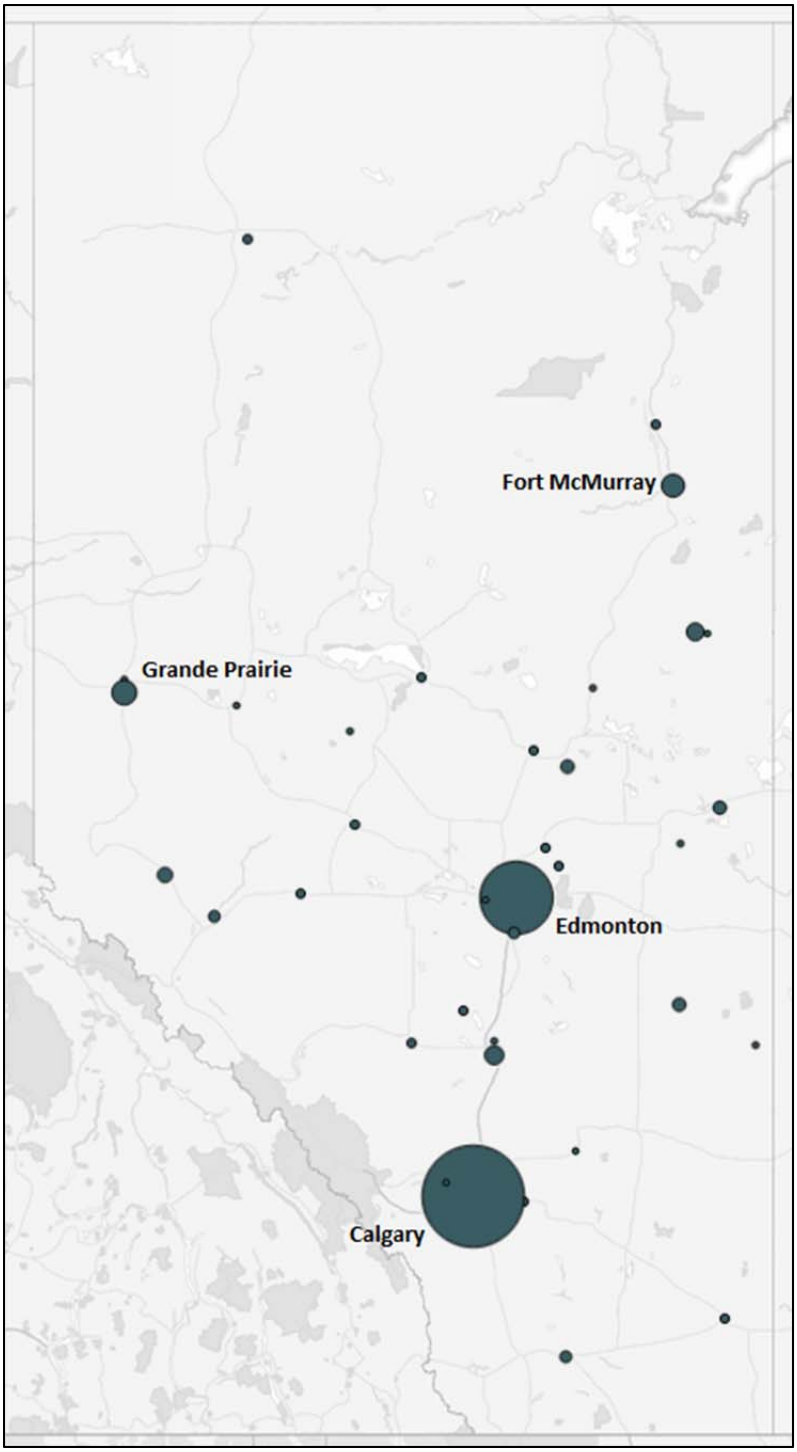


Source: Indeed

LOCATIONS

Approximately three-quarters of job listings examined in this report were for occupations located in Calgary or Edmonton (Figure 2.9). Of the 490 listings, 241 (49.2 percent) were located in Calgary and 123 (25.1 percent) were located in Edmonton. Other notable locations were Grand Prairie and Fort McMurray, which listed 14 and 12 job vacancies, respectively. Overall, job vacancies were dispersed throughout southern Alberta, suggesting demand for qualified candidates in many areas of the province.

Figure 2.9: Map of Pipeline-related Job Openings



Source: Indeed

Section III: Interviews with Industry Experts

To supplement labour market data, this section includes the results of interviews conducted with hiring managers at relevant pipeline companies in Alberta. The interview questions assessed company representatives' perceptions regarding the most important skills for potential job candidates, future hiring plans, and interest in participating in Portage College's Pipeline Training Center. Hanover interviewed representatives from four companies:

- **Access Pipeline** builds and operates oil and gas pipeline systems. Access' active projects consist of two distinct pipeline systems in Alberta.[25]
- **Inter Pipeline**, based in Calgary, is a multi-national "petroleum transportation, storage and natural gas liquids extraction business."[26]
- **Pure Technologies** is a multi-national company that develops and applies "technologies for inspection, monitoring and management of physical infrastructure including water and hydrocarbon pipelines, buildings and bridges."[27]
- **Wajax Equipment** "is a leading national heavy equipment machinery distributor in Canada." Wajax operates 34 heavy equipment sales branches throughout Canada.[28]

Workforce Needs

Employers indicated a variety of skill needs that varied based on the functions of their respective companies. Overall, however, **the employers interviewed for this report indicated a high demand for workers in technical occupations, including maintenance, mechanical, field, and heavy equipment technicians.** Employers also indicated that they employ construction workers, inspectors, and engineers. Interviewees suggested that pipeline companies have difficulty identifying and recruiting candidates with extensive and relevant work experience in the industry.

Access Pipeline

Access Pipeline employs workers in a variety of pipeline-related occupations, including environmental assessors, construction foreman, engineers, inspectors, maintenance

[25] [1] Access Pipeline. http://accesspipeline.com/
[2] Wright, Michelle. Human Resources, Access Pipeline. Telephone Interview. April 14, 2014.
[26] [1] Inter Pipeline. http://www.interpipeline.com/
[2] Solda, Stephanie. Human Resources, Inter Pipeline. Telephone Interview. April 11, 2014.
[27] [1] Pure Technologies. http://www.puretechltd.com/
[2] Schoffield, Theresa. Human Resources. Pure Technologies. Telephone Interview. April 14, 2014.
[28] [1] Wajax Equipment. http://www.wajaxequipment.com/
[2] Dyck, Brian. President, Wajax Equipment. Telephone Interview. April 11, 2014.

technicians, and control room operators. Access also contracts with heavy equipment operators, on-the-pipeline welders, and pipefitters.[29]

Michelle Wright, a human resources manager for Access, indicated that finding qualified applicants for these positions is a major challenge. Given that the company is relatively small compared to others in the industry, Access seeks to hire candidates with directly applicable experience, which compounds the challenge of finding qualified workers. Wright indicated that candidates for control room operator positions are especially difficult to identify. However, Access Pipeline's greatest areas of need in terms of pipeline-related skills are project management and operations staff, including mechanical, electrical, and instrumentation technicians.[30]

Inter Pipeline

Inter Pipeline, which is responsible for operating and maintaining pipeline systems, outsources most construction work. As such, the company employs certified electrical, mechanical, instrumentation, and operations technicians. Inter Pipeline does not aim to hire first-year apprentices and typically requires technician candidates to possess three to five years of work experience. The company's need for experienced workers stems from the small size of the company's field offices and the difficulty in providing necessary training for junior workers. Stephanie Solda, a human resources representative for Inter Pipeline, indicated that they have little difficulty identifying qualified candidates for these positions. The company takes advantage of word-of-mouth by encouraging current employees to recruit former coworkers.[31]

Pure Technologies

Pure Technologies inspects, monitors, and manages pipeline systems and employs pipeline engineers, inspectors, and field technicians. Theresa Schoffield, a human resources representative from Pure Technologies, indicated that the company has had difficulty identifying and recruiting qualified candidates for these positions. Pure Technologies often hires engineers and technicians directly from bachelor's degree and journeyman programs, although these job candidates often lack hands-on experience, including fundamental experience with computer software. The company is not involved in the construction of pipeline systems, and, therefore, does not employ heavy equipment operators, construction workers, welders, or steam-fitters and pipe-fitters.[32]

Wajax Equipment

Wajax Equipment, a heavy equipment distributor, primarily employs heavy duty technicians. Wajax is particularly interested in technicians to work on Hitachi excavators. Brian Dyck,

[29] Wright, Op. cit.
[30] Ibid.
[31] Solda, Op. cit.
[32] Schoffield, Op. cit.

president of Wajax Equipment, indicated that the company often hires certified journeyman and that new hires from these programs are "generally reasonable technicians."[33]

HIRING FORECAST

All company representatives indicated their company will pursue ambitious plans for employment growth in the coming years. While the number of employees each company plans to hire varies, Access Pipeline, Pure Technologies, and Wajax Equipment anticipate growing their workforce in Alberta or western Canada by 5 percent or more. Hiring managers also suggested that their company's hiring needs will not change significantly over the next five to 10 years.

ACCESS PIPELINE

Access Pipeline currently employs approximately 150 workers, approximately half of which are contract employees. Wright indicted that Access will seek to hire 30 to 40 new employees each year until the company reaches 300 employees. Approximately half of candidates are identified through a recruiting firm, and all applicants are vetted through a matrix interview process. Access does not anticipate any significant change in hiring needs over the next five to 10 years.[34]

INTER PIPELINE

Inter Pipeline filled 120 new positions in 2013 and is on pace to match this growth in 2014. Solda indicated that new employees do not typically lack any critical competencies because they are experienced workers and hiring managers thoroughly vet each candidate. Furthermore, Inter Pipeline emphasizes cultural fit and aims to hire candidates that embody the company's core values: honesty and integrity, teamwork, pursuit of excellence, personal accountability, and entrepreneurial spirit.[35] Solda did not anticipate that Inter Pipeline's hiring needs would change significantly over the next five to 10 years.[36]

PURE TECHNOLOGIES

Pure Technologies employs approximately 180 individuals, 35 of which located in Alberta. These positions are roughly evenly split between engineers and field technicians. Pure Technologies will add approximately 10 new employees to its Alberta workforce in the coming year. Schoffield does not anticipate that the company's hiring needs will change over the next five to 10 years, but she expressed concern that too few people are entering training programs to meet growing labour market demand.[37]

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[33] Dyck, Op. cit.
[34] Wright, Op. cit.
[35] "Core Values." Inter Pipeline. http://www.interpipeline.com/careers/core-values.cfm
[36] Solda, Op. cit.
[37] Schoffield, Op. cit.

Wajax Equipment

Wajax Equipment employs 500 to 600 technicians throughout Canada. Dyck anticipated that the company will add 20 to 30 new technicians per year for the near future and that hiring will likely accelerate thereafter. Dyck indicated that Wajax encounters high attrition rates and expressed concern that training programs have not kept pace with the rapidly growing oil and gas industry.[38]

Interest in Pipeline Training Centre

Employers indicated varying degrees of interest in Portage College's proposed topics for the Pipeline Training Centre. **Access Pipeline and Inter Pipeline each demonstrated strong interest in hands-on training related to control room operations**, while Pure Technologies and Wajax Equipment are not involved in this type of work. In addition to Portage's proposed training topics, companies indicated interest in training for stakeholder relations, corrosion technology, non-destructive testing (NDT), computer software, and fundamental field operations. Employers generally expressed less interest in training related to construction, partly because construction is outsourced to contractors. With the exception of Wajax Equipment, hiring managers indicated that employees would be eligible for tuition reimbursement if they attended training at the Pipeline Training Centre.

Access Pipeline

Access Pipeline indicated that all of Portage College's proposed training topics are important to the company's workforce, including training related to the control room's functions, controlled release training from the control room, living in a work camp, heavy equipment operator training, in-field welding training, contaminant recovery training, process operator training, and power engineering steam-fitting and pipe-fitting.[39]

When asked which skill areas employees could improve upon to reduce the rate of pipeline incidents such as spills and leaks, Wright indicated pipeline corrosion and integrity. Training in these areas may address the mechanics of corrosion as well as varying types of corrosion and would be most applicable to maintenance staff. Currently, Access deploys this type of training through consultants and organizations such as the National Association of Corrosion Engineers (NACE). Wright suggested that corrosion topics should also be included in the Pipeline Training Centre's curriculum, however. Additionally, Portage may offer shorter, one-time training seminars for current employees and experienced professionals.[40]

Access Pipeline also indicated that stakeholder relations training would be particularly valuable to its workforce. New staff members are typically accustomed to working inside plant sites rather than in the field. Wright suggested that training in this area may increase

[38] Dyck, Op. cit.
[39] Wright, Op. cit.
[40] Ibid.

general awareness of land management issues and improve employees' interpersonal communication with property owners.[41]

Access indicated that they would be interested in sending the company's employees to the Pipeline Training Centre, provided it offers relevant programming. Access may also encourage its contract employees to attend such training sessions. Wright suggested that employees would likely receive full tuition remission. The company is also considering offering tuition scholarships to students entering the program.[42]

Inter Pipeline

Inter Pipeline indicated that training in control room operations, contaminant recovery, and power engineering steam-fitting and pipe-fitting are most applicable to the company's workforce. Solda suggested that a course specifically designed for control room functions would be highly beneficial, especially because these occupations do not require certification. Solda also suggested that, while the company's environmental divisions are well versed in contaminant recovery, additional training would be useful. Conversely, Inter Pipeline is less interested in training related to living in work camps, welding, and heavy equipment operating because the company typically outsources these functions. Inter Pipeline delivers training in pipeline safety and emergency management training internally.[43]

Solda indicated that Inter Pipeline may be interested in encouraging employees to attend training at the Portage College Pipeline Training Centre. The company would not mandate attendance, however. Inter Pipeline does not cap tuition reimbursement, and employees who pursue training at the Centre would be eligible for full remission.[44]

Pure Technologies

A majority of Portage College's proposed training topics would not be directly relevant to the Pure Technologies workforce. Schoffield indicated that the company is most interested in candidates with hands-on training in non-destructive testing (NDT) and computer software and design. Additionally, when asked which skills employees could improve to reduce the rate of pipeline incidents, Schoffield suggested that technicians often lack fundamental experience working in the field. Schoffield suggested, for instance, that the curricula for new field technicians should include training in confined space environments, rope access, and harness use. Schoffield indicated that if the Pipeline Training Centre offered programs appropriate for a given position, enrolled employees would be eligible to receive tuition reimbursement of up to 75 percent.[45]

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[41] Ibid.
[42] Ibid.
[43] Solda, Op. cit.
[44] Ibid.
[45] Schoffield, Op. cit.

WAJAX EQUIPMENT

Wajax aims to hire 20 to 30 apprentices per year directly from Portage College. Given that the company's technicians are primarily responsible for servicing heavy equipment, however, training for current employees is provided by equipment manufacturers. As such, Wajax employees would be unlikely to pursue additional training at the Pipeline Training Centre.[46]

[46] Dyck, Op. cit.

Caveat

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