COAL ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TITLE OF REPORT: Coal Assessment Report for the Dillon lease, British Columbia, Canada

TOTAL COST: $5,019,372

AUTHOR(S): **C.G. Cathyl-Huhn, P.Geo., L.R. Avery, B.Sc., and P. Singh, M.A.Sc.**
SIGNATURE(S):

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): **900215 201101 CX 9-5 August 25, 2011**
STATEMENT OF WORK EVENT NUMBER(S)/DATE(S):

YEAR OF WORK: **2001 through 2011 inclusive; 2013.**

PROJECT NAME: **Dillon**

COAL LEASE ON WHICH PHYSICAL WORK WAS DONE: **412964**
COAL LICENSE(S) IN PROJECT AREA ON WHICH NO PHYSICAL WORK WAS DONE OVER THE CURRENT REPORTING PERIOD: **None; the property consists solely of Lease 412964.**

BC MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: **093P 007**

MINING DIVISION: **Liard**
NTS: **93P/5** BCGS: **093P.031 and 093P.041**
LATITUDE: (NAD83) 55°23’ 59.84"
LONGITUDE: (NAD83) 121° 49’ 35.38" (at centre of work)
UTM Zone: **10N** NATO zone **10U** digraph **EG** EASTING: **574317** NORTHING: **6139926**

OWNER(S): **Walter Canadian Coal Partnership**

MAILING ADDRESS: **800-688 West Hastings Street, Vancouver, British Columbia V6B 1P1**

OPERATOR: **0541237 B.C. Ltd. On Behalf of Brule Coal Partnership**

MAILING ADDRESS: **800-688 West Hastings Street, Vancouver, British Columbia V6B 1P1**

REPORT KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):
Bituminous coal, Early Cretaceous, Bullhead Group, Gething Formation, Gaylard Member, Chamberlain Member, Fort St. John Group, Gates Formation, Boulder Creek Formation, imbricate faults, thrust faults, thin-skinned tectonics, anticlines, synclines, Dillon Syncline
REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:
Coal Assessment Reports 486, 487, 488, 489, and 490

BC Geological Survey
Coal Assessment Report
957

SUMMARY OF TYPES OF WORK IN THIS REPORT	EXTENT OF WORK (in metric units)	ON WHICH TENURES
GEOLOGICAL (scale, area)		
Ground, mapping		
Photo interpretation	**1,176 hectares**	**412964**
GEOPHYSICAL (line-kilometres)		
Ground (Specify types)	**nil**	
Airborne (Specify types)	**nil**	
Borehole		
Gamma: **189 boreholes**	**15,331.55 metres**	**412964**
Resistivity: **177 boreholes**	**14,405.20 metres**	**412964**
Caliper: **177 boreholes**	**14,405.20 metres**	**412964**
Deviation/verticality: **155 boreholes**	**10,564.52 metres**	**412964**
Dipmeter: **1 borehole**	**53.00 metres**	**412964**
Others (specify)		
Density: **177 boreholes**	**14,405.20 metres**	**412964**
DRILLING (Total metres, number of holes, size, storage location): **cores consumed in analysis; except year-2013 cores, stored at Brule Mine**		
Core: **20 boreholes**	**1,686.75 metres**	**412964**
Non-core: **231 boreholes**	**18,054.29 metres**	**412964**
SAMPLING AND ANALYSES		
Total number of samples: **115**		
Proximate	**115**	**412964**
Ultimate (**sulphur only**)	**115**	**412964**
Petrographic	**1**	**412964**
Vitrinite reflectance	**1**	**412964**
Coking (**FSI test only**)	**4**	**412964**
Wash tests	**nil**	
PROSPECTING (scale/area)	**nil**	
PREPARATORY/PHYSICAL		
Line/grid (km)	**nil**	
Trench (number, metres)	**nil**	
Bulk sample(s): **414.28 metres of large-diameter drilling in 6 boreholes, in years 2003 and 2004; included in total of core drilling given above.**	**6 holes, total 414.28 m**	**412964**

Pages 29-34 (Table 2-6) of this report and analytical laboratory certificates remain confidential under the terms of the Coal Act Regulation, and have been removed from the public version.

http://www.bclaws.ca/civix/document/id/complete/statreg/251_2004

1 Table of contents

1.1 List of Tables

1.2 List of Maps

2 Introduction, situation, and details of work

This report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, documents current (year-2001 through year-2013) drilling, geophysical logging, and coal analyses, together with results of a year-2013 photogeological study of the Dillon coal lease (tenure 412964). This work was undertaken in support of resource appraisal, feasibility studies, mine development, and Western Canadian Coal's, Western Coal's, and Walter Canadian Coal Partnership's (WCCP's) ongoing mining operations of the Dillon, Blind and Brule open-pit mines within the Dillon property.

A considerable volume of historic (pre-2001) work was previously performed and reported by Teck Corporation and allied companies, as documented within in various historic coal-assessment reports as cited in **Section 7** of the current report. The present report does not include a review of historic coal-quality information, which has been previously reported within the relevant historic coal-assessment reports.

Mining commenced within the Dillon property in December of 2004, beginning with the development of the Dillon Pit, and continuing mining operations within the Blind and Brule pits. Total production of coal as of the end of year-2011 was 6.24 million tonnes, with an additional 1.8 million tonnes in year-2012 (Riddell, 2013). Year-2013 production figures do not distinguish between the Dillon tenure and other properties within the Brazion coalfield.

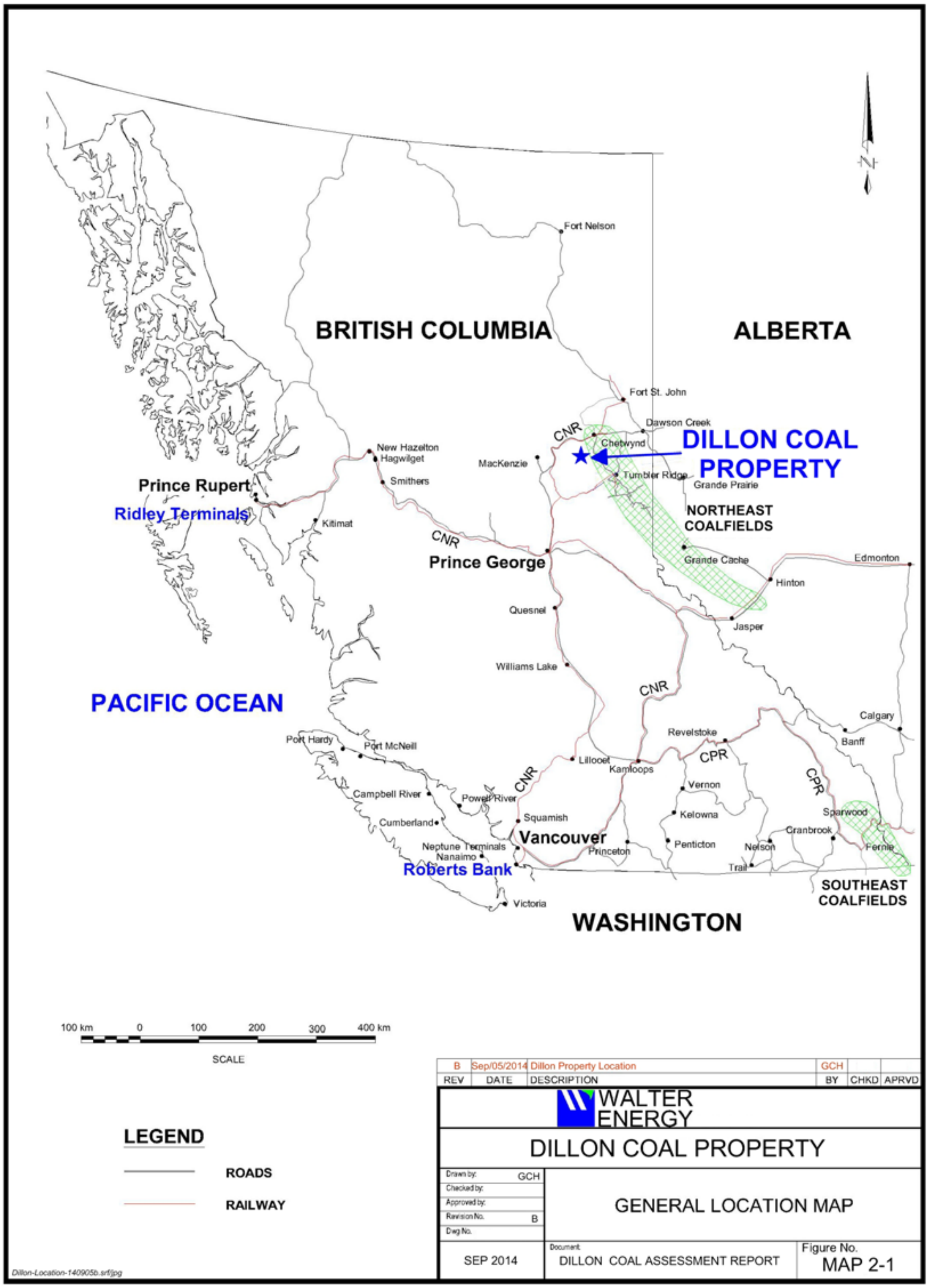
2.1 Location, tenure, access and infrastructure

General location of the Dillon coal property, within the Brazion coalfield of northeastern British Columbia, is depicted in **Map 2-1**, and access routes are shown in **Map 2-2**. The Brazion coalfield comprises the outcrop area of Jurassic and Early Cretaceous coal-measures, lying between the valleys of the Pine and Sukunka rivers, north of Pine River through to the west bank of the Sukunka River. The coalfield name has no formal standing as a toponymic entity, and it is used within this report for purposes of convenience. In detail, the Dillon coal property comprises a coal lease (Tenure 412964), covering a total area of 1,176 hectares, more or less, as shown by **Map 2-2**. The entire extent of this tenure is contiguous, with no detached or offsetting segments.

Road access is via two routes, of which the most convenient route passes through the Sukunka River valley, and an alternative is overland from the Pine River Valley, via Walter Energy's Falling Creek Connector Road.

To reach the Dillon property via road from the Sukunka River valley, access commences from the junction of highway BC-29 and the Sukunka Forest Service Road (FSR), which is maintained by the Sukunka Road Users Committee (a group of industrial users of the road). After travelling southward along the Sukunka FSR, following the eastern bank of Sukunka River, the junction with the Blind Creek Road is reached at kilometre 16.5 of the Sukunka FSR. Walter Energy holds tenure to the Blind Creek Road under a *Special Use Permit* (SUP) from the provincial Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO).

The Blind Creek Road crosses Sukunka River on a recently-reconstructed wood-floored deck-girder bridge suitable for highway loads, and then winds steeply uphill atop the southern canyon wall of Blind Creek. A number of spur roads and trails branch from the Blind Creek Road.



DILLON COAL PROPERTY

GENERAL LOCATION MAP

Figure No. MAP 2-1

The eastern edge of the Dillon lease is very poorly-served by roads, and is best accessed on foot via seismic lines which extend outward from the central developed area. Road access to Dillon requires passing through the security gates of Brule Mine. One gate is situated on the Blind Creek Road, whilst another gate is situated upon the Falling Creek Connector Road, within the valley of Mink Creek. The municipal airport at Chetwynd is the closest operating fixed-wing airfield to the Dillon coal property. Helicopters may be chartered from the Chetwynd airport, or alternatively they may be hired from the Tumbler Ridge airport. With prior permission from the mine's management, helicopters may be landed at Brule Mine. The closest railway service to Dillon is at Walter Energy's Willow Creek coal-loading facility, situated on the southern bank of Pine River, west of Chetwynd. The most direct coal-haulage route to the railway is via the Falling Creek Connector Road.

The Dillon property contains facilities and equipment necessary for open-pit mining, including a warehouse, offices, fuel tanks, and on-site repair shops for machinery and rolling-stock. Electrical power is available from B.C. Hydro at the Sukunka substation, which feeds a sub-transmission line to a transformer-station at Brule Mine, situated within the boundaries of the Dillon coal property. Telecommunications, including Internet access, are available via satellite and cellular telephone systems. Satellite access is excellent in within the deforested parts of the Dillon property, but unreliable in the heavily-wooded hillsides and riparian areas. Cellular coverage is inconsistent, owing to distance from transmitters, and to line-of-sight to transmitters.

Base-mapping for the Dillon area is freely available from the provincial government's Base Map Online Store, which affords a facility for downloading representational shaded-relief topographic maps. Map-sheet 093P/5 (at 1:50,000) of the National Topographic System, and provincial base map sheets 093P.031 and 093P.041 (at 1:20,000) cover the property.

2.2 Physiography, climate and vegetation

Terrain is generally mountainous, with very steep hill slopes, capped by rounded, rolling, densely-forested plateaux whose sides have been deeply-dissected by steep gullies and ravines. Ground elevations range from 940 metres at Blind Creek, in the extreme southeastern corner of the Dillon lease, to 1,385 metres atop Camp Ridge, within the lease's southwestern corner. The Dillon area has a continental alpine climate, characterised by long, moderately cold, snowy winters and short, rainy summers. Snow and frost may occur in any month of the year. Winds are generally gusty and ongoing, with rare calm periods. Convective thunderstorms frequently occur during summer months, bringing intense rain-showers and occasional hail.

A mosaic of overmature (unlogged) and immature second-growth (previously logged or burned by wildfires) coniferous forest covers most upland areas of the property, with more-abundant broadleaf trees along streams and creeks. The property lies within Canfor's Tree Farm Licence (TFL) No.48, comprising numerous cut-blocks. Most of the readily-accessible parts of the Dillon property are covered by juvenile second-growth forest.

Soil cover is patchy, consisting mainly, of till, colluvium and alluvium, with pockets of peat and silt within poorly-drained upland areas.

2.3 Property description

The Dillon coal property consists of one coal lease (**Map 2-2**), established within coal licences originally held by Teck Corporation (Teck), and sold by that firm to Western Canadian Coal Corp. (a predecessor company of Walter Energy) in 1999. To maintain good status, coal leases require the payment of an area-based annual rental fee as prescribed by the provincial *Coal Act Regulation*. **Table 2-1** presents tenure details for the Dillon property, whose total area is 1176 hectares and whose annual rental cost is $11,760.

Table 2-1: Coal tenure at Dillon

Tenure Numbers		Land description		Area in hectares (ha)	Dates		Annual rental at $10 or $15/ha
Current	Historic	Blocks	Units		Issued on	Renew by	
412964	CL 3079, 3080, 3084 and 3085	93P/5 Block F	65, 66, 67, 68, 75, 76, 77, 78, 85, 86, 87, 88, 95, 96, 97, 98	1,176 ha	Sept. 9, 2004	Sept. 9, 2014	$11,760 (at $10)
Totals		1 coal lease / 16 units		1,176 ha			$11, 760

2.3.1 Regulatory setting

Surface access for drilling and other exploratory works is regulated by the provincial government, under the *Coal Act Regulations* and the *Mines Act*. The Dillon coal property is situated within the Dawson Creek TSA (Timber Supply Area). Cutting of timber for mining purposes is subject to the terms of a *Free Use Permit* issued by MFLNRO.

2.4 Summary of coal resources and coal production

Several historic coal-resource determinations, not meeting current Canadian standards of practice (thus non-compliant with Canada's *National Instrument 43-101*), were reported by Teck during the period of their ownership of the coal licences now encompassed by the Dillon property. However, Teck's work covered a larger area comprising the current area of the Dillon lease and the adjoining Brule lease.

Following acquisition of the property now covered by the Dillon lease, WCC and successor companies conducted additional exploration and engineering work. This work led to technical reports (Dawson and Ennis, 2001; Kostic and others, 2004; Minnes, 2005; 2007), a feasibility study (Krpan, 2005) for Brule Mine (straddling the Dillon/Brule lease boundary) and to the compilation of 43-101-compliant estimates of coal resources, the most recent of which was published by Walter Energy in 2012 (Lortie and Allen, 2012), with an effective date of December 31, 2011. **Table 2-2**, given below, is derived from the 'Brule' entries in Lortie and Allen's report (*op.cit.*, page 65, Table 16).

Table 2-2: Brule Mine coal resource estimates by seam,
as of December 31, 2011

	Insitu (kilotonnes)			
	Seam	Measured	Indicated	Inferred
Brule	Seam 60	6,428	0	0
	Upper Seam / Lower Seam	21,554	0	0
	Totals	27,982	0	0

The effective date of this estimate is December 31, 2011.

As was the case with Teck’s reports, the year-2011 coal-resource estimate does not distinguish between areas covered by the Dillon mining lease (the subject of the current report) and the adjoining Brule mining lease.

Furthermore, coal production has occurred within the Dillon lease since the effective date (December 31, 2011) of Lortie and Allen’s resource estimate, thus reducing the amount of coal remaining in place.

Post-2011 coal-production figures are available only for year-2012 (Riddell, 2013): 1.8 million tonnes were produced from the Dillon lease in that year. Data are not separately available for Dillon (as distinct from other nearby properties within Walter Energy’s Brazion Group of mines) for year-2013 or year-2014.

Coal from the Dillon lease is sold into world markets as a Pulverised Coal Injection (PCI) product, used for steel-making purposes.

2.5 Review of previous exploration and geological studies

As with most other coal properties within northeastern British Columbia, the Dillon coal property attracted considerable attention as a coking-coal exploration play during the late 1970s and early 1980s. Although industrial expenditures declined in the middle 1980s, academic and governmental investigators carried on with regional geological studies, including structural mapping. **Table 2-3** presents a cross-reference to the most useful historic reports and maps.

Table 2-3: Cross-references to previous work

Year	*Report author(s) and venue of publication*	*Organisation*	*Nature of work done*
1960	P.B. Jones, PRB Report No.863	Triad Oil Co., Ltd.	Regional geological report
1968	D.F. Stott, *GSC* Bulletin 152	Geological Survey of Canada	Regional geological report
1973	D.F. Stott, *GSC* Bulletin 219	Geological Survey of Canada	Regional geological report
1975	R.S. Versoza, Coal Assessment Report No.486	Brameda Resources Ltd.	Property studies
1977	R.S. Versoza, Coal Assessment Report No.477	Teck/Brameda	Property studies
1979	R.D. Gilchrist, *Geological Fieldwork* 1978	B.C. Geological Survey	Regional geological report
1979	B.I. McClymont, Coal Assessment Report No.488	Teck/Brameda	Property studies
1980	J.E. Hughes, Coal Assessment Report No.531	Gulf Canada Resources	Regional geological report
1981	J.E. Hughes and C.C. McFall, Coal Assessment Report No.680	Gulf Canada Resources	Regional geological report
1981	B.I. McClymont and J.H. Wright, Coal Assessment Report No.489	Teck/Brameda-Yukon	Property studies
1981	B.I. McClymont, Coal Assessment Report No. 490	Teck Corporation	Property studies
1982	D.W. Gibson, GSC Bulletin 431	Geological Survey of Canada	Stratigraphic studies
1982	D.W. Gibson, GSC Bulletin 440	Geological Survey of Canada	Stratigraphic studies
1984	M.E. McMechan, GSC Map 1858A	Geological Survey of Canada	Regional structural geology
1991	D.J. Hunter and J.M. Cunningham, Fieldwork 1990	B.C. Geological Survey	Regional geological report
1991	D.J. Hunter and J.M. Cunningham, MEMPR Open-File Map 1991-4	B.C. Geological Survey	Structural mapping
2003	A.S. Legun, MEMPR Geoscience Map 2003-2	B.C. Geological Survey	Regional structural geology

2.5.1 Cross-references to historic geological mapping

The most useful of the historic maps are Triad Oil’s structural maps (Jones, 1960) and Teck’s geological compilations from their Burnt River coal property (McClymont, 1979; 1981), which at their time were the most complete collection of structural information available for the area, encompassing a much larger area than the current extent of the Dillon coal lease. McClymont’s 1981 map shows the locations of numerous coal outcrops discovered by Teck’s workers during their traversing of the property; these outcrops are noted on **Map 2-3** of the present report.

Bedrock geology of the eastern and northeastern parts of the Dillon property was mapped and reported by Hunter and Cunningham (1991b), working on behalf of the B.C. Geological Survey (BCGS).

A regional synthesis of geological structure, at a much less-detailed scale than the earlier work, was subsequently done by Legun (2003), also working for the BCGS.

2.5.2 Cross-references to historic coal-exploration drilling

Table 2-4 presents details of historic coal-exploration boreholes within the boundaries of the Dillon property. During the years 1978, 1980, 1981, and 1985, Teck drilled 158 boreholes (totalling at least 8860.38 metres’ depth of drilling – a minimal estimate inasmuch as final depths of eight of those boreholes are unknown) within the current boundaries of the Dillon lease. These boreholes are now regarded as being ‘historic’ with respect of the Dillon lease, as they were drilled prior to WCC’s ownership of the property, and their results and statistics have been reported in various of Teck’s Coal Assessment Reports.

Many of Teck’s boreholes were drilled with a rotary-drilling rig. Teck also used a small-diameter, readily-portable ‘Winkie’ diamond-coring rig for several other boreholes, and a larger diamond-drill for a few other others, as noted in **Table 2-4**.

Details of Teck’s boreholes as here-presented are entirely derived from data within historic coal-assessment reports. It has been possible to relocate only a few of Teck’s boreholes on the ground, during current fieldwork. For the purposes of the present study, Teck’s survey data have been accepted as correct, subject to the requirement to convert their UTM (Universal Transverse Mercator) coordinates from the NAD27 (North American Datum of 1927) positional system to the NAD83 (North American Datum of 1983) positional system.

Maps 2-4 through **2-7** depicts the distribution of historic boreholes (shown as unfilled circles) in comparison with the distribution of current boreholes (shown as filled circles) within the Dillon coal lease.

Owing to the extreme density of boreholes within the lease, annotation of individual historic borehole names is not attempted within these maps. As an alternative, locations of individual historic boreholes may be cross-referenced between the coordinates given in **Table 2-4** and the maps’ grid-squares.

Table 2-4: Historic coal-exploration boreholes (sheet 1 of 4)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
BR-1	574603.69	6138608.93	1148.7	165.55		Rotary	Yes	1978
BR-3	575553.49	6139807.13	1087.8	244.51		Rotary	Yes	1978
BR-15	574539.69	6140113.13	1174.6	49.69		Rotary	Yes	1978
BR-16	573902.69	6138190.63	1201.7	126.52		Rotary	Yes	1978
BR-17	573885.59	6138651.03	1211.6	128.04		Rotary	Yes	1978
BR-18	574342.29	6138183.53	1165.8	54.87		Rotary	Yes	1978
BR-21	573693.69	6139011.63	1205.7	77.13		Rotary	Yes	1978
BR-22	573550.59	6138925.23	1215	108.5		Rotary	Yes	1978
BR-23	573366.79	6138829.23	1227.6	134.11		Rotary	Yes	1978
BR-24	573216.39	6138733.83	1246.2	109.73		Rotary	Yes	1978
BR-25	573914.79	6138890.93	1179.2	63.1		Rotary	Yes	1980
BR-26	574193.59	6138588.33	1174.4	69.49		Rotary	Yes	1980
BR-27	574021.29	6138473.33	1198.3	106.06		Rotary	Yes	1980
BR-28	574147.69	6138311.43	1189	86.5		Rotary	Yes	1980
BR-29	573849.49	6138362.23	1225.6	129.9		Rotary	Yes	1980
BR-30	573821.59	6138126.83	1202.1	92		Rotary	Yes	1980
BR-31	573712.09	6138762.93	1206.6	117.3		Rotary	Yes	1980
BR-32	573682.89	6138525.03	1250.6	160		Rotary	Yes	1980
BR-33	573539.09	6138657.83	1229.4	133.2		Rotary	Yes	1980
BR-34	573290.19	6138985.93	1240.4	93.8		Rotary	Yes	1980
BR-35	573453.39	6139102.63	1227.9	66.45		Rotary	Yes	1980
BR-36	573624.19	6139213.33	1209.7	57.29		Rotary	Yes	1980
BR-37	573158.99	6139101.43	1252	81.4		Rotary	Yes	1980
BR-38	573308.79	6139262.03	1241.5	58.8		Rotary	Yes	1980
BR-39	573007.34	6139275.31	1283.55	83.21		Rotary	Yes	1980
BR-40	573202.32	6139398.13	1267.54	68.5		Rotary	Yes	1980
BR-41	572894.07	6139446.05	1296.27	84.73		Rotary	Yes	1980
BR-42	572765.29	6139399.56	1308.28	125.8		Rotary	Yes	1980
BR-43	573327.81	6139471.46	1257.2	47.2		Rotary	Yes	1980
BR-44	572864.53	6139222.02	1292.5	88.7		Rotary	Yes	1980
BR-45	573031.49	6139065.43	1260.9	114.9		Rotary	Yes	1980
BR-46	573149.49	6138916.63	1253.1	91.4		Rotary	Yes	1980
BR-47	573149.59	6138916.83	1252.8	15.8		Rotary	Yes	1980
BR-48	573708.19	6139276.93	1199.9	50.6		Rotary	Yes	1980
BR-58	572779.99	6139961.73	1323.8	114.3		Rotary	Yes	1980
BR-60	573409.69	6138570.63	1256.1	90.2		Rotary	Yes	1980
BR-61	574032.59	6139463.23	1175.6	92		Rotary	Yes	1980
BR-62	574032.61	6140053.04	1220.75	65.5		Rotary	Yes	1980
BR-62R	574033.99	6140053.63	1221.3	60.3		Rotary	Yes	1980

Table 2-4: Historic coal-exploration boreholes (sheet 2 of 4)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
BR-64	574304.01	6138662.68	1162.9	36		Rotary	Yes	1981
BR-65	573785.27	6138588.63	1230.59	165		Rotary	Yes	1981
BR-66	573910.6	6138441.16	1216.66	134		Rotary	Yes	1981
BR-69	574275.89	6138394.27	1184.5	75		Rotary	Yes	1981
BR-70	573468.99	6138626.63	1244	65		Rotary	Yes	1981
BR-71	574266.99	6138631.63	1171	36.2		Rotary	Yes	1981
BR-72	573283.57	6138804.59	1237.77	115.5		Rotary	Yes	1981
BR-73	573527.2	6139165.73	1221.66	91		Rotary	Yes	1981
BR-74	574180.65	6139955.99	1196.46	57		Rotary	Yes	1981
BR-74R	574179.99	6139955.63	1196.5	55.7		Rotary	Yes	1981
BR-75	573876.2	6140175.71	1224.76	48		Rotary	Yes	1981
BR-75R	573848.99	6140159.63	1224	18		Rotary	Yes	1981
BR-76	573721.86	6140309.19	1252.62	34		Rotary	Yes	1981
BR-76R	573720.99	6140308.63	1252.6	30		Rotary	Yes	1981
BR-77	573603.73	6140360.04	1280.48	27		Rotary	Yes	1981
BR-77R	573602.99	6140359.63	1280.5	43		Rotary	Yes	1981
BR-78	573708.20	6140415.39	1279.79	40		Rotary	Yes	1981
BR-79	573467.49	6140507.82	1303.94	131		Rotary	Yes	1981
BR-79R	573466.99	6140507.63	1303.9	37		Rotary	Yes	1981
BR-80	573619.15	6140591.98	1303.44	50		Rotary	Yes	1981
BR-81	573650.11	6140611.11	1299.29	79		Rotary	Yes	1981
BR-82	573340.95	6140440.94	1317.12	85		Rotary	Yes	1981
BR-83	573204.21	6140164.62	1282.69	53		Rotary	Yes	1981
BR-83R	573203.99	6140163.63	1282.7	53		Rotary	Yes	1981
BR-84	573093.37	6139362.4	1279.36	89		Rotary	Yes	1981
BR-84R	573092.99	6139361.63	1279.4	30		Rotary	Yes	*1985*
BR-85	574848.51	6138432.13	1126.97	21		Rotary	Yes	1981
BR-85R	574847.99	6138431.63	1127	22		Rotary	Yes	*1985*
BR-86	573073.87	6139538.09	1277.15	57		Rotary	Yes	1981
BR-87	573221.43	6139661.65	1262.7	50		Rotary	Yes	1981
BR-88	573128.41	6139609.81	1270.07	81		Rotary	Yes	1981
BR-89	573401.62	6139744.94	1249.61	49.5		Rotary	Yes	1981
BR-90	572918.54	6139735.96	1294.56	82		Rotary	Yes	1981
BR-91B	573089.11	6139869.35	1272.91	77		Rotary	Yes	1981
BR-99C	573161.27	6139912.65	1266.97	151.6		Rotary	Yes	1981
BR-100	573249.33	6140194.79	1284.16	31		Rotary	Yes	1981
BR-100R	573248.99	6140194.63	1284.2	31.3		Rotary	Yes	1981
BR-101	573025.12	6140066.27	1298.73	186.5		Rotary	Yes	1981
BR-102	573597.94	6140364.04	1280.82	28.8		Rotary	Yes	1981
BR-102A	573542.2	6140446.8	1292.59	7		Rotary	Yes	1981

Table 2-4: Historic coal-exploration boreholes (sheet 3 of 4)

	UTM coordinates (NAD83)		Collar elevation	Total depth		Drilling method	Geophysical logs run?	Year drilled
Borehole	Easting	Northing						
BR-102R	573596.99	6140363.63	1280.8	36		Rotary	Yes	1981
BR-103	573175.97	6140372.1	1334.59	66		Rotary	Yes	1981
BR-103R	573174.99	6140371.63	1334.6	30.3		Rotary	Yes	1981
BR-104	573032.88	6140299.93	1345.77	105		Rotary	Yes	1981
BR-105	572978.52	6140272.43	1353.69	57		Rotary	Yes	1981
BR-105R	572977.99	6140271.63	1353.7	18.4		Rotary	Yes	1981
BR-106	573687.31	6140495.37	1320.85	35		Rotary	Yes	1981
BR-107	573116.53	6140569.66	1346.23	70		Rotary	Yes	1981
BR-108	572931.85	6140475.55	1338.53	38		Rotary	Yes	1981
BR-108R	572930.99	6140474.63	1338.5	30		Rotary	Yes	1981
BR-109	572842.7	6140424.33	1342.37	93		Rotary	Yes	1981
BR-110	572757.07	6140375.76	1340.23	17		Rotary	Yes	1981
BR-113	573307.55	6139972.27	1257.41	57		Rotary	Yes	1981
BR-113R	573292.99	6139955.63	1257.5	55		Rotary	Yes	1981
BR-114	573244.89	6139434.9	1263.96	67		Rotary	Yes	1981
BR-114R	573243.99	6139434.63	1264	67		Rotary	Yes	1981
BR-115	573310.51	6139709.23	1253.92	79		Rotary	Yes	1981
BR-116	573361.34	6139492.57	1254.13	98		Rotary	Yes	1981
BR-117	573429.99	6139318.63	1227	51		Rotary	Yes	1981
BR-118	573441.5	6139547.49	1245.28	67		Rotary	Yes	1981
BR-119	573507.93	6139357.29	1219.56	58		Rotary	Yes	1981
BR-119R	573473.99	6139352.63	1221.5	53.1		Rotary	Yes	*1985*
BR-120	573519.4	6139600	1236.51	104		Rotary	Yes	1981
BR-121	573564.25	6139398.21	1212.51	60.8		Rotary	Yes	1985
BR-122	573072.99	6140445.63	1345	28.2		Rotary	Yes	1985
BR-85-1	574753.63	6138523.84	1133.14	20.1		Rotary	Yes	1985
BR-85-2	574773.81	6138485.52	1129.13	19.1		Rotary	Yes	1985
BR-85-3	574760.9	6138430.97	1122.06	18.7		Rotary	Yes	1985
BR-85-4	574764.43	6138356.63	1113.08	24		Rotary	Yes	1985
BR-85-5	574810.06	6138417.68	1123.78	21		Rotary	Yes	1985
BR-85-6	574736.34	6138457.02	1125.7	21		Rotary	Yes	1985
BR-85-7	574727.61	6138594.42	1137.26	19		Rotary	Yes	1985
BR-85-8	574786.17	6138543.55	1139.97	18		Rotary	Yes	1985
BR-85-9	574811.9	6138475.1	1131.28	18		Rotary	Yes	1985
BR-85-15	574574.76	6138118.19	1133.5	13		Rotary	Yes	1985
BR-85-16	574527.69	6138111.76	1137.49	15		Rotary	Yes	1985
BW-1	574432.79	6138434.13	1176.1	52.28		Winkie	Yes	1978
BW-2	574688.19	6138694.43	1141.7	21.21		Winkie	Yes	1978
BW-3	574534.39	6138676	1148	27.57		Rotary	Yes	1978
BW-26	574044.39	6138258.43	1200.7	38.41		Winkie	Yes	1978

Table 2-4: Historic coal-exploration boreholes (sheet 4 of 4)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
BW-28	574064.99	6138735.23	1170.7	53.72		Winkie	Yes	1978
BW-29	574537.69	6138264.03	1153.7	41		Winkie	Yes	1978
BW-31	573828.19	6139074.03	1194.4	12.5		Winkie	Yes	1980
BW-32	575580.09	6139614.73	1038.2	15.8		Winkie	Yes	1980
BW-33	575814.49	6139497.73	1093	16.1		Winkie	Yes	1980
BW-34	575482.39	6139734.23	1065.4	23.68		Winkie	Yes	1980
BW-35	573827.57	6139073.26	1194.47	25.51		Winkie	Yes	1980
BW-35R	573825.99	6139070.63	1194.4	41		Rotary	Yes	1980
BW-36	573359	6138468	unknown	12.2		Winkie	Yes	1980
BW-37	574671.79	6138343.33	1138.4	37.6		Winkie	Yes	1980
BW-38	574559.79	6138133.03	1136.8	22.4		Winkie	Yes	1980
BW-40	574088.19	6138462.53	1188.3	15.9		Winkie	Yes	1980
BW-41	574086.79	6138442.43	1193.6	22.49		Winkie	Yes	1980
BW-42	574619.99	6138621.63	1147.9	11.3		Winkie	Yes	1980
BW-43	574636.89	6138639.03	1145.4	12.3		Winkie	Yes	1980
BW-44	574641.79	6138594.93	1146.8	23.1		Winkie	Yes	1980
BW-45	574644.5	6138648.36	1145.84	17		Winkie	Yes	1980
BW-46	574344.99	6138669.63	1158	9.4		Rotary	Yes	1980
BW-47	574005.99	6138178.63	1192.5	20		Winkie	Yes	1980
BW-48	572817.49	6139698.83	1315.14	62.5		Winkie	Yes	1980
BW-49	572834.49	6140199.43	1308	29.78		Winkie	Yes	1980
BW-50	572999.09	6139799.03	1282.7	31.12		Winkie	Yes	1980
BW-51	573072.29	6139541.93	1277	30.1		Rotary	Yes	1980
BW-52	574224.89	6138770.63	1153.1	12.2		Rotary	Yes	1980
BW-54	573102.79	6140119.63	1295.8	32.92		Winkie	Yes	1980
BW-55	572917.69	6139740.83	1294.2	32.31		Winkie	Yes	1980
BW-56	572984.59	6139486.03	1287.4	46.18		Winkie	Yes	1980
BW-57	574599.49	6138607.13	1148.7	20.12		Winkie	Yes	1980
BW-58	573142.89	6140158.73	1296.7	47.8		Winkie	Yes	1980
BW-66	574081.27	6140153.37	1219.8	17.5		Winkie	Yes	1981
GT-1	574460.45	6138745.44	1167.94	unknown		Rotary	No	unknown
GT-2	575339.75	6138219.51	1119.99	17.5		Rotary	No	unknown
GT-3	574719.53	6138823.53	1132.35	unknown		Rotary	No	unknown
GT-5	574610.22	6139029.64	1143.5	unknown		Rotary	No	unknown
GT-6	574832.97	6139021.35	1124.13	unknown		Rotary	No	unknown
GT-7	575008.25	6138845.1	1097.44	unknown		Rotary	No	unknown
GT-8	574527.08	6138470.02	1153.13	unknown		Rotary	No	unknown
GT-9	574811.22	6138514.64	1136	unknown		Rotary	No	unknown
GT-10	575034.69	6138571.97	1123.79	unknown		Rotary	No	unknown

Notes: *table compiled by L.R. Avery, B.Sc.; elevations and depths are given in metres.*

Table 2-5: Current boreholes (sheet 1 of 7)

	UTM coordinates (NAD83)		Collar elevation	Total depth		Drilling method	Geophysical logs run?	Year drilled
Borehole	Easting	Northing						
BR2001-1C	573988.628	6140039.022	1223.242	41		Core	Yes	2001
BR2001-2C	574075.024	6140062.633	1220.448	44.4		Core	Yes	2001
BR2001-3	573697.813	6140258.227	1255.544	40		Rotary	Yes	2001
BR2001-4	573704.064	6140284.21	1254.13	46		Rotary	Yes	2001
BR2001-5	573202.221	6140592.849	1345.573	74.21		Rotary	Yes	2001
BR2001-6	573227.361	6140623.272	1346.571	59.71		Rotary	Yes	2001
BR2001-7	573279.089	6140681.421	1341.462	65		Rotary	Yes	2001
BR2001-8	573316.984	6140721.366	1334.327	80		Rotary	Yes	2001
BR2001-9	573656.68	6140056.78	1291.57	7		Rotary	No	2001
BR2001-10	573743.746	6140336.615	1252.922	85		Rotary	No	2001
BR2001-11	573244.91	6140642.943	1345.428	71		Rotary	Yes	2001
BR2001-12	573318.687	6140723.492	1333.924	98		Rotary	Yes	2001
BR2001-13	573295.562	6140706.524	1337.855	82		Rotary	Yes	2001
BR2001-14	573619.164	6140407.906	1280.678	11.9		Rotary	Yes	2001
BR2001-15	574568.3	6139436.61	1155.83	11.9		Rotary	No	2001
BR2001-16	574168.372	6139944.237	1199.79	33		Rotary	Yes	2001
BR2001-17	574185.145	6139963.026	1196.252	79		Rotary	Yes	2001
BR2001-18	573166.401	6140830.981	1331.261	77		Rotary	Yes	2001
BR2001-19	573139.072	6140798.745	1340.791	96		Rotary	Yes	2001
BR2001-20	573120.805	6140769.396	1345.111	101.5		Rotary	Yes	2001
BR2001-21	573069.527	6140728.368	1345.676	96		Rotary	Yes	2001
BR2001-22	573074.734	6140758.812	1345.26	61.79		Rotary	Yes	2001
BR2001-23	573385.915	6140796.281	1320.543	126.8		Rotary	Yes	2001
BR2001-24	573840.373	6140490.426	1273.701	33.3		Rotary	No	2001
BR2001-25	573945.99	6140618.784	1260.499	42.77		Rotary	No	2001
BR2001-26	574130.086	6140379.574	1216.483	48.78		Rotary	Yes	2001
BR2001-27	574486.255	6140009.944	1172.246	42.5		Rotary	Yes	2001
BR2001-28C	573253.553	6140662.453	1343.7	30		Core HQ	Yes	2001
BR2001-29C	573251.929	6140660.995	1343.71	33.4		Core HQ	Yes	2001
BR2001-30	573388.066	6140804.189	1320.193	89.1		Rotary	Yes	2001
BR2001-31	573716.222	6140304.078	1252.51	43		Rotary	Yes	2001
BR2002-1	573939.51	6140612.611	1261.338	152.4		Rotary	Yes	2002
BR2002-2	574116.759	6140364.268	1218.789	94.4		Rotary	Yes	2002
BR2002-3	574318.799	6140200.033	1192.391	85.3		Rotary	Yes	2002
BR2002-4	574540.522	6140030.914	1169.738	91.5		Rotary	Yes	2002
BR2002-5	573618.84	6139447.45	1207.17	12.2		Rotary	No	2002
BR2002-6	573483.4	6139811.03	1241.29	12.2		Rotary	No	2002
BR2002-7	573584.19	6139651.39	1230.48	16.7		Rotary	No	2002

Table 2-5: Current coal-exploration boreholes (sheet 2 of 7)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
BR2002-8	573342.72	6140003.36	1256.67	25.3		Rotary	Yes	2002
BR2002-9	573322.32	6139990.11	1257.76	10		Rotary	No	2002
BR2002-10	573280.43	6139926.61	1257.25	11.3		Rotary	No	2002
BR2002-11	572743.9	6140106.36	1314.33	153.17		Rotary	Yes	2002
BR2002-15	572945.39	6140308.11	1353.5	9.7		Rotary	Yes	2002
BR2002-16	572961.41	6140328.06	1352.3	12.8		Rotary	Yes	2002
BR2002-17	573032.35	6140405.26	1348.82	64.6		Rotary	Yes	2002
BR2002-18	572929.98	6140290.35	1354.73	25.3		Rotary	Yes	2002
BR2002-19C	572938.97	6140302.9	1353.42	8.8		Core	Yes	2002
BR2002-20	573064.37	6140445.42	1344.15	16.2		Rotary	No	2002
BR2002-21C	573063.43	6140446.34	1344.33	39.5		Core	Yes	2002
BR2002-22	572762.66	6139624.13	1316.77	70.5		Rotary	Yes	2002
BR2002-23C	573986.27	6140037.28	1223.05	50		Core	Yes	2002
BR2002-24	574001.18	6138915.26	1176.76	38		Rotary	Yes	2002
BR2003-6	574372.422	6139847.46	1153.277	51.86		Rotary	Yes	2003
BR2003-7	573802.555	6140095.181	1230.273	64.95		Rotary	Yes	2003
BR2003-8	573841.18	6140134.74	1224.71	34.43		Rotary	Yes	2003
BR2003-9	573860.14	6140152.82	1223.48	49.57		Rotary	Yes	2003
BR2003-10	573831.555	6140126.262	1225.519	20.66		Rotary	Yes	2003
BR2003-11C	573849.993	6140145.224	1223.842	40.87		Core	Yes	2003
BR2003-12	573866.933	6140167.222	1223.336	37.35		Rotary	Yes	2003
BR2003-13	573635.983	6139456.789	1206.008	54.29		Rotary	Yes	2003
BR2003-14	574371.217	6139815.02	1153.606	43.26		Rotary	Yes	2003
BR2003-15	574025.059	6140057.37	1219.787	64.97		Rotary	Yes	2003
BS2003-2	573987.761	6140038.459	1223.178	55.32		Core	Yes	2003
BS2003-3	573967.53	6140018.845	1223.628	45.76		Core	Yes	2003
BS2003-4	573966.18	6140019.6	1223.78	219.66		Core	No	2003
BR2004-01C	573848.99	6138352.13	1224.9	131.1		Core	Yes	2004
BR2004-02C	572799.84	6139847.51	1324.89	124.36		Core	Yes	2004
BR2004-03C	573196.23	6139044.48	1253.57	136.86		Core	Yes	2004
BR2004-04	573500	6139570	1239	78.23		Rotary	Yes	2004
BR2004-05	573555.998	6140423.883	1288.112	100.4		Rotary	Yes	2004
BR2004-06	573639.369	6140491.155	1303.872	32.03		Rotary	Yes	2004
BR2004-07	573603.054	6140744.174	1299.572	16.78		Rotary	Yes	2004
BR2004-08	573492.931	6140366.024	1304.292	35.08		Rotary	Yes	2004
BR2004-09	573343.42	6139772.83	1255.89	44.77		Rotary	Yes	2004
BR2004-10	573285	6139139.63	1244	100		Rotary	Yes	2004
BR2004-11	574542.46	6138428.43	1172.6	57.33		Rotary	Yes	2004

Table 2-5: Current coal-exploration boreholes (sheet 3 of 7)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
BR2004-12	574605.03	6138461.67	1161.92	49.53		Rotary	Yes	2004
BR2004-13	573739.91	6138380.52	1255.52	108.65		Rotary	Yes	2004
BR2004-14	573715	6138258.47	1245.68	121.35		Rotary	Yes	2004
BR2004-15	573992.65	6138695.29	1186.56	83.26		Rotary	Yes	2004
BR2004-16	573820	6138830	1187	36.57		Rotary	Yes	2004
BR2004-17	573716.64	6139055.26	1190.32	36.58		Rotary	Yes	2004
BR2004-23	574603.69	6138608.93	1148.7	165.55		Rotary	Yes	2004
BR2004-30	572940.3	6139958.89	1304.87	183.94		Rotary	Yes	2004
BR2004-31	573613.49	6139441.75	1210.7	66.1		Rotary	No	2004
BR2004-32	573682.17	6139469.85	1206.15	70		Rotary	No	2004
BR2004-34	573415.75	6139520.63	1251.12	54.2		Rotary	No	2004
BR2004-35	573045.25	6139314.08	1284.67	102.45		Rotary	Yes	2004
BRBS2004-3C	574770.59	6138450.47	1127.73	21.59		Core	Yes	2004
BRBS2004-4C	573847.59	6138347.56	1229.01	55		Core	Yes	2004
BRBS2004-5C	574542.66	6138135.19	1139.99	16.95		Core	Yes	2004
BR2005-02C	573020.23	6140006.49	1288.28	215.18		Core	Yes	2005
BR2005-03	573667.56	6140414.7	1280.84	58		Rotary	Yes	2005
BR2005-04	573540	6140330	1295.4	66.59		Rotary	No	2005
BR2005-05	573085.304	6139943.063	1274.473	179.94		Rotary	No	2005
BR2005-10	574411.523	6139901.028	1146.21	29.69		Rotary	No	2005
BR2005-11	574390.268	6139879.643	1142.662	38.71		Rotary	No	2005
BR2005-12	574390.163	6139884.173	1142.543	23.92		Rotary	No	2005
BR2005-13	574333.556	6139959.747	1142.866	46.09		Rotary	No	2005
BR2005-14	574331.887	6139968.927	1143.158	53.31		Rotary	No	2005
BR2005-15	574508.221	6139768.437	1108.504	24.99		Rotary	No	2005
BR2005-16	574438.099	6139769.405	1123.032	33.99		Rotary	Yes	2005
BR2005-17	574455.561	6139797.607	1120.758	36.08		Rotary	Yes	2005
BL2006-02	574382.47	6140009.41	1184.99	166.74		Rotary	Unknown	2006
BL2006-03	574989.28	6139510.99	1073.41	150.2		Rotary	Unknown	2006
BL2006-04	574711.08	6139769.69	1127.24	108.24		Rotary	Unknown	2006
BL2006-05	574647.32	6139912.39	1155.9	120		Rotary	Unknown	2006
BL2006-06	574587	6139961	1153.98	98.72		Rotary	Unknown	2006
BL2006-07	575002.8	6139566	1069.8	122.27		Rotary	Unknown	2006
BL2006-08	574841.3	6139547	1088.89	98.8		Rotary	Unknown	2006
BL2006-09	574418.3	6140055	1183.96	50.19		Rotary	Unknown	2006
BL2006-10	574304.6	6140138	1190.12	91.1		Rotary	Unknown	2006
BL2006-11	574306	6140167	1190.92	96.44		Rotary	Unknown	2006
DL2006-01	574395.57	6139872.59	1127.98	63.84		Rotary	Unknown	2006

Table 2-5: Current coal-exploration boreholes (sheet 4 of 7)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
DL2006-02	574328.37	6139911.47	1119.43	60		Rotary	Unknown	2006
DL2006-03	574336.03	6139918.59	1119.91	60		Rotary	Unknown	2006
BL-07-01	573777.41	6140497.8	1283.27	48.24		Rotary	Yes	2007
BL-07-02	573787.27	6140519.91	1278.77	33.25		Rotary	Yes	2007
BL-07-03	573794.28	6140535.29	1278.82	51.44		Rotary	Yes	2007
BL-07-04	573753.25	6140548.67	1281.26	39.14		Rotary	Yes	2007
BL-07-06	573714.18	6140569.19	1283.61	39		Rotary	Yes	2007
BL-07-07	573720.76	6140580.81	1283.59	49.5		Rotary	Yes	2007
BL-07-08	573683.62	6140589.09	1284.87	45.8		Rotary	Yes	2007
BL-07-09	573739.47	6140516.13	1290.32	30		Rotary	Yes	2007
BL-07-10	574037.47	6140318.19	1229.91	102.96		Rotary	Yes	2007
BL-07-11	574087.65	6140334.88	1222.99	139.56		Rotary	Yes	2007
BL-07-12	574135.68	6140390.28	1215.08	148.85		Rotary	Yes	2007
BL-07-13	574151.22	6140416.91	1214.92	91.7		Rotary	No	2007
BL-07-14	574009.94	6140294.29	1230.61	123.78		Rotary	Yes	2007
BL-07-15	573917.07	6140527.1	1257.08	125.5		Rotary	Yes	2007
BL-07-16	573902.14	6140476.05	1251.82	89.44		Rotary	Yes	2007
BL-07-17	573982.51	6140421.88	1236.13	98.33		Rotary	Yes	2007
BL-07-18	574046.53	6140441.26	1228.09	100		Rotary	Yes	2007
BL-07-19	574046.76	6140437.46	1228.16	101		Rotary	Yes	2007
BL-07-20	574006.61	6140441.95	1232.46	98		Rotary	Yes	2007
BL-07-21	574216.29	6140292.56	1203.95	85		Rotary	Yes	2007
BL-07-22	574247.2	6140330.92	1200.41	110		Rotary	Yes	2007
BL-07-23	574383.91	6140235.97	1188.55	152		Rotary	Yes	2007
BL-07-24	574447.25	6140095.31	1182.01	93.34		Rotary	Yes	2007
BL-07-25	574051.18	6140442.78	1227.71	96.16		Rotary	Yes	2007
BL-07-26	573929.95	6140568.69	1260.16	150.54		Rotary	Yes	2007
BL-07-27	574278.28	6140356.57	1195.04	121.45		Rotary	Yes	2007
BL-08-01	574383.81	6140171.24	1179.33	47.82		Rotary	Yes	2008
BL-08-02	574358.95	6140219.3	1180.18	70		Rotary	Yes	2008
BL-08-03	574330.76	6140190.75	1179.93	52		Rotary	Yes	2008
BL-08-04	574404.92	6140105.89	1179.47	50		Rotary	Yes	2008
BL-08-05	574470.22	6140040.91	1167.23	42.21		Rotary	Yes	2008
BL-08-06	574480.57	6140056.03	1167.36	50.9		Rotary	Yes	2008
BL-08-07	574442.56	6140027.83	1177.15	35		Rotary	Yes	2008
BL-08-08	574331.03	6140167.93	1180.9	50		Rotary	No	2008
BL-08-09	574344.87	6140140.46	1179.28	45.07		Rotary	Yes	2008
BL-08-10	574312.12	6140256.21	1190.54	36.46		Rotary	Yes	2008

Table 2-5: Current coal-exploration boreholes (sheet 5 of 7)

Borehole	UTM coordinates (NAD83)		Collar elevation	Total depth		Drilling method	Geophysical logs run?	Year drilled
	Easting	Northing						
BL-08-11	574299.75	6140242.7	1191.36	38.82		Rotary	Yes	2008
BL-08-12	574319.38	6140263.39	1189.88	54.61		Rotary	Yes	2008
BL-08-13	574274.87	6140280.75	1193.48	54.96		Rotary	Yes	2008
BL-08-14	574265.13	6140273.36	1194.61	38.96		Rotary	Yes	2008
BL-08-15	574288.57	6140292.11	1191.02	30.11		Rotary	Yes	2008
BL-08-16	574250.39	6140265.19	1196.12	37.21		Rotary	Yes	2008
BL-08-17	574250.79	6140261.97	1195.61	17.77		Rotary	Yes	2008
BL-08-18	574188.16	6140355.67	1205.68	30		Rotary	Yes	2008
BL-08-19	574198.13	6140362.2	1205.42	48		Rotary	Yes	2008
BL-08-20	574220.81	6140320.7	1206.69	50		Rotary	Yes	2008
BL-08-21	574051.53	6140388.97	1213.89	49.85		Rotary	Yes	2008
BL-08-22	574205.31	6140370.46	1204.97	45.17		Rotary	Yes	2008
BL-08-23	574050.3	6140391.19	1214.01	72.53		Rotary	Yes	2008
BR-09-01	574407.79	6138532.67	1171.4	49.58		Rotary	Yes	2009
BR-09-02	574439.43	6138580.38	1158.17	31.16		Rotary	Yes	2009
BR-09-03	574479.43	6138611.48	1151.4	24.98		Rotary	Yes	2009
BR-09-04	574228.05	6138347.37	1183.37	79.86		Rotary	Yes	2009
BR-09-05	574155	6138452.73	1183.66	82.72		Rotary	Yes	2009
BR-09-06	574251.31	6138503.93	1169.6	52.46		Rotary	Yes	2009
BR-09-07	574327.41	6138565.36	1158.47	36.92		Rotary	Yes	2009
BR-09-08	574359.27	6138601.04	1155.09	34.1		Rotary	Yes	2009
BR-09-09	574106.55	6138537.44	1179.2	85.9		Rotary	Yes	2009
BR-09-10	573953.56	6138541.61	1202.54	145.82		Rotary	Yes	2009
BR-09-11	574034.14	6138606.36	1180.73	88.94		Rotary	Yes	2009
BR-09-12	574120.14	6138660.63	1175.87	69		Rotary	Yes	2009
BR-09-13	574170.6	6138706.03	1168.26	47.62		Rotary	Yes	2009
BR-09-14	573911.05	6138640.45	1206.15	125.44		Rotary	Yes	2009
BR-09-16	573989.73	6138697.37	1182.93	98.26		Rotary	Yes	2009
BR-09-17	573727.56	6138691.42	1219.14	146.68		Rotary	Yes	2009
BR-09-18	573884.51	6138769.53	1186.29	107.4		Rotary	Yes	2009
BR-09-19	573999.56	6138847.78	1173.11	38		Rotary	Unknown	2009
BR-09-27	574193.27	6138169.87	1171.88	61.96		Rotary	Yes	2009
BR-09-28	574050.34	6138175.39	1178.33	77.1		Rotary	Yes	2009
BR-09-29	574139.14	6138265.92	1185.84	88.32		Rotary	Yes	2009
BR-10-12	572744.99	6140301.98	1320.39	166.34		Rotary	Yes	2010
BR-10-14	572775.02	6140200.65	1304.14	240.03		Rotary	Yes	2010
BR-10-15	572865.17	6140262.83	1338.08	152.2		Rotary	Yes	2010
BR-10-17	572848.46	6140134.44	1300.4	214.88		Rotary	Yes	2010

Table 2-5: Current coal-exploration boreholes (sheet 6 of 7)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*		*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*						
BR-10-18	572911.2	6140172.91	1318.43	172.21		Rotary	Yes	2010
BR-10-19	572923.16	6140054.98	1295.44	220.98		Rotary	Yes	2010
BR-10-20	573068.77	6140028.66	1286.63	132.58		Rotary	Yes	2010
BR-10-21	573123.24	6139953.98	1272.68	143.04		Rotary	Yes	2010
BR-10-22	573082.55	6139924.04	1278.42	228.1		Rotary	Yes	2010
BR-10-23	573003.08	6139870.19	1285.46	143.26		Rotary	Yes	2010
BR-10-24	573109.39	6139709.04	1266.75	118.29		Rotary	Yes	2010
BR-10-25	573238.42	6139778.82	1256.99	126.17		Rotary	Yes	2010
BR-10-26	573265.37	6139570.95	1261.6	102.33		Rotary	Yes	2010
BR-10-27	573339.99	6139615.72	1253.67	145.33		Rotary	Yes	2010
BR-10-28	573374.25	6139637.36	1252.02	108.2		Rotary	Yes	2010
BR-10-29	573416.11	6139542.03	1247.32	120.77		Rotary	Yes	2010
BR-10-30	573452.54	6139449.53	1233.96	87.6		Rotary	Yes	2010
BR-10-31	573509.06	6139486.27	1228.42	93.33		Rotary	Yes	2010
BR-10-32	573509.93	6139487.32	1228.5	105.43		Rotary	Yes	2010
BR-10-33	573455.28	6138981.62	1222.82	101.13		Rotary	Yes	2010
BR-10-34	573572.59	6139053.85	1212.28	76.81		Rotary	Yes	2010
BR-10-45	572742.44	6140106.47	1313.71	183.32		Rotary	Yes	2010
BR-10-46	572845.38	6140012.29	1308.55	211.82		Rotary	Yes	2010
BR-10-50	572932.75	6139955.97	1302.14	177.41		Rotary	Yes	2010
BR-10-52	572816.97	6139762.23	1314.23	154.34		Rotary	Yes	2010
BR-10-54	573070.38	6139796.94	1270.9	129.74		Rotary	Yes	2010
BR-10-55	573142.4	6139839.65	1264.33	181.91		Rotary	Yes	2010
BR-10-57	572801.2	6139509.18	1305.33	90.62		Rotary	Yes	2010
BR-10-58	572895.12	6139572.69	1293.8	64.4		Rotary	Yes	2010
BR-10-59	572991.01	6139638.04	1281.95	85.71		Rotary	Yes	2010
BR-10-60	572791.85	6139271.57	1300.53	148.14		Rotary	Yes	2010
BR-10-61	572974.98	6139380.48	1287.15	102.19		Rotary	Yes	2010
BR-10-62	573123.86	6139473.57	1275.23	100.46		Rotary	Yes	2010
BR-10-63	572866.61	6139222.61	1290.36	127.78		Rotary	Yes	2010
BR-10-64	572907.43	6139104.95	1280.05	138.21		Rotary	Yes	2010
BR-10-65	573052.96	6139194.14	1264.02	94.03		Rotary	Yes	2010
BR-10-66	573145.68	6139251.38	1259	60.71		Rotary	Yes	2010
BR-10-67	573259.87	6139323.57	1254.19	52.83		Rotary	Yes	2010
BR-10-68	573387.38	6139400.02	1238.15	66.21		Rotary	Yes	2010
BR-10-69	573226.56	6139185.24	1245.39	68.24		Rotary	Yes	2010
BR-10-71	573382.59	6139167.98	1236.94	66.39		Rotary	Yes	2010
BR-10-72	573478.84	6139231.01	1225.57	48.62		Rotary	Yes	2010

Table 2-5: Current coal-exploration boreholes (sheet 7 of 7)

	UTM coordinates (NAD83)		*Collar elevation*	*Total depth*	*Drilling method*	*Geophysical logs run?*	*Year drilled*
Borehole	*Easting*	*Northing*					
BR-10-73	573572.88	6139287.64	1211.23	58.19	Rotary	Yes	2010
BR-10-74	573617.06	6139313.44	1206.48	69.97	Rotary	Yes	2010
BR-10-75	573198.6	6138813.28	1245.59	163.5	Rotary	Yes	2010
BR-10-76	573243.99	6138839.13	1244.21	118.25	Rotary	Yes	2010
BR-10-78	573715.83	6139137.95	1194.97	63.94	Rotary	Yes	2010
BR-10-81	573643.21	6138856.13	1203.72	108.63	Rotary	Yes	2010
BR-10-83	573819.13	6138959.03	1196.8	82.88	Rotary	Yes	2010
BR-10-84	573884.21	6139007.72	1190.83	49.57	Rotary	Yes	2010
BM11-01	574381	6139850	1143.77	36.88	Rotary	No	2011
BM11-02	574136	6139914	1148.17	47.55	Rotary	No	2011
BM11-03	574312	6139919	1137.84	29.87	Rotary	No	2011
BM11-04	574457	6139797	1240.2	52.95	Rotary	No	2011
BM11-05	573328.02	6140347.57	1315.53	133	Rotary	Yes	2011
BM11-06	574136	6139914	1190.58	47.08	Rotary	No	2011
BM13-03A	575040.96	6139166.74	1075.29	47.6	Rotary	Yes	2013
BM13-04A	575398.72	6138284.71	1072.1	53.6	Rotary	Yes	2013
BM13-04B	575402.56	6138266.35	1071.09	5.3	Rotary	No	2013
BM13-05A	575119.06	6138951.89	1078.09	41.5	Rotary	Yes	2013
BM13-05B	575107.33	6138961.38	1077.23	16.77	Rotary	No	2013
BM13-09A	574557.31	6140457.52	1127.87	38.1	Rotary	Yes	2013
BM13-09B	574556.41	6140455.49	1127.97	7.6	Rotary	No	2013
BR13-01C	572829.952	6140165.819	1301.65	268	Core	Yes	2013
BR13-02C	572793.782	6140471.208	1324.84	109	Core	Yes	2013

Notes: *table compiled by L.R. Avery, B.Sc.; elevations and depths are given in metres; boreholes listed within this table are as presented in Appendix A of the present report.*

2.6 Synopsis of current work

‘Current work’ in the context of this report comprises drilling, geophysical, geological, coal-quality and ancillary activities performed within the boundaries of the Dillon lease from year-2001 onward to year-2013. No exploratory work was performed in year-2012.

2.6.1 Current drilling

Drilling has been by far the major exploratory activity at Dillon since year-2001, some of it having been performed as an exploratory activity, and some of it being intended to improve understanding of coal quality and geological structure ahead of advancing open-pit mine-workings. During the period from year-2001 through year-2011, and also in year-2013, 251 boreholes (totalling 19,741.04 metres’ depth of drilling) have been drilled within the boundaries of the Dillon mining lease by WCC and successor companies. Of these boreholes, 20 were cored; 231 were not cored. These boreholes follow upon the earlier work done by Teck and associated companies, both as infill to older work, and as extensions to that work.

Table 2-5 presents positions, depths, and other salient details of current boreholes. As noted above, the vast majority of the current boreholes were non-coring (rotary-drilled) exploratory holes. Although not explicitly stated in the available records, it is likely that most of the rotary-drilling was meant to elucidate the lateral extent, pattern of splitting, and structural configuration of the three thick Gaylard coal beds previously-discovered by Teck.

In 2001, 2002, 2003, 2004 and 2005, fifteen holes were partially or completely cored, in order to collect rock samples for coal-quality analyses, and for acid rock drainage (ARD) studies (Minnes, 2005, page 8-11). Core sizes ranged up to 6 inches (152 mm). In 2011 and 2013, thirteen boreholes (of the BM11- and BM13-series) were drilled as hydro-logical test-holes in support of a revised mine-plan (Bianchin, 2013). Finally, in 2013, two boreholes (of the BR13-series) were completely cored, in support of geotechnical investigations of proposed pit slopes. Most of the current boreholes have been geophysically logged. Available logs and other salient borehole information are presented in **Appendix A** of the present report. **Maps 2-4 through 2-7** depict current boreholes (filled circles) as time-slices of two to four years' drilling, in comparison with historic boreholes (unfilled circles) at Dillon.

2.6.2 Current coal-quality data

Table 2-6 presents coal-quality data for core samples taken in the course of current (year-2001 and later) exploratory drilling. Analytical certificates are given in **Appendix A** of the current report, filed with other data from their respective boreholes. Note that petrographic analysis and determination of vitrinite reflectance were done for coal from one borehole (BR2001-1C).

2.6.3 Photogeological compilation

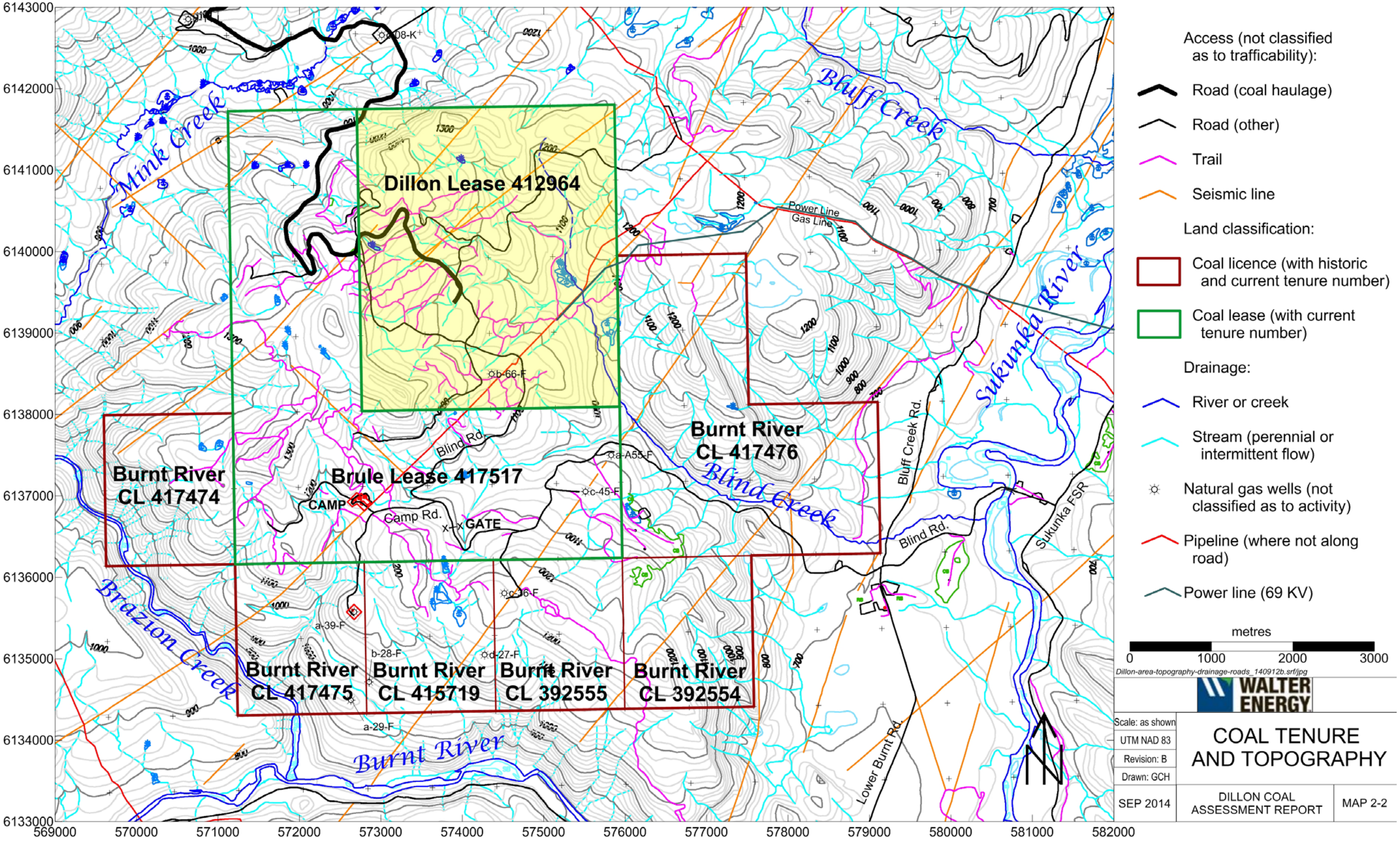
A photogeological study, using *Google Earth* satellite imagery and archival aerial-photographs, was conducted in 2013 by Gwyneth Cathyl-Huhn P.Geo., as part of a broader regional study. Substantial use was made of previous work, by McClymont (1979), Hughes (1980), Hunter and Cunningham (1991a, b) and Legun (2003). **Map 2-3** presents the resultant compilation, incorporating recognition of regional-scale thrust-faults and associated folds, and reassign-ment of formation and member contacts within the coal-measures, based on recent detailed stratigraphic studies within the workings of Brule Mine's Camp Pit (Cathyl-Huhn, 2013).

2.6.4 Acknowledgements and statement of professional responsibility

Geologist-in-training Laura R. Avery compiled cost data, and statistical tables of coal analyses, land tenure, and positions of current and historic boreholes. Data analyst Preetpal Singh scanned and organised borehole data and analytical reports, and assisted with statistical studies. Senior colliery geologist Gwyneth Cathyl-Huhn P.Geo. accepts professional responsibility for this report.

2.7 Evaluation of current work

Current (post-2001) exploratory work, including supporting studies, was successful in that it led to the opening and ongoing operation of open-pit mines within the Dillon property. The coal-measures within the Dillon area have not yet been completely tested by drilling, and ample scope remains for the extensions of the already-identified coal deposits, with potential for increase of the coal-resource base. The Dillon property merits further work.


Access (not classified as to trafficability):
Road (coal haulage)
Road (other)
Trail
Seismic line
Land classification:
Coal licence (with historic and current tenure number)
Coal lease (with current tenure number)
Drainage:
River or creek
Stream (perennial or intermittent flow)
Natural gas wells (not classified as to activity)
Pipeline (where not along road)
Power line (69 KV)
metres
0
1000
2000
3000
Dillon-area-topography-drainage-roads_140912b.srf/jpg
WALTER ENERGY
Scale: as shown
UTM NAD 83
Revision: B
Drawn: GCH
SEP 2014
COAL TENURE AND TOPOGRAPHY
DILLON COAL ASSESSMENT REPORT
MAP 2-2
Dillon Lease 412964
Brule Lease 417517
Burnt River CL 417474
Burnt River CL 417476
Burnt River CL 417475
Burnt River CL 415719
Burnt River CL 392555
Burnt River CL 392554
Mink Creek
Bluff Creek
Sukunka River
Blind Creek
Brazion Creek
Burnt River
Power Line
Gas Line
Blind Rd.
Camp Rd.
CAMP
GATE
Bluff Creek Rd.
Sukunka FSR
Lower Burnt Rd.
08-K
b-66-F
a-A55-F
c-45-F
c-16-F
a-39-F
b-28-F
d-27-F
a-29-F
6143000
6142000
6141000
6140000
6139000
6138000
6137000
6136000
6135000
6134000
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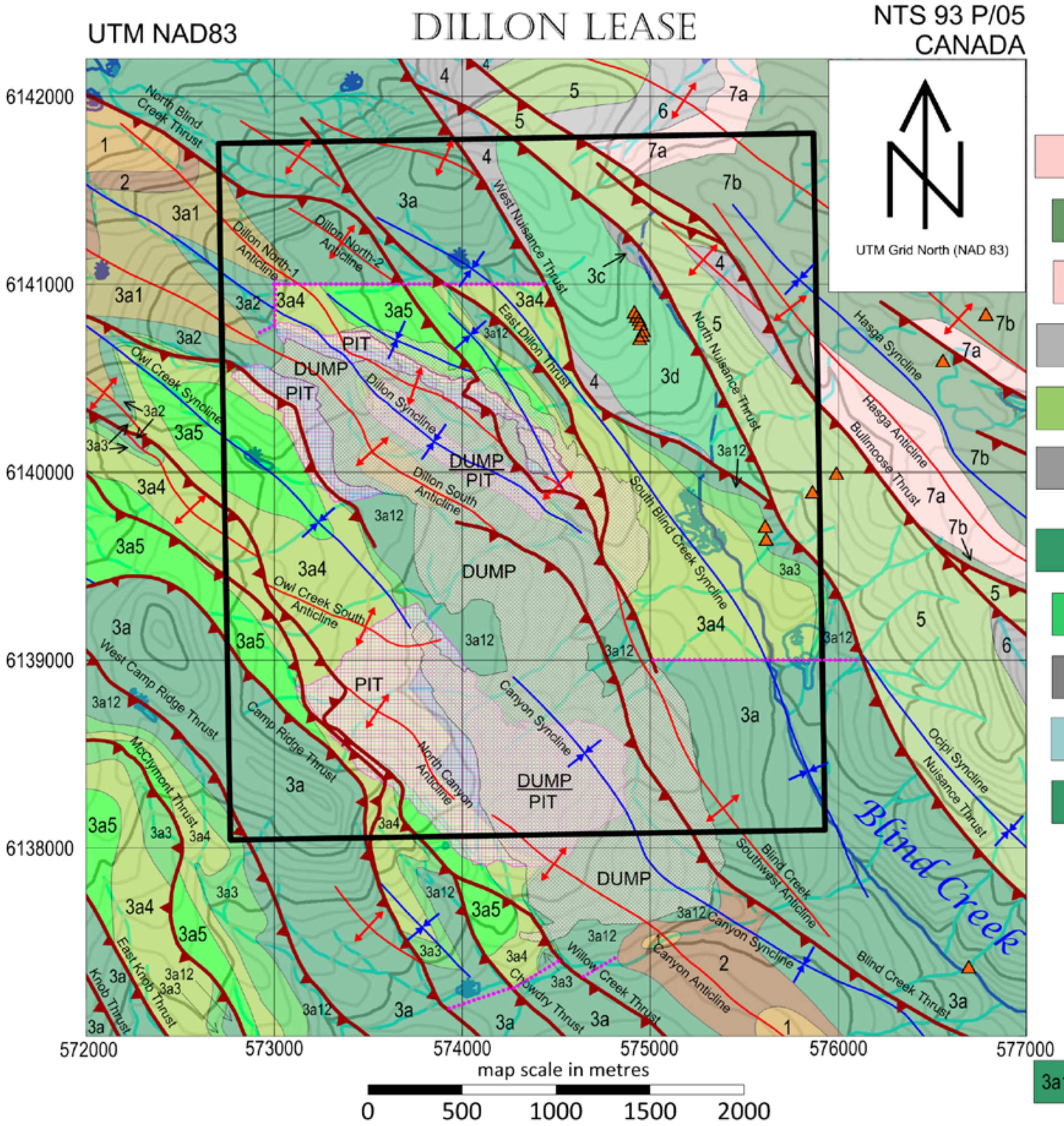
582000



STRUCTURE AND MAPPING

Anticline

Syncline

Strike-slip or tear fault

Thrust fault -- barbs on overthrust plate

Limit of detailed stratigraphic mapping

Outline of Walter's coal licences and leases

▲ Coal outcrop (as reported by McClymont, 1981)

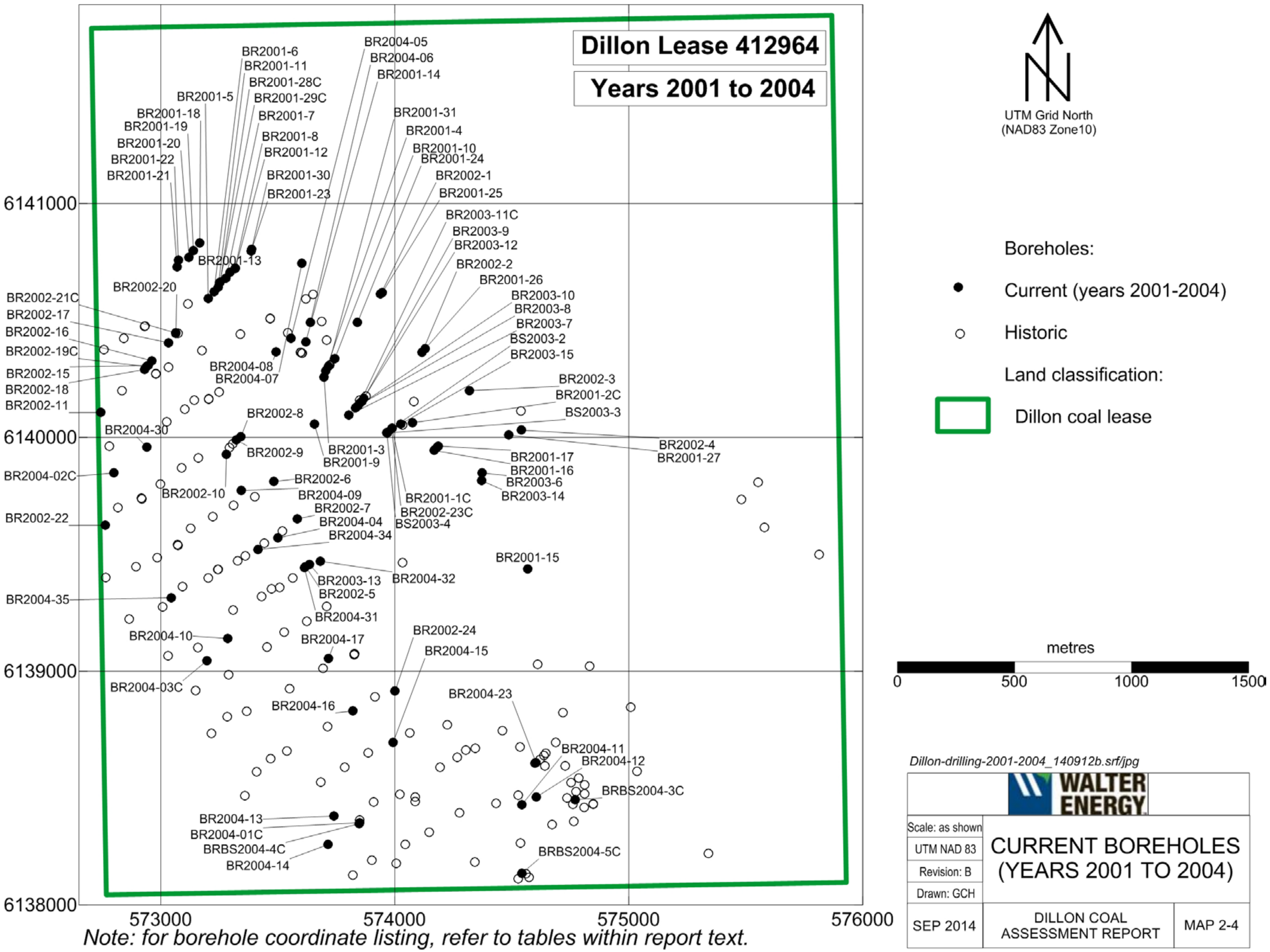
Author: C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME Date: 2014 Sept.13
Grid system: UTM NAD83 Zone 10N in metres 100 km grid square: ES
Scale: as shown on bar-scale Topography: TRIM-derived rasters
Sources: compiled from work by P.B. Jones (Triad Oil, 1960), B.McClymont (Teck Corporation, 1979, 1981), J.Hughes (Gulf Canada, 1980), and D.J.Hunter and J.M.Cunningham (BCGSB, 1991) and A.Legun (BCGCB, 2003)

STRATIGRAPHY

	FORT ST JOHN GROUP (Albian)
7	Boulder Creek Formation -- sandstone, shale, conglomerate and coal
7b	Walton Creek Member -- siltstone, sandstone, conglomerate and coal
7a	Cadotte Member -- conglomerate and sandstone
6	Hulcross Formation -- marine shale and siltstone, minor bentonite; basal grit
5	Gates Formation -- sandstone, shale, conglomerate; minor coal
4	Moosebar Formation -- marine siltstone and shale; bentonite; basal pebbly glauconitic sandstone (not Bluesky Member)
	BULLHEAD GROUP (Barremian to Aptian)
3	Gething Formation -- siltstone, sandstone and conglomerate; minor bentonite and coal
3d	Chamberlain Member -- sandstone and siltstone; minor coal
3c	Bullmoose Member -- marine shale and siltstone; minor sandstone and bentonite
3b	Bluesky Member -- pebbly glauconitic sandstone (not mapped separately at this scale)
3a	Gaylard Member -- siltstone, sandstone and coal; lenses of conglomerate and pebbly sandstone; minor bentonite
3a5	Division 5 -- sandstone and siltstone; minor coal
3a4	Division 4 -- siltstone and sandstone; coal
3a3	Division 3 -- siltstone and shale; coal
3a12: 3a2	Division 2 -- siltstone and sandstone; minor conglomerate and coal
3a12: 3a1	Division 1 -- sandstone, conglomerate and siltstone; minor coal
2	Cadomin Formation -- cliff-forming conglomerate and sandstone; minor siltstone and coal
	MINNES GROUP (Tithonian to Valanginian)
1	Bickford, Monach, Beattie Peaks and Monteith Formations -- sandstone, siltstone, shale, conglomerate, quartzite, ironstone and coal (not mapped separately at this scale)

WALTER ENERGY

K	Sep.13/14	Structural geology	
REV	DATE	DESCRIPTION	
Drawn by: GCH Scale: as shown Dwg. No.: Dillon-lease-geology-140913ki.srf/jpg	GEOLOGY OF DILLON COAL LEASE 412964		
SEP 2014	DILLON COAL ASSESSMENT REPORT		MAP 2-3


Dillon Lease 412964
Years 2001 to 2004
UTM Grid North
(NAD83 Zone10)
Boreholes:
● Current (years 2001-2004)
○ Historic
Land classification:
🟩 Dillon coal lease
metres
0
500
1000
1500
6141000
6140000
6139000
6138000
573000
574000
575000
576000
BR2001-6
BR2001-11
BR2001-28C
BR2001-29C
BR2001-5
BR2001-7
BR2001-18
BR2001-19
BR2001-20
BR2001-22
BR2001-21
BR2001-8
BR2001-12
BR2001-30
BR2001-23
BR2001-13
BR2004-05
BR2004-06
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BR2001-25
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BR2001-26
BR2003-10
BR2003-8
BR2003-7
BS2003-2
BR2003-15
BR2002-3
BR2001-2C
BS2003-3
BR2002-4
BR2001-27
BR2002-20
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BR2002-18
BR2002-11
BR2004-08
BR2004-07
BR2002-8
BR2004-30
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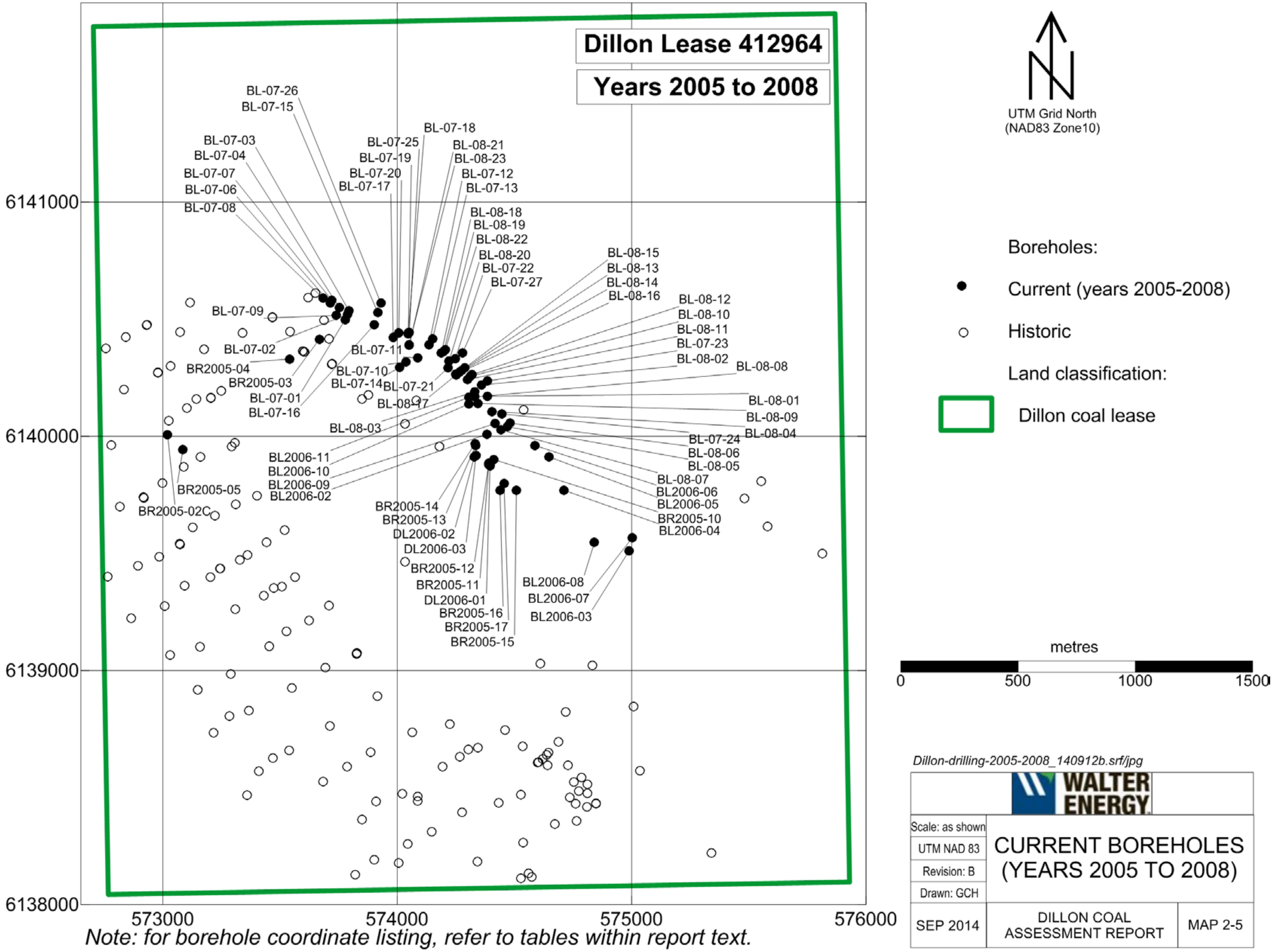
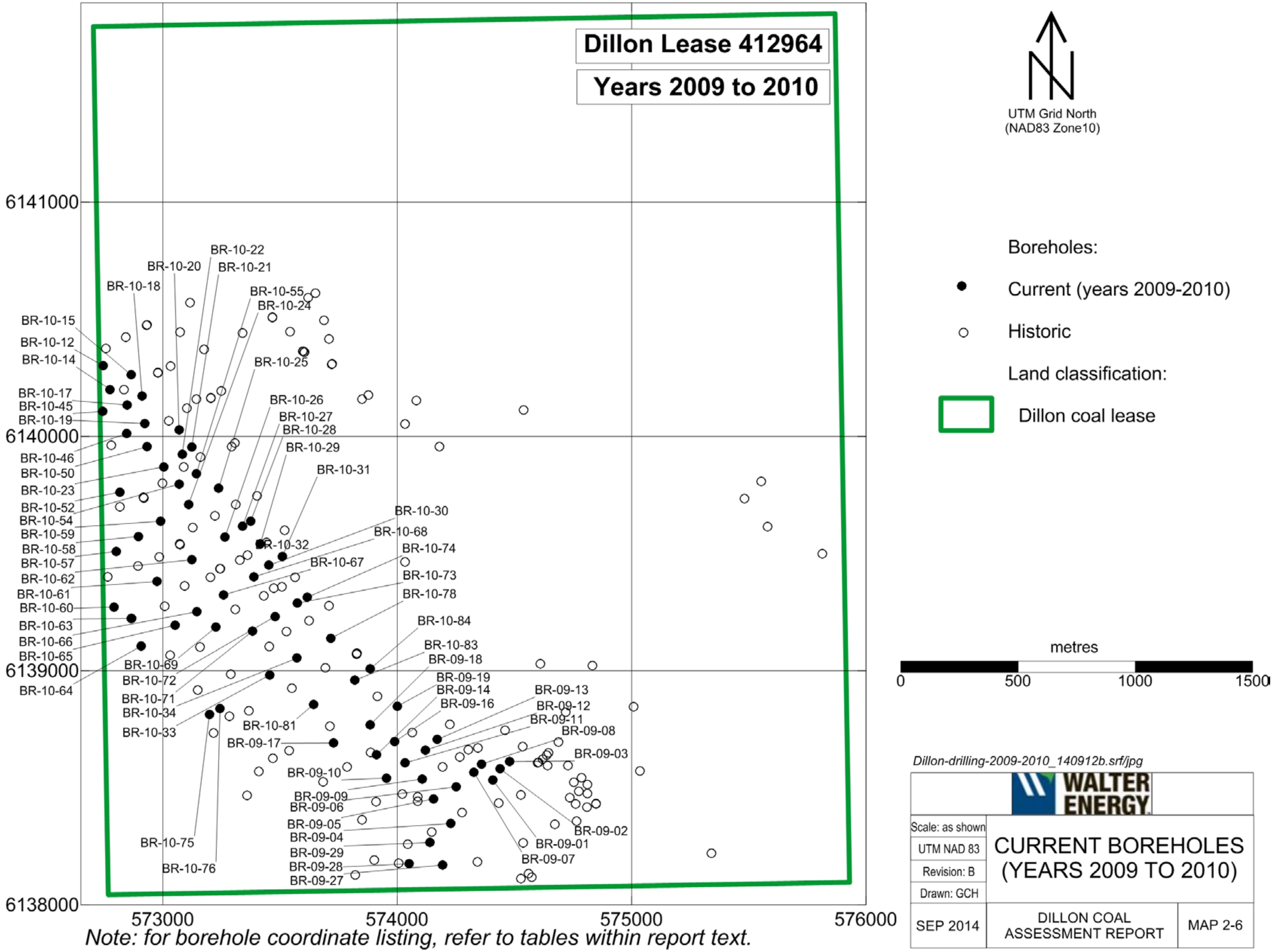
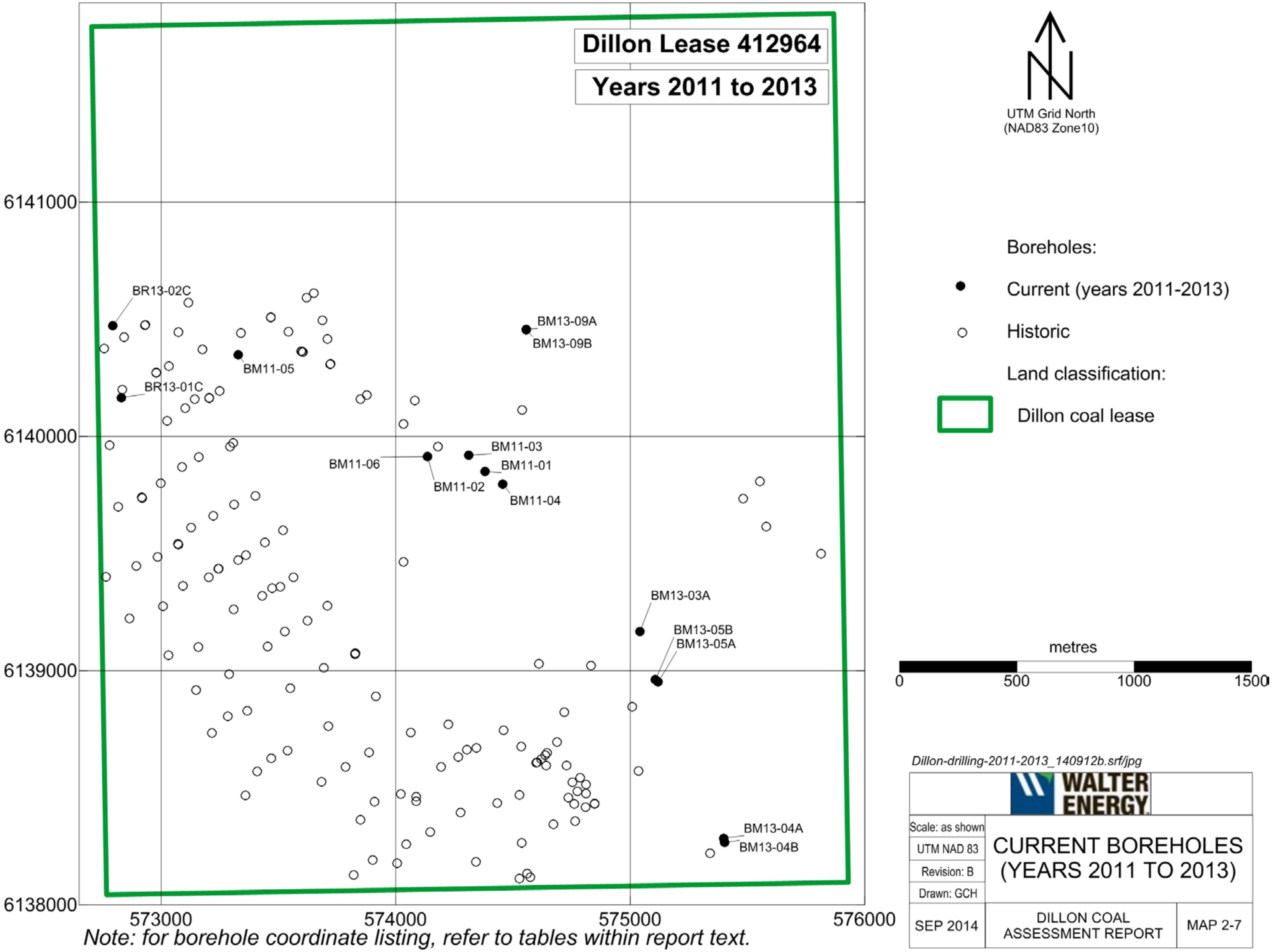
BR2002-23C
BS2003-4
BR2002-22
BR2001-15
BR2003-13
BR2002-5
BR2004-32
BR2004-35
BR2004-31
BR2004-10
BR2004-17
BR2002-24
BR2004-15
BR2004-03C
BR2004-16
BR2004-23
BR2004-11
BR2004-12
BRBS2004-3C
BR2004-13
BR2004-01C
BRBS2004-4C
BR2004-14
BRBS2004-5C
Note: for borehole coordinate listing, refer to tables within report text.
Dillon-drilling-2001-2004_140912b.srf/jpg
WALTER ENERGY
Scale: as shown
UTM NAD 83
Revision: B
Drawn: GCH
CURRENT BOREHOLES
(YEARS 2001 TO 2004)
SEP 2014
DILLON COAL
ASSESSMENT REPORT
MAP 2-4



Note: for borehole coordinate listing, refer to tables within report text.



Note: for borehole coordinate listing, refer to tables within report text.



Note: for borehole coordinate listing, refer to tables within report text.

3 Geology

Regional and local geology of the Dillon coal property (**Map 2-3**) is known mainly from the extensive work of D.F. Stott (1960; 1963; 1968; 1973; 1974; 1981; 1998) and D. Gibson (1992a; 1992b), both from the Geological Survey of Canada. Industrially-focussed work has also been done by the oil industry (Jones, 1960, focussing on structural geology) and the coal industry (chiefly by Teck Corporation).

As well, numerous other relevant coal-company reports are available as Coal Assessment Reports from the British Columbia Geological Survey Branch, as cited in **Section 7** of this report. The most useful of these reports (available as Coal Assessment Report No.490) was written by B.I. McClymont (1981) for a joint-venture of Teck and Brameda Resources Ltd.

3.1 Regional geology

The Dillon coal property lies within the Brazion coalfield of northeastern British Columbia, part of the Foothills structural province of the Canadian Cordillera. All rocks exposed at the ground surface are of latest Jurassic to Early Cretaceous age, belonging to the Minnes (Tithonian to Valanginian stages), Bullhead (Barremian to Aptian stages) and Fort St. John (Albian stage) groups. Where not subsequently eroded, the total undeformed thickness of these rocks is 2200 to 2350 metres. Depth to Precambrian continental basement, including both Mesozoic and Palaeozoic rocks, is more substantial, in the range of 10 to 12 kilometres (McMechan, 1984), although some of this thickness is attributable to thrust-induced tectonic stacking of the strata, and to associated shortening across folds.

The majority of sedimentary rocks within the Brazion coalfield are clastic in origin, ranging in grain-size from claystones and mudstones through pebble-conglomerates. Lesser amounts of biologically- and chemically-derived sedimentary rocks are present, comprising coals, banded and nodular ironstones, glauconite-rich sandstones and gritstones, and impure dolomites.

Volcanic rocks constitute a very small component of the Jurassic and Early Cretaceous strata, comprising very fine- to fine-grained tuffs, interpreted to have originated as wind-borne distal ash-fall deposits from contemporaneous volcanoes situated within the Coast Plutonic Complex, far to the southwest of the property. The volcanic rocks characteristically occur as very thin (at most a few decimetres) yet regionally-extensive bands, which are of use as markers for structural and stratigraphic correlations. No intrusive rocks are known to occur at Dillon.

3.1.1 Regional sedimentology and stratigraphy

During much of the Early Cretaceous period, the Western Interior of North America was occupied by a shallow seaway, variably-designated by different authors as the Western Interior Sea, the Boreal Sea, or by various analogues of formation names, such as the Clearwater Sea, Hulcross Sea or Moosebar Sea. Depths of the seaway, magnitude of accommodation space for sediments, and overall shoreline trends, were largely controlled by vertical movements within a block-faulted crystalline basement terrane of Precambrian age, the Peace River Arch.

During the latest Jurassic and earliest Cretaceous periods, sediments of the Minnes Group and the basal part of the Bullhead Group were derived from actively-eroding upland areas within the North American craton, particularly from the Peace River Arch. The receiving basin during this early time period lay to the west of the craton, within an actively-subsiding continental shelf which prograded westwards into the ancestral Pacific Ocean. Subsequently, slightly later within the Early Cretaceous period, sediments of the upper Bullhead Group and the Fort St. John Group were derived from actively-rising thrust-faulted tectonic forelands situated to the west and southwest of the seaway, synchronous with the docking of allochthonous tectonic terranes against the western margin of the North American craton.

Kalkreuth and Leckie (1989) recognised the close association between actively-subsiding shoreface sandstone deposits and the overlying presence of thick coal beds; this association is well-established within the upper part of the Gething Formation within the Brazion and Sukunka-Quintette coalfields, and less well-so within the lower part of the Gething Formation.

3.1.2 Regional tectonics

The Dillon property's structural geology is complex and thin-skinned (Barss and Montandon, 1981), characterised by cylindrical-conical tight folds, and by doubly-arcuate folded thrust-faults, locally producing very complex imbricate *schuppen*-structures with the Gething Formation coal-measures. Thrust faults are northeast-verging, and generally southwest-dipping, where not overturned by refolding. Thrusts characteristically overlap in *en echelon* manner, with displacement gradually transferring from one fault to another via trains of folds.

Age relationships amongst the thrusts are inferred to be as generally-observed within the Cordilleran fold-thrust belts of northwestern North America, with the oldest thrusts occupying stratigraphically-higher positions (generally to the southwest) of the stratigraphically-lower and younger thrusts.

3.2 Structural geology at local scale

In detail (**Map 2-3**), the Dillon property occupies a series of tightly-compressed structural slices (which may be informally referred to as structural 'plates', following general regional practice) bounded and stacked-up by folded, arcuate, northeastward-verging thrust-faults. *En-echelon* folds occur within displacement-transfer zones situated between major thrust-faults. Folds are concentric and cylindrical to conical in form.

Positional confidence of faults, folds and associated geological-unit contacts ranges from 'approximate' to 'defined' within the Dillon coal property, with the highest confidence being associated with mined-areas within the existing open-pit workings.

Some of the geological structures' names were first assigned in the late 1950s by Triad Oil's geologists (Jones, 1960), or in the 1970s by Teck Corporation's workers. Additional structures were subsequently recognised by Western Coal staff and consultants making more detailed studies of the Dillon lease and the adjoining Brule lease, while yet others are here newly-coined for the purposes of the regional geological study which underpins the present report.

3.2.1 Thrust faults

Most of the Dillon coal property lies between two regionally-significant faults: the Willow Creek Thrust in the southwest, and the Bullmoose Thrust in the northeast of the property.

Thrust faults, as inferred from landforms and from limited ground-surface observations, in general display sinuous map traces. Furthermore, thrust faults curve vertically, in consequence of ‘ramp-flat’ structural refraction between weak and strong beds, and also as a consequence of passive folding above later-formed structural ramps along deeper, younger thrusts.

Thrusts range in scale from outcrop-scale mesoscopic *schuppen*-structures comprised of many closely-associated micro- and meso-faults whose stratigraphic displacements are a few decimetres to a few metres, to regionally-throughgoing faults and fault zones (such as the Bullmoose, Nuisance, and Willow Creek thrust faults and associated splays), whose stratigraphic offsets may exceed several hundred metres.

Thrust faults locally follow bedding within coal beds, as evidenced by intense shearing and micro- to meso-scale imbricate structures within coal beds and also within nearby mechanically-weak roof and floor rocks. The most noteworthy horizons of bedding-parallel thrusting are the Marker D coal bed (close below coal C60) and the Marker B coal bed (close below the Lower Seam).

Some exploratory boreholes have encountered multiple structural ‘horses’ of overthrust coal, particularly along the keel and the near-axial region of the northeast limb of the Owl Creek Syncline.

Despite the pervasive faulting of the coal-measures, normal stratigraphic facing of the rocks is generally preserved, and overturned beds are uncommon.

3.2.2 Folds

As noted above, folds at Dillon are concentric to conical in form. Folds locally die out as closely-associated *en-echelon* couplets, interpreted as accommodating displacement transfer between thrust faults. Layer-parallel slip is characteristic within the deformed coal-measures.

As well, cataclastic ‘podding’ may occur within axial culminations and keels of the folds. Such axial thickening of coal is particularly likely to have occurred along the keel of the Dillon Syncline, which is locally near-isoclinal in form.

4 Stratigraphic review of the Dillon lease and its coal beds

A generalised stratigraphic profile of the Jurassic and Cretaceous coal-measures of the Dillon area is presented as **Table 4-1**. The following discussion provides a systematic description of the major rock-units, drawing heavily upon the detailed results of drilling within the western half of the Dillon lease. For convenience, the discussion is broken into the headings of ‘Younger rocks’ (**Section 4.1**), ‘Gething Formation coal-measures’ (**Section 4.2**) and ‘Older rocks’ (**Section 4.3**). Discussion of known mineable coal beds is presented within **Section 4.2.4**.

4.1 Younger rocks

‘Younger rocks’ within the Dillon coal property comprise Albian (Early Cretaceous) sedimentary rocks of the Boulder Creek, Hulcross, Gates and Moosebar formations, all of them being within the Fort St. John Group. The Boulder Creek Formation is the youngest of these rocks within the Dillon property, underlying a very small portion of the property’s northeastern corner. The following discussion proceeds downward in order of increasing geological age, from youngest to oldest.

4.1.1 Boulder Creek Formation (map-units 7b and 7a)

The Boulder Creek Formation, of late Middle Albian age (Gibson, 1992b) forms prominent cliffs in the upland area between Blind Creek and Sukunka River, immediately northeast of Dillon. Boulder Creek rocks are inferred to extend into the northeastern corner of the Dillon coal property, within the Hasga anticline-syncline system, and beneath the Bullmoose Thrust.

Regionally, conglomerate and sandstone are the predominant lithologies of the Boulder Creek Formation, but the formation also contains fine-grained rocks including siltstone, root-penetrated, variably-carbonaceous mudstone, and coal. Conglomerate and sandstone are concentrated in the basal Cadotte Member (map-unit 7a) of the formation, while fine-grained rocks are concentrated in the overlying Walton Creek Member (map-unit 7b). The uppermost regional division of the Boulder Creek Formation, comprising the conglomerate of the Paddy Member, is not recognised at Dillon.

The overall thickness of the Boulder Creek Formation is inferred to be 80 to 110 metres at Dillon, of which the basal 30 metres comprises the Cadotte Member and the overlying 50 to 80 metres comprises the Walton Creek Member. The basal contact of the Boulder Creek Formation with the underlying Hulcross Formation is abrupt to erosional at local scale, and likely to be interfingering at regional scale.

4.1.2 Hulcross Formation (map-unit 6)

The Hulcross Formation, of middle Albian age within the Early Cretaceous (Stelck and Leckie, 1988) comprises thinly-interbedded, locally-concretionary grey siltstone, fine-grained sandstone and dark grey mudstone with occasional very thin but extremely-persistent interbeds of soft, light grey to white tuff (Kilby, 1985; Gibson, 1992b) and rare thin stringers of coal. Sideritic concretions are commonly found in isolated, laterally-persistent bands.

Table 4-1: Table of lithostratigraphic units

Group/Formation/ Member			Map-	Lithology and thickness		Coal bed details
Fort St. John Group	Boulder Creek Fm.	Walton Creek Mb.	7b		siltstone, sandstone, conglomerate and coal; 50 to 85 m thick.	coal present but not yet drilled
		Cadotte Mb.	7a		conglomerate and sandstone; 30 m thick.	
	Hulcross Fm.		6		marine shale, siltstone and sandstone; minor tuff and sideritic concretions; thin basal grit; 130 m thick.	
	Gates Fm.		5		sandstone, shale, conglomerate; minor coal; 70 to 100 m thick?	coal present but not yet drilled
	Moosebar Fm.		4		marine siltstone and shale; minor tuff; basal pebbly glauconitic sandstone; 190 m thick?	
Bullhead Group	Gething Fm.	Chamberlain Mb.	3d		sandstone and siltstone; minor conglomerate and coal; 60 m thick?	coal present but not yet drilled
		Bullmoose Mb.	3c		marine shale and siltstone; minor sandstone and tuff; 105 m thick.	
		Bluesky Mb.	3b		glauconitic pebbly sandstone, pebbly mudstone and conglomerate; 2 to 21 m thick.	stringers of detrital coal
		Gaylard Mb.	3a	3a5	Division 5 (beds above Seam 60): sandstone and siltstone, minor coal; 95 to 105 m thick.	minor coals: Markers G, F, and E.
				3a4	Division 4 (beds above Upper Seam): siltstone and sandstone; coal; 45 to 75 m thick.	major coal: Seam 60 (at top); minor coals: Markers D, C.
				3a3	Division 3: siltstone and shale; coal; 8 to 35 m thick.	major coals: Upper Seam (at top) and Lower Seam (at base).
				3a2	Division 2 (beds below Lower Seam): siltstone and sandstone; minor conglomerate and coal; 105 m thick?	minor coals: Markers B (near top), AA and A (near base).
				3a1	Division 1: sandstone, conglomerate and siltstone; minor coal near base; 35 to 70 m thick.	basal section potentially contains coal; not yet drilled within property.
	Cadomin Fm.		2		gritty sandstone and conglomerate; minor siltstone; 25 to 35 m thick?	
Minnes Group	Bickford Fm. (formerly known as the Brenot Fm.)		1	1d	sandstone, siltstone, mudstone and coal; 285 to 300 m thick.	not yet drilled within property.
	Monach Fm.			1c	sandstone and quartzite; minor siltstone and conglomerate; 50 m thick.	
	Beattie Peaks Fm.			1b	sandstone, siltstone and shale; minor ironstone and coal; 300 m thick.	not yet drilled within property.
	Monteith Fm.			1a	sandstone, shale and conglomerate; quartzite; 600 m thick?	

At Dillon, the Hulcross Formation is inferred to only occur within an extremely limited area within the far northeastern extremity of the property, underlying the Bullmoose Thrust.

The thickness of the Hulcross Formation in the Dillon area is estimated to be 130 metres. The formation’s immediate base is characteristically marked by a thin (generally less than a metre thick) erosive-based bed of pebbly sandstone or gritstone, lying disconformably upon the underlying strata of the Gates Formation.

At Dillon, the fine-grained rocks of the Hulcross Formation, Moosebar Formation, and the Bullmoose Member of the Gething Formation are lithologically similar and therefore difficult to distinguish in isolated outcrop sections.

4.1.3 Gates Formation (map-unit 5)

The Gates Formation, of late Early Albian age within the Early Cretaceous (Stott, 1982), comprises thin to thick interbeds of sandstone, siltstone, conglomerate, and shale, locally accompanied by coal beds. The Gates Formation was formerly considered as a member within the Commotion Formation, and that usage prevailed in earlier governmental surveys and coal-industry exploration reports (Stott, 1968). Coals of the Gates Formation, and their enclosing sedimentary rocks, were deposited on the shoreline of the Clearwater Sea (part of the Western Interior Seaway) between 108.7 and 111.0 million years ago, as part of an extensive complex of coastal plains, deltas and estuaries collectively known as the Gates Delta.

Within the Dillon property, the Gates coal-measures are exposed within the northeastern limb of the Ocipi Syncline (beneath the North Nuisance Thrust) and likely also present at depth within the Hasga fold belt (beneath the Bullmoose Thrust). No drilling has been done within the Gates Formation at Dillon.

At Dillon, the Gates Formation is inferred to be 70 to 100 metres thick. The nature of its contact with the underlying Moosebar Formation is unknown at local scale, but likely to be interfingering at the regional scale.

4.1.4 Moosebar Formation (map-unit 4)

The Moosebar Formation, of Early Albian age (Stott, 1968) comprises approximately 190 metres of marine siltstone and shale, with minor interbeds of sandstone and very thin but extremely-persistent bands of tuff (generically named as ‘bentonites’ by local geologists). Within the Dillon property, the Moosebar Formation is inferred to form bedrock within two narrow structural slices lying between the West Nuisance, North Nuisance, and Bullmoose thrust faults. Insufficient lithological detail is available in this area, to support the usual subdivision of the formation into an upper siltstone/sandstone unit (the Spieker Member), and a lower mudstone/tuff member.

The basal contact of the Moosebar Formation with the underlying Chamberlain Member of the Gething Formation is marked by a thin but laterally-persistent, formally-unnamed zone of erosive-based pebbly, glauconitic sandstone, siltstone and mudstone.

4.2 Gething Formation coal-measures (map-unit 3)

The Gething Formation, of early Aptian to early Albian age within the Early Cretaceous (Gibson, 1992a), comprises thin to thick interbeds of siltstone, sandstone, mudstone and coal, with lesser amounts of gritstone, pebble-conglomerate, ironstone and tuff. The Gething Formation includes beds formerly designated as the Dresser Formation by Hughes (1964); its current stratigraphic extent was established by Stott (1968).

Following upon suggestions made by coal-company geologists (Wallis and Jordan, 1974) and subsequent work by the British Columbia Geological Survey (Duff and Gilchrist, 1981), Gibson divided the Gething into three members: the non-marine to transitional Chamberlain Member, the shallow-marine Bullmoose Member, and the non-marine to transitional Gaylard Member. A fourth member of the Gething Formation, the Bluesky Member, is also inferred to be present between the base of the Bullmoose Member and the top of the Gaylard Member.

The Gething Formation originated as a complex of non-marine to shallow-marine sedimentary deposits, laid down by meandering and braided streams and rivers within a widely-extensive belt of coastal deltas, of which two (the Gaylard and Chamberlain paleodeltas) extended into the Dillon area. Deltaic deposits were occasionally interrupted and at times extensively overrun by transgressive, shallow-marine deposits of the Western Interior Seaway. A thick central tongue of marine rocks (the Bullmoose Member) separates the non-marine and paralic deposits of the Gaylard and Chamberlain paleodeltas.

Coals of the Gething Formation at Dillon, and their enclosing sedimentary rocks, were deposited between 111 and 123 million years ago (Gibson, *ibid.*), on the basis of regional plant-fossil and foraminiferal zonations.

4.2.1 Chamberlain Member (map-unit 3d)

The Chamberlain Member of the Gething Formation is inferred to be exposed only in a small area within the Dillon property, situated between the two strands of the Nuisance Thrust.

The Chamberlain Member comprises interbedded sandstone and siltstone, with minor conglomerate, grading northward and northeastward to sandy siltstone (Gibson, 1992a). Regionally, the Chamberlain Member is well-known to contain several coal beds within the Sukunka-Quintette coalfield (Wallis and Jordan, 1974). Locally, coals interpreted to belong to the Chamberlain are known to outcrop between the West and North strands of the Nuisance Fault, within the northeastern corner of the Dillon property. However, the Chamberlain Member has not yet been tested by coal-exploration boreholes at Dillon. The Chamberlain Member is inferred to be approximately 60 metres thick within the area bounded by the two strands of the Nuisance Thrust, with an abrupt to interfingering basal contact above the underlying Bullmoose Member.

4.2.2 Bullmoose Member (map-unit 3c)

Within the Dillon coal property, the Bullmoose Member of the Gething Formation is inferred to only be present between the two strands of the Nuisance Thrust, where it is largely-covered by the overlying Chamberlain Member. Regionally, the Bullmoose Member comprises thinly-interbedded marine shale and siltstone, with an overall turbiditic aspect, accompanied by minor sandstone and tuff. Similar lithologies would be expected to exist within the poorly-exposed Bullmoose rocks at Dillon. Where a complete section of the Bullmoose Member has been drilled (within the Rocky Creek coal property, south of Dillon), its thickness is 83 metres, and its basal contact with the underlying Bluesky Member is gradational to abrupt. A similar contact relationship is expected at Dillon, although upon the evidence of widely-spaced natural-gas boreholes situated to the east and north of Dillon, the Bullmoose Member is inferred to be slightly thicker, at 105 metres.

4.2.3 Bluesky Member (map-unit 3b)

As with the Bullmoose Member, the Bluesky Member of the Gething Formation is inferred to only be present between the strands of the Nuisance Thrust, where it has no yet been located at outcrop, nor drilled. Regionally, the Bluesky Member comprises pebbly sandstone, pebbly mudstone and cherty pebble-conglomerate, often containing sparse to abundant glauconite, correlated on the basis of its stratigraphic position and distinctive glauconitic content with the

Bluesky Formation of the Dawson Creek area (Kilby, 1984; Legun, 1990; Gibson, 1992a). Again on a regional basis, the Bluesky ranges in thickness from 2 to 21 metres, with at least part of its thickness variation being occasioned by its erosion basal contact with the underlying Gaylard Member of the Gething Formation. Similar thickness and contact relationships are likely for the Bluesky Member at Dillon.

4.2.4 Gaylard Member (map-unit 3a)

The Gaylard Member of the Gething Formation is inferred to be represented at Dillon by approximately 330 metres of siltstone, sandstone, mudstone and minor ironstone, tuff, gritstone and conglomerate.

The Gaylard contains three thick coal beds (from top down, Seam C60, the Upper Seam, and the Lower Seam), each of which is locally several metres thick. Also present are at least nine thinner coal beds (collectively termed the ‘Marker’ coals) which seldom exceed a metre’s thickness each.

At Dillon, the Gaylard coal-measures may be usefully subdivided into five informal ‘divisions’, based mainly upon gross lithology and the presence of major coal beds. Stratigraphic details of these informal divisions are presented in **Tables 4-1** and **4-2**.

Gaylard lithologies

Siltstone is by far the predominant lithology within the Gaylard Member, characterised by variable levels of bioturbation from patchy to intense, occasionally with bands of nodular or massive (rarely mosaic-textured) ironstone, and ranging in texture from muddy to very sandy. Where they closely underlie coal beds, Gaylard Member siltstones are often rooty and somewhat carbonaceous, although immediate floors of coals generally grade upward to variably-carbonaceous mudstones.

Sandstones within the Gaylard Member range in texture from fine- to coarse-grained, rarely very coarse-grained to gritty or pebbly, and they are frequently cross-bedded. Channel-scours are characteristically found at the base of thicker sandstone units. The immediate basal portions of some channel-filling sandstones are sparsely- to moderately-bioturbated, suggesting the presence of basal salt-water wedges within their associated stream channels. Closely-spaced drilling demonstrates that the Gaylard sandstones vary rapidly in thickness between boreholes. Some of this variation may be due to channel-filling morphologies, whilst in other cases the tops of the sandstones may be bar-forms, draped in a variable thickness of fine-grained sedimentary rocks.

Mudstones within the Gaylard Member are generally silty, at times very much so, and variably-carbonaceous. Nodular ironstone is occasionally present within mudstone units, but the nodules appear to be randomly-disposed rather than concentrated into specific horizons. Glauconite is rarely, but notably, present within the finer mudstones, suggesting that such mudstones may host higher-order maximum flooding surfaces.

Coaly mudstones are characteristically present as thin (centimetre to decimetre-scale) partings within coal beds, or as lenses immediately overlying the tops of coal beds. Coaly mudstones are occasionally with elevated fusain contents in the immediately-underlying coals.

Tuff bands (colloquially termed as ‘ash bands’) are occasionally present within the well-exposed sections of the Gaylard Member at Brule Mine’s Camp Pit. These bands of pyroclastic volcanic rock appear as distinctively white to very light grey, clay-rich, soft layers, ranging from a few millimetres to a decimetre thick, within their otherwise-unremarkable bounding strata.

Gaylard coals

Coals and associated coaly mudstones comprise 5% to 10% of the Gaylard Member’s thickness within the Dillon coal property. Where observed in active working-faces at Brule Mine’s Camp Pit, the Gaylard Member coals range in texture from blocky and well-cleated to intensely-sheared and pulverised, locally forming finely-imbricate masses of ‘cornflakes’.

Three major coals are recognised at Dillon: coal C60 (at the top of Division 4), the Upper Seam (at the top of Division 3) and the Lower Seam (at the base of Division 3).

The Gaylard coals at Dillon range in visual brightness from ‘dull’ and ‘dull banded’ to ‘dull and bright’, rarely to ‘bright banded’ within the Diessel/CSIRO visual coal classification generally used in Canadian coalfields. Some of the dull coal has an anomalous sub-metallic lustre, verging upon ‘grey durain’ as is more characteristic of Carboniferous coals rather than Cretaceous coals. Banding is generally coarse, although it is often obscured by shearing. Within the Stopes macroscopic classification system (Stopes, 1935), the Gaylard coals range from ‘durains’ to ‘clarains’. The Gaylard coals occasionally grade into black coaly mudstone at their upper contacts. Where shearing is pervasive within such contact horizons, it is difficult to distinguish sheared coal from sheared coaly rock, although coals are more likely to have a black streak and coaly rock a dark brown to brownish-black streak when abraded.

Gaylard coals tend to pinch-out or split laterally. The pattern of splitting is rendered more difficult to decipher in those areas where faults travel along bedding within or adjacent to coal zones. Individual leaves of split coals sometimes retain a distinctive log response, increasing confidence in their correlation away from areas of conjoint coal. Drilling is sufficiently closely-spaced to allow mapping of splits within the western third of the Dillon lease (and to approximately map their morphology and internal topology), but insufficiently-so within the southeastern part of the property, which is as yet relatively underexplored.

Marine bands

The Gaylard coal-measures are punctuated by bands of shallow-marine rocks. The thickest and most readily-recognised of these ‘marine bands’ at Dillon comprises 2 to 9 metres of interbedded mudstone and siltstone with minor very thin bands of sandstone and tuff, designated as ‘Marker CD,’ within Division 4 of the Gaylard Member. Marker CD is of practical concern as being the most-extensive zone of potentially acid-generating (PAG) rocks recognised thus far within the Dillon mining lease. Marker CD can be readily recognised by its elevated natural gamma-radiation response on geophysical logs.

Gaylard-Cadomin contact

The basal contact of the Gaylard Member with the underlying Cadomin Formation is abrupt to possibly-erosional at the local scale (Cant, 1996), and interfingering at regional scale (Stott, 1968; Gibson, 1992a), being drawn at the top of a coarse-grained, locally-pebbly, often-gritty bed of sandstone.

Table 4-2: Stratigraphic setting of Gaylard Member coals at Dillon

Gaylard divisions	Coal beds	Lithology	Typical thickness of coal bed / Typical thickness of intervening strata
Division 5		fine- to coarse-grained sandstone and siltstone; minor gritstone and coal	65 metres?
	Marker G	coal – dull and bright, clean to dirty; numerous thin partings of carbonaceous to coaly mudstone.	0.5 to 1.5 metres
		variably-carbonaceous mudstone, siltstone and sandstone.	4 to 10 metres
	Marker F	coal – bright banded, clean; high gamma-ray response in immediate roof.	0.5 to 0.8 metres
		fine- to coarse-grained sandstone, variably-carbonaceous siltstone and mudstone.	20 to 25 metres
	Marker E	coal – dull and bright to bright banded; occasional bands of carbonaceous mudstone and mudstone/sandstone laminite; often a doublet of coals.	0.5 to 1.5 metres
		fine- to medium-grained sandstone, mudstone and carbonaceous mudstone; occasional ironstone bands near base.	10 to 15 metres
Division 4	Seam C60	coal – dull to bright banded, with numerous thin bands of carbonaceous to coaly mudstone and siltstone.	2.7 to 7.0 metres; splits to northeast
		carbonaceous mudstone; minor siltstone; locally thickens due to presence of sandstone.	0.1 to 20 metres; thickens northward
	Marker D	coal – dull to dull and bright, generally sheared; locally intensely-sheared and therefore inferred to host a bedding-parallel tectonic detachment zone.	0.5 to 2.0 metres; thickens to north
		siltstone; fine- to medium-grained sandstone, mudstone, minor carbonaceous mudstone and tuff.; includes Marker CD (possible marine band)	15 to 25 metres
	Marker C	coal – dull lustrous to bright, locally sheared.	0.5 to 1.0 metres; thins northward
		fine- to medium-grained sandstone; mudstone, minor siltstone; occasional bioturbated zones; with high gamma-log response in floor – *marine band*?	10 to 11 metres
	(unnamed)	coal – bright, with numerous thin bands of carbonaceous mudstone and siltstone.	0.4 metres
		fine- to medium-grained sandstone, mudstone; minor carbonaceous mudstone and siltstone, mainly as thin interbeds (point-bar structure?).	10 to 21metres
Division 3	Upper Seam	coal – dull and bright to bright banded, hard, locally containing 0.3 to 1.2 m parting of variably-carbonaceous mudstone. Where split, the upper ply is Upper A, and the lower ply is Upper B.	0.5 to 4.0 metres ; thins and splits northward
		fine-grained sandstone and siltstone; carbonaceous mudstone.	nil to 25 metres; thickens northward
	Marker M	coal – dull and bright to bright banded.	0.5 metres; Z-split geometry: rising southward from Lower to Upper Seam
		fine-grained sandstone and siltstone; carbonaceous mudstone.	nil to 3 metres; thickens southward
	Lower Seam	coal – bright banded, moderately hard to hard, with well-developed cleat; locally containing parting of siltstone or variably-carbonaceous mudstone. Where split, the upper ply is Lower A, and the lower ply is Lower B.	2.0 to 11.0 metres; thins and splits southward
Division 2		soft, variably-carbonaceous mudstone; minor siltstone.	0.2 to 1.8 metres
	Marker B	coal and dirty coal -- dull and bright, soft to very soft; typically contains many very thin partings of carbonaceous mudstone; moderately to intensely sheared; therefore inferred to host a bedding-parallel tectonic detachment zone.	0.45 to 1.0 metres
		fine-grained sandstone, mudstone, minor siltstone.	10 to 15 metres
	Marker AA	coal – dull and bright to bright banded, typically dirty, hard.	0.5 to 1.5 metres
		mudstone, siltstone and channel-filling sandstone with lenses of gritstone and pebble-conglomerate; minor carbonaceous to coaly mudstone.	45 to 75 metres
	Marker A	coal – dull and bright to bright banded, hard, typically a doublet of coals, with a central parting of carbonaceous to coaly mudstone.	0.9 to 1.5 metres
Division 1		very fine- to medium-grained sandstone, mudstone and siltstone; minor carbonaceous mudstone; coals may be present near base; sandstones are locally cross-bedded, with channel-filling morphology.	35 to ?70 metres

4.3 Older rocks

Along anticlinal crests, and also within the overthrust strata above and to the southwest of the Mt. Chamberlain Fault, rocks older than the Gething Formation are locally exposed within the Dillon coal property. These rocks remain virtually-unexplored at the local scale. Most of what is known of these formations' coal content comes from drilling within the Rocky Creek coal property, south of Dillon (Chowdry, 1980; Bowler, 1981).

In order from top down, these older formations comprise the Cadomin Formation (the basal unit within the Bullhead Group), and the Bickford, Monach, Beattie Peaks and Monteith Formations (within the Minnes Group), ranging in age from Late Jurassic to Early Cretaceous. At regional and property scale, all four of constituent formations within the Minnes Group are mapped together as a single unit (map-unit 1). Within the present detailed discussion and within **Table 4-1**, however, these formations are treated individually (as map-units 1d, 1c, 1b and 1a).

4.3.1 Cadomin Formation (map-unit 2)

The Cadomin Formation immediately underlies the Gething Formation, forming the basal part of the Bullhead Group (Stott, 1968). As such, the Cadomin Formation includes strata previously assigned to the Dresser Formation of the Crassier Group by Hughes (1964).

The Cadomin Formation comprises one or more thick beds of coarse-grained, gritty to pebbly sandstone and pebble-conglomerate (McLean, 1981) with occasional lenses of siltstone and pebbly gritstone, and rare thin lenses of dirty coal. The Cadomin Formation thus resembles the basal sandstone unit (Division 1) of the Gaylard Member, and its distinction from the overlying Gaylard sandstones rests mainly upon the Cadomin Formation’s greater lateral continuity.

At Dillon, the Cadomin Formation is estimated to be 25 to 35 metres thick. Its basal contact with the underlying Bickford Formation is erosional, with considerable local scour into the older sediments. Regionally, the base of the Cadomin marks a northeastward-deepening angular unconformity, cutting down into successively-older rocks of the Minnes Group (Stott, 1973).

4.3.2 Bickford Formation (map-unit 1d)

The Bickford Formation is the stratigraphically-highest and therefore youngest of the four formations which comprise the Minnes Group (Stott, 1981; 1998). The formation was previously designated by Hughes (1964) as the Brenot Formation, being the basal part of his now-superseded Crassier Group. The name ‘Brenot’ remained in local use by coal-industry workers until the earliest 1980s (Hughes, 1980; Stott, 1981).

The Bickford Formation consists of non-marine sandstone, siltstone, mudstone and coal, with a total thickness of 285 to 300 metres (Chowdry, 1980). Within the Dillon property, channel-filling conglomerates, up to 11 metres thick, occur near the top of the formation (Stott, 1998).The uppermost few metres of the formation, immediately beneath the base of the Cadomin Formation, is typically bleached and altered to a distinctively-soft, very light grey to white layer of clay-rich sediment.

Coals of potentially-mineable thickness were reported from the Bickford Formation within the Rocky Creek coal property (south of Dillon), on the basis of extensive drilling during the early 1980s, but the formation has yet to be drilled at Dillon, and its local coal potential is therefore unknown.

The basal contact of the Bickford Formation with the underlying Monach Formation is generally abrupt at local scale, but interfingering on a regional scale, being drawn at the top of the Monach’s distinctive quartzitic sandstones.

4.3.3 Monach Formation (map-unit 1c)

The Monach Formation comprises cliff-forming sandstone and quartzite, with lesser amounts of interbedded siltstone and conglomerate, and occasional thin coals, part of the Minnes Group (Chowdry, 1980; Stott, 1998); Hughes (1964) previously considered the Monach Formation to be the uppermost unit within his Beaudette Group, along with the underlying Beattie Peaks and Monteith formations. The coal content of the Monach Formation appears to be minimal, on a regional basis, and the formation's principal economic significance is as a marker bed in drilling and geological mapping.

The thickness of the Monach Formation at Rocky Creek is approximately 50 metres (Bowler, 1981); a similar thickness appears plausible for the Dillon area. The basal contact of the Monach Formation with the underlying Beattie Peaks Formation is gradational at local scale, and likely to be interfingering on a regional scale (Stott, 1998).

4.3.4 Beattie Peaks Formation (map-unit 1b)

The Beattie Peaks Formation comprises sandstone, siltstone and shale, locally accompanied by minor ironstone and coal, originating as a regionally-extensive shallow-marine to deep-marine turbidite system (Stott, 1998). Chowdry (1980) recognised the existence of thin coals and one thick coal (up to 2.5 metres) within the Beattie Peaks Formation at Rocky Creek, but these coals have not yet been traced into the Dillon area, where the formation remains unexplored.

The thickness of the Beattie Peaks Formation at Rocky Creek is approximately 300 metres, comprised mainly of sandstone, siltstone and shale, with minor ironstone and coal. A similar thickness of strata is inferred to be present within the Dillon property. The basal contact of the Beattie Peaks Formation upon the underlying Monteith Formation is abrupt (Hughes, 1964), and possibly interfingering on a regional scale.

4.3.5 Monteith Formation (map-unit 1a)

The Monteith Formation forms the basal unit of the Minnes Group (Stott, 1968) and as such it also formerly constituted the basal formation within Hughes' (1964) Beaudette Group. As with the other formations the Monteith Formation remains unexplored at Dillon Mine. Within the Rocky Creek coal property, however, Chowdry (1980) recognised interbedded sandstone, shale and conglomerate, with lesser amounts of quartzite and occasional thin coals.

The thickness of the Monteith Formation at Rocky Creek was estimated to be very approximately 600 metres (Chowdry, *ibid.*); a similar thickness appears reasonable for Dillon.

5 Reclamation

Technical records acquired by WCC from Teck, as part of the property acquisition, do not provide sufficient detail to assess past reclamation practice, although it may be presumed, from the senior author's contemporary experience in the 1970s and 1980s, that some form of roadway decommissioning (including installation of water bars?) was followed by seeding of a then-customary 'reclamation mix'.

A few attempts to relocate old boreholes in the field have been complicated by dense growth of grasses, shrubs and trees along the suspected alignment of former drillsite-access trails.

The year-2001 through year-2013 current boreholes, which were drilled on behalf of WCC and its successor companies, lie within the buffered facility footprint as shown within Brule Mine's five-year mine plan. Much of this footprint area has recently been cleared of vegetation and topsoil, in preparation for mining.

Reclamation details of current boreholes have not yet been found in the technical files acquired by WCCP from WCC. It may be presumed, however, that in keeping with their in-footprint location, minimal reclamation has been done at current borehole sites, except as might have been required for purposes of local control of water flows and sediment movement. Many of the boreholes' casings have been pulled from the ground in the course of pre-stripping operations, and their sites cannot now be readily distinguished.

6 Statement of costs

Prior to year-2013, exploratory costs ascribable to the Dillon coal property are only partially available for statistical review, owing to their having in many cases been commingled with costs ascribable to other nearby tenures. The cost estimate presented below in **Table 6-1**, and the cost breakdown presented in **Table 6-2**, are therefore based upon known quantities of work, and upon corporate internal average costs and provincial average unit-costs for comparable activities.

During year-2013, no detailed accounting was made of the division of geological labour involved in the regional photogeological compilation study, but a reasonable estimate of work time on the senior geologist's part (Gwyneth Cathyl-Huhn) is five days at nine hours/day. Given direct labour cost of $55.58/hour, the 45 working hours would amount to $2501.10, which may be rounded to $2500 in keeping with the estimated nature of this cost. The photogeological compilation is here allocated within 'personnel' for the year-2013 entry within **Table 6-1**, and as 'report preparation' within **Table 6-2**.

Table 6-1: Estimate of current exploratory costs for Dillon lease

Year	Comments	Comparison of rotary *vs.* core drilling						Downhole geophysical logging	Coal analysis	Road construction	Personnel	Total cost for the year (dollars)	Total number of boreholes	Total metreage of boreholes	Cost attributable to Dillon tenure (at 100% of total))	Average cost per metre
		Number of boreholes by method		Total metreage by method		Total drilling cost (dollars) by method										
		Rotary drilling	Core drilling	Rotary drilling	Core drilling	Rotary drilling	Core drilling									
2001	BR2001-series	27	4	1,702.26	148.80	350,987.97	22,674.65	32,504.61	8,584.11	43,129.70	37,928.22	495,809.27	31	1,851.06	495,809.27	267.85
2002	BR2002-series	18	3	901.57	98.30	181,522.10	20,676.42	17,557.72	7,827.63	23,296.97	20,487.34	271,368.18	21	999.87	271,368.18	271.40
2003	BR2003- and BS2003-series	9	4	421.34	361.61	84,832.60	76,061.05	13,748.60	28,795.00	18,242.74	16,042.65	237,722.63	13	782.95	237,722.63	303.62
2004	BR2004- and BRBS-series	20	6	1542.8	485.86	310,627.35	82,520.59	33,980.71	31,240.44	45,088.30	39,650.61	543,107.99	26	2,028.66	543,107.99	267.72
2005	BR2005-series	11	1	591.31	215.18	97,823.05	45,260.96	12,310.26	17,134.78	16,334.23	14,364.31	203,227.60	12	806.49	203,227.60	251.99
2006	BL2006- and DL2006-series	13	none	1,286.54	nil	259,031.96	nil	22,591.64	nil	29,976.38	26,361.20	337,961.19	13	1,286.54	337,961.19	262.69
2007	BL2007-series	26	none	2,363.98	nil	475,963.73	nil	41,511.49	nil	55,080.73	48,437.95	620,993.91	26	2,363.98	620,993.91	262.69
2008	BL2008-series	23	none	1,047.45	nil	210,893.58	nil	18,393.22	nil		21,462.25	250,749.06	23	1,047.45	250,749.06	239.39
2009	BR-09-series	21	none	1,572.22	nil	316,550.77	nil	27,608.18	nil		32,214.79	376,373.75	21	1,572.22	376,373.75	239.39
2010	BR-10-series	50	none	6,067.02	nil	1,221,533.81	nil	106,536.87	nil		124,313.24	1,452,383.92	50	6,067.02	1,452,383.92	239.39
2011	BM11-series	6	none	347.33	nil	69,931.42	nil	6,099.11	nil		7,116.79	83,147.33	6	347.33	83,147.33	239.39
2012	*no exploratory work was done during year-2012*															
2013	BM13- and BR13-series	7	2	210.47	377.00	42,376.03	79,298.18	10,315.97	nil		14,537.26	146,527.44	9	587.47	146,527.44	249.42
	Totals	231	20	18,054.29	1686.75	3,622,074.39	326,491.85	343,158.40	93,581.96	231,149.05	402,916.60	5,019,372.27	251	19,741.04	5,019,372.27	overall average $254.26/m
British Columbia average costs per metre						*201.53*	*210.34*	*17.56*	*79.63*	*23.30*	*20.49*	*293.08*				

Notes: *Table prepared by L.R. Avery, B.Sc. British Columbia average costs per metre were used to estimate the costs of each activity during those years for which detailed cost data could not be located amongst existing records. Numbers and aggregate metreages of boreholes are believed to be correct. Geotechnical and bulk-sampling costs are not yet known at time of preparation of this table, and have therefore not been estimated. The total programme cost listed in this table is a minimum value, as cost data concerning certain activities (such as geotechnical and bulk-sampling work) have not yet been located.*

Overall: 231 rotary holes, totalling 18,054.29 metres; 20 cored holes, totalling 1686.75 metres; overall programme cost $5,019,372 (to the nearest whole dollar) for 19,741.04 metres, thus $254.26/metre.

Table 6-2: Cost breakdown by activity

Item			Cost of work	Percentage attributable to Tenure 412964
Field personnel			$400,416.60	100%
Consultants	not individually available			
Food/accommodation	not individually available			
Mobe/demob within BC	not individually available			
Aircraft support	nil		nil	
Vehicle rentals	not individually available			
Equipment/supplies	not individually available			
Instrument rentals	not individually available			
Laboratory analysis	[coal analysis]		$93,581.96	100%
Contract jobs -- unit costs	[drilling, geophysics and road work]		$4,522,873.69	100%
Report preparation	[photogeological compilation]	45 hours at $55.58/hour	$2,500 (rounded)	100%
Management	not individually available			
		TOTAL (rounded)	$5,019,372.00	100%

Note: in this table, the $2,500 cost of the photogeological study is reported as ‘report preparation’, rather than being rolled into ‘field personnel’, as this work was primarily an office-based activity.

7 References

Barss, D.L. and Montandon, F.A.

1981: Sukunka-Bullmoose gas fields: models for a developing trend in the southern Foothills of northeast British Columbia; *Bulletin of Canadian Petroleum Geology*, volume 29 (September 1981), pages 293 to 333.

Bianchin, M.

2013: 2013 Brule Mine groundwater program field report; *Lorax Environmental*, unpublished report A320-2 for Walter Energy.

Bowler, A.R.

1981: B.C. Government report on the Rocky Creek 1981 exploration program, N.E.B.C.; *BP Exploration Canada Limited*, unpublished report PR – Rocky Creek 81(1)A, dated December 31, 1981; *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Coal Assessment Report No.620, 552 pages.

Cant, D.J.

1996: Sedimentological and sequence stratigraphic organization of a foreland clastic wedge, Mannville Group, Western Canada; *Journal of Sedimentary Research*, volume 66, number 6 (November 1996), pages 1137 to 1147.

Chowdry, M.A.

1980: B.C. Government report on the North East B.C. thermal coal exploration program, 1980; *BP Exploration Canada Limited*, unpublished report PR – Sukunka 80(1)A, dated December 31, 1980; *British Columbia Ministry of Energy, Mines and Petroleum Resource*s, Coal Assessment Report No. 667, 807 pages.

Dawson, R. and Ennis, S.

2001: Summary review of the Brazion Group of coal properties; *Norwest Mine Services Ltd.*, unpublished technical report 01-1990, dated September 26th, 2001, for Western Canadian Coal Corp.

Duff, P.McL.D. and Gilchrist, R.D.

1981: Correlation of Lower Cretaceous coal measures, Peace River Coalfield, British Columbia; *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Paper 1981-3, 31 pages.

Gibson, D.W.

1992a: Stratigraphy, sedimentology, coal geology and depositional environments of the Lower Cretaceous Gething formation, northeastern British Columbia and west-central Alberta; *Geological Survey of Canada*, Bulletin 431, 127 pages.

1992b: Stratigraphy and sedimentology of the Lower Cretaceous Hulcross and Boulder Creek formations, northeastern British Columbia; *Geological Survey of Canada*, Bulletin 440, 105 pages.

Gilchrist, R.D.

1979: Burnt River area (93P/4, 5); in Geological Fieldwork 1978, *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Paper 1979-1, pages 79 to 83.

Hughes, J.E.

1964: Jurassic and Cretaceous strata of the Bullhead succession in the Peace River Foothills; *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Bulletin 51, 73 pages.

1980: Goodrich coal project geological report; Gulf Canada Resources Inc., unpublished report PR-Goodrich 80(1)A dated December 1980; *British Columbia Geological Survey Branch,* Coal Assessment Report No.531, 88 pages.

Hughes, J.E. and McFall, C.C.

1981: Trefi coal project – geological report; Gulf Canada Resources Inc., unpublished report PR-Trefi 80(1)A dated May 1981; *British Columbia Geological Survey Branch*, Coal Assessment Report No.680, 305 pages.

Hunter, D.J. and Cunningham, J.M.

1991a: Burnt River mapping and compilation project; in Geological Fieldwork 1990, *British Columbia Ministry of Energy, Mines and Petroleum Resources,* Geological Survey Branch, Paper 1991-1, pages 407 to 414.

1991b: Geology of the Burnt River and Gwillim Lake (southwest half) areas, northeastern British Columbia, NTS 93P/5, 93P/6; *British Columbia Ministry of Energy, Mines and Petroleum Resources,* Geological Survey Branch, Open File Map 1991-4, 2 sheets.

Kalkreuth, W. and Leckie, D.A.

1989: Sedimentological and petrographical characteristics of Cretaceous strandplain coals: a model for coal accumulation from the North American Western Interior Seaway; *International Journal of Coal Geology*, volume 12, pages 381 to 424.

Kilby, W.E.

1984: The character of the Bluesky Formation in the Foothills of northeastern British Columbia (93 O, P, I); in Geological Fieldwork 1983, *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Geological Survey Branch Paper 1984-1, pages 108 to 112.

1985: Tonstein and bentonite correlations in northeast British Columbia (93O, P, I; 94A); in Geological Fieldwork 1984, *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Geological Survey Branch Paper 1985-1, pages 257 to 278.

Kostik, D.N., Sabo, J.W., Blandford, T.E., Del Bosco, T.D. and Dixon, J.A.

2004:Technical report on the proposed Dillon Mine coal project; *Weir International Mining Consultants*, project no. 4870.3, dated September 13, 2004, for Western Canadian Coal Corp.

Krpan, N.

2005: Brule feasibility study report; *Sandwell Engineering Inc.*, unpublished report, file 142874, dated 24th October 2005, for Western Canadian Coal Corp.

Legun, A.S.

1990: Stratigraphic trends in the Gething Formation; *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Open File 2006-13.

2003: Coalbed methane geology of the Peace River district, northeast British Columbia; *British Columbia Ministry of Energy and Mines*, Geoscience Map 2003-2.

Lortie, D.P. and Allen, M.G.

2012: Updated coal reserves of the Brule Project in the Peace River coalfield of British Columbia for Walter Energy Inc.; *Walter Energy Western Coal*, unpublished report dated February 28, 2012; viewed July 12, 2014 via *www.sedar.com*

McClymont, B.I.

1979: Report on the 1978 exploration program on the Burnt River property (Coal Lic. 3061-3088 inclusive), Sukunka River area, B.C. (93 P/5W); Teck Corporation and Brameda Resources Ltd., unpublished report PR – Burnt River 78(1)A dated January, 1979; *British Columbia Geological Survey Branch*, Coal Assessment Report 488, 98 pages.

1981: Burnt River coal property 1981 exploration report (Coal Licences 4254-4529, 3061-3088 inclusive), Sukunka River area, B.C., 93 P/5W; *Teck Corporation*, unpublished report PR – Burnt River 81(1)A dated December, 1981; *British Columbia Geological Survey Branch*, Coal Assessment Report 490, 81 pages.

McClymont, B.I. and Wright, J.H.

1981: Report on the 1980 exploration program for the Burnt River coal property (Coal Licences 4254-4529, 3061-3088 inclusive), Sukunka River area, B.C. (93 P/5W); *Teck Corporation and Amalgamated Brameda-Yukon Limited*, unpublished report PR – Burnt River 80(1)A dated January, 1981; *British Columbia Geological Survey Branch*, Coal Assessment Report 489, 400 pages.

McLean, J.R.

1977: The Cadomin Formation: stratigraphy, sedimentology, and tectonic implications; *Bulletin of Canadian Petroleum Geology*, volume 25, number 4, pages 792 to 827.

McMechan, M.E.

1984: Geology and cross-section, Dawson Creek, British Columbia; *Geological Survey of Canada*, Map 1858A, scale 1:250,000

1985: Low-taper triangle-zone geometry: an interpretation for the Rocky Mountain Foothills, Pine Pass – Peace River area, British Columbia; *Bulletin of Canadian Petroleum Geology*, volume 33, number 1 (March 1985), pages 31 to 38.

Minnes, E.H.

2005: Technical report on the Brule coal project of the Burnt River coal property, British Columbia; *Marston Canada Ltd.*, unpublished report dated October 27, 2005, for Western Canadian Coal Corporation.

2007: Updated technical report on the Brule coal project; *Marston Canada Ltd.*, unpublished report dated December 7, 2007, for Western Canadian Coal.

Riddell, J.M.

2013: MINFILE record summary, MINFILE No. 093P 007; accessible via *http://minfile.gov.bc.ca/Summary.aspx?minfilno=093P++007*, viewed September 13, 2014.

Stelck, C.R. and Leckie, D.A.

1988: Foraminiferal inventory and lithologic description of the Lower Cretaceous (Albian) Hulcross Shale, Monkman area, northeastern British Columbia; *Canadian Journal of Earth Sciences*, volume 25, pages 793 to 798.

Stopes, M.C.
1935: On the petrology of banded bituminous coals; *Fuel*, volume 14, pages 4 to 13.

Stott, D.F.
1960: Cretaceous rocks between Smoky and Pine rivers, Rocky Mountain Foothills, Alberta and British Columbia; *Geological Survey of Canada*, Paper 60-16, 52 pages.

1963: Stratigraphy of the Lower Cretaceous Fort St. John Group, Gething and Cadomin formations, Foothills of northern Alberta and British Columbia; *Geological Survey of Canada*, Paper 62-39, 48 pages.

1968: Lower Cretaceous Bullhead and Fort St. John groups, between Smoky and Peace rivers, Rocky Mountain Foothills, Alberta and British Columbia; *Geological Survey of Canada*, Bulletin 152, 279 pages.

1973: Lower Cretaceous Bullhead Group between Bullmoose Mountain and Tetsa River, Rocky Mountain Foothills, Northeastern British Columbia; *Geological Survey of Canada*, Bulletin 219, 228 pages.

1974: Lower Cretaceous coal measures of the Foothills of west-central Alberta and northeastern British Columbia; *Canadian Mining and Metallurgical Bulletin*, volume 67, number 749, pages 87 to 101.

1981: Bickford and Gorman Creek, two new formations of the Jurassic-Cretaceous Minnes Group, Alberta and British Columbia; *Geological Survey of Canada*, Paper 81-1B, p. 1-9.

1998: Fernie Formation and Minnes Group (Jurassic and lowermost Cretaceous), northern Rocky Mountain Foothills, Alberta and British Columbia; *Geological Survey of Canada*, Bulletin 516, 516 pages.

Versoza, R.S.
1975: Preliminary geology of the Burnt River property (Coal Lic. 3061-3088), Sukunka River area, B.C. (93 P 5/W); Brameda Resources Limited, unpublished report PR – Burnt River 75(1)A dated December 1975; *British Columbia Geological Survey Branch*, Coal Assessment Report 486, 17 pages.

1977: Report on the 1977 exploration program on the Burnt River property (Coal Lic. 3061-3088 inclusive), Sukunka River area, B.C. (93 P/5W); Teck Corporation Limited and Brameda Resources Limited, unpublished report PR – Burnt River 77(1)A dated November 1977; *British Columbia Geological Survey Branch*, Coal Assessment Report 487, 46 pages.

Wallis, G.R. and Jordan, G.R.
1974: The stratigraphy and structure of the Lower Cretaceous Gething Formation of the Sukunka River coal deposit in B.C.; *CIM Bulletin*, volume 67, number 743 (March 1974), pages 142 to 147.

8 Conclusions

The Dillon coal property contains coal-measures of latest Jurassic to Early Cretaceous age, within the Minnes, Bullhead and Fort St. John groups of sedimentary rocks. These rocks are deformed by numerous northeast-verging, imbricate thrust faults and associated tight concentric folds, consistent with the overall thin-skinned structural style of the Rocky Mountain Foothills of northeastern British Columbia.

Historic (pre-2001) exploration work at Dillon was done by Teck Corporation, as reported in Coal Assessment Reports Nos. 486, 487, 488, 489 and 490. Considerable current exploratory work has subsequently been done from year-2001 onward to year-2013, by Walter Energy, Walter Canadian Coal Partnership, associated firms, and preceding firms.

The current exploratory work (year-2001 through year-2013 work) on the Dillon coal property comprises drilling and ancillary activities thereto, including analytical work, geophysical logging, surveying and associated works as tabulated in **Section 6** of the current report, and as supported by technical records presented within **Appendix A** of the current report. Rounded to the nearest whole dollar, the current exploratory work at Dillon is estimated to have cost, at a minimum, $5,019,372. The cost figure is stated as a minimum, as it has not been possible to locate cost data for certain activities.

This work has met its immediate objectives of providing a better understanding of the property’s structural and stratigraphic geology, and of its coal quality and coal resource base.

The Dillon property merits further work.

9 Statements of qualifications

I, Laura Rose Avery B.Sc. B.Ed., do hereby certify that:

a) I am currently employed on a full-time basis by Walter Canadian Coal Partnership, a subsidiary of Walter Energy, in their Northeast British Columbia office in Chetwynd, British Columbia.

b) This certificate applies to the current report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, dated September 15, 2014.

c) I am in the process of applying for registration with the Association of Professional Engineers and Geoscientists of British Columbia.

d) I received my Bachelor of Science from Saint Mary's University in Halifax in 2006.

e) I have worked in the coal industry for three years.

f) I have been pit geologist for the Brazion group since March 2012.

g) I have been co-chair of the Joint Occupational Health, Safety and Environment Committee for both Brule and Willow for 2 years.

h) I am a contributing author of this report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, dated September 15, 2014, concerning the Dillon coal property.

I, Preetpal Singh M.A.Sc., do hereby certify that:

a) I am currently employed on a full-time basis by Walter Canadian Coal Partnership, a subsidiary of Walter Energy, in their Northeast British Columbia office in Tumbler Ridge, British Columbia.

b) This certificate applies to the current report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, dated September 15, 2014.

c) I am a member of the IEEE Computer Society since 2006.

d) I am in the process of applying for registration with the Association of Professional Engineers and Geoscientists of British Columbia.

e) I received my Bachelor of Science in Computer Science from Laurentian University in 2008, and my Master's of Applied Science in Mineral Resource Engineering, also from laurentian University, in 2012.

f) I have worked as a data analyst for Walter Canadian Coal Partnership since July of 2013.

g) I am a contributing author of this report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, dated September 15, 2014, concerning the Dillon coal property.

I, C.G. Cathyl-Huhn P.Geo.(BC) Lic.Geol.(WA) RMSME, do hereby certify that:

a) I am currently employed on a full-time basis by Walter Canadian Coal Partnership, a subsidiary of Walter Energy Inc.

b) This certificate applies to the current report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, dated September 15, 2014.

c) I am a member (Professional Geoscientist, Licence No. 20550) of the Association of Professional Engineers and Geoscientists of British Columbia, licenced as a geologist (Licence No. 2089) in Washington State, a member (No.152081) of the Association for Iron & Steel Technology, and a founding Registered Member of the Society for Mining, Metallurgy and Exploration (SME, Member No. 518350). I have worked as a colliery geologist in four countries for over 36 years since my graduation from university.

d) I certify that by reason of my education, affiliation with professional associations, and past relevant work experience, having written numerous published and private geological reports and technical papers concerning coalfield geology, coal-mining geology and coal-resource estimation, that I am qualified as a Qualified Person as defined by Canadian *National Instrument 43-101* and a Competent Person as defined by the Australian *JORC Code*.

e) I have worked as senior colliery geologist for Walter Canadian Coal Partnership's Canadian operations since November of 2011.

f) My most recent visit to the Dillon coal property was in the spring of 2014.

g) I am principal author of this report, titled *Coal Assessment Report for the Dillon lease, British Columbia, Canada*, dated September 15, 2014, concerning the Dillon coal property.

h) As of the date of this report, I am not independent of Walter Canadian Coal Partnership and Walter Energy, pursuant to the tests in Section 1.4 of *National Instrument 43-101*, for the reason that I am a full-time employee of Walter Canadian Coal Partnership.

i) The effective date of this report is September 15, 2014.

"original signed and sealed by"
Dated this 15th day of September, 2014. C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME

Appendix A:

Borehole records, geophysical logs, and analytical reports

Borehole records are presented within **Appendix A** as scanned pages (in PDF format), arranged by drilling series and thence by individual folders within each series (as in **Table A-4**). Each folder contains, where available, header sheets, driller's logs, core descriptions, analytical data and geophysical logs.

A.1 Notes on downhole geophysical logs

Of the 251 boreholes drilled at Dillon between the years 2001 and 2013, downhole geophysical logs are known to have been run in 222 boreholes, possibly were run (see **Table A-1**) in an additional 14 boreholes (but the logs are missing: see **Table A-2**), and are known to have not been run (**Table A-3**) in 29 boreholes. Reasons for not running logs likely included:

-- collapse of the borehole after drilling, preventing logging;
-- abandonment of the borehole within Drift, above the bedrock surface;
-- (rarely) decision to not run logs owing to lack of coal within the borehole; or
-- (rarely) inability to access the borehole site.

In most cases, a standard 'suite' of geophysical logs were run, comprising:

-- gamma-density-caliper-resistivity logs, from a coal combination sonde;
-- gamma-neutron logs; and
-- deviation and verticality logs (processed from data collected by the gamma-neutron sonde).

Boreholes which were regarded as being unstable were generally logged through the drill-rods, and in some cases such holes were subsequently re-logged with the standard suite of tools.

Where thick coals were indicated by the coal combination sonde, expanded-scale detail logs were plotted over depth ranges sufficient to cover the coals and their immediate bounding strata. In one case (hole BM13-04A), a dipmeter log was run.

Table A-1: Holes where geophysical logs may or may not have been run

BL2006-series: holes -02, -03, -04, -05, -06 -07, -08, -09, -10 and -11	DL2006-series: holes -01, -02,- and -03

Table A-2: Missing geophysical logs

BR2001-series: holes -24, and -25	BS-2003 series: hole -3
BR2004-series: holes -10, -16, and -27	BL-08-series: hole -06
BR-09-series: holes -02, -05, -06, -07, -09, and -11	BR-10-series: holes -57, -58, -59, and -65

Table A-3: Boreholes for which geophysical logs were not run

BR2001-series: hole -15	BR2002-series: holes -5, -6, -7, -9, -10, and -20
BS2003-series: hole -4	BR2004-series: holes -31, -32, and -34
BR2005-series: holes -04, -05, -10, -11, -12, -13, -14, and -15	BL-07-series: hole -13 BL-08-series: hole -08
BM11-series: holes -01, -02, -03, -04, and -06	BM13-series: holes -04B, -05B, and -09B

Table A-4: Inventory of geophysical logs (sheet 1 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR2001-1C	573988.63	6140039.02	1223.24	41	Core	Yes	2001	39.99			39.99		39.27	
BR2001-2C	574075.02	6140062.63	1220.45	44.4	Core	Yes	2001	44.4			44.34		44.31	
BR2001-3	573697.81	6140258.23	1255.54	40	Rotary	Yes	2001	39.98			39.98		32.86	
BR2001-4	573704.06	6140284.21	1254.13	46	Rotary	Yes	2001	46.87			46.61		46.62	
BR2001-11	573244.91	6140642.94	1345.43	71	Rotary	Yes	2001	70.9			70.9		70.84	
BR2001-12	573318.69	6140723.49	1333.92	98	Rotary	Yes	2001	98.52			98		98.75	
BR2001-13	573295.56	6140706.52	1337.86	82	Rotary	Yes	2001	82			83.22		83.01	
BR2001-14	573619.16	6140407.91	1280.68	11.9	Rotary	Yes	2001	10.75			10.79		8.57	
BR2001-15	574568.3	6139436.61	1155.83	11.9	Rotary	No	2001							
BR2001-16	574168.37	6139944.24	1199.79	33	Rotary	Yes	2001	33.95			33.99		26.61	
BR2001-17	574185.15	6139963.03	1196.25	79	Rotary	Yes	2001	79			78.95		61.41	
BR2001-18	573166.4	6140830.98	1331.26	77	Rotary	Yes	2001	76.48			76.52		76.44	
BR2001-19	573139.07	6140798.75	1340.79	96	Rotary	Yes	2001	96.45			96.29		98.21	
BR2001-20	573120.81	6140769.4	1345.11	101.5	Rotary	Yes	2001	101.49			101.51		101.21	
BR2001-21	573069.53	6140728.37	1345.68	96	Rotary	Yes	2001	96.48			96.84		96.06	
BR2001-22	573074.73	6140758.81	1345.26	61.79	Rotary	Yes	2001	61.79			61.81		61.75	
BR2001-23	573385.92	6140796.28	1320.54	126.8	Rotary	Yes	2001	126.8			126.8		98.2	
BR2001-24	573840.37	6140490.43	1273.7	33.3	Rotary	Yes	2001	Missing						
BR2001-25	573945.99	6140618.78	1260.5	42.77	Rotary	Yes	2001	Missing						
BR2001-26	574130.09	6140379.57	1216.48	48.78	Rotary	Yes	2001	48.78			48.78		37.66	
BR2001-27	574486.26	6140009.94	1172.25	42.5	Rotary	Yes	2001	39.42			39.34		31.74	
BR2001-28C	573253.55	6140662.45	1343.7	30	Core HQ	Yes	2001	26.61			26.63		26.42	
BR2001-29C	573251.93	6140661	1343.71	33.4	Core HQ	Yes	2001	33.51			33.55		33.34	
BR2001-30	573388.07	6140804.19	1320.19	89.1	Rotary	Yes	2001	89.07			89.17		88.76	

Table A-4: Inventory of geophysical logs (sheet 2 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR2001-31	573716.22	6140304.08	1252.51	43	Rotary	Yes	2001	37.37			37.45		37.2	
BR2002-1	573939.51	6140612.61	1261.34	152.4	Rotary	Yes	2002	151.52			151.7		119.09	
BR2002-2	574116.76	6140364.27	1218.79	94.4	Rotary	Yes	2002	94.43			94.43		71.77	
BR2002-3	574318.8	6140200.03	1192.39	85.3	Rotary	Yes	2002	85.87			85.97		69.43	
BR2002-4	574540.52	6140030.91	1169.74	91.5	Rotary	Yes	2002	91.36			91.44		69.78	
BR2002-5	573618.84	6139447.45	1207.17	12.2	Rotary	No	2002							
BR2002-6	573483.4	6139811.03	1241.29	12.2	Rotary	No	2002							
BR2002-7	573584.19	6139651.39	1230.48	16.7	Rotary	No	2002							
BR2002-8	573342.72	6140003.36	1256.67	25.3	Rotary	Yes	2002	24.8			24.89		24.71	
BR2002-9	573322.32	6139990.11	1257.76	10	Rotary	No	2002							
BR2002-10	573280.43	6139926.61	1257.25	11.3	Rotary	No	2002							
BR2002-11	572743.9	6140106.36	1314.33	153.17	Rotary	Yes	2002	94.54			94.92		94.69	
BR2002-15	572945.39	6140308.11	1353.5	9.7	Rotary	Yes	2002	9.59			9.73		9.55	
BR2002-16	572961.41	6140328.06	1352.3	12.8	Rotary	Yes	2002	12.6			12.68		12.49	
BR2002-17	573032.35	6140405.26	1348.82	64.6	Rotary	Yes	2002	64.42			64.46		64.1	
BR2002-18	572929.98	6140290.35	1354.73	25.3	Rotary	Yes	2002	24.84			24.97		24.76	
BR2002-19C	572938.97	6140302.9	1353.42	8.8	Core	Yes	2002	8.54			8.48		8.3	
BR2002-20	573064.37	6140445.42	1344.15	16.2	Rotary	No	2002							
BR2002-21C	573063.43	6140446.34	1344.33	39.5	Core	Yes	2002	37.83			37.73		37.53	
BR2002-22	572762.66	6139624.13	1316.77	70.5	Rotary	Yes	2002	70.61			70.64		70.39	
BR2002-23C	573986.27	6140037.28	1223.05	50	Core	Yes	2002	47.22			47.32		47.12	
BR2002-24	574001.18	6138915.26	1176.76	38	Rotary	Yes	2002	37.03			37.03			
BR2003-6	574372.42	6139847.46	1153.28	51.86	Rotary	Yes	2003	51.86			47.98		51.88	
BR2003-7	573802.56	6140095.18	1230.27	64.95	Rotary	Yes	2003	64.95			63.02		64.8	
BR2003-8	573841.18	6140134.74	1224.71	34.43	Rotary	Yes	2003	34.43			32.58		34.45	

Table A-4: Inventory of geophysical logs (sheet 3 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR2003-9	573860.14	6140152.82	1223.48	49.57	Rotary	Yes	2003	49.57			47.9		49.61	
BR2003-10	573831.56	6140126.26	1225.52	20.66	Rotary	Yes	2003	20.66			19.86		19.52	
BR2003-11C	573849.99	6140145.22	1223.84	40.87	Core	Yes	2003	40.87					40.8	
BR2003-12	573866.93	6140167.22	1223.34	37.35	Rotary	Yes	2003	37.35			35.62		35.22	
BR2003-13	573635.98	6139456.79	1206.01	54.29	Rotary	Yes	2003	54.29			53.87		54.35	
BR2003-14	574371.22	6139815.02	1153.61	43.26	Rotary	Yes	2003	43.26			41.69		43.25	
BR2003-15	574025.06	6140057.37	1219.79	64.97	Rotary	Yes	2003	64.97			62.98		64.84	
BS2003-2	573987.76	6140038.46	1223.18	55.32	Core	Yes	2003	55.32					55.3	
BS2003-3	573967.53	6140018.85	1223.63	45.76	Core	Yes	2003	Missing						
BS2003-4	573966.18	6140019.6	1223.78	219.66	Core	No	2003							
BR2004-01C	573848.99	6138352.13	1224.9	131.1	Core	Yes	2004	131.56			131.58		131.55	
BR2004-02C	572799.84	6139847.51	1324.89	124.36	Core	Yes	2004	124.44			124.41		124.36	
BR2004-03C	573196.23	6139044.48	1253.57	136.86	Core	Yes	2004		139.36			139.12		
BR2004-04	573500	6139570	1239	78.23	Rotary	Yes	2004		78.23					
BR2004-05	573556	6140423.88	1288.11	100.4	Rotary	Yes	2004	16.95	97.47					
BR2004-06	573639.37	6140491.16	1303.87	32.03	Rotary	Yes	2004	31.24			31.32		31.08	
BR2004-07	573603.05	6140744.17	1299.57	16.78	Rotary	Yes	2004	15.72			15.58		15.58	
BR2004-08	573492.93	6140366.02	1304.29	35.08	Rotary	Yes	2004	34.38			34.29		34.15	
BR2004-09	573343.42	6139772.83	1255.89	44.77	Rotary	Yes	2004		44.77					
BR2004-10	573285	6139139.63	1244	100	Rotary	Yes	2004	Missing						
BR2004-11	574542.46	6138428.43	1172.6	57.33	Rotary	Yes	2004	57.33			57.21		57.16	
BR2004-12	574605.03	6138461.67	1161.92	49.53	Rotary	Yes	2004	49.53			49.91		49.46	
BR2004-13	573739.91	6138380.52	1255.52	108.65	Rotary	Yes	2004	108.65			108.65		108.58	
BR2004-14	573715	6138258.47	1245.68	121.35	Rotary	Yes	2004		121.35					
BR2004-15	573992.65	6138695.29	1186.56	83.26	Rotary	Yes	2004	83.26	83.08				83.17	

Table A-4: Inventory of geophysical logs (sheet 4 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR2004-16	573820	6138830	1187	36.57	Rotary	Yes	2004	Missing						
BR2004-17	573716.64	6139055.26	1190.32	36.58	Rotary	Yes	2004	Missing						
BR2004-23	574603.69	6138608.93	1148.7	165.55	Rotary	Yes	2004	153.17			153.87		153.53	
BR2004-30	572940.3	6139958.89	1304.87	183.94	Rotary	Yes	2004	183.94			183.9		176.4	
BR2004-31	573613.49	6139441.75	1210.7	66.1	Rotary	No	2004		66.01					
BR2004-32	573682.17	6139469.85	1206.15	70	Rotary	No	2004							
BR2004-34	573415.75	6139520.63	1251.12	54.2	Rotary	No	2004							
BR2004-35	573045.25	6139314.08	1284.67	102.45	Rotary	Yes	2004	103.1			103.1		102.45	
BRBS2004-3C	574770.59	6138450.47	1127.73	21.59	Core	Yes	2004	21.59						
BRBS2004-4C	573847.59	6138347.56	1229.01	55	Core	Yes	2004	55						
BRBS2004-5C	574542.66	6138135.19	1139.99	16.95	Core	Yes	2004	16.95						
BR2005-02C	573020.23	6140006.49	1288.28	215.18	Core	Yes	2005	212.71			212			
BR2005-03	573667.56	6140414.7	1280.84	58	Rotary	Yes	2005	60.18					60.18	
BR2005-04	573540	6140330	1295.4	66.59	Rotary	No	2005							
BR2005-05	573085.3	6139943.06	1274.47	179.94	Rotary	No	2005							
BR2005-10	574411.52	6139901.03	1146.21	29.69	Rotary	No	2005							
BR2005-11	574390.27	6139879.64	1142.66	38.71	Rotary	No	2005							
BR2005-12	574390.16	6139884.17	1142.54	23.92	Rotary	No	2005							
BR2005-13	574333.56	6139959.75	1142.87	46.09	Rotary	No	2005							
BR2005-14	574331.89	6139968.93	1143.16	53.31	Rotary	No	2005							
BR2005-15	574508.22	6139768.44	1108.5	24.99	Rotary	No	2005							
BR2005-16	574438.1	6139769.41	1123.03	33.99	Rotary	Yes	2005	33.99			34.11		34.06	
BR2005-17	574455.56	6139797.61	1120.76	36.08	Rotary	Yes	2005					36.08		
BL2006-02	574382.47	6140009.41	1184.99	166.74	Rotary	Unknown	2006							
BL2006-03	574989.28	6139510.99	1073.41	150.2	Rotary	Unknown	2006							
BL2006-04	574711.08	6139769.69	1127.24	108.24	Rotary	Unknown	2006							

Table A-4: Inventory of geophysical logs (sheet 5 of 10)

Borehole	UTM NAD83		Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Depths (in metres) reached by geophysical sondes, and logs run						
	Easting (m)	Northing (m)						Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BL2006-05	574647.32	6139912.39	1155.9	120	Rotary	Unknown	2006							
BL2006-06	574587	6139961	1153.98	98.72	Rotary	Unknown	2006							
BL2006-07	575002.8	6139566	1069.8	122.27	Rotary	Unknown	2006							
BL2006-08	574841.3	6139547	1088.89	98.8	Rotary	Unknown	2006							
BL2006-09	574418.3	6140055	1183.96	50.19	Rotary	Unknown	2006							
BL2006-10	574304.6	6140138	1190.12	91.1	Rotary	Unknown	2006							
BL2006-11	574306	6140167	1190.92	96.44	Rotary	Unknown	2006							
DL2006-01	574395.57	6139872.59	1127.98	63.84	Rotary	Unknown	2006							
DL2006-02	574328.37	6139911.47	1119.43	60	Rotary	Unknown	2006							
DL2006-03	574336.03	6139918.59	1119.91	60	Rotary	Unknown	2006							
BL-07-01	573777.41	6140497.8	1283.27	48.24	Rotary	Yes	2007	48.24			47.82		41.6	
BL-07-02	573787.27	6140519.91	1278.77	33.25	Rotary	Yes	2007	33.25			33.19		29.72	
BL-07-03	573794.28	6140535.29	1278.82	51.44	Rotary	Yes	2007	51.44			51.38		45.17	
BL-07-04	573753.25	6140548.67	1281.26	39.14	Rotary	Yes	2007	39.14			39.28		34.41	
BL-07-06	573714.18	6140569.19	1283.61	39	Rotary	Yes	2007	38.47			38.53		33.8	
BL-07-07	573720.76	6140580.81	1283.59	49.5	Rotary	Yes	2007	49.03			49.05		42.82	
BL-07-08	573683.62	6140589.09	1284.87	45.8	Rotary	Yes	2007	45.37			45.15		39.93	
BL-07-09	573739.47	6140516.13	1290.32	30	Rotary	Yes	2007	29.99			29.73		26.56	
BL-07-10	574037.47	6140318.19	1229.91	102.96	Rotary	Yes	2007	102.96			102.92		90.64	
BL-07-11	574087.65	6140334.88	1222.99	139.56	Rotary	Yes	2007	139.56			139.22		114.64	
BL-07-12	574135.68	6140390.28	1215.08	148.85	Rotary	Yes	2007	148.85			148.85		129.64	
BL-07-13	574151.22	6140416.91	1214.92	91.7	Rotary	No	2007	91.16						
BL-07-14	574009.94	6140294.29	1230.61	123.78	Rotary	Yes	2007	123.78			123.92		116.75	
BL-07-15	573917.07	6140527.1	1257.08	125.5	Rotary	Yes	2007	124.28			125.39		96.72	

Table A-4: Inventory of geophysical logs (sheet 6 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BL-07-16	573902.14	6140476.05	1251.82	89.44	Rotary	Yes	2007	89.45			89.53		71.99	
BL-07-17	573982.51	6140421.88	1236.13	98.33	Rotary	Yes	2007	98.95			98.35		69.91	
BL-07-18	574046.53	6140441.26	1228.09	100	Rotary	Yes	2007	97.37			96.53		73.77	
BL-07-19	574046.76	6140437.46	1228.16	101	Rotary	Yes	2007	100.97			100.91		99.06	
BL-07-20	574006.61	6140441.95	1232.46	98	Rotary	Yes	2007	84.63			84.91		62.72	
BL-07-21	574216.29	6140292.56	1203.95	85	Rotary	Yes	2007	81.38			83.08		65.37	
BL-07-22	574247.2	6140330.92	1200.41	110	Rotary	Yes	2007	108.65			108.63		84.13	
BL-07-23	574383.91	6140235.97	1188.55	152	Rotary	Yes	2007	151.82			151.98		132.35	
BL-07-24	574447.25	6140095.31	1182.01	93.34	Rotary	Yes	2007	93.35			93.55		82.26	
BL-07-25	574051.18	6140442.78	1227.71	96.16	Rotary	Yes	2007	96.16			96.2		71.86	
BL-07-26	573929.95	6140568.69	1260.16	150.54	Rotary	Yes	2007	138.96			139.02		110.33	
BL-07-27	574278.28	6140356.57	1195.04	121.45	Rotary	Yes	2007	121.45			121.33		87.5	
BL-08-01	574383.81	6140171.24	1179.33	47.82	Rotary	Yes	2008	47.82			47.46		35.12	
BL-08-02	574358.95	6140219.3	1180.18	70	Rotary	Yes	2008	45.33			45.27		33	
BL-08-03	574330.76	6140190.75	1179.93	52	Rotary	Yes	2008	52			51.84		36.56	
BL-08-04	574404.92	6140105.89	1179.47	50	Rotary	Yes	2008	31.7			31.68		23.26	
BL-08-05	574470.22	6140040.91	1167.23	42.21	Rotary	Yes	2008	42.21			42.07		29.78	
BL-08-06	574480.57	6140056.03	1167.36	50.9	Rotary	Yes	2008	Missing						
BL-08-07	574442.56	6140027.83	1177.15	35	Rotary	Yes	2008	26.86			26.9		21.06	
BL-08-08	574331.03	6140167.93	1180.9	50	Rotary	No	2008							
BL-08-09	574344.87	6140140.46	1179.28	45.07	Rotary	Yes	2008	45.07			45.11		34.96	
BL-08-10	574312.12	6140256.21	1190.54	36.46	Rotary	Yes	2008	36.46			36.44		27.34	
BL-08-11	574299.75	6140242.7	1191.36	38.82	Rotary	Yes	2008	38.82			38.98		28.56	
BL-08-12	574319.38	6140263.39	1189.88	54.61	Rotary	Yes	2008	54.61			54.63		41.48	

Table A-4: Inventory of geophysical logs (sheet 7 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BL-08-13	574274.87	6140280.75	1193.48	54.96	Rotary	Yes	2008	54.94			54.19		41.14	
BL-08-14	574265.13	6140273.36	1194.61	38.96	Rotary	Yes	2008	38.96			38.94		30.3	
BL-08-15	574288.57	6140292.11	1191.02	30.11	Rotary	Yes	2008	30.11			29.42		22.14	
BL-08-16	574250.39	6140265.19	1196.12	37.21	Rotary	Yes	2008	37.21			36.78		36.57	
BL-08-17	574250.79	6140261.97	1195.61	17.77	Rotary	Yes	2008	17.77			17.73		13.9	
BL-08-18	574188.16	6140355.67	1205.68	30	Rotary	Yes	2008	30.11			30.09		22.48	
BL-08-19	574198.13	6140362.2	1205.42	48	Rotary	Yes	2008	48.26			48.1		37.06	
BL-08-20	574220.81	6140320.7	1206.69	50	Rotary	Yes	2008	36.04			36.04		26.88	
BL-08-21	574051.53	6140388.97	1213.89	49.85	Rotary	Yes	2008			49.85				
BL-08-22	574205.31	6140370.46	1204.97	45.17	Rotary	Yes	2008	45.17			45.13		32.81	
BL-08-23	574050.3	6140391.19	1214.01	72.53	Rotary	Yes	2008	72.53			72.54		54.62	
BR-09-01	574407.79	6138532.67	1171.4	49.58	Rotary	Yes	2009	49.85						
BR-09-02	574439.43	6138580.38	1158.17	31.16	Rotary	Yes	2009	Missing			Missing		Missing	
BR-09-03	574479.43	6138611.48	1151.4	24.98	Rotary	Yes	2009	25.15			25.15		24.97	
BR-09-04	574228.05	6138347.37	1183.37	79.86	Rotary	Yes	2009	80.02			80.04		79.59	
BR-09-05	574155	6138452.73	1183.66	82.72	Rotary	Yes	2009	Missing			Missing		Missing	
BR-09-06	574251.31	6138503.93	1169.6	52.46	Rotary	Yes	2009	Missing			Missing		Missing	
BR-09-07	574327.41	6138565.36	1158.47	36.92	Rotary	Yes	2009	Missing			Missing		Missing	
BR-09-08	574359.27	6138601.04	1155.09	34.1	Rotary	Yes	2009	34.35			34.27		34.09	
BR-09-09	574106.55	6138537.44	1179.2	85.9	Rotary	Yes	2009	Missing			Missing		Missing	
BR-09-10	573953.56	6138541.61	1202.54	145.82	Rotary	Yes	2009	146.15			146.01		145.66	
BR-09-11	574034.14	6138606.36	1180.73	88.94	Rotary	Yes	2009	Missing			Missing		Missing	
BR-09-12	574120.14	6138660.63	1175.87	69	Rotary	Yes	2009	69.17			69.17			
BR-09-13	574170.6	6138706.03	1168.26	47.62	Rotary	Yes	2009	47.96			47.8		47.59	

Table A-4: Inventory of geophysical logs (sheet 8 of 10)

	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR-09-14	573911.05	6138640.45	1206.15	125.44	Rotary	Yes	2009	125.69			125.61		125.36	
BR-09-16	573989.73	6138697.37	1182.93	98.26	Rotary	Yes	2009	98.13						
BR-09-17	573727.56	6138691.42	1219.14	146.68	Rotary	Yes	2009	146.96			146.86		146.56	
BR-09-18	573884.51	6138769.53	1186.29	107.4	Rotary	Yes	2009	107.34						
BR-09-19	573999.56	6138847.78	1173.11	38	Rotary	Unknown	2009							
BR-09-27	574193.27	6138169.87	1171.88	61.96	Rotary	Yes	2009	61.85			61.96		61.9	
BR-09-28	574050.34	6138175.39	1178.33	77.1	Rotary	Yes	2009	77.01			77.09		76.95	
BR-09-29	574139.14	6138265.92	1185.84	88.32	Rotary	Yes	2009	88.22			40.34		40.11	
BR-10-12	572744.99	6140301.98	1320.39	166.34	Rotary	Yes	2010	166.34						
BR-10-14	572775.02	6140200.65	1304.14	240.03	Rotary	Yes	2010	240.03			240.19		206.77	
BR-10-15	572865.17	6140262.83	1338.08	152.2	Rotary	Yes	2010	152.2			152.02		115.5	
BR-10-17	572848.46	6140134.44	1300.4	214.88	Rotary	Yes	2010	210.58					201.88	
BR-10-18	572911.2	6140172.91	1318.43	172.21	Rotary	Yes	2010	169.91			170.16		138.64	
BR-10-19	572923.16	6140054.98	1295.44	220.98	Rotary	Yes	2010	216.93			217.33		198.94	
BR-10-20	573068.77	6140028.66	1286.63	132.58	Rotary	Yes	2010	130.98			131.1		106.57	
BR-10-21	573123.24	6139953.98	1272.68	143.04	Rotary	Yes	2010	143.32		127.3	143.22		107.7	
BR-10-22	573082.55	6139924.04	1278.42	228.1	Rotary	Yes	2010	192.13		221.39	192.19		185.15	
BR-10-23	573003.08	6139870.19	1285.46	143.26	Rotary	Yes	2010	35.04		138.92	35.04		31.36	
BR-10-24	573109.39	6139709.04	1266.75	118.29	Rotary	Yes	2010	118.25			118.29		117.59	
BR-10-25	573238.42	6139778.82	1256.99	126.17	Rotary	Yes	2010	125.95			126.17		116.39	
BR-10-26	573265.37	6139570.95	1261.6	102.33	Rotary	Yes	2010	102.49			102.33		93.64	
BR-10-27	573339.99	6139615.72	1253.67	145.33	Rotary	Yes	2010	145.41			145.33		145.01	
BR-10-28	573374.25	6139637.36	1252.02	108.2	Rotary	Yes	2010	107.94			108.02		99.43	
BR-10-29	573416.11	6139542.03	1247.32	120.77	Rotary	Yes	2010	120.63			120.77		120.47	

Table A-4: Inventory of geophysical logs (sheet 9 of 10)

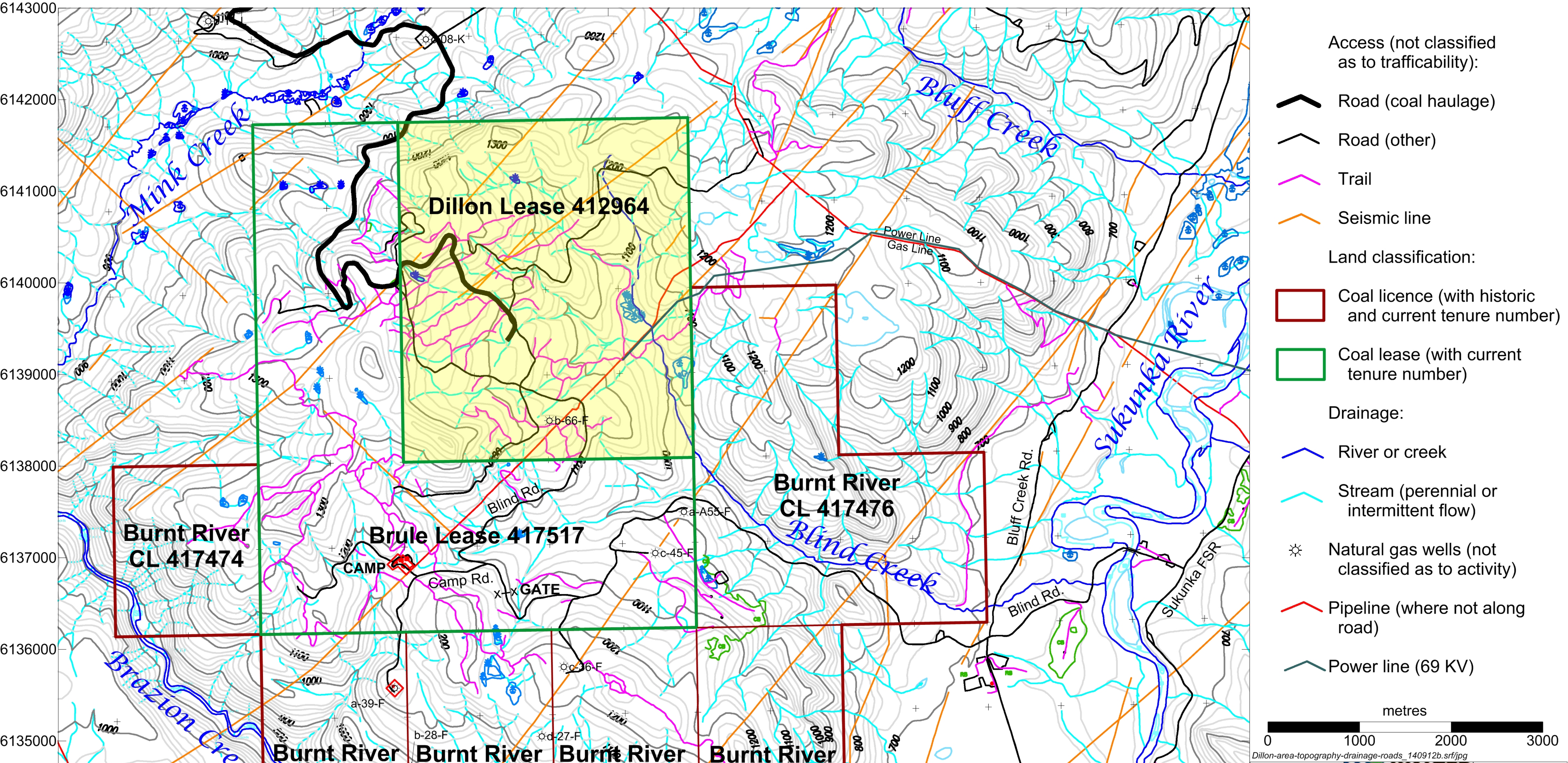
	UTM NAD83							Depths (in metres) reached by geophysical sondes, and logs run						
Borehole	Easting (m)	Northing (m)	Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR-10-30	573452.54	6139449.53	1233.96	87.6	Rotary	Yes	2010			97.6				
BR-10-31	573509.06	6139486.27	1228.42	93.33	Rotary	Yes	2010			90.64	93.33		93.13	
BR-10-32	573509.93	6139487.32	1228.5	105.43	Rotary	Yes	2010	104.06		105.43	104.71		94.53	
BR-10-33	573455.28	6138981.62	1222.82	101.13	Rotary	Yes	2010	101.17			101.13		100.22	
BR-10-34	573572.59	6139053.85	1212.28	76.81	Rotary	Yes	2010	76.85			76.81		76.06	
BR-10-45	572742.44	6140106.47	1313.71	183.32	Rotary	Yes	2010	183.16			183.32		158.43	
BR-10-46	572845.38	6140012.29	1308.55	211.82	Rotary	Yes	2010	211.9			211.82		206.6	
BR-10-50	572932.75	6139955.97	1302.14	177.41	Rotary	Yes	2010	177.35			177.41		162.97	
BR-10-52	572816.97	6139762.23	1314.23	154.34	Rotary	Yes	2010			154.34				
BR-10-54	573070.38	6139796.94	1270.9	129.74	Rotary	Yes	2010	127.94			109.05		100.46	
BR-10-55	573142.4	6139839.65	1264.33	181.91	Rotary	Yes	2010	182.03			181.91		172.52	
BR-10-57	572801.2	6139509.18	1305.33	90.62	Rotary	Yes	2010	Missing			Missing		Missing	
BR-10-58	572895.12	6139572.69	1293.8	64.4	Rotary	Yes	2010	Missing			Missing		Missing	
BR-10-59	572991.01	6139638.04	1281.95	85.71	Rotary	Yes	2010	Missing			Missing		Missing	
BR-10-60	572791.85	6139271.57	1300.53	148.14	Rotary	Yes	2010	148.14						
BR-10-61	572974.98	6139380.48	1287.15	102.19	Rotary	Yes	2010	102.19						
BR-10-62	573123.86	6139473.57	1275.23	100.46	Rotary	Yes	2010	100.46						
BR-10-63	572866.61	6139222.61	1290.36	127.78	Rotary	Yes	2010	127.72						
BR-10-64	572907.43	6139104.95	1280.05	138.21	Rotary	Yes	2010	138.21						
BR-10-65	573052.96	6139194.14	1264.02	94.03	Rotary	Yes	2010	Missing			Missing		Missing	
BR-10-66	573145.68	6139251.38	1259	60.71	Rotary	Yes	2010	60.71						
BR-10-67	573259.87	6139323.57	1254.19	52.83	Rotary	Yes	2010	52.77						
BR-10-68	573387.38	6139400.02	1238.15	66.21	Rotary	Yes	2010			66.21				
BR-10-69	573226.56	6139185.24	1245.39	68.24	Rotary	Yes	2010	68.24						

Table A-4: Inventory of geophysical logs (sheet 10 of 10)

Borehole	UTM NAD83		Collar Elevation	Depth	Drilling method	Geophysical logs run?	Year	Depths (in metres) reached by geophysical sondes, and logs run						
	Easting (m)	Northing (m)						Gamma-Density-Caliper-Resistivity	Gamma-Density through rods	Gamma (slim tool)	Neutron	Neutron through rods	Deviation/ verticality	Dipmeter
BR-10-71	573382.59	6139167.98	1236.94	66.39	Rotary	Yes	2010	66.39			66.39		65.94	
BR-10-72	573478.84	6139231.01	1225.57	48.62	Rotary	Yes	2010	48.02						
BR-10-73	573572.88	6139287.64	1211.23	58.19	Rotary	Yes	2010	57.99						
BR-10-74	573617.06	6139313.44	1206.48	69.97	Rotary	Yes	2010	69.97						
BR-10-75	573198.6	6138813.28	1245.59	163.5	Rotary	Yes	2010	163.5						
BR-10-76	573243.99	6138839.13	1244.21	118.25	Rotary	Yes	2010	118.25						
BR-10-78	573715.83	6139137.95	1194.97	63.94	Rotary	Yes	2010	63.94						
BR-10-81	573643.21	6138856.13	1203.72	108.63	Rotary	Yes	2010			108.63				
BR-10-83	573819.13	6138959.03	1196.8	82.88	Rotary	Yes	2010	82.88						
BR-10-84	573884.21	6139007.72	1190.83	49.57	Rotary	Yes	2010	49.52						
BM11-01	574381	6139850	1143.77	36.88	Rotary	No	2011							
BM11-02	574136	6139914	1148.17	47.55	Rotary	No	2011							
BM11-03	574312	6139919	1137.84	29.87	Rotary	No	2011							
BM11-04	574457	6139797	1240.2	52.95	Rotary	No	2011							
BM11-05	573328.02	6140347.57	1315.53	133	Rotary	Yes	2011	Missing			Missing		Missing	
BM11-06	574136	6139914	1190.58	47.08	Rotary	No	2011							
BM13-03A	575040.96	6139166.74	1075.29	47.6	Rotary	Yes	2013				37.31			
BM13-04A	575398.72	6138284.71	1072.1	53.6	Rotary	Yes	2013	53.85			53.63		53.43	53
BM13-04B	575402.56	6138266.35	1071.09	5.3	Rotary	No	2013							
BM13-05A	575119.06	6138951.89	1078.09	41.5	Rotary	Yes	2013	41.17			41.07		40.89	
BM13-05B	575107.33	6138961.38	1077.23	16.77	Rotary	No	2013							
BM13-09A	574557.31	6140457.52	1127.87	38.1	Rotary	Yes	2013	35.48			35.48		35.28	
BM13-09B	574556.41	6140455.49	1127.97	7.6	Rotary	No	2013							
BR13-01C	572829.95	6140165.82	1301.65	268	Core	Yes	2013	267.56			267.44			
BR13-02C	572793.78	6140471.21	1324.84	109	Core	Yes	2013	107.26			107.14			

Note: table prepared by data analyst P. Singh, M.A.Sc.

file: 140915p.doc



WALTER ENERGY

Scale: as shown

UTM NAD 83

Revision: B

Drawn: GCH

COAL TENURE AND TOPOGRAPHY

SEP 2014

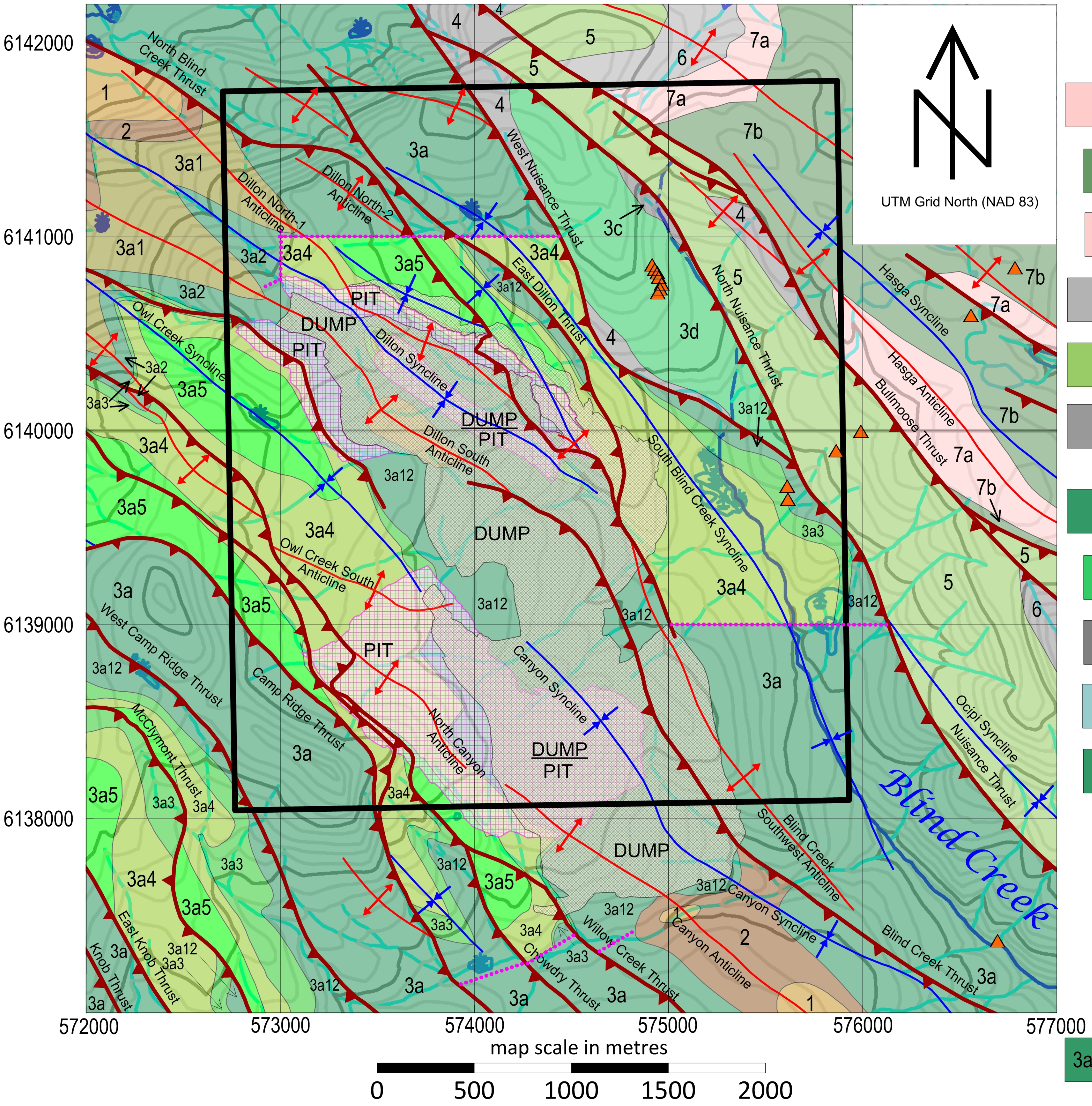
DILLON COAL ASSESSMENT REPORT

MAP 2-2

DILLON LEASE

UTM NAD83

NTS 93 P/05
CANADA



STRATIGRAPHY

	FORT ST JOHN GROUP (Albian)
7	Boulder Creek Formation -- sandstone, shale, conglomerate and coal
7b	Walton Creek Member -- siltstone, sandstone, conglomerate and coal
7a	Cadotte Member -- conglomerate and sandstone
6	Hulcross Formation -- marine shale and siltstone, minor bentonite; basal grit
5	Gates Formation -- sandstone, shale, conglomerate; minor coal
4	Moosebar Formation -- marine siltstone and shale; bentonite; basal pebbly glauconitic sandstone (not Bluesky Member)
	BULLHEAD GROUP (Barremian to Aptian)
3	Gething Formation -- siltstone, sandstone and conglomerate; minor bentonite and coal
3d	Chamberlain Member -- sandstone and siltstone; minor coal
3c	Bullmoose Member -- marine shale and siltstone; minor sandstone and bentonite
3b	Bluesky Member -- pebbly glauconitic sandstone (not mapped separately at this scale)
3a	Gaylard Member -- siltstone, sandstone and coal; lenses of conglomerate and pebbly sandstone; minor bentonite
3a5	Division 5 -- sandstone and siltstone; minor coal
3a4	Division 4 -- siltstone and sandstone; coal
3a3	Division 3 -- siltstone and shale; coal
3a12 [3a2	Division 2 -- siltstone and sandstone; minor conglomerate and coal
3a12 [3a1	Division 1 -- sandstone, conglomerate and siltstone; minor coal
2	Cadomin Formation -- cliff-forming conglomerate and sandstone; minor siltstone and coal
	MINNES GROUP (Tithonian to Valanginian)
1	Bickford, Monach, Beattie Peaks and Monteith Formations -- sandstone, siltstone, shale, conglomerate, quartzite, ironstone and coal (not mapped separately at this scale)

STRUCTURE AND MAPPING

Anticline

Syncline

Strike-slip or tear fault

Thrust fault -- barbs on overthrust plate

Limit of detailed stratigraphic mapping

Outline of Walter's coal licences and leases

▲ Coal outcrop (as reported by McClymont, 1981)

Author: C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME Date: 2014 Sept.13
Grid system: UTM NAD83 Zone 10N in metres 100 km grid square: ES
Scale: as shown on bar-scale Topography: TRIM-derived rasters
Sources: compiled from work by P.B. Jones (Triad Oil, 1960), B.McClymont (Teck Corporation, 1979, 1981), J.Hughes (Gulf Canada, 1980), and D.J.Hunter and J.M.Cunningham (BCGSB, 1991) and A.Legun (BCGCB, 2003)

WALTER ENERGY

REV	DATE	DESCRIPTION
K	Sep.13/14	Structural geology

Drawn by: GCH
Scale: as shown
Dwg. No.: Dillon-lease-geology-140913ki.srf/jpg

GEOLOGY OF DILLON COAL LEASE 412964

SEP 2014	DILLON COAL ASSESSMENT REPORT	MAP 2-3