COAL ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TITLE OF REPORT: Coal assessment report for the Mink Creek coal property, British Columbia

TOTAL COST: $2,916,828

AUTHOR(S): **M. Sultan and C.G. Cathyl-Huhn**

SIGNATURE(S):

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): **CX9-047 and CX 9-048**

YEAR OF WORK: **2011, 2012, and 2013**

PROPERTY NAME**: Mink Creek**

COAL LICENSE(S) AND/OR LEASES ON WHICH PHYSICAL WORK WAS DONE:
Coal Licences 366054, 366091, 366092, 366093, 415721, and 415722

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN:

MINING DIVISION: **Liard**

NTS / BCGS**: NTS 93P/5W and 93O/8E**

LATITUDE: **55° 25’ 00" North**; LONGITUDE: **121° 55’ 37" West** (at centre of work)

UTM Zone: 10N EASTING: **567933** NORTHING: **6141679**

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

MAILING ADDRESS: **800-668 West Hasting Street, Vancouver, BC, V6B 1P1**

OPERATOR(S) [who paid for the work]: **Walter Canadian Coal Partnership**

MAILING ADDRESS: **800-668 West Hasting Street, Vancouver, BC, V6B 1P1**

REPORT KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude). **coal, Gething Formation, Gaylard Member, anticlines, synclines, thrust faults**

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: **Coal Assessment Reports 490, 522, 523, 524, 525, 526, 531, 537, 582, 583, 584, 585, 586, 587, 588, 667, 888; Petroleum Report 863**

SUMMARY OF TYPES OF WORK IN THIS REPORT		EXTENT OF WORK (in metric units)	ON WHICH TENURES
GEOLOGICAL (scale, area)			
	Ground, mapping	**1:10,000 over 3528 hectares**	
	Photo interpretation	**1:20,000 over 3528 hectares**	
GEOPHYSICAL (line-kilometres)			
	Ground (Specify types)	**nil**	
	Airborne	**nil**	
	(Specify types)		
	Borehole		
	Gamma, Resistivity, **in 55 boreholes**	**9927.45 m**	**366054, 366091, 366092, 366093, and 415722**
	Resistivity **in 55 boreholes**	**9927.45 m**	**366054, 366091, 366092, 366093, and 415722**
	Caliper **in 55 boreholes**	**9927.45 m**	**366054, 366091, 366092, 366093, and 415722**
	Deviation **in 57 boreholes**	**10168.59 m**	**366054, 366091, 366092, 366093, and 415722**
	Dip **in 21 boreholes**	**4114.49 m**	**366054, 366091, 366092, 366093, and 415722**
	Others **Density in 58 boreholes** **Neutron in 59 boreholes**	**10649.24 m** **10465.40 m**	**366054, 366091, 366092, 366093, and 415722**
	Core **partial or complete in 7 boreholes**	**1183.67 m**	**366054 and 415722**
	Non-core **(rotary) in 54 boreholes**	**9771.94 m**	**366054, 366091, 366092, 366093, and 415722**
SAMPLING AND ANALYSES			
	Total # of Samples **58**		**366054 and 415722**
	Proximate	**58**	**366054 and 415722**
	Ultimate	**21**	**366054 and 415722**
	Petrographic	**27**	**366054 and 415722**
	Vitrinite reflectance	**27**	**366054 and 415722**
	Coking	**nil**	
	Wash tests	**58**	**366054 and 415722**
PROSPECTING (scale/area)		**nil**	
PREPARATORY/PHYSICAL			
Line/grid (km)		**nil**	
Trench (number, metres)		**nil**	
Bulk sample(s)		**nil**	

Appendix B and Appendix C 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 figures

1.3 List of maps

2 Introduction

The Mink Creek coal property comprises 3,528 hectares of Crown coal licenses, situated within the Brazion coalfield of northeastern British Columbia. The property may be conveniently divided into two contiguous sub-areas: Mink West and Mink East

This report covers the exploration activities undertaken during the years 2010 through 2013. Work done comprised geological mapping, open-hole and core drilling, downhole geophysical logging of boreholes, collection of quality information, and interpretation of data collected during exploration. The objectives of this work were to upgrade the existing knowledge of the area's coal deposits, to evaluate the property's economic potential, and to outline coal resources of interest for surface mining.

Near-surface sedimentary rocks are of Lower Cretaceous age, comprising the Moosebar, Gething, and Dresser formations (**Figure 2-1**). The Gething Formation hosts known potentially-mineable coal beds. Associated sedimentary rocks comprise conglomerates, sandstones, siltstones, mudstones, and carbonaceous mudstones. Marine mudstones occur within a medial marine tongue (the Bullmoose Member) of the Gething Formation, and also within the Moosebar Formation. The facies of the thin, sandy, uppermost Chamberlain Member of the Gething is likely also marine. The facies of the basal coal-bearing Gaylard Member of the Gething Formation, and of the underlying Dresser Formation, are dominantly fluvial.

The Mink Creek coal property is structurally very complex. Closely-spaced, tight, northwest-striking, northeast-verging folds predominate at Mink Creek. These folds are most commonly associated with northeast-verging thrust-faults, which themselves are folded.

Within the Gaylard coal-measures, 19 coal zones have been found by drilling at Mink West, and at least 15 coal zones have been found at Mink East. Coal beds range in thickness from a few decimetres to over 7 metres. Thicker, more laterally-extensive coals occur in the upper 70 to 90 metres of the Gaylard Member.

The F seam in Mink West and the C seam in Mink East appear to be the most prospective of the coals. Resources calculated for Mink West, using *Minesight* software, are substantial but these resources mostly fall in inferred and speculative categories, given the current state of exploration. Extensive drilling will be required in order to define any exploitable resources.

2.1 Scope of report

This report is submitted by Walter Canadian Coal Partnership (WCCP) in keeping with the provisions of the *Coal Act* and the *Coal Act Regulation*, with respect of exploratory activities on Crown coal tenures within British Columbia.

This report documents exploratory work completed on WCCP's Mink Creek coal property, situated within the Brazion coalfield, in northeastern British Columbia. WCCP acquired the Mink Creek coal licenses in 1998 (as tenures 366054, 366091, 366092, and 366093) and 2004 (as tenures 415721 and 415722). Details of these tenures are presented as **Table 2-1**.

WCCP's fieldwork began in year-2010, and has continued in each successive year until 2013. No physical work was done at Mink Creek in 2014. The exploration programs and this report were completed by personnel working in WCCP's offices situated in Vancouver and Tumbler Ridge, British Columbia.

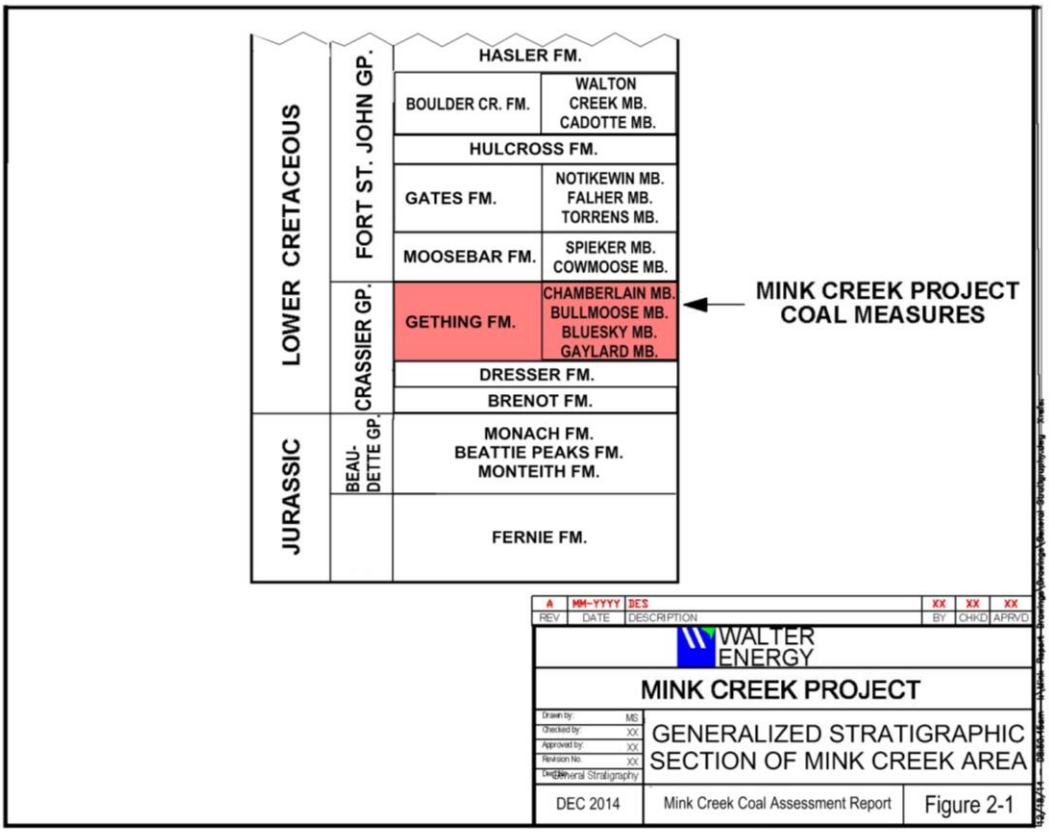


Table 2-1: Tenures comprising the Mink Creek property

Tenure Number	Owner No. (%)	Type of Tenure	Map Number	Date Acquired	Area (hectares)	Property
366054	140768 (100%)	Coal License	093P041	October 9, 1998	294	Mink Creek (Brazion)
366091	140768 (100%)	Coal License	093P031	October 9, 1998	294	Mink Creek (Brazion)
366092	140768 (100%)	Coal License	093P041	October 9, 1998	294	Mink Creek (Brazion)
366093	140768 (100%)	Coal License	093P031	October 9, 1998	294	Mink Creek (Brazion)
415721	140768 (100%)	Coal License	093P031	November 18, 2004	1176	Mink Creek (Brazion)
415722	140768 (100%)	Coal License	093O050	November 18, 2004	1176	Mink Creek (Brazion)

Note: Tenures listed above are currently held by 0541237 B.C. Ltd. as trustee for and on behalf of WCCP, pursuant to the declaration of trust entered into by 0541237 B.C. Ltd. in favour of WCCP dated November 22, 2012. Map numbers in the table above refer to map-sheets of the British Columbia government's TRIM base-mapping system.

2.2 Situation and objectives

The Mink Creek coal property is located in the Peace River region of northeastern British Columbia (**Map 2-1**), which has long been known to contain coal of economic interest .WCCP has for some years operated metallurgical-coal mines to the north (Willow Creek Mine) and to the southeast (Brule and Dillon mines) of the Mink Creek property.

Publicly-available geological data from historic coal exploration reports (**Table 2-2**) suggested that coal bearing Gething-Formation would be widely exposed in the Mink Creek area. Historic drilling data, incorporated in these reports, confirms the subsurface existence of coal seams having potentially-mineable thickness. As well, the Willow Creek, Brule and Dillon mines have been working Gething coal for some years.

However, the geology of Mink Creek area was clearly quite complex, engendering the need to conduct detailed exploration as a prerequisite to accurate evaluation of the area's coal resources. To that end, WCCP staff designed a phased, multi-year exploration programme for the Mink Creek coal property, building upon existing information, with the aim of establishing the area's coal-resource base.

The main objectives of the first phase of the Mink Creek exploration program were:

a. to conduct geological mapping to better understand the stratigraphy and structure of coal measures;
b. to understand the distribution of coal-bearing rocks within the property;
c. to confirm the presence and thickness of coal seams within the property; and
d. to recommend a drilling program to validate the presence of possible viable coal seams

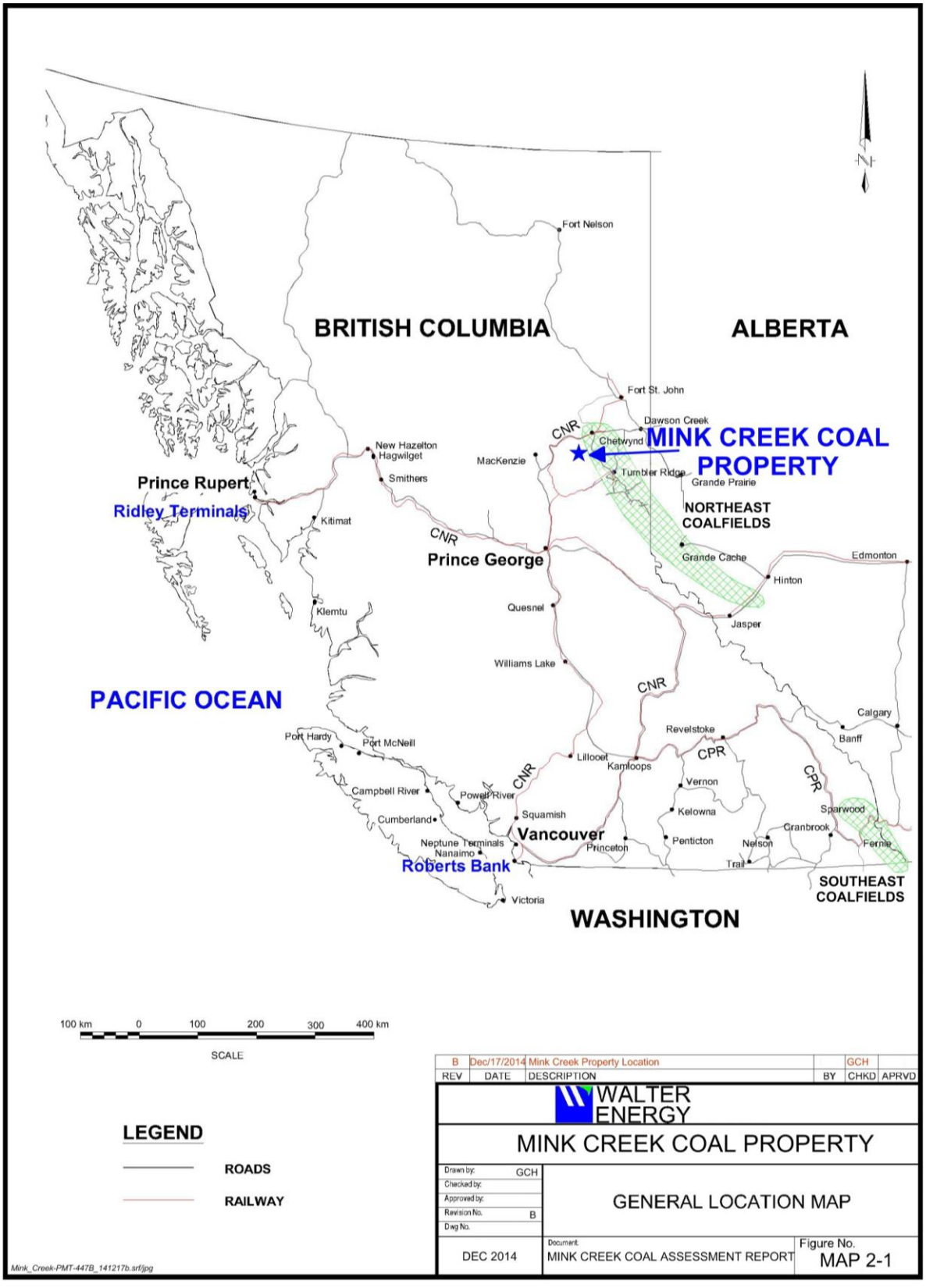
The first phase of the project was followed by drilling a number of diamond-core and rotary-drill holes. Data were collected concerning lithology of the coal-measures, coal seam identification and correlation, geological structure and coal quality. On the basis of these data, a preliminary geological model was built for the Mink Creek coal property.

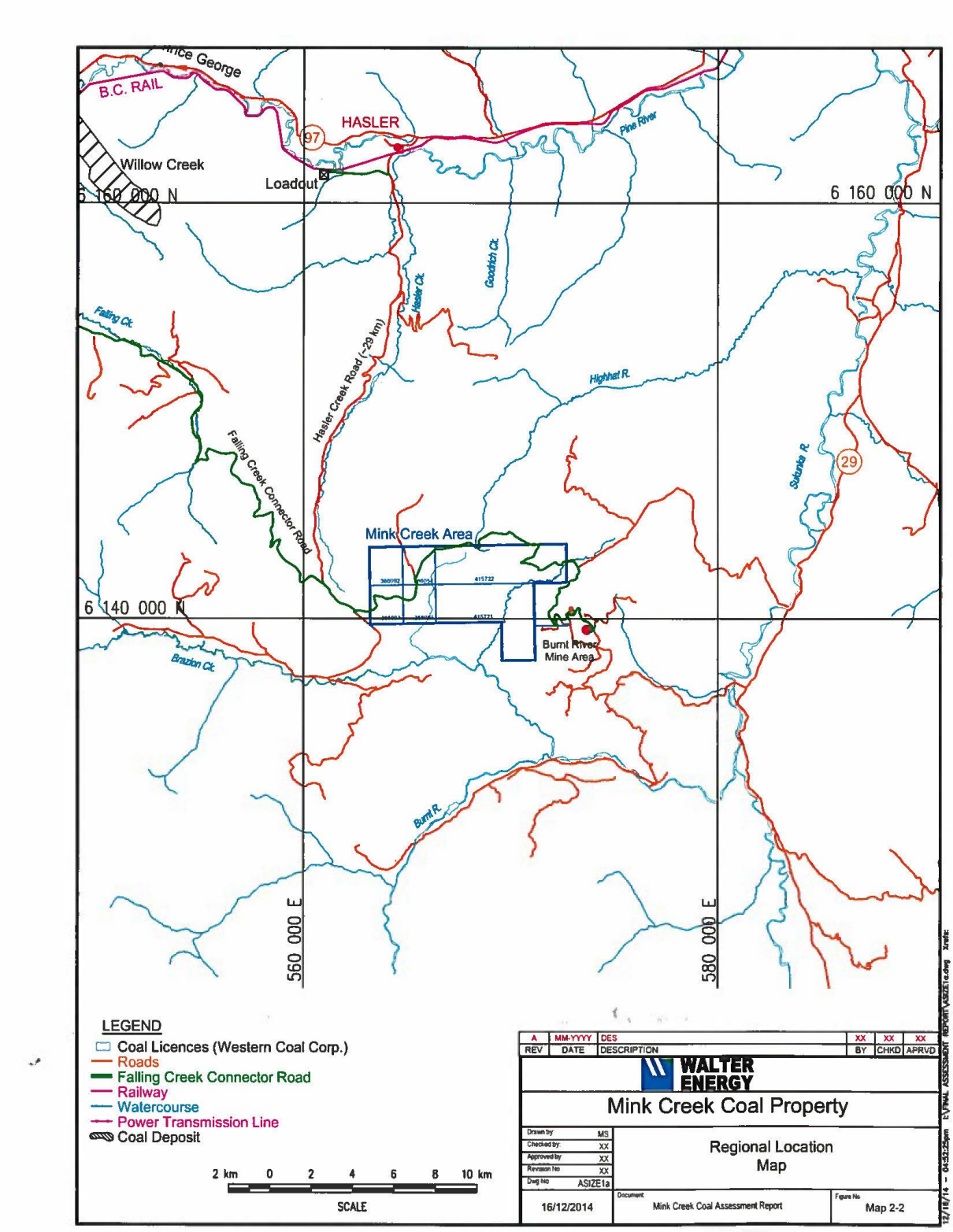
2.3 Property description

The Mink Creek coal licenses are located in northeastern British Columbia and, as with all other coal tenures within this part of the province, they lie within the Liard mining district. The property is centred at latitude 55º 24' 00" north and longitude 121º 55' 30" west, comprising six contiguous provincially-granted coal licenses (Crown coal tenures 366092, 366093, 366054, 366091, 415721, and 415721) located in map-sheets 93P/5 and 93O/8 of Canada's National Topographic System. These coal licenses cover an area of 3,528 hectares. **Table 2-1** (given above) sets forth relevant information for each individual license.

2.4 Location and access

Chetwynd town, located on Highway 97 and situated 54 kilometres northeast of the property, is the closest incorporated settlement to Mink Creek (**Map 2-1**). Chetwynd’s population was reported as 2,633 persons in the year-2006 census.

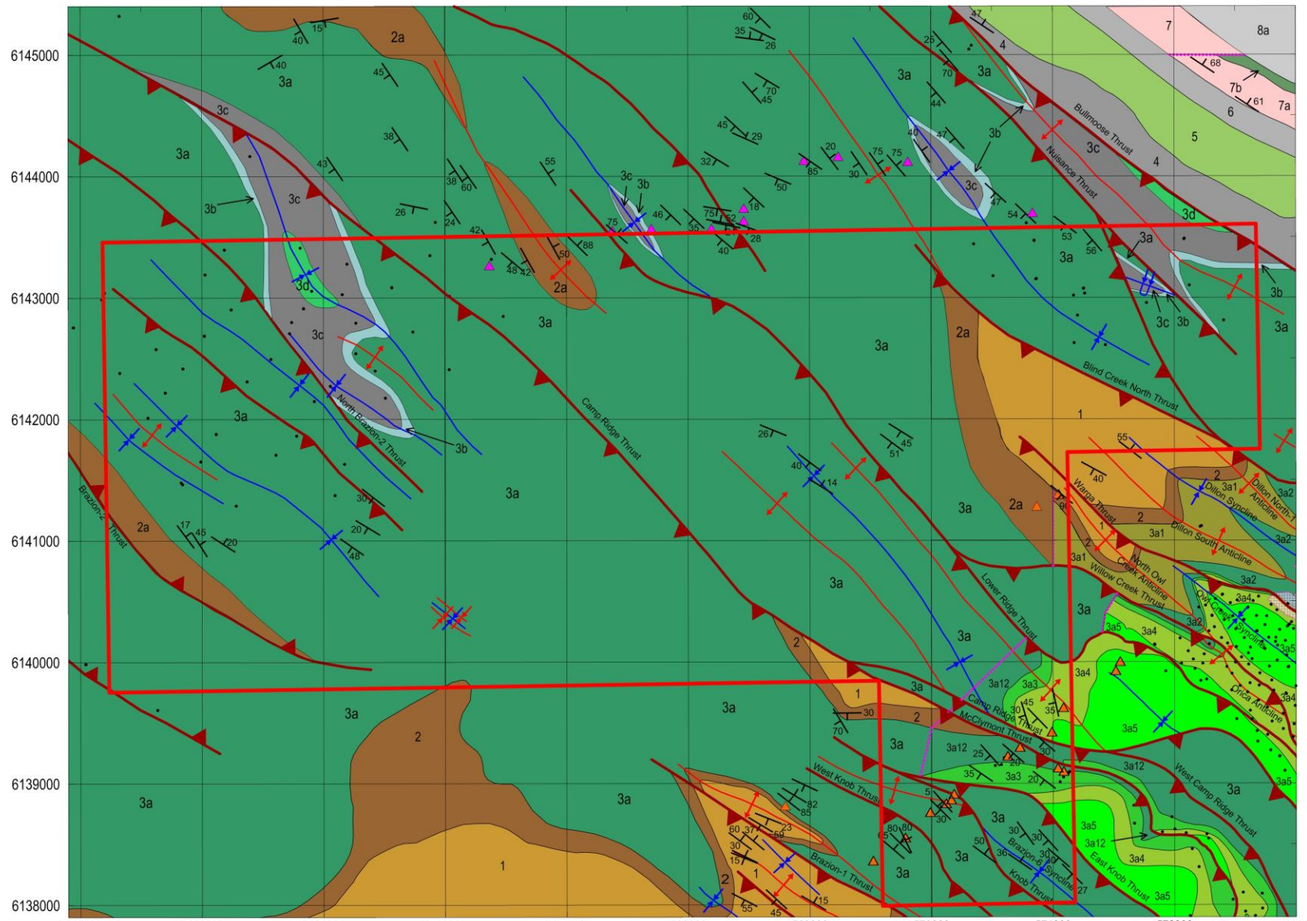

BRITISH COLUMBIA
ALBERTA
PACIFIC OCEAN
WASHINGTON
Fort Nelson
Fort St. John
Dawson Creek
Chetwynd
MINK CREEK COAL PROPERTY
MacKenzie
Tumbler Ridge
Grande Prairie
NORTHEAST COALFIELDS
New Hazelton
Hagwilget
Smithers
Prince Rupert
Ridley Terminals
Kitimat
Prince George
Grande Cache
Edmonton
Hinton
Klemtu
Quesnel
Jasper
Williams Lake
Calgary
Revelstoke
Banff
Port Hardy
Port McNeill
Lillooet
Kamloops
Vernon
Campbell River
Powell River
Kelowna
Sparwood
Cumberland
Squamish
Vancouver
Cranbrook
Neptune Terminals
Nanaimo
Roberts Bank
Princeton
Penticton
Nelson
Fernie
Trail
SOUTHEAST COALFIELDS
Victoria
CNR
CPR
100 km 0 100 200 300 400 km
SCALE
LEGEND
ROADS
RAILWAY
B Dec/17/2014 Mink Creek Property Location GCH
REV DATE DESCRIPTION BY CHKD APRVD
WALTER ENERGY
MINK CREEK COAL PROPERTY
Drawn by: GCH
Checked by:
Approved by:
Revision No. B
Dwg No.
GENERAL LOCATION MAP
DEC 2014
Document: MINK CREEK COAL ASSESSMENT REPORT
Figure No. MAP 2-1
Mink_Creek-PMT-447B_141217b.srf/jpg


B.C. RAIL
HASLER
97
Willow Creek
Loadout
6 160 000 N
6 140 000 N
Pine River
Goodrich Ck.
Hasler Ck.
Hasler Creek Road (~29 km)
Falling Ck.
Falling Creek Connector Road
Highhat R.
Sukunka R.
29
Mink Creek Area
Burnt River Mine Area
Brazion Ck.
Burnt R.
560 000 E
580 000 E
LEGEND
Coal Licences (Western Coal Corp.)
Roads
Falling Creek Connector Road
Railway
Watercourse
Power Transmission Line
Coal Deposit
2 km 0 2 4 6 8 10 km
SCALE
REV DATE DESCRIPTION BY CHKD APRVD
WALTER ENERGY
Mink Creek Coal Property
Regional Location Map
Drawn by: MS
Checked by: XX
Approved by: XX
Revision No: XX
Dwg No: ASIZE1a
16/12/2014
Mink Creek Coal Assessment Report
Figure No: Map 2-2

UTM NAD83

MINK CREEK

NTS 93 O/8 E and P/5 W
CANADA



STRATIGRAPHY

FORT ST JOHN GROUP (Albian)
- 8a — Hasler Formation -- siltstone and mudstone
- 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 tuff; basal grit
- 5 — Gates Formation -- sandstone, shale, conglomerate; minor coal
- 4 — Moosebar Formation -- marine siltstone and shale; minor tuff; basal pebbly glauconitic sandstone ('Green Marker')

CRASSIER GROUP (Valanginian? to early Albian)
- 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; siltstone and mudstone
  - 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
      - 3a1 — Division 1 -- sandstone, conglomerate and siltstone; minor coal
    - 2a
      - 2 — Cadomin Formation (Unit 2) / Dresser Formation (Unit 2a) -- cliff-forming conglomerate and sandstone; minor siltstone and coal. Dresser Formation includes beds elsewhere mapped as Unit 3a1 of the Gething Formation
- 1 — Brenot Formation -- sandstone, siltstone, shale, conglomerate, and coal

map scale in metres
0 500 1000 1500 2000 2500 3000 3500 4000

STRUCTURE AND MAPPING

Bedding attitude 15
Anticline
Syncline
Thrust fault -- barbs on overthrust plate
Limit of detailed stratigraphic mapping
Outline of Mink Creek coal property
Coal outcrops:
from M. Sultan's mapping (2014)
from B. McClymont (1981)
Boreholes (current and historic)

UTM Grid North (NAD 83)

Authors: C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME and M. Sultan P.Geo. Date: 2014 Dec.27 (revision E2)
Grid system: UTM NAD83 Zone 10N in metres 100 km grid square: ES Scale: as shown on bar-scale
Sources: compiled by C.G. Cathyl-Huhn from work by P.B. Jones (Triad Oil, 1960), B.McClymont (Teck Corporation, 1979, 1981), J.Hughes (Gulf Canada, 1980), D.J.Hunter and J.M.Cunningham (BCGSB, 1991), A.Legun (BCGSB, 2003), and M.Sultan (Western Coal / Walter Energy, 2011-2014).

REV	DATE	DESCRIPTION
E	Dec.27/14	Structural geology

WALTER ENERGY

Drawn by:	GCH
Scale:	as shown
Dwg. No.:	Mink_Creek-workmap-geology-141227e.srf/jpg

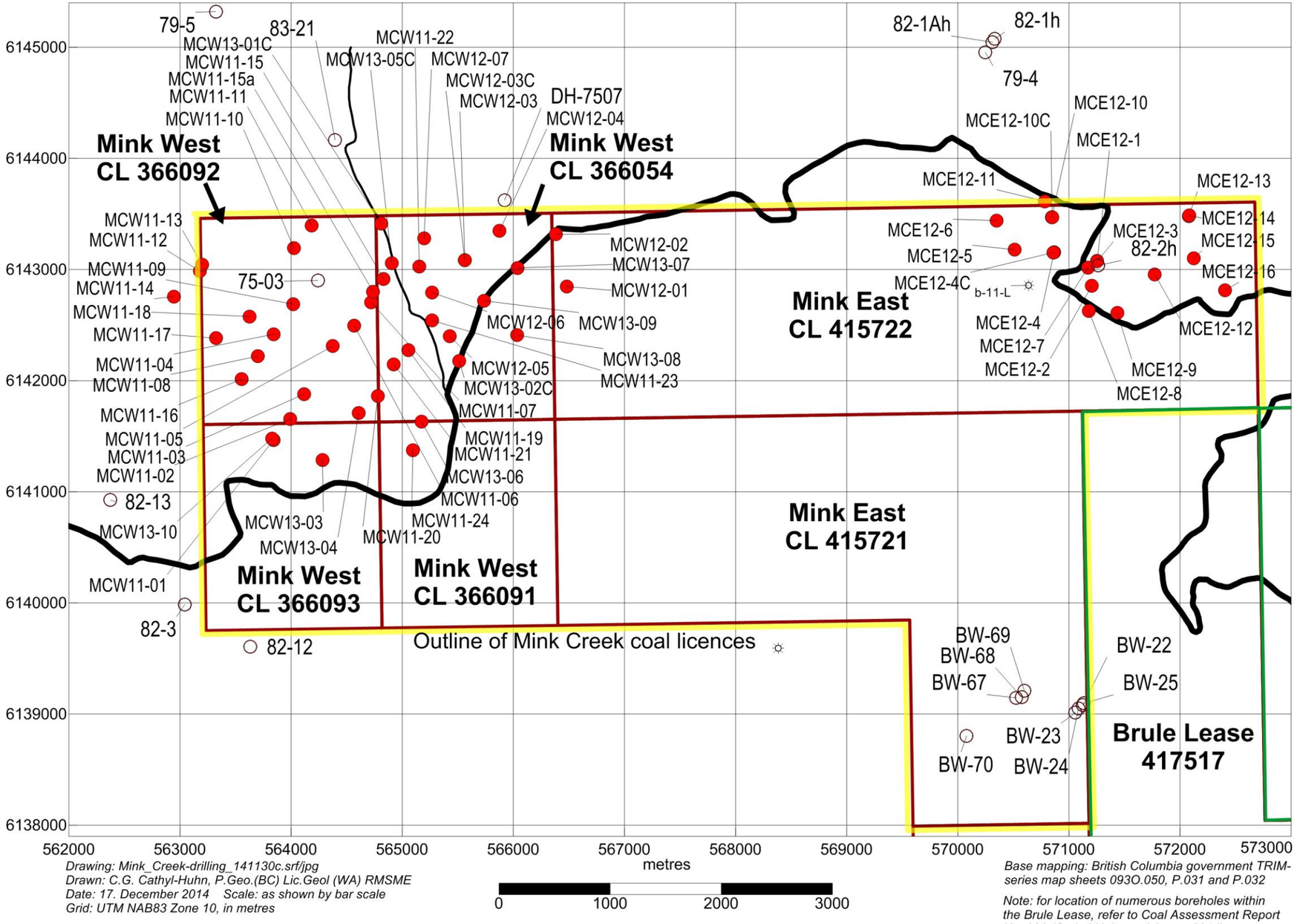
GEOLOGY OF MINK CREEK COAL PROPERTY

DEC 2014 | MINK CREEK COAL ASSESSMENT REPORT | MAP 2-3

MINK CREEK

UTM NAD 83

CANADA
NTS 93 O/8 and 93 P/5



UTM Grid North

Access (not classified as to trafficability):

- Road (coal haulage)
- Road (other)

Land classification:

- Coal licence (with historic and current tenure number)
- Coal lease (with current tenure number)
- Natural gas wells (not classified as to activity)
- Historic boreholes (except those drilled in Brule Lease, not shown)
- Current boreholes (except those drilled in Brule Lease, not shown)

Note: current boreholes MCW11-12 and -14, and MCE12-11, are located outside the bounds of the Mink Creek property.

Drawing: Mink_Creek-drilling_141130c.srf/jpg
Drawn: C.G. Cathyl-Huhn, P.Geo.(BC) Lic.Geol (WA) RMSME
Date: 17. December 2014 Scale: as shown by bar scale
Grid: UTM NAB83 Zone 10, in metres

Base mapping: British Columbia government TRIM-series map sheets 093O.050, P.031 and P.032

Note: for location of numerous boreholes within the Brule Lease, refer to Coal Assessment Report No. 936 (Cathyl-Huhn and Avery, 2014)

Mink_Creek-drilling_141217c.srf/jpg

WALTER ENERGY

Scale: as shown	CURRENT AND HISTORIC DRILLING	
UTM NAD 83		
Revision: C		
Drawn: GCH		
DEC 2014	MINK CREEK COAL ASSESSMENT REPORT	MAP 2-4

Table 2-2: Cross-reference to publicly-available coal-assessment reports

Company	*Author*	*Coal Assessment Report No.*	*Year*	*Area*	*NTS map-sheets*	*Easting*	*Northing*
Koporok Mines	Pringle, 1968	582	1968	Pine Pass	93P/9, 93P/8, 93P/5	542327	6150303
Pan Ocean Oil	Dyson, 1973	583	1973	Pine Pass	93P/5, 93O/8, 93O/9	557140	6128545
McIntyre Mines	Dyson, 1975a	526	1975	Falls Mountain	93P/5, 93O/8, 93O/9	549489	6159505
Pan Ocean Oil	Dyson, 1975b	584	1975	Pine Pass	93P/5, 93O/8, 93O/9	557140	6128545
Pan Ocean Oil	Dyson, 1977	585	1977	Pine Pass	93P/5, 93O/8, 93O/9	557140	6128545
Shell Canada	Panchy, 1979	586	1979	Pine Pass	93O/9	547782	6161823
Norcen Energy	Newson, 1980a	587	1980	Pine Pass	93P/7, 93O/9	559390	6154730
Norcen Energy	Newson, 1980b	588	1980	Pine Pass	93P/7, 93O/9	559390	6154730
Esso Resources	Water, 1981	522	1980	Falling Creek	93O/8, 93O/9 ,93P/4	563303	6141614
Esso Resources	Horgan and Klatzel-Mudry, 1982	523	1981	Falling Creek	93O/8, 93O/9, 93P/5	560571	6142281
Esso Resources	Klatzel-Mudry *et al*, 1982	524	1982	Falling Creek	93O/8, 93O/9, 93P/4	563294	6142208
Esso Resources	Klatzel-Mudry *et al*, 1984	525	1983	Falling Creek	93O/8, 93O/9, 93P/5	560623	6147735
Shell Canada	White, 1983	537	1983	Highhat	93P/5	510555	6139317
Kennecott	Hovis *et al*, 2006	888	2006	Falling Creek	93O/8, 93O/9		

Note: modified after Ryan (2010, his Table 4-1)

In the context of more-distant communities within British Columbia, the Mink Creek property is located 135 kilometres south of Fort St John, 100 kilometres west of Dawson Creek, and 310 kilometres east of Prince George. Vancouver is situated 725 kilometres to the south-southwest of the property. Commercially-scheduled aircraft flights connect Vancouver to Fort St. John.

Primary access to the property from Chetwynd is via paved provincial highway BC-97, which intersects the Hasler Creek Forest Service Road (FSR), 24 kilometres west of Chetwynd. Southward 28 kilometres along the Hasler Creek FSR is a junction with the Falling Creek Connector Road (the FCCR).

The Mink Creek West property is bisected by the FCCR, which traverses the property from west to northeast and east, as shown in **Map 2-2** and **Map 2-3**. Alternate access to the property is provided by Sukunka FSR, an all-weather gravel road, extending along the eastern bank of the Sukunka River. The Sukunka FSR is accessible from Chetwynd via highways BC-97 and BC-29. At 16.5 kilometres along the Sukunka FSR, the Blind Creek Road (a non-status industrial road) crosses Sukunka River on a high-capacity bridge, and extends generally westward along the southwestern bank of Blind Creek, meeting the FCCR from the southeast after 21.5 kilometres.

2.5 Climate

The nearest climate station to Mink Creek is the town of Chetwynd, whose climate is 'cool continental', with frigid winters and warm summers. Average annual rainfall and snowfall at Chetwynd are 306 millimetres and 169 centimetres respectively. The average frost free period ranges 84 to 91 days, and about 30 days with some fog are expected per year. The mean daily temperature at Chetwynd is 15.4 C in July and -10.7 C in January. Winter temperatures below -40C are not uncommon, with the coldest weather occurring in January and February of most years.

2.6 Landforms and forest cover

The Mink Creek Property lies within the Inner Foothills of the Rocky Mountains. Topography comprises deeply-dissected, steep-sided, rounded hills and mountains, with elevations ranging from 875 to 1447 metres above sea level. Topographic contours at 20-metre intervals are shown in **Map 2-3**. The property is heavily forested, chiefly with pine and spruce, and low-level scrub.

3 Exploration

Both historic (pre-2010) and current (post-2010) coal exploration has been done by various parties at and near the Mink Creek coal property.

3.1 History of exploration

The following discussion (**Section 3.1**) is adapted mainly from an unpublished report for Unicorn International Mines Group Inc. (Ryan, 2010).

Coal was first discovered in the Peace River District in 1793, by Alexander MacKenzie's exploring expedition. Prior to 1980, less than 100,000 tonnes of coal were mined at all locations within northeastern British Columbia (Ryan, 2002).

Within the vicinity of the Mink Creek coal property, small-scale mining (by the Hasler Creek Coal Company) commenced at Hasler Creek in 1943, and continued through 1944 and 1945. The Northern Alberta Railways took 4,500 short tons of coal for use in their locomotives serving their Dawson Creek railroad division (Spivak, 1944, Stott, 1973).

The expansion of steel production in mid-1960s stimulated exploration for metallurgical coking coal. By the mid-1970s within northeastern British Columbia, most of the land with coal potential had been acquired by mining companies, or by oil and gas companies seeking to enter the coal industry as a means of diversification. Initial development interest was along the existing railway (then known as the British Columbia Railway) which passed through Pine Pass and thus connected Chetwynd and Dawson Creek with then-existing ports along British Columbia's western coast.

Interest in coal development increased with the signing of a joint government-industry agreement between Japan and Canada, to develop new coal mines, highways, railways, other infrastructure, and a workers' townsite at Tumbler Ridge. Shipments of northeastern British Columbia coal through a new port at Ridley Island (near Prince Rupert, British Columbia) commenced in 1984, and have continued to the present day.

Owing to its relative isolation at the time, the Mink Creek coal property did not receive as much exploratory attention as other, more accessible, parts of the northeastern British Columbia coalfields. As the oil and gas industry and the forestry industry extended their industrial road networks westward from Sukunka River and southward from Pine River, it became easier to bring drilling rigs into the Mink Creek area. This increased access accounts for the sparse extent of historic geological studies (**Table 2-2**) and historic coal-exploration drilling at and near Mink Creek (**Table 3-1**) as compared with current drilling within the Mink Creek property *per se* (**Table 3-3**), which has been greatly facilitated by improvements in the industrial road network.

3.1.1 Regional exploratory context

The earliest coal exploration within the Brazion coalfield was conducted in the Falling Creek area between 1946 and 1951 by the Coal Division of the then-extant British Columbia Department of Land and Forests, to estimate mineable coal reserves near the proposed railway route through Pine Pass and into the Peace River District (McKechnie, 1955; Dyson, 1975a). The program consisted of geological mapping, trenching and 14,830 metres of diamond-drilling. The work was mainly conducted in the Noman Creek, Willow Creek and Hasler Mine areas.

Table 3-1: Summary of selected historic drilling within and adjacent to Mink Creek property

Borehole / Year	Company Name	In / Near Mink Creek property?	UTM (NAD 83)		metres		Starts in	Gething Forma-tion Top	Lithology	metres		
			Easting NAD 83	Northing NAD 83	Elevation	Total depth				From	To	Thick-ness
75-03 1975	Pan Ocean Oil Limited	**In property**	564242	6142902.6	1432	273	Gaylard	0	Drift	0	0	0
									Coal	4.42	4.54	0.12
									Coal	5.49	7.16	1.67
									Coal	26.2	26.68	0.48
									Coal	58.1	58.5	0.4
									Coal	60.1	61.6	1.5
									Coal	77.6	81.5	3.9
									Coal	138.1	138.6	0.5
									Coal	142.5	142.8	0.3
									Coal	145.1	145.7	0.6
									Coal	163.4	164	0.6
									Coal	168.1	170.1	2
									Coal	173.9	174.2	0.3
									Coal	176.8	177.1	0.3
									Coal	182.3	183.5	1.2
									Coal	236	238	2
									Coal	241	242	1
75-07 1975	Pan Ocean Oil Limited	Nearby	565923	6143621	1219	343	Gaylard		Drift	0	22.55	22.55
									C.Sh	49.68	49.99	0.31
									C/Mst	75.94	76.65	0.71
									Coal	121.31	121.76	0.45
									Coal	159.71	160.17	0.46
									Coal	203.75	204.06	0.31
									Coal	238.65	239.87	1.22
									Coal	317.6	317.9	0.3

Table 3-1: Summary of historic drilling within and adjacent to the Mink Creek property (continued)

Borehole / Year	Company Name	In / Near Mink Creek property?	UTM (NAD 83)		metres		Starts in	Gething Forma-tion Top	Lithology	metres		
			Easting NAD 83	Northing NAD 83	Elevation	Total depth				From	To	Thick-ness
79-4 1979	Norcen Energy	Nearby	570247.9	6144955.6	1415	157.62	Gaylard		Drift	0	11	11
							Steep dip		Coal	45.5	52	6.5
79-5 1979	Norcen Energy	Nearby	563322.7	6145320.7	1220	259.15	Gaylard		Drift	0	35	35
									Coal	46	46.7	0.7
									C + C.Sh	53	55	2
									Coal	114.9	115.4	0.5
									Coal	152.5	153.2	0.7
									Coal	236.5	237	0.5
									Coal	247.5	248	0.5
82-1h 1982	Shell Canada	Nearby	570333	6145076	1437	25.5	Gaylard		Drift	0	2	2
									Coal	19.4	24	4.6
82-1Ah 1982	Shell Canada	Nearby	570313	6145046	1428	41.02	Gaylard		Drift	0	2	2
									Coal	3.92	8.44	4.52
82-2h 1982	Shell Canada	**In property**	571263	6143036	1112	33.2	Gaylard		Drift	0	1.7	1.7
									Coal	14.8	16.2	1.4
83-21 1983	Esso Resources	Nearby	564395.6	6144165.2	1390	325	Chamber-lain	48.14	Drift	0	4.23	4.23
									Coal	48.18	49.01	0.83
									Coal	49.59	50.25	0.66

Table 3-1: Summary of historic drilling within and adjacent to the Mink Creek property (concluded)

Borehole / Year	Company Name	In / Near Mink Creek property?	UTM (NAD 83)		metres		Starts in	Gething Formation Top		metres		
			Easting NAD 83	Northing NAD 83	Elevation	Total depth			Lithology	From	To	Thick-ness
83-21 1983 (continued)									Coal	60.32	62.82	2.5
									Coal	67.84	68.44	0.6
									Coal	88.05	88.46	0.41
									Coal	93.1	93.15	0.05
									Coal	118	118.02	0.02
									Coal	120.15	121.15	1
									Coal	128.05	128.45	0.4
									Coal	138.95	139.55	0.6
									Coal	143.34	143.68	0.34
									Coal	145.77	152.74	6.97
									Coal	154.82	156.44	1.62
									Coal	160.52	160.76	0.24
									Coal	165.47	167.3	1.83
									Coal	171.72	172.27	0.55
									Coal	184.2	184.7	0.5
									Coal	196.78	201.01	4.23
									Coal	211.59	212.12	0.53
									Coal	227.97	230.02	2.05
									Coal	232.08	234.13	2.05
									Coal	252.4	253.07	0.67
									Coal	254.43	255.2	0.77
									Coal	285.05	287.17	2.12
									Coal	304.16	307.78	3.62

***Note**: Drift = unconsolidated materials above bedrock; Thickness =drilled (apparent) thickness; C = coal; C.Sh= carbonaceous shale, Mst = mudstone*

Brameda Resources drilled 23 diamond-drill holes with a total length of 4,786 metres in the Noman Creek area during years 1968 and 1969. Brameda also conducted trenching and geological mapping (Panchy, 1979).

Pan Ocean Oil Limited began exploration activity in the autumn of 1972, and completed field mapping and drilling of five boreholes (designated as H1 through H5) in early 1973 (Dyson, 1973). The area on the divide between Willow Creek and Johnson Creek was chosen for drilling because of generally low dips, proven presence of thicker coal seams, and relatively easy access for drilling.

Pan Ocean drilled ten additional boreholes in 1974-1975 (Dyson, 1975) to test the coal bearing sequence at widely scattered locations across the remainder of their coal licenses. Two of these holes (designated as 75-03 and 75-07, with results shown in **Table 3-1**) are located within or very near (**Map 2-4**) to the Mink Creek West portion of the Mink Creek property. These two boreholes demonstrated that the major potential for potentially-mineable coal deposits lay within the upper portion of the Gething Formation's Gaylard Member.

During 1976 and 1977, Pan Ocean drilled three more boreholes, in an attempt to select a site for a test adit. The holes intersected coal seams, but adits were not successful due to overburden and faulting (Dyson, 1977).

Norcen Energy, under a joint venture agreement with Pan Ocean, carried out exploration in 1979. The exploration program included field mapping at a scale of 1:10,000 and the drilling of seven boreholes with a cumulative coring length of 1,700 metres (Newson, 1980a). The mapping was not very helpful due to lack of exposures.

The Norcen / Pan Ocean licenses were relinquished, and thereupon acquired and then in turned relinquished by Manalta. Esso Resources then acquired the property in May 1980 (Waters, 1981).

Esso continued mapping and drilling in 1982 (Klatzel-Mudry *et al.*, 1982). Fourteen drill holes were completed. All of these boreholes lie within Walter Energy's Hudette property, which is adjacent to the Mink Creek property. Coal seams were intersected within the upper half of the Gething Formation's Gaylard Member. Coal seams were named, in ascending order, the Contact Seam (1.5 to 2 metres), High Gamma Seam (less than 1 metre), Rat Seam (2 metres), Dave Seam (2.60 metres), Twin Seam (3.3 metres) and Brenda Seam (6.5 metres). The Brenda Seam was well-correlated in this effort.

Shell Canada Resources acquired the Highhat River property in 1982 (White, 1983). The property covers a part of Pan Ocean's former Pine Pass Property which was dropped in 1981.

In 1983, eight more boreholes were drilled, with depths ranging from 77 to 384 metres. The purpose of the 1983 drilling was to intersect the Moosebar/Gething contact (as then understood by coal-industry workers) to use as a datum for coal-bed stratigraphy. One borehole (83-21, whose coal intersections are given in **Table 3-1**) lies just north of Mink Creek West. The exploration halted in 1984 as coal market declined.

Exploration activity resumed in 2004, when Kennecott Exploration Company (Hovis *et al*, 2006) carried out geological mapping and drilling. Geological mapping was limited to outcrops in the road cuts of logging roads. Fourteen holes including diamond and rotary were drilled during 2004/2005.

3.1.2 Governmental investigations

In the early and mid-1960s, post-graduate geological research and structural modelling was undertaken by J.E. Hughes (1963), under the sponsorship of the provincial Department of Mines and Petroleum Resources. Subsequent reports on reconnaissance-scale stratigraphic and structural analysis, and a regional geological synthesis, were published in the middle and late 1960s (Hughes, 1964; 1967).

In 1990 and 1991, staff of the British Columbia Geological Survey Branch mapped the Mink Creek property and surrounding area at a scale of 1:50,000 (Hunter and Cunningham, 1991; Cunningham and Sprecher, 1992). Two stratigraphic studies of the relationship between the Gething, Bluesky and Moosebar formations were published by Branch Staff, incorporating results from numerous coal-exploration boreholes (Kilby, 1984a; Legun, 1990). A compilation map of the geology of the Peace River coalfields on a scale of 1:200,000 was subsequently published by Legun (2003).

Table 3-2: Coal exploration contractors in years 2011 through 2013

Contractor	Year		
	2011	2012	2013
Downhole geophysical logging			
Century Wireline Services	x	x	x
Access(trail building) and support			
Can-West Exploration Ltd.	x	x	x
Don Ho		x	
Rotary drilling			
G.Lindsay Drilling	x	x	x
Core drilling			
Boart Longyear			x
Laboratories			
Loring Laboratories		x	
Walter Energy (minesite) laboratory			x
Pearson & Associates Ltd.		x	x
ALS			x

3.2 Current exploration

Western Coal Corp. (and subsequently Walter Energy Inc. following a merger) began exploration of the Mink Creek property in May 2010 and continued until December 2013. The program was completed in two phases. The first phase included review of all available information from the property and reconnaissance geological mapping. It was completed in 2010. The field mapping was followed by drilling between 2011 and 2013. Apart from survey, data analysis and geological interpretation including core logging, geophysical log interpretation

and construction of a three-dimensional (3-D) geological model, all other tasks relevant to property exploration were conducted by professional contracting firms. **Table 3-2** lists the contractors engaged to do this work.

3.2.1 Year-2010 geological mapping

Geological mapping was mostly carried out during the summer of year-2010. A modest amount of additional mapping continued from 2011 to 2013, but this work was restricted to minor outcrops exposed along newly-built trails to access drill sites. The purpose of mapping was to confirm and expand the existing knowledge of geology, particularly the structure and distribution of the coal bearing rocks in the area. The data collected include location of coal seams at outcrop, their thickness, probable correlation and recording of bedding attitudes on isolated outcrops. The new data collected allowed a refinement of existing geologic map and reinterpretation of the historic data.

The Mink Creek coal licenses are heavily covered with forest. Glacial debris ranges in thickness from few metres to few tens of metres throughout the area. As a result, bedrock exposures are very scarce. Geological mapping by Western Coal's geological staff in year-2010 primarily focused along the FCCR, which was under construction at the time. Occasional outcrops were seen in stream cuttings or newly built trails. Although many more coal outcrops and coal occurrences were found than had previously been reported, no complete Gething Formation sections was exposed. The lack of outcrop continuity did not allow seam tracing, nor correlation, for a considerable distance. New structures were recognized, but their extent were not generally traceable. All of the data were plotted onto a base map, originally at 1:10,000 scale, and here incorporated within **Map 2-3.**

3.2.2 Current drilling

Western Coal, and subsequently Walter Canadian Coal Partnership (WCCP), drilled within the Mink Creek coal property in years 2011, 2012 and 2013. The purpose of the drilling was to test the Gething Formation for potentially-mineable coal seams, improve the understanding of structural features within the property, test coal-bed continuity, and obtain unweathered samples of coal for quality analysis.

In all, 61 boreholes with a cumulative length of 10,955.61 metres were drilled within the Mink Creek property between 2011 and 2013 (see **Map 2-4** for location, and **Table 3-3** for coordinate listings). Out of these 61 holes, 54 were drilled as open-holes with air-rotary equipment, and 7 (3 in Mink East and 2 in Mink West) were drilled with the air-rotary method with spot-coring of coal seams, and 2 (in Mink West) were continuously cored using diamond coring equipment. Spot-cored holes were located within few metres of air-rotary open-holes, and only the known coal-bearing zones encountered in the adjacent open-holes were cored. Two additional rotary-drill holes (MCE11-14 and MCW 12-11, totalling 332.22 metres' length) were drilled just outside the property boundaries, as shown on **Map 2-4**; these boreholes will be further discussed in their appropriate coal-assessment reports.

All boreholes were accessed from the Falling Creek Connector Road, most of them via newly-built trails as needed to reach their sites. **Table 3-3** sets forth collar coordinates, orientation, total depth, and overburden thicknesses of current drilling.

Table 3-3: Current (year-2011 through year-2013) drilling at Mink Creek

Borehole	Easting	Northing	Elev-ation	Total depth	Azimuth	Dip	Casing depth	Commenced (day/month/year)	Completed (day/month/year)	Geophysical logs run?
MCW11-01	563841.34	6141465.24	1259.8	227	0	Vertical	6.09	14-Jul-11	20-Jul-11	Yes
MCW11-02	563990.22	6141653.24	1264.5	260.6	0	Vertical	3.08	21-Jul-11	26-Jul-11	Yes: Density thru rods
MCW11-03	564118.46	6141879.23	1268.3	89.91	0	Vertical	7.62	26-Jul-11	28-Jul-11	Yes
MCW11-04	563843.94	6142418.26	1371.9	257.55	0	Vertical	3.04	29-Jul-11	6-Aug-11	Yes
MCW11-05	564373.29	6142310.33	1363.7	126.49	0	Vertical	6.09	7-Aug-11	12-Aug-11	Yes
MCW11-06	564568.41	6142494.19	1384.4	153.92	0	Vertical	3.04	7-Sep-11	8-Sep-11	Yes
MCW11-07	564721.31	6142704.75	1361.9	92.96	0	Vertical	3.04	6-Aug-11	7-Aug-11	Yes
MCW11-08	563699.31	6142220.29	1299.7	214.88	0	Vertical	3.04	12-Aug-11	14-Aug-11	Yes
MCW11-09	564019.73	6142687.22	1417.4	242.31	0	Vertical	1.52	15-Aug-11	17-Aug-11	Yes
MCW11-10	564025.69	6143191.45	1426.8	62.48	0	Vertical	3.04	17-Aug-11	18-Aug-11	Yes
MCW11-11	564184.72	6143394.26	1404.4	77.72	0	Vertical	4.57	18-Aug-11	19-Aug-11	Yes
MCW11-12	563178.49	6142985.67	1338.1	117.34	035	-55	6.09	20-Aug-11	22-Aug-11	Yes
MCW11-13	563198.92	6143042.44	1347.7	184.4	035	-70	3.04	23-Aug-11	25-Aug-11	Yes
MCW11-14	562943.43	6142757.21	1277.8	230.12	*Note: drilled outside boundary of the property, to the west (see Map 2-4)*					
MCW11-15	564833.14	6142913.71	1339.5	245.36	035	-60	15.24	30-Aug-11	5-Sep-11	Yes: Density thru rods
MCW11-15A	564738.32	6142799.18	1364.2	62	0	Vertical		5-Sep-11	7-Sep-11	No
MCW11-16	563555.51	6142013.60	1244.2	227.68	0	Vertical	3.04	8-Sep-11	12-Sep-11	Yes: Density thru rods
MCW11-17	563323.74	6142382.50	1274.2	245.36	0	Vertical	6.09	12-Sep-11	16-Sep-11	Yes
MCW11-18	563624.22	6142577.18	1352.7	226	0	Vertical	3.04	17-Sep-11	21-Sep-11	Yes
MCW11-19	565055.99	6142274.54	1325.5	193.54	0	Vertical	3.04	21-Sep-11	25-Sep-11	Yes
MCW11-20	564779.69	6141862.11	1313.7	231.64	0	Vertical	3.04	26-Sep-11	3-Oct-11	Yes
MCW11-21	564924.34	6142146.84	1337.6	223	045	-60	3.04	4-Oct-11	7-Oct-11	Yes

Table 3-3: Current (year-2011 through year-2013) drilling at Mink Creek (continued)

Borehole	Easting	Northing	Elev-ation	Total depth	Azimuth	Dip	Casing depth	Commenced (day/month/year)	Completed (day/month/year)	Geophysical logs run?
MCW11-22	565153.08	6143027.43	1269.0	245.36	0	Vertical	30.48	8-Oct-11	18-Oct-11	Yes
MCW11-23	565267.15	6142542.66	1287.0	259.08	0	Vertical	21.33	6-Dec-11	11-Dec-11	Yes
MCW11-24	565094.56	6141373.64	1289.0	251.46	0	Vertical	6.09	12-Dec-11	16-Dec-11	Yes
MCE12-01	571254.62	6143076.44	1109.0	214.27	040	-60	3.04	5-Jul-12	9-Jul-12	Yes
MCE12-02	571205.07	6142853.19	1079.4	251.48	040	-60	9.14	9-Jul-12	13-Jul-12	Yes
MCE12-03	571253.76	6143073.93	1109.0	153.92	0	Vertical	3.04	13-Jul-12	16-Jul-12	Yes
MCE12-04	570866.07	6143154.10	1132.0	169.16	040	-60	3.04	17-Jul-12	19-Jul-12	Yes
MCE12-04C	570861.52	6143153.67	1132.1	72	040	-60	3.04	27-Aug-12	31-Aug-12	Yes
MCE12-05	570510.79	6143178.58	1156.5	233.17	220	228.93	6.09	19-Jul-12	22-Jul-12	Yes
MCE12-06	570349.99	6143441.43	1157.4	214.88	0	Vertical	6.09	22-Jul-12	25-Jul-12	Yes
MCE12-06C	570349.99	6143441.43		200.56	0	Vertical	7	31-Aug-12	9-Sep-12	Yes
MCE12-07	571170.88	6143017.53	1108.0	102.1	0	Vertical	6.09	25-Jul-12	27-Jul-12	Yes
MCE12-08	571177.73	6142626.30	1039.4	251.46	220	-60	24.38	27-Jul-12	2-Aug-12	Yes
MCE12-09	571434.66	6142608.52	1038.7	251.46	0	Vertical	3.04	2-Aug-12	6-Aug-12	Yes
MCE12-10	570846.73	6143469.03	1134.3	2002.69	040	-60	6.09	6-Aug-12	13-Aug-12	Yes
MCE12-10C	570849.14	6143470.74	1134.5	120.39	040	-60	9.14	15-Aug-12	19-Aug-12	Yes
MCE12-11	570783.83	6143614.08	1189.4	102.1	*Note: drilled outside boundary of the property, to the north (see Map 2-4)*					
MCE12-12	571772.75	6142956.41	1051.1	251	0	Vertical	3.048	23-Aug-12	26-Aug-12	Yes
MCE12-13	572078.64	6143481.32	1130.0	205.74	220	-60	57.91	11-Sep-12	30-Sep-12	Yes: Neutron thru rods
MCE12-14	572082.40	6143486.64	1129.9	239.26	040	-60	44.19	1-Oct-12	7-Oct-12	Yes
MCE12-15	572124.01	6143101.79	1049.7	51.81	0	Vertical	30.48	7-Oct-12	11-Oct-12	Yes
MCE12-16	572406.00	6142813.00		41.76	0	Vertical	41.76	12-Oct-12	14-Oct-12	Yes
MCE12-17	570499.00	6142865.50		205.74	0	Vertical	12.19	15-Oct-12	21-Oct-12	Yes

Table 3-3: Current (year-2011 through year-2013) drilling at Mink Creek (concluded)

Borehole	Easting	Northing	Elev-ation	Total depth	Azimuth	Dip	Casing depth	Commenced (day/month/year)	Completed (day/month/year)	Geophysical logs run?
MCW12-01	566479.41	6142847.05	1170.2	49	0	Vertical	49	23-Oct-12	27-Oct-12	No
MCW12-02	566383.47	6143316.62	1188.3	120.39	0	Vertical	6.09	28-Oct-12	2-Nov-12	Yes
MCW12-03	565563.76	6143082.86	1212.9	195.68	0	Vertical	3.96	2-Nov-12	5-Nov-12	Yes
MCW12-03C	565561.98	6143085.71	1212.6	77.72	0	Vertical	4.57	16-Nov-12	22-Nov-12	Yes
MCW12-04	565875.90	6143348.98	1190.7	205.74	220	-60	12.19	6-Nov-12	15-Nov-12	Yes
MCW12-05	565426.50	6142400.28	1251.0	214.88	0	Vertical	16.76	23-Nov-12	29-Nov-12	Yes
MCW12-06	565266.72	6142793.41	1250.5	147.82	0	Vertical	16.76	29-Nov-12	7-Dec-12	Yes
MCW12-07	565196.91	6143279.76	1254.5	158.49	0	Vertical	33.52	7-Dec-12	14-Dec-12	Yes
MCW13-01C	564810.888	6143412.377	1340.7	251	0	Vertical	24.38	12-Jul-13	14-Jul-13	Yes
MCW13-02C	565512.323	6142177.254	1231.3	250	0	Vertical	3.04	15-Jul-13	19-Jul-13	Yes
MCW13-03	564281.872	6141287.408	1228.1	30	0	Vertical	6.09	21-Jul-13	12-Jul-13	No
MCW13-04	564608.997	6141707.446	1275.4	249			3.04	15-Jul-13	19-Jul-13	Yes
MCW13-05C	564906.389	6143055.611	1317.7	212	0	Vertical	6.5	22-Jul-13	30-Jul-13	Yes
MCW13-06	565174.444	6141629.971	1277.3	250			57.91	1-Aug-13	6-Aug-13	Yes
MCW13-07	566038.748	6143014.473	1185.1	181	0	Vertical	44.19	7-Aug-13	20-Aug-13	Yes
MCW13-08	566035.396	6142408.815	1151.9	156			30.48	22-Aug-13	29-Aug-13	Yes
MCW13-09	565736.335	6142718.683	1185.7	216			41.76	30-Aug-13	4-Sep-13	Yes
MCW13-10	563827.461	6141480.065	1264.6	40	0	Vertical	12.19	5-Sep-13	9-Sep-13	Yes

Note: boreholes suffixed with 'C' were partly or wholly cored. All others were drilled open-hole, by air-rotary method. Boreholes prefixed 'MCW' were drilled at Mink Creek West; those prefixed 'MCE' were drilled at Mink Creek East. Coordinates are NAD83 UTM. MCE12-11 and MCW 11-14 drilled outside property.

After completion, all holes were surveyed for collar coordinates except the following.

- MCE12-06C Not accessible to surveyors; location was within few metres of MCE12-06
- MCE12-16 Not surveyed, owing to being abandoned in Drift.
- MCE12-17 Not accessible to surveyors; only Global Positioning System (GPS) coordinates obtained.
- MCW13-03 Not surveyed owing to hole being abandoned in Drift.

3.2.2.1 Year-2011 drilling

Twenty four-boreholes, with a total length of 4,518.04 metres, were drilled within the Mink West area of the property in 2011 (**Table 3-3**). One borehole, excluded from the total length, was drilled outside the property. All year-2011 boreholes were completed by G. Lindsay Drilling Company. Drilling was done using a track-mounted air-rotary drill rig. Diameter of the bedrock portion of boreholes was 63.5 millimetres.

Sumps were constructed at each site to accommodate the discharge of drill cuttings and any produced water; this is normal practice for mineral- and coal-exploration boreholes in British Columbia. Drilling was carried out only during the days, on a single-shift basis.

Boreholes were cased through unconsolidated Drift deposits with 127 millimetre steel casing; casings were landed in bedrock, and generally left in place after completion of each hole. Access to drill sites was via newly-built trails connected to the FCCR. Can-West was responsible for constructing the trails and providing support services.

3.2.2.2 Year-2012 drilling

Year-2012 drilling was a continuation of the drilling program started in 2011. Eight boreholes were drilled at Mink Creek West, and nineteen boreholes at Mink Creek East. Drilling in both areas was done by G. Lindsay Drilling. The same equipment and procedures used in 2011 were used in the 2012 exploration effort. The total year-2012 drilling at Mink West was 1,169.72 metres.

- MCW12-01 was abandoned at approximately 49 metres in overburden when the casing could not be advanced any further. No geophysical logging was conducted for this hole.
- MCW12-03C was spot-cored within a coal-bearing zone (5m-70m) in MCW12-03C was cored. Results from nearby pilot hole MCW12-03 was used to select the core point.
- With the exception of MCW12-03C, all of the year-2012 boreholes at Mink Creek West were open-holes, drilled with air-rotary equipment.
- As before, Can-West built the trails and provided support services.

During year-2012, nineteen holes were completed in the Mink East area, totalling 3432.85 metres. Sixteen of these holes were air-rotary open-holes whereas three (MCE12-4C, MCE12-6C, and MCE12-10C) were spot-cored within coal-bearing intervals. One

borehole, not included in the totals, was drilled outside the property, as shown on **Map 2-4**. Access to drill sites was via newly-built trails connected to the FCCR.

3.2.2.3 Year-2013 drilling

Ten holes were drilled, all of them at Mink West, in 2013, with total length of 1835 metres. Eight of these holes were drilled by G. Lindsay Drilling Company using air-rotary equipment. Two continuously-cored holes (MCW13-01C and MCW13-02C) were completed by Boart Longyear using an LF90-D diamond-drill. Continuous core drilling was supported by a water-truck, skidder and drill-rod hauling truck. Each drill crew consisted of a driller and a helper. Drilling was carried out on a 24-hour basis, with two shifts of workers. Again, Can-West provided access and support services for both drilling companies.

- Two attempts were made to complete drill hole MCW13-03, however the surface casing broke in overburden each time. This hole was abandoned.
- MCW13-10 was spot cored from 19 meter to 40 meter immediately adjacent to MCW11-01, using the previous drilling results to guide spot-coring intervals.

3.3 Borehole geophysics

Downhole geophysical surveys were conducted by Century Wireline Services within each borehole completed during years-2011 to 2013, except for those boreholes which were abandoned in Drift. In all boreholes that were successfully logged, provided that stable drill hole conditions prevailed, the following suite of geophysical logs were obtained:

- Compensated density/gamma/caliper/resistivity (9239C tool);
- Gamma/neutron (9057A tool);
- Verticality and deviation survey (9057A tool); and
- Dipmeter (9411 tool, in years 2012 and 2013, provided that borehole conditions were acceptable for running this high-value tool)

Whenever possible, the geophysical tools were run into open holes, with the drilling rods having been removed beforehand. In cases where the holes were known to blocked, or where poor ground conditions were otherwise suspected a slimline gamma-density tool (providing an uncalibrated density log), or (as an alternative) a gamma-neutron tool, were run through the drill rods to obtain a basic log.

Copies of all downhole geophysical logs are presented in **Appendix A**, with an inventory of logs set forth below as **Table 3-4** (also repeated as **Table A-1** within **Appendix A)**. Exceptions to the typical geophysical logging programme are listed below:

- MCW11-02 Ran gamma-density log inside drill rods; density is uncalibrated.
- MCW11-15 Ran gamma-density log inside drill rods; density is uncalibrated.
- MCW11-15A Not logged, owing to hole being very unstable.
- MCW11-16 Ran gamma-density log inside drill rods; density is uncalibrated.
- MCW12-01 Hole abandoned in Drift at 49 metres; no logs run.
- MCW13-03 Hole abandoned in Drift at 30 metres; no logs run.

Table 3-4: Geophysical logs run in current boreholes

Borehole	Easting	Northing	Elev-ation	Total depth	Gamma/Caliper/ Resistivity/Density	Gamma/ Neutron	Gamma/ Density	Deviation	Dipmeter	Notes
MCW11-01	563841.34	6141465.24	1259.8	227	224.33	224.45		224.26		
MCW11-02	563990.22	6141653.24	1264.5	260.6		203.49	254.96	203.50		Density thru rods
MCW11-03	564118.46	6141879.23	1268.3	89.91	88.95	88.99		88.80		
MCW11-04	563843.94	6142418.26	1371.9	257.55	256.39	256.33		256.12		
MCW11-05	564373.29	6142310.33	1363.7	126.49	125.71	125.73		125.54		
MCW11-06	564568.41	6142494.19	1384.4	153.92	153.11	153.15		152.96		
MCW11-07	564721.31	6142704.75	1361.9	92.96	89.49	92.14		91.94		
MCW11-08	563699.31	6142220.29	1299.7	214.88	213.98	214.06		213.86		
MCW11-09	564019.73	6142687.22	1417.4	242.31	238.16	238.16				
MCW11-10	564025.69	6143191.45	1426.8	62.48	61.81	61.87		61.68		
MCW11-11	564184.72	6143394.26	1404.4	77.72	76.71	76.69		76.50		
MCW11-12	563178.49	6142985.67	1338.1	117.34	107.74	107.22		107.02		
MCW11-13	563198.92	6143042.44	1347.7	184.4	182.88	182.98		182.78		
MCW11-15	564833.14	6142913.71	1339.5	245.36			242.72	107.12		Density thru rods
MCW11-15A	564738.32	6142799.18	1364.2	62						No geophysics
MCW11-16	563555.51	6142013.60	1244.2	227.68		38.67	224.11	38.48		Density thru rods
MCW11-17	563323.74	6142382.50	1274.2	245.36	244.41	244.37		244.18		
MCW11-18	563624.22	6142577.18	1352.7	226	224.99	224.93		224.74		
MCW11-19	565055.99	6142274.54	1325.5	193.54	187.44	187.50		187.30		
MCW11-20	564779.69	6141862.11	1313.7	231.64	230.22	230.22		230.02		

Table 3-4: Geophysical logs run in current boreholes (continued)

Borehole	Easting	Northing	Elev-ation	Total depth	Gamma/Caliper/ Resistivity/Density	Gamma/ Neutron	Gamma/ Density	Deviation	Dipmeter	Notes
MCW11-21	564924.34	6142146.84	1337.6	223	219.68	219.66		219.46		
MCW11-22	565153.08	6143027.43	1269.0	245.36	243.14	243.04		242.84		
MCW11-23	565267.15	6142542.66	1287.0	259.08	258.28	258.14		257.94		
MCW11-24	565094.56	6141373.64	1289.0	251.46	247.22	247.22		247.22		
MCE12-01	571254.62	6143076.44	1109.0	214.27	213.27	213.29		213.10	212.00	
MCE12-02	571205.07	6142853.19	1079.4	251.48	245.29	245.19		245.00	244.00	
MCE12-03	571253.76	6143073.93	1109.0	153.92	150.17	150.05		149.86	148.50	
MCE12-04	570866.07	6143154.10	1132.0	169.16	167.98	168.04		167.84	165.50	
MCE12-04C	570861.52	6143153.67	1132.1	72	70.66	70.76		70.56		
MCE12-05	570510.79	6143178.58	1156.5	233.17	228.89	228.93		228.74	227.50	
MCE12-06	570349.99	6143441.43	1157.4	214.88	213.71	212.27		212.08	211.00	
MCE12-06C	570349.99	6143441.43		200.56		199.50		199.30		Sonde jammed
MCE12-07	571170.88	6143017.53	1108.0	102.1	101.13	101.13		100.94		
MCE12-08	571177.73	6142626.30	1039.4	251.46	245.33	245.51		245.32		
MCE12-09	571434.66	6142608.52	1038.7	251.46	248.99	248.99		248.80	246.00	
MCE12-10	570846.73	6143469.03	1134.3	2002.69	196.69	196.85		196.66	195.50	
MCE12-10C	570849.14	6143470.74	1134.5	120.39	118.68	118.68		118.38		
MCE12-12	571772.75	6142956.41	1051.1	251	244.95	245.57		245.38		
MCE12-13	572078.64	6143481.32	1130.0	205.74	170.40	187.78		170.01	169.50	Neutron thru rods
MCE12-14	572082.40	6143486.64	1129.9	239.26	233.63	233.75		233.56	232.50	
MCE12-15	572124.01	6143101.79	1049.7	51.81	40.34	40.30		40.10		
MCE12-16	572406.00	6142813.00		41.76	38.49	38.51				Not to bedrock

Table 3-4: Geophysical logs run in current boreholes (concluded)

Borehole	Easting	Northing	Elev-ation	Total depth	Gamma/Caliper/ Resistivity/Density	Gamma/ Neutron	Gamma/ Density	Deviation	Dipmeter	Notes
MCE12-17	570499.00	6142865.50		205.74	203.38	203.86		203.66	202.50	
MCW12-01	566479.41	6142847.05	1170.2	49						No geophysics
MCW12-02	566383.47	6143316.62	1188.3	120.39	115.44	115.46		115.26		
MCW12-03	565563.76	6143082.86	1212.9	195.68	194.32	194.24		194.04	193.50	
MCW12-03C	565561.98	6143085.71	1212.6	77.72	77.09	77.09		76.90		
MCW12-04	565875.90	6143348.98	1190.7	205.74	203.50	203.42		203.22	202.50	
MCW12-05	565426.50	6142400.28	1251.0	214.88	214.02	213.94		213.74	213.00	
MCW12-06	565266.72	6142793.41	1250.5	147.82	147.06	147.06		145.86	146.50	
MCW12-07	565196.91	6143279.76	1254.5	158.49	153.39	153.23		153.02	97.00	
MCW13-01C	564810.888	6143412.377	1340.7	251	251.38	251.34		251.34		
MCW13-02C	565512.323	6142177.254	1231.3	250	248.17	248.09		247.72		
MCW13-03	564281.872	6141287.408	1228.1	30						No geophysics
MCW13-04	564608.997	6141707.446	1275.4	249	247.52	247.60		247.60		
MCW13-05C	564906.389	6143055.611	1317.7	212	211.18	211.18		211.18	210.50	
MCW13-06	565174.444	6141629.971	1277.3	250	244.07	245.59		245.60	240.50	
MCW13-07	566038.748	6143014.473	1185.1	181	179.50	155.94		155.94	179.00	
MCW13-08	566035.396	6142408.815	1151.9	156	155.20	155.08		155.08	167.50	
MCW13-09	565736.335	6142718.683	1185.7	216	210.96	210.66		210.66	209.99	
MCW13-10	563827.461	6141480.065	1264.6	40	39.00	38.88		38.88		

3.4 Sampling and analytical work

Fifty-eight samples (**Table 3-5**, repeated as **Table B-1** within **Appendix B**) from Mink Creek West and Mink Creek East were sent to labs for quality analyses. Thirty of these samples were collected in 2012 (14 from Mink West, and 16 from Mink East); these samples were analysed by Loring Laboratories. The remaining 28 samples were collected in 2013 (all of them from Mink West); these samples were partially analysed in Walter Energy's in-house laboratory at the Wolverine minesite, and partially analysed by ALS. Only proximate analyses and Free Swelling Index (FSI) tests were completed on year-2012 samples, whereas proximate and ultimate analyses, fluidity, Arnu dilatation, ash fusibility and ash chemistry determinations were conducted on year-2013 samples. Results of all of these analyses are presented within **Appendix B** of this report.

Petrographic analyses were conducted on 7 of the year-2012 samples (5 from Mink West and 2 from Mink East), and on all of the year-2013 samples (all from Mink West). Results of petrographic analyses are presented within **Appendix C** of this report.

Table 3-5: Sample inventory

Borehole	Sample tag no.	Coal bed	metres				Recovery %
			From	To	Thickness	Recovered	
MCE12-04C	3463	Coal	22	24.68	2.68	1.19	44
MCE12-04C	3464	Coal	24.68	26.20	1.52	1.02	67
MCE12-04C	3466	Coal	47.57	48.94	1.37	1.37	100
MCE12-04C	3467	Coal	48.94	51.2	2.26	0.98	43
MCE12-04C	3469	Coal	66.55	69.59	3.04	1.39	45
MCE12-04C	3470	Coal	69.59	70.5	0.91	0.91	100
MCE12-06C	8245	A	25.9	28.3	2.4	1.71	71
MCE12-06C	8246	A	28.95	29.35	0.4	0.4	100
MCE12-06C	8248	B	60.71	63.93	3.22	1.34	42
MCE12-06C	8250	B	65.62	65.73	0.11	0.11	100
MCE12-06C	8201	B	65.73	67.61	1.88	0.83	44
MCE12-06C	8202	B	67.61	68.16	0.55	0.55	100
MCE12-06C	8203	B	68.16	68.38	0.22	0.22	100
MCE12-06C	8204	B	68.38	68.58	0.2	0.2	100
MCE12-06C	8205	C	90.73	91.15	0.42	0.42	100
MCE12-10C	3472	C	54.85	56.9	2.05	1.46	71
MCW12-03C	3474	A1	5.2	6.1	0.9	0.4	44
MCW12-03C	8226	A2	7.65	7.78	0.13	0.13	100
MCW12-03C	8228	A2	7.86	7.97	0.11	0.22	100
MCW12-03C	8229	A2	7.97	8.19	0.22	0.22	100
MCW12-03C	8230	A2	8.19	8.42	0.23	0.23	100
MCW12-03C	8231	A3	8.6	10.6	2	1.1	55
MCW12-03C	8233	D2	48	49.3	1.3	0.45	35
MCW12-03C	8234	Coal	50.82	50.92	0.1	0.1	100
MCW12-03C	8236	D3	51.3	52	0.7	0.7	100
MCW12-03C	8238	F1	65.9	67.41	1.51	1.16	77
MCW12-03C	8239	F1	67.41	68.2	0.79	0.69	87
MCW12-03C	8240	F1	68.2	69.04	0.84	0.84	100

Table 3-5: Sample inventory (concluded)

Borehole	Sample tag no.	Coal bed	metres				Recovery %
			From	To	Thickness	Recovered	
MCW12-03C	8241	F2	69.04	70	0.96	0.9	93
MCW12-03C	8243	F2	70.08	70.4	0.32	0.32	100
MCW13-01C	1858	A1	150.2	151.8	1.6	1.6	100
MCW13-01C	1859	A1	151.8	152.15	0.35	0.35	100
MCW13-01C	1862	A2	156.05	157.65	1.6	1.6	100
MCW13-01C	1863	A2+A3	157.65	159.45	1.8	1.8	100
MCW13-01C	1864	A3	159.45	160.18	0.73	0.48	65.8
MCW13-01C	1870	D2	190.78	190.98	0.2	0.2	100
MCW13-01C	1871	D3	195.05	195.55	0.5	0.5	100
MCW13-01C	1872	D3	195.55	195.68	0.13	0.13	100
MCW13-01C	1873	D3	195.68	195.85	0.17	0.17	100
MCW13-01C	1875	F1	213.7	215.2	1.5	1.5	100
MCW13-01C	10376	F1	215.2	216.7	1.5	1.38	92
MCW13-01C	10377	F1+F2	216.7	218.43	1.73	1.73	100
MCW13-01C	10380	G1	227.45	228.08	0.63	0.63	100
MCW13-01C	10379	H1	237.6	237.92	0.32	0.32	100
MCW13-02C	10381	A1	68.35	69.33	0.98	0.98	100
MCW13-02C	10382	A3	71.95	72.23	0.28	0.28	100
MCW13-02C	10383	D2	139.00	140	1	0.63	63
MCW13-02C	10384	D3	140.85	141.85	1	1	100
MCW13-02C	10385	F1	152.65	154.01	1.36	1.36	100
MCW13-02C	10386	F1	154.01	155.41	1.4	1.4	100
MCW13-02C	10387	F1	155.41	157.87	2.46	1.32	54
MCW13-02C	10390	F2	159.95	161.73	1.78	0.88	49
MCW13-02C	10391	F2	161.73	162.60	0.87	0.87	100
MCW13-10C	1830	D2	21.4	23	1.6	0.86	54
MCW13-10C	1831	D3	25.85	27.15	1.3	1.05	81
MCW13-10C	1827	F1	34.70	35.20	0.50	0.5	100
MCW13-10C	1828	F2	36.15	37.02	0.87	0.8	92
MCW13-10C	1829	F2	37.42	37.87	0.45	0.45	100

4 Geological setting

The coalfields of northeastern British Columbia are hosted by marine and non-marine clastic sediments of Jurassic, Cretaceous and earliest Tertiary age. These rocks form a series of thick sequences of molasse with a lesser proportion of flysch, all of which was deposited into the Rocky Mountain Foreland Basin of Western Canada.

The basin is bounded by the mobile crustal terranes of the Cordilleran Orogen to the west, and the cratonic rocks and Palaeozoic cover sequences of the Canadian Shield to the east.

Most of the Jura-Cretaceous sediments were derived from orogenically-uplifted landmasses lying to the southwest of the basin, although patterns of sedimentation were to some extent influenced by occasional vertical movements of underlying structures within the cratonic basement rocks, chief amongst which was the Peace River Arch (Stott, 1968).

During Late Mesozoic and Early Cenozoic time, the Cordilleran Orogen underwent two main phases of deformation: the Late Jurassic to earliest Late Cretaceous Columbian Orogeny, and the Late Cretaceous to Oligocene Laramide Orogeny (Douglas et al, 1970). Both of these orogenies were driven by transpressional crustal movements along the outboard (western) edge of the North American continent. In each case, orogenic activity was driven by the collision of northward-moving exotic crustal terranes, which in turn caused compressive strains within the previously-accreted western margin of the continent. Northeast-directed overthrusting of Palaeozoic rocks caused episodic uplift of the Cordilleran Orogen, in turn providing a ready source of sediment into the Foreland Basin.

4.1 Regional structural setting

The present-day Rocky Mountains are the most visible manifestation of Columbian and Laramide overthrusting, which gradually proceeded northeastward, with successively-younger thrusts tending to break through the Foreland rocks at successively-deeper stratigraphic levels. As successively-younger thrusts developed, they generated passive folding within overlying, previously-deformed rocks. Overlying, older thrusts were therefore passively folded along with their adjoining strata.

From southwest to northeast, the Cordilleran fold-thrust belt gradually changes structural styles (Thompson, 1979) from a thrust-dominant regime(within the mostly-Palaeozoic carbonate-clastic rocks of the Rocky Mountain Main Ranges and Front Ranges) to a mixed fold-thrust regime (within the Inner Foothills, including the Mink Creek property) to a gently-folded frontal regime (within the Outer Foothills, ten or more kilometres to the northeast of Mink Creek).

4.2 Regional stratigraphic setting

Regional stratigraphic nomenclature within the coalfields of northeastern British Columbia has undergone considerable revision during the past fifty years. Principal workers, whose reports were used as primary references for the present report, are J.E. Hughes (1964, 1967), D. Stott (1967, 1968, 1974), P.McL.D. Duff and R.D. Gilchrist (1981), and D.W. Gibson (1992a, 1992b).

The stratigraphic sequence in the Falling Creek region (and within the northwestern part of the Brazion coalfield) consists of Lower Cretaceous sediments of the Fort St. John, Crassier, and Beaudette groups (**Figure 2-1**). Within the Mink Creek property *per se*, only Fort St. John

and Crassier rocks are recognised at or near the ground surface, and the Beaudette Group is confined to the deeper subsurface.

The Fort St John Group within the Mink Creek area is represented by its basal and middle formations only, owing to the erosion of its youngest formations. Within the Mink Creek property, the Moosebar Formation is the sole Fort St. John unit present, being present within the extreme northeastern corner of the property. Younger rocks, of the Gates through Hasler formations, are recognised outside the property, immediately to its north and east (**Map 2-3**).

Most of the stratigraphic controversy to date has revolved around the identity and stratigraphic topology of rocks underlying and overlying the coal-measures of the Gething Formation. In this report, the Gething formation, as well as sub-Gething rocks, are assigned to the Crassier Group, following Hughes' work. Stott's subsequent (1968, 1973) assignment of the Gething and immediate sub-Gething rocks to the Bullhead Group is not here used. As a result, the stratigraphic scheme used in the present report differs somewhat from that which has been previously applied within Walter Energy's coal properties lying immediately to the south and east of the Mink Creek coal property (Cathyl-Huhn and Avery, 2014a).

Within the Brazion and Sukunka-Quintette coalfields, Gibson (1992a) divided the Gething Formation into four members. From top down, these are the Chamberlain, Bullmoose, Bluesky, and Gaylard Members. Within the Mink Creek coal property, only the Gaylard Member is definitely known to contain coal of potentially-mineable thickness, although within the nearby Burnt River property (McClymont, 1982; Cathyl-Huhn and Avery, 2014b), the Chamberlain Member also appears to be coal-bearing. Inasmuch as only the basal, non-coal-bearing portion of the Chamberlain Member has been thus far found at Mink Creek, the Chamberlain is not regarded to be of interest for coal development.

Supra-Gething rocks are assigned to the Fort St. John Group, following Stott's work as subsequently modified by Gibson (1992b).

4.3 Local structural geology

Structural geology of the Mink Creek area would be difficult to decipher on the sole basis of bedding attitudes within exposed bedrock, owing to the pervasive Drift cover over the area, and the concomitant paucity of outcrops. Much of our understanding of local structural geology comes from borehole intersections of coal-measures and associated younger non-coal-bearing rocks, supplemented by exposures of bedrock along exploration trails and within the locally-substantial rock-cuts bounding the Falling Creek Connector Road (the FCCR).

An additional source of structural information, albeit indirect, is from the interpretation of landforms as visible in aerial photographs and on detailed topographic maps, although this indirect observation is hampered by the aforementioned Drift cover.

Map 2-3 depicts our current understanding of bedrock structure. The Mink Creek property is tightly folded, mostly by northwest-striking synclines which appear to be associated with generally northeast-verging thrust faults. Two southwest-verging thrusts are interpreted to cross the extreme southwestern corner of the property, while a substantial northeast-verging thrust (the Bullmoose Thrust) crosses the property's northeastern corner. Two northeast-verging thrusts (the Camp Ridge Thrust and the Willow Creek Thrust) are projected across the central portion of the property, based largely upon their recognition in the better-exposed bedrock

(locally supported by closely-spaced drilling) to the north and to the southeast of the Mink Creek property's boundaries.

4.4 Local stratigraphy

Based on outcrop examination, core study and geophysical log interpretation, the following stratigraphic sequence has been identified within and adjacent to the Mink Creek Property.

Table 4-1: Table of formations and subdivisions

Group/Formation/ Member			Map-unit	Lithology and thickness				
Fort St. John Group	Hasler Fm.		8a	siltstone and mudstone; minor sideritic concretions; 250 m thick.				outside Mink Creek property, to the northeast
	Boulder Creek Fm.	Walton Creek Mb.	7b	siltstone, sandstone, conglomerate and coal; 50 to 85 m thick				
		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.				
	Moosebar Fm.		4	marine siltstone and shale; minor tuff; basal pebbly glauconitic sandstone ('Green Marker'); 190 m thick.				
Crassier Group	Gething Fm.	Chamberlain Mb.	3d	sandstone and siltstone; at least 16m thick (no complete sections).				
		Bullmoose Mb.	3c	marine shale and siltstone; minor sandstone; tuff; 109 to 118 m thick.				
		Bluesky Mb.	3b	glauconitic pebbly sandstone, turbiditic siltstone and mudstone; pebbly mudstone and conglomerate; 2 to 21 m thick.				
		Gaylard Mb. [note: two-fold subdivision of Gaylard Member is recognised in Mink Creek property; fivefold subdivision is recognised in southeastern part of property, and in adjoining areas]	3a	*Mink Creek property*		*Areas to south and east of Mink Creek*		
				Upper Gaylard	siltstone, sandstone, mudstone and coal; 56 to 90 m thick.	3a5	Division 5: sandstone and siltstone, minor coal; 95 to 105 m thick.	
				Lower Gaylard	sandstone, siltstone, mudstone and coal; 275 to 300 m thick.	3a4	Division 4: siltstone and sandstone; coal; 45 to 75 m thick.	
						3a3	Division 3: siltstone and shale; coal; 8 to 35 m thick.	
						3a2	Division 2: siltstone and sandstone; minor conglom-erate and coal; 105 m thick	
	Dresser Fm. / Cadomin Fm. (see note to left)		2a	[Note: These beds are considered to form the upper part of the Dresser at Mink Creek, and the lowermost part of the Gaylard to the south and east of the property]		3a1	Division 1: sandstone, conglomerate and siltstone; minor coal near base; 35 to 70 m thick.	
				Dresser Formation: conglomerate, sandstone, coal; not yet drilled, ?350 m thick.		2	Cadomin Formation: gritty sandstone and conglomerate; minor siltstone; 25 to 35 m thick?	
	Brenot Fm.		1	sandstone, siltstone, mudstone and coal; 285 to 300 m thick.				

Most of the Mink Creek coal property is underlain by the Gaylard Member of the Gething Formation, which is therefore the main focus of this study, inasmuch as all known coal occurrences of potential interest for mining lie within this unit.

The overlying Chamberlain, Bullmoose and Bluesky Members of the Gething are also locally exposed, as well as the underlying Dresser Formation.

Much of the property is covered by a thick blanket of Drift, chiefly glacial till. Owing to Drift cover and heavy forest cover, complete stratigraphic sections of any of the above formations are not exposed. Most of the outcrop data was recorded from isolated exposures, generally along the FCCR or along newly-built exploration trails, as the rocks were exposed during construction.

Relationships between the various rock-units that occur within and adjacent to the Mink Creek coal property are shown on the geological map (**Map 2-3**) accompanying this report. **Map 2-3** incorporates results of current drilling and geological fieldwork, together with historic drilling and geological mapping done by others, as cited on the map (and cross-referenced in **Section 10** of this report). Geological contacts shown on the map are approximate, owing to the locally-thick Drift cover and the generally-discontinuous nature of bedrock exposures.

Map-units are discussed in detail below, in order from youngest (generally nearest the ground surface) to oldest. Localised inversions of stratigraphic position, owing to thrust-faulting, or overturned bedding, are possible, but the overall stratigraphic relations remain readily-recognisable, owing to distinctive geophysical characteristics of the various units.

4.4.1 Hasler Formation (map-unit 8c)

The Hasler Formation, of late Middle Albian to Late Albian age (Gibson, 1992b) forms subdued slopes within the upland area between Mink Creek and Sukunka River, to the northeast of, and completely outside the Mink Creek property. The formation is approximately 250 metres thick, comprised of marine siltstone, overlain by marine mudstone with occasional bands of sideritic concretions. A few centimetres to decimetres of erosive-based cherty gritstone commonly mark the formation's basal contact with the underlying Boulder Creek Formation.

4.4.2 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 Mink Creek and Sukunka River, immediately northeast of the Mink Creek coal property. Boulder Creek rocks are not inferred to extend into the Mink Creek property *per se*, and the discussion here is offered for reasons of completeness, in light of the substantial historical effort devoted to coal exploration within the formation.

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, some of which attains thicknesses of interest for underground mining.

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). Where map-units 7b and 7a cannot be distinguished, the Boulder

Creek Formation as a whole is depicted as map-unit 7. The uppermost regional division of the Boulder Creek Formation, comprising the conglomerate of the Paddy Member, is not recognised within the Mink Creek study area.

The overall thickness of the Boulder Creek Formation is inferred to be 80 to 110 metres in the vicinity of Mink Creek, 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.

4.4.3 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.

Within the area covered by **Map 2-3**, the Hulcross Formation is inferred to only occur beyond the northeastern corner of the Mink Creek property

The thickness of the Hulcross Formation near Mink Creek 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 erosionally upon the underlying strata of the Gates Formation.

4.4.4 Gates Formation (map-unit 5)

The Gates Formation, of late Early Albian age within the Early Cretaceous, 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.

Near the Mink Creek coal property, the Gates coal-measures are present to the northeast of (and therefore structurally below) the Bullmoose Thrust, and thus completely outside the boundaries of the Mink Creek coal licences. No drilling has been done within the Gates Formation near Mink Creek, and its coal content (if any) in this area is not yet known.

The Gates Formation is inferred to be 70 to 100 metres thick within the area covered by **Map 2-3**. The nature of its contact with the underlying Moosebar Formation is unknown at local scale, but likely to be interfingering at the regional scale.

4.4.5 Moosebar Formation (map-unit 4)

The Moosebar Formation, of early Albian age (Stott, 1968) forms the basal part of the Fort St John Group. It was originally defined by McLearn (1923), from a type locality at the southeastern end of the Peace River Canyon. At its type locality, the Moosebar Formation is

about 289 metres thick, but it gradually thins southeasterly along the Foothills, such that its thickness within the Mink Creek area is reduced to approximately 190 metres (Cathyl-Huhn and Avery, 2014a). At and near Mink Creek, the Moosebar Formation consists of mudstone, siltstone and minor sandstone, with occasional thin but laterally-persistent (centimetre- to decimetre-scale) bands of tuff.

Within the Mink Creek property, the Moosebar Formation is inferred to form bedrock within a narrow structural slice lying between the Nuisance Thrust and the Bullmoose Thrust. Insufficient lithological detail is available in this area, to support the usual subdivision of the formation into two sub-units:

- an upper siltstone/sandstone member (the Spieker Member of Duff and Gilchrist (1981), locally designated as the unnamed bioturbated siltstone member of Klatzel-Mudry *et al* (1984); and
- a lower mudstone/tuff member (the unnamed mudstone member of Klatzel-Mudry *et al* (1984), designated as the Cowmoose Member by Cathyl-Huhn and Avery (2014c)).

The basal contact of the Moosebar Formation with the underlying Chamberlain Member of the Gething Formation is marked by the Green Marker (Cathyl-Huhn and Avery, 2014c), a thin but laterally-persistent zone of erosive-based, pebbly, intensely-bioturbated, commonly-glauconitic sandstone, siltstone and mudstone. Although the lithology of the Green Marker is superficially similar to that of the Bluesky Member of the Gething Formation, these two glauconite-bearing zones are stratigraphically distinct, both in space and in time.

4.4.6 **Gething Formation (map-unit 3)**

The Gething Formation, of Hauterivian to late Early Albian age (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 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 at least one (the Gaylard paleodelta) extended throughout the Brazion coalfield, and the Falling Creek area in general, including the Mink Creek coal property.

The Gething Formation forms the top of the Crassier Group (*sensu* Hughes, 1964) of the Pine Pass area, and the Bullhead Group (Stott, 1968) of the broader Foothills area. The Gething Formation (introduced by McLearn, 1923) is named for Gething Creek, a tributary of Peace River, situated west of the village of Hudson's Hope. In its type locality, the Gething Formation is at least 550 metres thick. Within the Brazion coalfield, the Gething is approximately 450 metres thick, although a considerable proportion of that thickness consists of marine siltstone and mudstone.

During the current investigation of the Mink Creek coal licenses, almost every borehole has intersected some section of the Gething Formation, but a complete lithological section of the formation cannot yet be established from this work, since none of the boreholes have reached the underlying Dresser Formation. Although a number of Gething outcrops are exposed, particularly along the FCCR, no continuous section from top to bottom has been exposed.

Within the main body of the Mink Creek coal property, the Gething Formation is inferred to be underlain by the Dresser Formation. Within the extreme southeastern part of the property, the sub-Gething beds are assigned to the Cadomin Formation.

The basal contact of the Gething Formation, whether with the Dresser or Cadomin formations, is abrupt to possibly erosional at the local scale (Cant, 1996) and interfingering at the regional scale (Stott, 1968; Gibson, 1992a), drawn at the top of a bed of coarse-grained, often gritty and occasionally pebbly sandstone which may laterally grade into more typical pebble-conglomerate characteristic of the underlying sub-Gething beds.

4.4.6.1 Stratigraphic subdivisions of the Gething Formation

The presence of a thick, fine-grained, marine sub-unit within the Gething Formation was first recognised in the early 1970s by coal-exploration geologists working within the Sukunka area, on the eastern bank of Sukunka River, about 20 kilometres southwest of the Mink Creek property (Wallis and Jordan, 1974). The mid-Gething marine band was subsequently found by boreholes drilled in the Rocky Creek area, about 10 kilometres south of the Mink Creek property (Chowdry, 1980).

In 1992, the Geological Survey of Canada published a stratigraphic and sedimentological review of the Gething Formation (Gibson, 1992a), drawing upon coal-exploration results to propose a fourfold subdivision of the Gething Formation. From top downward, Gibson recognised four members:

- Chamberlain Member: marine and non-marine sandstone and siltstone, locally containing coal of mineable thickness;
- Bullmoose Member: marine siltstone, mudstone and sandstone, lacking coal;
- Bluesky Member: marine sandstone, conglomerate, siltstone and mudstone, lacking coal, but characteristically containing glauconite at its top; and
- Gaylard Member: non-marine siltstone, sandstone and mudstone, with numerous coal beds, some of which are of mineable thickness.

4.4.6.2 Chamberlain Member (map-unit 3d)

The Chamberlain Member within the Mink Creek area comprises very thinly- to thinly-interbedded, sparsely to moderately bioturbated very fine-grained sandstone and siltstone, with occasional bands of silty mudstone. In contrast with the Chamberlain sections drilled in the Sukunka area (20 kilometres to the southwest of Mink Creek), no coal has been found within the two incomplete sections of the Chamberlain drilled thus far at Mink Creek.

Both of the Chamberlain intersections at Mink Creek are within the Mink Creek West area, confined to a narrow north-trending syncline outlined by the Bluesky and Bullmoose members of the Gething Formation, and cored by the Chamberlain Member. The two boreholes within this syncline (MCW13-01C and MCW13-05C) encountered drilled thicknesses of 16.32 metres and 0.75 metre respectively, of Chamberlain rocks. As noted, neither borehole found coal within the Chamberlain, although that may be due to

their having only encountered the basal portion of the member, its upper beds having been removed by erosion at the bedrock surface.

The Chamberlain Member is not known to contain diagnostic fossils; it has been assigned an Early Albian age by Gibson (1992a) on the basis of fossils found within the overlying Moosebar Formation.

The basal contact of the Chamberlain Member with the underlying Bullmoose Member is gradational by interbedding, being drawn at the base of the Chamberlain's sandstone. The Chamberlain-Bullmoose contact likely rises stratigraphically, to the north and east.

4.4.6.3 Bullmoose Member (map-unit 3c)

The Bullmoose Member comprises 109 to 118 metres of thinly-interbedded, recessive-weathering mudstone, siltstone and minor sandstone of turbiditic aspect, forming several fining-upward sequences within an overall coarsening-upward sequence.

At Mink Creek, as is generally the case within the southern part of the Brazion coalfield and the northern part of the Sukunka-Quintette coalfield, the Bullmoose Member of the Gething Formation may be readily recognized to contain three divisions, recognizable most readily by their geophysical log response but also (in areas with more frequent bedrock exposure than Mink Creek), by their distinctive lithologies. For convenience these sub-units may be referred to as the Upper, Middle and Lower divisions of the Bullmoose Member. The Upper and Middle Divisions likely correspond with the 'Lower Silty Member' of the Moosebar Formation, as suggested by Duff and Gilchrist (1981), within those areas (for example, the deep subsurface near Chetwynd) where the overlying Chamberlain Member is absent.

The geophysical log response of the Bullmoose Member is very distinct, as compared with the overlying Chamberlain Member and the underlying Bluesky Member. **Table 4-2** summarises drilled intersections of the Bullmoose Member at and near the Mink Creek property, within the context of the adjoining Chamberlain, Bluesky and Gaylard members of the Gething Formation.

The Bullmoose Member forms isolated areas of bedrock within synclinal troughs situated in the western and central portions of the Mink Creek property, and as well it is inferred to form bedrock between the Nuisance and Bullmoose thrust faults, within the property's extreme northeastern corner.

The Bullmoose Member does not contain any coal, other than isolated coalified logs and coarse, poorly-preserved 'plant trash', likely of drifted origin. The general lack of coal is also observed by the numerous boreholes which have penetrated the Bullmoose Member within the Mink Creek property.

The Bullmoose Member does, however, contain abundant molluscan fossils, including *Pecten (Entolium)* cf. *irenense* McLearn (Gibson, 1992a) and *Yoldia kissoumi* (Duff and Gilchrist, 1981), which, although not age-diagnostic, are locally-characteristic of the unit.

Table 4-2: Drilled thickness of Bullmoose Member and associated rocks at and near Mink Creek												
Bore-hole	Chamberlain Member		Upper Division of Bullmoose Member		Middle Division of Bullmoose Member		Lower Division of Bullmoose Member			Bluesky Member		Gaylard Member
	top	thickness	top	thickness	top	thickness	top	thickness	Ash band	top	thickness	top
83-21							Starts at 4.23 m	>23.70 m	Starts below ash	28.03 m	20.11 m	48.14 m
MCW 11-07			Starts at 2.80 m	>17.00 m	19.80 m	11.45 m	31.25 m	>58.24 m	DNR at 89.49 m	DNR		DNR
MCW 11-15							Starts at 14.65 m	>119.50 m (faulted?)	63.75 to 64.05 m?	134.15 m	34.39 m	168.53 m
MCW 11-19							Starts at 2.75 m	>2.25 m	Starts below ash	5.00 m	4.15 m (faulted?)	9.15 m
MCW 11-22							Starts at 29.20 m	>38.35 m	36.00 to 36.20 m	67.55 m	17.65 m	85.20 m
MCW 12-06							Starts at 15.55 m	>21.50 m	Starts below ash	37.05 m	16.65 m	53.70 m
MCW 12-07							Starts at 33.20 m	>13.80 m	Starts below ash	47.00 m	20.20 m	67.20 m
MCW 13-01C	Starts at 4.18 m	>16.32	20.50	34.70 m	55.20 m	5.00 m	60.20 m	69.64 m	96.35 to 96.55 m	129.84 m	20.21 m	150.05 m
MCW 13-02C							starts	>21.20 m	Starts below ash	44.80 m	23.55 m	68.35 m
MCW 13-05C	Starts at 6.50 m	>0.75 m	7.25 m	32.65 m	39.70 m	5.50 m	45.20 m	72.85 m	83.40 to 83.60 m	118.05 m	22.50 m	140.55 m
MCE 12-12							DNR at 244.95 m	>125.15 m	152.10 to 152.25 m	119.80 m (overturned)	15.60 m	Starts at 2.80 m; top at 104.2 m (overturned)
MCE 12-13			Starts at 57.91 m	32.29 m	90.20 m	2.40 m	92.60 m	56.10 m	Not recog-nised	148.70 m	21.70 m	170.40 m
MCE 12-14					Starts at 43.40 m	>1.50 m	44.90 m	140.00 m (faulted?)		184.90 m	35.50 m (faulted?)	220.40 m

Note: in boreholes MCE12-12 the stratigraphic section appears to be overturned. In MCE12-12 and MCE12-14, drilled thicknesses of rock-units appear to be substantially exaggerated by steep dips of strata relative to the boreholes' trajectories.

The mudstone facies of the Lower Division of the Bullmoose Member is interpreted as offshore deposits on the basis of trace fossils, and their lithological similarity to offshore mudstones in other modern and ancient settings. The overlying, sandier, Middle Division and the uppermost Upper Division appear to be transitional deposits from the offshore to a lower shoreface setting, with the sandstones of the Chamberlain Member possibly representing an upper shoreface or offshore bar deposit.

The Bullmoose Member is of late Early Albian age (Gibson, 1992a); its basal contact with the Bluesky Member is generally gradational, but locally abrupt.

Upper Division

The Upper Division of the Bullmoose Member is interpreted as a near shore marine facies of the Bullmoose. The Upper Division consists of siltstone, grading downward at its base to the interbedded sandstone and mudstone of the Middle Division, and grading upward at its top to the very fine-grained sandstone with interbedded mudstone and siltstone of the Chamberlain Member.

Sandstone and siltstone of the Upper Division are light to medium grey, but in outcrop, they weather to medium to dark yellowish brown. Sandstones are very fine-grained, commonly well-sorted, and clean. Quartz and chert appear to be the principal detrital components. Pyritised worm tubes and burrows are common. Primary sedimentary structures include parallel bedding, cross bedding and ripples. Pyrite is associated with burrows and occasionally occurs as nodules and dissemination. Siltstones commonly include sandstone lenses and laminations. Mudstone interbeds are medium grey, silty to highly silty and commonly 4 to 5 centimetres in thickness. The sandstone interbeds are interpreted to be turbidite deposits (Duff and Gilchrist, 1981).

Figure 4-1 presents a typical geophysical log section of the Upper Division of the Bullmoose Member, taken from borehole MCW13-01C. Log tracks are gamma-ray (solid line) and caliper (dashed line) at left, and resistivity (dashed line) and density (solid line) at right.

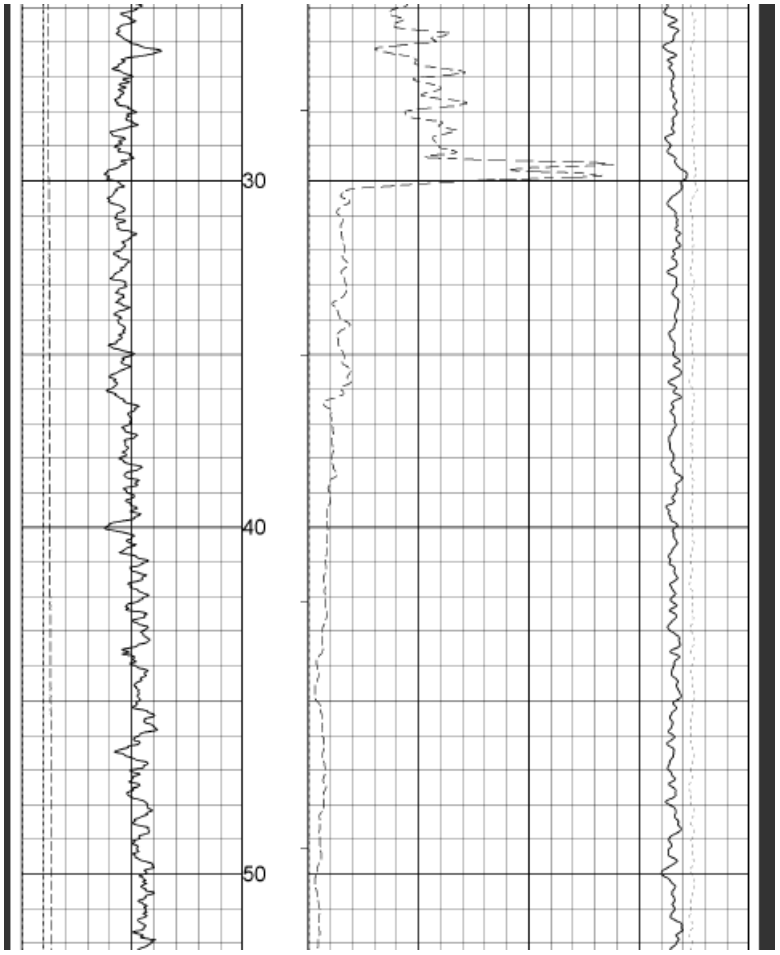


Figure 4-1: Typical log response of the Upper Division of the Bullmoose Member

Middle Division

The Middle Division of the Bullmoose Member consists of thin to medium interbeds of dark grey, glauconitic mudstone with locally-abundant pyritic nodules, and very fine- to fine-grained sandstone, occasionally containing cherty grit and pebbles. Geophysical logs of the Middle Division show a muted gamma-log response to the Division's sand content, and a stronger resistivity-log response which may reflect the Division's pyrite content. The Middle Division's top and base appear to be abrupt. Drilled thickness of the Middle Division of the Bullmoose Member is 2.4 to 11.45 metres, with the thicker intersections perhaps being due to steep apparent dips of strata relative to the borehole trajectory.

Lower Division

The Lower Division of the Bullmoose Member consists mainly of medium-dark to dark grey, commonly homogenous mudstone, which is silty near its upper contact with the overlying beds of the Middle Division. Bedding within the mudstone is indistinct, and laminations are rare. Occasional medium grey siltstone and rare very fine-grained sandstone interbeds occur in the lower third of the sequence. In outcrop, the mudstone of the Lower Division weathers to a light brown or olive grey and bands of small rusty weathering carbonate/iron concretions are common. Burrows, pyritised worm tubes, and

shell fragments are common. Pyrite is fairly common and occurs as nodules, in disseminated form, and as trace-fossil burrow-fillings.

Geophysical logs of the Lower Division show a characteristic high-gamma response at two horizons situated 30 to 40 metres above the Bullmoose/Bluesky contact. These gamma ‘spikes’ are interpreted to be thin bands of tuff, each of them one to two decimetres thick, with the lower of the two bands being more persistent. These bands provide a regionally-extensive geophysical marker throughout the Falling Creek region (Kilby, 1984a).

The basal contact of the Lower Division with the underlying Bluesky Member is drawn at the top of the underlying glauconitic sandy mudstone. In geophysical logs, the Bullmoose/Bluesky contact is readily recognised as a rapid downward change in log response to higher resistivity response, lower API gamma counts, and higher API neutron counts (as shown below in **Figure 4-2**. This downward change is interpreted to correspond with a rapid downward passage from fine-grained mudstone of the Basal Division of the Bullmoose, to the sandy mudstone and sandstone of the uppermost Bluesky.

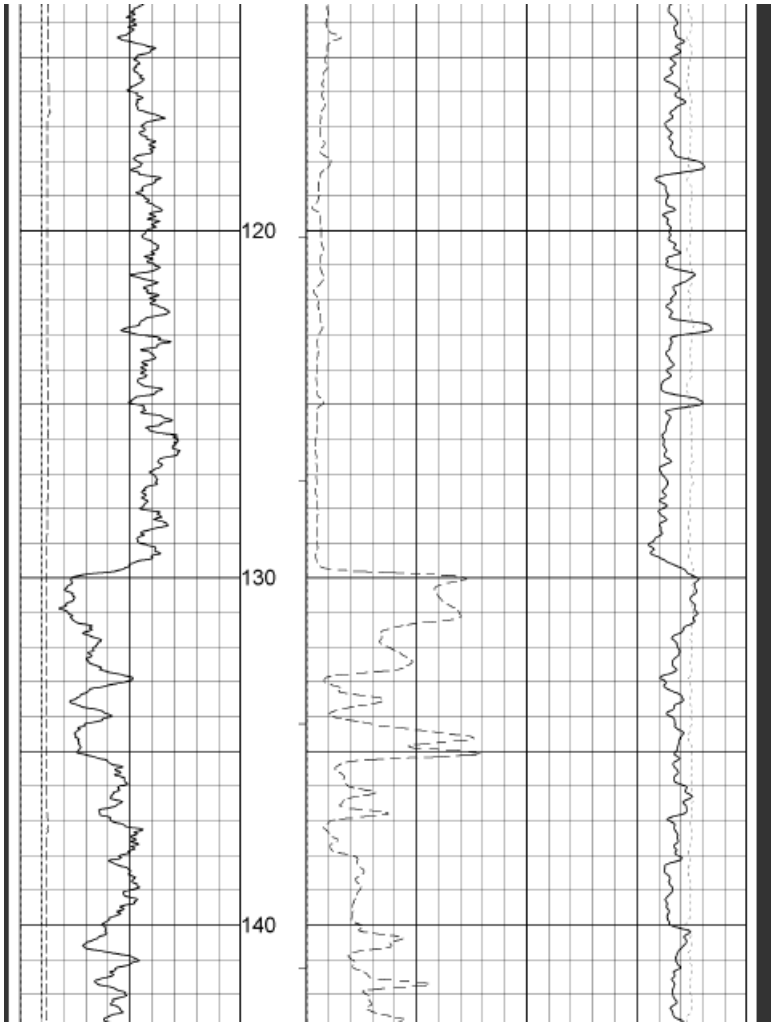


Figure 4-2. Geophysical log response of Bullmoose/Bluesky contact

Depths in **Figure 4-2** are shown in metres, with a scale of ten metres per major division, five metres per medium division, and five decimetres per minor division. The Bullmoose-Bluesky contact is interpreted to occur at a depth of 129.84 metres.

4.4.6.4 Bluesky Member (map-unit 3b)

The Bluesky Member is a transitional unit between marine and non-marine facies, and there has been considerable debate within the geological literature (as summarised by Stott, 1968, and further discussed by Kilby (1984b) and Legun (1990), as to whether it properly belongs with the Gething Formation or the Moosebar Formation. In areas some tens of kilometres to the north and east of the Mink Creek property, where the Bullmoose and Chamberlain members of the Gething Formation can no longer be recognised, the Bluesky is customarily mapped as a formation in its own right, bounded above by the Moosebar Formation, and beneath by the Gething Formation (Legun, 1990). At Mink Creek, following the usage of Gibson (1992), the Bluesky is considered as a member within the Gething Formation.

The Bluesky Member generally consists of coarsening-upward cycles of interbedded mudstone, siltstone, and sandstone. Thin to medium interbeds of sandstone and mudstone give parts of the Bluesky a banded appearance. The top of the Bluesky is characteristically marked by a glauconitic horizon. The glauconitic zone, where observed in the Mink Creek property, is 40 to 57 centimetres thick, and contains abundant fine-grained, green glauconite within sandy mudstone and argillaceous sandstone. Minor chert pebbles in the sandstone were noted in outcrop and in the core of borehole MCW13-02C.

Bluesky sandstones are otherwise typically medium to light grey, very fine- to fine-grained, commonly well sorted, laminated and in places cross-laminated. Siltstone laminations are common within the sandstones, in the southern portion of the Mink Creek property. Trace fossils of burrows, occasionally pyritised, are less common than in the overlying rocks. Mudstone rip-up clasts are occasionally present. Occasional carbonaceous laminae with polished surfaces also occur locally.

Siltstone is rare within the Bluesky Member within the northern part of the property, but abundant to the south. It is medium grey, laminated, and in places it includes sandstone and mudstone lenses.

Mudstones are medium-dark to dark grey, and occasionally silty and carbonaceous, with occasional trace fossils of burrows, traces of pyrite, rare coalified plant debris, and in places, sandstone lenses, pebbles and laminations.

At Mink Creek West, the Bluesky's lithology changes from mudstone and sandstone in the north to mudstone, siltstone, and sandstone in the south. The contact between mudstone and sandstone in the north is commonly sharp whereas it is gradational from mudstone to siltstone to sandstone in the south.

Regionally, the basal contact of the Bluesky Member within the underlying Gaylard Member is characterized by chert- and quartz-pebble conglomerate up to a metre thick, grading to argillaceous sandstone with few randomly-distributed chert and quartz pebbles. However, the basal Bluesky-Gaylard contact within the Mink Creek Property does not consist of sandstone or conglomerate, but rather a mudstone. The contact is therefore placed at an upward lithofacies from continental to marine, marked by a bed of coal, or of

carbonaceous mudstone or carbonaceous siltstone, which in turn is assigned to the Gaylard Member.

The erosive-based Bluesky sediments likely represent the initial transgressive deposits of an early tongue of the Moosebar-Clearwater Sea, which shortly after deposition of the Bluesky had transgressed to a southerly limit several hundred kilometres southeast of Mink Creek (Gibson, 1992b).

A complete section of the Bluesky Member was intersected in 11 boreholes at Mink Creek East and Mink Creek West. Incomplete sections were intersected in 4 more holes at Mink Creek West area. Glauconitic sediments of the Bluesky Member are exposed at outcrop near UTM grid reference 570421 easting and 6143890 northing. The Bluesky, as-drilled within the Mink Creek property, is generally 15 to 24 metres thick with one exception of 34 metres in borehole MCW11-15.

4.4.6.5 Gaylard Member (map-unit 3a)

The Gaylard Member is the basal unit of the Gething Formation, comprising dominantly (or entirely?) non-marine sedimentary rocks within the Mink Creek coal property. The Gaylard's age (Gibson, 1992a) is Hauterivian to late Early Albian.

The Gaylard Member is largely a sequence of fining upward cyclothems (**Figure 4-3**), typical of fluvial to deltaic depositional environments. The cyclic coal-bearing succession consists of a heterogeneous assemblage of rare conglomerate, coarse- to fine-grained sandstone, siltstone, mudstone, carbonaceous mudstone and coal. Coal seams developed in the culminating phase of many cycles.

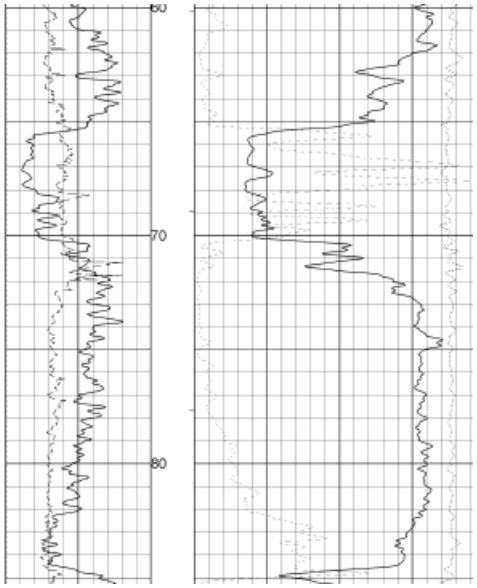


Figure 4-3. Fining-upward sequence capped by coal seam in upper part of the Gaylard Member

A typical Gaylard Member geophysical log shows intercalated lithologies of sandstone, mudstone, siltstone and coal. Fining-upward cyclothems are easily-recognised on these

logs (**Figure 4-3, above**). Gamma-log response in the underlying Dresser Formation is blockier than that of the Gaylard coal-measures (Klatzel-Mudry *et al*, 1984); this affords a useful criterion for differentiating the two units**.**

Nearly all of the known coal occurrences within the Mink Creek property are hosted by the Gaylard Member of the Gething Formation, with a few coal showings within the underlying Dresser Formation. Drilling has demonstrated the existence of at least nineteen Gaylard coal zones (**Tables 5-1** and **5-2**) within the property.

Coals of the Gaylard Member at Mink Creek, and their enclosing sedimentary rocks, were deposited between 112 and 133 million years ago (Gibson, *ibid.*), on the basis of regional plant-fossil and foraminiferal zonations.

Depositional environment of the Gaylard Member

The Gaylard Member is bounded by the overlying transitional and marine sediments of the Bluesky Member, and the underlying delta-plain facies of the Dresser Formation. The tectonic and sedimentary processes active during the Gaylard's period of deposition may be analogous to those found in a humid alluvial-plain or delta-plain setting (Klatzel-Mudry, 1984). Different facies within the Gaylard Member (such as channel sandstone, carbonaceous mudstone, or coal) may be interpreted as various components of a deltaic complex.

In a subsequent study, Gibson (1992a) concluded that the sedimentary facies, facies relationships, petrographic composition of sedimentary rocks, the presence of diagnostic sedimentary and biogenic structures, and the occurrence or absence of characteristic megafossils, microfossils and microfloral assemblages, suggested that most strata of the Gaylard Member were deposited in a deltaic coastal plain, or paralic depositional environment.

Subdivisions of the Gaylard Member

Within the main body of the Mink Creek coal property (those areas situated north and west of the Mink Creek valley), the Gaylard Member may be most conveniently divided into two sub-units, here informally termed the Upper Gaylard and Lower Gaylard (**Table 4-1**). Thick and consistent coal seams occur in the Upper Gaylard, whereas coals of the Lower Gaylard are generally very thin, occasionally swelling to greater thicknesses, but not considered economic at the present time.

Within the extreme southeastern portion of the property (south and east of Mink Creek valley), the Gaylard may be divided into five sub-units, designated from bottom upward as Divisions 1 through 5 (**Table 4-1**; see also **Map 2-3** for details of the area within which this finer subdivision is practicable). Division 1 of the Gaylard Member is interpreted to be the southeastward lateral equivalent of the upper part of the Dresser Formation, as indicated by **Table 4-1**.

Division 5 of the Gaylard Member (within the southeastern area) may conceivably be the lateral equivalent of the Upper Gaylard (within the remainder of the property), but this supposition remains unverified by drilling or the measurement of surface sections.

4.4.6.6 Details of the Upper Gaylard

Six coal zones, designated as A through F in order from top downwards, commonly occur within the upper 56 to 77 metres (**Tables 5-1** and **5-2**) of the Gaylard. Member. The strata containing these coals, bounded at the top by the Bluesky-Gaylard contact, and bounded at the base by the floor of the F coal zone, are designated as the Upper Gaylard. The lithological sequence of the Upper Gaylard is based on two core logs from current drilling, two historic boreholes (83-21 and DH-7503), limited outcrop data and interpretation of geophysical logs.

Sandstone and mudstone constitute the dominant lithology of the Upper Gaylard. Percentages of sandstone and mudstone vary between boreholes, and no particular trend of these lithologies may be concluded from the available data. However, three cored boreholes show an increase in sand facies towards south. The Upper Gaylard in the northernmost borehole (83-21, which lies to the north of the Mink Creek property's northern boundary) consists of 28% siltstone and 63% mudstone whereas the middle (MCW13-01C) and southernmost (MCW13-02C) boreholes are comprised of approximately 65% and 75% sandstone respectively. Geophysical logs of other boreholes in the area indicate that sandstone percentage is slightly higher in the Upper Gaylard, as compared to mudstone, although a few boreholes show the opposite trend. The other rock types within the Upper Gaylard include siltstone, coal, carbonaceous shale, mudstone, and siltstone.

Sandstone

Sandstone of the Upper Gaylard is light to medium grey, moderately- to well-sorted, and well-indurated. It weathers orange-brown to brownish-grey in outcrops. The grains appear to be mostly quartz and chert, commonly subrounded to subangular, and they exhibit salt-and-pepper texture in places. Although the grain size ranges from very fine- to very coarse-grained (occasionally grading to pebbly sandstone), fine- to medium lower grained sandstone form the major portion of the strata. Finer and coarser sizes usually occur at the top and bottom of the cyclothems.

Most of the cyclic units in borehole MCW13-01C begin with coarse-grained sandstone or pebbly sandstone and contain an organic phase, either as coal or carbonaceous mudstone at the top, whereas many cycles in MCW13-02C culminate in very fine-grained sandstone. Parallel laminations, cross laminations, mudstone lenses, carbonaceous laminae, coalified and carbonaceous plant debris and rip-up clasts were noted in places. The upper and lower contacts of these sandstones vary from sharp to gradational.

Mudstone

Mudstone constitutes the most abundant to second-most abundant lithology in the Upper Gaylard. Mudstone is medium to dark grey, variably-silty or non-silty, and slightly to highly carbonaceous, locally grading to carbonaceous shale. A number of soft, light grey tuff bands have been reported from borehole 83-21. Coal laminae, stringers, very thin coal beds, and coalified and carbonaceous plant debris is common to abundant. Rootlets, soft-sediment deformation structures, bioturbation, sandstone and siltstone lenses and very thin beds occur in places. Rare pyrite was also noted.

Siltstone and pebbly sandstone

Quantitatively, siltstone and pebbly sandstone constitute the minor portion of the Upper Gaylard sequence in the cored boreholes. Siltstones are medium grey, and usually grade to sandstone or mudstone in the cycle. Carbonaceous and coalified plant fragments, and trace fossils of burrows occur in places. Pebbly sandstone occurs at the base of the cycles; these sandstones are generally coarse- to very coarse-grained with abundant chert pebbles, up to 5 millimetres in diameter.

Coal

Six coal zones, designated from A to F (from top downwards) are recognised within the Upper Gaylard. The extent, thickness and economic potential of four of these six coal zones are described in detail in **Section 5** of this report.

4.4.6.7 Details of the Lower Gaylard

The Lower Gaylard, for purposes of this report, represents all the strata drilled below the floor of the F coal zone during the 2011-2013 drilling program. The entirety of the Lower Gaylard was not intersected in any single hole during current exploration program. Based on seam correlation, however, it is estimated that 275 to 300 metres of Lower Gaylard strata have been drilled.

Numerous coal occurrences in the Lower Gaylard have been interpreted from responses of downhole density and neutron logs (**Tables 5-1** and **5-2**), but these coals are generally too thin to be of economic interest. Some of the Lower Gaylard coals do locally thicken up to 2 metres, but these coals generally thin out or pinch out quickly. Although seam correlation within the Lower Gaylard is generally reasonably confident, some of the coal zones have been more difficult to correlate, owing to their variable seam characteristics (such as their geophysical-log 'signature'), the absence of marker beds, and overall apparent lack of stratal continuity. Additional data from future exploration programs may improve the reliability of seam correlation in the Lower Gaylard.

The bottom 87 metres of core from borehole MCW13-02C, and the 33 metres of core from MCW13-01C, represent the Lower Gaylard coal-measures. All other boreholes which intersected the Lower Gaylard were rotary-drill (non-coring) holes. The information from year-2013 cores, taken along with core description from historic boreholes 83-21, DH 75-3 and DH 75-7 are the basis of Lower Gaylard unit description.

Boreholes DH 75-3 and DH 75-7 are located at Mink Creek West. These holes were intended to reach the Cadomin Formation (as then-understood at the time, and now designated as the Dresser Formation) but, owing to difficulties in drilling, these holes were to be abandoned before reaching the base of the coal-measures (Dyson, 1975b). However, a substantial section of the Lower Gaylard was intersected in these two boreholes.

Sandstone

Sandstone forms a major component of the Lower Gaylard. It is light to medium grey, argillaceous to clean, commonly fine- to very fine-grained, locally grading to medium- to very coarse-grained, moderately- to well-sorted and generally calcareous. Other locally-developed features include laminations, cross lamination, burrows, bioturbation, rootlets,

coal lenses, coal stringers, coalified plant debris, slumping and compaction structures and rip-up clasts.

Mudstone

Mudstone of the Lower Gaylard is medium to dark grey, locally carbonaceous and silty and variably-calcareous. Sandstone and siltstone laminations are common in some intervals. Laminations, coaly and carbonaceous stringers, coalified plant debris, and coal laminae occur in places. The contact with other lithologies is generally gradational. Nodular appearance, pyrite nodules and polished fragments and surfaces are occasional.

Siltstone

Siltstone of the Lower Gaylard is dark grey to black, commonly argillaceous and calcareous. Fine sand laminations, bioturbation, burrows, cross lamination, parallel- to ripple-lamination, and coalified and carbonaceous plant debris occur locally.

Coal

Fourteen coal zones are identified within the Lower Gaylard. The seams are generally thin and laterally discontinuous. The detailed description of Lower Gaylard coal seams is given in **Section 5** of this report.

Basal contact

The Gaylard/Dresser contact was neither intersected in boreholes, nor observed at outcrop, during current investigations. Hughes (1967) described the contact as being at the top of a 15 to 20 metre thick sequence of sandstone, grit, and conglomerate.

4.4.7 Dresser Formation (map-unit 2a)

The Dresser Formation underlies the Gething Formation, within the main body of the Mink Creek coal property. The type locality of the Dresser Formation is located at the west end of Peace River canyon, near W.A.C. Bennett Dam, where the Dresser can be mapped at surface, as well as being recognisable in diamond-drill cores obtained in the course of foundation design for the dam (Hughes, 1963).

The thickness of the Dresser Formation along the Peace River canyon ranges from 370 metres in the west to 200 metres in the east (Hughes 1964). The average thickness in the Falling Creek area of the Brazion coalfield is reported to be 350 metres (Klatzel-Mudry *et al.*, 1984). The Dresser Formation has been intersected by many boreholes situated to the north of the Mink Creek property, but not thus far by any of the boreholes situated within the property *per se*.

The Dresser is exposed in outcrop to the west of the Mink Creek property, and these outcrops were visited in the course of the present study. Although complete sections of the Dresser Formation, or exposures of the Gething/Dresser contact were not seen, lithologies ranging from conglomerate to mudstone, along with thin coals, are exposed in the area.

The formation consists of interbedded mudstone, siltstone, sandstone, gritstone, conglomerate and coal. Mudstone and siltstone generally form a minor component of the Dresser section. Sandstones are commonly very coarse- to medium-grained, but grain sizes

locally range down to very fine-grained. Grains within the sandstones are mostly quartz and chert, and beds are medium to very thick. Both tabular and trough cross-bedding was noted. Conglomerate units within the Dresser are thick, and comprised of 3 millimetre to 100 millimetre, subrounded to rounded granules, pebbles, and cobbles of chert and quartz.

The formation was deposited in distal alluvial fan and braided stream (predominantly channel) environments. The lower contact of the Dresser Formation with the underlying Brenot Formation is placed at the base of the lowest coarse-grained sandstone.

4.4.8 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 which may alternatively be assigned to the Dresser Formation of the Crassier Group *sensu* 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, and its greater proportion of conglomerate.

Within the southeastern portion of the Mink Creek coal property, the Cadomin Formation is estimated to be 25 to 35 metres thick. Its basal contact with the underlying Brenot 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).

4.4.9 Brenot Formation (map-unit 1)

The Brenot formation is the basal unit within the Crassier Group (as proposed by Hughes, 1964, and as subsequently used by Hughes (1980) and Stott (1981). Beds coeval with the Brenot are recognised by Stott (1981) as the Bickford Formation, being the uppermost unit within Stott's Minnes Group. At Mink Creek, the name 'Brenot' is used, whereas in previous Walter Energy studies of nearby properties to the south and east, the name 'Bickford' has been used.

The Brenot Formation consists of non-marine sandstone, siltstone, mudstone and coal, with a total thickness of 285 to 300 metres (Chowdry, 1980). Channel-filling conglomerates, up to 11 metres thick, locally 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 (Chowdry, 1980) from the Bickford Formation (coeval with the Brenot Formation) within the Rocky Creek coal property (10 kilometres south of Mink Creek), on the basis of extensive drilling during the early 1980s, but the Brenot Formation has yet to be drilled at Mink Creek (other than in one natural-gas well, and its local coal potential is therefore unknown.

5 Coal

The Gething Formation contains several coal seams of economic importance within the Mink Creek Property. Coals of the two exploration areas within the property, Mink West (**Table 5-**1) and Mink East (**Table 5-2**), will be discussed separately, inasmuch as the two areas are four kilometres apart and they are not at the same stage of exploration (Mink West being more-advanced). No attempt is here made to correlate the coals between these two regions.

5.1 Coals of the Mink West area

Nineteen coal zones were identified on downhole geophysical logs and in cores taken at Mink West, although seams in several zones are thin and probably not of immediate economic interest.

The nineteen coal zones are designated by letters, from A zone at the top of the Upper Gaylard Member, to S zone near the base of the Lower Gaylard Member. Most of these zones comprise more than one seam and a few of the coal seams consist of sub-seams or plies. Coal seam intervals, true thickness, overburden (Drift) thickness and the presence of the Bullmoose and Bluesky members of the Gething Formation are summarised in **Table 5-1**.

In the course of the present study, Upper Gaylard coal seams have been modelled, using *MineSight* software as a means to construct a 3-D geological model. Thickness values of 0.01m to 0.05m, presented in **Table 5-1**, are dummy values used solely for modelling.

Historic borehole 83-21 is included in **Table 5-1**; but this borehole is excluded from consideration in the statistics presented in **Table 5-3,** because the hole is situated far from the current exploration area and its location was not part of WCCP's coal license area in 2013.

5.1.1 Coal seam development

At Mink West, coal seams occur in zones, with individual seam thickness ranging from 12 centimetres up to 7.32 metres. Lateral extent of these coal seams varies from few hundred metres to few thousand metres. Coal seam nomenclature from previous work done by Esso (Klatzel-Mudry *et al,* 1983) and Norcen (Newson, 1980b) is not followed in this report because many more coals were recognised as a result of the relatively close-spaced exploratory drilling of this project. However, for reference, the Brenda Seam of Klatzel-Mudry *et al* (1983) is considered equivalent to F Seam of the current study.

Four boreholes, MCW11-05, MCW11-09, MCW12-03, and MCW13-01, together include all of the correlatable coal seams recognized at Mink West. Apparent (as-drilled) and true stratigraphic (normal to roof and floor) thicknesses are presented in **Table 5-1**, along with as-drilled thickness of Drift, and the presence of the Bullmoose and Bluesky members of the Gething Formation in each borehole. Interburden thicknesses between coal seams and coal zones are presented in **Table 5-3**, along with coal thickness statistics.

The thickest and most consistently-developed coal seams occur within the Upper Gaylard Member. A seam, D seam and F seam appear to be particularly attractive for mining at the present stage of exploration.

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
83-21	0	4.23	4.23	OB		4.23	Drift
83-21	0	28.03	28.03	MDST/SLT/SST		27.60	Bullmoose Member
83-21	28.03	48.14	20.11	MDST/SLT/SST		19.80	Bluesky Member
83-21	48.18	49.01	0.83	Coal	A1	0.81	
83-21	49.59	50.25	0.66	Coal	A2	0.65	
83-21	60.32	62.82	2.5	Coal	A3	2.45	
83-21	67.84	68.44	0.6	Coal	B?	0.59	Not confirm
83-21	88.05	88.46	0.41	Coal	C1?	0.40	Not confirm
83-21	120.15	121.15	1	Coal	D2	0.99	
83-21	128.05	128.45	0.4	Coal	D3	0.40	
83-21	138.95	139.55	0.6	Coal	E1	0.59	
83-21	143.34	143.68	0.34	Coal	E2	0.33	
83-21	145.77	152.74	6.97	Coal	F1	6.87	
83-21	154.82	156.44	1.62	Coal	F2	1.60	
83-21	160.52	160.76	0.24	Coal	Coal	0.24	Unidentified Seam
83-21	165.47	167.3	1.83	Coal	G1	1.79	
83-21	171.72	172.27	0.55	Coal	G2	0.54	
83-21	184.2	184.7	0.5	Coal	H1	0.49	
83-21	196.78	201.01	4.23	Coal	I1?	4.15	Not confirmed
83-21	211.59	212.12	0.53	Coal	J1	0.52	
83-21	227.97	230.02	2.05	Coal	K2	2.01	
83-21	232.08	234.13	2.05	Coal	L1	2.01	
83-21	252.4	253.07	0.67	Coal	M	0.66	
83-21	254.43	255.2	0.77	Coal	Coal	0.75	Unidentified Seam
83-21	285.05	287.17	2.12	Coal	N1	2.08	
83-21	304.16	307.78	3.62	Coal	N1	3.55	
DH-7503	0	3	3	OB	OB	3	
DH-7503	4.42	4.54	0.12	Coal	A1	0.12	
DH-7503	5.49	7.16	1.67	Coal	A2	1.66	
DH-7503	26.2	26.7	0.5	Coal	C1	0.5	
DH-7503	58.1	58.5	0.4	Coal	D2	0.4	
DH-7503	60.1	61.6	1.5	Coal	D3	1.5	
DH-7503	77.6	79.24	1.64	Coal	F1	1.64	
DH-7503	80.01	81.5	1.49	Coal	F2	1.49	
DH-7503	138.1	138.6	0.5	Coal	K1	0.50	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
DH-7503	142.5	142.8	0.3	Coal	K2	0.30	
DH-7503	145.1	145.7	0.6	Coal	L1	0.60	
DH-7503	163.4	164	0.6	Coal	L2	0.60	
DH-7503	168.1	170.1	2	Coal	L3	2.00	
DH-7507	173.9	174.2	0.3	Coal	L4	0.21	Drift not known
DH-7507	176.8	177.1	0.3	Coal	Coal	0.21	Unidentified Seam
DH-7507	182.3	183.5	1.2	Coal	N1	0.84	
MCW11-01	0	3.05	3.05	OB		3.05	Drift
MCW11-01	20.15	21.85	1.7	Coal	D2	1.62	
MCW11-01	24.8	25.27	0.47	Coal	D3	0.45	
MCW11-01	25.6	26.15	0.55	Coal	D3	0.52	
MCW11-01	27.2	27.28	0.08	Coal	D3	0.08	
MCW11-01	33.6	34.1	0.5	Coal	F1	0.48	
MCW11-01	35	36	1	Coal	F2	0.95	
MCW11-01	36.32	36.8	0.48	Coal	F2	0.46	
MCW11-01	51.8	52.25	0.45	Coal	H1	0.43	
MCW11-01	76.95	77.25	0.3	Coal	Coal	0.29	Unidentified Seam
MCW11-01	86	86.8	0.8	Coal	I1	0.76	
MCW11-01	100.6	100.95	0.35	Coal	J1	0.33	
MCW11-01	153.3	153.6	0.3	Coal	K2	0.29	
MCW11-01	188.55	188.8	0.25	Coal	M	0.24	
MCW11-01	220.5	221.2	0.7	Coal	N1	0.67	
MCW11-02	0	3.05	3.05	OB		3.05	
MCW11-02	12.3	12.8	0.5	Coal	Coal	0.46	Unidentified Seam
MCW11-02	17.3	18.5	1.2	Coal	D2	1.1	
MCW11-02	23.95	24.25	0.3	Coal	D3	0.27	
MCW11-02	25.9	26.18	0.28	Coal	D3	0.26	
MCW11-02	28.45	29.35	0.9	Coal	F1	0.82	
MCW11-02	29.83	30.52	0.69	Coal	F2	0.63	
MCW11-02	43	43.62	0.62	Coal	H1	0.57	
MCW11-02	57.31	57.48	0.17	Coal	Coal	0.16	Unidentified Seam
MCW11-02	70.63	71.2	0.57	Coal	I1	0.52	
MCW11-02	76.73	77.05	0.32	Coal	J1	0.29	
MCW11-02	122.32	122.59	0.27	Coal	K1	0.25	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-02	123.63	124.07	0.44	Coal	K2	0.4	
MCW11-02	188.44	188.88	0.44	Coal	N1	0.4	
MCW11-02	209.65	209.9	0.25	Coal	P2	0.23	
MCW11-02	211	211.84	0.84	Coal	P3	0.77	
MCW11-02	245.25	245.75	0.5	Coal	Q	0.46	
MCW11-03	0	7.62	7.62	OB		7.32	Drift
MCW11-03	32.49	32.76	0.27	Coal	K1	0.26	
MCW11-03	33.95	34.62	0.67	Coal	K1	0.64	
MCW11-03	35.31	35.96	0.65	Coal	K2	0.62	
MCW11-03	50.1	50.24	0.14	Coal	L1	0.13	
MCW11-03	54.4	54.62	0.22	Coal	L2	0.21	
MCW11-03	71.8	72	0.2	Coal	M	0.19	
MCW11-04	0	3.05	3.05	OB		3.05	Drift
MCW11-04	6.6	7.42	0.82	Coal	I1	0.81	
MCW11-04	13.35	13.74	0.39	Coal	J1	0.39	
MCW11-04	45.91	46.29	0.38	Coal	Coal	0.38	Unidentified Seam
MCW11-04	46.85	47.37	0.52	Coal	Coal	0.52	Unidentified Seam
MCW11-04	47.85	48.21	0.36	Coal	Coal	0.36	Unidentified Seam
MCW11-04	48.38	48.78	0.4	Coal	Coal	0.4	Unidentified Seam
MCW11-04	75.79	76.22	0.43	Coal	K1	0.43	
MCW11-04	77.3	77.91	0.61	Coal	K2	0.61	
MCW11-04	88.16	88.5	0.34	Coal	L1	0.34	
MCW11-04	91.1	91.25	0.15	Coal	L2	0.15	
MCW11-04	94.79	95.25	0.46	Coal	L3	0.46	
MCW11-04	97.27	97.8	0.53	Coal	L4	0.53	
MCW11-04	117.08	117.32	0.24	Coal	M	0.24	
MCW11-04	153.5	154.47	0.97	Coal	N1	0.96	
MCW11-04	163.55	164.24	0.69	Coal	O2	0.68	
MCW11-04	164.74	165.44	0.7	Coal	O3	0.69	
MCW11-04	170.85	171.12	0.27	Coal	Coal	0.27	Unidentified Seam
MCW11-04	190.1	190.98	0.88	Coal	P1	0.87	
MCW11-04	204.01	204.91	0.9	Coal	P1	0.89	
MCW11-04	222.48	222.65	0.17	Coal	Q	0.17	
MCW11-05	0	6.09	6.09	OB		6.09	Drift

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-05	4.07	4.78	0.71	Coal	I1	0.7	
MCW11-05	8.38	8.6	0.22	Coal	I2	0.22	
MCW11-05	35.4	35.8	0.4	Coal	J1	0.4	
MCW11-05	36.29	36.65	0.36	Coal	J2	0.36	
MCW11-05	37.44	37.76	0.32	Coal	J3	0.32	
MCW11-05	57.2	59.05	1.85	Coal	K1	1.83	
MCW11-05	59.68	60.2	0.52	Coal	K2	0.51	
MCW11-05	98.55	98.8	0.25	Coal	M	0.25	
MCW11-06	0	3.05	3.05	OB		2.95	Drift
MCW11-06	2.41	2.88	0.47	Coal	I1	0.45	
MCW11-06	96.6	96.8	0.2	Coal	L1	0.19	
MCW11-06	99.33	99.76	0.43	Coal	L2	0.42	
MCW11-06	100.55	100.77	0.22	Coal	L3	0.21	
MCW11-06	102.92	103.1	0.18	Coal	L4	0.17	
MCW11-06	103.89	104.34	0.45	Coal	Coal	0.43	Unidentified Seam
MCW11-06	118.52	119.19	0.67	Coal	M	0.65	
MCW11-07	0	3.05	3.05	OB		3.05	Drift
MCW11-07	3.05	114.3	111.25	MDST/SLT/SST		63.81	Bullmoose Member only
MCW11-08	0	3.05	3.05	OB		3.05	Drift
MCW11-08	13.08	14.45	1.37	Coal	G2	1.36	G1and G2 combined?
MCW11-08	33.9	34.57	0.67	Coal	H1	0.67	
MCW11-08	47.41	47.53	0.12	Coal	I1	0.12	
MCW11-08	85.15	85.85	0.7	Coal	J1	0.69	
MCW11-08	86.64	87.37	0.73	Coal	J2	0.72	
MCW11-08	88.03	88.44	0.41	Coal	J3	0.41	
MCW11-08	88.91	89.48	0.57	Coal	J4	0.57	
MCW11-08	117.02	117.59	0.57	Coal	K1	0.57	
MCW11-08	118.8	119.32	0.52	Coal	K2	0.52	
MCW11-08	136.38	136.7	0.32	Coal	L1	0.32	
MCW11-08	138.56	139.98	1.42	Coal	L2	1.41	
MCW11-08	143.09	143.44	0.35	Coal	L3	0.35	
MCW11-08	148	148.83	0.83	Coal	L4	0.82	
MCW11-08	169.09	169.42	0.33	Coal	M	0.33	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-08	207.11	207.95	0.84	Coal	N1	0.83	
MCW11-09	0	1.52	1.52	OB		1.52	Drift
MCW11-09	8.67	9.24	0.57	Coal	H1	0.56	
MCW11-09	16.23	16.38	0.15	Coal	I1	0.15	
MCW11-09	45.98	46.6	0.62	Coal	J1	0.61	
MCW11-09	47.44	47.89	0.45	Coal	J2	0.45	
MCW11-09	48.17	48.71	0.54	Coal	J3	0.53	
MCW11-09	48.87	49.24	0.37	Coal	J4	0.37	
MCW11-09	68.7	70.51	1.81	Coal	K1	1.79	
MCW11-09	71.59	72.26	0.67	Coal	K2	0.66	
MCW11-09	86.82	87.12	0.3	Coal	L1	0.3	
MCW11-09	93	93.23	0.23	Coal	L2	0.23	
MCW11-09	94.23	94.72	0.49	Coal	L3	0.49	
MCW11-09	115.52	115.87	0.35	Coal	M	0.35	
MCW11-09	119.83	120.83	1	Coal	L1	0.99	
MCW11-09	132.22	132.4	0.18	Coal	L2	0.18	
MCW11-09	132.86	133.12	0.26	Coal	L3	0.26	
MCW11-09	140.1	140.54	0.44	Coal	L4	0.44	
MCW11-09	164.21	164.4	0.19	Coal	M	0.19	
MCW11-09	192.81	194.05	1.24	Coal	N1	1.23	
MCW11-09	223	224.19	1.19	Coal	N1	1.18	
MCW11-09	230.8	231.1	0.3	Coal	O1	0.3	
MCW11-10	0	3.48	3.48	OB		3.48	Drift
MCW11-10	3.8	4.42	0.62	Coal	D2	0.62	
MCW11-10	5.3	6.53	1.23	Coal	D3	1.23	
MCW11-10	33.13	36.4	3.27	Coal	F1	3.26	
MCW11-10	37.22	37.53	0.31	Coal	F1	0.31	
MCW11-10	38.7	39.39	0.69	Coal	F2	0.69	
MCW11-11	0	4.57	4.57	OB		4.57	Drift
MCW11-11	38.1	38.83	0.73	Coal	D2	0.73	
MCW11-11	39.14	39.8	0.66	Coal	D3	0.66	
MCW11-12	0	6.09	6.09	OB		6.09	Drift
MCW11-12	4.49	4.66	0.17	Coal	Coal	0.12	Unidentified Seam
MCW11-12	18.38	18.6	0.22	Coal	K1	0.16	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-12	19.9	20.2	0.3	Coal	K2	0.21	
MCW11-12	21.53	21.8	0.27	Coal	K3	0.19	
MCW11-12	23.61	23.78	0.17	Coal	L1	0.12	
MCW11-12	24.22	24.48	0.26	Coal	L2	0.18	
MCW11-12	25.6	26	0.4	Coal	L3	0.28	
MCW11-12	34.4	34.55	0.15	Coal	Coal	0.11	Unidentified Seam
MCW11-12	54	54.29	0.29	Coal	M	0.21	
MCW11-12	103.35	103.92	0.57	Coal	M	0.4	
MCW11-13	0	3.05	3.05	OB		3.05	Drift
MCW11-13	20.19	21.05	0.86	Coal	E	0.47	
MCW11-13	27.72	28.18	0.46	Coal	F1	0.25	
MCW11-13	28.6	29.38	0.78	Coal	F1	0.42	
MCW11-13	29.6	32.2	2.6	Coal	F2	1.42	
MCW11-13	36.11	37.91	1.8	Coal	F1	0.98	
MCW11-13	38.71	40.7	1.99	Coal	F2	1.08	
MCW11-13	115.75	117.47	1.72	Coal	I1	0.94	
MCW11-13	138.08	138.8	0.72	Coal	J1	0.39	
MCW11-13	142.73	143.5	0.77	Coal	J2	0.42	
MCW11-13	150.25	150.91	0.66	Coal	K1	0.36	
MCW11-13	152.47	152.81	0.34	Coal	K2	0.19	
MCW11-13	155.15	155.78	0.63	Coal	K3	0.34	
MCW11-13	159.19	159.7	0.51	Coal	L1	0.28	
MCW11-13	163.01	163.66	0.65	Coal	L2	0.35	
MCW11-14	0	6.09	6.09	OB		6.09	Drift
MCW11-14	22	22.6	0.6	Coal	K1	0.58	Note: this borehole was drilled outside the property boundary, a short distance to the west (see Map 2-4)
MCW11-14	22.75	23	0.25	Coal	K2	0.24	
MCW11-14	24.39	25.05	0.66	Coal	K3	0.64	
MCW11-14	25.2	25.35	0.15	Coal	K4	0.15	
MCW11-14	27.73	28.12	0.39	Coal	L1	0.38	
MCW11-14	29.23	29.82	0.59	Coal	L2	0.57	
MCW11-14	47.36	47.62	0.26	Coal	M	0.25	
MCW11-14	90	90.25	0.25	Coal	Coal	0.24	Unidentified Seam
MCW11-14	99.8	100.25	0.45	Coal	N1	0.44	
MCW11-14	100.63	100.8	0.17	Coal	Coal	0.16	Unidentified Seam

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-14	102.85	103.26	0.41	Coal	O1	0.4	
MCW11-14	110.36	110.5	0.14	HCC	O2	0.14	
MCW11-14	115.18	115.52	0.34	Coal	Coal	0.33	Unidentified Seam
MCW11-14	126.11	126.28	0.17	Coal	Coal	0.16	Unidentified Seam
MCW11-14	135.48	136.01	0.53	Coal	P1	0.51	
MCW11-14	159.06	159.55	0.49	Coal	Q	0.48	
MCW11-14	173.9	174.75	0.85	Coal	R	0.82	
MCW11-14	195.7	196.63	0.93	Coal	S	0.9	
MCW11-15	0	15.24	15.24	OB		15.24	Drift
MCW11-15	15.24	134	118.76	MDST/SLT/SST		111.6	Bullmoose Member
MCW11-15	134	168.8	34.8	MDST/SLT/SST		32.45	Bluesky Member
MCW11-15	168.8	171	2.2	Coal	A1	2.07	
MCW11-15	171.3	174.16	2.86	Coal	A2	2.69	
MCW11-15	175.08	177.44	2.36	Coal	A3	2.22	
MCW11-15	208.12	208.3	0.18	Coal	D2	0.17	
MCW11-15	210.89	211.3	0.41	Coal	D3	0.39	
MCW11-15	211.69	211.8	0.11	Coal	D3	0.1	
MCW11-15	222.8	227.74	4.94	Coal	F1	4.64	
MCW11-15	227.74	228.88	1.14	Coal	F2	1.07	
MCW11-15	233.7	234.03	0.33	Coal	G1	0.31	
MCW11-15	234.6	235.1	0.5	Coal	G2	0.47	
MCW11-15	238.88	239.1	0.22	Coal	Coal	0.21	
MCW11-16	0	3.05	3.05	OB		3.05	Drift
MCW11-16	20.71	20.87	0.16	Coal	I1	0.16	
MCW11-16	21.3	21.93	0.63	Coal	I2	0.63	
MCW11-16	26.69	27.2	0.51	Coal	Coal	0.51	
MCW11-16	48.2	48.4	0.2	Coal	J1	0.2	
MCW11-16	49.2	49.67	0.47	Coal	J2	0.47	
MCW11-16	64.1	64.29	0.19	Coal	K1	0.19	
MCW11-16	69.89	70.18	0.29	Coal	K2	0.29	
MCW11-16	74.75	74.97	0.22	Coal	L1	0.22	
MCW11-16	89.85	90	0.15	Coal	M	0.15	
MCW11-16	126.4	126.88	0.48	Coal	N1	0.48	
MCW11-16	136.88	137.35	0.47	Coal	P1	0.47	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-16	139.3	139.8	0.5	Coal	P2	0.5	
MCW11-16	149.9	150.1	0.2	Coal	Coal	0.2	Unidentified Seam
MCW11-16	164.97	165.71	0.74	Coal	Q	0.74	
MCW11-16	182.58	183	0.42	Coal	R	0.42	
MCW11-16	201.3	201.74	0.44	Coal	S	0.44	
MCW11-17	0	6.09	6.09	OB		6.09	Drift
MCW11-17	19.55	19.8	0.25	Coal	I1	0.25	
MCW11-17	21.01	22.17	1.16	Coal	I2	1.15	
MCW11-17	44.4	44.75	0.35	Coal	J1	0.35	
MCW11-17	45.8	45.92	0.12	Coal	J2	0.12	
MCW11-17	58.84	59.18	0.34	Coal	K1	0.34	
MCW11-17	60.6	60.7	0.1	Coal	K2	0.1	
MCW11-17	63.6	63.8	0.2	Coal	K3	0.2	
MCW11-17	65	65.35	0.35	Coal	K4	0.35	
MCW11-17	84.19	84.4	0.21	Coal	M	0.21	
MCW11-17	116.7	117.4	0.7	Coal	N1	0.7	
MCW11-17	128.3	129.17	0.87	Coal	P1	0.87	
MCW11-17	131.05	131.61	0.56	Coal	P2	0.56	
MCW11-17	138.05	138.2	0.15	Coal	P3	0.15	
MCW11-17	157.59	158.55	0.96	Coal	Q	0.95	
MCW11-17	179.2	179.82	0.62	Coal	R	0.62	
MCW11-17	202.08	202.39	0.31	Coal	S	0.31	
MCW11-18	0	3.05	3.05	OB		3.05	Drift
MCW11-18	24.4	25.12	0.72	Coal	I1	0.71	
MCW11-18	25.77	27.67	1.9	Coal	I2	1.88	
MCW11-18	47.27	47.68	0.41	Coal	J1	0.41	
MCW11-18	48.35	48.82	0.47	Coal	J2	0.47	
MCW11-18	49.59	50.03	0.44	Coal	J3	0.44	
MCW11-18	64.49	65.24	0.75	Coal	K1	0.74	
MCW11-18	66.98	67.12	0.14	Coal	K2	0.14	
MCW11-18	70.41	70.72	0.31	Coal	L1	0.31	
MCW11-18	71.9	72.5	0.6	Coal	L2	0.59	
MCW11-18	101.95	102.22	0.27	Coal	M	0.27	
MCW11-18	139.35	140.49	1.14	Coal	N1	1.13	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-18	151.99	152.19	0.2	Coal	P1	0.2	
MCW11-18	153.29	153.66	0.37	Coal	P2	0.37	
MCW11-18	157.25	157.38	0.13	Coal	P3	0.13	
MCW11-18	160.23	160.42	0.19	Coal	Coal	0.19	Unidentified Seam
MCW11-18	180.2	180.96	0.76	Coal	Q	0.75	
MCW11-18	187.7	188.02	0.32	Coal	Coal	0.32	Unidentified Seam
MCW11-18	188.7	189.28	0.58	Coal	R	0.57	
MCW11-18	196.3	197.21	0.91	Coal	Q	0.9	
MCW11-18	215	215.24	0.24	Coal	R	0.24	
MCW11-19	0	3.05	3.05	OB		3.05	
MCW11-19	9.15	9.5	0.35	Coal	A1	0.22	
MCW11-19	10.35	11.1	0.75	Coal	A2	0.46	
MCW11-19	11.55	12.4	0.85	Coal	A3	0.52	
MCW11-19	14.02	14.15	0.13	Coal	Coal	0.08	Unidentified Seam
MCW11-19	27.8	27.84	0.04	Coal	A1	0.02	
MCW11-19	28	29.5	1.5	Coal	A2	0.92	
MCW11-19	29.5	30.5	1	Coal	A3	0.62	
MCW11-19	65.16	66.65	1.49	Coal	B	0.92	
MCW11-19	81.13	81.33	0.2	Coal	C1	0.12	
MCW11-19	98.18	100.21	2.03	Coal	D1	1.62	
MCW11-19	116.3	123.8	7.5	Coal	F1	5.99	
MCW11-19	124.1	125.23	1.13	Coal	F2	0.9	
MCW11-19	143.29	143.5	0.21	Coal	H1	0.17	
MCW11-19	171.09	171.32	0.23	Coal	Coal	0.18	Unidentified Seam
MCW11-20	0	3.05	3.05	OB		3.05	Drift
MCW11-20	4.09	4.4	0.31	Coal	H1	0.29	
MCW11-20	5.75	6.71	0.96	Coal	H2	0.89	
MCW11-20	15.32	16.44	1.12	Coal	I1	1.04	
MCW11-20	30.89	31.45	0.56	Coal	J1	0.52	
MCW11-20	36.17	36.51	0.34	Coal	J2	0.32	
MCW11-20	146.3	147.2	0.9	Coal	A1	0.83	
MCW11-20	151.3	152.05	0.75	Coal	A3	0.7	
MCW11-20	173.36	174.13	0.77	Coal	C1	0.71	
MCW11-20	178.93	179.25	0.32	Coal	C2	0.3	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-20	194.55	197.33	2.78	Coal	D1	2.58	
MCW11-20	199.42	199.88	0.46	Coal	D2	0.43	
MCW11-20	202.94	203.7	0.76	Coal	D3	0.7	
MCW11-20	204.59	204.79	0.2	Coal	D3	0.19	
MCW11-20	211.39	216.26	4.87	Coal	F1	4.52	
MCW11-20	217.94	219.11	1.17	Coal	F2	1.08	
MCW11-21	0	3.05	3.05	OB		3.05	Drift
MCW11-21	3.34	3.53	0.19	Coal	H1	0.15	
MCW11-21	6.41	7.39	0.98	Coal	H2	0.75	
MCW11-21	17.79	18.93	1.14	Coal	I1	0.87	
MCW11-21	57.69	58.13	0.44	Coal	Coal	0.34	Unidentified Seam
MCW11-21	94.82	95.04	0.22	Coal	Coal	0.17	Unidentified Seam
MCW11-21	104.59	105.9	1.31	Coal	H1 or G	1	
MCW11-21	106.56	107.31	0.75	Coal	H2 or G	0.57	
MCW11-21	158.49	159.78	1.29	Coal	I1	0.99	
MCW11-21	167.4	167.56	0.16	Coal	Coal	0.12	
MCW11-21	170.55	172.06	1.51	Coal	J1	1.16	
MCW11-21	178.11	178.59	0.48	Coal	J2	0.37	
MCW11-22	0	30.48	30.48	OB		30.48	Drift
MCW11-22	30.48	67.5	36.52	MDST/SLT/SST		36.52	Bullmoose Member
MCW11-22	67.5	85.2	17.7	MDST/SLT/SST		13.56	Bluesky Member
MCW11-22	85.35	87.5	2.15	Coal	A1	2.12	
MCW11-22	87.82	90.7	2.88	Coal	A2	2.84	
MCW11-22	91.44	91.81	0.37	Coal	A3	0.36	
MCW11-22	94.95	95.12	0.17	Coal	Coal	0.17	Unidentified Seam
MCW11-22	159.72	160.55	0.83	Coal	D1	0.78	
MCW11-22	162.45	162.7	0.25	Coal	D2	0.23	
MCW11-22	165.79	166.76	0.97	Coal	D3	0.91	
MCW11-22	183.88	188.1	4.22	Coal	F1	3.97	
MCW11-22	188.3	189.2	0.9	Coal	F2	0.85	
MCW11-22	195.69	196.06	0.37	Coal	G1	0.35	
MCW11-22	197.77	198.23	0.46	Coal	G2	0.43	
MCW11-22	218.3	218.86	0.56	Coal	H1	0.53	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW11-22	228.41	229.99	1.58	Coal	I1	1.48	
MCW11-22	237.83	238.2	0.37	Coal	Coal	0.35	Unidentified Seam
MCW11-23	0	21.33	21.33	OB		21.33	Drift
MCW11-23	57.52	57.75	0.23	Coal	C2	0.22	
MCW11-23	81.62	82.45	0.83	Coal	D2	0.8	
MCW11-23	83	83.4	0.4	Coal	D2	0.39	
MCW11-23	84.2	86	1.8	Coal	D3	1.74	
MCW11-23	96.25	102.8	6.55	Coal	F1	6.33	
MCW11-23	102.8	104.37	1.57	Coal	F2	1.52	
MCW11-23	114.29	114.8	0.51	Coal	G1	0.49	
MCW11-23	117.85	118.32	0.47	Coal	G2	0.45	
MCW11-23	163.9	164.32	0.42	Coal	I1	0.41	
MCW11-23	164.6	165.16	0.56	Coal	I2	0.54	
MCW11-23	171.14	171.56	0.42	Coal	J1	0.41	
MCW11-23	182.4	182.6	0.2	Coal	Coal	0.19	Unidentified Seam
MCW11-23	219.89	220.1	0.21	Coal	Coal	0.2	Unidentified Seam
MCW11-23	249.7	250	0.3	Coal	N1	0.29	
MCW11-23	250.7	250.86	0.16	Coal	Coal	0.15	Unidentified Seam
MCW11-23	253.45	253.6	0.15	Coal	Coal	0.14	Unidentified Seam
MCW11-23	254	255.15	1.15	Coal	N2	1.11	
MCW11-24	0	6.06	6.06	OB		6.06	Drift
MCW11-24	2.5	3.34	0.84	Coal	C1	0.78	
MCW11-24	9.87	10.5	0.63	Coal	C2	0.58	
MCW11-24	14.8	15.45	0.65	Coal	D1	0.6	
MCW11-24	21.23	21.6	0.37	Coal	D3	0.34	
MCW11-24	39.55	41.55	2	Coal	F1	1.85	
MCW11-24	42.44	42.9	0.46	Coal	F2	0.43	
MCW11-24	103.61	103.9	0.29	Coal	Coal	0.27	
MCW11-24	174.7	175.29	0.59	Coal	N1	0.55	
MCW11-24	177.01	177.18	0.17	Coal	N2	0.16	
MCW11-24	184.09	184.22	0.13	Coal	O1	0.12	
MCW11-24	186.12	187.81	1.69	Coal	O2	1.57	
MCW11-24	188.69	188.82	0.13	Coal	O3	0.12	
MCW12-01	0	49	49	OB		49	abandoned in Drift

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW12-02	0	6.09	6.09	OB		6.09	Drift
MCW12-02	77	77.25	0.25	Coal	Coal	0.22	Unidentified Seam
MCW12-03	0	3.96	3.96	OB		3.96	Drift
MCW12-03	4.65	5.8	1.15	Coal	A1	1.08	
MCW12-03	7	7.75	0.75	Coal	A2	0.7	
MCW12-03	8.25	10.15	1.9	Coal	A3	1.79	
MCW12-03	47.4	48.9	1.5	Coal	D2	1.41	
MCW12-03	50.85	51.45	0.6	Coal	D3	0.56	
MCW12-03	65.4	68.25	2.85	Coal	F1	2.68	
MCW12-03	68.35	70.2	1.85	Coal	F2	1.74	
MCW12-03	84.9	85	0.1	Coal	Coal	0.09	Unidentified Seam
MCW12-03	110.35	110.8	0.45	Coal	I1	0.42	
MCW12-03	111.35	111.7	0.35	Coal	I2	0.33	
MCW12-03	119	119.15	0.15	Coal	Coal	0.14	Unidentified Seam
MCW12-03	137.4	137.55	0.15	Coal	J1	0.14	
MCW12-03	154.6	154.82	0.22	Coal	Coal	0.21	Unidentified Seam
MCW12-03	156.5	156.6	0.1	Coal	Coal	0.09	Unidentified Seam
MCW12-03	169.6	170.12	0.52	Coal	K1	0.49	
MCW12-03	170.35	171.35	1	Coal	K2	0.94	
MCW12-03	171.6	172.4	0.8	Coal	K3	0.75	
MCW12-03	186.4	187.75	1.35	Coal	L1	1.27	
MCW12-03C	0	4.57	4.57	OB		4.29	Drift
MCW12-03C	5.2	6.1	0.9	Coal	A1	0.85	
MCW12-03C	7.65	8.4	0.75	Coal	A2	0.7	
MCW12-03C	8.6	10.6	2	Coal	A3	1.88	
MCW12-03C	48	49.3	1.3	Coal	D2	1.22	
MCW12-03C	51.3	52	0.7	Coal	D3	0.66	
MCW12-03C	65.9	68.95	3.05	Coal	F1	2.87	
MCW12-03C	69.05	70.4	1.35	Coal	F2	1.27	
MCW12-04	0	12.19	12.19	OB		11.05	Drift
MCW12-04	148.4	149.15	0.75	Coal	Coal	0.26	Unidentified Seam
MCW12-04	161.5	162.5	1	Coal	Coal	0.34	Unidentified Seam
MCW12-05	0	16.76	16.76	OB	OB	15.75	Drift
MCW12-05	48.8	49.35	0.55	Coal	D2	0.52	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW12-05	50.75	51.25	0.5	Coal	D3	0.47	
MCW12-05	51.55	52.35	0.8	Coal	D3	0.75	
MCW12-05	69	73.8	4.8	Coal	F1	4.51	
MCW12-05	73.8	75.95	2.15	Coal	F2	2.02	
MCW12-05	126.1	126.4	0.3	Coal	I1	0.28	
MCW12-05	126.9	127.3	0.4	Coal	I2	0.38	
MCW12-05	133.5	133.7	0.2	Coal	J1	0.19	
MCW12-06	0	16.76	16.76	OB		15.75	Drift
MCW12-06	16.76	37	20.24	MDST/SLT/SST		19.02	Bullmoose Member
MCW12-06	37	53.95	16.5	MDST/SLT/SST		15.96	Bluesky Member
MCW12-06	53.95	55.3	1.35	Coal	A1	1.27	
MCW12-06	56.6	58.45	1.85	Coal	A2	1.74	
MCW12-06	59.2	59.5	0.3	Coal	A3	0.28	
MCW12-06	104.5	104.52	0.02	Coal	D1	0.02	
MCW12-06	107.25	107.4	0.15	Coal	D2	0.14	
MCW12-06	109.5	110.4	0.9	Coal	D3	0.85	
MCW12-06	123.45	127.6	4.15	Coal	F1	3.9	
MCW12-06	128	128.7	0.7	Coal	F2	0.66	
MCW12-06	134.35	134.55	0.2	Coal	G1	0.19	
MCW12-06	136.18	136.38	0.2	Coal	G2	0.19	
MCW12-07	0	33.52	33.52	OB		33.52	Drift
MCW12-07	33.52	47	13.48	MDST/SLT/SST		13.19	Bullmoose Member
MCW12-07	47	67.2	20.2	MDST/SLT/SST		19.76	Bluesky Member
MCW12-07	67.2	69	1.8	Coal	A1	1.76	
MCW12-07	69.4	70.8	1.4	Coal	A2	1.37	
MCW12-07	70.8	71.8	1	Coal	A3	0.98	
MCW12-07	103.7	103.85	0.15	Coal	D2	0.15	
MCW12-07	107.8	108.7	0.9	Coal	D3	0.88	
MCW12-07	128	132	4	Coal	F1	3.91	
MCW12-07	132.3	133.3	1	Coal	F2	0.98	
MCW12-07	143	143.3	0.3	Coal	G2	0.29	
MCW13-01C	0	4.18	4.18	OB		4.18	Drift
MCW13-01C	4.18	129.8	125.62	MDST/SLT/SST		122.43	Bullmoose Member
MCW13-01C	129.8	150.2	20.4	MDST/SLT/SST		19.51	Bluesky Member

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW13-01C	150.2	152.15	1.95	Coal	A1	1.88	
MCW13-01C	156.05	158.2	2.15	Coal	A2	2.08	
MCW13-01C	158.25	160.18	1.93	Coal	A3	1.86	
MCW13-01C	190.78	190.98	0.2	Coal	D2	0.19	
MCW13-01C	195.05	195.85	0.8	Coal	D3	0.77	
MCW13-01C	213.7	217.4	3.7	Coal	F1	3.57	
MCW13-01C	217.45	218.43	0.98	Coal	F2	0.95	
MCW13-01C	227.45	228.08	0.63	Coal	G1	0.61	
MCW13-01C	228.25	228.4	0.15	Coal	G2	0.14	
MCW13-01C	237.6	237.92	0.32	Coal	H1	0.31	
MCW13-02C	0	23.6	23.6	OB		23.6	Drift
MCW13-02C	23.6	44.5	19.7	MDST/SLT/SST		16.14	Bullmoose Member
MCW13-02C	44.5	68.35	23.5	MDST/SLT/SST		20.35	Bluesky Member
MCW13-02C	68.35	69.33	0.98	Coal	A1	0.8	
MCW13-02C	70.55	71.05	0.5	Coal	A2	0.41	
MCW13-02C	71.95	72.23	0.28	Coal	A3	0.23	
MCW13-02C	139	140	1	Coal	D2	0.82	
MCW13-02C	140.85	141.85	1	Coal	D3	0.82	
MCW13-02C	152.65	157.87	5.22	Coal	F1	4.28	
MCW13-02C	159.95	162.6	2.65	Coal	F2	2.17	
MCW13-02C	223.32	223.92	0.6	Coal	I1	0.49	
MCW13-03	0	4.57	4.57	OB		4.57	Drift
MCW13-04	0	9	9	OB		9	Drift
MCW13-04	49.8	50	0.2	Coal	F1	0.19	
MCW13-04	51.8	54.75	2.95	Coal	F2	2.74	
MCW13-04	86.1	86.3	0.2	Coal	COAL	0.19	Unidentified Seam
MCW13-04	115.6	116.77	1.17	Coal	I1	1.08	
MCW13-04	143.45	144.1	0.65	Coal	J2	0.6	
MCW13-04	173.4	173.78	0.38	Coal	K1	0.35	
MCW13-04	182.2	182.95	0.75	Coal	L2	0.7	
MCW13-04	197.56	199.4	1.84	Coal	M	1.71	
MCW13-04	201.8	202	0.2	Coal	COAL	0.19	Unidentified Seam
MCW13-04	202.78	202.95	0.17	Coal	COAL	0.16	Unidentified Seam
MCW13-04	218.8	219.65	0.85	Coal	COAL	0.79	Unidentified Seam

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW13-04	232.76	233.15	0.39	Coal	N1	0.36	
MCW13-04	235.1	236.05	0.95	Coal	N2	0.88	
MCW13-04	237.8	238.5	0.7	Coal	COAL	0.65	Unidentified Seam
MCW13-05C	0	6.5	6.5	OB		6.5	Drift
MCW13-05C	6.5	118.77	112.27	MDST/SLT/SST		110.56	Bullmoose Member
MCW13-05C	118.77	140.55	21.73	MDST/SLT/SST		22.11	Bluesky Member
MCW13-05C	140.55	142.8	2.25	Coal	A1	2.22	
MCW13-05C	142.85	146.05	3.2	Coal	A2	3.15	
MCW13-05C	146.25	148.6	2.35	Coal	A3	2.31	
MCW13-05C	177.4	177.85	0.45	Coal	D2	0.44	
MCW13-05C	180.7	181.85	1.15	Coal	D3	1.13	
MCW13-05C	195.4	200.15	4.75	Coal	F1	4.68	
MCW13-05C	200.3	201.6	1.3	Coal	F2	1.28	
MCW13-06	0	6.5	6.5	OB		4.6	Drift
MCW13-06	11.22	11.47	0.25	Coal	A1	0.18	
MCW13-06	13.3	13.6	0.3	Coal	A2	0.21	
MCW13-06	14.7	15.3	0.6	Coal	A3	0.42	
MCW13-06	39.4	40	0.6	Coal	COAL	0.42	Unidentified Seam
MCW13-06	45.2	46.3	1.1	Coal	B	0.78	
MCW13-06	59.12	59.3	0.18	Coal	C1	0.13	
MCW13-06	63.4	63.65	0.25	Coal	C2	0.18	
MCW13-06	70.22	70.8	0.58	Coal	D1	0.41	
MCW13-06	72	72.2	0.2	Coal	D2	0.14	
MCW13-06	76.8	77	0.2	Coal	D3	0.14	
MCW13-06	90.5	92.5	2	Coal	F1	1.41	
MCW13-06	92.7	93.45	0.75	Coal	F2	0.53	
MCW13-06	186	186.25	0.25	Coal	K1	0.18	
MCW13-06	225.8	226.6	0.8	Coal	COAL	0.57	Unidentified Seam
MCW13-07	0	9.14	9.14	OB		9.14	Drift
MCW13-07	24	24.4	0.4	Coal	COAL	0.31	Unidentified Seam
MCW13-07	31.9	32.3	0.4	Coal	K1	0.31	
MCW13-07	38.25	39.05	0.8	Coal	K2	0.61	
MCW13-07	39.55	39.75	0.2	Coal	K3	0.15	
MCW13-07	47.2	47.4	0.2	Coal	L1	0.15	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW13-07	50.4	51	0.6	Coal	L2	0.46	
MCW13-07	51.8	52.5	0.7	Coal	L3	0.54	
MCW13-07	62.1	62.3	0.2	C.Sh	M	0.15	
MCW13-07	116.05	116.35	0.3	Coal	N1	0.23	
MCW13-07	119.2	119.7	0.5	Coal	N2	0.38	
MCW13-07	121	121.2	0.2	Coal	COAL	0.15	Unidentified Seam
MCW13-08	0	24.38	24.38	OB		21.11	Drift
MCW13-08	55.4	55.85	0.45	Coal	I1	0.39	
MCW13-08	56.2	56.75	0.55	Coal	I2	0.48	
MCW13-08	57.85	58.05	0.2	Coal	Coal	0.17	Unidentified Seam
MCW13-08	63.2	63.65	0.45	Coal	J1	0.39	
MCW13-08	71.6	71.7	0.1	Coal	J2	0.09	
MCW13-08	100.62	101.1	0.48	Coal	K1	0.42	
MCW13-08	104	104.2	0.2	Coal	K2	0.17	
MCW13-08	104.65	106.2	1.55	Coal	K3	0.56	
MCW13-08	109.5	110	0.5	Coal	L1	0.43	
MCW13-08	110.3	111	0.7	Coal	L2	0.61	
MCW13-08	126.9	127	0.1	Coal	COAL	0.09	Unidentified Seam
MCW13-09	0	15.24	15.24	OB		15.24	Drift
MCW13-09	47	48.1	1.1	Coal	D2	0.95	
MCW13-09	49.2	50.08	0.88	Coal	D3	0.76	
MCW13-09	63.6	67	3.4	Coal	F1	2.94	
MCW13-09	67.05	68	0.95	Coal	F2	0.82	
MCW13-09	83.5	83.7	0.2	Coal	COAL	0.17	Unidentified Seam
MCW13-09	111.3	111.9	0.6	Coal	I1	0.52	
MCW13-09	112.2	112.7	0.5	Coal	I2	0.43	
MCW13-09	113.2	113.3	0.1	Coal	Coal	0.09	Unidentified Seam
MCW13-09	113.4	113.55	0.15	Coal	Coal	0.13	Unidentified Seam
MCW13-09	117.4	118	0.6	Coal	J1	0.52	
MCW13-09	122.9	123.1	0.2	Coal	J2	0.17	
MCW13-09	152.5	152.9	0.4	Coal	K1	0.35	
MCW13-09	153.45	153.75	0.3	Coal	K2	0.26	
MCW13-09	155.9	156.35	0.45	Coal	K3	0.39	
MCW13-09	156.62	158.18	1.56	Coal	K4	0.59	

Table 5-1: Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in Mink West boreholes (concluded)

Borehole	From	To	Thick-ness	Lithology	Seam	True thickness	Remarks
MCW13-09	162.9	164.3	1.4	Coal	L1	1.21	
MCW13-09	177.7	177.9	0.2	Coal	COAL	0.17	Unidentified Seam
MCW13-09	192	192.05	0.05	Coal	COAL	0.05	Unidentified Seam
MCW13-09	208	208.16	0.16	Coal	COAL	0.15	Unidentified Seam
MCW13-10	19.75	19.76	0.01	Coal	D1	0.01	
MCW13-10	21.4	23	1.6	Coal	D2	1.52	
MCW13-10	25.85	27.15	1.3	Coal	D3	1.24	
MCW13-10	34.7	35.2	0.5	Coal	F1	0.48	
MCW13-10	35.6	35.75	0.15	Coal	F2	0.14	
MCW13-10	36.15	37.02	0.87	Coal	F2	0.83	
MCW13-10	37.42	37.87	0.45	Coal	F2	0.43	

Note: Thicknesses and depths in metres. MDST= Mudstone SLT= siltstone SST= Sandstone

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East.

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-01	0	3.048	3.048	OB		3.048	Drift
MCE12-01	10.2	10.7	0.5	Coal	D	0.50	TD=214.37m, Hole Angle= 60, Az=40, Dipmeter from 26m.
MCE12-01	13.3	13.6	0.3	Coal	D	0.30	
MCE12-01	16.3	17	0.7	Coal	D	0.70	
MCE12-01	28.4	28.6	0.2	C.Sh	E	0.20	Coaly carb shale
MCE12-01	34.9	36.8	1.9	Coal	E	1.90	
MCE12-01	38.1	38.4	0.3	Coal	E	0.30	
MCE12-01	38.9	39.3	0.4	Coal	Coal	0.40	
MCE12-01	62.6	62.8	0.2	Coal	Coal	0.20	
MCE12-01	87.7	88	0.3	Coal	Coal	0.30	
MCE12-01	89.8	90.1	0.3	Coal	Coal	0.30	
MCE12-01	98.8	99.1	0.3	Coal	Coal	0.30	
MCE12-01	115.1	116.5	1.4	Coal	X	1.40	
MCE12-01	116.5	116.9	0.4	Pt	X	0.40	

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-01	116.9	117.1	0.2	Coal	X	0.20	
MCE12-01	138.6	138.7	0.1	Coal	Coal	0.10	
MCE12-01	174.1	174.3	0.2	Coal	X1	0.20	
MCE12-01	174.6	175.1	0.5	Coal	X1	0.50	
MCE12-01	176	176.2	0.2	Coal	X1	0.20	
MCE12-01	179.4	179.6	0.2	Coal	Coal	0.20	
MCE12-01	191.3	191.75	0.45	Coal	Coal	0.45	
MCE12-01	196.15	196.62	0.47	Coal	Coal	0.47	
MCE12-02	0	9.14	9.14	**OB**		9.14	Drift
MCE12-02	33.4	35.2	1.8	Coal	Coal	1.15	TD=251.46m, Az=40 Dip=-60
MCE12-02	56.1	57	0.9	Coal	Coal	0.58	
MCE12-02	57.8	58.8	1	Coal	Coal	0.64	
MCE12-02	80.2	80.6	0.4	Coal	Coal	0.23	
MCE12-02	86.8	87	0.2	Coal	Coal	0.11	
MCE12-02	88.4	92	3.6	Coal	C	2.74	
MCE12-02	92.1	92.3	0.2	Coal	C	0.15	
MCE12-02	92.3	92.4	0.1	Pt	C	0.08	Coaly carb shale
MCE12-02	92.4	94	1.6	Coal	C	1.22	
MCE12-02	94.8	95.6	0.8	Coal	C	0.76	
MCE12-02	106.6	106.9	0.3	Coal	D	0.29	
MCE12-02	107.3	107.4	0.1	Coal	D	0.10	
MCE12-02	129	129.2	0.2	Coal	Coal	0.20	
MCE12-02	147.5	147.7	0.2	Coal	Coal	0.20	
MCE12-02	154.7	155.1	0.4	Coal	Coal	0.40	
MCE12-02	159.1	159.4	0.3	Coal	Coal	0.29	
MCE12-02	164.5	164.7	0.2	Coal	Coal	0.20	
MCE12-02	177.7	179.7	2	Coal	X	2.00	
MCE12-02	204.6	204.8	0.2	Coal	Coal	0.20	
MCE12-02	240.4	240.7	0.3	Coal	X1	0.30	
MCE12-02	241.5	241.7	0.2	Coal	X1	0.20	
MCE12-03	0	3.04	3.04	**OB**		3.04	Drift
MCE12-03	13.2	13.8	0.6	Coal	D	0.52	
MCE12-03	16.6	16.9	0.3	Coal	D	0.26	TD=153.92.46m, Dip=-90

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-03	18.9	19.1	0.2	Coal	D	0.17	
MCE12-03	20.4	20.9	0.5	Coal	D	0.43	
MCE12-03	39.6	41.7	2.1	Coal	E	1.81	
MCE12-03	42.1	42.2	0.1	Coal	E	0.09	
MCE12-03	43.3	43.7	0.4	Coal	E	0.34	
MCE12-03	44	44.3	0.3	Coal	E	0.26	
MCE12-03	52.1	52.4	0.3	Coal	Coal	0.26	
MCE12-03	68.4	68.7	0.3	Coal	Coal	0.26	
MCE12-03	85.2	85.4	0.2	C.Sh	Coal	0.17	
MCE12-03	94.2	94.4	0.2	Coal	Coal	0.17	
MCE12-03	96.5	97	0.5	Coal	Coal	0.43	
MCE12-03	104.6	104.9	0.3	Coal	Coal	0.26	
MCE12-03	119.8	120.9	1.1	Coal	X	0.95	
MCE12-03	120.9	121.6	0.7	Coal	X	0.60	
MCE12-03	121.6	121.8	0.2	Coal	X	0.17	
MCE12-04	0	3.04	3.04	**OB**			Drift
MCE12-04	24.5	30.4	5.9	Coal	A	2.49	TD=169.16m, Az=40 Dip=-60
MCE12-04	54.8	57.5	2.7	Coal	B	0.70	
MCE12-04	79.7	83.1	3.4	Coal	C	1.16	
MCE12-04	143.1	144.7	1.6	Coal	E	0.92	
MCE12-04	159.1	160.1	1	Coal	Coal	0.64	
MCE12-04	163.5	164	0.5	Coal	Coal	0.29	
MCE12-04C	0	3.04	3.04	**OB**	Coal		Drift
MCE12-04C	21	26.2	5.2	Coal	A	2.20	TD=71.63m, Az=40 Dip=-60, No dipmeter, A-seam repeated twice.
MCE12-04C	45.6	51.2	5.6	Coal	A	2.35	
MCE12-04C	65.4	70.5	5.1	Coal	A	1.33	
MCE12-05	0	6.09	6.09	**OB**			Drift
MCE12-05	7.2	7.8	0.6	Coal	Coal	0.54	TD=233.17m, Az= 220 Dip=-60, dipmeter starts at 35m.
MCE12-05	9.4	9.6	0.2	C.sh	Coal	0.18	
MCE12-05	10.9	11.3	0.4	Coal	Coal	0.36	
MCE12-05	16.9	17.1	0.2	Coal	Coal	0.18	
MCE12-05	36.4	37.2	0.8	Coal	X	0.72	

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-05	37.2	37.6	0.4	Coal	X	0.36	High ash Coal
MCE12-05	37.6	37.8	0.2	Coal	X	0.18	
MCE12-05	38.4	39.1	0.7	Coal	X	0.65	
MCE12-05	67.8	67.95	0.15	C.Sh	Coal	0.14	Coaly carb shale
MCE12-05	104.3	104.6	0.3	Coal	Coal	0.28	
MCE12-05	106.3	107.3	1	Coal	X1	0.93	
MCE12-05	107.9	108.1	0.2	Coal	X1	0.19	
MCE12-05	111.2	111.4	0.2	Coal	Coal	0.19	
MCE12-05	118.8	119.3	0.5	Coal	Coal	0.46	
MCE12-05	205.2	205.6	0.4	Coal	Coal	0.25	
MCE12-05	216.2	216.6	0.4	Coal	Coal	0.25	
MCE12-06	0	6.09	6.09	OB			Drift
MCE12-06	23	23.2	0.2	C.Sh	Coal	0.13	TD=214.88m, Dip=-90
MCE12-06	26.5	30.6	4.1	Coal	A	1.72	
MCE12-06	57.2	59.5	2.3	Coal	B	0.85	
MCE12-06	60.5	62.7	2.2	Coal	B	0.37	
MCE12-06	75.5	75.8	0.3	Coal	Coal	0.05	
MCE12-06	82.7	83.1	0.4	Coal	C	0.07	
MCE12-06	83.1	83.3	0.2	Coal	C	0.03	High ash Coal
MCE12-06	83.3	86.8	3.5	Coal	C	1.19	
MCE12-06	86.9	89.8	2.9	Coal	C	0.99	
MCE12-06	89.8	90.1	0.3	Pt	C	0.10	
MCE12-06	90.1	93.6	3.5	Coal	C	1.19	
MCE12-06	104.5	104.7	0.2	Coal	Coal	0.08	
MCE12-06	115.7	115.9	0.2	Coal	Coal	0.07	
MCE12-06	125.4	125.7	0.3	Coal	Coal	0.10	
MCE12-06	136.6	136.8	0.2	Coal	Coal	0.08	
MCE12-06	146.8	147.15	0.35	Coal	Coal	0.09	
MCE12-06	151	151.5	0.5	Coal	Coal	0.17	
MCE12-06	155.7	156.5	0.8	Coal	Coal	0.27	
MCE12-06	169.9	170.1	0.2	Coal	Coal	0.02	
MCE12-06	177.6	177.8	0.2	C.Sh	Coal	0.07	
MCE12-06	181.2	182.5	1.3	Coal	Coal	0.44	

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-06	184.6	184.95	0.35	Coal	Coal	0.09	
MCE12-06	186.5	187.1	0.6	Coal	Coal	0.15	
MCE12-06	193.5	194	0.5	Coal	Coal	0.13	
MCE12-06C	0	7	7	OB		7.00	Drift
MCE12-06C	24.80	25.90	1.1	Coal	**A**	0.45	TD=200.56m, Dip=-90, No geophysical Log, depths and thickness from the core.
MCE12-06C	25.90	28.30	2.4	Coal	**A**	0.98	
MCE12-06C	28.30	28.95	0.65	Coal	**A**	0.27	
MCE12-06C	28.95	29.35	0.4	Coal	**A**	0.16	
MCE12-06C	60.71	60.96	0.25	Coal	**C**	0.10	
MCE12-06C	60.96	63.93	2.97	Coal	**C**	1.22	
MCE12-06C	65.62	65.73	0.11	Coal	**C**	0.05	
MCE12-06C	65.73	67.36	1.63	Coal	**C**	0.67	
MCE12-06C	67.36	67.61	0.25	Coal	**C**	0.10	
MCE12-06C	67.61	68.16	0.55	Coal	**C**	0.23	
MCE12-06C	68.38	68.58	0.2	Coal	**C**	0.08	
MCE12-06C	68.58	70.10	1.52	Coal	**C**	0.62	
MCE12-07	0	2	2	OB			Drift
MCE12-07	2.3	2.4	0.1	Coal	Coal	0.08	TD=102.1m, Dip=-90 No dipmeter, Deviation indicate SW dip.
MCE12-07	2.6	5.3	2.7	Coal	Coal	2.57	
MCE12-07	7.4	7.7	0.3	Coal	Coal	0.29	
MCE12-07	50.9	52.3	1.4	Coal	Coal	1.37	
MCE12-07	72.7	73	0.3	Coal	Coal	0.30	
MCE12-07	85	85.25	0.25	Coal	Coal	0.25	
MCE12-07	93	94.7	1.7	Coal	X	1.68	
MCE12-07	98.3	98.6	0.3	Coal	Coal	0.29	
MCE12-08	0	24.38	24.38	OB			Drift
MCE12-08	64.3	65.2	0.9	Coal	X1	0.56	TD=251.46m, Az=220 Dip=-60 No dipmeter, Deviation indicate NE dip, dip.
MCE12-08	65.6	67.6	2	Coal	X1	1.26	
MCE12-08	71.3	72.2	0.9	Coal	X1	0.56	
MCE12-08	177.5	178.3	0.8	Coal	Coal	0.50	
MCE12-08	181.3	183.1	1.8	Coal	Coal	1.13	
MCE12-08	192.2	193.8	1.6	Coal	Coal	1.01	
MCE12-09	0	3.04	3.04	OB			Drift
MCE12-09	7.4	7.73	0.33	Coal	Coal	0.32	TD=251.46m, Dip=-90, dipmeter started at 33m.

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-09	21.45	21.75	0.3	Coal	Coal	0.29	
MCE12-09	24	24.5	0.5	Coal	Coal	0.49	
MCE12-09	27.2	27.67	0.47	Coal	Coal	0.46	
MCE12-09	41.95	43.85	1.9	Coal	X	1.84	High ash 42.50m-42.60m and 42.70m-42.82m
MCE12-09	106	107.1	1.1	Coal	X1	1.04	
MCE12-09	107.85	108.1	0.25	Coal	X1	0.24	
MCE12-09	111	111.32	0.32	Coal	Coal	0.30	
MCE12-09	111.75	111.85	0.1	Coal	Coal	0.09	
MCE12-09	125.8	127.25	1.45	Coal	Coal	1.41	
MCE12-09	140.9	143.45	2.55	Coal	Coal	2.50	
MCE12-09	149.2	150.8	1.6	Coal	Coal	1.58	
MCE12-09	183.5	186.4	2.9	Coal	Coal	1.86	
MCE12-10	0	3.04	3.04	OB			Drift
MCE12-10	10.9	11.85	0.95	Coal	A	0.93	
MCE12-10	12.8	13.76	0.96	Coal	A	0.94	
MCE12-10	14.8	15.1	0.3	Coal	A	0.30	
MCE12-10	20.8	21.38	0.58	Coal	B	0.57	
MCE12-10	21.6	22.1	0.5	Coal	B	0.49	
MCE12-10	23.8	23.95	0.15	Coal	Coal	0.15	
MCE12-10	50.42	57.2	6.78	Coal	C	6.64	
MCE12-10	67.75	68.77	1.02	Coal	D	1.00	
MCE12-10	72.37	72.8	0.43	Coal	D	0.42	
MCE12-10	81.5	81.7	0.2	Coal	Coal	0.20	
MCE12-10	86.1	88.85	2.75	Coal	E	2.72	
MCE12-10	95.2	95.3	0.1	Coal	Coal	0.10	
MCE12-10	110.75	111	0.25	Coal	Coal	0.25	
MCE12-10	131	131.37	0.37	Coal	Coal	0.36	
MCE12-10	133.25	133.35	0.1	Coal	Coal	0.10	
MCE12-10	169.4	170.55	1.15	Coal	X	1.15	
MCE12-10	171	171.15	0.15	Coal	X	0.15	
MCE12-10	171.6	172.15	0.55	Coal	X	0.55	
MCE12-10	193.95	194.15	0.2	Coal	Coal	0.20	
MCE12-10C	0	6.09	6.09	OB			Drift

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (continued)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-10C	10.2	11.55	1.35	Coal	A	1.32	TD=120.39m, AZ = 40 Dip=-60
MCE12-10C	12.4	13.3	0.9	Coal	A	0.88	
MCE12-10C	14.45	14.65	0.2	Coal	A	0.20	
MCE12-10C	14.8	14.95	0.15	Coal	A	0.15	
MCE12-10C	20.2	20.72	0.52	Coal	B	0.51	
MCE12-10C	21.05	21.5	0.45	Coal	B	0.44	
MCE12-10C	49.9	52.2	2.3	Coal	C	2.25	
MCE12-10C	54.85	56.9	2.05	Coal	C	2.01	
MCE12-10C	67.2	68.4	1.2	Coal	D	1.19	
MCE12-10C	72	72.35	0.35	Coal	D	0.35	
MCE12-10C	81.2	81.4	0.2	Coal	Coal	0.20	
MCE12-10C	85.8	88.75	2.95	Coal	E	2.95	
MCE12-10C	89.6	89.8	0.2	Coal	E	0.20	
MCE12-10C	110.5	110.7	0.2	Coal	Coal	0.20	
MCE12-11	0	3.04	3.04	OB			Drift
MCE12-11	30	33.5	3.5	Coal	A	3.43	Drilled outside property boundary, to north (see Map 2-4) Only neutron log in pipe, partings not picked, top and bottom might be slightly different.
MCE12-11	41	42	1	Coal	B	0.98	
MCE12-11	64	68.5	4.5	Coal	C	4.41	
MCE12-11	76.7	79	2.3	Coal	D	2.28	
MCE12-11	82	83	1	Coal	E	0.99	
MCE12-11	87	88	1	Coal	E	0.99	
MCE12-11	90.5	90.7	0.2	Coal	Coal	0.20	
MCE12-12	0	3.04	3.04	OB			Drift
MCE12-12	32.1	32.25	0.15	Coal	Coal	0.15	No dipmeter log, Deviation suggest SW dip. All sequence below X seam.
MCE12-12	33.4	33.75	0.35	Coal	Coal	0.35	
MCE12-12	79.5	79.9	0.4	Coal	Coal	0.40	
MCE12-12	96.55	97.1	0.55	Coal	Coal	0.55	
MCE12-12	99.1	99.5	0.4	Coal	Coal	0.40	
MCE12-12	103.3	104.2	0.9	Coal	Coal	0.90	
MCE12-12	109	120	11	MDST/SLT/SST		11.00	Bluesky Member
MCE12-12	120	242	122	MDST/SLT/SST		122.00	Bullmoose Member
MCE12-13	0	57.91	57.91	OB			Drift
MCE12-13	57.91	148.8	90.89	MDST/SLT/SST		31.09	Bullmoose Member

Table 5-2. Coal seam, Drift, Bullmoose Member and Bluesky Member intervals in boreholes at Mink East (concluded)

Borehole	From	To	Thick-ness	Lithology	Seam	True Thick-ness	Remarks
MCE12-13	148.8	170.4	21.6	MDST/SLT/SST		7.39	Bluesky Member
MCE12-13	170.4	205.74	35.34	No Log		12.09	Logging tool stuck, No Log,
MCE12-14	0	44.19	44.19	OB			Drift
MCE12-14	44.19	184.9	140.71	MDST/SLT/SST		138.57	Bullmoose Member
MCE12-14	184.9	220.4	35.5	MDST/SLT/SST		34.96	Bluesky Member
MCE12-14	220.4	223.36	2.96	COAL	A	2.91	
MCE12-15	0	30.48	30.48	OB		30.48	Drift
MCE12-15	36.25	36.5	0.25	Coal	Coal	0.25	TD=51.81m, Log Bottom 40.34m Dip=-90
MCE12-15	36.75	37.5	0.75	Coal	Coal	0.75	
MCE12-15	39.7	39.9	0.2	Coal	Coal	0.2	
MCE12-16	0	41.75	41.75	OB			Only Drift
MCE12-17	0	12.19	12.19	OB		12.19	
MCE12-17	9.45	10.4	0.95	Coal	Coal	0.48	
MCE12-17	20.6	20.75	0.15	Coal	Coal	0.07	
MCE12-17	21.5	21.75	0.25	Coal	Coal	0.13	
MCE12-17	74.1	74.3	0.2	Coal	Coal	0.10	
MCE12-17	117.32	117.45	0.13	Coal	Coal	0.08	
MCE12-17	121.4	121.55	0.15	Coal	Coal	0.10	
MCE12-17	145.95	146.85	0.9	Coal	Coal	0.45	
MCE12-17	176.25	176.4	0.15	Coal	Coal	0.12	

Note: depths and thicknesses are given in metres. Coals identified simply as ‘Coal’ have not been correlated to named coal beds.

Table 5-3: Summary of coal zones, coal seams, and interburden in Mink West boreholes

					Gross thickness			Net thickness		
Coal zone	Between zones	Between seams	Seams / zones	Number of bore-holes	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)
A	Top Zone		A-Zone		6.13	5.5	2.70-14.64	3.5	3.43	0.81-7.68
			A1	13	1.18	1.08	0.12-2.22			
			A2	13	1.46	1.37	0.21-3.15			
			A3	13	1.09	0.7	0.52-2.22			
		A1-A2		13	1.05	1	0.25-3.84			
		A2-A3		11	0.6	0.7	0.19-0.86			
B	B-A3			2	19.13	19.13	17-21.22			
			B	2	0.85	0.85	0.78-0.92			
C	C1-A3			2	18.84	18	17.90-19.78			
	C1-B			2	8.98	9.00	8.91-9.06			
			C1	5	0.45	0.5	0.12-0.78			
			C2	4	0.32	0.26	0.18-0.58			
		C2-C1		5	4.12	4.53	2.23-4.99			
	D1-A3			8	35.93	31.80	24.88-63.16			
	D1-C2			7	15.82	12.23	3.96-39.10			
			D-Zone	21	4.80	4.41	1.7-10.20	1.68	1.71	0.56-3.20
			D1	5	1.2	0.78	0.41-2.58			
			D2	20	0.67	0.52	0.14-1.62			
			D3	21	0.68	0.66	0.08-1.74			
		D2-D1		21	2.9	2.57	1.2-5.86			
		D3-D2		22	2.37	2.43	0.31-6.75			
E			E		10.16	10.16	10.16			
F	F1-D3			22	12.57	11.88	2.07-32.52			
			F-Zone		3.9	3.9	0.80-7.80	3.76	4.04	0.46-7.85
			F1	23	2.73	2.91	0.19-6.33			
			F2	23	1.08	0.95	0.14-2.74			
		F2-F1		22	0.51	0.29	0.75-1.7			

Table 5-3: Summary of coal zones, coal seams, and interburden in Mink West boreholes (continued)

					Gross thickness			Net thickness		
Coal zone	Between zones	Between seams	Seams / zones	Number of bore-holes	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)
G	G1-F2			5	6.54	5.31	4.53-8.88			
			G1	5	0.39	0.35	0.19-0.61			
			G2	7	0.48	0.43	0.14-1.36			
		G2-G1		5	1.26	1.31	0.17-2.76			
H	H1-F2			3	13.45	14.27	11.47-14.62			
	H1-G2			3	15.88	18.99	9.2-19.45			
			H1	9	0.41	0.43	0.17-0.67			
			H2	2	0.82	0.82	0.75-0.89			
		H1-H2		2	1.73	1.73	1.25-2.3			
I	I1-H1			5	16.73	12.80	6.92-32.06			
	I1-F2			5	46.56	46.50	37.23-55.98			
			I1	21	0.62	0.52	0.12-1.48			
			I2	9	0.67	0.48	0.22-1.88			
		I2-I1		9	0.84	0.46	0.23-3.56			
J	J1-I1			8	16.64	13.21	5.01-37.08			
			J1	17	0.43	0.39	0.14-1.16			
			J2	12	0.38	0.395	0.09-0.72			
			J3	4	0.43	0.425	0.32-0.53			
			J4	2	0.47	0.47	0.37-0.57			
		J2-J1		12	2.26	1.05	0.49-7.2			
		J3-J2		4	0.62	0.72	0.27-0.79			
		J4-J3		2	0.31	X	0.16-0.47			

Table 5-3: Summary of coal zones, coal seams, and interburden in Mink West boreholes (continued)

					Gross thickness			Net thickness		
Coal zone	Between zones	Between seams	Seams / zones	Number of bore-holes	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)
K	K1-J2			5	16.29	14.39	3.68-25.46			
			K1	19	0.54	0.39	0.16-1.83			
			K2	18	0.40	0.29	0.1-0.94			
			K3	8	0.40	0.37	0.15-0.75			
			K4	3	0.36	0.35	0.15-0.59			
		K2-K1		16	2.33	1.01	0.15-14.42			
		K3-K2		8	1.16	1.11	0.23-2.88			
		K4-K3		3	0.52	0.23	0.15-1.19			
L	L1-K2			6	10.49	11.88	3.26-16.93			
			L1	15	0.45	0.32	0.12-1.27			
			L2	13	0.48	0.44	0.15-1.41			
			L3	8	0.57	0.41	0.21-2.0			
			L4	5	0.43	0.44	0.17-0.82			
		L2-L1		11	2.15	1.85	0.26-5.82			
		L3-L2		6	1.63	0.89	0.61-3.51			
		L4-L3		4	3.88	3.30	2.0-6.90			
M	M-L4			4	19.10	19.62	13.72-23.44			
			M	15	0.36	0.245	0.15-1.71			
N	N1-M			9	33.69	35.91	11.39-50.63			
			N1	14	0.69	0.67	0.29-1.23			
			N2	4	0.63	0.63	0.16-1.11			
		N2-N1		5	1.97	1.81	0.37-3.88			
O	O1-N2			1	6.41	6.41	6.41			
			O1	3	0.27	0.3	012-0.40			
			O2	3	0.80	0.68	0.14-1.57			
			O3	2	0.40	0.40	0.12-0.69			
		O2-O1		1	1.99	1.99	1.99			
		O3-O2		2	0.66	0.66	0.50-0.82			

Table 5-3: Summary of coal zones, coal seams, and interburden in Mink West boreholes (concluded)

					Gross thickness			Net thickness		
Coal zone	Between zones	Between seams	Seams / zones	Number of bore-holes	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)	Mean true thickness (metres)	Median true thickness (metres)	True thickness range (metres)
P	P1-N1			3	10.73	10.84	9.98-11.39			
			P1	6	0.64	0.69	0.20-0.89			
			P2	4	0.42	0.435	0.23-0.56			
			P3	3	0.35	0.15	0.13-0.77			
		P2-P1		4	4.46	1.91	1.09-12.93			
		P3-P2		3	3.65	3.56	1.00-6.40			
Q	Q-P3			2	24.90	24.90	19.28-30.52			
			Q	6	0.64	0.74	0.17-0.95			
R	R-Q			4	14.49	15.38	6.67-20.54			
			R	4	0.53	0.57	0.24-0.82			
S	S-R			3	20.24	20.33	18.26-22.14			
			S	3	0.55	0.44	0.31-0.90			

Note: 'between zones'= thickness data for the interval between zones; between seams, 'Between seams' = thickness data for the interval between seam,

5.1.2 Coal zones of the Upper Gaylard

Coal zones A, B, C, D, E and F lie within the Upper Gaylard Member. The coal zones start from Bluesky/Gaylard contact, and continue downward across a stratigraphic interval of approximately 80 metres (**Table 5-1).**

5.1.2.1 A zone

Coal zone A is the uppermost coal zone of the Upper Gaylard, consisting of three seams, named in descending order A1, A2 and A3. All three of these coals are potentially mineable at Mink West. Coal zone A was intersected in 13 boreholes during the current exploration drilling. These holes are located in the eastern portion of the Mink West area.

- In the western part of Mink West, coal zone A is generally eroded.
- Faulting repeated the zone in MCW11-19.
- In borehole MCW11-20, the H, I and J coal zones of the Lower Gaylard have been overthrust above coal zone A.
- Zone A was also identified in two historic holes.

The thickness of the zone varies from 2.70 to 14.64 metres and averages approximately 5.50 metres (**Table 5-3**). The net coal in the zone ranges from 0.81 to 7.68 metres. The average cumulative thickness of coal in A-coal zone is 3.43m (**Table 5-3**). Thicknesses greater than 3 metres was intersected in eight holes, generally located in the north eastern part of the property.

All three coal seams of A-zone are commonly dull with minor bright bands, hard, solid, occasionally broken to much sheared, closely cleated in places and rarely pyritic. The zone appears to be thinning towards the south, although more data is needed to confirm this. The partings are generally thin to absent in thicker seams suggesting normal thickness of seams. Tectonic thickening may also have played some role because MCW13-05 with thickest A-zone is on the axial plane of an anticline. Samples from three drill holes were collected for analyses.

Interburden

A1-A2 parting: The interburden thickness varies from 0.25 to 3.84 meters with average and median values of 1.05 and 1.0 metres. The parting is commonly less than 1.50 metres thick except in MCW13-01C where it reaches 3.84 metres. There is no clear thickening or thinning pattern.

The parting generally consists of mudstone, which grades downward from carbonaceous shale to mudstone. Coalified plant debris and coal laminae are common in the upper portion of the parting, but minor in the lower part. Fine sandstone laminations occur in places.

A2-A3 parting: The interburden thickness varies from 0.19 to 0.86 metres with average and median values of 0.6 and 0.7 metres respectively. The parting consists of dark grey, carbonaceous mudstone. Coalified plant debris and coal lamina are common to abundant. The mudstone is occasionally silty to sandy. Tuff bands were found within this parting, in borehole 83-21. The floor of A3 seam consists of mudstone.

5.1.2.2 B seam

The B seam lies 17 to 22 metres below A3 seam. B seam was developed in a very limited area, insofar as it was intersected only in two boreholes. These holes are located in the southeastern part of the area of investigation, and aligned in a north-south direction. Both boreholes were rotary (non-coring), hence no quality data is available from B seam. Thickness of B seam varies from 78 to 92 centimetres. Mudstone forms the roof and floor of B seam.

5.1.2.3 C zone

Two coal seams (C1 and C2) occur in the C coal zone. These coal seams were recognised within five current boreholes, and also correlated with one historic drill hole. The drill holes intersecting C-zone coal are located in south central part of the Mink West area. The C coal zone lies approximately 9 metres below B seam.

In some holes, the interval between A3 and C1 is same as that between A3 and-B. Although seams were correlated for more than a kilometre, the thickness of the C1 and C2 seams does not exceed 75 centimetres. The average, median and range of thickness in C1 and C2 seams are given in **Table 5-3**. The thickness of parting between C1 and C2 varies from 2.23 to 4.99 metres and averages 3.94 metres. The interval between C1 and C2 include either mudstone or sandstone. All boreholes intersecting C-zone were rotary-drilled; therefore, no core samples were available for analysis.

5.1.2.4 D zone

D zone lies 25 to 63 metres below A3 seam. Coal zone D was encountered in 21 boreholes. D1 and A3 seam were intersected in 14 of these holes. For this reason, the interval between A3 and D1 seam is taken as reference. The thickest interburden, thinning to the north and south, was encountered in MCW11-22 in the north-central portion of the investigation area.

D zone consist of three seams, in descending order named D1, D2 and D3. The lower two seams are made up of more than one ply in a few holes. Overall zone thickness ranges from 1.7 to 10.2 metres, with average and median thicknesses of 4.80 and 4.41 metres. Net coal thickness within D zone ranges 0.56 to 3.2 metres with average and median thicknesses of 1.68 and 1.71 metres, respectively. D zone has thus far been traced within the central part of the exploration area, for approximately 2 kilometres in a north-south direction, with a maximum width of 1.3 kilometres. D-zone coals also appear in historic borehole 83-21, situated 750 metres north of the northernmost current borehole, MCW13-01C.

D-zone has been correlated with certainty in most of the current boreholes, particularly in holes where A-zone or F-zone also occur. However, more drilling is needed in some areas to confirm the proposed correlation. Out of 21 boreholes, four holes were cored, allowing for collection and analysis of coal samples.

D1 seam: D1 seam was intersected in six holes. Thickness of D1 ranges from 0.41-2.58 metres, but only two holes have more than 2 metres of coal. This thicker coal is located in the middle of the D-zone area. D1 is missing in cored boreholes; there are, therefore, no analytical data, nor information concerning physical characteristics, for D1.

D1-D2 parting: D1-D2 parting varies in thickness from 1.2 to 5.86 metres. The thickest partings are noted in the southeastern portion of the exploration area. Lithology of the D1-D2 parting is dominated by mudstone which is generally dark grey, carbonaceous, coaly to highly coaly and occasionally intercalated with very fine-grained sandstone laminations.

D2 seam: Although D2 seam was intersected in 20 boreholes, coal thickness greater than a metre was found only in 9 holes. Two of these holes (as pilot hole and subsequent cored borehole) were drilled at the same location. D2 seam thickness varies from 0.14 to 1.62 metres, with the thicker seams being generally in the eastern portion of the exploration area. In borehole MCW11-23, D2 comprises two plies of coal, separated by 55 centimetres of sandstone. D2 coal is commonly solid, dull with minor bright bands and occasionally dirty and cleated.

D2-D3 parting: D2-D3 parting varies in thickness from 0.31 to 6.75 metres. The lithology of this parting varies; both arenaceous and argillaceous facies have been identified in core and geophysical logs.

D3 Seam: D3 seam occur in 21 holes (again, two of these boreholes being at the same location), where it ranges in thickness from 0.08 to 1.74 metres. D3 is developed in almost all areas where the D-zone is recognised. The seam consists of two plies in five of the boreholes, and three plies in one hole (as enumerated in **Table 5-1**). These split occurrences are located in the western part of the D-zone's development area. Partings within the D3 seam either sandstone or mudstone. Overall, D3 coal appears to be dirtier than D2 coal. D3 coal is characteristically dull with minor bright bands, commonly solid, occasionally cleated, and intercalated with very thin mudstone bands in places. The floor of D3 comprises sandstone, siltstone and mudstone.

5.1.2.5 E zone

E zone is regarded as insignificant, because it was identified in only one borehole during current drilling at Mink West. It was named for two coal seams (E1 and E2) lying 10 metres below D-zone as observed in historic borehole 83-21. In this hole, the E1 and E2 coals are separated by 3.7 metres of rock. Individual coal seam thicknesses are 0.34 and 0.86 metres.

5.1.2.6 F zone

F zone is the most consistently-developed thick coal horizon at Mink West, and therefore is regarded as affording the most attractive prospect for future mining. F zone typically consists of two seams. These seams have consistently-adequate thickness and continuity to be considered for mining. F zone usually has a distinct and consistent geophysical-log 'signature' which is very useful for correlation of the Upper Gaylard coals. Klatzel-Mudry *et al* (1984) previously named this zone as the Brenda Seam.

F zone occurs 2.07 to 32.52 metres below D3 seam (**Table 5-3**). The sequence of interburden rocks generally thins from north to south, with few exceptions. F zone has been intersected in 24 boreholes, of which two are historical and two were drilled at the same location as pilot hole and subsequent cored boreholes. Within F zone, two coal seams are recognised, the upper F1 and the underlying F2. At some locations, F1 and F2 combine and appear as one seam, but no effort was made to give a separate name to this combined

seam. Instead they have been consistently distinguished as F1 and F2, albeit with locally less than 5 centimetres of intervening rock..

F1 and F2 both typically consist of one coal ply except in boreholes MCW11-13 and MCW11-10 where F1 comprises two plies, and boreholes MCW11-01 and MCW11-13 where F2 consists of two plies. Correlation of the F-zone coals within the central part of the Mink West exploration area appears to be very reasonable; however, additional data is needed in some areas – particularly in the south – to validate the proposed correlation. The thickness of F zone ranges from 0.80 to 7.80 metres with average and median thicknesses of 3.90 metres. Net coal thickness in F zone ranges from 0.46 to 7.84 metres, with average and median thicknesses of 3.76 and 4.04 metres, respectively.

D3-F1 parting: The D3-F1 parting varies from 2.07 to 32.52 metres. The average and median thicknesses of the interval between D3 seam and F-zone are 12.57 and 11.88 metres respectively. Lithologies of this parting vary from mudstone to sandstone. Sandstones typically are light grey and fine-grained sandstone, with abundant coaly and carbonaceous matter and some thin to very thin coal intercalations. Mudstone occasionally occurs at the top of fining upward sequences. At MCW13-02C in the south, the D3-F1 parting comprises mainly dark grey, carbonaceous and coaly to highly coaly mudstone.

F1 seam: F1 coal is the thickest of the coal seams at Mink West, where it has been encountered in 23 boreholes. The seam ranges in thickness from 0.19 to 6.33 metres, thickening within the central part of the exploration area. Average and median thicknesses are 3.08 and 3.57 metres. F1 is separated by siltstone or mudstone into two plies in two boreholes. Coal of the F1 is dull with some bright bands, commonly hard, occasionally cleated, soft and sheared. F1 rarely includes partings, ranging in thickness from 3 to 5 centimetres; as well, pyrite is occasionally visible. Historic borehole 83-21, situated north of the property's northern boundary, encountered a 2 centimetre tuff band within the F1 coal.

F1-F2 parting: The F1-F2 parting ranges in thickness from 0.75 to 1.70 metres, with average and median thicknesses of 0.51 and 0.29 metres respectively. Mudstone with coaly and carbonaceous matter and common coal laminae is the dominant lithology of this parting, which tends to thicken southward.

F2 seam: F2 ranges in thickness from 0.14 to 2.74 metres, with average and median thicknesses of 1.10 and 1.08 metres. In two boreholes, F2 is observed to be separated into two plies by an intervening band of siltstone. F2 coal is dull and bright banded (with more bright bands in its lower part), commonly hard, occasionally cleated, and rarely including partings, 3 to 5 centimetres thick. Thicker coal is generally found in the eastern part of the exploration area. F2's floor is typically carbonaceous to coaly mudstone.

5.1.3 Coal zones of the Lower Gaylard

At Mink West, all coal zones which occur stratigraphically beneath the F2 seam (thus, zones G through S) lie within the Lower Gaylard Member. These coals, which are generally less than a metre thick, have limited lateral extent. At the present stage of exploration, none of these seams appear to be economically significant. Correlations of the Lower Gaylard coals are generally reasonable but, due to structural complexity, additional drilling would be required to confirm the suggested correlation in some areas.

5.1.3.1 G zone

G zone is developed in the northern half of the northeastern portion of the exploration area, where it was encountered in eight holes. Two coal seams are recognised: the upper G1 coal and the underlying G2 coal. G1 ranges in thickness from 0.20 to 0.63 metres, and G2 ranges from 0.15 to 0.55 metres. An unusual thickness of G-zone coal in borehole MCW11-08 (**Table 5-1**) is probably due to lack of G1-G2 parting (combined G1 and G2).

G-zone coal is dull and bright banded, hard and cleated. One core sample was collected from MCW13-01C, for coal-quality determination.

F2-G1 parting: interburden between F2 seam and G1 seam varies from 4.5 to 9 metres, with mean and median thicknesses of 6.54 and 5.31 meters respectively. Lithology of the F2-G1 interburden comprises intercalated dark grey, carbonaceous and coaly mudstone and very fine-grained sandstone.

G1-G2 parting: the interval between G1 and G2 ranges from 0.17 to 2.76 metres with an average and median thicknesses of 1.26 and 1.31 metres. The parting between G1 and G2 is predominantly mudstone.

5.1.3.2 H zone

H zone may be recognised in nine boreholes, mostly within the western part of the exploration area; the zone occurs 9.0 to 19.45 metres below G2 seam. In most cases, H zone contains only one coal seam, the H1. H1 is generally less than 60 centimetres thick. A lower seam, H2, was identified in two boreholes, at an interval of 1.25 to 2.3 metres below H1. One core sample of H-zone coal was collected from borehole MCW13-01C.

5.1.3.3 I zone

I zone was identified in 21 boreholes, generally located within the western part of the exploration area, where it lies 7 to 32 metres below H zone. Two I-zone coals are recognised: the upper I1 seam, and the underlying I2 seam. 1 and I2 range in thickness from 0.12 to 1.48 metres, and 0.22 to 1.88 metres, respectively. In ten boreholes, situated in the eastern and western ends of the area where I zone is recognised, net coal within I zone exceeds one metre. Interburden between I1 and I2 varies from 0.23 to 3.56 metres, with most boreholes showing thicknesses of 0.26 to 0.64 metres.

5.1.3.4 J zone

J zone was recognized in 17 boreholes, mostly located in the southwestern part of the Mink West exploration area. J zone occurs 5 to 37 metres below I zone. Four J-zone coal seams are recognised, from top downward designated as J1, J2, J3, and J4.

Partings between the J-coals are generally less than 1 metre thick, although the interval between J1 and J2 is notably thicker, ranging from 2 to 7 metres in four boreholes located in the eastern portion of the J-zone development area. Individual coal seams within J zone are less than a metre thick, but overall J-zone net coal ranges from 1.32 to 2.19 metres within five boreholes, all of them situated to the southwest.

5.1.3.5 K zone

K zone is recognisable in 20 boreholes within the southwestern and eastern parts of the Mink West exploration area. The interval between the base of the J2 coal and the top of the K zone varies from 3.7 to 25 metres.

Four K-zone coals are present, designated from top down as K1, K2, K3, and K4. K1 is the most widespread of the coals, occurring in 20 boreholes, whereas K2, K3, and K4 were intersected in 18, 8, and only 3 holes respectively. Partings between these seams commonly range from 0.15 to 1.86 metres, although thicker partings (ranging from 2.45 to 14.42 metres) were noted in four boreholes. K-zone coals are generally less than 60 centimetres thick and only rarely do they exceed a metre. In five boreholes, net K-zone coal thickness exceeds a metre (ranging from 1.14 to 2.45 metres of coal, as set forth in **Table 5-1**).

5.1.3.6 L zone

L zone was encountered in 15 boreholes, where it lies 3.26 to 17 metres below the K2 seam. Four L-zone coals are recognized, named in descending order L1, L2, L3, and L4. Partings between these coals vary from 0.26 to 6.90 metres, although most partings are 1 and 2 metres thick. Individual L-zone coals are commonly less than 50 centimetres thick, and coal thickness exceeds a metre in very few holes.

5.1.3.7 M seam

M seam is recognised in 15 boreholes. M seam underlies L4 seam at an interval ranging from 14 to 23 metres. M coal is usually less than 40 centimetres thick, with the exception of borehole MCW13-04, where it is 1.71 metres thick.

5.1.3.8 N zone

N zone was encountered in thirteen boreholes, occurring 11 to 35 meters below M seam. As well, borehole MCW11-14 (situated just west of the property's western boundary), found 50 metres of M-N interburden. Two N-zone coals are recognised, the upper N1 and the underlying N2 coal. N2 is recognised in only five boreholes, located along the eastern edge of the investigated area. The interburden between N1 and N2 commonly ranges from 1.60 to 3.88 metres. Coal thickness greater than a metre was observed in five boreholes, and over 50 centimetres in six boreholes.

5.1.3.9 Zones O through S

Coal zones O through S are characteristically limited in their lateral extent, and commonly are only recognised near the western edge of the Mink West exploration area. These coals are therefore unlikely to be economically-significant. Intervals between these zones, parting thicknesses, seam thicknesses and thickness statistics are presented in **Tables 5-1** and **5-3.**

5.2 Coals of the Mink East area

The Mink East region of the Mink Creek property is located approximately 4km east of Mink West region. The drilling was carried out in areas located between 6142608 and 6143614 northing, and 570350 and 572406 easting (coordinates given are UTM NAD83, in Zone 10N). The Mink East exploration area extends 1700 metres from east to west, 1100 metres from north to south. Nineteen boreholes with a cumulative depth of 3432.85 metres were drilled within the Mink East area, and an additional borehole (MCE12-11, with a depth of 102.1 metres) was drilled just beyond the property's northern boundary. Borehole details and coal intersections for the Mink East boreholes are given in **Table 5-2**.

- Due to mechanical problems, one hole (MCE12-16) was abandoned in Drift.
- One hole (MCE12-15) was drilled only 10 metres into bedrock, beneath Drift.
- Three spot-cored boreholes (MCE12-4C, MCE12-6C, and MCE12-10C) were drilled at the same locations as their pilot holes (MCE12-4, MCE12-6, and MCE12-10, respectively). The reason for drilling the second hole was to obtain samples for preliminary coal-quality studies.
- Two holes, MCE 12-03 and MCE12-14, were drilled at a different angle and azimuth at the same sites as MCE12-01 and MCE12-13, respectively.
- Two holes (MCE12-13 & MCE12-14) were spudded in the Bullmoose Member of the Gething Formation. Both holes are on the same location but were drilled in opposite directions.
- Bullmoose Member rocks were also identified in MCE12-12 underlying the Gaylard Member of the Gething Formation; this may be due to overturning of the strata, or due to a fault.
- All other holes intersected only the Gaylard Member.

Structurally, the investigated area is characterized by tight folds and by thrust faults. Three folds and at least one thrust-fault were recognized in the Mink East exploration area (**Map 2-3**).

As is the case at Mink West, all of the coal seams in Mink East occur within the Gaylard Member of the Gething Formation. The thicker and laterally consistent coal seams at Mink East occur within the Upper Gaylard sub-unit, which is 80 to 90 metres thick at Mink East.

Five coal zones (designated as A to E from the Bluesky/Gaylard contact downward), with a number of associated sub-seams, have been intersected within the Upper Gaylard at Mink East. The base of the Upper Gaylard is drawn at the floor of the lowermost thick coal (the E seam). The C seam at Mink East and the F seam at Mink West occur at approximately the same stratigraphic level.

At least 15 coal seams (including the A through E zones mentioned above), each locally exceeding 30 cetimetres in thickness, have been recognised within the Gaylard Member at Mink East (**Table 5-2**). Beneath the floor of the E seam at Mink East, these coals are referred to the Lower Gaylard. Owing to limited data, the Lower Gaylard coals at Mink East have generally not been given names. However, two laterally-consistent coals within the Lower Gaylard are

designated as the X and X1 seams; these coals are helpful for correlation of the Lower Gaylard strata at Mink East.

A much-generalized coal seam stratigraphy for the Mink East area can be assembled from the sections found in boreholes MCE12-10, MCE12-5 and MCE12-17. X seam was found at a true stratigraphic interval of 156 metres below A seam in borehole MCE12-10. In borehole MCE12-17, a thin coal seam occurring at a true stratigraphic interval of 135 metres below X seam appears to be the same as the coal seam found 24 metres down in MCE12-17. A further 98 metres of section was drilled below this lower coal in borehole MCE12-17. The total Gaylard section drilled at Mink East thus appears to be approximately 400 metres.

5.2.1 Coal seam development

At Mink East, Gaylard coals range in thickness from a few centimetres to 6.64 m. Correlations of coals within the Upper Gaylard are generally reasonable, but due to structural complexity, wide borehole spacing, and the variable nature of coal seams, additional data are required to confirm the suggested correlation in the area. Laterally, Upper Gaylard coals occur from the western end to the eastern end of the Mink Creek exploration area, a distance of roughly 1700 metres. These coals are potentially of interest for mining; following is a brief description of each zone.

5.5.2.1 A seam

A seam is the uppermost coal seam of the Upper Gaylard at Mink East; it was intersected in six holes within the property (MCE12-04, MCE12-4C, MCE12-06, MCE12-10, MCE12-10C, and MCE12-14), and in one hole situated just north of the property's northern boundary (MCE12-11). The seam consists of one to four plies of coal. Net coal thickness varies from 2.20 to 3.43 metres, within a maximum gross thickness of 4 metres.

The thickest coal intersection was found in MCE12-11 drill hole, just outside the property limits. Faulting repeated the A seam in MCE12-04C. Samples from MCE12-04C and MCE12-06C were analysed, although core recovery was not very good.

5.5.2.2 B seam

B seam lies approximately 10 metres below A seam, and occur in four holes within the property (MCE12-04, MCE12-06, MCE12-10, and MCE12-10C), and one nearby hole (MCE12-11). The net coal in B seam ranges from 70 centimetres to 1.12 metres, and include one or two coal plies. The interval between the two plies, where they occur, is generally less than 50 centimetres. B seam was not encountered in any of the cored boreholes.

5.5.2.3 C zone

C zone seams is the thickest and most laterally-consistent coal horizon at Mink East, and therefore appears to have the greatest potential for mining.

C zone occurs 10 to 30 metres below B seam (**Table 5-2**). C zone was intersected in five holes within the property (MCE12-02, MCE12-4, MCE12-06, MCE12-10, MCE12-10C), and in one nearby hole (MCE12-11). The zone ranges in thickness from 3.40m to 6.64m and consists of one to six plies. The parting between coal plies is generally a few

centimetres, but locally the parting swells to 2.5 metres in borehole MCE12-10C. Six samples were collected for quality information from borehole MCE12-06C.

5.5.2.4 D zone

D zone was encountered in five holes within the Mink East property (MCE12-01, MCE12-02, MCE12-03, MCE12-10, and MCE12-10C), and in one nearby hole (MCE12-11). The interval between C zone and D zone varies from 8 to 10 metres. Coals of the D zone occur within a gross thickness of 5 to 7 metres of coal and rock. Net coal within D zone is generally 1.5 metres, but it ranges from 0.39 to 2.28 metres. A single ply of coal, 2.28 metres thick, was encountered in MCE12-11, just outside the northern boundary of the property. No quality data are available for D-zone.

5.5.2.5 E zone

E zone was recognized in five holes within the Mink East area (MCE12-01, MCE12-03, MCE12-04, MCE12-10, and MCE12-10C), and in one nearby hole (MCE12-11), just north of the property boundary. E zone occurs 9 to 16 metres below D zone, although it is only 3 metres below D zone in borehole MCE12-11. Net coal thickness within E zone varies from 0.92 to 3.15 metres within an interval ranging from 4 to 10 metres. The number of coal plies within E zone varies from one to four.

5.5.3 Lower coal zone

All the coal seams below E zone are included in the Lower coal zone, within the Lower Gaylard. These seams are generally thin and occasionally occur in the lower 100 metres of the Gaylard Member. At this stage of exploration at Mink East, none of these seams appear to be economically significant. Correlation in general is unlikely with currently available data, although two seams (X and X1) thicker than one metre and laterally consistent for a considerable distance have been correlated.

5.5.3.1 X seam

X seam was intersected in seven holes (MCE12-01, MCE12-02, MCE12-03, MCE12-05, MCE12-07, MCE12-09 MCE12-10), where it is observed to lie approximately 140 metres below the floor of A-seam in borehole MCE12-10. Net coal within X seam varies from 1.7 to 2.0 metres (true stratigraphic thickness) within a maximum gross interval of 3 metres. The number of plies in X seam varies from one to four. X seam is very helpful for correlation in drill holes where coals A through E are not present. X seam was not cored in any borehole.

5.5.3.2 X1 seam

X1 seam occurs approximately 50 to 60 metres below X seam, and was intersected in five holes (MCE12-01, MCE12-02, MCE12-05, MCE12-08 and MCE12-09). Net coal varies from 0.9 to 1.4 metres (true stratigraphic thickness). X1 seam generally consists of two plies separated by a rock parting of 40 to 90 centimetres. X1 was not intersected in any of the cored boreholes at Mink East.

6 Coal quality

Coal quality data for ‘current’ boreholes drilled in year-2012 and year-2013 are presented in **Appendices B** and **C** of this report. No coal-quality work was done in year-2011, owing to the non-coring nature of the drilling done in that year.

Appendix B deals with clean-coal quality, from core samples taken within year-2012 and year-2013. **Appendix C** presents petrographic data. Both of these appendices are presented on a confidential basis, owing to their dealing with clean-coal quality (no raw-coal quality work having been done at Mink Creek during the years covered by the present report).

6.1 Note concerning historic coal-quality data

The present report does not include a review of historic coal-quality information. Such data are available within historic coal-assessment reports covering the Mink Creek area and its vicinity.

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7 Coal-resource estimation

Within the Mink Creek coal property, only the Mink West area has been sufficiently drilled to be able to confidently establish its level of geological complexity. Within the Canadian national standard coal-resource estimation scheme (Hughes *et al*, 1989), the tight folding and moderate intensity of faulting at Mink West places it within the 'complex' tectonostratigrahic category, requiring the use of cross-sectioning methods as a means of resource estimation.

At its present density of drilling, Mink West has not yet been sufficiently-explored to support coal-resource estimation by cross-sectioning. Further exploration would be needed before any consideration could be given to the recognition of measured or indicated coal resources.

8 Reclamation

Drilling at Mink Creek during the years 2011 through 2013 required the construction of drill pads (upon which the drilling rig and associated equipment could be safely placed, with sufficient room for parking and movements of support vehicles), as well as the construction of new drill trails to reach sites which were not adequately served by existing trails and roads.

Disturbance associated with the year-2011 drilling programme was reduced by the choice to employ an air-rotary drill rather than a diamond-drill (which would have required the use of mud-based drilling fluids) . Where possible, pre-existing trails were re-used in the course of the year-2012 and year-2013 drilling programmes, further reducing disturbance.

Substantial reclamation effort was undertaken after the completion of the year-2013 drilling programme. Drill sites were cleared of equipment, supplies and trash prior to removal of the drilling rigs, and appropriate revegetation seed mix was applied to those trails where there was no immediate ongoing need to maintain trafficability.

9 Statement of costs

'Current work' within the Mink Creek coal property, for purposes of the present report, comprises exploratory work done between the years 2011 and 2013.

For the year-2011 and year-2013 drilling programmes, exploratory costs are available from exploration department files, but these data are not accessible for the year-2012 programme. Year-2012 costs are therefore estimated, based on provincial average unit costs, following the methodology used in Coal Assessment Report No.936 for the nearby Brule property (Cathyl-Huhn and Avery, 2014a).

Table 9-1 presents the resultant combination of known (year-2011/2013) and estimated (year-2012) costs.

Table 9-1: Estimated exploratory cost breakdown by activity

	2011		2012			2013			Totals
Item/year	Quantities	Costs	Quantities	Average unit costs	Estimated costs	Quantities	Average unit costs	Costs	Costs
Rotary-drilling	4518.04 metres	$507,720	4132.20 metres	$201.34/ metre	$831,977	1122 metres		$295,157	$1,634,854
Core-drilling	nil	nil	392.95 metres	$210.34/ metre	$82,653	713 metres		Included in above	$82,653
Geophysical logging	4344.97 metres	$102,500	4453.40 metres	$17.56/ metre	$78,202			$18, 426 (likely in-complete)	$199,128
Roadwork	unknown length	$484,921	(based on 4602.57 metres of drilling)	$23.30/ metre	$107,240	unknown length		$313,800	$905,961
Analytical work	nil	nil	(based on 470.37 metres of cored boreholes)	$79.63/ metre	$37,456	(based on 713 metres of cored boreholes)	$79.63/ metre	$56,776 (esti-mated)	$94,232
Totals		$1,095,141			$1,137,528			$684,159	$2,916,828

Notes: unit costs are on per-metre drilled length basis, derived from provincial average unit-costs (see Bouchard (2011) report on behalf of Natural Resources Canada. Geophysical log metreage is slightly lower than drilled metreage, as not all boreholes could be logged, and logging often starts slightly above the bottoms of holes. Breakdown of coring *vs.* non-coring costs is not available for year-2013 drilling.

10 References

The following reference materials were used in the compilation of this report, with citations given at relevant points within the report's text. All coal-assessment reports here cited are available in digital versions via the British Columbia Geological Survey Branch's webspace, with the exception that year-2014 reports are still confidential at the time of this writing.

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11 Conclusions

Coal occurrences within the Mink Creek coal property are hosted by the Gaylard Member of the Early Cretaceous Gething Formation. Results of geological mapping and exploratory drilling, conducted between 2011 and 2013, suggest that potentially-mineable coal seams occur within the upper eighty metres (here designated as the 'Upper Gaylard') of the Gaylard Member.

Two areas within the property, designated as Mink West and Mink East, were drilled. At Mink West, three coal zones, designated as zones A, D, and F, appear to be particularly attractive for mining, at the current stage of exploration. At Mink East, three coal zones, designated as zones A, C, and E, also appear to be attractive for mining, although exploration at Mink East is comparatively less-advanced than at Mink West.

F zone at Mink West, and C zone at Mink East, are the most prospective of the coals, on the basis of their thickness and consistent development.

Geological modelling of the Mink West area suggests that substantial coal resources may be present, but the present spacing of data points is insufficient to allow the confident recognition of indicated or measured coal resources.

The Mink Creek coal property is structurally-complex, characterised by tight folding and moderate faulting. For this reason, the tectonostratigraphic geology type of the property is considered to be complex (as defined within the Canadian national standard classification of coal resources).

A closely-spaced drilling programme will be required to better establish the property's geology, as well as allow a formal coal-resource estimate.

Estimated exploratory costs to date, covering year-2011 through year-2013 activities, are $2,916,828. The Mink Creek coal property is regarded as being a property of merit.

12 Statements of qualifications

I, Muzaffer Sultan P.Geo.(BC), 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 Canadian office in Vancouver, British Columbia.

b) This certificate applies to the current report, titled *Coal Assessment Report for the Mink Creek coal licences, British Columbia*, dated December 30, 2014.

c) I am a member (Professional Geoscientist, Licence No. 34690) of the Association of Professional Engineers and Geoscientists of British Columbia. I have worked as a geologist for over 41 years since my graduation from university.

d) I certify that by reason of my education, affiliation with a professional association, and past relevant work experience, having written numerous published and private geological reports and technical papers, that I am qualified as a Qualified Person as defined by Canadian *National Instrument 43-101*.

e) My most recent visit to the Mink Creek coal property was in December 2013.

f) I am an author of this report, titled *Coal Assessment Report for the Mink Creek coal licences, British Columbia*, dated December 30, 2014, concerning the Mink Creek coal property.

g) As of the date of the writing 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*.

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, 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 Mink Creek coal licences, British Columbia*, dated December 30, 2014.

c) I am a member (Professional Geoscientist, Licence No.20550) of the Association of Professional Engineers and Geoscientists of British Columbia, licensed as a geologist (Licence No.2089) in Washington State, 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 several 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) My most recent visit to the Mink Creek coal property was in the summer of 2014.

f) I am an author of this report, titled *Coal Assessment Report for the Mink Creek coal licences, British Columbia*, dated December 30, 2014, concerning the Mink Creek coal property.

g) As of the date of the writing 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*.

"original signed and sealed by" M. Sultan P.Geo.

"original signed and sealed by"
Dated this 30th day of December 2014. C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME

Appendix A: Geophysical logs and other borehole data

Geophysical logs run in current (year-2011 through year-2013) boreholes are summarised in **Table A-1**. Copies of these logs are submitted as digital files accompanying this report, in both LAS and TIF format where available. Note that not all boreholes were logged, and further note that in some boreholes only a minimal suite of logs were obtained, owing to poor ground conditions necessitating the running of geophysical tools inside drilling-rods.

Copies of core descriptions, for those boreholes from which cores were taken, are also presented in digital format; in this case, *Excel* files have been provided.

Table A-1: Geophysical logs run in current boreholes

Borehole	Easting	Northing	Elev-ation	Total depth	Gamma/Caliper/ Resistivity/Density	Gamma/ Neutron	Gamma/ Density	Deviation	Dipmeter	Notes
MCW11-01	563841.34	6141465.24	1259.8	227	224.33	224.45		224.26		
MCW11-02	563990.22	6141653.24	1264.5	260.6		203.49	254.96	203.50		Density thru rods
MCW11-03	564118.46	6141879.23	1268.3	89.91	88.95	88.99		88.80		
MCW11-04	563843.94	6142418.26	1371.9	257.55	256.39	256.33		256.12		
MCW11-05	564373.29	6142310.33	1363.7	126.49	125.71	125.73		125.54		
MCW11-06	564568.41	6142494.19	1384.4	153.92	153.11	153.15		152.96		
MCW11-07	564721.31	6142704.75	1361.9	92.96	89.49	92.14		91.94		
MCW11-08	563699.31	6142220.29	1299.7	214.88	213.98	214.06		213.86		
MCW11-09	564019.73	6142687.22	1417.4	242.31	238.16	238.16				
MCW11-10	564025.69	6143191.45	1426.8	62.48	61.81	61.87		61.68		
MCW11-11	564184.72	6143394.26	1404.4	77.72	76.71	76.69		76.50		
MCW11-12	563178.49	6142985.67	1338.1	117.34	107.74	107.22		107.02		
MCW11-13	563198.92	6143042.44	1347.7	184.4	182.88	182.98		182.78		
MCW11-15	564833.14	6142913.71	1339.5	245.36			242.72	107.12		Density thru rods
MCW11-15A	564738.32	6142799.18	1364.2	62						No geophysics
MCW11-16	563555.51	6142013.60	1244.2	227.68		38.67	224.11	38.48		Density thru rods
MCW11-17	563323.74	6142382.50	1274.2	245.36	244.41	244.37		244.18		
MCW11-18	563624.22	6142577.18	1352.7	226	224.99	224.93		224.74		
MCW11-19	565055.99	6142274.54	1325.5	193.54	187.44	187.50		187.30		

Table A-1: Geophysical logs run in current boreholes (continued)

Borehole	Easting	Northing	Elev-ation	Total depth	Gamma/Caliper/ Resistivity/Density	Gamma/ Neutron	Gamma/ Density	Deviation	Dipmeter	Notes
MCW11-20	564779.69	6141862.11	1313.7	231.64	230.22	230.22		230.02		
MCW11-21	564924.34	6142146.84	1337.6	223	219.68	219.66		219.46		
MCW11-22	565153.08	6143027.43	1269.0	245.36	243.14	243.04		242.84		
MCW11-23	565267.15	6142542.66	1287.0	259.08	258.28	258.14		257.94		
MCW11-24	565094.56	6141373.64	1289.0	251.46	247.22	247.22		247.22		
MCE12-01	571254.62	6143076.44	1109.0	214.27	213.27	213.29		213.10	212.00	
MCE12-02	571205.07	6142853.19	1079.4	251.48	245.29	245.19		245.00	244.00	
MCE12-03	571253.76	6143073.93	1109.0	153.92	150.17	150.05		149.86	148.50	
MCE12-04	570866.07	6143154.10	1132.0	169.16	167.98	168.04		167.84	165.50	
MCE12-04C	570861.52	6143153.67	1132.1	72	70.66	70.76		70.56		
MCE12-05	570510.79	6143178.58	1156.5	233.17	228.89	228.93		228.74	227.50	
MCE12-06	570349.99	6143441.43	1157.4	214.88	213.71	212.27		212.08	211.00	
MCE12-06C	570349.99	6143441.43		200.56		199.50		199.30		Sonde jammed
MCE12-07	571170.88	6143017.53	1108.0	102.1	101.13	101.13		100.94		
MCE12-08	571177.73	6142626.30	1039.4	251.46	245.33	245.51		245.32		
MCE12-09	571434.66	6142608.52	1038.7	251.46	248.99	248.99		248.80	246.00	
MCE12-10	570846.73	6143469.03	1134.3	2002.69	196.69	196.85		196.66	195.50	
MCE12-10C	570849.14	6143470.74	1134.5	120.39	118.68	118.68		118.38		
MCE12-12	571772.75	6142956.41	1051.1	251	244.95	245.57		245.38		
MCE12-13	572078.64	6143481.32	1130.0	205.74	170.40	187.78		170.01	169.50	Neutron thru rods
MCE12-14	572082.40	6143486.64	1129.9	239.26	233.63	233.75		233.56	232.50	
MCE12-15	572124.01	6143101.79	1049.7	51.81	40.34	40.30		40.10		
MCE12-16	572406.00	6142813.00		41.76	38.49	38.51				Not to bedrock

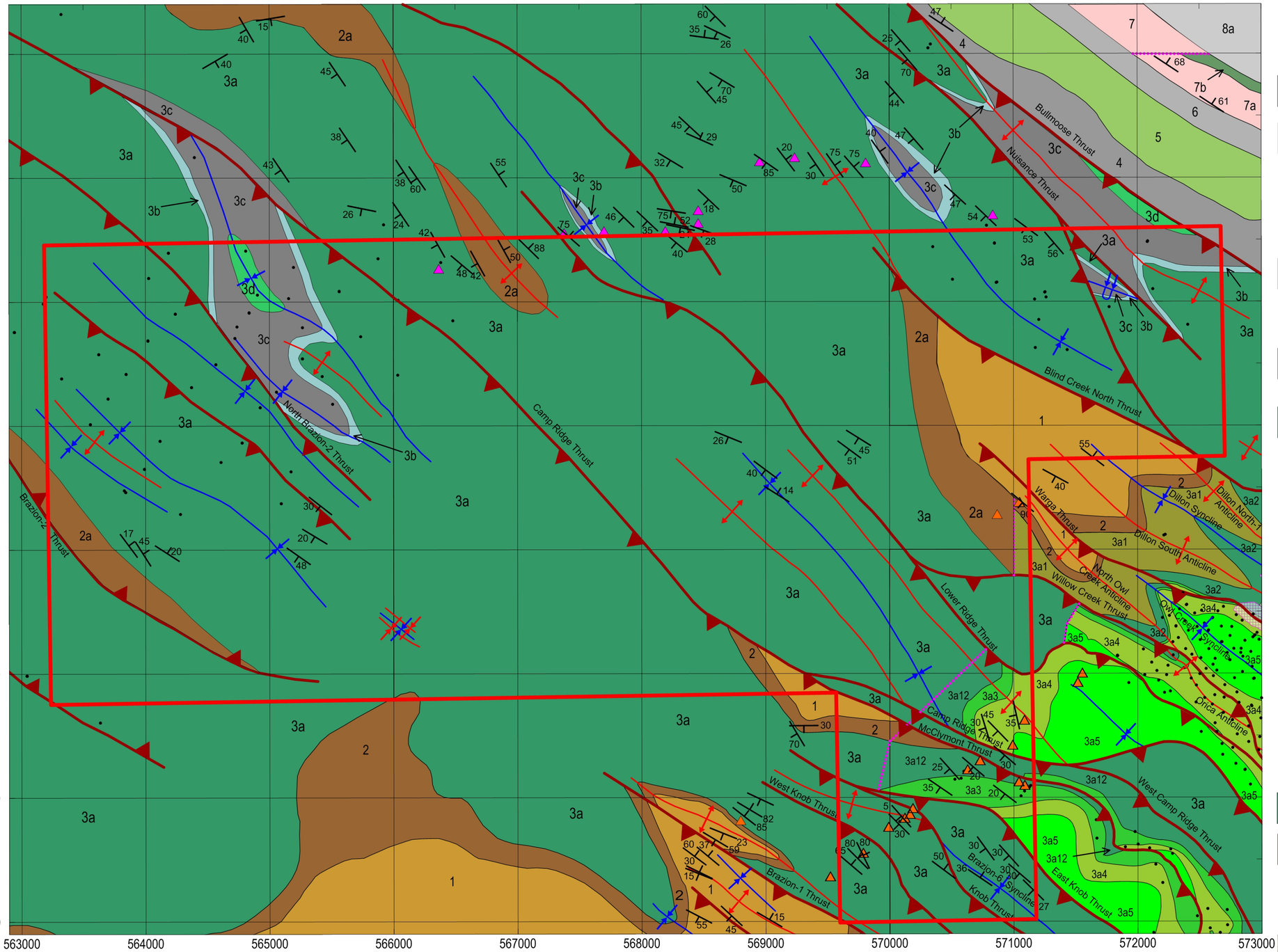
Table A-1: Geophysical logs run in current boreholes (concluded)

Borehole	Easting	Northing	Elev-ation	Total depth	Gamma/Caliper/ Resistivity/Density	Gamma/ Neutron	Gamma/ Density	Deviation	Dipmeter	Notes
MCE12-17	570499.00	6142865.50		205.74	203.38	203.86		203.66	202.50	
MCW12-01	566479.41	6142847.05	1170.2	49						No geophysics
MCW12-02	566383.47	6143316.62	1188.3	120.39	115.44	115.46		115.26		
MCW12-03	565563.76	6143082.86	1212.9	195.68	194.32	194.24		194.04	193.50	
MCW12-03C	565561.98	6143085.71	1212.6	77.72	77.09	77.09		76.90		
MCW12-04	565875.90	6143348.98	1190.7	205.74	203.50	203.42		203.22	202.50	
MCW12-05	565426.50	6142400.28	1251.0	214.88	214.02	213.94		213.74	213.00	
MCW12-06	565266.72	6142793.41	1250.5	147.82	147.06	147.06		145.86	146.50	
MCW12-07	565196.91	6143279.76	1254.5	158.49	153.39	153.23		153.02	97.00	
MCW13-01C	564810.888	6143412.377	1340.7	251	251.38	251.34		251.34		
MCW13-02C	565512.323	6142177.254	1231.3	250	248.17	248.09		247.72		
MCW13-03	564281.872	6141287.408	1228.1	30						No geophysics
MCW13-04	564608.997	6141707.446	1275.4	249	247.52	247.60		247.60		
MCW13-05C	564906.389	6143055.611	1317.7	212	211.18	211.18		211.18	210.50	
MCW13-06	565174.444	6141629.971	1277.3	250	244.07	245.59		245.60	240.50	
MCW13-07	566038.748	6143014.473	1185.1	181	179.50	155.94		155.94	179.00	
MCW13-08	566035.396	6142408.815	1151.9	156	155.20	155.08		155.08	167.50	
MCW13-09	565736.335	6142718.683	1185.7	216	210.96	210.66		210.66	209.99	
MCW13-10	563827.461	6141480.065	1264.6	40	39.00	38.88		38.88		

UTM NAD83

MINK CREEK

NTS 93 O/8 E and P/5 W
CANADA



STRATIGRAPHY

FORT ST JOHN GROUP (Albian)

- 8a — Hasler Formation -- siltstone and mudstone
- 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 tuff; basal grit
- 5 — Gates Formation -- sandstone, shale, conglomerate; minor coal
- 4 — Moosebar Formation -- marine siltstone and shale; minor tuff; basal pebbly glauconitic sandstone ('Green Marker')

CRASSIER GROUP (Valanginian? to early Albian)

- 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; siltstone and mudstone
  - 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 — Division 2 -- siltstone and sandstone; minor conglomerate and coal
      - 3a2
      - 3a1 — Division 1 -- sandstone, conglomerate and siltstone; minor coal
- 2a
  - 2 — Cadomin Formation (Unit 2) / Dresser Formation (Unit 2a) -- cliff-forming conglomerate and sandstone; minor siltstone and coal. Dresser Formation includes beds elsewhere mapped as Unit 3a1 of the Gething Formation
- 1 — Brenot Formation -- sandstone, siltstone, shale, conglomerate, and coal

STRUCTURE AND MAPPING

- Bedding attitude
- Anticline
- Syncline
- Thrust fault -- barbs on overthrust plate
- Limit of detailed stratigraphic mapping
- Outline of Mink Creek coal property
- Coal outcrops:
  - from M. Sultan's mapping (2014)
  - from B. McClymont (1981)
- Boreholes (current and historic)

map scale in metres

0 500 1000 1500 2000 2500 3000 3500 4000

UTM Grid North (NAD 83)

Authors: C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME and M. Sultan P.Geo. Date: 2014 Dec.27 (revision E2)
Grid system: UTM NAD83 Zone 10N in metres 100 km grid square: ES Scale: as shown on bar-scale
Sources: compiled by C.G. Cathyl-Huhn from work by P.B. Jones (Triad Oil, 1960), B.McClymont (Teck Corporation, 1979, 1981), J.Hughes (Gulf Canada, 1980), D.J.Hunter and J.M.Cunningham (BCGSB, 1991), A.Legun (BCGSB, 2003), and M.Sultan (Western Coal / Walter Energy, 2011-2014).

REV	DATE	DESCRIPTION
E	Dec.27/14	Structural geology

WALTER ENERGY

Drawn by:	GCH
Scale:	as shown
Dwg. No.: Mink_Creek-workmap-geology-141227e.srf/jpg	

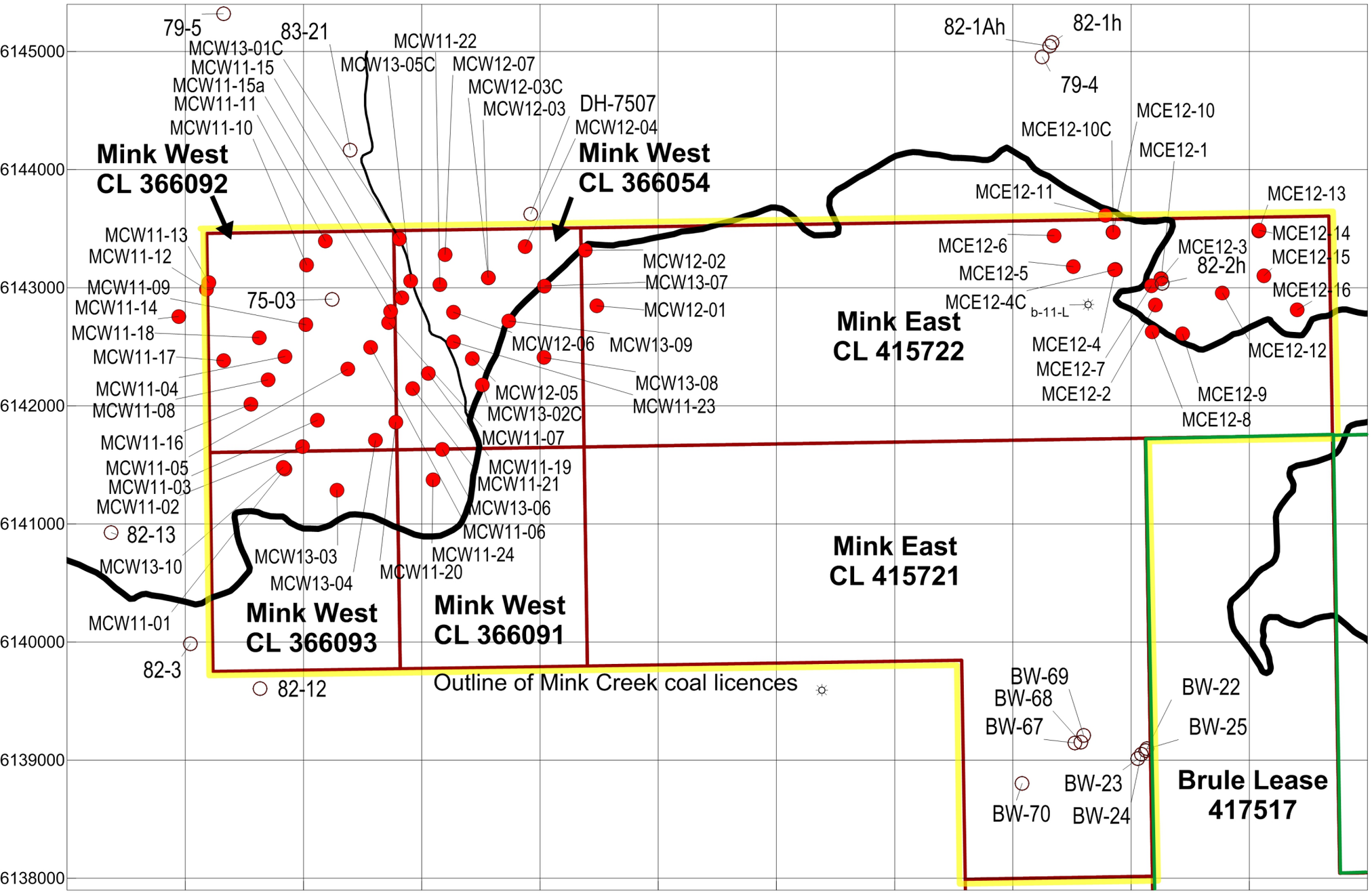
GEOLOGY OF MINK CREEK COAL PROPERTY

DEC 2014 | MINK CREEK COAL ASSESSMENT REPORT | MAP 2-3

MINK CREEK

UTM NAD 83

CANADA
NTS 93 O/8 and 93 P/5



UTM Grid North

Access (not classified as to trafficability):

Road (coal haulage)

Road (other)

Land classification:

Coal licence (with historic and current tenure number)

Coal lease (with current tenure number)

Natural gas wells (not classified as to activity)

Historic boreholes (except those drilled in Brule Lease, not shown)

Current boreholes (except those drilled in Brule Lease, not shown)

Note: current boreholes MCW11-12 and -14, and MCE12-11, are located outside the bounds of the Mink Creek property.

Drawing: Mink_Creek-drilling_141130c.srf/jpg
Drawn: C.G. Cathyl-Huhn, P.Geo.(BC) Lic.Geol (WA) RMSME
Date: 17. December 2014 Scale: as shown by bar scale
Grid: UTM NAB83 Zone 10, in metres

Base mapping: British Columbia government TRIM-series map sheets 093O.050, P.031 and P.032

Note: for location of numerous boreholes within the Brule Lease, refer to Coal Assessment Report No. 936 (Cathyl-Huhn and Avery, 2014)

Mink_Creek-drilling_141217c.srf/jpg

WALTER ENERGY

Scale: as shown	CURRENT AND HISTORIC DRILLING	
UTM NAD 83		
Revision: C		
Drawn: GCH		
DEC 2014	MINK CREEK COAL ASSESSMENT REPORT	MAP 2-4