APPENDIX C

Part 3 Oil, Gas and Energy Exploration and Production Activity

1 INTRODUCTION

This Appendix provides additional information on petroleum and natural gas exploration and production activity in B.C., with a particular focus on the Montney Play region in the Northeast. The purpose of this appendix is to support Volume 3 Section 22 Oil, Gas and Energy of the Site C Clean Energy Project EIS.

2 PRODUCTION AND TENURES

2.1 Provincial Production

Recent years have seen a favorable investment climate, and receptive government policies (e.g., summer drilling program, deep drilling program, royalty rebates) that have spurred exploration and development of natural gas and other hydrocarbon resources. Industry growth has occurred despite historically low gas prices.

Petroleum and Natural Gas (PNG) tenures, drilling and production activity for the B.C. industry is shown in Table 1. Tenure activity varied widely during the nine-year period ending in 2010 with peak disposition by area in 2002 and peak tender bonus receipts in 2008, when the province received a record $2.66 billion in revenues. Dispositions have dropped dramatically since 2008, as have the average price paid per hectare, but the latter remains well above pre-2007 levels.

Drilling activity peaked in 2006 and has been declining steadily since even though production activity has increased. While the number of producing oil wells has remained relatively stable over the nine years ending in 2010, the number of producing gas wells has more than doubled from 3,066 in 2002 to 7,307 in 2010.

Table 1 Petroleum and natural gas tenures, drilling and production activity statistics for B.C., 2002–2010

Tenures	2002	2003	2004	2005	2006	2007	2008	2009	2010
PNG Rights Dispositions									
Hectares disposed	848,917	733,487	540,427	579,402	690,744	595,559	756,752	389,146	381,132
Total Tender Bonus ($millions)	$289	$647	$232	$534	$630	$1,047	$2,662	$893	$844
Average Price ($/ha)	$340	$882	$430	$922	$912	$1,758	$3,518	$2,295	$2,216
Drilling Activity									
Wells drilled	580	1032	1117	1202	1313	827	805	667	554
Production Activity									
Producing oil wells	1,045	1,085	1,110	1,092	1,122	1,078	1,061	1,043	1,026
Producing gas wells	3,066	3,569	4,385	5,217	6,608	6,607	7,157	7,129	7,307

SOURCES:
BCMEMNG (2011A); CAPP (2011)

Expenditures by the petroleum industry in B.C. during a nine-year period ending in 2009 are presented in Table 2. Total expenditures climbed 44%, with increases experienced in exploration (80%), development (56%) and operations (127%). Royalties to

government fluctuated during this period due primarily to changes in gas prices. Prices in late 2010 were trending around $4 per million British Thermal Units versus a peak of $16 in 2006. In 2009, royalties were roughly one third their peak in 2006. Crown royalties contribute to the provincial treasury as well as regional finances through the Fair Share Agreement with the province. This program sees a portion of resource revenues shared with the local governments (refer to Government Finances analysis in Section 16 Local Government Revenue).

Table 2 Net cash expenditures of the petroleum industry in B.C., 2001–2009 ($millions)

Industry	2001	2002	2003	2004	2005	2006	2007	2008	2009
Exploration									
Geological & geophysical	149	178	200	239	237	280	186	181	123
Drilling	511	389	640	640	542	916	957	1,133	995
Land	489	335	689	290	599	700	1,109	2,728	953
Total	**1,148**	**902**	**1,530**	**1,170**	**1,378**	**1,896**	**2,252**	**4,042**	**2,071**
Development									
Drilling	1,117	783	1,388	1,702	2,444	2,721	2,012	2,403	1,908
Field equipment	665	525	662	849	972	1,321	1,113	1,315	1,012
Enhanced Oil Recovery	5	5	0	0	3	10	8	10	0
Gas plants	195	205	206	177	137	146	117	110	182
Total	**1,982**	**1,518**	**2,257**	**2,728**	**3,555**	**4,198**	**3,250**	**3,837**	**3,102**
Operating									
Wells and flow lines, etc.	607	778	784	871	992	1,136	1,153	1,193	1,236
Gas plants	155	178	220	247	275	331	352	375	490
Total	762	956	1,004	1,118	1,267	1,467	1,504	1,568	1,726
Royalties	1,246	906	1,413	1,508	1,967	1,444	1,255	1,370	500
Total Expenditures	**5,137**	**4,281**	**6,204**	**6,523**	**8,167**	**9,005**	**8,261**	**10,817**	**7,399**

SOURCE:
CAPP (2011)

The value of producers' sales is shown in Table 3. In 2009, natural gas accounted for approximately 75% of all commodity sales, slightly below its average share of 81% for the nine-year period ending in 2009. Other hydrocarbons have increased their share of total sales in the latter part of this period although their combined contribution remains less than 15%. Oil and condensate sales held a relatively constant share of around 10%.

Table 3 Value of B.C. producers' sales, 1997–2006 ($millions)

Commodity	2001 ($)	2002 ($)	2003 ($)	2004 ($)	2005 ($)	2006 ($)	2007 ($)	2008 ($)	2009 ($)
Crude oil and condensate	593	577	669	749	849	803	758	955	572
Natural gas	4,853	3,529	5,526	5,877	8,004	6,576	6,429	7,978	3,978
Pentanes plus	134	139	137	169	213	224	199	259	194
Propane	72	53	80	70	91	96	114	70	80
Butanes	50	56	73	86	85	101	128	136	116
Sulphur	0	2	8	6	15	9	14	258	241
Ethane	120	152	196	174	245	224	250	319	147
Total	**5,823**	**4,508**	**6,688**	**7,130**	**9,501**	**8,034**	**7,892**	**9,974**	**5,328**

SOURCE:
CAPP (2011)

2.2 Regional Production

The Montney Play region is one of Northeast's most active exploration and development areas, accounting for close to 50% of total provincial value of petroleum and natural gas tender bonuses in 2009. The region is approximately 7,669 square km extending from north central Alberta to the northwest of Fort St. John, and includes the area under the Peace River between Fort St. John and Hudson's Hope. The main Montney producing area is approximately 1 million hectares, located south of the Peace River in the South Peace region. The gas-in-play estimates of commercially viable gas amount to 250 trillion cubic feet (BCMEMPR 2010b).

2.3 Local Assessment Area Tenure Process

The province holds monthly public sealed bidding competitions for companies seeking to acquire the rights to petroleum and natural gas tenures. B.C. uses three types of agreements:

- permits, which carry an obligation to conduct exploration
- drilling licences, conveying the exclusive right for permission to drill oil and gas wells in a defined area
- leases, allowing production and exclusive drilling rights

Oil companies, or agents acting on their behalf (e.g., land companies) will request specific parcels for posting. Upon receiving a request, the Ministry of Energy, Mines and Natural Gas initiates a referral process through which government agencies, local governments and First Nations have the opportunity to provide comments. The referral process may include caveats or development considerations as part of the parcel posting. Common consultation caveats include directives for the use of directional drilling within the proposed Peace River Boudreau Lake protected area (see Volume 3 Section 22 Figure 22.3) and restrictions on access and well site construction within the Order In Council (OIC) reserve. Any licensee bidding on rights within the OIC reserve would be made aware through the bid notice of the possibility of flooding (OGC, Area Director 2008 pers. comm.).

Petroleum and natural gas tenures may contain rights to all resources beneath the surface that are located within the tenure's parcel description, or tenures may convey the right to specific geological zones only. Petroleum and natural gas zones are packages of one or more geological formations believed to contain petroleum and natural gas resources. As a result, an area of land at its surface may have two or more overlapping subsurface petroleum and natural gas tenures with rights to different geological zones (BCMEMNG 2011b).

3 REFERENCES

3.1 Literature Cited

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