COAL ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TITLE OF REPORT: **Coal Assessment Report for the Willow Creek coal lease -- Volume 5: Willow Creek Mine, 2018 infill drilling**

TOTAL COST: **$1,617,533.79**

AUTHOR(S): **C.G. Cathyl-Huhn P.Geo, 17.March, 2019**

SIGNATURE(S):

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):

YEAR OF WORK: **2018-2019 lease term**

PROPERTY NAME**: Willow Creek**

COAL LICENSE(S) AND/OR LEASES ON WHICH PHYSICAL WORK WAS DONE:
Coal Lease 389294

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: **93O.008**

MINING DIVISION: **Liard**

NTS / BCGS**: NTS 93O/9 / BCGS 93O.059, 93O.060, 93O.069, and 93O.070**

LATITUDE: **55° 36’ 00" North**; LONGITUDE: **122° 12’ 50" West** (at centre of work)

UTM Zone: **10N** EASTING: **549540** NORTHING: **6161855**

OWNER(S): **Conuma Coal Resources Limited**

MAILING ADDRESS: **200-235 Front St. (P.O. Box 2140), Tumbler Ridge, BC, V0C 2W0**

OPERATOR(S) [who paid for the work]: **Conuma Coal Resources Limited**

MAILING ADDRESS: **200-235 Front St. (P.O. Box 2140), Tumbler Ridge, BC, V0C 2W0**

REPORT KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralisation, size and attitude). **coal, Minnes Group, Bickford Formation, Bullhead Group, Cadomin Formation, Gething Formation, Gaylard Member, Bluesky Formation, Moosebar Formation, Bullmoose Member, Chamberlain Member, Cowmoose Member, anticlines, synclines, thrust faults**

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:
Coal Assessment Reports 984, 986, 988, and 1001 (primary references); also 490, 526, 667, 861, 936, 937, 952, 966, and 972; Petroleum Reports 582, 746, 863, and 1161.

SUMMARY OF TYPES OF WORK IN THIS REPORT		EXTENT OF WORK (in metric units)	ON WHICH TENURES
GEOLOGICAL (scale, area)			
	Ground, mapping	**nil**	n/a
	Photo interpretation	**nil**	n/a
GEOPHYSICAL (line-kilometres)			
	Ground (Specify types)	**nil**	n/a
	Airborne	**nil**	n/a
	(Specify types)		
	Borehole -- ***geophysical logs in all 37 holes***		
	Gamma-density (logged within drill rods)	**3310.09 m in 25 holes**	389294
	Compensated gamma-density-caliper-resistivity	**4699.35 m in 37 holes**	389294
	Deviation	**4659 m in 37 holes**	389294
	Gamma-neutron (logged within drill rods)	**3647.20 m in 27 holes**	389294
	Gamma-neutron	**4322.19 m in 37 holes**	389294
	Dipmeter	**1715.17 m in 14 holes**	389294
	Sonic	**449.51 m in 4 holes**	389294
	Spectral gamma-ray (KUT-log)	**nil**	389294
	Others	**nil**	n/a
	Core drilling	**3676.59 m in 27 holes**	389294
	Non-core (rotary) drilling	**1022.94 m in 10 holes**	389294
SAMPLING AND ANALYSES			
Total number of samples		**499 samples**	389294
	Proximate (with sulphur)	**499 analyses**	389294
	Ultimate	**nil**	n/a
	Apparent specific gravity	**499 analyses**	389294
	Ash chemistry (reported as oxides)	**nil**	n/a
	Ash fusibility	**nil**	n/a
	Petrographic	**nil**	n/a
	Vitrinite reflectance	**nil**	n/a
	Light transmission (oxidation test)	**414 analyses**	389294
	Caking (Free Swelling Index determination)	**414 analyses**	389294
	Coking	**nil**	n/a
	Wash tests	**nil**	n/a
PROSPECTING (scale/area)		**nil**	n/a
PREPARATORY/PHYSICAL			
Line/grid (km)		**nil**	n/a
Trench (number, metres)		**nil**	n/a
Bulk sample(s):		**nil**	n/a

Section 7 remains confidential under the terms of the Coal Act Regulation, and has been removed from the public version.

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

1 Table of contents

1.1 List of tables

1.2 List of maps

1.3 List of Plates

2 Introduction

The Willow Creek coal lease, although held as one tenure, has been in recent years been explored and developed as three geographically (and to some extent tectonically) distinct blocks, although these blocks do not have independent identities as mineral tenures in their own right:

- Willow Creek Mine block, the subject of the present study, previously-reported in Coal Assessment Reports (CARs) 988 and 1001;
- Willow West block, situated along the southwestern bank of Willow Creek, and thus lying to the west of Willow Creek Mine, previously reported in CAR-984;
- Willow South block, situated along the northeastern bank of Willow Creek, and thus lying to the southeast of Willow West, previously reported in Coal Assessment Report 986; and

The present volume is the fifth in a series of coal assessment reports concerning portions of the Willow Creek coal lease, covered by Crown tenure 389294. Previous volumes have focussed on the Willow South and Willow West exploration activities, previous work at Willow Creek Mine itself, and archival presentation of borehole data from exploration conducted at the mine in 1997. The present report discusses results of year-2018 infill drilling, conducted to investigate coal-quality trends and geological structure (both of tectonic and sedimentological origin) within the 4N2 area of Willow Creek Mine.

2.1 Arrangement of this report

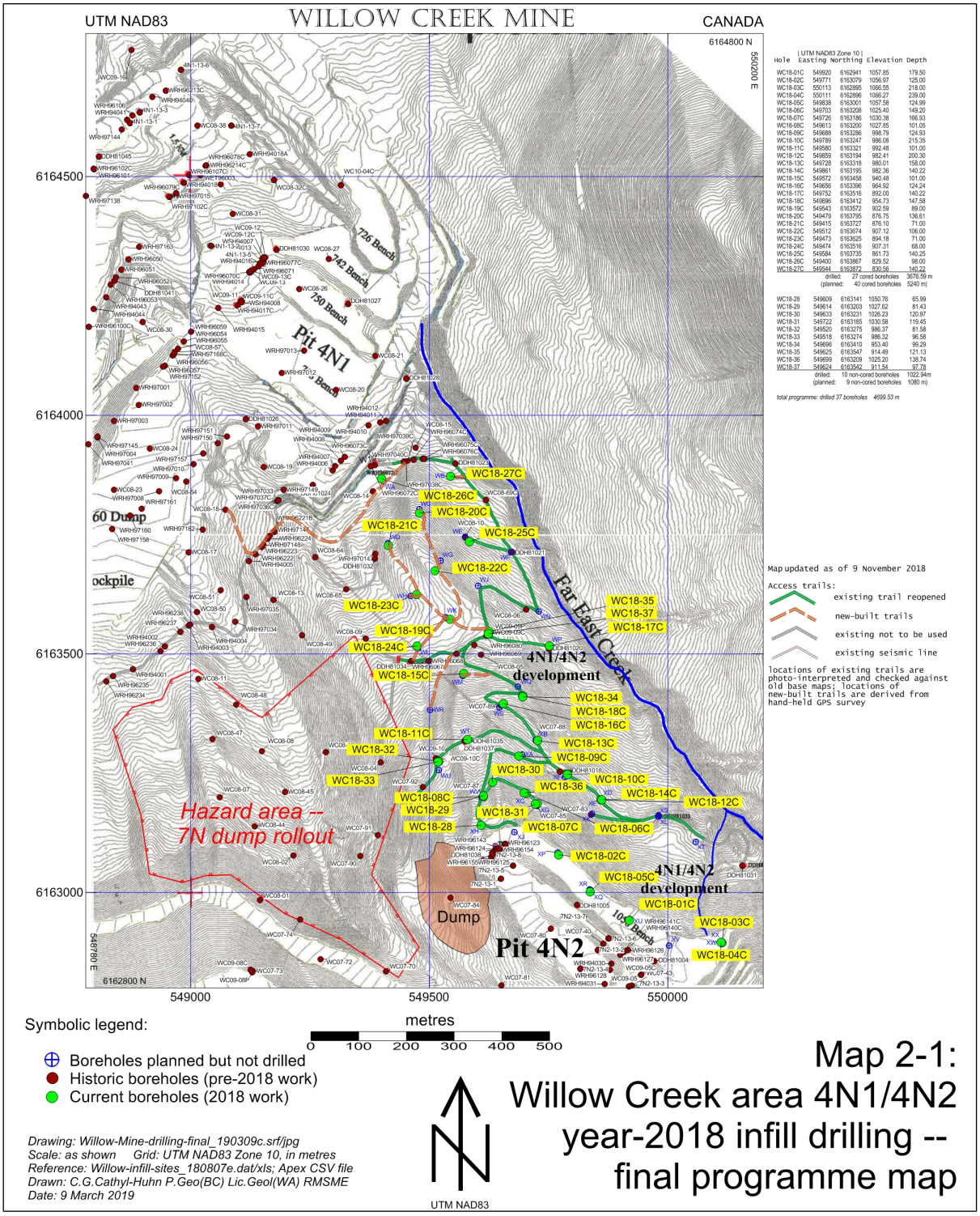
To reiterate, this report concerns the Willow Creek Mine block. The text and **Appendix A** discuss year-2018 infill diamond core-drilling, non-coring rotary-drilling, and associated downhole geophysical surveys. **Appendix B** presents initial (raw-coal) results of coal-quality sampling and consequent proximate analyses of diamond-drill cores. All of this work was done within the mine's permitted disturbance boundary, specifically within the 4N1/4N2 development area of the mine (as shown in detail within **Map 2-1**). Results of this infill work are being incorporated into a geological model and an updated mine plan, being prepared by the mine's engineering and geological staff.

2.2 Distinction of historic and current work

Historic work comprises drilling of 726 boreholes (a majority of which were non-coring rotary-holes) and ancillary downhole geophysical surveys, as previously reported in Coal Assessment Reports 984 (Cathyl-Huhn *et al*., 2015a), 986 (Cathyl-Huhn *et al*., 2015b), 988 (Cathyl-Huhn *et al*., 2015c), and 1001 (Cathyl-Huhn, 2015). Historic work was conducted between 1980 through 2013.

Current work (**Table 3-1**) comprises drilling of 37 boreholes (the majority of which were cored diamond-drill holes) and an ancillary programme of downhole geophysical surveys (as documented in **Appendix A** of this report). Current work was done in 2018 (during which year all of the disturbant work was done) and 2019 (with year-2019 work being analytical in scope).

The total number of boreholes now known to have been drilled at Willow Creek Mine is 763. Borehole records, which are presented in **Appendix A**, are filed in the geological archives of Willow Creek Mine. Diamond-drill core samples are stored at the mine's coreshack and laydown yard, situated within the 7N area of the mine.



UTM NAD83 Zone 10				
Hole	Easting	Northing	Elevation	Depth
WC18-01C	549920	6162941	1057.85	179.50
WC18-02C	549771	6163079	1056.97	125.00
WC18-03C	550113	6162895	1066.55	218.00
WC18-04C	550111	6162896	1066.27	239.00
WC18-05C	549838	6163001	1057.58	124.99
WC18-06C	549703	6163208	1025.40	149.20
WC18-07C	549726	6163186	1030.38	166.93
WC18-08C	549613	6163200	1027.85	101.05
WC18-09C	549688	6163286	998.79	124.93
WC18-10C	549789	6163247	986.08	215.35
WC18-11C	549580	6163321	992.48	101.00
WC18-12C	549659	6163194	982.41	200.30
WC18-13C	549728	6163318	980.01	158.00
WC18-14C	549861	6163195	982.36	140.22
WC18-15C	549572	6163458	940.48	101.00
WC18-16C	549656	6163396	964.92	124.24
WC18-17C	549752	6163516	892.00	140.22
WC18-18C	549695	6163412	954.73	147.58
WC18-19C	549543	6163572	902.59	89.00
WC18-20C	549479	6163795	876.75	136.61
WC18-21C	549415	6163727	876.10	71.00
WC18-22C	549512	6163674	907.12	106.00
WC18-23C	549473	6163525	894.18	71.00
WC18-24C	549474	6163516	907.31	68.00
WC18-25C	549584	6163735	861.73	140.25
WC18-26C	549400	6163867	829.52	98.00
WC18-27C	549544	6163672	830.56	140.22
	drilled:	27 cored boreholes		3676.59 m
	(planned:	40 cored boreholes		5240 m)
WC18-28	549609	6163141	1050.76	65.99
WC18-29	549614	6163203	1027.62	81.43
WC18-30	549633	6163231	1026.23	120.97
WC18-31	549722	6163185	1030.58	119.45
WC18-32	549520	6163275	986.37	81.58
WC18-33	549518	6163274	986.32	96.58
WC18-34	549696	6163410	953.40	99.29
WC18-35	549625	6163547	914.49	121.13
WC18-36	549699	6163209	1025.20	138.74
WC18-37	549624	6163542	911.54	97.78
	drilled:	10 non-cored boreholes		1022.94m
	(planned:	9 non-cored boreholes		1080 m)

total programme: drilled 37 boreholes 4699.53 m

Map 2-1: Willow Creek area 4N1/4N2 year-2018 infill drilling -- final programme map

2.3 Regulatory basis of report

This report has been compiled and submitted by Conuma Coal Resources Limited (Conuma), 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 infill drilling and associated geophysical and analytical work, focussed on the 4N1/4N2 development area (**Map 2-1**) of Willow Creek Mine, situated within Conuma's Willow Creek coal lease (**Maps 2-2** and **2-3**), sited in the northeastern part of British Columbia, Canada (**Map 2-4**).

2.4 Situation and current drilling objectives

The objective of current work was to increase Conuma's level of understanding of coal quality and geological structure within the 4N1/4N2 area of Willow Creek Mine, and furthermore to test for the potential mineability of coal zones not previously brought into the mine's resource base and reserves.

Current work has consisted of maintenance and extension of access trails and drillsite pads within the 4N1/4N2 area of Willow Creek Mine, diamond- and rotary-drilling, acquisition of borehole geophysical data, and the measurement of physical and chemical properties of coal samples through laboratory analysis, including proximate analysis, determination of total sulphur, caking (FSI) tests, and tests for oxidation by optical means.

2.4.1 Tenure description

The Willow Creek Mine block occupies the northeastern portion of the Willow Creek coal lease (Tenure 389294), within the Liard Mining District of northeastern British Columbia, situated within the eastern half of map-area 93O/9 of Canada's National Topographic System.

Table 2-1: Tenure details of the Willow Creek coal lease

Tenure Number	Map	Block	Units	Date Acquired	Area (hectares)	Former coal lease number
389294 (84 units)	93O/9E	B	61, 62, 63, 64, 71, 72, 73, 74, 81, 82, 83, 84, 85, 86, 87, 88 91, 92, 93, 94, 95, 96, 97, 98	March 31, 1998	6151	Coal Lease 15
	93O/9W	F	1, 2, 11, 12, 21, 22, 31, 32 41, 42, 51, 52, 61, 62, 63, 64 71, 72, 73, 74, 83, 84, 93, 94			
	93O/9E	G	3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 25, 26, 27, 28, 29, 30, 35, 36, 37, 38, 39, 40, 47, 48, 49, 50, 57, 58, 59, 60			
Totals:	1 tenure		84 units		6,151 hectares	

Note: Map sheets listed are within the National Topographic System. Blocks and Units refer to the British Columbia Coal Tenures Grid System, whose unit cells are based upon NAD 27 surveys, and translated into NAD 83 coordinates for purposes of mapping.

The aggregate area of the Willow Creek coal lease is 6151 hectares. Tenure 389294 was granted by the Crown on March 31, 1998 (as listed in **Table 2-1**). Annual reporting and rental-payment anniversary dates are therefore March 31. The Willow Creek Mine block is an informal operational subdivision of the coal lease, with no formal stand-alone identity within

the Crown mineral-tenure system of British Columbia. The outline of the Willow Creek Mine block is depicted upon **Map 2-2** and **Map 2-3** of the present report.

2.4 Coal production history

Willow Creek Mine's coals have been extensively worked by open-pit operations, commencing in year-2001 and proceeding with some interruptions to the present day.

2.4.1 Mine operation under Conuma ownership

In 2016, Conuma acquired the then-dormant mine in 2016. Mining operations recommenced in July 2018, and has continued to the present date. The mine is working within its 4N1/4N2 mining areas, which had previously been worked by Walter Energy. Workshops and other requisite support facilities (including administrative, environmental, and technical offices) exist at Willow Creek Mine, and are in active use. A coal-washery and railcar-loader with railway-sidings are also present.

2.4.2 Production statistics

During the overall period of operation, Willow Creek Mine has produced slightly more than 6.05 million run-of-mine (ROM) tonnes of coal, at a strip ratio of 9.35 cubic metres/ROM tonne. Breakdown by year and material type is presented as **Table 2-2**.

Table 2-2: Production statistics by year and material type

	Bank cubic metres			Tonnes		
Year	Total mined	Waste	Coal	Total mined	Waste	Coal
2001	186,690	160,000	26,690	452,031	416,000	36,031
2002	215,811	180,000	35,811	516,345	468,000	48,345
2003	0	0	0	0	0	0
2004	1,594,963	1,412,000	182,963	3,918,200	3,671,200	247,000
2005	5,748,955	5,219,615	529,339	14,285,608	13,571,000	714,608
2006	4,779,093	4,328,231	450,861	11,862,062	11,253,400	608,662
2007	0	0	0	0	0	0
2008	1,249,000	1,212,000	37,000	3,201,150	3,151,200	49,950
2009	0	0	0	0	0	0
2010	6,415,816	6,078,157	337,659	16,259,048	15,803,208	455,840
2011	6,285,249	5,594,582	690,667	15,478,314	14,545,913	932,401
2012	16,228,129	15,245,144	982,985	40,964,404	39,637,374	1,327,030
2013	7,942,988	7,433,970	509,018	20,015,496	19,328,322	687,174
2014	1,727,828	1,581,502	146,326	4,309,445	4,111,905	197,540
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018 (Jul-Dec)	n/a	5,907,000	n/a	n/a	n/a	549,000
2019 (Jan-Feb)	n/a	2,186,000	n/a	n/a	n/a	197,000
Totals		**56,538,201**				**6,050,081**

Notes: data to end of 2014 compiled by Allen Baron, P.Eng. Figures for years prior to 2010 were taken from annual reports. Year-2018 and 2019 data provided by Sal Bafaro and by Lukas Klemke P.E.

2.5 Geological setting of Willow Creek Mine

Near-surface sedimentary rocks within and adjacent to the Willow Creek Mine block are of Lower Cretaceous age, comprising (from youngest to oldest) the basal formations of the Fort St. John Group, and the entirety of the Bullhead Group. The older and stratigraphically-lower Minnes Group is inferred to underlie the Willow Creek Mine block, but it is not mapped at outcrop at any point, and it likely has not yet been reached by coal-exploration drilling within the block, although oil and gas wells have drilled through these rocks.

The regionally-extensive coal-measures of the Gates and Boulder Creek formations have not been drilled at Willow Creek. Coal has, however been extensively drilled within the Gaylard Member (Gibson,1992a) of the Gething Formation of the Bullhead Group (**Map 2-3**).

2.5.1 Stratigraphic summary

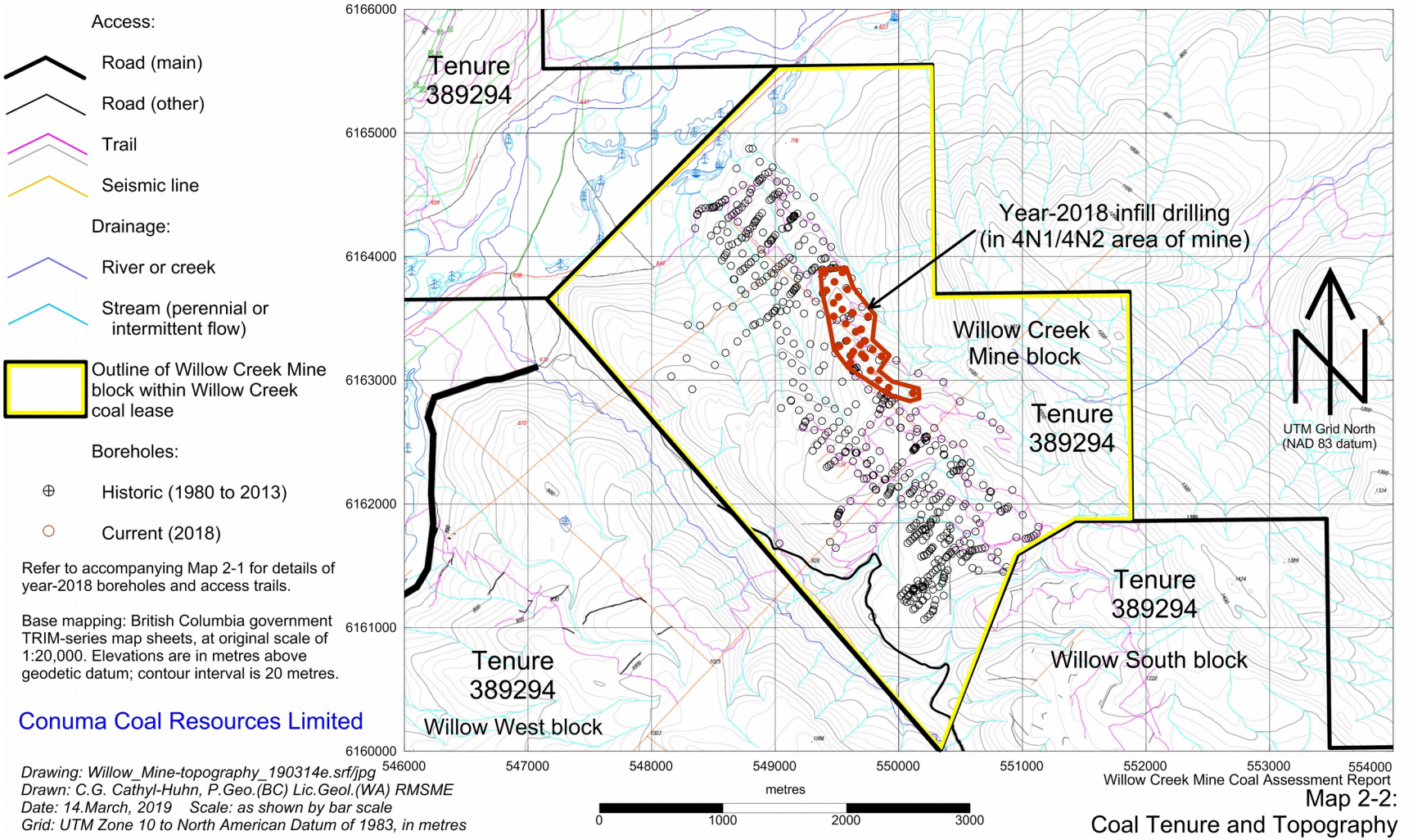
Other than the coals which have been the focus of exploratory activities within the Willow Creek Mine block, associated sedimentary rocks comprise conglomerates, sandstones, siltstones, mudstones, carbonaceous mudstones, concretionary or banded ironstone, and thin but distinctive bands of igneous tuff (Kilby, 1984a; 1985). Marine mudstones and siltstones occur within the Fort St. John Group (Wickenden and Shaw, 1943; Hughes, 1963), most notably within the Moosebar and Hulcross formations. Furthermore, the local occurrence of bioturbated mudstones and siltstones in the basal half of the Gething Formation's Gaylard Member hints at the presence of marine conditions, there too, during deposition. The facies of the remainder of the Gaylard Member, of the overlying Gates and Boulder Creek coal-measures, and also of the underlying Cadomin and Bickford formations, are otherwise alluvial, fluvial, or deltaic.

2.5.2 Structural summary

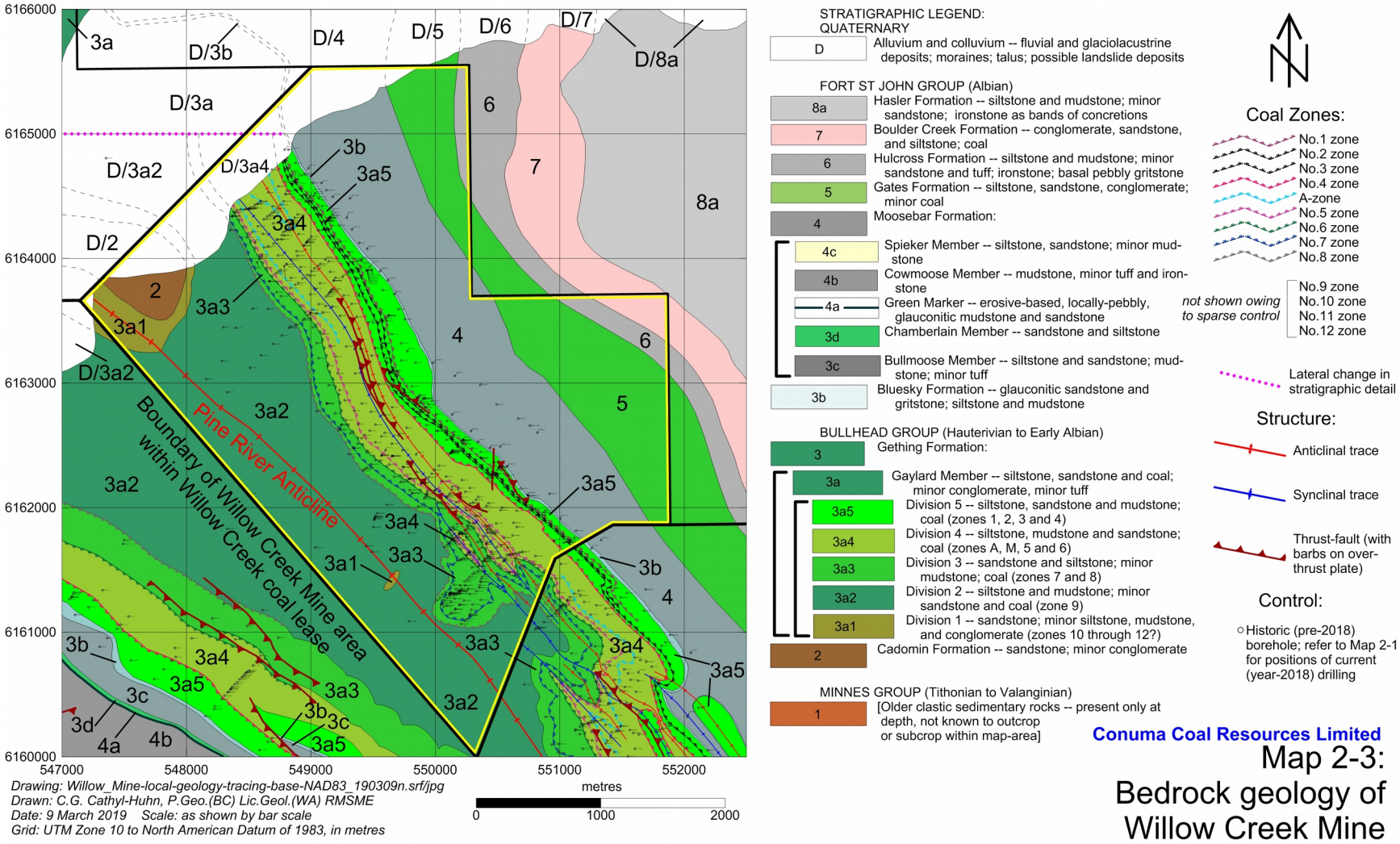
Bedrock within the Willow Creek Mine block is moderately- to complexly-deformed, possibly more-so than is the case in the adjoining Willow West and Willow South blocks (James, 1998; Jordan and Acott, 2005; Cathyl-Huhn *et al.*, 2015a; 2015b). Southwest-verging thrust-faults, some of which may be folded, and associated northwest-striking, southwest-verging folds predominate at Willow Creek Mine, consistent with a structural setting within a passive-roof duplex system. Folding of the near-surface thrust-faults, and refolding of some of the folds, are very likely the result of tectonic ramping of younger, underlying, northeast-verging thrust-faults, as suggested by oilfield seismic surveys. The opposing vergences of the shallow and deep structures is consistent with the triangle-zone structure which is well-established to be present within the Pine Pass area (McMechan, 1985; Lingrey, 1996).

2.5.3 Nomenclature and context of coal zones

Within the Gaylard coal-measures, numerous coal zones have been found by historic and current drilling at Willow Creek Mine. Coal zones are numbered in downward succession from the No.1 (near the top of the coal-measures) through No.12, following a long-established schema (McKechnie, 1955). As well, a coal zone at the immediate top of the coal-measures has been given the local name of Bird Seam, although this coal is by no means correlative with the Bird Seam as previously-recognised (Wallis and Jordan, 1974) in other coal properties of northeastern British Columbia.



Map 2-2: Coal Tenure and Topography



Map 2-3: Bedrock geology of Willow Creek Mine block

Most of the coal zones contain one or more major coal beds, often associated with laterally-branching splits, stringers and stringer plies (as summarised in **Table 5-1**). Individual coal beds and sub-beds range in thickness from a few decimetres to several metres.

At Willow Creek Mine, the Gaylard coal-measures may be conveniently subdivided into five informal divisions, numbered in upward succession from Division 1 at the base of the Gaylard, to Division 5 at the top of the Gaylard. Drilling has established that the thickest, and possibly more laterally-extensive, coals occur within Divisions 3, 4, and 5 of the Gaylard Member, at Willow Creek Mine.

2.5.4 Proposed regional coal correlations

Regional correlations of Gaylard coals are suggested as follows:

- The 'Bird' zone at Willow Creek Mine may be correlative with the Lower Gething A zone at Sukunka Colliery. It is definitely not correlative with the type Bird Seam at Sukunka, East Bullmoose, and Perry Creek.
- No.4 zone at Willow Creek Mine may be correlative with the Brenda in the Hudette area, F zone at Mink Creek, Conuma A coal zone (formerly known as Seam C60) at Brule Mine, and the B zone at Sukunka;
- No.6 zone at Willow Creek Mine may be correlative with the Conuma B coal zone (formerly known as the Upper Seam) at Brule Mine; and
- No.7 zone at Willow Creek Mine may be correlative with the Conuma C coal zone (formerly known as the Lower Seam) at Brule Mine.

2.6 Location and access

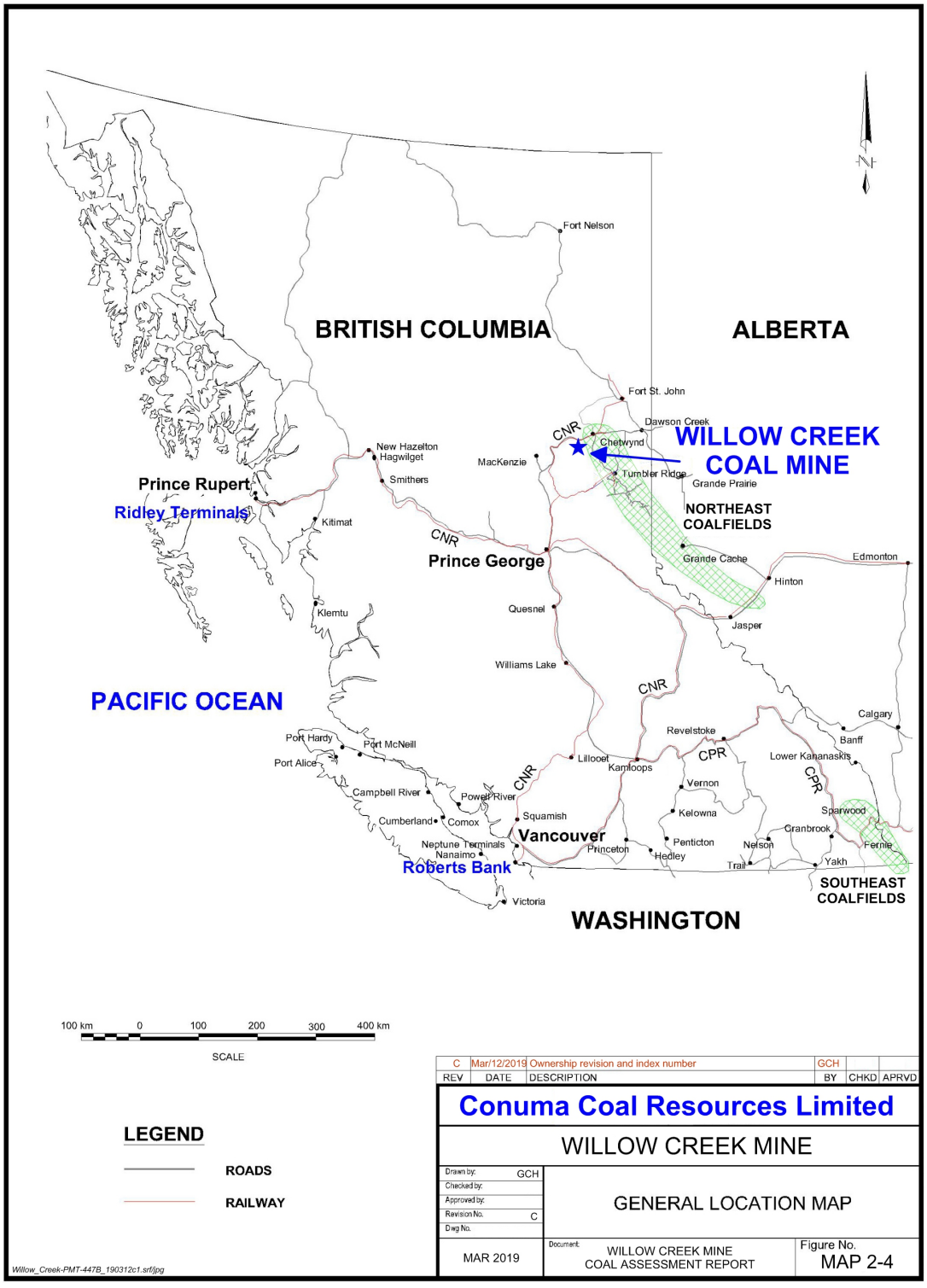
Chetwynd town, located on Highway 97 and situated approximately 50 kilometres northeast of Willow Creek Mine, is the closest incorporated settlement to Willow Creek Mine (**Map 2-4**). Chetwynd's population was reported as 2,633 persons in the year-2006 census. In the context of more-distant communities within British Columbia, the Willow Creek Mine coal property is located 130 kilometres south of Fort St John, 95 kilometres west of Dawson Creek, and 315 kilometres northeast of Prince George. Vancouver is situated 730 kilometres to the south-southwest of the property. Commercially-scheduled aircraft flights connect Vancouver to Fort St. John and Dawson Creek. A municipal airstrip is maintained at Chetwynd for non-scheduled use, chiefly by chartered helicopters.

2.6.1 Coal-loading facility and railway connections

A coal-loading facility is situated on the southern bank of the Pine River, 2 kilometres to the northwest of Willow Creek Mine. This loadout site, which fills railway cars with coal produced from Brule Mine and from the Willow Creek coal washery, allows rail access to ports along the Pacific Coast of Canada, and elsewhere within the North American railway network. CN Rail are the operator of the former BC Rail line to which the loadout site is connected.

2.7 Climate

The nearest climate station to Willow Creek Mine is at Chetwynd, with 'cool continental' climate of frigid winters and warm summers. Average annual rainfall and snowfall at Chetwynd are 306



Map 2-4: General location map

millimetres and 169 centimetres respectively. The average frost free period ranges between 84 to 91 days, and about 30 foggy days 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.

2.8 Landforms and forest cover

The Willow Creek Mine block lies within the Inner Foothills of the Rocky Mountains. Topography comprises deeply-dissected, steep-sided, rounded hills and mountains, with elevations ranging from 635 to 1345 metres above sea level. Topographic contours at 20-metre intervals, based upon provincial government mapping (TRIM map-sheets 93O.059 and 93O.069), are shown in **Map 2-2**.

The Willow Creek Mine block is heavily forested, chiefly with lodgepole pine, trembling aspen, balsam poplar, white and black spruce, and tamarack. The property lies within Tree Farm Licence 48, part of the Dawson Creek Timber Supply Area. Some cut-blocks have been operated for timber harvesting within the Willow Creek Mine block. As well, areas of forest cover (including a substantial portion of the mine's 4N1/4N2 development area) have been cleared in preparation for mine development. As a result, forest cover exhibits a range of ages and states of maturity.

2.8.1 Biogeoclimatic ecosystem classification

Willow Creek Mine lies within the Sub-Boreal Interior ecoprovince, within which are three biogeoclimatic ecosystem classification variants:

- Boreal White and Black Spruce moist warm Peace variant (*BWBSmw1*),
- Sub-boreal Spruce wet cool Finlay-Peace variant (*SBSwk2*), and
- Englemann Spruce Subalpine Fir moist very cold Bullmoose variant (*ESSFmv2*).

2.9 Acknowledgements and statement of professional responsibility

Thanks are due to many past and present workers:

- Allen Baron, P.Eng., senior mining engineer at Willow Creek Mine;
- Jerry Holmes, P.Geo., Apex Geoscience's drilling project manager;
- Dr. Peter Jones, at International Tectonic Consultants, who has continued to offer thought-provoking insights into the structural geology of the Mink-Brazion coalfield, including the Pine River Anticlinorium and the associated triangle-zone structure;
- Vesko Karadzic, P.Geo., mine geologist at Willow Creek Mine, who is reconstructing the structural and quality models of the mine, as well as maintaining the mine's geological archives; and
- John Stokmans, Laura LeMay, and Katherine Evans, former mine geologists at Walter Energy, for stimulating discussions of the geological structure and mining conditions at Willow Creek.

The author accepts professional responsibility for data and conclusions presented within this report.

3 Exploration

Both historic (pre-2018) and current (year-2018) coal exploration has been done by various parties within the Willow Creek Mine segment of the Willow Creek coal lease. The majority of the work is of historic vintage. In all, 763 historic and current boreholes (**Table 3-1**) are known to have been drilled between the years 1980 and 2018. Earlier (1946 to 1951) diamond-drilling is known to have occurred (as reported by McKechnie, 1955), but has not yet been accurately-located within the Willow Creek Mine block.

3.1 History of coalfield development

The following discussion is adapted in part from an unpublished report (Ryan, 2010) on behalf of Unicorn International Mines Group Inc.

Coal was first discovered in the Peace River District in 1793, by Alexander MacKenzie's exploring expedition (MacKenzie, 1801). Prior to 1980, less than 100,000 tonnes of coal were mined at all locations within northeastern British Columbia (Ryan, 2002).

At a location on Hasler Creek, situated about 17 kilometres southeast of Willow Creek Mine, the Hasler Creek Coal Company commenced small-scale underground coal-mining in 1943, continuing through 1944 and 1945. At this time, considerable geological mapping and some prospecting were undertaken within the Pine River Anticlinorium, including the Willow Creek Mine area (Wickenden and Shaw, 1943, Spivak, 1944; reviewed by Stott, 1973).

From 1946 onward to 1951, British Columbia's former Department of Mines conducted a diamond-drilling and trenching programme of the then-known coal deposits near the Pine River valley (McKechnie, 1955). This programme entailed extensive drilling within the Willow Creek Mine block, but logs of these boreholes have not yet been located, although they might eventually be found within the working files of the British Columbia Geological Survey Branch, or within the British Columbia Archives.

From the late 1950s onward, several oil companies undertook structural and stratigraphic mapping within and adjacent to Willow Creek Mine, and within the Mink-Brazion coalfield generally.

- In the summer and autumn of 1956, Photographic Survey Corporation Limited compiled a aerial-photographic interpretation of the geological structure of the area (Pekar and Scott, 1956), on behalf of West Canadian Petroleums and Trans Empire Oils Ltd.
- In the summer of 1957, Trans Empire Oils Ltd. conducted a follow-up fieldwork programme, as reported by Bossort (1957).
- Two reports prepared on behalf of Triad Oil by Dr. Peter Jones (1960; 1963) are the most useful of those reports which are publicly-available, as they incorporate detailed structural and stratigraphic mapping.

Governmental and academic surveys were carried on concurrently. In 1963, Dr. John Hughes compiled a dissertation for McGill University, concerning structural geology and tectonics of the Pine River valley, including the Willow Creek Mine area (Hughes, 1963). Dr. Hughes' work was sponsored by the then-extent British Columbia Department of Mines, leading to the publication of two provincial Geological Survey Bulletins (Hughes, 1964; 1967).

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 rapid increase in crude oil prices, and concomitant increase in coal prices. These price increases were followed in short order by 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, albeit at currently-reduced levels owing to the present depression in global coal prices.

The Geological Survey of Canada published a regional-scale structural synthesis (McMechan, 1984), consisting of a map and cross-section at a scale of 1:250,000, followed by a journal article concerning the geometry of thrust-faults (McMechan, 1985).

3.2 Historic (years-1980 through 2013) exploration

The bulk of historic exploratory work at Willow Creek Mine has been by means of drilling, although considerable trenching and test-pitting was also done, especially within coal outcrops exposed during the construction of access trails and drill pads. A continuous miner (an underground coal-cutting and loading machine) was transported to the property from the Sukunka Mines in the early 1980s, but it remains unclear whether it was ever put into use to drive adits into the property although such work was planned (A.S. Marton, personal communication, 1981).

Historic work has been documented within coal-assessment reports and unpublished technical reports prepared by third parties (Marton, 1981; Marton and Jones, 1981; Anonymous, 1997; James; 1998; Jordan and Acott, 2005) and by Walter Energy (Cathyl-Huhn, 2015b; Cathyl-Huhn *et al*., 2015c). By the late 1990s, the structure and general characteristics of the Willow Creek coals were sufficiently well-understood, to appreciate that the coal-measures were complexly-folded and faulted, and that principal structures had a southwestern vergence (in contrast to the usual northeastern structural vergence of the Peace River coalfields).

Locations of historic boreholes are generally well-established by means of surveying, initially established in terms of local (minesite) coordinate systems (*vide* **Section 3.2.2**, and **Table 3-2**, below), but subsequently translated into Universal Transverse Mercator (UTM) coordinates referred to the older NAD27 (North American Datum of 1927) or the modern NAD83 (North American Datum of 1983) metrologies.

A conspicuous exception concerns the positions of numerous year-1997 boreholes from which cores were aggregated to form drilled bulk-samples for coking tests (Anonymous, 1997); these boreholes' positions are only known in general terms, from graphic symbols presented on a drilling plan. The reason for the lack of surveyed coordinate data for these holes is unknown.

The substantial majority (**Table 3-1**, below) of historic boreholes were drilled by means of non-coring rotary methods. Rotary-holes were generally shallower than diamond-cored

boreholes. Drilling of the property in 1980-81 was entirely by means of coring, in keeping with the need to establish stratigraphy and structural style through the examination of cores (A.S. Marton, personal communication, 1980).

The numerous boreholes drilled in years-1980 through 1996 are documented in maps and data tables within coal-assessment reports (Marton, 1981; Marton and Jones, 1981; James, 1998). More recent historic work, by Western Coal and by Walter Energy, has also been documented within more recent coal-assessment reports (*vide* Cathyl-Huhn, 2015b; Cathyl-Huhn *et al.*, 2015c).

Table 3-1: Statistical summary of historic and current drilling

Year in which drilled	Core drilling		Rotary drilling		All boreholes	
	Total holes	Total metres	Total holes	Total metres	Total holes	Total metres
historic drilling						
1980	3	854.70	0	nil	3	854.70
1981	43	11,240.30	0	nil	43	11,240.30
1994	3	107.91	54	2,694.29	57	2,802.20
1996	55	2,041.76	145	4,781.04	200	6,822.80
1997	73	2,052.30	67	3,119.88	140	5,172.18
1999	16	299.95	24	627.83	40	927.78
2001	5	708.80	15	576.20	20	1,285.00
2005	0	nil	28	1,975.40	28	1,975.40
2007	3	201.16	74	8,079.65	77	8,280.81
2008	3	475.30	50	5,887.68	53	6,362.98
2009	13	380.00	25	1,983.15	38	2,363.15
2010	5	493.05	1	13.00	6	506.05
2011	0		7	1,024.35	6	1,024.35
2013	14	1,083.83	0		14	1,083.83
totals	236 core	19,939.06	490 rotary	30,762.47	726 overall	50,701.53
current drilling						
2018	27	3,676.59	10	1,022.94	37	4,699.53
totals	27 core	3,676.59	10 rotary	1,022.94	37 overall	4,699.53
all years	*263 core*	*23,616.65*	*500 rotary*	*31,785.41*	*763 overall*	*55,401.06*

3.2.1 Cross-reference to historic borehole positions and depths

Positions and depths of historic (pre-2018) boreholes are presented in Tables 3-2 and 3-3 of the year-2015 coal assessment report for Willow Creek Mine (Cathyl-Huhn *et al*., 2015c).

3.2.2 Coordinate transformation from minesite grid to UTM (NAD83 Zone 10)

Prior to 2008, most exploration activities were surveyed in terms of a local mine grid, for convenience in locating boreholes along cross-section lines. Although the mine grid is no longer in active use, mathematical transformations are required to bring earlier work into present-day terms of the UTM grid system used in governmental base-mapping. The following notes summarise the transformation algorithm.

Table 3.2: Coordinate transformation notes

Minesite grid	
Origin east 14652.254	Origin north 14950.671
UTM grid	
Transformed east 534954.317	Transformed north 6146860.561
Rotation -46º 55' 52.918088"	
Scale factor 0.99946605	Elevation adjustment -2.623 metres

Plate 1: Geotech Drilling Services diamond-drill at site on then-inactive floor of 4N2 open-pit. Orange bladder contains water supply for drilling. Metal structure at extreme right is skid-mounted mud-tank. Southeastern highwall of 4N2 pit is in distance. [*RC4927/18.jpg*]

3.3 Current (year-2018) in-mine drilling

Conuma conducted drilling programmes within the Willow Creek Mine block in the summer and autumn of 2018. Drilling contractors were Geotech Drilling Services (two skid-mounted A5 diamond-drill rigs) and RC Drilling Ltd. (one track-mounted air-rotary drilling rig).

In all, 37 boreholes were drilled, with overall depth of 4,699.35 metres. Of these boreholes, 27 were cored and 10 were rotary-drilled.

Table 3-3 (below) and **Table A-1** (within **Appendix A**) presents the positional details and depths of the year-2018 boreholes. Lithological interpretation, including correlated intersections of coal and associated rock partings, are presented as **Table A-2,** within **Appendix A**. This table is followed (in the printed form of this report) by core descriptions pertaining to the 27 cored boreholes drilled in 2018. The core logs are also presented in digital form, as PDF-format scan-files.

Plate 2: Interior view of core shack at 7S laydown area of Willow Creek Mine. Building was previously used as a mine dry and subsequently as a storage facility. Core boxes are Northeast Coal standard length of 2.5 feet (ca. 75 cm), holding HQ diamond-drill core. Lighting was provided by a rented generator situated outside the building. [*RC4948/18.jpg*]

The purpose of the current drilling was to refine and extend the understanding of the structure and extent of surface-mineable coal in Willow Creek Mine's 4N1/4N2 area, and to better define the quality variations of major coal beds. Initial coal-quality results are presented as **Table B-1** in **Appendix B**. Current drilling mainly examined the coals of zones No. 1 through No.4 and A, within the upper and middle portions of the Gaylard Member. Less attention was paid to the No.5 coal zone. The majority of the boreholes, as noted above, were advanced by means of diamond-drills, allowing the recovery of coal and rock cores. A modest amount of follow-up rotary-drilling was undertaken; cores were not taken in these holes.

Access to drill sites was via a combination of existing and new trails, including reactivated logging trails where they were conveniently located with regard to the desired drilling locations. Efforts were made to maximise re-use of existing trails, in the interests of minimising construction of new trails. Some drill-pads were built directly open the existing (but then-inactive) floor of the 4N2 pit of Willow Creek Mine.

Plate 3: Geophysical logging engineer prepares to run gamma-density tool down borehole WC18-03C. Talus in background is derived from weathered highwall of 4N2 pit, excavated in silty mudstone of the Bullmoose Member of the Moosebar Formation [*RC4951/18.jpg*].

3.3.1 Borehole geophysics

Downhole geophysical logging of all of the current boreholes was done by Century Wireline Services (based out of Red Deer, Alberta, but operating from a hotel in Chetwynd), using a truck-mounted logging unit with draw-works and generator-derived power supply. A standard coal-industry suite of logs was run:

- Gamma/caliper/resistivity/compensated density (9239C tool);
- Gamma/density through drill rods (9068 tool, run in anticipation of hole instability);
- Gamma/neutron (9067 and 9058A tools);
- Deviation/verticality (9058A tool); and in certain boreholes,
- Dipmeter (9411A tool); and
- Sonic (9325A tool).

General-scale logs were plotted at 1:100 vertical scale, with selected detail logs at 1:50 vertical scale. Digital copies of downhole geophysical logs are presented in **Appendix A**, with an inventory of logs given as **Table A-1**. The digital logs are presented in LAS (Log ASCII Standard, as promulgated by the Canadian Well Logging Society) format, in TIF (Tagged Image File) format, and as PDF (Portable Document Format) files. LAS files can readily be imported into, and manipulated by, geophysical-processing software such as *LAS Viewer* or *WellCAD*, whereas TIF files may be opened by the native *Microsoft Windows* image-viewer, or by image-processing programmes such as *Photoshop*. PDF files are suitable for printing via plotter, or as sectionalised images via a capable printer.

3.4 Comments on validity of exploratory work

Historic and current drilling at Willow Creek Mine, comprising 55,401.06 metres' total length (**Table 3-1**) is regarded as having validly tested the coal potential of the coal-measures of the Gaylard Member of the Gething Formation, such that a revised structural and quality models can be compiled, and that tonnage estimates of the coal resource (of coal-in-place) can be undertaken with reasonable confidence. Coal-resource and coal-reserve estimation are discussed in greater detail within **Section 7** of the present report.

Stratigraphic variations in coal quality (notably, in the characteristic caking propensities of the various coal beds) between coal zones are reasonably-well established by existing drilling and analytical work. However, understanding of spatial variations of coal quality within individual coal beds, or closely-associated coal beds within a given coal zone, is hampered by the missing positional data of numerous historic boreholes, which would otherwise be useful in refining the spatial variations of coal quality. In contrast, positional data is available for all 37 of the current (year-2018) boreholes.

Table 3-3: Details of current boreholes

Borehole ('C' indicates cored hole)	Surveyed borehole position (metres: UTM NAD83 Zone 10)			Drilled depth (metres)		Borehole orient-ation (degrees)	
	Easting	Northing	Elevation	Cored (HQ size)	Non-cored (114.3 mm)	Azimuth	Dip
WC18-01C	549919.717	6162941.125	1057.853	179.50		46.51	69.1
WC18-02C	549770.728	6163078.855	1056.971	125.00		230.43	69.8
WC18-03C	550113.152	6162894.828	1066.552	218.00		243.94	70.0
WC18-04C	550111.305	6162896.186	1066.265	239.00		53.88	69.8
WC18-05C	549837.504	6163001.175	1057.579	124.99		228.91	69.9
WC18-06C	549703.347	6163208.038	1025.403	149.20		249.27	69.2
WC18-07C	549726.288	6163185.982	1030.381	166.93		238.40	67.3
WC18-08C	549613.477	6163200.911	1027.849	101.05		227.96	69.7
WC18-09C	549687.550	6163285.864	998.789	124.93		242.24	69.8
WC18-10C	549789.164	6163247.370	986.076	215.35		226.56	71.3
WC18-11C	549580.191	6163320.688	992.477	101.00		228.83	70.3
WC18-12C	549859.289	6163193.974	982.413	200.30		47.31	69.5
WC18-13C	549727.625	6163318.047	980.012	158.00		47.77	70.2
WC18-14C	549861.101	6163194.631	982.358	140.22		231.90	69.0
WC18-15C	549571.514	6163458.394	940.478	101.00		225.37	68.9
WC18-16C	549655.649	6163395.747	964.918	124.24		230.42	68.4
WC18-17C	549752.080	6163516.076	891.998	140.22		236.95	68.6
WC18-18C	549696.047	6163411.618	954.725	147.58		49.76	72.3
WC18-19C	549543.156	6163572.340	902.591	89.00		222.17	71.5
WC18-20C	549478.986	6163795.215	876.747	136.61		233.10	68.5
WC18-21C	549414.521	6163726.503	876.097	71.00		223.80	69.3
WC18-22C	549512.394	6163673.934	907.123	106.00		233.07	69.5
WC18-23C	549472.881	6163624.654	894.18	71.00		221.07	72.6
WC18-24C	549474.112	6163516.344	907.308	68.00		229.47	69.1
WC18-25C	549584.109	6163735.278	861.732	140.25		228.77	68.5
WC18-26C	549400.485	6163867.209	829.519	98.00		226.54	70.9
WC18-27C	549544.060	6163871.966	830.558	140.22		227.48	69.2
WC18-28	549608.840	6163141.020	1050.764		65.99	156.46	86.3
WC18-29	549613.570	6163203.004	1027.623		81.43	206.04	87.4
WC18-30	549632.612	6163231.418	1026.229		120.97	217.24	59.7
WC18-31	549722.241	6163184.832	1030.577		119.45	216.97	60.8
WC18-32	549519.825	6163274.772	986.371		81.58	230.21	87.9
WC18-33	549518.468	6163274.156	986.323		96.58	229.82	58.5
WC18-34	549696.213	6163410.049	953.399		99.29	220.11	59.4
WC18-35	549624.894	6163546.955	914.489		121.13	217.99	87.2
WC18-36	549699.301	6163208.768	1025.2		138.74	200.80	58.6
WC18-37	549623.775	6163541.670	911.541		97.78	214.96	68.7
37 holes 4699.53 m				27 holes 3676.59 m	10 holes 1022.94 m		

Note: borehole orientation from geophysical deviation survey; azimuth is over entire surveyed extent of hole, relative to astronomic north (at assumed declination of 17.5 degrees east). Dip is complement of uppermost slope-angle reading, and is here assumed to approximate the dip of borehole casing.

4 Review of coalfield geology

This chapter of the report is adapted from the discussion presented in Coal Assessment Report No. 988 (Cathyl-Huhn *et al*., 2015c), in light of recent drilling results. Discussion proceeds from regional setting to local scale.

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 and 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.

4.1 Regional structural setting

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 (Cant and Stockmal, 1989; Cant, 1996; Cant and Abrahamson, 1996).

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's 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. Recognition of folded thrusts is essential to understanding the structural geology of the Foothills coal deposits of northeastern British Columbia.

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 Willow Creek Mine property) to a gently-folded frontal regime (within the Outer Foothills, five to ten kilometres to the northeast of Willow Creek Mine).

4.2 Regional stratigraphic setting

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 (1968, 1973, 1981, 1998), P.McL.D. Duff and R.D. Gilchrist (1981), and D.W. Gibson (1992).

The stratigraphic sequence within the northwestern part of the Mink-Brazion coalfield (including Willow Creek Mine) comprises Lower Cretaceous rocks of the Fort St. John and Bullhead groups, and older Jurassic to Lower Cretaceous rocks of the Minnes Group (**Table 4-1**). Fort St. John Group rocks are present only along the northeastern fringe of the Willow Creek Mine block, owing to substantial erosion. Minnes Group rocks are present only in the subsurface at Willow Creek Mine, inasmuch as the Bullhead Group rocks are nowhere completely stripped-away by erosion (**Map 2-3**). Almost all of the block is covered with coal-measures of the Gaylard Member of the Gething Formation, which forms the upper part of the Bullhead Group, or by the marine rocks of the overlying Bluesky and Moosebar formations, which form the basal part of the Fort St. John Group.

4.2.1 The Gething-Bluesky controversy and its resolution

Considerable stratigraphic controversy (as expressed in works of Hughes and Stott, studied further by Oppelt (1988), and to some extent resolved by Gibson's 1992a report) has revolved around the stratonymy and chronological topology of rocks underlying and overlying the coal-measures of the Gething Formation. In this report, the Gething Formation, as well as immediate sub-Gething rocks, are assigned to the Bullhead Group, following Stott's extensive regional work. Hughes' previous stratonymy, comprising the Crassier and Beaudette groups, is now formally deprecated, although it is still being used by some industrial geologists.

At the latitude of the Willow Creek Mine block, and within the Pine Pass area in general, only the Gaylard Member of the Gething Formation is known to contain coal of potentially-mineable thickness, although within the nearby Burnt River property (McClymont, 1981; Cathyl-Huhn and Avery, 2014b), the Chamberlain Member (there the uppermost subdivision of the Gething Formation) also appears to be coal-bearing (although not thus far examined beyond initial prospecting during the property's early years of exploration).

Owing to the general southwestward back-stepping of the Gething paleodelta complex, at Willow Creek Mine the Bluesky is in the present report recognised as a formation in its own right (homotaxial with the more-extensive Bluesky sediments within the Deep Basin of the Alberta Syncline), and the Bullmoose and Chamberlain members (elsewhere assigned to the Gething Formation) are both considered to be members of the Moosebar Formation, as neither the Bullmoose rocks nor the Chamberlain rocks manifest any non-marine indicators. Supra-Gething rocks (from the Bluesky Formation upwards) are assigned to the Fort St. John Group, following Stott's work.

4.3 Local structural geology

Structural geology of the Willow Creek Mine area would be difficult to decipher on the sole basis of bedding attitudes within exposed bedrock, owing to the isolated nature of the outcrops, other than those formed by temporary or longer-lived open-pit walls. Much of our understanding of local structural geology comes from borehole intersections of faulted coal-measures, supplemented by isolated exposures of bedrock alongside roads and trails. 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 locally hampered by Drift cover.

Map 2-3 depicts, in general terms, our understanding of bedrock structure at property scale. Willow Creek Mine comprises a series of moderately-tight southwest-verging folds, overlain and bounded to the northeast by a northeast-dipping monoclinal panel of coal-measures and cover rocks, dislocated by southwest-verging thrust-faults. The Willow Creek Mine block occupies the leading (northeastern) limb and central duplex zone of the Pine River Anticlinorium, which in turn lies within a regional-scale triangle zone (McMechan, 1984; 1985; Lingrey, 1996). Willow Creek Mine's coal-measures appear to occupy a shallower structural position within the triangle-zone than those of the Willow South or Willow West blocks.

Within the 4N1/4N2 development area (the site of year-2018 drilling), the upper portion of the Gaylard coal-measures appears to form a consistent northeast-dipping homoclinal panel of strata, broken by metre- to dekametre-scale southwest-verging thrust-faults. Faulting is visible as contorted and shattered zones within cores, as well as borehole-wall breakouts visible on geophysical caliper logs. Faults, as interpreted from downhole duplication of geophysical-log response patterns, have been subdivided into three levels-of-assurance:

- Fault, established -- where there is a demonstrable repeat of log-response interpreted to be associated with a consistently-developed coal bed

- Fault, probable -- where there appears to be a repeat of a minor coal, or of a characteristic sequence of non-coal strata

- Fault, possible -- where there appears to be a local thickening or duplication of stratal pattern, generally-associated with borehole breakout(s), but the interpretation is not robust-enough to justify classification as 'probable'.

This tripartite structural classification follows practice developed by geologists of BP Coal, working in the late 1970s and early 1980s on their then-operated Sukunka coal property.

Furthermore, bedding-plane shearing is pervasive within incompetent strata such as dirty coals or coaly mudstones, and some of this shearing might be associated with bedding-plane faulting. However, this possibility might be difficult to validate prior to downward and lateral extension of the 4N2 open-pit workings into the 4N1/4N2 area.

4.3.1 Tectonostratigraphic coherence

Normal stratigraphic sequences are generally preserved at Willow Creek Mine, despite the thrust-faulting of the rocks and concomitant folding and tectonic stacking. Overturned strata appear to be rare, although this determination is clouded by the angled geometry of most exploratory boreholes.

4.4 Local stratigraphy

Based largely upon the interpretation of downhole geophysical logs of coal-exploration boreholes and natural-gas wells, the local stratigraphic sequence (as shown in **Table 4-1**) has been identified within and adjacent to the Willow Creek Mine block.

Relationships between the various rock-units that occur within and adjacent to the Willow Creek Mine block are shown on the geological map (**Map 2-3**) accompanying this report. **Map 2-3** incorporates results of current drilling, together with historic drilling and geological mapping

done by others, as cross-referenced in **Section 10** of this report. Geological contacts shown on the map are approximate to inferred, owing to the generally-discontinuous nature of bedrock exposures, and paucity of documented stratigraphic and structural fieldwork.

Table 4-1: Table of formations and subdivisions

Group/Formation/Member			Map-unit		Lithology and thickness	
Quaternary Drift			D		Alluvium; lodgement till; moraines; talus; glaciolacustrine silts, up to ? 150 m thick within Pine Valley.	
Fort St. John Group	Hasler Fm.		8a		Siltstone and mudstone; minor sandstone; ironstone as bands of concretions; at least 180 m thick	
	Boulder Creek Fm.		7		Sandstone and siltstone; conglomerate; coal; 75 to 95 m	*Presence of coal not yet proven within Willow Creek Mine block*
	Hulcross Fm.		6		Siltstone and mudstone; minor sandstone and tuff; basal pebbly gritstone; erosional base; 120 to 130 m thick	
	Gates Fm.		5		Siltstone, sandstone and conglomerate; minor coal; 190 to 230 m thick	*Presence of coal not yet proven within Willow Creek Mine block*
	Moosebar Fm. 165 to 280 m thick	Spieker Mb.	4	4c	Siltstone, sandstone; minor mudstone; 60 to 90 m thick	*May be locally structurally-thickened due to internal thrust-induced telescoping, or repeated outright by thrusting. Possible detachment zones at base of Cowmoose Member and Bullmoose Member.*
		Cowmoose Mb.		4b	Mudstone; minor tuff and ironstone; erosive-based basal glauconitic grit; 80 to 100 m thick	
		Green Marker		4a	Locally-glauconitic siltstone and sandstone; nil to *ca.* 3 m thick	
		Chamberlain Mb.		3d	Sandstone and siltstone; 3 to 6 m thick	
		Bullmoose Mb.		3c	Siltstone and sandstone; mudstone; minor tuff; 100 to 120 m thick	
	Bluesky Fm.		3b		Glauconitic sandstone and gritstone; siltstone and mudstone; 1 to 8 m	
Bullhead Group	Gething Fm.	Gaylard Mb.	3a	3a5	Siltstone, sandstone, mudstone and coal (zones 'Bird' and 1 through 4); minor tuff	
				3a4	Siltstone and mudstone; coal (zones A, 5 and 6)	
				3a3	Sandstone; minor siltstone and mudstone; coal (zones 7 and 8)	
				3a2	Siltstone and mudstone; minor sandstone and coal (zone 9)	
				3a1	Numerous fining-upward cycles of sandstone, siltstone, mudstone and coal (zones 'Bird' and 1 through 12); minor tuff; local concentration of sandstone beds; 260 to 360? metres thick	<u>Basal sandy unit</u>: sandstone and siltstone; minor coal (zones 10 to 12 -- correlations tentative)
	Cadomin Fm.		2		Gritty to pebbly, siliceous sandstone and sandy conglomerate with distinctive 'blocky' gamma-log response; minor siltstone and coal; 2.5 to 14? m thick; erosional base	
Minnes Gp.	Bickford Fm.		1		Siltstone, sandstone, conglomerate, and mudstone; minor coal; 285 to 300 m thick	*present only at depth beneath the property*
	Monach Fm.				Sandstone and conglomerate; siltstone; 210 to 260 m thick	
	Beattie Peaks Fm.				Siltstone, sandstone and mudstone; minor coal; 285 to 350 m thick	
	Monteith Fm.				Quartzite and sandstone; minor siltstone; 340 to 425 m thick	

Rock-units are discussed in detail below, in order from youngest (generally nearest the ground surface) to oldest. Localised inversions of stratigraphic position have been induced by

stratal shuffling consequent upon thrust-faulting, but the overall stratigraphic relations remain readily-recognisable, owing to distinctive geophysical and lithological characteristics of the various rock-units.

4.5 Drift (map-unit D)

Unconsolidated sediments, inferred to be of Quaternary age, form a patchy blanket at the ground surface throughout the Willow Creek Mine block. For reasons of clarity, Drift is not mapped as a separate entity within **Map 2-3**, except along the floor of the Pine River valley.

The most pervasive Drift cover consists of glacial till, usually less than 10 metres thick within the upland areas of the property. Patches of sandy, gravelly and bouldery alluvium are present within stream channels. McKechnie (1955) noted the presence of possibly-glaciolacustrine silt deposits within the southeastern portion of the Willow South area; although an extension of such deposits into Willow Creek Mine area is considered likely, the extent of such deposits has yet to be assessed in detail, owing to lack of lithological records in Drift-penetrating boreholes.

The Pine River valley is inferred to be floored and possibly flanked by valley-filling alluvial, glacial, and glaciolacustrine sediments. By inference with results of sparse drilling in other valleys within the Foothills of northeastern British Columbia, such deposits are inferred to be locally more than 150 metres thick.

4.6 Fort St. John Group (map-units 5, 4, and upper part of map-unit 3)

The uppermost of the Early Cretaceous rocks of the Fort St. John Group have been completely removed by erosion at Willow Creek Mine. Most of this erosion is likely to have occurred during a prolonged episode of regional uplift during the Tertiary era (Cant and Stockmal, 1989), followed by further glacial scouring during the Quaternary era, and continuing through fluvial down-cutting to the present time.

Within the Group, the remainder of its constituent formations remain at least locally-present within the Willow Creek Mine map-area. From top down, these are the basal half of the Hasler Formation, and the entirety of the Boulder Creek, Hulcross, Gates, Moosebar and Bluesky formations.

4.6.1 Hasler Formation (map-unit 8a)

The Hasler Formation, of late Middle Albian to Late Albian age (Gibson, 1992b) forms subdued slopes within the upland area northeast of the Willow Creek Mine block. The Hasler Formation is not interpreted to form bedrock within the boundaries of the block, but its basal portion (at least 180 metres thick) is mapped as forming bedrock within the northeastern corner of the mapped area of **Map 2-3**, completely outside the property's extent.

The Hasler Formation comprises marine siltstone, overlain by dark grey to black marine mudstone with occasional bands of sideritic concretions. The complete, undeformed thickness of the formation is approximately 335 to 365 metres (Wickenden and Shaw, 1943). A few centimetres to decimetres of erosive-based cherty gritstone commonly mark the Hasler Formation’s abrupt basal contact with the underlying Boulder Creek Formation (Wickenden and Shaw, *op.cit*., page 6).

4.6.2 Boulder Creek Formation (map-unit7)

The Boulder Creek Formation, of late Middle Albian age (Gibson, 1992b) forms prominent cliffs in the upland area, along and immediately to the northeast of the Willow Creek Mine block's northeastern boundary. The Boulder Creek Formation is the uppermost of the three formations (Boulder Creek, Hulcross, and Gates) formerly covered by the now-superseded Commotion Formation of Wickenden and Shaw (1943).

Regionally, conglomerate and sandstone are the predominant lithologies of the Boulder Creek Formation, but the Walton Creek Member of 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 of the formation, while fine-grained rocks are concentrated in the overlying Walton Creek Member (Gibson, 1992b). The uppermost regionally-mapped division of the Boulder Creek Formation, comprising the conglomerate of the Paddy Member, is not recognised within the Willow Creek Mine area.

The overall thickness of the Boulder Creek Formation is tentatively inferred to be 75 to 95 metres at Willow Creek Mine, of which the basal 30 to 45 metres comprises the Cadotte Member and the overlying 45 to 50 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.

4.6.2.1 Walton Creek Member

The Walton Creek Member of the Boulder Creek Formation comprises 45 to 50 metres of generally-recessive siltstone, variably-carbonaceous, locally root-penetrated mudstone and variably-thick coal beds, of which two or three appear to be laterally-continuous within Trefi Coal Corp.'s Trefi coal property, which lies to the southeast of the Willow Creek Mine block (Morris, 2015).

The swale-forming fine-grained rocks of the Walton Creek Member are punctuated by cliff-forming lenses of sandstone, gritstone and pebble-conglomerate, inferred to be channel-fills. Gibson (1992b) considered the Walton Creek Member to be of probable Late Albian age, based on angiosperm flora. The basal contact of the Walton Creek Member with the underlying Cadotte Member is generally abrupt, and regarded by Gibson (*op. cit.*) as being conformable.

4.6.2.2 Cadotte Member

The Cadotte Member of the Boulder Creek Formation comprises 30 to 45 metres of cliff-forming sandstone and pebble-conglomerate with rare thin interbeds of siltstone. The Cadotte generally coarsens upward, with its sandstones being at its base and its conglomerates being in its middle and at its top. Other than isolated coalified logs, the Cadotte Member is devoid of coal. The basal contact of the Cadotte Member with the underlying Hulcross Formation is generally abrupt and therefore considered to be conformable at local scale (Gibson, 1992b), although it may intertongue at regional scale.

4.6.3 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 forms a recessive band along the northeastern margin of the Willow Creek Mine block. The thickness of the Hulcross Formation at Willow Creek Mine is estimated to be 120 to 130 metres, based on borehole data and measured outcrop sections from nearby properties, as reported by Gibson (1992b). 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 Notikewin Member of Gates Formation.

4.6.4 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.

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.

At Willow Creek Mine, the Gates coal-measures are present along the northeastern margin of the property. No boreholes have yet penetrated the Gates Formation at or near Willow Creek Mine, and hence its coal potential is unknown in detail, although expected to be low on account of the well-established northward diminishment of coal content within the formation.

. Regionally, the Gates Formation may be readily subdivided into three members: the uppermost, dominantly fine-grained Notikewin coal-measures (90 to 120 metres thick?), the medial, dominantly coarse-grained conglomeratic Falher coal-measures (50 to 90 metres thick?), and the basal Torrens sandstone (30 to 40 metres thick?). The Notikewin, Falher and Torrens members can be reasonably-distinguished in the logs of oil and gas wells drilled to within the Highhat gasfield, situated to the southeast of Willow South, but these units cannot be easily mapped separately without the aid of detailed aerial imagery, so no attempt has been made to depict them separately on **Map 2-3**.

The Gates Formation is inferred to be 190 to 230 metres at Willow Creek. The nature of its contact with the underlying Moosebar Formation appears to be abrupt at local scale, but likely to be interfingering at the regional scale.

4.6.5 Moosebar Formation (map-units 4c, 4b, 3d, and 3c)

The Moosebar Formation, of early Albian age (Stott, 1968) forms the basal part of the Fort St John Group. At and near Willow Creek Mine, the Moosebar Formation has a typical stratigraphic thickness of at least 165 metres (Wickenden and Shaw, 1943, page 4) and

perhaps 240 to 280 metres, although the latter figure likely indicates substantial structural thickening due to thrust-induced telescoping of the Moosebar rocks.

The Moosebar Formation comprises an overall coarsening-upward sequence, comprised of several lesser coarsening-upward cycles, of mudstone passing upward to sandy siltstone. A basal pebbly, locally-glauconitic gritstone occurs within the middle of the formation in some sections. Very thin (a few millimetres to a few decimetres) bands of tuff form conspicuous marker bands, generally concentrated within the basal 30 metres of the formation (Kilby, 1984a; 1985).

At Willow Creek Mine, the Moosebar Formation is inferred to form bedrock along the block's northeastern side, flanking the Gething coal-measures exposed within the northeastern limb of the Pine River Anticlinorium (**Map 2-3**).

Regionally, deep exploratory drilling for natural gas targets allows the recognition of five lithological subdivisions (from top down, the Spieker and Cowmoose members, the Green Marker, and the Chamberlain and Bullmoose members) within the Moosebar Formation of the Willow Creek Mine area. All but the uppermost of these subdivisions are present and recognisable in pit-slope exposures at Willow Creek Mine, although one (the Green Marker, map-unit 4a) is consistently too thin to be mappable as anything other than a single line at the scale of **Map 2-3**.

Owing to the sparse extent of drilling within the Moosebar Formation, and the lack of detailed borehole records, no attempt has been made to map the subdivisions of the formation within the Willow Creek Mine block *per se*, although such mapping has been accomplished within the adjoining Willow West block.

4.6.5.1 Spieker Member (map-unit 4c)

The Spieker Member of the Moosebar Formation (Duff and Gilchrist, 1981), of early Albian age (Stott, 1968), comprises thinly-interbedded, coarsening-upward units of siltstone and very fine sandstone, within an overall coarsening-upward sequence. Bioturbation is pervasive and intense within the Spieker Member, which is interpreted to have formed as shallow-water turbidites within a proximal shelf setting in advance of the northward-prograding Gates paleodelta. The undeformed thickness of the Spieker Member at Willow Creek Mine is estimated to be 60 to 90 metres, possibly being locally thickened through thrust-induced structural telescoping.

The Spieker Member's existence at the latitude of the Willow Creek coal lease is established by drilling within the western part of the Willow West area (Cathyl-Huhn, 2015c), outside the extent of **Map 2-3**. The Spieker Member is also likely to be present within the northeastern part of the Willow Creek Mine block, but beyond the area which has been tested by drilling.

The basal contact of the Spieker Member with the underlying Cowmoose Member is abrupt, generally drawn at the base of an upward decrease in natural gamma radiation, which appears to coincide with an upward increase in the silt content of the rocks, and a concomitant passage from dark greyish-black to medium grey rock colour. The immediate base of the Spieker Member is in some sections marked by one or two metres of distinctly-sandy siltstone.

4.6.5.2 Cowmoose Member (map-unit 4b)

At and near Willow Creek Mine, the Cowmoose Member of the Moosebar Formation comprises 80 to 100 metres of rubbly-weathering, massive-appearing, dark greyish-black to black mudstone, punctuated by occasional bands crowded with ironstone concretions, and several very thin (a few millimetres to a few decimetres) but laterally-persistent and visually-prominent bands of light olive drab to white tuff. The tuff bands are useful as local structural markers (Duff and Gilchrist, 1981; Kilby, 1984a; Jordan and Dawson, 1988). The Cowmoose mudstones are sparsely-bioturbated, and locally contain sparse to abundant burrow-fillings, irregular blebs and euhedral crystals of pyrite, indicative of overall anoxic depositional conditions. Pyrite is particularly abundant near the base of the Cowmoose Member.

The name 'Cowmoose' was introduced by Cathyl-Huhn and Singh (2014) as an informal and pragmatic stratigraphic name, for the purposes of Walter Canadian Coal Partnership's coal-assessment studies; these rocks were previously referred to as the 'basal mudstone member' of the Moosebar Formation or simply as the 'mudstone member' (Duff and Gilchrist, 1981). The recommended type-section of the Cowmoose Member (Cathyl-Huhn and Singh, 2014) is on the northeastern face of Cowmoose Mountain, situated between Sukunka River and the western fork of Bullmoose Creek. Within the Willow Creek Mine block, the Cowmoose Member is locally exposed in road-cuttings and shale-pits along access roads within the northeastern fringe of the block.

Without recourse to cored sections or gamma-neutron logs, isolated exposures of the Cowmoose Member would be quite similar in weathering-habit to, and therefore difficult to distinguish from, the basal part of the older Bullmoose Member. The Cowmoose Member is locally thickened to over 200 metres by thrust-induced structural telescoping (Cathyl-Huhn, 2015a; 2015b; Cathyl-Huhn *et al.*, 2015).

The age of the Cowmoose Member is Early Albian (as noted for the mudstones of the Moosebar Formation by Stott, 1968). The basal contact of the Cowmoose mudstones over the underlying Green Marker is gradational to abrupt, and generally easily-recognised on geophysical logs.

The basal contact of the Cowmoose Member with the underlying Green Marker (an informal lithostratigraphic unit previously designated as the 'Bluesky-S unit' by Kilby, 1984b) is abrupt, being readily recognised as a downward decrease of gamma-log counts, and the downward appearance of distinctively-greenish glauconitic sediments.

4.6.5.3 Green Marker (map-unit 4a)

The Green Marker (Cathyl-Huhn and Avery, 2014c) is a thin but regionally-persistent zone of erosive-based, pebbly, intensely-bioturbated, commonly-glauconitic sandstone, siltstone and mudstone. The Green Marker comprises zero to perhaps 3 metres of variably-glauconitic siltstone or chert-rich lithic arenite, locally containing stringers or lenses of gritstone or pebble-conglomerate. Owing to its minimal thickness, the Green Marker is depicted as a single line upon **Map 2-3**.

The Green Marker is locally altogether absent; hence its minimum thickness of 'nil' as given in **Table 4-1**. Glauconite development within this unit is patchy, in contrast with its more obvious presence in other areas.

Earlier reports (Wallis and Jordan, 1975; Jordan and Dawson, 1978) denoted this zone as the Bluesky Formation, on the grounds of its lithologic similarity to the typical Bluesky rocks of the Alberta Syncline and Deep Basin, but that correlation is now understood to be incorrect (Cathyl-Huhn and Singh, 2014). Although the lithology of the Green Marker is superficially similar to that of the older Bluesky Formation, these two glauconite-bearing zones are stratigraphically distinct, both in space and in time (Kilby, 1984b; Legun, 1990).

Kilby's (*op. cit.*) 'Bluesky-S unit' corresponds to the beds currently mapped as the Green Marker, whereas his older and stratigraphically-lower 'Bluesky-N' unit corresponds to beds here mapped as the Bluesky Formation.

The basal contact of the Green Marker with the underlying Chamberlain Member, or with the Bullmoose Member where the Chamberlain is absent, is characteristically abrupt and may at least locally be erosional.

4.6.5.4 Chamberlain Member (map-unit 3d)

At Willow Creek Mine, the Chamberlain Member of the Moosebar Formation is a geophysically-distinctive (moderately-low gamma-log responses) unit within the Moosebar, comprising a few (3 to perhaps 6) metres of rocks with a geophysical-log signature consistent with the regionally-known Chamberlain lithologies of interbedded sandstone and siltstone.

In contrast with the Chamberlain sections drilled in the Sukunka area (to the southeast of Willow Creek Mine), no coal has been found within the Chamberlain Member at Willow Creek Mine. Regionally, the Chamberlain Member is well-established as thinning to the east and northeast; it is locally altogether absent within oil and gas wells drilled at Highhat Mountain (a few tens of kilometres east of Willow Creek Mine), and in those wells the Cowmoose mudstones appear to directly overlie the Bullmoose siltstones.

Although in its type area at Sukunka Colliery and Bullmoose Mountain, the Chamberlain Member was defined by Gibson (1992a) as the uppermost member of the Gething Formation, in the Willow Creek area the Chamberlain's much-reduced thickness and apparent non-coalbearing nature support its being more properly assigned to the Moosebar Formation.

The Chamberlain Member is not known to contain diagnostic fossils; it has therefore been assigned an Early Albian age by Gibson (1992) on the basis of fossils found within the overlying Cowmoose Member of the 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 lowest thick sandstone. The Chamberlain-Bullmoose contact possibly rises stratigraphically, to the north and east (Cathyl-Huhn *et al.*, 2015), but available drilling does not suffice to confirm nor contradict this supposition.

4.6.5.5 Bullmoose Member (map-unit 3c)

The Bullmoose Member of the Willow Creek Mine block comprises 100 to 120 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.

Plate 4: Southeastern highwall of 4N2 pit, as seen prior to resumption of mining in autumn of 2018. Forested slopes are underlain by siltstones with minor bands of ironstone and tuff, of the basal two-thirds of the Bullmoose Member of the Moosebar Formation. Cleared hillside to right is underlain by interbedded siltstone, sandstone, coal and variably-carbonaceous mudstone of the Gaylard Member of the Gething Formation. Closely-associated 400, 401, and 410 coals come to the ridgeline at the extreme right of the photograph. Bedding forms a northeastward homoclinal panel of strata, at dips of 30 to 32 degrees. [*RC4849/18.jpg*]

The geophysical log response of the Bullmoose Member is very distinct, as compared with the overlying Chamberlain Member and the underlying Bluesky Formation. Bullmoose rocks have characteristically-higher natural-gamma log responses than their bounding rock-units. On the other hand, the Bullmoose Member is difficult to distinguish from the younger Cowmoose Member.

The Bullmoose Member is well-exposed in the southeastern highwall of the 4N2 open-pit workings (as shown in **Plate 4**). The Bullmoose is inferred to form extensive areas of bedrock along the northeastern margin of the Willow Creek Mine block, extending into the adjoining Willow South block (**Map 2-3**).

The Bullmoose lacks coal, other than isolated coalified logs and coarse, poorly-preserved 'plant trash', likely of drifted origin. The Bullmoose 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. The Bullmoose Member likely corresponds with the 'Lower Silty Member' of the Moosebar Formation, as originally suggested and locally-recognised by Duff and Gilchrist (1981), within those areas (for example, the deep subsurface under Highhat Mountain, southeast of the Willow Creek Mine block) where the overlying Chamberlain Member is absent. Geophysical logs of the Bullmoose Member show a characteristic high-gamma response at two horizons situated a few tens of 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 Bullmoose, with the underlying Bluesky Formation, 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 natural-gamma counts, and higher API neutron counts. This downward change is interpreted to correspond with a rapid downward passage from fine-grained mudstone of the basal Bullmoose, to the sandy mudstone and sandstone of the uppermost Bluesky.

The Bullmoose Member is of late Early Albian age (Gibson, 1992a). The original stratigraphic thickness of the Bullmoose is approximately 100 to 120 metres at Willow Creek Mine, although thicker sections (likely structurally-thickened by thrust-induced telescoping of the strata) are suspected to exist. Similar anomalous thickening was previous noted from the Highhat Mountain area, where the Bullmoose Member was found to be 189 and 237 metres thick, respectively, in natural-gas wells b-91-L and a-23-D (Cathyl-Huhn, 2015b).

4.6.6 Bluesky Formation (map-unit 3b)

The Bluesky Formation is a transitional unit between marine and non-marine facies. Accordingly, there has been considerable debate within the geological literature -- starting with Stott (1968), and further discussed by Kilby (1984b) and Legun (1990) -- as to the Bluesky's stratigraphic affinities. In the present report, the Bluesky is considered to constitute a formation in its own right, bounded above by the Moosebar Formation, and beneath by the Gething Formation, following earlier workers (*cf.* Legun, 1990 and James, 1998). Further to the south within the Mink-Brazion coalfield, the Bluesky is considered to be a member within the Gething Formation (Cathyl-Huhn, 2015a; Cathyl-Huhn and Avery, 2014a; 2014b)

Plate 5: Geologist's hand marks erosional contact of Bluesky pebbly gritstone over Gaylard sandy siltstone. Rusty weathering habit of Bluesky rock suggests potential for acid rock drainage. View is to northeast, along eastern edge of 7S open-pit workings [*RC4945/18.jpg*]

The Bluesky Formation generally consists of coarsening-upward cycles of interbedded mudstone, siltstone, and sandstone. The top of the Bluesky is characteristically marked by a glauconitic horizon, a few decimetres thick (observed to be 40 to 57 centimetres thick at the nearby Mink Creek coal property by Sultan and Cathyl-Huhn, 2014), comprising abundant fine-grained, green glauconite within sandy mudstone and argillaceous, locally-pebbly, sandstone. The base of the Bluesky (shown in **Plate 5**) is marked by a distinctive erosive-based chert- and quartz-pebble conglomerate up to a metre thick, grading to argillaceous sandstone with few randomly-distributed chert and quartz pebbles. The conglomerate horizon's presence has been noted on numerous historic borehole records at Willow Creek Mine.

Bluesky sediments likely represent the initial transgressive deposits of an early tongue of the Clearwater Sea, which shortly after deposition of the Bluesky had transgressed to a southerly limit several hundred kilometres southeast of the Willow Creek area (Gibson, 1992a). The Bluesky Formation, as-drilled at and near Willow Creek Mine, is 1 to 8 metres thick. The age of the Bluesky is not directly known, but inferred to be late Early Albian on the basis of the ages of its bounding strata. The basal contact of the Bluesky Formation within the underlying Gething Formation is almost always erosional, locally with substantial downward scour into the older Gething rocks.

4.7 Bullhead Group (map-units 3a and 2)

Both formations of the Bullhead Group -- the Gething and the older Cadomin -- are present at Willow Creek Mine, with the Gething containing all known potentially-mineable coal beds.

4.7.1 ***Gething Formation (map-unit 3a)***

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 and an intervening marine-influenced bay, of which the basal delta (the coal-bearing Gaylard paleodelta) extended throughout the Mink-Brazion coalfield, including the Willow Creek Mine block. At the latitude of Willow Creek Mine, the overlying (and therefore younger) Chamberlain paleodelta is presumed to have been only represented by a thin, non-coal-bearing, fringe of sandy/silty delta-front to prodeltaic deposits (Gibson, 1992a).

The Gething Formation forms the top of the Bullhead Group (Stott, 1968, as used in the present report), and of the Crassier Group (*sensu* Hughes, 1964, as previously observed in the Mink Creek coal property by Sultan and Cathyl-Huhn, 2014).

During historic (pre-2007) as well as current (years-2007 through 2013) drilling within the Willow Creek Mine block, nearly every coal-exploration borehole has intersected some section of the Gething Formation, but the thickness of the formation can only be indirectly estimated from this work, owing to lack of drilling into the underlying Cadomin Formation, as well as the block's pervasive structural complexity.

The basal contact of the Gething Formation with the underlying Cadomin Formation

is inferred to be 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 or multi-storey sandstone characteristic of the underlying sub-Gething beds.

4.7.1.1 Gaylard Member

Only one member (the Gaylard Member) is recognised within the Gething Formation at Willow Creek Mine, the overlying Bullmoose and Chamberlain rocks being here assigned to the Moosebar Formation, instead of to the Gething Formation as has been the case in property studies of areas lying further to the southeast.

4.7.1.2 Subdivisions of the Gaylard Member (map-units 3a1 through 3a5)

The Gaylard Member may be conveniently divided into five informal subdivisions, on the basis of characteristic lithologies (chiefly changes in sand-shale ratio, with alternations of sandier and shalier sub-units), anchored by the presence of thick and laterally-extensive coal zones which likely formed atop regionally-extensive interfluves.

The divisions of the Gaylard are numbered in upward succession from Division 1 at the base of the Gaylard, to Division 5 at the top of the Gaylard. Drilling has established that the thickest, and possibly more laterally-extensive, coals occur within the Divisions 3, 4 and 5 of the Gaylard Member, within the Willow Creek Mine block.

Table 4-1 (given above) summarises the subdivisions of the Gaylard Member. Major coal zones and other lithologies used as division markers are:

- No.4 coal zone, marking the base of Division 5;
- No.6 coal zone, marking the base of Division 4;
- No.8 coal zone, marking the base of Division 3;
- Heterolithic, mainly silty, strata forming Division 2; and
- Dominantly-sandy strata, comprising Division 1.

4.7.1.3 Sedimentological and cyclothemic details

The Gaylard Member is interpreted to consist predominantly of non-marine sedimentary rocks within the Willow Creek Mine block, although the presence of at least one coal zone with slightly-elevated sulphur content (within the adjoining Willow South block) suggests that some marine influence may have occurred. The coal zone in question, No.8, lies within the basal half of the Gaylard Member.

The Gaylard Member consists principally of many vertically-stacked, locally erosive-based, fining-upward bedsets, such as are typical of fluvial and deltaic depositional settings.

A typical cyclic succession of Gaylard sediments commences with basal sandstone (rarely basal gritstone or pebble-conglomerate), passing upward through coarse- to fine-grained sandstone, siltstone, variably-carbonaceous mudstone, rooty

seatearth mudstone and coal. Most, but not all, Gaylard cycles are capped by coal beds, or by laterally-correlative carbonaceous to coaly mudstones. Coals vary in thickness: some are too thin (less than 40 to 50 cm) or too dirty, to be considered potentially-mineable, whereas other coals locally coalesce to form thick conjoint zones up to 4 metres thick. The individual component coal beds of these conjoint zones are readily-traceable on gamma-density logs, and they thus are interpreted to maintain their identity as sedimentation-units despite their bounding coal-on-coal contacts.

Coals frequently contain partings of siltstone or variably-carbonaceous mudstone, sometimes of tuff (the 'tonstein' bands of Kilby, 1984a and 1985), and rarely of nodular or banded ironstone. Splitting and lateral coalescence of coals is interpreted to represent the near-isochronous interaction peat accumulation in wetlands, avulsive processes within nearby river distributaries, and concomitant crevasse-splay sedimentation atop the coeval coal-forming wetlands (Banerjee and others, 1996).

Gamma-log response of the Gaylard sandstones (within and between these cycles) are 'ragged' in detail, occasionally capped by an upward-increasing 'bell-shaped' log response. In contrast, the siliceous sandstones and conglomerates within the underlying Cadomin Formation display distinctly 'blockier' responses than those of the Gaylard sandstones.

4.7.1.4 Discussion concerning the thickness of the Gaylard Member

The thickness of the Gaylard Member is not directly known at Willow Creek Mine, owing to the lack of completely-drilled sections, and the pervasive presence of incompetent structures comprising folds and both small- and large-scale thrust-faults within the Gaylard's coal-measures. From incomplete, but apparently minimally-disturbed, sections the Gaylard is established to be at least 260 metres thick at Willow Creek Mine, and possibly up to 360 metres thick. Yet-greater thickness has not yet been ruled-out.

In contrast, within the nearby Highhat gasfield (15 kilometres to the southeast of Willow Creek Mine), complete sections of the Gething Formation are 475 to 720 metres thick (Cathyl-Huhn, 2015a), although some of that thickness is made up by marginal-marine deposits which are considered to be homotaxial with the basal part of the Moosebar Formation as found at Willow Creek Mine.

4.7.2 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 now-deprecated Dresser Formation of the Crassier Group *sensu* Hughes (1964) and Sultan (2015).

Regionally, the Cadomin Formation comprises one or more thick beds of coarse-grained, gritty to pebbly sandstone and pebble-conglomerate (McLean, 1977) with occasional lenses of siltstone and pebbly gritstone, and rare thin lenses of coal, several tens of metres thick overall.

The Cadomin Formation may be distinguished from the sandier parts of the Gaylard Member, upon the bases of the Cadomin Formation’s greater lateral continuity, the

Cadomin's distinctly-'blocky' gamma-log response, and the frequent (but not universal, *cf.* Cant and Abrahamson, 1996) presence of an intervening zone of fine-grained coal-measures strata.

Again regionally, the base of the Cadomin marks a northeastward-deepening angular unconformity, cutting down into successively-older rocks of the Minnes Group (Stott, 1973).

Locally, it remains uncertain whether the Cadomin Formation has been reached by any of the historic or current boreholes at Willow Creek Mine. By comparison with nearby properties, the Cadomin's basal contact with the underlying Bickford Formation of the Minnes Group is presumed to be erosional, with considerable local scour into the older sediments. The thickness of the Cadomin Formation at Willow Creek Mine is unknown, on account of lack of deep drilling. The estimated thickness of 2.5 to ca. 14 metres, as given in **Table 4-1** above, is derived from studies of the Gething and Cadomin formations within the adjoining Willow South coal property.

4.8 Minnes Group (map-unit 1)

The Minnes Group comprises 1000 to 1200 metres of clastic sedimentary rocks of latest Jurassic and earliest Cretaceous age, forming a poorly-exposed deltaic/shelfal/basinal complex which is overlain by the Bullhead Group. Four formations are locally recognised within the Minnes Group. From top down, they are the Bickford (equivalent to most of the now-deprecated Brenot Formation of Hughes, 1964), the Monach, the Beattie Peaks, and the Monteith formations (Stott, 1981; 1998). Coal is known to at least locally occur in all four of the Minnes Group's formations (Chowdry, 1980), but only the Bickford Formation is inferred to occur at reasonable depths within the Willow Creek Mine block, and therefore to be a credible (albeit thus-far apparently-untested) target for coal exploration.

5 Coal

As discussed above in **Section 4**, the Gaylard Member contains numerous coal beds, some of which are sufficiently thick and apparently laterally-continuous to constitute reasonable exploratory and mining targets, within the Willow Creek Mine block.

5.1 Regional correlations of major Gaylard coals

Regional correlations of Gaylard coals are here proposed, although not examined in detail:

- The variably-sulphurous 'Bird' zone at Willow Creek Mine (shown in **Plate 6**) may be correlative with the Lower Gething A zone at Sukunka Colliery. It is definitely not correlative with the type Bird Seam at Sukunka, which instead lies near the top of the Chamberlain Member of the Gething Formation.
- No.4 zone at Willow Creek Mine may be correlative with the Brenda Seam at Hasler Creek, F zone at Mink Creek, Seam C60 at Burnt River, and the Lower Gething B zone at Sukunka Colliery;
- No.6 zone at Willow Creek Mine may be correlative with the Upper Seam at Burnt River; and
- No.7 zone at Willow Creek Mine may be correlative with the Lower Seam at Burnt River.

Coals of the Gaylard Member at Willow Creek Mine, and their enclosing sedimentary rocks, were deposited during Hauterivian to late Early Albian time, between 112 and 133 million years ago, on the basis of plant-fossil and foraminiferal zonations, as presented by Gibson (1992a).

Plate 6: Bird coal seam, approximately a metre thick, as exposed in the southeastern highwall of the 4N2 open-pit workings. Coal seam comprises alternating blocky and sheared mushy bands. Note the bright yellow sulphate bloom on the weathered surface of the coal. Above is about 3 metres of silty sandstone and pebbly sandstone of the uppermost Gaylard Member, in turn erosionally-overlain by dark-weathering Bluesky gritstone. Top of exposed section is Bullmoose siltstone with centimetre- to decimetre-thick bands of conspicuously light-weathering tuff. [*RC4841/18.jpg*]

5.2 Local naming scheme for Gaylard coals

Table 5-1 depicts the conceptual stratigraphic hierarchy of coal zones, coal beds, and lesser subdivisions of coal beds, at Willow Creek Mine. Coal zones are numbered downwards from the Bird at the immediate top of the Gaylard Member, and then proceeding downward from the No.1 zone to the No.4 zone, then the A zone, followed by the No.5 through No.12 zones. The No.12 zone is postulated to lie close to the base of the Gaylard Member (or even, conceivably, within the older Bickford Formation although that supposition is not yet established). Each coal zone contains at least one major coal bed, and numerous subordinate and associated 'splits', 'stringers' and 'stringer plies'. Designations of the various major and minor coal beds have evolved with time from McKechnie's (1955) original concept of a series of numbered coal beds, into a more complex scheme of subordinate relationships. A system of split numbering was established by James (1998), who assigned odd terminal digits to subordinate coals lying above a major coal bed, and even terminal digits to those lying below a major coal bed.

Plate 7: Overturned chevron-fold, about 5 metres wide across axial plane, in the A1/A3/A5 group of coals within the A coal zone, as exposed in the highwall of a subsidiary pit situated to the southwest of 4N1 open-pit workings. View is upward and to the southwest, into the northwestern edge of the 4N1/4N2 development area. [*RC4922/18.jpg*]

5.2.1 Caveat concerning coal bed designations

The system of coal-bed designation presented within **Table 5-1** is not intended to imply that major ('00' terminal-digit) coal beds become completely split into subordinate beds. Furthermore, not all stringers necessarily originate as laterally-continuous extensions of major coal beds. Considerable work likely remains to fully-establish splitting and coalescent relationships of the Gaylard Member coals at Willow Creek Mine, and within the Willow Creek coal lease in general.

Table 5-1: Stratigraphic hierarchy of coals and carbonaceous zones at Willow Creek Mine

Formation	Member	Division	Coal Zone	Bed	Split	Stringer	Stringer Ply
Gething	Gaylard	Division 5	**Bird**	Bird			
			No.1	190 (rare)			
				170			
				150			
				130			
					/ 111		
				110	110		
					/ 101		
				100	100		
			No.2		/ 201		
				200			
					\ 202		
				203 (rare)			
			No.3	330 (rare)			
				310			
					/ 301		
				300	300		
				320			
				340			
				360 (rare)			
			No.4	430			
						/ 410	
					/ 401	401	
				400	400	400	
						\ 420	420
							\ 422 (rare}
				440	440	440	
						\ 442	
				460			
				463			
				480	480		
					\ 483		
		Division 4			/ A71		
				A7	A7		
					\ A72		
							/ A55 (rare)
						/ A53 (rare)	A53 (rare)
					/ A51 (rare)	A51 (rare)	
				A5			
					/ A3		
				A1	A1		
						/ A03 (?)	
					/ A01	A01 (?)	
				A0	A0		
					\ A02		
				A2 (?)			

Table 5-1: Stratigraphic hierarchy of coals and carbonaceous zones at Willow Creek Mine (continued)

Formation	Member	Division	Coal Zone	Bed	Split	Stringer	Stringer Ply
Gething (continued)	Gaylard (continued)	Division 4 (continued)	**No.5**	550			
				530			
					/ 511		
				510	510		
					/ 501		
				500 (?)			
					\ 502		
				520			
				540			
				560			
				580			
		Division 3	**No.6**	670			
				650			
					/ 631		
				630	630		
				610			
					/ 601		
				600	600		
					\ 602 (?)		
				620			
				640			
			No.7	770			
				750			
					731		
				730			
					/ 703 (?)		
							/ 712 (?)
						/ 710	710
					/ 701	701	
				700	700		
					\ 702		
					/ 721		
				720	720		
					\ 722		
				740			
				760			
			No.8	830			
				810			
				800	800		
					\ 802		
				820			
		Division 2	**No.9**				
				900	900		
					\ 920 (?)		
				980			

Table 5-1: Stratigraphic hierarchy of coals and carbonaceous zones at Willow Creek Mine (concluded)

Formation	Member	Division	Coal Zone	Coal Bed	Split	Stringer	Stringer Ply
Gething (continued)	Gaylard (continued)	Division 1	**No.10**	1090			
				1070			
					/ 1003		
						/ 1010 (?)	
					/ 1001	1001	
				1000	1000		
				1020			
				1060			
				1080			
			No.11		/ 1101		
				1100	1100		
					\ 1102	1102	
							/ 1121 (?)
						\ 1120 (?)	1120
							\ 1122 (?)
					\ 1104		
				1140			
				1160			
				1180			
			No.12		/ 1210 (?)		
				1200	1200		
					\ 1220 (?)		

Note: table compiled by C.G. Cathyl-Huhn from Willow Creek Mine year-2001 through year-2018 drilling. Drilling of coal zones No.9 through No.12 is sparse; existence of No.12 zone in any of the year-2001 or more recent boreholes is not adequately established. Assignment of coal zone 12 to the Gething Formation is speculative, and merits further critical consideration. (?) indicates uncertainty of correlation. Symbols \ and / denote postulated splitting relationships.

5.3 Coals intersected by current boreholes at Willow Creek Mine

Correlatable coal intersections within the more recently-drilled of the historic boreholes (those drilled in years-2001 and 2005) and the current boreholes (those drilled in years-2007 through 2013) are collated as **Table A-2** within **Appendix A** of this report. Most of the coal intersections listed in **Table A-2** have been given identifying codes, such as '400', '442', or 'A3'. These codes have been assigned in aid of generating digital deposit models, subject to explicit hierarchical rules (presented graphically as **Table 5-1**) denoting their postulated 'parent-child' relationships as the various coal zones and coal beds are interpreted to split and possibly rejoin laterally.

Uncorrelated coal intersections are simply marked as 'coal'; additionally, thicknesses of Drift, presence of marker-horizons such as the Moosebar and Bluesky formations, along with the positions of inferred fault zones, are given within this table. It should not be presumed that all faults have yet been found, as it is likely to be more difficult to identify bedding-parallel faults (where the usual cues of missing or repeated sections of strata may be absent). Faults have been classified into their level-of-assurance as 'established', 'probable', and 'possible'.

6 Coal quality

Coal-quality data on samples of raw coal and associated rocks (from year-2018 borehole cores) are presented as **Table B-1** within **Appendix B** of this report.

6.1 Scope of current coal-quality data

Amongst the 37 year-2018 boreholes, 27 were fully-cored at HQ size. Samples were taken of potentially-mineable coal beds as well as zones of rock (mostly carbonaceous or coaly rock) which might report as dilution within a mined product. Although it was planned and initially budgeted to conduct single-point washing at a separating density of 1.60 s.g., followed by compositional. petrographic, and reflectometric analyses, this work was not commenced during the period covered by this report, owing to backlogs in processing of the raw-coal samples.

A sample inventory and summary of raw coal quality results is presented as **Table B-1** within **Appendix B**. This table is followed by copies of analytical certificates provided by Birtley Coal & Minerals Testing, who conducted the laboratory tests of raw coal quality.

6.1.1 Cross-reference to historic coal-quality data

A considerable volume of historic (pre-2018) coal quality data is available; these data are presented within a prior coal assessment report (CAR-988: Cathyl-Huhn *et al*., 2015c).

8 Reclamation

Drilling at Willow Creek Mine in year-2018 required the construction or reoccupation of 27 drill sites (see **Map 2-1**), some of which were pre-existing. Drill pads were mostly situated along pre-existing exploration trails, or atop the pit floor of the then-inactive 4N2 pit of the mine. Some drill pads were situated along newly-constructed trails. All work was done within the mine's existing disturbance boundary, and care was taken to avoid riparian setback areas.

As per usual practice, the drill sites were cleared of equipment, supplies and trash prior to demobilisation of the drilling rigs. Steep banks were pulled down at two locations, water bars were emplaced along the trails, deadfall was bucked and delimbed, and trees cut along new trails were bucked and delimbed. Wood was scattered along the trails, to create coarse woody substrates along the trails. Appropriate seeding will be undertaken as necessary, once the winter's snow has melted away.

9 Statement of costs

'Current work' at Willow Creek Mine, for purposes of the present report, comprises exploratory work done during the 2018-2019 tenure term, incorporating invoiced costs received to compilation date (March 17, 2019). No additional invoices are expected to be received during the remainder of March, 2019.

Work consisted mainly of drilling, by means of diamond-drilling (coring) and rotary (non-coring) methods (as referenced in **Table 3-3**, within **Section 3** of this report). All of the boreholes were logged by means of downhole geophysical surveys (as discussed in **Appendix A** of this report). Analytical work (see **Appendix B**) was done on core samples recovered from the diamond-drill holes.

Costs given below in **Table 9-1** (given on the following page) are based on invoices, net of Goods and Services Tax (GST). Drilling depths have been compiled from a collection of individual records, aggregated as hole-by-hole running totals.

In aid of planning future work, unit costs per metre have been determined via division of invoiced cost by relevant total metreages of drilling.

Overall cost of current work is estimated to have been $1,617,533.79.

Cost breakdown by activity for the 2018-2019 reporting period: **Table 9-1**

Year / activity	Rotary drilling (including mobe/demobe of rig, casing and bit charges, and consumables))		Core drilling (including mobe/demob of rig, subsistence, casing and bit charges, consum-ables, and catwork in support of rig moves)		Geophysical logging (including mobe/demobe of logging unit, subsist-ence, and crew rotation costs		Lab analysis (as reported in **Appendix B** of this report)		Roadwork (in support of rotary-drilling, and for trail deactivation)		Consultants (geological supervision and core-logging), including subsistence, crew rotations, and consumables)		Cost totals
	rotary metres	cost	cored metres	cost	drilled metres	cost	cored metres	cost	rotary metres	cost	drilled metres	cost	
2018/2019	1022.94	$74,792.50	3676.59	$943,543.13	4699.53	$203,580.00	3676.59	$100,397.55	1022.94	$62,976.91	4699.53	$232,243.70	$1,617,533.79
Totals	1022.94	$74,792.50	3676.59	$943,543.13	4699.53	$203,580.00	3676.59	$100,397.55	1022.94	$62,976.91	4699.53	$232,243.70	$1,617,533.79
Unit cost	$73.12 / metre		$256.64 / metre		$43.32 / metre		$27.31 / metre		$61.56 / metre		$49.42 / metre		$344.19 / metre

Notes: unit costs are on per-metre drilled length basis, by division of the net invoiced costs by the length of relevant (cored vs. non-cored vs. all) drilling. Roadwork cost is only available for the rotary-drilling programme, inasmuch as the diamond-drilling programme carried costs of catwork for its drill-pads and access trails. Row and column totals contain slight rounding errors. Overall unit cost is based on all net costs divided by all metres drilled.

Personnel estimate: 405 total person-days of direct employment upon the work programme.

9.1 Contractor list

The following contractors provided goods or services in support of the 2018 drilling programme:

- Apex Geoscience -- consulting geology and project management, led by Jerry Holmes P.Geo.;
- Can-West Exploration -- catwork, in support of RC Drilling, and for trail deactivation;
- Century Wireline Services -- geophysical logging of all 37 boreholes;
- Duz Cho Construction -- catwork, billed through Geotech Drilling;
- Geotech Drilling Services -- diamond core drilling of 27 boreholes, with two drilling-rigs;
- RC Drilling -- air-rotary drilling of 10 boreholes, with one drilling-rig; and
- Robertson Manufacturing -- custom-made core boxes, billed through Geotech 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.

Allen, M. and Minev, I.
2017: Technical report, Willow Creek coal property, British Columbia, Canada; *Norwest Corporation*, unpublished report dated August 30, 2017 for Conuma Coal Resources Limited. [This report includes estimates of coal reserves and coal resources effective December 31, 2016, prepared by M. Allen P.Eng. (a qualified person for purposes of *National Instrument 43-101*, who estimated reserves) and by I. Minev P.Geol. (a qualified person for purposes of *National Instrument 43-101*, who estimated resources)].

Anonymous
1997: Willow Creek Project coal quality data, submitted as supplemental to Willow Creek project report; *Pine Valley Coal Ltd*., unpublished report dated November 27, 1997, on behalf of Willow Creek Joint Venture.

Avery, L.R. and Voyle, K.
2013: Willow Creek exploration summary, 2013; *Walter Energy Inc.*, unpublished report dated April 26, 2013.

Banerjee, I., Kalkreuth, W. and Davies, E.H.
1996: Coal seam splits and transgressive-regressive coal couplets: a key to stratigraphy of high-frequency sequences; *Geology*, volume 24, number 11, pages 1001 to 1004.

Bossort, D.O.
1957: Geology of the petroleum and natural gas permit No.746, northeast British Columbia; *Trans Empire Oils Ltd*., unpublished report dated August 30, 1957; *British Columbia Ministry of Energy and Mines*, Petroleum Resources Branch Assessment Report No. 654.

Bouchard, G.
2011: Mineral exploration, deposit appraisal, and mine complex development activity in Canada, 2010 and 2011; *Natural Resources Canada*, online document accessed via *http://www.nrcan.gc.ca/mining-materials/exploration/13814#t5a*

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

Cant, D.J. and Abrahamson, B.
1996: Regional distribution and internal stratigraphy of the Lower Mannville; *Bulletin of Canadian Petroleum Geology*, volume 44, number 3, pages 508 to 529.

Cant, D.J., and Stockmal, G.S.
1989: The Alberta foreland basic: relationship between stratigraphy and Cordilleran terrane-accretion events; *Canadian Journal of Earth Sciences*, volume 26, pages 1964 to 1975.

1993: Some controls on sedimentary sequences in foreland basins: examples from the Alberta Basin; in L.E. Frostick and R.J. Steel (editors), Tectonic Controls and Signatures in Sedimentary Successions; *International Association of Sedimentologists*, Special Publication No.20, pages 49 to 65.

Cathyl-Huhn, C.G.

2015a: Coal assessment report for the Mink North coal property, British Columbia, Canada; *Walter Canadian Coal Partnership*, unpublished report dated February 19, 2015; *British Columbia Geological Survey Branch*, Coal Assessment Report 972.

2015b: Coal assessment report for the Willow Creek coal lease - Volume 4: Year-1997 borehole records; unpublished report dated October 21, 2015; *British Columbia Geological Survey Branch*, Coal Assessment Report 1001.

Cathyl-Huhn, C.G. and Avery, L.R.

2014a: Coal assessment report for the Brule lease, British Columbia, Canada; *Walter Canadian Coal Partnership*, unpublished report dated July 17, 2014; *British Columbia Geological Survey Branch*, Coal Assessment Report 936.

2014b: Coal assessment report for the Burnt River coal property, British Columbia; *Walter Canadian Coal Partnership*, unpublished report dated July 17, 2014; *British Columbia Geological Survey Branch*, Coal Assessment Report 937.

Cathyl-Huhn, C.G., LeMay, L.R., and Singh, P.

2015a: Coal assessment report for the Willow Creek coal lease --Volume 1: Willow South area; *Walter Canadian Coal Partnership*, unpublished report dated April 21, 2015; *British Columbia Geological Survey Branch*, Coal Assessment Report 984.

2015b: Coal assessment report for the Willow Creek coal lease --Volume 2: Willow West area; *Walter Canadian Coal Partnership*, unpublished report, dated May 27, 2015; *British Columbia Geological Survey Branch*, Coal Assessment Report 986.

2015c: Coal assessment report for the Willow Creek coal lease -- Volume 3: Willow Creek Mine; *Walter Canadian Coal Partnership*, unpublished report, dated June 17, 2015; *British Columbia Geological Survey Branch*, Coal Assessment Report 988.

Cathyl-Huhn, C.G. and Singh, P.

2014: Coal Assessment Report for the EB Trend coal licences, Mt. Spieker area, British Columbia; *Walter Canadian Coal Partnership*, unpublished report, dated October 28, 2014; *British Columbia Geological Survey Branch*, Coal Assessment Report 952.

Chowdry, M.A.

1980: B.C. Government report on the North East B.C. thermal coal exploration program, 1980; *BP Exploration Canada Limited*, unpublished report PR – Sukunka 80(1)A, dated December 31, 1980; *British Columbia Geological Survey Branch*, Coal Assessment Report No. 667, 807 pages.

Douglas, R.J.W., Gabrielse, H., Wheeler, J.O., Stott, D.F. and Belyea, H.R.

1970: Geology of Western Canada: Chapter VIII; in Douglas, R.J.W. (editor), Geology and Economic Minerals of Canada, *Geological Survey of Canada,* Economic Geology Report, volume 1, pages 366 to 488.

Duff, P.McL.D. and Gilchrist, R.D.
1981: Correlation of Lower Cretaceous coal measures, Peace River coalfield, British Columbia; *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Paper 1981-3, 31 pages.

Ennis, S.
2010: Willow Creek project: permit-level geotechnical design for the north waste rock dumps; *Norwest Corporation*, unpublished report 09-4516 dated June 28, 2010, on behalf of Western Coal Corp.

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

1992b: Stratigraphy and sedimentology of the Lower Cretaceous Hulcross and Boulder Creek formations, northeastern British Columbia; *Geological Survey of Canada*, Bulletin 440, 111 pages.

Ginnever, L.
2009: Terrain stability and geohazards field assessment of Far East Creek and A Creek drainage corridors, plus, preliminary geotechnical engineering site investigation and design appraisal for Far East Creek non contact channel, Willow Creek Mine, northeastern British Columbia; *Firth Hollin Resource Science Corp*., unpublished report 2267 dated November 24, 2009, on behalf of Western Coal Corp.

Hughes, J.D., Klatzel-Mudry, L. and Nikols, D.J.
1989: A standardized coal resource/reserve reporting system for Canada; *Geological Survey of Canada*, Paper 88-21.

Hughes, J.E.
1963: The Peace and Pine River Foothills (structures and tectonics); *McGill University*, unpublished Ph.D. dissertation dated September 1963.

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

1967: Geology of the Pine Valley, Mount Wabi to Solitude Mountain, northeastern British Columbia; *British Columbia Department of Mines and Petroleum Resources*, Bulletin 52.

James, K.
1998: Willow Creek Coal Project 1996 coal exploration program; *Pine Valley Coal Ltd*., unpublished report dated March 9, 1998; *British Columbia Geological Survey Branch*, Coal Assessment Report No.861.

Jones, P.B.
1960: Geological field work in the North Monkman group of permit areas, British Columbia, 1959; *Triad Oil Co. Ltd*., unpublished report T.R. 152, dated April 1960; *British Columbia Ministry of Energy and Mines*, Petroleum Resources Branch Assessment Report No. 863.

1963: Report on geological field work in the Pine Valley area, northeast British Columbia; *Triad Oil Co. Ltd*., unpublished report 55/121/39, dated September 1963; *British Columbia Ministry of Energy and Mines*, Petroleum Resources Branch Assessment Report No. 1161.

Jordan, G. and Acott, P.
2005: Technical report, Willow Creek property; *Norwest Corporation*, unpublished technical report 05-2707, dated July 28, 2005, on behalf of Pine Valley Mining Corporation.

Kilby, W.
1984a: Tonsteins and bentonites in northeast British Columbia ((3O, P, I); in Geological Fieldwork 1983; *British Columbia Geological Survey Branch*, Paper 1984-1, pages 95 to 107.

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

1985: Tonstein and bentonite correlations in northeast British Columbia (93O, P, I; 94A); in Geological Fieldwork 1984; *British Columbia Geological Survey Branch*, Paper 1985-1, pages 257 to 277.

Legun, A.S.
1990: Stratigraphic trends in the Gething Formation (NTS 93P/1 to 8 and 93I/14, 15); *British Columbia Ministry of Energy, Mines and Petroleum Resources*, Open File 1990-33.

2003: Coalbed methane geology of the Peace River District - NE BC, NTS (Parts of 94A&B; 93I, O&P); *British Columbia Geological Survey Branch*, Geoscience Map 2003-2.

Lingrey, S.
1996: Structural patterns of imbrication in the Pine River area of northeastern British Columbia; *Bulletin of Canadian Petroleum Geology*, volume 44, number 2, pages 324 to 336.

MacKenzie, A.
1801: Voyages from Montreal on the River St. Lawrence, through the continent of North America, to the Frozen and Pacific Oceans in the years 1789 and 1793; Cadell, London, 412 pages.

Marton, A.S.
1981: Diamond drilling and trenching report on Coal Licences 3986 to 3993 inclusive, 6792, 7191 and 7192, Willow Creek area; *G.A. Noel and Associates, Inc*., unpublished report PR-Willow Creek 81(1)A, dated December 15, 1981, on behalf of Semper Resources Inc.; *British Columbia Geological Survey Branch*, Coal Assessment Report No.690.

Marton, A.S. and Jones, H.S.
1981: Diamond drilling and trenching report on Coal Licences 3986 to 3993 inclusive and 6792, Pine River area; *G.A. Noel and Associates, Inc*., unpublished report PR-Willow Creek 80(1)A, dated May 31, 1981, on behalf of Semper Resources Inc.; *British Columbia Geological Survey Branch*, Coal Assessment Report No.689.

McClymont, B.I.
1981: Burnt River coal property 1981 exploration report; *Teck Corporation*, unpublished report PR – Burnt River 81(1)A, dated December 1981; *British Columbia Geological Survey Branch*, Coal Assessment Report No.490.

McKechnie, N.D.
1955: Coal reserves of the Hasler Creek - Pine River area, British Columbia; *British Columbia Department of Mines*, Bulletin 36.

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

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

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

Morris, R.J.
2015: Summary report on the Trefi coal property; *Moose Mountain Technical Services*, unpublished report dated March 5, 2015, for Trefi Coal Corp; *British Columbia Geological Survey Branch*, Coal Assessment Report No.975.

Morris, R.J., Gray, J.H., and Zik, M.
2010: Preliminary feasibility study, NI 43-101 technical report for the Willow Creek Mine; *Moose Mountain Technical Services*, unpublished technical report dated July 16, 2010, on behalf of Western Coal Corp.

Olauson, E. and LaCas, B.
2010: Willow Creek project: geotechnical and hydrological design of the north pond; *Norwest Corporation*, unpublished report 09-4516-3 dated June 29, 2010, on behalf of Western Coal Corp.

Oppelt, H.
1988: Sedimentology and ichnology of the Bluesky Formation in northeastern British Columbia*; Canadian Society of Petroleum Geologists*, Memoir 15, pages 401 to 415.

Pekar, E.L. and Scott, H.S.
1956: Geological photo-interpretation, summary report, August to October 1956, submitted as a progress report to record exploratory work on P&NG permit No.746, on behalf of West Canadian Petroleum and Trans Empire Oils Ltd.; *The Photographic Survey Corporation Limited*, unpublished report dated October, 1956; *British Columbia Ministry of Energy and Mines*, Petroleum Resources Branch Assessment Report No. 582.

Pomeroy, K. (editor)
2010: Willow Creek Mine - 3.8 Mtpa application package for amendments to mine, effluent & air permits, EA certificates & occupant licence to cut; *Western Coal Corp.*, unpublished report dated September 17, 2010, submitted to British Columbia Ministry of Energy, Mines and Petroleum Resource.

Ryan, B.D.
1997: Coal quality variations in the Gething Formation, northeast British Columbia; in Geological Fieldwork 1996; *British Columbia Geological Survey Branch*, Paper 1997-1, pages 373 to 398.

2002: Coal in British Columbia; *British Columbia Ministry of Energy and Mines and Responsible for Core Review*, website accessed December 17, 2014 via *http://www.empr.gov.bc.ca/Mining/Geoscience/Coal/CoalBC/Pages/default.aspx*

2010: Technical report: Hasler Creek coal property, unpublished report on behalf of *Unicorn International Mines Group Inc*., dated March 1st, 2010; 77 pages.

Spivak, J.
1944: Geology and coal deposits of Hasler Creek area, British Columbia; *Geological Survey of Canada*, Paper 44-7 [accompanied by Preliminary Map 44-7A at scale of 1:31,680].

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

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

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

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

Sultan, M. and Cathyl-Huhn, C.G.
2014: Coal assessment report for the Mink Creek coal property, British Columbia; *Walter Canadian Coal Partnership*, unpublished report dated December 30, 2014; *British Columbia Geological Survey Branch*, Coal Assessment Report 966.

Thompson, R.I.
1979: A structural interpretation across part of the northern Rocky Mountains, British Columbia, Canada; *Canadian Journal of Earth Sciences*, volume 16, pages 1228 to 1241.

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

Wickenden, R.T.D. and Shaw, G.
1943: Stratigraphy and structure in Mount Hulcross - Commotion Creek map-area, British Columbia; *Geological Survey of Canada*, Paper 43-13 [accompanied by Preliminary Map 43-13A at scale of 1:63,360].

11 Conclusions

Coal occurrences, known to include coals of workable thickness and variable raw (unwashed) ash content and caking propensity, occur within the Willow Creek Mine block of the Willow Creek coal property. These coals are contained within the Gaylard Member of the Lower Cretaceous (Hauterivian to Early Albian) Gething Formation. The Gaylard coal-measures have a stratigraphic thickness of at least 260 metres, possibly 360 metres or more. Numerous coal zones, each containing one or more major coal beds, are present within the Gaylard Member. Coal beds split and coalesce laterally, complicating their correlation and tracing throughout the Willow Creek Mine block.

Rocks at Willow Creek Mine have been dislocated by several southwest-verging thrust faults, likely accompanied by incompetent mesoscale folds, within an overall passive-roof duplex (triangle-zone) structural style consisted with lying within the northeastern leading edge of the Pine River Anticlinorium.

In all, 726 historic boreholes, totalling 50,701.53 metres' length, have been drilled during years-1980 through 2013 within the Willow Creek Mine block of the Willow Creek coal lease. No drilling is known by the author to have been done in years-2014 through 2017. An additional 37 current boreholes (here-reported for the first time), with overall length of 4,699.53 metres, were drilled on the property in year-2018. Overall drilling totals to date are 763 boreholes and 55,401.06 metres. This total does not include earlier drilling (at locations not yet confirmed by site surveys, and for which logs are as-yet unavailable) of boreholes by the British Columbia Department of Mines (reported by McKechnie, 1955) in years-1946 through 1951.

Drilling at Willow Creek Mine is regarded as sufficient to support the determination of coal-resources to current Canadian geometric standards (Hughes *et al.*, 1989), provided that an updated structural model is assembled, and an updated coal-quality model is constructed, in order to support the distinction of coking-coal, PCI coal, and thermal-coal within the deposit. This modelling work is now being undertaken by the mine's engineering and geological staff

Estimated current exploratory and analytical costs to date (from April 1, 2019 through to March 17, 2019, and anticipating no further invoices received prior to the tenure's anniversary date of March 31, 2019), are $1,617,533.79.

The Willow Creek Mine block is regarded as being a property of merit.

12 Statement of qualifications

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 as Chief Geologist by Conuma Coal Resources Limited, in their Canadian regional office in 200-235 Front Street (PO Box 2140), Tumbler Ridge, British Columbia, V0C 2W0 Canada, with permanent domicile at P.O. Box 40, Cumberland, British Columbia V0R 1S0 Canada.

b) This certificate applies to the current report, titled *Coal Assessment Report for the Willow Creek coal lease -- Volume 5: Willow Creek Mine, 2018 infill drilling*, dated March 17, 2019.

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, a founding Registered Member of the Society for Mining, Metallurgy and Exploration (SME, Member No.518350), and a Life Member of the Canadian Institute of Mining, Metallurgy, and Petroleum (CIM). I hold British Columbia certification as a Mine Supervisor (No.835247, valid until May 31, 2023). I have worked as a colliery geologist in several countries for 40 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 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 visits to the Willow Creek Mine block of the Willow Creek coal property were in the summer and autumn of 2018, to oversee and direct the drilling and geophysical logging programme in my capacity as Chief Geologist.

f) I am the author of this report, titled *Coal Assessment Report for the Willow Creek coal lease - Volume 5: Willow Creek Mine, 2018 infill drilling*, dated March 17, 2019, concerning the Willow Creek Mine block of the Willow Creek coal property.

g) As of the date of the writing of this report, I am not independent of Conuma Coal Resources Limited, pursuant to the tests in Section 1.4 of *National Instrument 43-101*.

“original signed and sealed by”
Dated this 17th day of March, 2019.

C.G. Cathyl-Huhn P.Geo. (BC) Lic.Geol. (WA) RMSME
British Columbia Mine Supervisor No.835247

Hole	UTM NAD83 Zone 10 | Easting	Northing	Elevation	Depth
WC18-01C	549920	6162941	1057.85	179.50
WC18-02C	549771	6163079	1056.97	125.00
WC18-03C	550113	6162895	1066.55	218.00
WC18-04C	550111	6162896	1066.27	239.00
WC18-05C	549838	6163001	1057.58	124.99
WC18-06C	549703	6163208	1025.40	149.20
WC18-07C	549726	6163186	1030.38	166.93
WC18-08C	549613	6163200	1027.85	101.05
WC18-09C	549688	6163286	998.79	124.93
WC18-10C	549789	6163247	986.08	215.35
WC18-11C	549580	6163321	992.48	101.00
WC18-12C	549859	6163194	982.41	200.30
WC18-13C	549728	6163318	980.01	158.00
WC18-14C	549861	6163195	982.36	140.22
WC18-15C	549572	6163458	940.48	101.00
WC18-16C	549656	6163396	964.92	124.24
WC18-17C	549752	6163516	892.00	140.22
WC18-18C	549696	6163412	954.73	147.58
WC18-19C	549543	6163572	902.59	89.00
WC18-20C	549479	6163795	876.75	136.61
WC18-21C	549415	6163727	876.10	71.00
WC18-22C	549512	6163674	907.12	106.00
WC18-23C	549473	6163625	894.18	71.00
WC18-24C	549474	6163516	907.31	68.00
WC18-25C	549584	6163735	861.73	140.25
WC18-26C	549400	6163867	829.52	98.00
WC18-27C	549544	6163872	830.56	140.22
	drilled:	27 cored boreholes		3676.59 m
	(planned:	40 cored boreholes		5240 m)
WC18-28	549609	6163141	1050.76	65.99
WC18-29	549614	6163203	1027.82	81.43
WC18-30	549633	6163231	1026.23	120.97
WC18-31	549722	6163185	1030.58	119.45
WC18-32	549520	6163275	986.37	81.58
WC18-33	549518	6163274	986.32	96.58
WC18-34	549696	6163410	953.40	99.29
WC18-35	549625	6163547	914.49	121.13
WC18-36	549699	6163209	1025.20	138.74
WC18-37	549624	6163542	911.54	97.78
	drilled:	10 non-cored boreholes		1022.94m
	(planned:	9 non-cored boreholes		1080 m)

total programme: drilled 37 boreholes 4699.53 m

Map updated as of 9 November 2018

Access trails:

- existing trail reopened
- new-built trails
- existing not to be used
- existing seismic line

locations of existing trails are photo-interpreted and checked against old base maps; locations of new-built trails are derived from hand-held GPS survey

Symbolic legend:

- Boreholes planned but not drilled
- Historic boreholes (pre-2018 work)
- Current boreholes (2018 work)

metres: 0 100 200 300 400 500

UTM NAD83

Map 2-1: Willow Creek area 4N1/4N2 year-2018 infill drilling -- final programme map

Drawing: Willow-Mine-drilling-final_190309c.srf/jpg
Scale: as shown Grid: UTM NAD83 Zone 10, in metres
Reference: Willow-infill-sites_180807e.dat/xls; Apex CSV file
Drawn: C.G.Cathyl-Huhn P.Geo(BC) Lic.Geol(WA) RMSME
Date: 9 March 2019

Access:

Road (main)

Road (other)

Trail

Seismic line

Drainage:

River or creek

Stream (perennial or intermittent flow)

Outline of Willow Creek Mine block within Willow Creek coal lease

Boreholes:

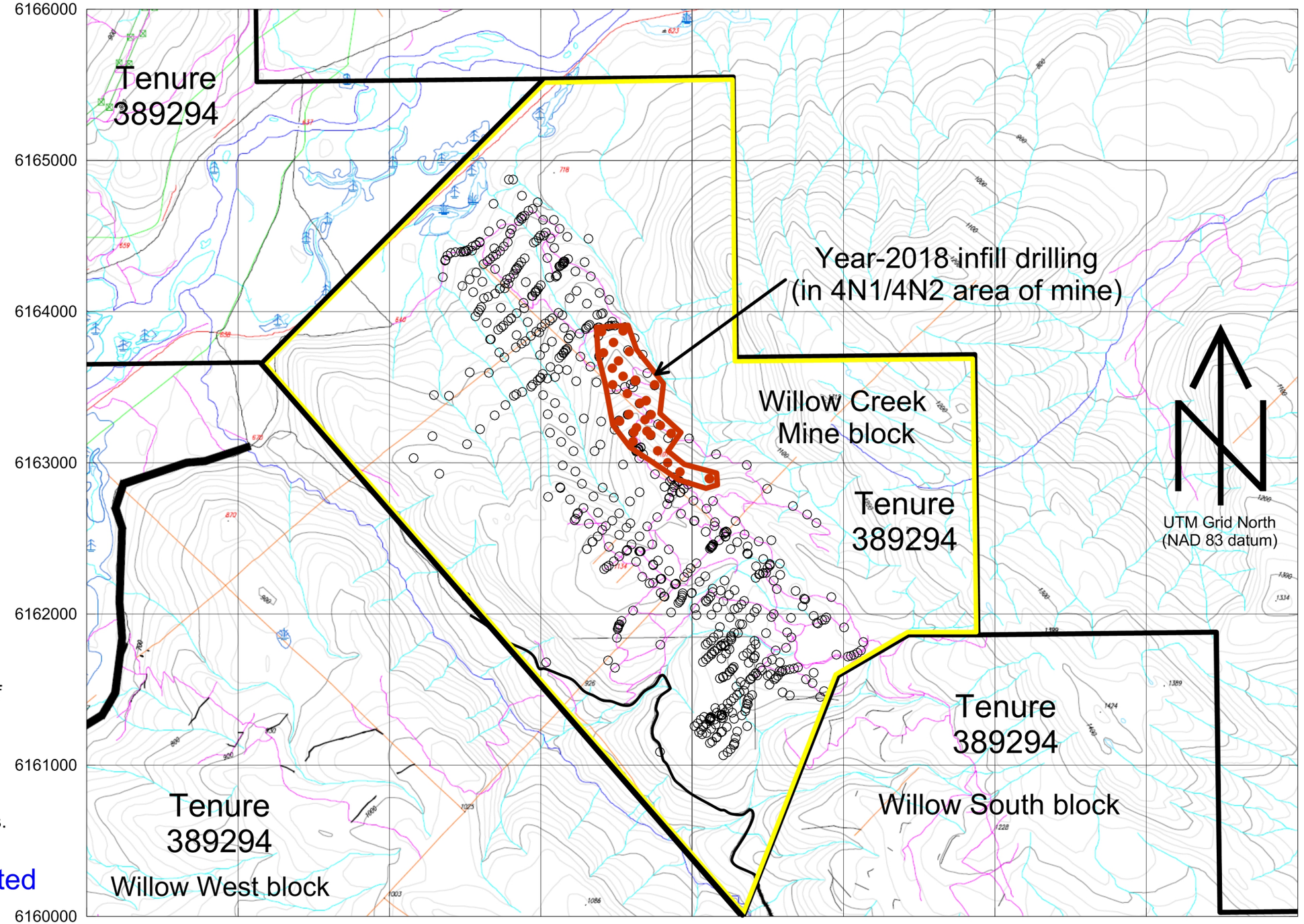
⊕ Historic (1980 to 2013)

○ Current (2018)

Refer to accompanying Map 2-1 for details of year-2018 boreholes and access trails.

Base mapping: British Columbia government TRIM-series map sheets, at original scale of 1:20,000. Elevations are in metres above geodetic datum; contour interval is 20 metres.

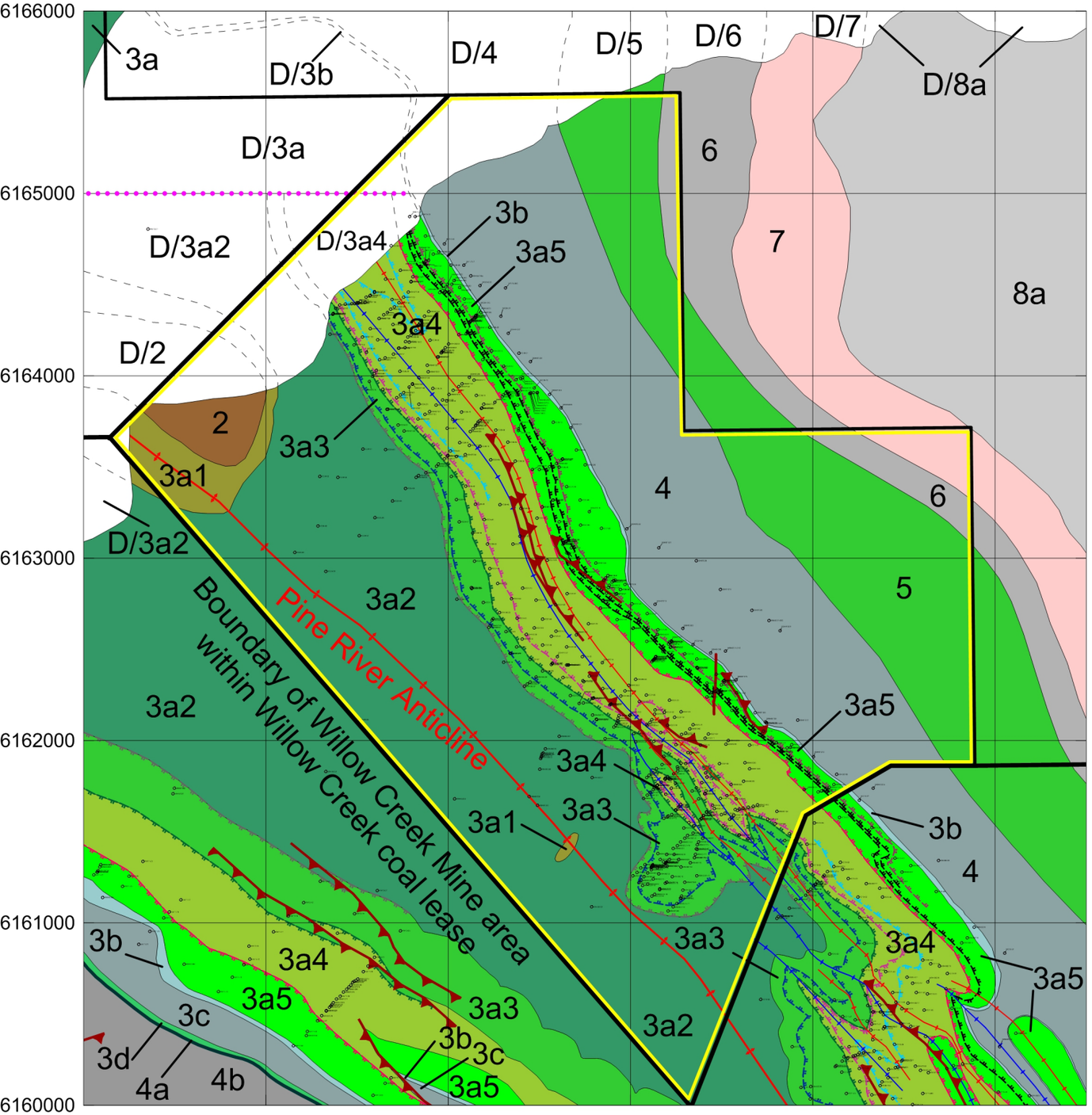
Conuma Coal Resources Limited



Drawing: Willow_Mine-topography_190314e.srf/jpg
Drawn: C.G. Cathyl-Huhn, P.Geo.(BC) Lic.Geol.(WA) RMSME
Date: 14.March, 2019 Scale: as shown by bar scale
Grid: UTM Zone 10 to North American Datum of 1983, in metres

Willow Creek Mine Coal Assessment Report

Map 2-2: Coal Tenure and Topography



metres
0 1000 2000

Drawing: Willow_Mine-local-geology-tracing-base-NAD83_190309n.srf/jpg
Drawn: C.G. Cathyl-Huhn, P.Geo.(BC) Lic.Geol.(WA) RMSME
Date: 9 March 2019 Scale: as shown by bar scale
Grid: UTM Zone 10 to North American Datum of 1983, in metres

STRATIGRAPHIC LEGEND:

QUATERNARY

D — Alluvium and colluvium -- fluvial and glaciolacustrine deposits; moraines; talus; possible landslide deposits

FORT ST JOHN GROUP (Albian)

8a — Hasler Formation -- siltstone and mudstone; minor sandstone; ironstone as bands of concretions

7 — Boulder Creek Formation -- conglomerate, sandstone, and siltstone; coal

6 — Hulcross Formation -- siltstone and mudstone; minor sandstone and tuff; ironstone; basal pebbly gritstone

5 — Gates Formation -- siltstone, sandstone, conglomerate; minor coal

4 — Moosebar Formation:

- 4c — Spieker Member -- siltstone, sandstone; minor mudstone
- 4b — Cowmoose Member -- mudstone, minor tuff and ironstone
- 4a — Green Marker -- erosive-based, locally-pebbly, glauconitic mudstone and sandstone
- 3d — Chamberlain Member -- sandstone and siltstone
- 3c — Bullmoose Member -- siltstone and sandstone; mudstone; minor tuff

3b — Bluesky Formation -- glauconitic sandstone and gritstone; siltstone and mudstone

BULLHEAD GROUP (Hauterivian to Early Albian)

3 — Gething Formation:

- 3a — Gaylard Member -- siltstone, sandstone and coal; minor conglomerate, minor tuff
  - 3a5 — Division 5 -- siltstone, sandstone and mudstone; coal (zones 1, 2, 3 and 4)
  - 3a4 — Division 4 -- siltstone, mudstone and sandstone; coal (zones A, M, 5 and 6)
  - 3a3 — Division 3 -- sandstone and siltstone; minor mudstone; coal (zones 7 and 8)
  - 3a2 — Division 2 -- siltstone and mudstone; minor sandstone and coal (zone 9)
  - 3a1 — Division 1 -- sandstone; minor siltstone, mudstone, and conglomerate (zones 10 through 12?)

2 — Cadomin Formation -- sandstone; minor conglomerate

MINNES GROUP (Tithonian to Valanginian)

1 — [Older clastic sedimentary rocks -- present only at depth, not known to outcrop or subcrop within map-area]

Coal Zones:

No.1 zone
No.2 zone
No.3 zone
No.4 zone
A-zone
No.5 zone
No.6 zone
No.7 zone
No.8 zone

not shown owing to sparse control

No.9 zone
No.10 zone
No.11 zone
No.12 zone

Lateral change in stratigraphic detail

Structure:

Anticlinal trace

Synclinal trace

Thrust-fault (with barbs on over-thrust plate)

Control:

○ Historic (pre-2018) borehole; refer to Map 2-1 for positions of current (year-2018) drilling

Conuma Coal Resources Limited

Map 2-3:
Bedrock geology of Willow Creek Mine

100 km 0 100 200 300 400 km

SCALE

LEGEND

ROADS

RAILWAY

REV	DATE	DESCRIPTION	BY	CHKD	APRVD
C	Mar/12/2019	Ownership revision and index number	GCH		

Conuma Coal Resources Limited

WILLOW CREEK MINE

Drawn by: GCH	GENERAL LOCATION MAP
Checked by:	
Approved by:	
Revision No. C	
Dwg No.	
MAR 2019	Document: WILLOW CREEK MINE COAL ASSESSMENT REPORT
	Figure No. MAP 2-4

Willow_Creek-PMT-447B_190312c1.srf/jpg

Geophysical logs and borehole statistics: **Appendix A**

Geophysical logging and the pertinent statistics of the current (year-2018) boreholes at Willow Creek Mine are summarised in **Table A-1** (commencing on the following page). Copies of the geophysical logs are submitted as digital files on a flash drive accompanying this report, in LAS, TIF, and/or PDF formats.

LAS and TIF are the primary digital formats within which geophysical logs are customarily (in modern practice) provided by borehole-logging service companies. PDF is a secondary format.

Geophysical logs are obtained by lowering a self-contained cylindrical sonde to the bottom of a borehole (or as close to the bottom as is safely practicable, given borehole wall stability conditions), and then drawing the sonde upward by means of a cable which contains power and data-transfer conductors. Depth reference on each log is based upon readings of a depth transponder connected to the geophysical logging system's drawworks. A very small amount of cable stretch may occur, depending upon the weight and diameter of each sonde; this accounts for slight variations in reported depths of log measurements as compared from one log suite to another.

Ordinarily, geophysical logs are run within boreholes once the drilling rods have been withdrawn. This practice allows for measurement of borehole diameter with a caliper instrument, and further allows for the effective collection of properly-calibrated log measurements. In some occasions, logs have been run within the drill rods, owing to concerns regarding borehole stability; these logs may or may not be subsequently be re-run with the rods withdrawn, again depending upon borehole conditions.

Positional and elevation data for boreholes are given in metres. Depths given on all geophysical logs are also given in metres, below the datum points mentioned in the headers of each log. Downhole depths reached by individual logging suites will vary, according to the length of each sonde, and also according to the source/detector geometry (and hence the measurement reference point) of each sonde. Geophysical log depth is therefore generally slightly less than driller's reported depth of each hole.

Table A-2 presents interpretations of principal correlatable coal beds within current (year-2018) boreholes at Willow Creek Mine. All depths presented within this table are given in terms of downhole depth (along the boreholes' trajectories) in metres.

Table A-3 presents cross-references between PDF scan-files and borehole core descriptions for boreholes WC18-01C through WC18-27C. In the printed copies of this report, xerographic copies of core descriptions follow **Table A-4**.

Table A-4 describes methods of core description, and identifies the contract geological staff (from Apex Geoscience) who logged the cores under the author's direction and supervision.

Inventory of boreholes and geophysical logs **Table A-1** - sheet 1 of 1

Borehole details (suffix 'C' denotes cored borehole)						Geophysical logs run and depths reached (metres)											
Borehole	Surveyed borehole position (metres: UTM NAD83 Zone 10)			Drilled depth (metres)		Gamma-density through drill rods		Compensated gamma-density-resistivity-caliper		Deviation	Gamma-neutron through drill roads		Gamma-neutron		Dipmeter		Sonic	
	Easting	Northing	Elevation	Cored (HQ size)	Non-cored (114.3 mm)	Century 9068 tool		Century 9239C tool		Century 9058A	Century 9067 tool		Century 9058A tool		Century 9411A tool		Century 9325A tool	
						TD logger	Last rdg	TD logger	Last rdg	Last rdg	TD logger	Last rdg	TD logger	Last rdg	TD logger	Last rdg	TD logger	Last rdg
WC18-01C	549919.717	6162941.125	1057.853	179.50		179.26	179.06	179.26	179.02	179	n/a	179.10	179.26	179.08				
WC18-02C	549770.728	6163078.855	1056.971	125.00		125.00	124.92	125.00	124.74	124	125.00	124.86	125.00	124.86				
WC18-03C	550113.152	6162894.828	1066.552	218.00				218.00	217.76	217	218.00	217.92	218.00	217.80	218.00	217.40		
WC18-04C	550111.305	6162896.186	1066.265	239.00		239.00	238.76	239.00	238.76	238	239.00	238.80	239.00	238.84				
WC18-05C	549837.504	6163001.175	1057.579	124.99		124.99	124.74	124.99	124.72	124	124.99	124.64	124.99	124.56				
WC18-06C	549703.347	6163208.038	1025.403	149.20				149.00	148.76	148			149.00	148.68	149.00	148.90		
WC18-07C	549726.288	6163185.982	1030.381	166.93		166.93	166.78	166.93	166.66	165	166.93	166.62	166.93	166.74	166.93	165.97		
WC18-08C	549613.477	6163200.911	1027.849	101.05		101.05	100.84	101.05	100.74	100	101.05	100.84	101.05	100.88				
WC18-09C	549687.550	6163285.864	998.789	124.93		124.93	124.64	124.93	124.68	124	124.93	124.88	124.93	124.54				
WC18-10C	549789.164	6163247.370	986.076	215.35		215.35	215.02	215.35	215.10	215	215.35	215.04	215.35	215.22				
WC18-11C	549580.191	6163320.688	992.477	101.00		101.00	100.74	101.00	100.74	100	101.00	100.86	101.00	100.88				
WC18-12C	549859.289	6163193.974	982.413	200.30		200.30	200.04	200.30	200.02	200	200.30	200.04	200.30	200.04				
WC18-13C	549727.625	6163318.047	980.012	158.00		158.00	157.76	158.00	157.76	157	158.00	157.90			158.00	157.72		
WC18-14C	549861.101	6163194.631	982.358	140.22		140.22	140.00	140.22	139.98	139	140.22	139.90	140.22	139.94				
WC18-15C	549571.514	6163458.394	940.478	101.00		101.00	101.20	101.00	100.74	100	101.00	101.12	101.00	100.90				
WC18-16C	549655.649	6163395.747	964.918	124.24		124.24	124.74	124.24	124.00	124	124.24	124.78	124.24	124.00				
WC18-17C	549752.080	6163516.076	891.998	140.22		140.22	139.76	140.22	139.98	139	140.22	139.90	140.22	139.94				
WC18-18C	549696.047	6163411.618	954.725	147.58		147.82	145.72	147.82	147.58	147	n/a	146.00	147.82	148.80				
WC18-19C	549543.156	6163572.340	902.591	89.00		89.00	79.98	89.00	88.74	79	89.00	79.92	89.00	88.62				
WC18-20C	549478.986	6163795.215	876.747	136.61		136.61	135.84	136.61	136.36	136	136.61	135.92	136.61	136.52				
WC18-21C	549414.521	6163726.503	876.097	71.00		71.00	70.76	71.00	70.76	70	71.00	70.90	71.00	70.90				
WC18-22C	549512.394	6163673.934	907.123	106.00		106.00	95.08	106.00	105.76	105	106.00	95.12	106.00	105.72				
WC18-23C	549472.881	6163624.654	894.18	71.00		71.00	70.76	71.00	70.76	70	71.00	70.80	71.00	70.90			71.00	70.54
WC18-24C	549474.112	6163516.344	907.308	68.00		68.00	67.76	68.00	67.30	67	68.00	67.90	68.00	67.90				
WC18-25C	549584.109	6163735.278	861.732	140.25		140.25	140.00	140.25	140.02	140	140.25	140.16	140.25	140.16			140.25	139.30
WC18-26C	549400.485	6163867.209	829.519	98.00		98.00	97.74	98.00	97.74	97	98.00	97.90	98.00	97.88				
WC18-27C	549544.060	6163871.966	830.558	140.22		140.22	139.76	140.22	139.98	140	140.22	139.90	140.22	140.12			140.22	139.06
WC18-28	549608.840	6163141.020	1050.764		65.99			65.99	65.74	65			65.99	65.72	65.99	65.34		
WC18-29	549613.570	6163203.004	1027.623		81.43			81.43	81.16	81			81.43	81.12	81.43	81.19		
WC18-30	549632.612	6163231.418	1026.229		120.97			120.97	120.70	120			120.97	120.70	120.97	120.79		
WC18-31	549722.241	6163184.832	1030.577		119.45			119.45	119.26	119			119.49	119.24	119.49	119.31		
WC18-32	549519.825	6163274.772	986.371		81.58			81.58	81.30	81			81.58	81.16	81.58	81.14		
WC18-33	549518.468	6163274.156	986.323		96.58			96.58	96.32	96			96.58	96.32	96.58	82.63		
WC18-34	549696.213	6163410.049	953.399		99.29			99.29	99.02	99					99.29	99.14		
WC18-35	549624.894	6163546.955	914.489		121.13			121.13	120.86	119	121.13	116.38			121.13	120.97		
WC18-36	549699.301	6163208.768	1025.2		138.74			138.74	138.48	138			138.74	138.28	138.74	138.20		
WC18-37	549623.775	6163541.670	911.541		97.78			98.04	97.78	97			98.04	97.86	98.04	97.86	98.04	97.84
37 holes 4699.53 m				27 holes 3676.59 m	10 holes 1022.94 m	25 holes 3310.09 m		37 holes 4699.35 m		37 holes 4659 m	27 holes 3647.20 m		34 holes 4322.19 m		14 holes 1715.17 m		4 holes 449.51 m	

Abbreviations: TD -- total depth (in metres); rdg - reading (on log, in metres); all log depths are taken from log headers, with exception of deviation, taken as deepest reported depths

Willow-2018-Table-A-1_190310b.doc

Lithology codes for CAR-1048 **Table A-2**:

ASH = volcanic ash (high-gamma zone)
C = coal
CBSH = carbonaceous rock
CR = coaly rock
DC = dirty coal
DNR = did not reach (the horizon in question)
ND = no data
NP = not present
NR = not recognised
R= rock

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-01C (metres)				
0	4.1	4.1	DRIFT	DRIFT
4.1	5.75	1.65	R	
5.75	6.1	0.35	DC	111
6.1	6.45	0.35	CBSH	111
6.45	6.75	0.3	DC	111
6.75	8.9	2.15	R	
8.9	9.8	0.9	C	110
9.8	18.65	8.85	R	
18.65	18.95	0.3	DC	101
18.95	20.55	1.6	C	101
20.55	23.8	3.25	C	100
23.8	24.1	0.3	CBSH	
24.1	26.8	2.7	R	
26.8	27	0.2	CBSH	
27	27.9	0.9	R	
27.9	38.35	10.45	CBSH	
38.35	38.55	0.2	CR	
38.55	40.05	1.5	C	201
40.05	40.3	0.25	CR	
40.3	40.45	0.15	CBSH	
40.45	42.2	1.75	R	
42.2	42.45	0.25	DC	202
42.45	42.65	0.2	ASH	202
42.65	42.8	0.15	CR	202
42.8	43.02	0.22	DC	202
43.02	43.35	0.33	C	202
43.35	54.35	11	R	
54.35	55.2	0.85	CBSH	
55.2	55.6	0.4	C	310
55.6	55.75	0.15	CBSH	
55.75	61.6	5.85	R	
61.6	61.9	0.3	C	300
61.9	62.05	0.15	DC	300
62.05	62.6	0.55	C	300
62.6	62.8	0.2	CBSH	
62.8	68.8	6	R	
68.8	69.2	0.4	CBSH	
69.2	69.5	0.3	DC	320
69.5	69.8	0.3	C	320
69.8	70.3	0.5	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-01C (metres) -- continued				
70.3	73.9	3.6	R	
73.9	74.7	0.8	CBSH	340
74.7	74.95	0.25	CR	340
74.95	75.15	0.2	DC	340
75.15	75.6	0.45	CR	340
75.6	75.9	0.3	DC	340
75.9	76.25	0.35	CBSH	340
76.25	76.4	0.15	R	340
76.4	76.8	0.4	CBSH	340
76.8	77.2	0.4	CR	340
77.2	77.65	0.45	CBSH	340
77.65	78.35	0.7	CR	340
78.35	78.55	0.2	CBSH	340
78.55	111.65	33.1	R	
111.65	112.2	0.55	CBSH	410?
112.2	112.4	0.2	CR	
112.4	113.6	1.2	C	401
113.6	115.6	2	C	400
115.6	115.8	0.2	C	420
115.8	116.05	0.25	CBSH	
116.05	118.65	2.6	R	
118.65	118.9	0.25	CBSH	
118.9	119.65	0.75	C	440
119.65	122.65	3	R	
122.65	122.9	0.25	IRST	IRONSTONE
122.9	128.6	5.7	R	
128.6	129.05	0.45	CBSH	
129.05	129.3	0.25	R	
129.3	130.4	1.1	CBSH	463
130.4	137.1	6.7	R	
137.1	137.3	0.2	CR	460
137.3	137.5	0.2	CBSH	460
137.5	139.55	2.05	R	
139.55	139.9	0.35	CBSH	483?
139.9	140.1	0.2	FAULT	POSSIBLE
140.1	144.4	4.3	R	
144.4	144.6	0.2	CR	460
144.6	144.8	0.2	CBSH	460
144.8	156.4	11.6	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-01C (metres) -- continued				
156.4	156.65	0.25	CR	
156.65	157.05	0.4	C	480
157.05	157.25	0.2	DC	480
157.25	157.65	0.4	C	480
157.65	157.9	0.25	CR	
157.9	163.5	5.6	R	
163.5	163.7	0.2	CR	
163.7	172.65	8.95	R	
172.65	172.85	0.2	CBSH	
172.85	173.8	0.95	C	A7
173.8	174.1	0.3	CR	
174.1	174.4	0.3	CBSH	
174.4	179.5	5.1	R	
-----	-----			
Log interpretation of WC18-02C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	4.5	4.5	DRIFT	DRIFT
4.5	6.05	1.55	R	
6.05	6.3	0.25	CBSH	170?
6.3	9.8	3.5	R	
9.8	10.1	0.3	C	150
10.1	10.4	0.3	DC	150
10.4	10.6	0.2	CR	
10.6	11.2	0.6	CBSH	
11.2	16.65	5.45	R	
16.65	17.05	0.4	CBSH	130
17.05	20.55	3.5	R	
20.55	20.9	0.35	DC	111
20.9	21.05	0.15	CBSH	
21.05	22	0.95	R	
22	22.43	0.43	DC	110
22.43	22.6	0.17	C	110
22.6	26	3.4	R	
26	26.55	0.55	C	101
26.55	27.8	1.25	C	100
27.8	28.4	0.6	R	
28.4	28.8	0.4	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-02C (metres) -- continued				
28.8	32	3.2	R	
32	32.5	0.5	CBSH	
32.5	32.59	0.09	DC	201
32.59	33.3	0.71	C	201
33.3	33.5	0.2	CBSH	
33.5	35.5	2	R	
35.5	35.7	0.2	C	202
35.7	35.83	0.13	DC	202
35.83	36.03	0.2	C	202
36.03	36.05	0.02	DC	202
36.05	36.16	0.11	ASH	202
36.16	36.25	0.09	DC	202
36.25	36.55	0.3	C	202
36.55	43.8	7.25	R	
43.8	44.3	0.5	CBSH	
44.3	44.75	0.45	R	
44.75	45.1	0.35	CBSH	310
45.1	46.3	1.2	R	
46.3	46.6	0.3	IRST	IRONSTONE
46.6	49.75	3.15	R	
49.75	49.88	0.13	DC	300
49.88	50.4	0.52	C	300
50.4	54.2	3.8	R	
54.2	54.35	0.15	C	320
54.35	54.39	0.04	R	320
54.39	54.46	0.07	C	320
54.46	56.15	1.69	R	
56.15	57.55	1.4	CBSH	340
57.55	79.35	21.8	R	
79.35	79.5	0.15	C	410
79.5	80.05	0.55	R	
80.05	80.6	0.55	C	401
80.6	81.4	0.8	C	400
81.4	83.55	2.15	R	
83.55	83.79	0.24	DC	420
83.79	84.05	0.26	C	420
84.05	84.6	0.55	DC	420
84.6	85	0.4	R	
85	85.4	0.4	DC	422?

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-02C (metres) -- continued				
85.4	89.25	3.85	R	
89.25	89.6	0.35	C	440
89.6	89.77	0.17	R	
89.77	89.9	0.13	DC	442
89.9	90	0.1	CR	
90	105.1	15.1	R	
105.1	105.33	0.23	DC	460
105.33	105.39	0.06	C	460
105.39	105.5	0.11	DC	460
105.5	115.2	9.7	R	
115.2	115.44	0.24	DC	480
115.44	115.55	0.11	R	480
115.55	116.1	0.55	C	480
116.1	117.5	1.4	R	
117.5	117.9	0.4	CBSH	
117.9	120.2	2.3	R	
120.2	120.5	0.3	CBSH	
120.5	125	4.5	R	
-----	-----			
Log interpretation of WC18-03C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	11.78	11.78	DRIFT	DRIFT
11.78	14.65	2.87	R	BULLMOOSE
14.65	15	0.35	IRST	BULLMOOSE
15	17.35	2.35	R	BULLMOOSE
17.35	17.75	0.4	IRST	BULLMOOSE
17.75	20.7	2.95	R	BULLMOOSE
20.7	21.1	0.4	IRST	BULLMOOSE
21.1	30.6	9.5	R	BULLMOOSE
30.6	34.5	3.9	R	BLUESKY
34.5	34.6	0.1	R	
34.6	35.6	1	DC	BIRD
35.6	36.4	0.8	R	
36.4	36.75	0.35	CBSH	
36.75	36.95	0.2	R	
36.95	37.3	0.35	CBSH	
37.3	41.7	4.4	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-03C (metres) -- continued				
41.7	41.95	0.25	CBSH	190
41.95	55.35	13.4	R	
55.35	55.9	0.55	DC	150
55.9	60.25	4.35	R	
60.25	60.7	0.45	CBSH	130
60.7	64.2	3.5	R	
64.2	64.5	0.3	DC	111
64.5	65.55	1.05	R	
65.55	65.9	0.35	C	110
65.9	69.05	3.15	R	
69.05	69.6	0.55	C	101
69.6	71.8	2.2	C	100
71.8	72	0.2	DC	100
72	85.25	13.25	R	
85.25	85.6	0.35	CBSH	
85.6	86.42	0.82	C	201
86.42	86.55	0.13	DC	201
86.55	87.2	0.65	R	
87.2	87.65	0.45	C	202
87.65	88.02	0.37	ASH	202
88.02	88.4	0.38	C	202
88.4	94.25	5.85	R	
94.25	94.55	0.3	CBSH	330
94.55	95.85	1.3	R	
95.85	96	0.15	CR	
96	96.15	0.15	DC	310
96.15	96.7	0.55	CR	
96.7	97	0.3	CBSH	
97	97.1	0.1	CR	
97.1	97.3	0.2	DC	300
97.3	97.4	0.1	CR	300
97.4	97.55	0.15	CBSH	300
97.55	97.7	0.15	DC	300
97.7	98.4	0.7	C	300
98.4	101.3	2.9	R	
101.3	101.75	0.45	CBSH	320?
101.75	102.2	0.45	CR	320?
102.2	105.4	3.2	R	
105.4	105.65	0.25	CBSH	340

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-03C (metres) -- continued				
105.65	121.35	15.7	R	
121.35	121.55	0.2	CBSH	410
121.55	122.4	0.85	C	401
122.4	123.7	1.3	C	400
123.7	123.95	0.25	DC	400
123.95	125	1.05	R	
125	125.35	0.35	CBSH	420
125.35	129.65	4.3	R	
129.65	129.9	0.25	CBSH	
129.9	130.9	1	R	
130.9	131.05	0.15	CR	
131.05	131.2	0.15	R	
131.2	131.5	0.3	DC	440
131.5	133.8	2.3	R	
133.8	134.05	0.25	CBSH	442?
134.05	135.95	1.9	R	
135.95	136.65	0.7	CBSH	463
136.65	140.5	3.85	R	
140.5	140.8	0.3	CBSH	460?
140.8	143.75	2.95	R	
143.75	143.9	0.15	CBSH	483?
143.9	148.45	4.55	R	
148.45	149.05	0.6	C	480
149.05	149.35	0.3	DC	480
149.35	153.45	4.1	R	
153.45	153.75	0.3	CBSH	
153.75	159	5.25	R	
159	159.3	0.3	CBSH	
159.3	159.7	0.4	C	A7
159.7	159.9	0.2	DC	A7
159.9	167	7.1	R	
167	167.55	0.55	CBSH	
167.55	168.6	1.05	R	
168.6	168.9	0.3	CBSH	
168.9	169.95	1.05	R	
169.95	170.3	0.35	CBSH	
170.3	180.9	10.6	R	
180.9	181	0.1	CR	
181	181.4	0.4	C	A5

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-03C (metres) -- continued				
181.4	189.8	8.4	R	
189.8	190	0.2	CR	
190	190.2	0.2	DC	A3
190.2	190.45	0.25	C	A3
190.45	192.5	2.05	R	
192.5	192.9	0.4	CBSH	
192.9	193.2	0.3	CR	A1
193.2	194.05	0.85	R	
194.05	194.45	0.4	CR	A0
194.45	215.9	21.45	R	
215.9	216.2	0.3	CBSH	
216.2	216.65	0.45	DC	511
216.65	217.2	0.55	R	
217.2	217.5	0.3	CR	510
217.5	218	0.5	R	
-----	-----			
Log interpretation of WC18-04C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	14.5	14.5	DRIFT	DRIFT
14.5	25.5	11	R	BULLMOOSE
25.5	26	0.5	IRST	BULLMOOSE
26	30.1	4.1	R	BULLMOOSE
30.1	30.6	0.5	IRST	BULLMOOSE
30.6	46.45	15.85	R	BULLMOOSE
46.45	52.9	6.45	R	BLUESKY
52.9	53.16	0.26	R	
53.16	53.26	0.1	CBSH	
53.26	53.74	0.48	DC	BIRD
53.74	53.85	0.11	CR	BIRD
53.85	53.97	0.12	DC	BIRD
53.97	54.29	0.32	CR	BIRD
54.29	54.42	0.13	DC	BIRD
54.42	54.62	0.2	CR	
54.62	54.83	0.21	CBSH	
54.83	62.4	7.57	R	
62.4	62.7	0.3	CR	190
62.7	77.7	15	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-04C (metres) -- continued				
77.7	78	0.3	CBSH	170
78	82.74	4.74	R	
82.74	82.98	0.24	CR	
82.98	83.14	0.16	C	150
83.14	83.27	0.13	CR	150
83.27	83.33	0.06	DC	150
83.33	83.41	0.08	C	150
83.41	83.63	0.22	DC	150
83.63	83.82	0.19	CR	
83.82	84.36	0.54	CBSH	
84.36	89.7	5.34	R	
89.7	90	0.3	CR	130
90	95.44	5.44	R	
95.44	95.5	0.06	CBSH	
95.5	95.78	0.28	CR	111
95.78	95.9	0.12	DC	111
95.9	96.06	0.16	CR	111
96.06	96.26	0.2	CBSH	
96.26	97.5	1.24	R	
97.5	97.7	0.2	CBSH	
97.7	97.95	0.25	DC	110
97.95	98.04	0.09	C	110
98.04	98.21	0.17	DC	110
98.21	98.36	0.15	CBSH	
98.36	101.65	3.29	R	
101.65	101.83	0.18	CBSH	
101.83	101.93	0.1	CR	
101.93	103.01	1.08	C	101
103.01	105.85	2.84	C	100
105.85	105.94	0.09	DC	100
105.94	106.09	0.15	CBSH	
106.09	125.19	19.1	R	
125.19	125.31	0.12	CBSH	
125.31	125.5	0.19	R	
125.5	125.71	0.21	CBSH	
125.71	125.82	0.11	DC	201
125.82	126.78	0.96	C	201
126.78	127.03	0.25	DC	201
127.03	127.17	0.14	CR	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-04C (metres) -- continued				
127.17	127.89	0.72	R	
127.89	128	0.11	CR	
128	128.09	0.09	DC	202
128.09	128.6	0.51	C	202
128.6	128.77	0.17	ASH	202
128.77	129.02	0.25	CR	202
129.02	129.48	0.46	C	202
129.48	129.7	0.22	CBSH	
129.7	140.2	10.5	R	
140.2	140.6	0.4	CBSH	310
140.6	141.76	1.16	R	
141.76	141.85	0.09	CBSH	
141.85	141.94	0.09	CR	
141.94	141.98	0.04	DC	300
141.98	142.64	0.66	C	300
142.64	142.85	0.21	FAULT	POSSIBLE
142.85	144.12	1.27	C	300
144.12	144.33	0.21	CBSH	
144.33	144.6	0.27	R	
144.6	144.66	0.06	CBSH	
144.66	144.74	0.08	CR	
144.74	145.02	0.28	DC	320
145.02	145.82	0.8	C	320
145.82	146.1	0.28	CBSH	
146.1	149.5	3.4	R	
149.5	150.25	0.75	CR	340
150.25	150.4	0.15	CBSH	340
150.4	150.55	0.15	CR	340
150.55	151.15	0.6	CBSH	340
151.15	155.45	4.3	R	
155.45	155.62	0.17	CBSH	360
155.62	180.3	24.68	R	
180.3	180.48	0.18	CBSH	410
180.48	180.9	0.42	R	
180.9	181	0.1	CBSH	
181	181.08	0.08	CR	
181.08	181.2	0.12	DC	401
181.2	182.63	1.43	C	401
182.63	183.02	0.39	C	400

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-04C (metres) -- continued				
183.02	183.1	0.08	FAULT	POSSIBLE
183.1	187.56	4.46	C	400
187.56	187.65	0.09	DC	400
187.65	187.8	0.15	C	400
187.8	187.91	0.11	DC	400
187.91	188.01	0.1	CR	
188.01	188.1	0.09	CBSH	
188.1	191	2.9	R	
191	191.4	0.4	CR	420
191.4	191.5	0.1	CBSH	
191.5	191.8	0.3	R	
191.8	192.2	0.4	CBSH	
192.2	198.14	5.94	R	
198.14	198.74	0.6	CBSH	
198.74	198.84	0.1	CR	
198.84	198.9	0.06	DC	440
198.9	199.12	0.22	C	440
199.12	199.16	0.04	DC	440
199.16	199.33	0.17	C	440
199.33	199.36	0.03	DC	440
199.36	199.46	0.1	C	440
199.46	199.55	0.09	DC	440
199.55	199.64	0.09	CR	
199.64	200.02	0.38	CBSH	
200.02	205.25	5.23	R	
205.25	205.7	0.45	CBSH	
205.7	205.9	0.2	CR	
205.9	206.3	0.4	CBSH	
206.3	206.75	0.45	R	
206.75	207	0.25	CBSH	
207	207.4	0.4	CR	463
207.4	207.5	0.1	CBSH	
207.5	213.7	6.2	R	
213.7	214.1	0.4	CBSH	460?
214.1	218.39	4.29	R	
218.39	219.25	0.86	CBSH	483?
219.25	220	0.75	R	
220	221	1	CBSH	
221	224.95	3.95	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-04C (metres) -- continued				
224.95	225.12	0.17	CBSH	
225.12	225.19	0.07	DC	480
225.19	226.25	1.06	C	480
226.25	226.4	0.15	DC	480
226.4	226.71	0.31	CBSH	
226.71	232.7	5.99	R	
232.7	233.02	0.32	DC	
233.02	239	5.98	R	
-----	-----			
Log interpretation of WC18-05C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	7.15	7.15	DRIFT	DRIFT
7.15	10.5	3.35	R	
10.5	10.85	0.35	CBSH	130
10.85	13.83	2.98	R	
13.83	14.04	0.21	CBSH	
14.04	14.18	0.14	DC	111
14.18	14.42	0.24	CR	
14.42	14.52	0.1	CBSH	
14.52	15.46	0.94	R	
15.46	15.6	0.14	CBSH	
15.6	15.94	0.34	C	110
15.94	16.14	0.2	CBSH	
16.14	17.8	1.66	R	
17.8	17.93	0.13	CBSH	
17.93	18.95	1.02	C	101
18.95	20.87	1.92	C	100
20.87	20.95	0.08	DC	
20.95	21.2	0.25	CBSH	
21.2	28.44	7.24	R	
28.44	28.56	0.12	CR	
28.56	29.21	0.65	C	201
29.21	29.31	0.1	DC	201
29.31	29.5	0.19	CBSH	
29.5	30.09	0.59	R	
30.09	30.3	0.21	CBSH	
30.3	30.51	0.21	C	202

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-05C (metres) -- continued				
30.51	30.6	0.09	CR	
30.6	30.72	0.12	CBSH	
30.72	35.3	4.58	R	
35.3	35.7	0.4	CBSH	310
35.7	36	0.3	R	310
36	36.4	0.4	CBSH	310
36.4	40.9	4.5	R	
40.9	41.16	0.26	CBSH	
41.16	41.28	0.12	C	300
41.28	41.35	0.07	ASH?	300
41.35	41.53	0.18	C	300
41.53	41.7	0.17	CR	
41.7	41.8	0.1	CBSH	
41.8	45.39	3.59	R	
45.39	45.62	0.23	CBSH	
45.62	45.8	0.18	C	320
45.8	46.04	0.24	CBSH	
46.04	47.05	1.01	R	
47.05	47.2	0.15	IRST	IRONSTONE
47.2	48.02	0.82	R	
48.02	48.23	0.21	CBSH	340
48.23	48.36	0.13	CR	340
48.36	48.53	0.17	CBSH	340
48.53	48.74	0.21	R	340
48.74	49.42	0.68	CBSH	340
49.42	52.3	2.88	R	
52.3	52.6	0.3	CBSH	360
52.6	70.52	17.92	R	
70.52	70.7	0.18	CBSH	
70.7	70.88	0.18	DC	410
70.88	71.03	0.15	CBSH	
71.03	71.28	0.25	R	
71.28	71.48	0.2	CBSH	
71.48	72.3	0.82	C	401
72.3	73.24	0.94	C	400
73.24	73.35	0.11	DC	400
73.35	73.51	0.16	CR	
73.51	73.7	0.19	CBSH	
73.7	74.6	0.9	C	420

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-05C (metres) -- continued				
74.6	74.68	0.08	DC	420
74.68	74.8	0.12	CR	
74.8	75.21	0.41	CBSH	
75.21	77.16	1.95	R	
77.16	77.32	0.16	CBSH	
77.32	77.42	0.1	DC	440
77.42	77.53	0.11	C	440
77.53	77.63	0.1	DC	440
77.63	77.75	0.12	C	440
77.75	77.94	0.19	DC	440
77.94	78.12	0.18	CBSH	
78.12	80.45	2.33	R	
80.45	80.7	0.25	CBSH	442
80.7	88.2	7.5	R	
88.2	88.6	0.4	CBSH	
88.6	89.05	0.45	R	
89.05	89.6	0.55	CBSH	463
89.6	93.4	3.8	R	
93.4	93.55	0.15	CBSH	
93.55	93.85	0.3	CR	460
93.85	102.3	8.45	R	
102.3	102.54	0.24	CBSH	
102.54	103.13	0.59	C	480
103.13	103.35	0.22	DC	480
103.35	103.54	0.19	CBSH	
103.54	104.73	1.19	R	
104.73	105.2	0.47	CBSH	
105.2	107.76	2.56	R	
107.76	108.14	0.38	CBSH	
108.14	113.65	5.51	R	
113.65	113.81	0.16	CBSH	
113.81	113.94	0.13	CR	
113.94	114.78	0.84	C	A7
114.78	115.03	0.25	CBSH	
115.03	122.35	7.32	R	
122.35	123	0.65	CBSH	A5?
123	124.99	1.99	R	
-----	-----			

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-06C (metres)				
0	2.4	2.4	DRIFT	DRIFT
2.4	4.65	2.25	R	
4.65	4.9	0.25	DC	130
4.9	5.1	0.2	CR	130
5.1	5.4	0.3	C	130
5.4	5.6	0.2	CBSH	
5.6	8.76	3.16	R	
8.76	8.94	0.18	CBSH	
8.94	9.25	0.31	C	111
9.25	9.4	0.15	CBSH	
9.4	10.32	0.92	R	
10.32	10.43	0.11	CR	
10.43	10.84	0.41	C	110
10.84	11.03	0.19	CR	
11.03	14.8	3.77	R	
14.8	15.05	0.25	CBSH	
15.05	17.16	2.11	R	
17.16	17.34	0.18	CBSH	
17.34	17.85	0.51	C	101
17.85	19.37	1.52	C	100
19.37	19.47	0.1	DC	100
19.47	19.58	0.11	CR	
19.58	22.9	3.32	R	
22.9	23.24	0.34	CBSH	
23.24	23.42	0.18	CR	
23.42	24	0.58	C	201
24	24.07	0.07	DC	201
24.07	24.22	0.15	CR	
24.22	24.62	0.4	CBSH	
24.62	27.23	2.61	R	
27.23	27.35	0.12	CBSH	
27.35	27.44	0.09	CR	
27.44	27.66	0.22	C	202
27.66	27.7	0.04	DC	202
27.7	27.88	0.18	CR	202
27.88	28.04	0.16	ASH	202
28.04	28.18	0.14	C	202
28.18	28.3	0.12	CR	
28.3	28.37	0.07	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-06C (metres) -- continued				
28.37	32.8	4.43	R	
32.8	33.1	0.3	CBSH	
33.1	35	1.9	R	
35	35.65	0.65	CBSH	
35.65	36.9	1.25	R	
36.9	37.3	0.4	CBSH	
37.3	40.24	2.94	R	
40.24	40.42	0.18	CR	
40.42	40.64	0.22	DC	300
40.64	40.77	0.13	CR	300
40.77	40.97	0.2	DC	300
40.97	41.13	0.16	CBSH	
41.13	45.25	4.12	R	
45.25	45.6	0.35	CR	320
45.6	45.9	0.3	CBSH	320
45.9	48.3	2.4	R	
48.3	48.6	0.3	CR	340
48.6	49	0.4	R	340
49	49.7	0.7	CBSH	340
49.7	70.5	20.8	R	
70.5	70.62	0.12	CBSH	
70.62	70.83	0.21	CR	410
70.83	70.95	0.12	CBSH	
70.95	71.84	0.89	R	
71.84	71.96	0.12	CBSH	
71.96	72.63	0.67	C	401
72.63	74.84	2.21	C	400
74.84	75.2	0.36	DC	400
75.2	75.34	0.14	CBSH	
75.34	75.85	0.51	R	
75.85	76.22	0.37	CBSH	420
76.22	78.74	2.52	R	
78.74	78.84	0.1	CBSH	
78.84	78.95	0.11	DC	440
78.95	79.14	0.19	C	440
79.14	79.22	0.08	DC	440
79.22	79.39	0.17	CBSH	
79.39	80.74	1.35	R	
80.74	80.94	0.2	CBSH	442

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-06C (metres) -- continued				
80.94	87.1	6.16	R	
87.1	87.35	0.25	CBSH	463
87.35	91.4	4.05	R	
91.4	91.8	0.4	CBSH	460
91.8	102.43	10.63	R	
102.43	102.77	0.34	CBSH	
102.77	103.19	0.42	R	
103.19	103.33	0.14	CBSH	
103.33	103.43	0.1	CR	
103.43	104.12	0.69	C	480
104.12	104.28	0.16	DC	480
104.28	104.48	0.2	CR	
104.48	104.59	0.11	CBSH	
104.59	107.6	3.01	R	
107.6	107.8	0.2	CBSH	
107.8	114.7	6.9	R	
114.7	115.05	0.35	CBSH	A71?
115.05	118.28	3.23	R	
118.28	118.37	0.09	CBSH	
118.37	118.44	0.07	CR	
118.44	118.53	0.09	DC	A7?
118.53	118.68	0.15	C	A7?
118.68	118.78	0.1	CR	
118.78	118.85	0.07	CBSH	
118.85	121.44	2.59	R	
121.44	121.93	0.49	CBSH	
121.93	122.23	0.3	R	
122.23	122.37	0.14	CBSH	
122.37	122.53	0.16	CR	
122.53	122.77	0.24	DC	A5
122.77	123.1	0.33	CR	A5
123.1	123.32	0.22	DC	A5
123.32	124.2	0.88	C	A5
124.2	124.3	0.1	DC	A5
124.3	124.76	0.46	CR	
124.76	124.95	0.19	CBSH	
124.95	141.4	16.45	R	
141.4	141.7	0.3	CBSH	
141.7	141.9	0.2	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-06C (metres) -- continued				
141.9	142.2	0.3	CBSH	A3
142.2	147.05	4.85	R	
147.05	147.35	0.3	CBSH	A1?
147.35	147.85	0.5	R	
147.85	148.5	0.65	CBSH	A0?
148.5	149.2	0.7	R	
-----	-----			
Log interpretation of WC18-07C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	3.9	3.9	DRIFT	DRIFT
3.9	5.9	2	R	
5.9	6.1	0.2	CBSH	
6.1	6.3	0.2	DC	150
6.3	6.4	0.1	CBSH	150
6.4	6.6	0.2	CR	150
6.6	6.8	0.2	DC	150
6.8	7.15	0.35	CBSH	
7.15	11.2	4.05	R	
11.2	11.6	0.4	CBSH	130
11.6	14.8	3.2	R	
14.8	15	0.2	CBSH	
15	15.3	0.3	C	111
15.3	15.45	0.15	CBSH	
15.45	16.4	0.95	R	
16.4	16.6	0.2	CBSH	110
16.6	17.15	0.55	C	
17.15	17.4	0.25	CBSH	
17.4	24.2	6.8	R	
24.2	24.45	0.25	CBSH	
24.45	25.08	0.63	C	101
25.08	26.42	1.34	C	100
26.42	26.7	0.28	CR	
26.7	27	0.3	CBSH	
27	29.9	2.9	R	
29.9	30.15	0.25	CBSH	
30.15	30.7	0.55	C	201
30.7	31	0.3	DC	201

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-07C (metres) -- continued				
31	34.4	3.4	R	
34.4	34.75	0.35	C	202
34.75	34.9	0.15	CR	202
34.9	35	0.1	DC	202
35	35.12	0.12	CR	202
35.12	35.42	0.3	C	202
35.42	42.05	6.63	R	
42.05	42.3	0.25	CBSH	
42.3	43.2	0.9	R	
43.2	43.6	0.4	CBSH	
43.6	46.4	2.8	R	
46.4	46.55	0.15	CR	
46.55	46.65	0.1	DC	300
46.65	47.2	0.55	C	300
47.2	51.2	4	R	
51.2	51.5	0.3	CBSH	320
51.5	51.65	0.15	CR	320
51.65	52.1	0.45	CBSH	320
52.1	53.65	1.55	R	
53.65	54.08	0.43	CBSH	340
54.08	54.4	0.32	CR	340
54.4	55.35	0.95	CBSH	340
55.35	76.05	20.7	R	
76.05	76.5	0.45	CR	410
76.5	77.25	0.75	R	
77.25	77.42	0.17	CBSH	
77.42	77.72	0.3	C	401
77.72	78.74	1.02	C	400
78.74	79	0.26	DC	400
79	80.8	1.8	R	
80.8	81.25	0.45	DC	420
81.25	86.08	4.83	R	
86.08	86.3	0.22	CBSH	
86.3	86.55	0.25	CR	440
86.55	86.7	0.15	CBSH	
86.7	87.15	0.45	R	
87.15	87.52	0.37	CBSH	442
87.52	91.65	4.13	R	
91.65	92.02	0.37	CR	463?

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-07C (metres) -- continued				
92.02	94.05	2.03	R	
94.05	94.6	0.55	CBSH	
94.6	97.05	2.45	R	
97.05	97.45	0.4	CBSH	
97.45	97.6	0.15	CR	460
97.6	97.8	0.2	CBSH	
97.8	99.9	2.1	R	
99.9	100	0.1	FAULT	POSSIBLE
100	108.9	8.9	R	
108.9	109	0.1	CBSH	460
109	121.4	12.4	R	
121.4	121.65	0.25	CBSH	
121.65	122.05	0.4	CR	480
122.05	122.2	0.15	CBSH	480
122.2	122.45	0.25	CR	480
122.45	122.9	0.45	DC	480
122.9	123.1	0.2	CBSH	
123.1	128.4	5.3	R	
128.4	128.7	0.3	CR	
128.7	133.1	4.4	R	
133.1	133.45	0.35	CBSH	A71?
133.45	135.1	1.65	R	
135.1	135.6	0.5	CBSH	
135.6	135.8	0.2	R	
135.8	136	0.2	CBSH	
136	136.5	0.5	C	A7
136.5	136.65	0.15	DC	A7
136.65	136.9	0.25	CBSH	
136.9	144.6	7.7	R	
144.6	145.4	0.8	CBSH	
145.4	150.35	4.95	R	
150.35	150.65	0.3	CR	
150.65	151.25	0.6	R	
151.25	151.65	0.4	CBSH	
151.65	153.85	2.2	R	
153.85	154.1	0.25	CBSH	
154.1	154.7	0.6	C	A5
154.7	154.95	0.25	DC	A5
154.95	155.2	0.25	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-07C (metres) -- continued				
155.2	160.4	5.2	R	
160.4	160.8	0.4	CBSH	
160.8	161	0.2	R	
161	161.28	0.28	CBSH	
161.28	161.48	0.2	C	A3
161.48	161.75	0.27	DC	A3
161.75	162.2	0.45	CBSH	
162.2	162.45	0.25	R	
162.45	162.65	0.2	CR	
162.65	162.9	0.25	C	A1
162.9	163.1	0.2	CR	
163.1	163.9	0.8	CBSH	
163.9	164.2	0.3	CR	
164.2	164.3	0.1	DC	A0
164.3	164.5	0.2	CBSH	
164.5	166.93	2.43	R	
-----	-----			
Log interpretation of WC18-08C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.55	2.55	DRIFT	DRIFT
2.55	2.9	0.35	R	
2.9	3.55	0.65	CBSH	310?
3.55	12.4	12.95	R	
12.4	12.5	0.1	IRST	IRONSTONE
12.5	12.65	0.15	R	
12.65	12.75	0.1	IRST	IRONSTONE
12.75	16.5	3.75	R	
16.5	17.1	0.6	CBSH	
17.1	17.6	0.5	R	
17.6	17.65	0.05	CBSH	
17.65	18.05	0.4	DC	300
18.05	18.1	0.05	CBSH	
18.1	21.05	2.95	R	
21.05	21.45	0.4	CBSH	320
21.45	24.1	2.65	R	
24.1	24.6	0.5	CBSH	340
24.6	24.7	0.1	CR	340

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-08C (metres) -- continued				
24.7	24.95	0.25	CBSH	340
24.95	25.4	0.45	R	340
25.4	26.1	0.7	CBSH	340
26.1	30.4	4.3	R	
30.4	30.85	0.45	CBSH	360
30.85	46.7	15.85	R	
46.7	47.1	0.4	CR	410
47.1	48.3	1.2	R	
48.3	48.5	0.2	CBSH	
48.5	49.1	0.6	C	401
49.1	49.2	0.1	FAULT	ESTABLISHED
49.2	49.3	0.1	R	
49.3	49.55	0.25	CBSH	
49.55	49.6	0.05	DC	401
49.6	50.75	1.15	C	401
50.75	50.85	0.1	FAULT	ESTABLISHED
50.85	50.9	0.05	DC	401
50.9	52.2	1.3	C	401
52.2	52.7	0.5	DC	400
52.7	54.8	2.1	C	400
54.8	55.1	0.3	FAULT	PROBABLE
55.1	55.25	0.15	CBSH	
55.25	55.4	0.15	R	
55.4	55.65	0.25	CBSH	
55.65	56.1	0.45	C	420
56.1	58.6	2.5	R	
58.6	58.85	0.25	CBSH	
58.85	59.5	0.65	C	440
59.5	59.7	0.2	CBSH	
59.7	60.9	1.2	R	
60.9	61.3	0.4	CBSH	442
61.3	71.25	9.95	R	
71.25	71.45	0.2	CBSH	463
71.45	75.95	4.5	R	
75.95	76.1	0.15	CBSH	
76.1	76.5	0.4	DC	460
76.5	76.6	0.1	CBSH	
76.6	78.1	1.5	R	
78.1	78.5	0.4	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-08C (metres) -- continued				
78.5	79.6	1.1	R	
79.6	80	0.4	CBSH	
80	83.4	3.4	R	
83.4	83.8	0.4	CBSH	
83.8	85.95	2.15	R	
85.95	86.2	0.25	CBSH	
86.2	86.5	0.3	DC	480
86.5	86.9	0.4	C	480
86.9	87.1	0.2	DC	480
87.1	87.4	0.3	CBSH	
87.4	89.4	2	R	
89.4	89.75	0.35	CBSH	
89.75	91.4	1.65	R	
91.4	91.7	0.3	CBSH	
91.7	92.87	1.17	R	
92.87	93.3	0.43	DC	A71
93.3	94.55	1.25	R	
94.55	95.18	0.63	C	A7
95.18	95.4	0.22	CR	
95.4	101.05	5.65	R	
-----	-----			
Log interpretation of WC18-09C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	0.5	0.5	DRIFT	DRIFT
0.5	2	1.5	R	
2	2.35	0.35	DC	111
2.35	2.55	0.2	CR	
2.55	2.75	0.2	CBSH	
2.75	2.85	0.1	R	
2.85	2.95	0.1	CBSH	
2.95	3.5	0.55	R	
3.5	3.7	0.2	CR	
3.7	4	0.3	C	110
4	4.25	0.25	CBSH	
4.25	9.8	5.55	R	
9.8	10	0.2	CR	
10	10.55	0.55	C	101

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-09C (metres) -- continued				
10.55	11.95	1.4	C	100
11.95	12.05	0.1	DC	100
12.05	13.05	1	CBSH	
13.05	15	1.95	R	
15	15.3	0.3	CBSH	
15.3	15.4	0.1	CR	
15.4	15.5	0.1	CBSH	
15.5	15.6	0.1	DC	201
15.6	15.7	0.1	CR	201
15.7	15.98	0.28	DC	201
15.98	16.95	0.97	C	201
16.95	17.15	0.2	CBSH	
17.15	20.6	3.45	R	
20.6	20.9	0.3	CBSH	
20.9	21.1	0.2	C	202
21.1	21.3	0.2	CR	202
21.3	21.4	0.1	DC	202
21.4	21.55	0.15	CR	202
21.55	21.7	0.15	C	202
21.7	21.95	0.25	CBSH	
21.95	28	6.05	R	
28	28.4	0.4	CBSH	
28.4	30.8	2.4	R	
30.8	31.2	0.4	CBSH	310
31.2	31.3	0.1	ASH	310
31.3	31.4	0.1	CBSH	310
31.4	37.1	5.7	R	
37.1	37.3	0.2	CBSH	
37.3	37.6	0.3	C	300
37.6	37.9	0.3	CBSH	
37.9	40.8	2.9	R	
40.8	41	0.2	CR	320
41	41.3	0.3	CBSH	320
41.3	43.75	2.45	R	
43.75	44.5	0.75	CBSH	340
44.5	45.2	0.7	R	340
45.2	45.65	0.45	CBSH	340
45.65	50.15	4.5	R	
50.15	50.5	0.35	CBSH	360

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-09C (metres) -- continued				
50.5	65.55	15.05	R	
65.55	66	0.45	CBSH	430
66	67.4	1.4	R	
67.4	67.6	0.2	CR	
67.6	68.15	0.55	C	410
68.15	68.65	0.5	CBSH	
68.65	68.8	0.15	DC	401
68.8	69.97	1.17	C	401
69.97	70.02	0.05	DC	400
70.02	71.3	1.28	C	400
71.3	71.5	0.2	DC	400
71.5	72.1	0.6	R	
72.1	72.3	0.2	CBSH	
72.3	72.6	0.3	DC	420
72.6	72.8	0.2	CR	
72.8	75.8	3	R	
75.8	75.95	0.15	CR	
75.95	76.1	0.15	DC	440
76.1	76.28	0.18	C	440
76.28	76.4	0.12	DC	440
76.4	76.5	0.1	C	440
76.5	76.65	0.15	DC	440
76.65	76.8	0.15	C	440
76.8	77	0.2	CBSH	
77	78.3	1.3	R	
78.3	78.7	0.4	CBSH	442
78.7	82.8	4.1	R	
82.8	83	0.2	CBSH	
83	83.3	0.3	R	
83.3	83.7	0.4	CBSH	463
83.7	87.95	4.25	R	
87.95	88.4	0.45	CBSH	460
88.4	99.75	11.35	R	
99.75	100	0.25	CBSH	
100	100.65	0.65	C	480
100.65	100.9	0.25	DC	480
100.9	101.1	0.2	CBSH	
101.1	106.3	5.2	R	
106.3	106.7	0.4	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-09C (metres) -- continued				
106.7	107.85	1.15	R	
107.85	107.95	0.1	CBSH	
107.95	108.15	0.2	DC	A71
108.15	108.4	0.25	CBSH	
108.4	108.9	0.5	R	
108.9	109.12	0.22	CBSH	
109.12	109.75	0.63	C	A7
109.75	110.2	0.45	DC	A7
110.2	116.4	6.2	R	
116.4	116.85	0.45	CBSH	
116.85	117.1	0.25	CR	
117.1	117.3	0.2	CBSH	
117.3	121.9	4.6	R	
121.9	122.1	0.2	CBSH	
122.1	122.3	0.2	CR	
122.3	122.4	0.1	CBSH	
122.4	122.9	0.5	R	
122.9	123.3	0.4	CBSH	
123.3	124.93	1.63	R	
-----	-----			
Log interpretation of WC18-10C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	4.6	4.6	DRIFT	DRIFT
4.6	6.8	2.2	R	
6.8	7.1	0.3	CBSH	
7.1	7.2	0.1	C	150
7.2	7.3	0.1	CR	150
7.3	7.45	0.15	C	150
7.45	7.65	0.2	CR	150
7.65	7.8	0.15	DC	150
7.8	8.95	1.15	CBSH	
8.95	12.5	3.55	R	
12.5	12.9	0.4	CBSH	130
12.9	15.75	2.85	R	
15.75	15.95	0.2	CBSH	111
15.95	16.1	0.15	R	111
16.1	16.6	0.5	CBSH	111

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-10C (metres) -- continued				
16.6	17.15	0.55	R	
17.15	17.35	0.2	CBSH	
17.35	17.7	0.35	C	110
17.7	17.9	0.2	CBSH	
17.9	20	2.1	R	
20	20.3	0.3	CBSH	
20.3	21.09	0.79	C	101
21.09	21.14	0.05	DC	100
21.14	23.1	1.96	C	100
23.1	26.95	3.85	R	
26.95	27.5	0.55	CBSH	
27.5	28.1	0.6	C	201
28.1	28.25	0.15	DC	201
28.25	28.4	0.15	CBSH	
28.4	30.65	2.25	R	
30.65	30.95	0.3	CBSH	
30.95	31.1	0.15	C	202
31.1	31.4	0.3	DC	202
31.4	31.5	0.1	CR	202
31.5	31.6	0.1	DC	202
31.6	31.85	0.25	CBSH	
31.85	39.4	7.55	R	
39.4	39.95	0.55	CBSH	
39.95	40.1	0.15	R	
40.1	40.7	0.6	CBSH	
40.7	42.8	2.1	R	
42.8	43.05	0.25	CBSH	
43.05	43.6	0.55	C	300
43.6	43.85	0.25	CBSH	
43.85	47.7	3.85	R	
47.7	47.95	0.25	CBSH	
47.95	48.4	0.45	DC	320
48.4	48.65	0.25	CBSH	
48.65	51.05	2.4	R	
51.05	51.8	0.75	CBSH	340
51.8	52.5	0.7	R	340
52.5	53.2	0.7	CBSH	340
53.2	68.65	15.45	R	
68.65	68.75	0.1	FAULT	POSSIBLE

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-10C (metres) -- continued				
68.75	73.6	4.85	R	
73.6	73.75	0.15	CBSH	430
73.75	76.18	2.43	R	
76.18	76.23	0.05	CBSH	410
76.23	76.4	0.17	R	
76.4	76.68	0.28	CR	
76.68	78.48	1.8	C	401
78.48	78.53	0.05	DC	400
78.53	81.08	2.55	C	400
81.08	81.28	0.2	CBSH	
81.28	83.8	2.52	R	
83.8	84.25	0.45	CR	420
84.25	86.2	1.95	R	
86.2	86.4	0.2	CBSH	
86.4	86.75	0.35	C	440
86.75	86.9	0.15	DC	440
86.9	87.05	0.15	C	440
87.05	87.25	0.2	DC	440
87.25	87.4	0.15	CBSH	
87.4	88.7	1.3	R	
88.7	89.2	0.5	CBSH	442
89.2	92.4	3.2	R	
92.4	92.85	0.45	CBSH	
92.85	93.15	0.3	R	
93.15	93.55	0.4	CBSH	463
93.55	97.5	3.95	R	
97.5	98	0.5	CBSH	460
98	108.9	10.9	R	
108.9	109.15	0.25	CBSH	
109.15	109.95	0.8	C	480
109.95	110.1	0.15	DC	480
110.1	110.35	0.25	CBSH	
110.35	115.4	5.05	R	
115.4	115.8	0.4	CBSH	
115.8	116.65	0.85	R	
116.65	116.85	0.2	CBSH	
116.85	117	0.15	C	A71
117	117.2	0.2	CBSH	
117.2	117.6	0.4	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-10C (metres) -- continued				
117.6	117.85	0.25	CBSH	
117.85	118.4	0.55	C	A7
118.4	118.6	0.2	DC	A7
118.6	118.9	0.3	CBSH	
118.9	125.55	6.65	R	
125.55	126.35	0.8	CBSH	
126.35	131.4	5.05	R	
131.4	131.6	0.2	CBSH	
131.6	131.85	0.25	CR	
131.85	132.55	0.7	R	
132.55	132.9	0.35	CBSH	
132.9	137.1	4.2	R	
137.1	137.4	0.3	CBSH	
137.4	138.15	0.75	C	A5
138.15	138.4	0.25	CBSH	
138.4	141.7	3.3	R	
141.7	142.2	0.5	CBSH	
142.2	142.6	0.4	R	
142.6	142.8	0.2	CBSH	
142.8	143.05	0.25	CR	
143.05	143.2	0.15	C	A3
143.2	143.3	0.1	DC	A3
143.3	143.4	0.1	C	A3
143.4	143.6	0.2	CR	
143.6	144.2	0.6	CBSH	
144.2	144.4	0.2	C	A1
144.4	144.9	0.5	CBSH	
144.9	145.2	0.3	R	
145.2	145.45	0.25	CBSH	
145.45	145.9	0.45	CR	A0
145.9	155.6	9.7	R	
155.6	155.75	0.15	CBSH	
155.75	165.4	9.65	R	
165.4	165.6	0.2	DC	530
165.6	165.8	0.2	C	530
165.8	166.1	0.3	CBSH	
166.1	166.8	0.7	R	
166.8	167.2	0.4	CBSH	510
167.2	168.7	1.5	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-10C (metres) -- continued				
168.7	168.95	0.25	CBSH	
168.95	169.8	0.85	C	501
169.8	170	0.2	CBSH	
170	170.4	0.4	R	
170.4	170.6	0.2	CBSH	
170.6	171.05	0.45	C	502
171.05	171.3	0.25	CBSH	
171.3	174.4	3.1	R	
174.4	174.8	0.4	CBSH	520
174.8	176.15	1.35	R	
176.15	176.4	0.25	CR	
176.4	176.6	0.2	CBSH	
176.6	176.95	0.35	R	
176.95	177.15	0.2	CR	
177.15	177.4	0.25	C	540
177.4	177.6	0.2	CBSH	
177.6	179.3	1.7	R	
179.3	179.7	0.4	CBSH	
179.7	189.45	9.75	R	
189.45	189.7	0.25	CBSH	
189.7	189.9	0.2	C	630
189.9	190.2	0.3	CR	
190.2	190.85	0.65	R	
190.85	191.05	0.2	CBSH	
191.05	191.2	0.15	CR	
191.2	191.4	0.2	DC	610
191.4	191.5	0.1	CBSH	
191.5	191.6	0.1	CR	
191.6	191.9	0.3	CBSH	
191.9	192.3	0.4	R	
192.3	192.5	0.2	CBSH	
192.5	193.4	0.9	C	601
193.4	193.6	0.2	DC	601
193.6	193.8	0.2	CBSH	
193.8	194	0.2	CR	
194	194.65	0.65	C	600
194.65	194.9	0.25	CBSH	
194.9	197.4	2.5	R	
197.4	197.85	0.45	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-10C (metres) -- continued				
197.85	199.3	1.45	R	
199.3	199.75	0.45	CBSH	
199.75	204.1	4.35	R	
204.1	204.6	0.5	CBSH	770
204.6	207.4	2.8	R	
207.4	207.6	0.2	CBSH	
207.6	207.8	0.2	CR	750
207.8	208.65	0.85	R	
208.65	209.1	0.45	CBSH	
209.1	211.55	2.45	R	
211.55	211.8	0.25	CR	
211.8	212	0.2	C	730
212	212.15	0.15	CBSH	
212.15	213.9	1.75	R	
213.9	214.05	0.15	CBSH	
214.05	214.25	0.2	CR	710
214.25	214.4	0.15	CBSH	
214.4	215.35	0.95	R	
-----	-----			
Log interpretation of WC18-11C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	3	3	DRIFT	DRIFT
3	10.4	7.4	R	
10.4	11.3	0.9	CBSH	
11.3	14.7	3.4	R	
14.7	15.2	0.5	CBSH	
15.2	15.4	0.2	CR	
15.4	15.6	0.2	C	300
15.6	15.8	0.2	CR	
15.8	19	3.2	R	
19	19.7	0.7	CBSH	320
19.7	22.15	2.45	R	
22.15	23.05	0.9	CBSH	340
23.05	23.85	0.8	R	340
23.85	24.65	0.8	CBSH	340
24.65	28.5	3.85	R	
28.5	28.55	0.05	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-11C (metres) -- continued				
28.55	28.65	0.1	FAULT	POSSIBLE
28.65	28.7	0.05	CBSH	
28.7	42.95	14.25	R	
42.95	43.25	0.3	CBSH	
43.25	43.7	0.45	R	
43.7	43.95	0.25	CR	430
43.95	44.2	0.25	CBSH	
44.2	44.35	0.15	R	
44.35	44.4	0.05	FAULT	POSSIBLE
44.4	46.3	1.9	R	
46.3	46.5	0.2	CBSH	
46.5	47.2	0.7	C	410
47.2	47.45	0.25	CBSH	
47.45	47.9	0.45	R	
47.9	48.15	0.25	CBSH	
48.15	48.4	0.25	CR	
48.4	49.65	1.25	C	401
49.65	49.7	0.05	DC	401
49.7	49.9	0.2	C	401
49.9	49.95	0.05	DC	400
49.95	52.13	2.18	C	400
52.13	52.28	0.15	DC	400
52.28	52.4	0.12	C	400
52.4	52.5	0.1	CR	
52.5	52.62	0.12	DC	420
52.62	52.8	0.18	CR	420
52.8	52.95	0.15	DC	420
52.95	53.05	0.1	CR	
53.05	53.3	0.25	CBSH	
53.3	55.15	1.85	R	
55.15	55.42	0.27	CBSH	
55.42	55.6	0.18	C	440
55.6	55.85	0.25	DC	440
55.85	56	0.15	C	440
56	56.1	0.1	DC	440
56.1	56.3	0.2	C	440
56.3	56.5	0.2	CBSH	
56.5	58.15	1.65	R	
58.15	58.65	0.5	CBSH	442

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-11C (metres) -- continued				
58.65	66.25	7.6	R	
66.25	66.85	0.6	CBSH	463
66.85	70.6	3.75	R	
70.6	70.75	0.15	CBSH	
70.75	70.9	0.15	CR	460
70.9	71.02	0.12	DC	460
71.02	71.3	0.28	CBSH	
71.3	74.65	3.35	R	
74.65	75.02	0.37	CBSH	
75.02	75.8	0.78	R	
75.8	75.95	0.15	CBSH	
75.95	78.95	3	R	483
78.95	79.32	0.37	CBSH	
79.32	81.9	2.58	R	
81.9	82.15	0.25	CBSH	
82.15	82.8	0.65	C	480
82.8	83	0.2	DC	480
83	83.2	0.2	CBSH	
83.2	83.85	0.65	R	
83.85	84.05	0.2	CBSH	
84.05	85.05	1	R	
85.05	85.5	0.45	CBSH	
85.5	87.5	2	R	
87.5	87.85	0.35	CBSH	
87.85	88.3	0.45	R	
88.3	88.6	0.3	DC	A71
88.6	88.8	0.2	CBSH	
88.8	89.7	0.9	R	
89.7	89.98	0.28	CR	
89.98	90.65	0.67	C	A7
90.65	90.9	0.25	DC	A7
90.9	91.1	0.2	CBSH	
91.1	98	6.9	R	
98	98.8	0.8	CBSH	
98.8	99.1	0.3	CR	A5
99.1	99.2	0.1	DC	A5
99.2	99.45	0.25	CBSH	
99.45	100.2	0.75	R	
100.2	100.55	0.35	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-11C (metres) -- continued				
100.55	101	0.45	R	
-----	-----			
Log interpretation of WC18-12C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	4.3	4.3	DRIFT	DRIFT
4.3	15.25	10.95	R	
15.25	15.5	0.25	IRST	IRONSTONE
15.5	15.8	0.3	CBSH	
15.8	16.45	0.65	R	
16.45	16.8	0.35	CBSH	170
16.8	21.6	4.8	R	
21.6	21.7	0.1	CR	
21.7	21.9	0.2	DC	150
21.9	22.1	0.2	C	150
22.1	22.22	0.12	DC	150
22.22	22.6	0.38	C	150
22.6	22.8	0.2	DC	150
22.8	23.15	0.35	CBSH	
23.15	24.05	0.9	R	
24.05	24.75	0.7	CBSH	
24.75	28.85	4.1	R	
28.85	29.08	0.23	CBSH	
29.08	29.2	0.12	DC	130
29.2	29.45	0.25	CR	130
29.45	35.02	5.57	R	
35.02	35.3	0.28	DC	111
35.3	35.5	0.2	CR	111
35.5	35.92	0.42	DC	111
35.92	37.25	1.33	R	
37.25	37.5	0.25	DC	110
37.5	37.75	0.25	C	110
37.75	37.9	0.15	DC	110
37.9	39.8	1.9	R	
39.8	40.18	0.38	DC	101
40.18	41.1	0.92	C	101
41.1	44.8	3.7	C	100
44.8	45.05	0.25	CR	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-12C (metres) -- continued				
45.05	50.85	5.8	R	
50.85	51.05	0.2	IRST	IRONSTONE
51.05	52.6	1.55	R	
52.6	53	0.4	CBSH	
53	53.2	0.2	DC	201
53.2	54.3	1.1	C	201
54.3	54.6	0.3	DC	201
54.6	54.7	0.1	CBSH	
54.7	55.55	0.85	R	
55.55	55.8	0.25	IRST	IRONSTONE
55.8	56.4	0.6	R	
56.4	56.6	0.2	DC	202
56.6	57.1	0.5	C	202
57.1	57.35	0.25	R	202
57.35	57.55	0.2	CR	202
57.55	57.9	0.35	C	202
57.9	58.1	0.2	CBSH	
58.1	62.7	4.6	R	
62.7	62.9	0.2	CBSH	330
62.9	63	0.1	FAULT	POSSIBLE
63	68.5	5.5	R	
68.5	68.75	0.25	CBSH	330
68.75	70.15	1.4	R	
70.15	70.6	0.45	CBSH	
70.6	71.15	0.55	R	
71.15	71.5	0.35	DC	310
71.5	71.65	0.15	CR	310
71.65	72.75	1.1	R	
72.75	73.05	0.3	CBSH	
73.05	73.6	0.55	R	
73.6	73.9	0.3	CBSH	
73.9	74.15	0.25	DC	300
74.15	74.53	0.38	C	300
74.53	74.68	0.15	R	300
74.68	75.12	0.44	C	300
75.12	75.45	0.33	CBSH	
75.45	79.2	3.75	R	
79.2	79.8	0.6	CBSH	
79.8	80.28	0.48	C	320

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-12C (metres) -- continued				
80.28	80.5	0.22	CBSH	
80.5	85.1	4.6	R	
85.1	85.8	0.7	CBSH	340
85.8	85.9	0.1	CR	340
85.9	86.15	0.25	CBSH	340
86.15	86.3	0.15	CR	340
86.3	86.55	0.25	CBSH	340
86.55	87.45	0.9	R	340
87.45	88	0.55	CBSH	340
88	88.15	0.15	R	340
88.15	88.35	0.2	CBSH	340
88.35	110.55	22.2	R	
110.55	110.65	0.1	IRST	IRONSTONE
110.65	118.85	8.2	R	
118.85	119.2	0.35	DC	410
119.2	120	0.8	R	
120	120.2	0.2	CR	
120.2	121.85	1.65	C	401
121.85	123.7	1.85	C	400
123.7	124	0.3	CR	
124	125.3	1.3	R	
125.3	125.5	0.2	CBSH	
125.5	125.75	0.25	C	420
125.75	126.05	0.3	CBSH	
126.05	126.55	0.5	R	
126.55	126.8	0.25	CR	
126.8	127.22	0.42	CBSH	
127.22	127.34	0.12	DC	440
127.34	127.8	0.46	C	440
127.8	127.9	0.1	DC	440
127.9	128.2	0.3	C	440
128.2	128.38	0.18	CR	440
128.38	128.7	0.32	C	440
128.7	128.9	0.2	CBSH	
128.9	131.3	2.4	R	
131.3	131.56	0.26	CBSH	
131.56	131.75	0.19	CR	442
131.75	131.85	0.1	CBSH	
131.85	132.8	0.95	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-12C (metres) -- continued				
132.8	133.2	0.4	CR	
133.2	133.4	0.2	CBSH	
133.4	134.05	0.65	R	
134.05	134.65	0.6	CBSH	
134.65	135	0.35	R	
135	135.4	0.4	CBSH	
135.4	135.6	0.2	R	
135.6	136.2	0.6	CBSH	
136.2	136.6	0.4	R	
136.6	137	0.4	CBSH	463
137	143.4	6.4	R	
143.4	143.7	0.3	DC	460
143.7	150.32	6.62	R	
150.32	150.5	0.18	CBSH	483
150.5	159.2	8.7	R	
159.2	159.35	0.15	CR	
159.35	159.6	0.25	C	480
159.6	159.75	0.15	CBSH	480
159.75	159.95	0.2	DC	480
159.95	160.7	0.75	C	480
160.7	160.85	0.15	CR	
160.85	163.75	2.9	R	
163.75	163.9	0.15	CBSH	
163.9	172.25	8.35	R	
172.25	172.45	0.2	CR	
172.45	172.65	0.2	CBSH	
172.65	175.2	2.55	R	
175.2	175.45	0.25	CBSH	
175.45	175.8	0.35	DC	A71
175.8	177	1.2	R	
177	177.25	0.25	CBSH	
177.25	178.3	1.05	C	A7
178.3	178.5	0.2	DC	A7
178.5	178.72	0.22	CBSH	
178.72	186.7	7.98	R	
186.7	187.6	0.9	CBSH	A5
187.6	187.9	0.3	CR	A5
187.9	188.1	0.2	CBSH	A5
188.1	191.45	3.35	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-12C (metres) -- continued				
191.45	191.8	0.35	CBSH	
191.8	193.95	2.15	R	
193.95	194.3	0.35	DC	A3
194.3	194.5	0.2	CBSH	
194.5	195.3	0.8	R	
195.3	195.7	0.4	CBSH	A1
195.7	200.3	4.6	R	
-----	-----			
Log interpretation of WC18-13C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	3	3	DRIFT	DRIFT
3	3.15	0.15	DC	150
3.15	3.65	0.5	C	150
3.65	3.8	0.15	CR	150
3.8	3.95	0.15	C	150
3.95	4.1	0.15	DC	150
4.1	4.3	0.2	C	150
4.3	4.6	0.3	DC	150
4.6	4.85	0.25	CR	
4.85	5.3	0.45	CBSH	
5.3	5.7	0.4	R	
5.7	5.85	0.15	CBSH	
5.85	6.2	0.35	CR	
6.2	6.35	0.15	CBSH	
6.35	6.8	0.45	CR	
6.8	7.1	0.3	DC	
7.1	7.45	0.35	CBSH	
7.45	11	3.55	R	
11	11.32	0.32	CBSH	
11.32	11.8	0.48	CR	130
11.8	16.65	4.85	R	
16.65	16.7	0.05	CR	
16.7	16.85	0.15	DC	111
16.85	17	0.15	C	111
17	17.2	0.2	DC	111
17.2	17.6	0.4	C	111
17.6	17.85	0.25	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-13C (metres) -- continued				
17.85	19.2	1.35	R	
19.2	19.45	0.25	CR	
19.45	20.2	0.75	C	110
20.2	20.4	0.2	CBSH	
20.4	20.75	0.35	R	
20.75	21	0.25	CBSH	
21	28.3	7.3	R	
28.3	28.45	0.15	CR	
28.45	28.6	0.15	DC	101
28.6	29.95	1.35	C	101
29.95	32.65	2.7	C	100
32.65	32.9	0.25	DC	100
32.9	33.2	0.3	CBSH	
33.2	33.45	0.25	CR	
33.45	36.2	2.75	R	
36.2	36.55	0.35	CBSH	
36.55	38.95	2.4	R	
38.95	39.4	0.45	CBSH	
39.4	39.7	0.3	R	
39.7	39.95	0.25	CR	
39.95	40.9	0.95	C	201
40.9	41.2	0.3	CR	
41.2	46.75	5.55	R	
46.75	46.9	0.15	CBSH	
46.9	47	0.1	DC	202
47	47.4	0.4	C	202
47.4	47.6	0.2	CBSH	202
47.6	47.8	0.2	CR	202
47.8	48.3	0.5	C	202
48.45	54.55	6.1	R	
54.55	55.1	0.55	CBSH	330
55.1	58	2.9	R	
58	58.55	0.55	CBSH	310
58.55	63.95	5.4	R	
63.95	64.55	0.6	CBSH	
64.55	68.25	3.7	R	
68.25	68.4	0.15	CR	
68.4	68.62	0.22	C	300
68.62	68.85	0.23	DC	300

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-13C (metres) -- continued				
68.85	69.15	0.3	R	300
69.15	69.35	0.2	CBSH	300
69.35	69.65	0.3	C	300
69.65	69.85	0.2	CBSH	
69.85	73.55	3.7	R	
73.55	74	0.45	CBSH	
74	74.35	0.35	R	
74.35	74.62	0.27	CBSH	
74.62	75.18	0.56	C	320
75.18	75.9	0.72	CBSH	
75.9	81.2	5.3	R	
81.2	81.9	0.7	CBSH	340
81.9	82.05	0.15	CR	340
82.05	82.15	0.1	CBSH	340
82.15	82.32	0.17	CR	340
82.32	82.8	0.48	CBSH	340
82.8	83.85	1.05	R	340
83.85	85.3	1.45	CBSH	340
85.3	89.7	4.4	R	
89.7	89.9	0.2	CBSH	
89.9	90.55	0.65	R	
90.55	90.95	0.4	CBSH	360
90.95	99.8	8.85	R	
99.8	99.9	0.1	FAULT	POSSIBLE
99.9	105.05	5.15	R	
105.05	105.3	0.25	CBSH	
105.3	112.75	7.45	R	
112.75	112.85	0.1	CR	430
112.85	113.15	0.3	C	430
113.15	113.4	0.25	CBSH	
113.4	115.6	2.2	R	
115.6	115.85	0.25	DC	410
115.85	117.05	1.2	C	410
117.05	117.4	0.35	CBSH	
117.4	117.55	0.15	CR	
117.55	119.6	2.05	C	401
119.6	122.8	3.2	C	400
122.8	125.45	2.65	R	
125.45	125.6	0.15	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-13C (metres) -- continued				
125.6	125.75	0.15	DC	420
125.75	126	0.25	C	420
126	126.2	0.2	DC	420
126.2	126.45	0.25	CBSH	
126.45	130.1	3.65	R	
130.1	130.18	0.08	CR	
130.18	130.28	0.1	DC	440
130.28	130.63	0.35	C	440
130.63	130.75	0.12	DC	440
130.75	130.9	0.15	C	440
130.9	131.05	0.15	DC	440
131.05	131.2	0.15	R	440
131.2	131.35	0.15	C	440
131.35	131.45	0.1	DC	440
131.45	131.6	0.15	C	440
131.6	131.8	0.2	CBSH	
131.8	133.55	1.75	R	
133.55	133.72	0.17	CBSH	
133.72	133.9	0.18	DC	442
133.9	134.1	0.2	CBSH	
134.1	139.85	5.75	R	
139.85	140.3	0.45	CBSH	463
140.3	145.25	4.95	R	
145.25	145.4	0.15	CR	
145.4	145.5	0.1	CBSH	
145.5	145.65	0.15	DC	460
145.65	157	11.35	R	
157	157.5	0.5	CBSH	483
157.5	158	0.5	R	
-----	-----			
Log interpretation of WC18-14C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	3.9	3.9	DRIFT	DRIFT
3.9	14.95	11.05	R	
14.95	15.1	0.15	CR	
15.1	15.7	0.6	C	150
15.7	15.95	0.25	DC	150

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-14C (metres) -- continued				
15.95	16.1	0.15	CBSH	
16.1	16.3	0.2	R	
16.3	16.65	0.35	CBSH	
16.65	20.3	3.65	R	
20.3	20.5	0.2	CBSH	
20.5	20.7	0.2	CR	130
20.7	21	0.3	CBSH	
21	23.75	2.75	R	
23.75	24	0.25	CBSH	
24	24.2	0.2	C	111
24.2	24.5	0.3	CBSH	
24.5	25.1	0.6	R	
25.1	25.3	0.2	CBSH	
25.3	25.6	0.3	C	110
25.6	26.75	1.15	R	
26.75	27	0.25	CBSH	
27	28.12	1.12	C	101
28.12	30	1.88	C	100
30	30.18	0.18	DC	100
30.18	30.4	0.22	CR	
30.4	31.4	1	CBSH	
31.4	34.5	3.1	R	
34.5	34.82	0.32	CBSH	
34.82	35.05	0.23	CR	
35.05	35.8	0.75	C	201
35.8	36	0.2	CR	
36	37	1	R	
37	37.15	0.15	CBSH	
37.15	37.22	0.07	DC	202
37.22	37.5	0.28	C	202
37.5	37.87	0.37	DC	202
37.87	38.1	0.23	C	202
38.1	38.3	0.2	CBSH	
38.3	45.6	7.3	R	
45.6	45.95	0.35	CBSH	
45.95	46.2	0.25	R	
46.2	46.35	0.15	CBSH	
46.35	46.6	0.25	CR	
46.6	46.8	0.2	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-14C (metres) -- continued				
46.8	48.45	1.65	R	
48.45	48.8	0.35	C	300
48.8	49	0.2	DC	300
49	49.15	0.15	C	300
49.15	49.4	0.25	CR	
49.4	51.5	2.1	R	
51.5	51.75	0.25	CBSH	
51.75	52.12	0.37	C	320
52.12	52.2	0.08	CBSH	
52.2	54.8	2.6	R	
54.8	55.35	0.55	CBSH	340
55.35	55.45	0.1	CR	340
55.45	55.5	0.05	CBSH	340
55.5	55.9	0.4	R	340
55.9	56.55	0.65	CBSH	340
56.55	77.6	21.05	R	
77.6	78	0.4	CR	410
78	78.3	0.3	R	
78.3	78.6	0.3	CBSH	
78.6	79.05	0.45	C	401
79.05	79.4	0.35	DC	400
79.4	80	0.6	C	400
80	80.1	0.1	FAULT	ESTABLISHED
80.1	81.2	1.1	C	401
81.2	81.75	0.55	DC	400
81.75	81.8	0.05	C	400
81.8	81.85	0.05	FAULT	POSSIBLE
81.85	85.05	3.2	C	400
85.05	85.4	0.35	DC	400
85.4	85.5	0.1	FAULT	ESTABLISHED
85.5	86.9	1.4	C	400
86.9	87.38	0.48	DC	400
87.38	88.45	1.07	R	
88.45	88.7	0.25	CR	
88.7	88.95	0.25	C	420
88.95	89.2	0.25	CBSH	
89.2	89.35	0.15	R	
89.35	89.8	0.45	CBSH	
89.8	90.1	0.3	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-14C (metres) -- continued				
90.1	90.45	0.35	IRST	IRONSTONE
90.45	90.85	0.4	R	
90.85	91.5	0.65	CBSH	
91.5	92	0.5	R	
92	92.25	0.25	CBSH	
92.25	92.32	0.07	DC	440
92.32	92.7	0.38	C	440
92.7	92.9	0.2	DC	440
92.9	93.05	0.15	C	440
93.05	93.3	0.25	DC	440
93.3	95.5	2.2	R	
95.5	96	0.5	CBSH	442
96	96.3	0.3	R	
96.3	96.65	0.35	CBSH	
96.65	97	0.35	R	
97	97.35	0.35	CBSH	
97.35	98.95	1.6	R	
98.95	99.3	0.35	CBSH	
99.3	101.2	1.9	R	
101.2	101.65	0.45	CBSH	
101.65	102.1	0.45	R	
102.1	102.6	0.5	CBSH	463
102.6	106.9	4.3	R	
106.9	107.05	0.15	CBSH	460
107.05	107.3	0.25	CR	460
107.3	114.2	6.9	R	
114.2	114.7	0.5	CBSH	483
114.7	118.1	3.4	R	
118.1	118.45	0.35	CBSH	
118.45	118.6	0.15	R	
118.6	118.8	0.2	CBSH	
118.8	119.15	0.35	C	480
119.15	119.3	0.15	DC	480
119.3	119.55	0.25	CBSH	
119.55	124.8	5.25	R	
124.8	125.2	0.4	CBSH	
125.2	127	1.8	R	
127	127.2	0.2	CBSH	
127.2	127.45	0.25	DC	A71

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-14C (metres) -- continued				
127.45	127.95	0.5	R	
127.95	128.4	0.45	DC	A7
128.4	128.95	0.55	C	A7
128.95	129.1	0.15	DC	A7
129.1	129.35	0.25	CBSH	
129.35	135.7	6.35	R	
135.7	136.4	0.7	CBSH	A5
136.4	138.45	2.05	R	
138.45	138.8	0.35	CBSH	
138.8	140.22	1.42	R	
-----	-----			
Log interpretation of WC18-15C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	4	4	DRIFT	DRIFT
4	5.2	1.2	R	
5.2	5.42	0.22	CBSH	310
5.42	5.6	0.18	DC	310
5.6	5.82	0.22	CR	310
5.82	11.75	5.93	R	
11.75	11.95	0.2	CBSH	
11.95	12.1	0.15	DC	300
12.1	12.6	0.5	C	300
12.6	12.8	0.2	CBSH	
12.8	15.6	2.8	R	
15.6	16.5	0.9	CBSH	320
16.5	19.4	2.9	R	
19.4	20.7	1.3	CBSH	340
20.7	22.35	1.65	R	340
22.35	23.2	0.85	CBSH	340
23.2	32.72	9.52	R	
32.72	32.9	0.18	CBSH	360
32.9	41.7	8.8	R	
41.7	42.05	0.35	DC	430
42.05	42.2	0.15	CBSH	
42.2	45.12	2.92	R	
45.12	45.35	0.23	DC	410
45.35	46.18	0.83	C	410

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-15C (metres) -- continued				
46.18	47.2	1.02	R	
47.2	47.38	0.18	CBSH	
47.38	47.58	0.2	CR	
47.58	48.55	0.97	C	401
48.55	48.65	0.1	DC	400
48.65	50.3	1.65	C	400
50.3	50.65	0.35	DC	400
50.65	50.85	0.2	CR	
50.85	51.05	0.2	R	
51.05	51.3	0.25	DC	420
51.3	51.5	0.2	CBSH	
51.5	53.82	2.32	R	
53.82	54.27	0.45	C	440
54.27	54.37	0.1	DC	440
54.37	54.45	0.08	C	440
54.45	54.52	0.07	DC	440
54.52	54.85	0.33	C	440
54.85	55.05	0.2	CBSH	
55.05	56.7	1.65	R	
56.7	57.1	0.4	CR	442
57.1	62.85	5.75	R	
62.85	63.2	0.35	CBSH	
63.2	63.9	0.7	R	
63.9	64.5	0.6	CBSH	463
64.5	68.48	3.98	R	
68.48	68.6	0.12	CBSH	
68.6	68.8	0.2	DC	460
68.8	68.9	0.1	CBSH	
68.9	70.9	2	R	
70.9	71.3	0.4	IRST	IRONSTONE
71.3	71.55	0.25	CBSH	
71.55	72.08	0.53	R	
72.08	72.4	0.32	CBSH	
72.4	73.3	0.9	R	
73.3	73.65	0.35	IRST	IRONSTONE
73.65	75.95	2.3	R	
75.95	76.2	0.25	CBSH	
76.2	78.85	2.65	R	
78.85	79.05	0.2	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-15C (metres) -- continued				
79.05	79.2	0.15	C	480
79.2	79.35	0.15	DC	480
79.35	79.8	0.45	C	480
79.8	80	0.2	DC	480
80	81.05	1.05	R	
81.05	81.5	0.45	CBSH	
81.5	82.9	1.4	R	
82.9	83.3	0.4	CBSH	
83.3	84.9	1.6	R	
84.9	85.25	0.35	CBSH	
85.25	85.5	0.25	R	
85.5	85.7	0.2	CBSH	
85.7	86.12	0.42	C	A71
86.12	86.35	0.23	CBSH	
86.35	87.1	0.75	R	
87.1	87.5	0.4	C	A7
87.5	87.6	0.1	DC	A7
87.6	87.68	0.08	CBSH	
87.68	88	0.32	R	
88	88.13	0.13	CBSH	
88.13	88.3	0.17	DC	A72
88.3	88.5	0.2	CBSH	
88.5	95.2	6.7	R	
95.2	95.72	0.52	CBSH	
95.72	96	0.28	CR	A5
96	96.2	0.2	CBSH	
96.2	99.3	3.1	R	
99.3	99.6	0.3	CBSH	
99.6	101	1.4	R	
-----	-----			
Log interpretation of WC18-16C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	1.6	1.6	DRIFT	DRIFT
1.6	2.5	0.9	R	
2.5	2.9	0.4	DC	110
2.9	3.1	0.2	CBSH	
3.1	8.6	5.5	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-16C (metres) -- continued				
8.6	8.8	0.2	CBSH	
8.8	9.25	0.45	C	101
9.25	10.65	1.4	C	100
10.65	10.93	0.28	CR	
10.93	11.65	0.72	CBSH	
11.65	14.8	3.15	R	
14.8	15.4	0.6	CBSH	
15.4	16	0.6	C	201
16	16.15	0.15	DC	201
16.15	16.4	0.25	CBSH	
16.4	17.7	1.3	R	
17.7	17.85	0.15	IRST	IRONSTONE
17.85	18.55	0.7	R	
18.55	18.7	0.15	CR	
18.7	18.85	0.15	C	202
18.85	19.2	0.35	DC	202
19.2	19.48	0.28	CBSH	
19.48	37.55	18.07	R	
37.55	37.75	0.2	CBSH	
37.75	38.12	0.37	C	300
38.12	38.22	0.1	CBSH	
38.22	41.2	2.98	R	
41.2	41.45	0.25	CBSH	320
41.45	41.6	0.15	CR	320
41.6	41.85	0.25	CBSH	320
41.85	44.85	3	R	
44.85	45.45	0.6	CBSH	340
45.45	45.6	0.15	CR	340
45.6	45.85	0.25	CBSH	340
45.85	46.63	0.78	R	340
46.63	47.5	0.87	CBSH	340
47.5	51.65	4.15	R	
51.65	52	0.35	CBSH	360
52	66	14	R	
66	66.12	0.12	CBSH	
66.12	66.4	0.28	DC	430
66.4	68.45	2.05	R	
68.45	68.55	0.1	CBSH	
68.55	68.95	0.4	C	410

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-16C (metres) -- continued				
68.95	69.05	0.1	FAULT	POSSIBLE
69.05	69.3	0.25	C	410
69.3	70	0.7	R	
70	70.28	0.28	CBSH	
70.28	71	0.72	C	401
71	71.38	0.38	DC	400
71.38	72.6	1.22	C	400
72.6	73.08	0.48	DC	400
73.08	73.3	0.22	CBSH	
73.3	73.6	0.3	R	
73.6	73.8	0.2	CBSH	
73.8	73.95	0.15	DC	420
73.95	74.2	0.25	CR	
74.2	74.4	0.2	CBSH	
74.4	77.45	3.05	R	
77.45	77.7	0.25	CBSH	
77.7	77.92	0.22	C	440
77.92	78.28	0.36	DC	440
78.28	78.5	0.22	C	440
78.5	79.9	1.4	R	
79.9	80.3	0.4	CBSH	442
80.3	84.75	4.45	R	
84.75	85.15	0.4	CBSH	463
85.15	89.22	4.07	R	
89.22	89.55	0.33	CR	460
89.55	98.8	9.25	R	
98.8	99.25	0.45	CBSH	
99.25	101.1	1.85	R	
101.1	101.3	0.2	CBSH	
101.3	101.53	0.23	DC	480
101.53	102.1	0.57	C	480
102.1	102.3	0.2	DC	480
102.3	102.48	0.18	CBSH	
102.48	103.25	0.77	R	
103.25	103.9	0.65	CBSH	
103.9	105.05	1.15	R	
105.05	105.45	0.4	CBSH	
105.45	107.4	1.95	R	
107.4	107.7	0.3	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-16C (metres) -- continued				
107.7	107.85	0.15	R	
107.85	108	0.15	CBSH	
108	108.35	0.35	C	A71
108.35	108.55	0.2	CBSH	
108.55	109.05	0.5	R	
109.05	109.3	0.25	CBSH	
109.3	110.15	0.85	C	A7
110.15	110.3	0.15	DC	A7
110.3	116.5	6.2	R	
116.5	117	0.5	CBSH	
117	117.15	0.15	CR	A5
117.15	117.4	0.25	CBSH	
117.4	120.5	3.1	R	
120.5	120.9	0.4	CBSH	
120.9	122.45	1.55	R	
122.45	122.75	0.3	DC	A3
122.75	123.4	0.65	R	
123.4	123.6	0.2	CBSH	A1
123.6	123.75	0.15	CR	A1
123.75	124.24	0.49	R	
-----	-----			
Log interpretation of WC18-17C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	7.45	7.45	DRIFT	DRIFT
7.45	10.9	3.45	R	
10.9	11.05	0.15	CBSH	
11.05	11.2	0.15	R	
11.2	11.3	0.1	CBSH	
11.3	11.7	0.4	R	
11.7	12.2	0.5	CBSH	
12.2	13.1	0.9	R	
13.1	13.4	0.3	CBSH	
13.4	13.9	0.5	R	
13.9	14.4	0.5	CBSH	
14.4	16.8	2.4	R	
16.8	17	0.2	C	150
17	17.6	0.6	DC	150

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-17C (metres) -- continued				
17.6	17.85	0.25	CBSH	
17.85	18	0.15	R	
18	18.4	0.4	CBSH	
18.4	21.35	2.95	R	
21.35	21.8	0.45	CR	130
21.8	23.6	1.8	R	
23.6	24.05	0.45	CBSH	
24.05	26.85	2.8	R	
26.85	27.05	0.2	CBSH	
27.05	27.35	0.3	C	111
27.35	27.6	0.25	CBSH	
27.6	28.3	0.7	R	
28.3	28.65	0.35	C	110
28.65	28.8	0.15	CR	
28.8	29.18	0.38	R	
29.18	29.4	0.22	CBSH	
29.4	30.35	0.95	C	101
30.35	32.05	1.7	C	100
32.05	39.6	7.55	R	
39.6	40.12	0.52	C	201
40.12	40.2	0.08	DC	201
40.2	40.32	0.12	CBSH	
40.32	43.4	3.08	R	
43.4	43.75	0.35	C	202
43.75	43.85	0.1	CR	202
43.85	43.98	0.13	DC	202
43.98	44.08	0.1	CR	202
44.08	44.2	0.12	DC	202
44.2	44.3	0.1	CR	
44.3	44.38	0.08	CBSH	
44.38	52.8	8.42	R	
52.8	53.2	0.4	CBSH	310
53.2	62.85	9.65	R	
62.85	63.3	0.45	CBSH	
63.3	63.9	0.6	R	
63.9	64.1	0.2	CBSH	
64.1	64.32	0.22	CR	
64.32	64.45	0.13	CBSH	
64.45	64.83	0.38	C	300

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-17C (metres) -- continued				
64.83	68	3.17	R	
68	68.2	0.2	CR	320
68.2	68.4	0.2	DC	320
68.4	68.62	0.22	CBSH	
68.62	74.25	5.63	R	
74.25	74.6	0.35	CBSH	340
74.6	74.92	0.32	R	340
74.92	75.39	0.47	CBSH	340
75.39	75.8	0.41	R	340
75.8	76.2	0.4	CBSH	340
76.2	79.2	3	R	340
79.2	79.8	0.6	CBSH	340
79.8	84.6	4.8	R	
84.6	84.8	0.2	CBSH	
84.8	93.9	9.1	R	
93.9	94.2	0.3	DC	430
94.2	94.4	0.2	CBSH	
94.4	97.48	3.08	R	
97.48	98.3	0.82	C	410
98.3	98.8	0.5	R	
98.8	99.03	0.23	CR	
99.03	99.8	0.77	C	401
99.8	100	0.2	DC	400
100	101.2	1.2	C	400
101.2	101.5	0.3	DC	400
101.5	101.75	0.25	CBSH	
101.75	104.05	2.3	R	
104.05	104.25	0.2	CBSH	
104.25	104.4	0.15	DC	420
104.4	104.6	0.2	CR	420
104.6	106.85	2.25	R	
106.85	107	0.15	CBSH	
107	107.2	0.2	C	440
107.2	107.3	0.1	DC	440
107.3	107.42	0.12	C	440
107.42	107.58	0.16	DC	440
107.58	107.85	0.27	C	440
107.85	108.85	1	R	
108.85	109.05	0.2	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-17C (metres) -- continued				
109.05	109.2	0.15	DC	442
109.2	109.4	0.2	CBSH	
109.4	113.3	3.9	R	
113.3	113.8	0.5	CBSH	463
113.8	117.6	3.8	R	
117.6	117.8	0.2	CBSH	460
117.8	118	0.2	CR	460
118	118.12	0.12	CBSH	460
118.12	126.05	7.93	R	
126.05	126.26	0.21	CBSH	
126.26	127.1	0.84	C	480
127.1	127.2	0.1	DC	480
127.2	127.4	0.2	CBSH	
127.4	128.6	1.2	R	
128.6	129.2	0.6	CBSH	
129.2	132.53	3.33	R	
132.53	132.9	0.37	CBSH	
132.9	133.35	0.45	R	
133.35	133.75	0.4	DC	A71
133.75	134.2	0.45	R	
134.2	134.45	0.25	CBSH	
134.45	134.65	0.2	C	A7
134.65	135.05	0.4	DC	A7
135.05	135.15	0.1	CR	A7
135.15	135.35	0.2	DC	A7
135.35	140.22	4.87	R	
-----	-----			
Log interpretation of WC18-18C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.44	2.44	DRIFT	DRIFT
2.44	11.15	8.71	R	
11.15	11.43	0.28	CR	
11.43	11.6	0.17	C	150
11.6	11.8	0.2	R	150
11.8	12.05	0.25	DC	150
12.05	12.15	0.1	C	150
12.15	12.45	0.3	DC	150

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-18C (metres) -- continued				
12.45	12.7	0.25	CBSH	
12.7	13.3	0.6	R	
13.3	13.52	0.22	CBSH	
13.52	18.85	5.33	R	
18.85	19.2	0.35	CR	130
19.2	19.4	0.2	CBSH	
19.4	23.05	3.65	R	
23.05	23.38	0.33	DC	111
23.38	23.48	0.1	CR	111
23.48	23.8	0.32	DC	111
23.8	24	0.2	CBSH	
24	25.3	1.3	R	
25.3	25.75	0.45	C	110
25.75	26.1	0.35	CBSH	
26.1	27.4	1.3	R	
27.4	27.65	0.25	CBSH	
27.65	29.3	1.65	C	101
29.3	31.5	2.2	C	100
31.5	31.75	0.25	DC	100
31.75	32.05	0.3	CR	
32.05	33.25	1.2	CBSH	
33.25	40.3	7.05	R	
40.3	41.35	1.05	C	201
41.35	44.25	2.9	R	
44.25	44.65	0.4	CBSH	
44.65	45.7	1.05	R	
45.7	45.9	0.2	DC	202
45.9	46.4	0.5	C	202
46.4	46.6	0.2	CBSH	202
46.6	46.82	0.22	CR	202
46.82	47.05	0.23	C	202
47.05	47.23	0.18	DC	202
47.23	58.7	11.47	R	
58.7	59.75	1.05	CBSH	310?
59.75	62.85	3.1	R	
62.85	63.2	0.35	IRST	IRONSTONE
63.2	67.3	4.1	R	
67.3	67.8	0.5	CBSH	
67.8	71.55	3.75	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-18C (metres) -- continued				
71.55	72.2	0.65	IRST	IRONSTONE
72.2	76.05	3.85	R	
76.05	76.3	0.25	CR	
76.3	76.55	0.25	DC	300
76.55	76.75	0.2	C	300
76.75	77	0.25	R	300
77	77.08	0.08	DC	300
77.08	77.6	0.52	C	300
77.6	77.8	0.2	CBSH	
77.8	81.6	3.8	R	
81.6	81.8	0.2	CBSH	
81.8	82	0.2	CR	320
82	82.22	0.22	C	320
82.22	82.85	0.63	CBSH	
82.85	90.05	7.2	R	
90.05	90.2	0.15	CBSH	
90.2	90.8	0.6	R	
90.8	92.6	1.8	CBSH	340
92.6	94.3	1.7	R	340
94.3	95.45	1.15	CBSH	340
95.45	95.65	0.2	R	340
95.65	95.95	0.3	CBSH	340
95.95	100.8	4.85	R	
100.8	101.1	0.3	CBSH	
101.1	101.6	0.5	R	
101.6	101.8	0.2	CBSH	360
101.8	121.15	19.35	R	
121.15	121.25	0.1	CR	430
121.25	121.4	0.15	DC	430
121.4	121.65	0.25	CR	430
121.65	121.85	0.2	CBSH	
121.85	125	3.15	R	
125	125.1	0.1	IRST	IRONSTONE
125.1	125.7	0.6	R	
125.7	125.97	0.27	CR	
125.97	126.5	0.53	C	410
126.5	126.63	0.13	FAULT	PROBABLE
126.63	126.95	0.32	C	410
126.95	127.4	0.45	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-18C (metres) -- continued				
127.4	128.4	1	C	401
128.4	128.6	0.2	DC	400
128.6	130.15	1.55	C	400
130.15	130.4	0.25	DC	400
130.4	133.3	2.9	R	
133.3	133.5	0.2	CBSH	
133.5	133.7	0.2	DC	420
133.7	133.9	0.2	CR	
133.9	134.15	0.25	CBSH	
134.15	137.75	3.6	R	
137.75	138.1	0.35	IRST	IRONSTONE
138.1	138.85	0.75	R	
138.85	139	0.15	CR	
139	139.1	0.1	DC	440
139.1	139.4	0.3	C	440
139.4	139.52	0.12	DC	440
139.52	139.75	0.23	CR	440
139.75	140.15	0.4	DC	440
140.15	140.6	0.45	CR	440
140.6	142.65	2.05	R	
142.65	143.05	0.4	C	
143.05	143.25	0.2	CBSH	
143.25	147.58	4.33	R	
-----	-----			
Log interpretation of WC18-19C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	5.8	5.8	DRIFT	DRIFT
5.8	8.15	2.35	R	
8.15	8.55	0.4	CBSH	310?
8.55	15.55	7	R	
15.55	15.85	0.3	IRST	IRONSTONE
15.85	16	0.15	CBSH	
16	16.52	0.52	C	300
16.52	17.45	0.93	R	
17.45	17.9	0.45	CBSH	
17.9	19.8	1.9	R	
19.8	20.6	0.8	CBSH	320

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-19C (metres) -- continued				
20.6	25.4	4.8	R	
25.4	25.5	0.1	CBSH	340
25.5	30.2	4.7	R	340
30.2	30.8	0.6	CBSH	340
30.8	36.25	5.45	R	
36.25	36.75	0.5	CBSH	360
36.75	46.55	9.8	R	
46.55	46.8	0.25	CBSH	
46.8	47.05	0.25	DC	430
47.05	49.6	2.55	R	
49.6	49.95	0.35	IRST	IRONSTONE
49.95	50.25	0.3	R	
50.25	50.45	0.2	CBSH	
50.45	50.6	0.15	DC	410
50.6	51.4	0.8	C	410
51.4	51.7	0.3	CBSH	
51.7	52.7	1	R	
52.7	52.95	0.25	CBSH	
52.95	53.9	0.95	C	401
53.9	54.1	0.2	DC	400
54.1	55.4	1.3	C	400
55.4	55.85	0.45	DC	400
55.85	56	0.15	C	420
56	56.1	0.1	DC	420
56.1	56.3	0.2	CR	
56.3	56.55	0.25	CBSH	
56.55	56.95	0.4	R	
56.95	57.4	0.45	IRST	IRONSTONE
57.4	57.6	0.2	CBSH	
57.6	57.9	0.3	C	440
57.9	58	0.1	DC	440
58	58.1	0.1	C	440
58.1	58.2	0.1	DC	440
58.2	58.3	0.1	C	440
58.3	58.5	0.2	DC	440
58.5	58.75	0.25	CBSH	
58.75	60.2	1.45	R	
60.2	60.3	0.1	CBSH	
60.3	60.6	0.3	DC	442

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-19C (metres) -- continued				
60.6	68	7.4	R	
68	68.8	0.8	CBSH	463
68.8	72.52	3.72	R	
72.52	72.9	0.38	DC	460
72.9	75.7	2.8	R	
75.7	76	0.3	CBSH	483
76	80	4	R	
80	80.4	0.4	CBSH	
80.4	81.6	1.2	R	
81.6	81.95	0.35	CBSH	
81.95	82.3	0.35	R	
82.3	82.5	0.2	CBSH	
82.5	83.18	0.68	C	480
83.18	85.05	1.87	R	
85.05	85.4	0.35	CBSH	
85.4	85.9	0.5	R	
85.9	86.2	0.3	CBSH	
86.2	87.5	1.3	R	
87.5	87.85	0.35	CBSH	
87.85	88.2	0.35	R	
88.2	88.5	0.3	CBSH	
88.5	89	0.5	R	
-----	-----			
Log interpretation of WC18-20C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.5	2.5	DRIFT	DRIFT
2.5	9.55	7.05	R	
9.55	9.7	0.15	CBSH	
9.7	9.9	0.2	C	150
9.9	10	0.1	DC	150
10	10.15	0.15	C	150
10.15	10.5	0.35	DC	150
10.5	10.75	0.25	CBSH	
10.75	11.1	0.35	R	
11.1	11.3	0.2	CBSH	
11.3	16.3	5	R	
16.3	16.7	0.4	CBSH	130

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-20C (metres) -- continued				
16.7	19.35	2.65	R	
19.35	19.55	0.2	CBSH	
19.55	20.45	0.9	C	111
20.45	20.65	0.2	CBSH	
20.65	21.4	0.75	R	
21.4	21.65	0.25	CR	
21.65	22.05	0.4	C	110
22.05	22.4	0.35	DC	101
22.4	22.65	0.25	C	101
22.65	24.25	1.6	C	100
24.25	24.5	0.25	DC	100
24.5	26.45	1.95	R	
26.45	26.8	0.35	CBSH	
26.8	28.25	1.45	R	
28.25	28.8	0.55	C	201
28.8	29	0.2	CR	
29	29.45	0.45	CBSH	
29.45	30.4	0.95	R	
30.4	30.55	0.15	CBSH	
30.55	30.75	0.2	C	202
30.75	30.85	0.1	CR	202
30.85	30.98	0.13	DC	202
30.98	31.07	0.09	CR	202
31.07	31.32	0.25	DC	202
31.32	31.5	0.18	CBSH	
31.5	37	5.5	R	
37	37.2	0.2	CBSH	310?
37.2	41.55	4.35	R	
41.55	41.7	0.15	CBSH	
41.7	42.35	0.65	C	300
42.35	42.45	0.1	DC	300
42.45	42.6	0.15	CBSH	
42.6	44.25	1.65	R	
44.25	44.4	0.15	IRST	IRONSTONE
44.4	44.65	0.25	R	
44.65	44.85	0.2	CBSH	320
44.85	70.65	25.8	R	
70.65	71.1	0.45	DC	430
71.1	72	0.9	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-20C (metres) -- continued				
72	72.35	0.35	CBSH	
72.35	73.8	1.45	R	
73.8	74	0.2	CBSH	
74	74.2	0.2	CR	
74.2	74.8	0.6	C	410
74.8	75.8	1	R	
75.8	76	0.2	CBSH	
76	76.75	0.75	C	401
76.75	77	0.25	CBSH	
77	82.42	5.42	R	
82.42	83	0.58	C	400
83	83.42	0.42	DC	400
83.42	83.55	0.13	CR	
83.55	83.7	0.15	C	420
83.7	83.8	0.1	DC	420
83.8	83.9	0.1	C	420
83.9	84.15	0.25	CR	
84.15	84.95	0.8	R	
84.95	85.3	0.35	C	440
85.3	85.4	0.1	DC	440
85.4	85.65	0.25	C	440
85.65	85.85	0.2	DC	440
85.85	85.95	0.1	CBSH	
85.95	86.25	0.3	R	
86.25	86.5	0.25	CR	
86.5	86.75	0.25	DC	442
86.75	97.5	10.75	R	
97.5	97.75	0.25	CBSH	463
97.75	103.35	5.6	R	
103.35	103.5	0.15	CBSH	460
103.5	103.7	0.2	CR	460
103.7	103.85	0.15	CBSH	460
103.85	106.4	2.55	R	
106.4	106.75	0.35	CBSH	483
106.75	108.95	2.2	R	
108.95	109.15	0.2	CBSH	
109.15	109.45	0.3	C	480
109.45	109.6	0.15	DC	480
109.6	110.2	0.6	C	480

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-20C (metres) -- continued				
110.2	112.7	2.5	R	
112.7	113.05	0.35	CBSH	
113.05	113.5	0.45	R	
113.5	113.85	0.35	CBSH	
113.85	114.4	0.55	R	
114.4	114.6	0.2	CBSH	
114.6	114.8	0.2	DC	A71
114.8	114.9	0.1	CR	A71
114.9	115	0.1	DC	A71
115	115.1	0.1	CR	
115.1	115.2	0.1	CBSH	
115.2	117.45	2.25	R	
117.45	117.7	0.25	CBSH	
117.7	117.95	0.25	C	A7
117.95	118.2	0.25	CBSH	
118.2	119.05	0.85	R	
119.05	119.2	0.15	CBSH	
119.2	119.45	0.25	CR	A72
119.45	119.8	0.35	CBSH	
119.8	125.3	5.5	R	
125.3	125.8	0.5	CBSH	A5
125.8	125.9	0.1	CR	A5
125.9	126.15	0.25	CBSH	A5
126.15	132.75	6.6	R	
132.75	133.15	0.4	DC	A3
133.15	133.5	0.35	R	
133.5	133.8	0.3	CBSH	
133.8	135.3	1.5	R	
135.3	135.5	0.2	CBSH	
135.5	136.15	0.65	C	A1
136.15	136.61	0.46	R	
-----	-----			
Log interpretation of WC18-21C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	5.3	5.3	DRIFT	DRIFT
5.3	24.7	19.4	R	
24.7	24.85	0.15	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-21C (metres) -- continued				
24.85	25.15	0.3	DC	430
25.15	28.25	3.1	R	
28.25	28.4	0.15	CBSH	
28.4	28.55	0.15	CR	
28.55	29.35	0.8	C	410
29.35	29.55	0.2	CBSH	
29.55	30.85	1.3	R	
30.85	31.8	0.95	C	401
31.8	32	0.2	CR	
32	34.2	2.2	R	
34.2	35.75	1.55	C	400
35.75	35.9	0.15	DC	400
35.9	36.05	0.15	C	420
36.05	36.3	0.25	CR	
36.3	37.1	0.8	R	
37.1	37.4	0.3	C	440
37.4	37.7	0.3	DC	440
37.7	38	0.3	C	440
38	38.5	0.5	R	
38.5	38.8	0.3	CBSH	
38.8	39.1	0.3	C	442
39.1	39.2	0.1	CBSH	
39.2	55.05	15.85	R	
55.05	55.25	0.2	CBSH	460
55.25	55.4	0.15	CR	460
55.4	55.5	0.1	CBSH	460
55.5	57.9	2.4	R	
57.9	60	0.1	CBSH	483
60	60.55	0.55	R	
60.55	60.7	0.15	CBSH	
60.7	61.55	0.85	C	480
61.55	63	1.45	R	
63	63.35	0.35	CBSH	
63.35	64.8	1.45	R	
64.8	65.1	0.3	CBSH	A71
65.1	65.3	0.2	CR	A71
65.3	67.7	2.4	R	
67.7	68.2	0.5	C	A7
68.2	69.1	0.9	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-21C (metres) -- continued				
69.1	69.5	0.4	DC	A72
69.5	71	1.5	R	
-----	-----			
Log interpretation of WC18-22C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.45	2.45	DRIFT	DRIFT
2.45	9.05	6.6	R	
9.05	9.3	0.25	CBSH	
9.3	9.45	0.15	C	150
9.45	9.8	0.35	DC	150
9.8	9.95	0.15	CR	150
9.95	10.05	0.1	DC	150
10.05	10.1	0.05	CR	
10.1	10.9	0.8	CBSH	
10.9	12.45	1.55	R	
12.45	12.8	0.35	CBSH	
12.8	14.95	2.15	R	
14.95	15.5	0.55	CBSH	130
15.5	18.2	2.7	R	
18.2	19.15	0.95	C	111
19.15	19.3	0.15	CBSH	
19.3	20.85	1.55	R	
20.85	21.3	0.45	C	110
21.3	21.6	0.3	DC	110
21.6	22.05	0.45	C	101
22.05	23.7	1.65	C	100
23.7	24.12	0.42	DC	100
24.12	24.6	0.48	CBSH	
24.6	26.55	1.95	R	
26.55	26.9	0.35	CBSH	
26.9	27.35	0.45	R	
27.35	27.55	0.2	CBSH	
27.55	28.1	0.55	C	201
28.1	28.3	0.2	CR	
28.3	28.8	0.5	CBSH	
28.8	29.8	1	R	
29.8	30.2	0.4	C	202

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-22C (metres) -- continued				
30.2	30.3	0.1	CR	202
30.3	30.4	0.1	DC	202
30.4	30.5	0.1	CR	202
30.5	30.72	0.22	DC	202
30.72	30.85	0.13	CBSH	
30.85	35.6	4.75	R	
35.6	35.8	0.2	CBSH	
35.8	36.65	0.85	R	
36.65	37.05	0.4	CBSH	
37.05	37.75	0.7	R	
37.75	38.15	0.4	IRST	IRONSTONE
38.15	40.95	2.8	R	
40.95	41.4	0.45	CBSH	
41.4	42.35	0.95	R	
42.35	42.6	0.25	CBSH	
42.6	43.1	0.5	C	300
43.1	43.35	0.25	CR	
43.35	44.25	0.9	R	
44.25	44.65	0.4	CBSH	
44.65	46.5	1.85	R	
46.5	46.7	0.2	CBSH	320
46.7	46.9	0.2	CR	320
46.9	47.2	0.3	CBSH	320
47.2	60.05	12.85	R	
60.05	61.05	1	CBSH	340
61.05	64.6	3.55	R	340
64.6	65	0.4	CBSH	340
65	65.85	0.85	R	340
65.85	66.4	0.55	CBSH	340
66.4	75.1	8.7	R	340
75.1	75.25	0.15	CR	
75.25	75.6	0.35	C	430
75.6	79	3.4	R	
79	79.2	0.2	CBSH	
79.2	79.4	0.2	CR	
79.4	80.1	0.7	C	410
80.1	80.25	0.15	CBSH	
80.25	81.5	1.25	R	
81.5	81.65	0.15	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-22C (metres) -- continued				
81.65	81.85	0.2	DC	401
81.85	82.45	0.6	C	401
82.45	82.6	0.15	CR	
82.6	82.95	0.35	CBSH	
82.95	84.6	1.65	C	400
84.6	85.15	0.55	C	420
85.15	85.4	0.25	CR	
85.4	85.6	0.2	CBSH	
85.6	86.1	0.5	R	
86.1	86.35	0.25	CBSH	
86.35	86.5	0.15	C	440
86.5	86.6	0.1	DC	440
86.6	86.7	0.1	C	440
86.7	86.85	0.15	DC	440
86.85	87.15	0.3	C	440
87.15	88.3	1.15	R	
88.3	88.6	0.3	C	442
88.6	99.5	10.9	R	
99.5	99.7	0.2	CBSH	463
99.7	103.75	4.05	R	
103.75	104.15	0.4	CR	460
104.15	106	1.85	R	
-----	-----			
Log interpretation of WC18-23C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	5.45	5.45	DRIFT	DRIFT
5.45	10	4.55	R	
10	10.15	0.15	CBSH	340
10.15	10.3	0.15	R	340
10.3	10.6	0.3	CBSH	340
10.6	11.5	0.9	R	340
11.5	11.65	0.15	CBSH	340
11.65	14.6	2.95	R	340
14.6	15.1	0.5	CBSH	340
15.1	15.85	0.75	R	340
15.85	16.1	0.25	CBSH	340
16.1	30.6	14.5	R	

Table A-2: Lithological interpretation of geophysical logs				
From	To	Drilled thickness	Interpreted lithology	Name
Log interpretation of WC18-23C (metres) -- continued				
30.6	30.8	0.2	CR	
30.8	31.15	0.35	C	430
31.15	34.7	3.55	R	
34.7	34.9	0.2	CBSH	
34.9	35.05	0.15	CR	
35.05	35.8	0.75	C	410
35.8	35.95	0.15	CR	
35.95	37.15	1.2	R	
37.15	37.4	0.25	CR	
37.4	38.05	0.65	C	401
38.05	38.3	0.25	DC	401
38.3	38.45	0.15	CR	
38.45	39.8	1.35	C	400
39.8	39.9	0.1	DC	400
39.9	40.32	0.42	C	420
40.32	40.75	0.43	R	
40.75	40.9	0.15	CBSH	440
40.9	41.6	0.7	R	
41.6	41.85	0.25	CBSH	442
41.85	42.05	0.2	CR	442
42.05	52.85	10.8	R	
52.85	53.35	0.5	CBSH	463
53.35	57.7	4.35	R	
57.7	58.03	0.33	CR	460
58.03	61.7	3.67	R	
61.7	62.1	0.4	CBSH	483
62.1	65.35	3.25	R	
65.35	65.7	0.35	C	480
65.7	65.85	0.15	DC	480
65.85	65.9	0.05	C	480
65.9	66	0.1	DC	480
66	66.2	0.2	C	480
66.2	66.4	0.2	CR	
66.4	69.2	2.8	R	
69.2	70.45	1.25	CBSH	
70.45	71	0.55	R	
-----	-----			

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-24C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	1.4	1.4	DRIFT	DRIFT
1.4	3.95	2.55	R	
3.95	4.2	0.25	DC	410
4.2	5.05	0.85	C	410
5.05	5.35	0.3	CR	
5.35	6.5	1.15	R	
6.5	6.8	0.3	CBSH	
6.8	8.15	1.35	R	
8.15	8.5	0.35	CR	
8.5	10	1.5	C	401
10	12.15	2.15	C	400
12.15	12.35	0.2	DC	400
12.35	12.7	0.35	C	420
12.7	12.8	0.1	DC	420
12.8	12.95	0.15	C	420
12.95	13.2	0.25	CR	
13.2	14.4	1.2	R	
14.4	14.6	0.2	CR	
14.6	14.8	0.2	C	440
14.8	14.9	0.1	DC	440
14.9	15.45	0.55	C	440
15.45	15.6	0.15	CBSH	
15.6	17.5	1.9	R	
17.5	17.9	0.4	DC	442
17.9	26.6	8.7	R	
26.6	27	0.4	CBSH	463
27	31.35	4.35	R	
31.35	31.7	0.35	DC	460
31.7	35.1	3.4	R	
35.1	35.35	0.25	CBSH	483
35.35	41.3	5.95	R	
41.3	41.5	0.2	CBSH	
41.5	42.5	1	C	480
42.5	42.65	0.15	CBSH	
42.65	44.15	1.5	R	
44.15	44.55	0.4	CBSH	
44.55	45.6	1.05	R	
45.6	46	0.4	CBSH	
46	46.4	0.4	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-24C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
46.4	46.65	0.25	CBSH	
46.65	46.9	0.25	CR	A71
46.9	47.25	0.35	C	A71
47.25	48.7	1.45	R	
48.7	48.85	0.15	CBSH	
48.85	49.2	0.35	C	A7
49.2	49.3	0.1	CR	A7
49.3	49.8	0.5	R	
49.8	50	0.2	CBSH	A72
50	50.15	0.15	CR	A72
50.15	50.35	0.2	CBSH	A72
50.35	57.5	7.15	R	
57.5	58.05	0.55	CBSH	
58.05	58.25	0.2	CR	A5
58.25	58.4	0.15	CBSH	
58.4	64.1	5.7	R	
64.1	64.5	0.4	DC	A3
64.5	64.85	0.35	R	
64.85	65.15	0.3	CBSH	
65.15	65.7	0.55	R	
65.7	65.8	0.1	CBSH	
65.8	68	2.2	R	
-----	-----			
Log interpretation of WC18-25C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	1.85	1.85	DRIFT	DRIFT
1.85	2.5	0.65	R	
2.5	2.65	0.15	IRST	IRONSTONE
2.65	6.55	3.9	R	
6.55	6.9	0.35	CBSH	170
6.9	14.8	7.9	R	
14.8	14.95	0.15	CBSH	
14.95	15.1	0.15	C	150
15.1	15.2	0.1	DC	150
15.2	15.6	0.4	C	150
15.6	15.9	0.3	CR	
15.9	16.5	0.6	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-25C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
16.5	20.6	4.1	R	
20.6	20.8	0.2	CBSH	
20.8	21.05	0.25	CR	130
21.05	23.2	2.15	R	
23.2	23.6	0.4	CBSH	
23.6	24.3	0.7	C	111
24.3	24.5	0.2	CBSH	
24.5	25.2	0.7	R	
25.2	25.45	0.25	CR	
25.45	26.12	0.67	C	110
26.12	26.6	0.48	C	101
26.6	28.5	1.9	C	100
28.5	29.1	0.6	CR	
29.1	29.6	0.5	CBSH	
29.6	30.05	0.45	R	
30.05	30.5	0.45	IRST	IRONSTONE
30.5	30.9	0.4	R	
30.9	31.3	0.4	CBSH	
31.3	31.85	0.55	R	
31.85	32.1	0.25	CBSH	
32.1	32.25	0.15	DC	201
32.25	32.8	0.55	C	201
32.8	33.1	0.3	CR	
33.1	34.6	1.5	R	
34.6	34.8	0.2	DC	202
34.8	35.03	0.23	C	202
35.03	35.23	0.2	DC	202
35.23	35.4	0.17	R	202
35.4	35.65	0.25	C	202
35.65	50.8	15.15	R	
50.8	51	0.2	CR	300
51	51.2	0.2	CBSH	
51.2	53.05	1.85	R	
53.05	53.6	0.55	CBSH	320
53.6	80.8	27.2	R	
80.8	81	0.2	CBSH	
81	81.18	0.18	C	430
81.18	81.45	0.27	DC	430
81.45	84.95	3.5	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-25C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
84.95	85.15	0.2	CBSH	
85.15	85.35	0.2	CR	
85.35	86.18	0.83	C	410
86.18	87.2	1.02	R	
87.2	87.38	0.18	CBSH	
87.38	88.4	1.02	C	401
88.4	90.75	2.35	R	
90.75	92.1	1.35	C	400
92.1	92.6	0.5	DC	400
92.6	92.8	0.2	C	420
92.8	93	0.2	DC	420
93	93.1	0.1	CBSH	
93.1	93.85	0.75	R	
93.85	94.05	0.2	CBSH	
94.05	94.35	0.3	CR	
94.35	94.7	0.35	DC	440
94.7	95.1	0.4	C	440
95.1	96	0.9	R	
96	96.45	0.45	C	442
96.45	105.7	9.25	R	
105.7	105.95	0.25	CBSH	463
105.95	111.2	5.25	R	
111.2	111.4	0.2	CBSH	460
111.4	111.55	0.15	CR	460
111.55	111.75	0.2	CBSH	460
111.75	114.9	3.15	R	
114.9	115.3	0.4	CBSH	483
115.3	118.45	3.15	R	
118.45	118.55	0.1	CBSH	
118.55	118.65	0.1	CR	
118.65	118.98	0.33	DC	480
118.98	119.5	0.52	C	480
119.5	119.7	0.2	CBSH	
119.7	121.9	2.2	R	
121.9	122.28	0.38	CBSH	
122.28	122.95	0.67	R	
122.95	123.35	0.4	CBSH	
123.35	124	0.65	R	
124	124.48	0.48	C	A71

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-25C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
124.48	126.5	2.02	R	
126.5	126.75	0.25	CBSH	
126.75	127.07	0.32	DC	A7
127.07	127.25	0.18	CBSH	
127.25	128.4	1.15	R	
128.4	128.8	0.4	CR	A72
128.8	129.15	0.35	CBSH	
129.15	134.9	5.75	R	
134.9	135.4	0.5	CBSH	
135.4	135.6	0.2	CR	A5
135.6	135.75	0.15	CBSH	
135.75	139.5	3.75	R	
139.5	139.75	0.25	CBSH	
139.75	140.25	0.5	R	
-----	-----			
Log interpretation of WC18-26C (metres)				
From	To	Appt	Lith	Name
0	1.3	1.3	DRIFT	DRIFT
1.3	2.7	1.4	R	
2.7	3	0.3	CBSH	320
3	18.7	15.7	R	
18.7	18.8	0.1	CBSH	340
18.8	18.95	0.15	CR	340
18.95	19.1	0.15	CBSH	340
19.1	22.6	3.5	R	340
22.6	22.8	0.2	CBSH	340
22.8	29.4	6.6	R	
29.4	29.85	0.45	CBSH	430
29.85	33.85	4	R	
33.85	34	0.15	CBSH	
34	34.25	0.25	CR	
34.25	34.9	0.65	C	410
34.9	36.1	1.2	R	
36.1	36.3	0.2	CBSH	
36.3	37.15	0.85	C	401
37.15	42.1	4.95	R	
42.1	42.3	0.2	CBSH	
42.3	43.4	1.1	C	400

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-26C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
43.4	43.65	0.25	C	420
43.65	43.75	0.1	DC	420
43.75	43.9	0.15	C	420
43.9	44.2	0.3	CR	
44.2	44.8	0.6	R	
44.8	45	0.2	CBSH	
45	45.75	0.75	C	440
45.75	46.1	0.35	R	
46.1	46.3	0.2	CBSH	
46.3	46.65	0.35	C	442
46.65	62.7	16.05	R	
62.7	63.05	0.35	CBSH	460
63.05	65.25	2.2	R	
65.25	65.85	0.6	CBSH	483
65.85	68.3	2.45	R	
68.3	68.5	0.2	CBSH	
68.5	69.4	0.9	C	480
69.4	69.5	0.1	DC	480
69.5	69.65	0.15	CBSH	
69.65	71.05	1.4	R	
71.05	71.35	0.3	CBSH	
71.35	72.15	0.8	R	
72.15	72.5	0.35	CBSH	
72.5	74.3	1.8	R	
74.3	74.6	0.3	CR	A71
74.6	78.25	3.65	R	
78.25	78.45	0.2	CBSH	
78.45	78.65	0.2	DC	A7
78.65	78.75	0.1	C	A7
78.75	79.05	0.3	CBSH	
79.05	79.9	0.85	R	
79.9	80.3	0.4	CR	A72
80.3	80.5	0.2	CBSH	
80.5	86.35	5.85	R	
86.35	87.2	0.85	CBSH	A5
87.2	94.05	6.85	R	
94.05	94.2	0.15	CBSH	
94.2	94.45	0.25	DC	A3
94.45	94.65	0.2	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-26C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
94.65	94.95	0.3	CBSH	
94.95	96.15	1.2	R	
96.15	96.35	0.2	CBSH	
96.35	96.95	0.6	C	A1
96.95	97.15	0.2	CBSH	
97.15	98	0.85	R	
-----	-----			
Log interpretation of WC18-27C (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	3.8	3.8	DRIFT	DRIFT
3.8	4.6	0.8	R	
4.6	4.75	0.15	IRST	IRONSTONE
4.75	4.9	0.15	R	
4.9	5	0.1	IRST	IRONSTONE
5	9.1	4.1	R	
9.1	9.4	0.3	CBSH	
9.4	10.4	1	R	
10.4	10.8	0.4	CBSH	
10.8	11.45	0.65	R	
11.45	11.65	0.2	CBSH	170
11.65	11.75	0.1	CR	170
11.75	12	0.25	CBSH	170
12	13.05	1.05	R	
13.05	13.4	0.35	CBSH	
13.4	14.3	0.9	R	
14.3	14.75	0.45	CBSH	
14.75	18.6	3.85	R	
18.6	18.75	0.15	CBSH	
18.75	19.6	0.85	C	150
19.6	19.8	0.2	CR	
19.8	20.3	0.5	CBSH	
20.3	24.1	3.8	R	
24.1	24.6	0.5	CBSH	130
24.6	27.05	2.45	R	
27.05	28	0.95	C	111
28	28.5	0.5	R	
28.5	28.7	0.2	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-27C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
28.7	29	0.3	C	110
29	29.1	0.1	DC	110
29.1	29.35	0.25	C	110
29.35	29.5	0.15	DC	101
29.5	29.65	0.15	C	101
29.65	29.8	0.15	DC	101
29.8	29.95	0.15	C	101
29.95	31.5	1.55	C	100
31.5	31.55	0.05	DC	100
31.55	31.75	0.2	CR	
31.75	32.3	0.55	CBSH	
32.3	33.55	1.25	R	
33.55	33.9	0.35	CBSH	
33.9	34.7	0.8	R	
34.7	34.9	0.2	CR	
34.9	35.3	0.4	C	201
35.3	35.45	0.15	DC	201
35.45	35.6	0.15	CR	
35.6	36.7	1.1	R	
36.7	36.95	0.25	CBSH	
36.95	37.15	0.2	DC	202
37.15	37.3	0.15	C	202
37.3	37.85	0.55	DC	202
37.85	45.05	7.2	R	
45.05	45.3	0.25	IRST	IRONSTONE
45.3	52.75	7.45	R	
52.75	53.2	0.45	CBSH	
53.2	53.35	0.15	CR	300
53.35	53.5	0.15	CBSH	
53.5	56.75	3.25	R	
56.75	56.97	0.22	CBSH	320
56.97	57.12	0.15	CR	320
57.12	57.35	0.23	CBSH	320
57.35	71.1	13.75	R	
71.1	71.5	0.4	CBSH	340
71.5	74.1	2.6	R	340
74.1	74.35	0.25	IRST	340
74.35	75.1	0.75	R	340
75.1	75.5	0.4	CBSH	340

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-27C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
75.5	82.05	6.55	R	
82.05	82.45	0.4	C	430
82.45	86.85	4.4	R	
86.85	87.4	0.55	C	410
87.4	87.7	0.3	CR	
87.7	88.35	0.65	R	
88.35	88.55	0.2	CBSH	
88.55	89.45	0.9	C	401
89.45	95.15	5.7	R	
95.15	95.35	0.2	CBSH	
95.35	96.08	0.73	C	400
96.08	96.3	0.22	C	420
96.3	96.45	0.15	DC	420
96.45	96.85	0.4	CBSH	
96.85	97.3	0.45	R	
97.3	97.8	0.5	CBSH	
97.8	98.15	0.35	DC	440
98.15	99	0.85	C	440
99	99.15	0.15	CBSH	
99.15	99.5	0.35	R	
99.5	99.75	0.25	C	442
99.75	116.95	17.2	R	
116.95	117.3	0.35	CBSH	460
117.3	120.55	3.25	R	
120.55	121	0.45	CBSH	483
121	123.95	2.95	R	
123.95	124.2	0.25	CR	
124.2	124.35	0.15	C	480
124.35	124.5	0.15	DC	480
124.5	125	0.5	C	480
125	126.85	1.85	R	
126.85	127.2	0.35	CBSH	
127.2	127.65	0.45	R	
127.65	128.02	0.37	CBSH	
128.02	128.6	0.58	R	
128.6	129	0.4	CBSH	
129	129.2	0.2	CR	A71
129.2	129.4	0.2	DC	A71
129.4	129.5	0.1	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-27C (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
129.5	132.8	3.3	R	
132.8	133.05	0.25	CBSH	
133.05	133.3	0.25	DC	A7
133.3	133.45	0.15	CR	A7
133.45	133.55	0.1	CBSH	
133.55	134.5	0.95	R	
134.5	134.88	0.38	CR	A72
134.88	140.22	5.34	R	
-----	-----			
Log interpretation of WC18-28 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.77	2.77	DRIFT	DRIFT
2.77	17.2	14.43	R	
17.2	17.45	0.25	CBSH	
17.45	17.55	0.1	CR	
17.55	17.85	0.3	C	300
17.85	18.05	0.2	CBSH	
18.05	22	3.95	R	
22	22.35	0.35	CBSH	
22.35	24.3	1.95	R	
24.3	24.45	0.15	FAULT	POSSIBLE
24.45	25.2	0.75	R	
25.2	25.4	0.2	CR	320?
25.4	25.8	0.4	R	
25.8	25.95	0.15	IRST	IRONSTONE
25.95	26.2	0.25	R	
26.2	27.3	1.1	CBSH	
27.3	32.05	4.75	R	
32.05	32.7	0.65	CBSH	340
32.7	36.85	4.15	R	
36.85	37	0.15	CBSH	360
37	52.55	15.55	R	
52.55	52.95	0.4	CBSH	430
52.95	55.6	2.65	R	
55.6	55.9	0.3	CBSH	410
55.9	57.2	1.3	R	
57.2	57.45	0.25	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-28 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
57.45	58.35	0.9	C	401
58.35	58.75	0.4	DC	400
58.75	59.45	0.7	C	400
59.45	59.7	0.25	CBSH	
59.7	61.8	2.1	R	
61.8	62.05	0.25	CBSH	
62.05	62.3	0.25	C	420
62.3	62.5	0.2	DC	420
62.5	64.85	2.35	R	
64.85	65	0.15	CBSH	
65	65.3	0.3	C	440
65.3	65.6	0.3	DC	440
65.6	65.99	0.39	R	
-----	-----			
Log interpretation of WC18-29 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.8	2.8	DRIFT	DRIFT
2.8	3.95	1.15	R	
3.95	4.05	0.1	CBSH	310?
4.05	13.95	9.9	R	
13.95	14.05	0.1	IRST	IRONSTONE
14.05	18.2	4.15	R	
18.2	18.55	0.35	CBSH	
18.55	19.05	0.5	R	
19.05	19.45	0.4	DC	300
19.45	22.9	3.45	R	
22.9	23.2	0.3	CBSH	320
23.2	23.55	0.35	R	320
23.55	23.7	0.15	CBSH	320
23.7	24.2	0.5	R	320
24.2	24.4	0.2	CBSH	320
24.4	26	1.6	R	
26	26.5	0.5	CBSH	340
26.5	27.05	0.55	CR	340
27.05	27.3	0.25	R	340
27.3	27.9	0.6	CBSH	340
27.9	49.2	21.3	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-29 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
49.2	49.35	0.15	CBSH	410
49.35	49.55	0.2	CR	410
49.55	49.65	0.1	CBSH	410
49.65	50.8	1.15	R	
50.8	51	0.2	CR	
51	51.55	0.55	C	401
51.55	51.75	0.2	CR	
51.75	51.95	0.2	CBSH	
51.95	52.1	0.15	DC	400
52.1	52.75	0.65	C	400
52.75	52.8	0.05	FAULT	ESTABLISHED
52.8	54.15	1.35	C	401
54.15	57.4	3.25	C	400
57.4	57.55	0.15	DC	400
57.55	57.9	0.35	R	
57.9	58.1	0.2	CBSH	
58.1	58.3	0.2	DC	420
58.3	58.5	0.2	CR	
58.5	61.15	2.65	R	
61.15	61.2	0.05	FAULT	ESTABLISHED
61.2	61.65	0.45	R	
61.65	61.95	0.3	DC	420
61.95	62.2	0.25	CBSH	
62.2	63.15	0.95	R	
63.15	63.4	0.25	DC	440
63.4	63.9	0.5	C	440
63.9	63.95	0.05	FAULT	ESTABLISHED
63.95	64.05	0.1	CR	
64.05	64.3	0.25	DC	440
64.3	64.7	0.4	C	440
64.7	64.9	0.2	CBSH	
64.9	65.6	0.7	R	
65.6	65.7	0.1	CBSH	
65.7	65.75	0.05	FAULT	PROBABLE
65.75	66	0.25	DC	440?
66	66.18	0.18	CR	440?
66.18	66.3	0.12	DC	440?
66.3	68.1	1.8	R	
68.1	68.45	0.35	CBSH	442

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-29 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
68.45	76.35	7.9	R	
76.35	76.75	0.4	CBSH	463
76.75	80.85	4.1	R	
80.85	80.95	0.1	CBSH	
80.95	81.16	0.21	R	
81.16	81.43	0.27	ND	
-----	-----			
Log interpretation of WC18-30 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.2	2.2	DRIFT	DRIFT
2.2	2.4	0.2	R	
2.4	2.5	0.1	C	101
2.5	2.65	0.15	DC	101
2.65	2.85	0.2	C	101
2.85	3	0.15	CR	
3	3.9	0.9	C	100
3.9	4.15	0.25	DC	100
4.15	6.5	2.35	CBSH	
6.5	7.4	0.9	R	
7.4	7.9	0.5	CBSH	
7.9	8.55	0.65	C	201
8.55	8.65	0.1	DC	201
8.65	8.8	0.15	CBSH	
8.8	11.6	2.8	R	
11.6	11.8	0.2	CR	
11.8	12	0.2	C	202
12	12.7	0.7	DC	202
12.7	16.35	3.65	R	
16.35	16.8	0.45	CBSH	310
16.8	29	12.2	R	
29	29.45	0.45	CBSH	
29.45	29.6	0.15	CR	
29.6	29.7	0.1	DC	300
29.7	29.85	0.15	C	300
29.85	30.05	0.2	CBSH	
30.05	33.3	3.25	R	
33.3	33.7	0.4	CBSH	320

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-30 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
33.7	33.9	0.2	R	320
33.9	34.3	0.4	CBSH	320
34.3	36.4	2.1	R	
36.4	36.6	0.2	CBSH	340
36.6	36.9	0.3	CR	340
36.9	37.05	0.15	CBSH	340
37.05	37.35	0.3	R	340
37.35	38.25	0.9	CBSH	340
38.25	58.7	20.45	R	
58.7	58.8	0.1	CBSH	
58.8	59.1	0.3	CR	430
59.1	60.4	1.3	R	
60.4	60.6	0.2	CBSH	
60.6	60.75	0.15	DC	410
60.75	61	0.25	C	410
61	61.15	0.15	CR	
61.15	61.4	0.25	DC	401
61.4	63	1.6	C	401
63	64.45	1.45	C	400
64.45	64.5	0.05	FAULT	PROBABLE
64.5	65.9	1.4	C	401
65.9	68.7	2.8	C	400
68.7	68.85	0.15	DC	420
68.85	69.4	0.55	C	420
69.4	69.65	0.25	CBSH	
69.65	70.05	0.4	R	
70.05	70.4	0.35	CBSH	
70.4	70.6	0.2	R	
70.6	70.7	0.1	FAULT	PROBABLE
70.7	70.95	0.25	CBSH	
70.95	71.15	0.2	DC	420
71.15	71.3	0.15	C	420
71.3	71.5	0.2	CBSH	
71.5	72	0.5	R	
72	72.15	0.15	DC	
72.15	72.4	0.25	CR	
72.4	75.9	3.5	R	
75.9	76.1	0.2	CBSH	
76.1	76.7	0.6	DC	440

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-30 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
76.7	76.95	0.25	C	440
76.95	78.7	1.75	R	
78.7	79.1	0.4	CBSH	442
79.1	85.4	6.3	R	
85.4	85.85	0.45	CBSH	463
85.85	91.1	5.25	R	
91.1	91.3	0.2	CBSH	
91.3	91.55	0.25	C	460
91.55	91.75	0.2	CBSH	
91.75	93.2	1.45	R	
93.2	93.6	0.4	CBSH	483?
93.6	100.7	7.1	R	
100.7	101.05	0.35	CBSH	
101.05	101.35	0.3	R	
101.35	101.8	0.45	C	480
101.8	102	0.2	DC	480
102	102.2	0.2	CBSH	
102.2	108.1	5.9	R	
108.1	108.25	0.15	CBSH	
108.25	108.5	0.25	DC	A71
108.5	108.7	0.2	CBSH	
108.7	109.8	1.1	R	
109.8	110	0.2	CBSH	
110	110.3	0.3	DC	A7
110.3	110.9	0.6	C	A7
110.9	111	0.1	DC	A7
111	111.2	0.2	CBSH	
111.2	118	6.8	R	
118	118.3	0.3	CBSH	
118.3	118.45	0.15	R	
118.45	118.8	0.35	CR	A55
118.8	120.7	1.9	R	
120.7	120.97	0.27	ND	
-----	-----			

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-31 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.65	2.65	DRIFT	DRIFT
2.65	5.5	2.85	R	
5.5	5.75	0.25	CR	
5.75	5.9	0.15	C	150
5.9	6.45	0.55	DC	150
6.45	6.7	0.25	CBSH	
6.7	7.1	0.4	R	
7.1	7.45	0.35	CBSH	
7.45	10.55	3.1	R	
10.55	10.85	0.3	CR	130
10.85	14.2	3.35	R	
14.2	14.35	0.15	CR	
14.35	14.5	0.15	DC	111
14.5	14.6	0.1	CBSH	
14.6	14.75	0.15	CR	
14.75	15	0.25	CBSH	
15	16	1	R	
16	16.2	0.2	CBSH	
16.2	16.65	0.45	C	110
16.65	16.85	0.2	CR	
16.85	23.1	6.25	R	
23.1	23.3	0.2	CBSH	
23.3	23.85	0.55	C	101
23.85	25.4	1.55	C	100
25.4	25.65	0.25	CR	
25.65	26.05	0.4	R	
26.05	26.2	0.15	CBSH	
26.2	28.8	2.6	R	
28.8	29	0.2	CBSH	
29	29.1	0.1	CR	
29.1	29.3	0.2	DC	201
29.3	29.9	0.6	C	201
29.9	30.05	0.15	DC	201
30.05	30.3	0.25	CBSH	
30.3	33.7	3.4	R	
33.7	33.9	0.2	CBSH	
33.9	34.2	0.3	C	202
34.2	34.3	0.1	CR	202
34.3	34.4	0.1	DC	202

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-31 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
34.4	34.55	0.15	CR	202
34.55	34.7	0.15	C	202
34.7	34.9	0.2	CBSH	
34.9	40.3	5.4	R	
40.3	40.6	0.3	IRST	IRONSTONE?
40.6	45.85	5.25	R	
45.85	46	0.15	CBSH	
46	46.25	0.25	CR	
46.25	46.7	0.45	C	300
46.7	46.9	0.2	CR	
46.9	50.7	3.8	R	
50.7	50.9	0.2	CBSH	320
50.9	51.05	0.15	CR	320
51.05	51.75	0.7	CBSH	320
51.75	53.7	1.95	R	
53.7	54.15	0.45	CBSH	340
54.15	54.55	0.4	R	340
54.55	55	0.45	CR	340
55	59.05	4.05	R	
59.05	59.5	0.45	CBSH	360?
59.5	74.7	15.2	R	
74.7	74.95	0.25	DC	410
74.95	75.1	0.15	CBSH	
75.1	75.9	0.8	R	
75.9	76.1	0.2	CBSH	
76.1	76.5	0.4	C	401
76.5	76.9	0.4	C	400
76.9	77.05	0.15	CBSH	
77.05	77.45	0.4	R	
77.45	77.8	0.35	CBSH	420
77.8	83.05	5.25	R	
83.05	83.4	0.35	CBSH	440
83.4	88.45	5.05	R	
88.45	88.65	0.2	CBSH	463?
88.65	91.35	2.7	R	
91.35	91.4	0.05	FAULT	PROBABLE
91.4	100.4	9	R	
100.4	100.6	0.2	CBSH	463
100.6	101.95	1.35	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-31 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
101.95	102.35	0.4	CBSH	460
102.35	109.65	7.3	R	
109.65	110	0.35	CBSH	483
110	110.1	0.1	R	483
110.1	110.4	0.3	CBSH	483
110.4	119.26	8.86	R	
119.26	119.45	0.19	ND	
-----	-----			
Log interpretation of WC18-32 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.82	2.82	DRIFT	DRIFT
2.82	9.7	6.88	R	
9.7	10	0.3	CR	410
10	10.2	0.2	CBSH	
10.2	12.3	2.1	R	
12.3	12.7	0.4	CBSH	
12.7	12.95	0.25	DC	401
12.95	13.65	0.7	C	401
13.65	14.25	0.6	R	
14.25	14.4	0.15	DC	400
14.4	14.5	0.1	FAULT	PROBABLE
14.5	15.3	0.8	C	401
15.3	15.55	0.25	DC	400
15.55	17.05	1.5	C	400
17.05	17.2	0.15	DC	420
17.2	17.35	0.15	C	420
17.35	17.65	0.3	CBSH	
17.65	18.2	0.55	R	
18.2	18.45	0.25	IRST	IRONSTONE
18.45	18.7	0.25	R	
18.7	19	0.3	CBSH	
19	19.6	0.6	DC	440
19.6	19.85	0.25	C	440
19.85	21.55	1.7	R	
21.55	21.9	0.35	CBSH	442
21.9	28.85	6.95	R	
28.85	29.05	0.2	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-32 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
29.05	29.25	0.2	CR	
29.25	29.8	0.55	R	
29.8	30.15	0.35	CBSH	
30.15	31.5	1.35	R	
31.5	31.7	0.2	CBSH	
31.7	32.3	0.6	R	
32.3	32.85	0.55	CBSH	463
32.85	33.9	1.05	R	
33.9	34	0.1	CBSH	
34	34.4	0.4	R	
34.4	34.6	0.2	CBSH	
34.6	36.6	2	R	
36.6	36.7	0.1	CBSH	
36.7	39.8	3.1	R	
39.8	40.05	0.25	CBSH	
40.05	40.3	0.25	DC	460
40.3	40.6	0.3	CBSH	
40.6	45.95	5.35	R	
45.95	46.3	0.35	CBSH	483
46.3	49.95	3.65	R	
49.95	50.4	0.45	CBSH	
50.4	52.15	1.75	R	
52.15	52.4	0.25	CBSH	
52.4	52.65	0.25	CR	
52.65	53.1	0.45	C	480
53.1	53.35	0.25	DC	480
53.35	56.2	2.85	R	
56.2	56.45	0.25	CBSH	
56.45	59.4	2.95	R	
59.4	59.8	0.4	DC	A71
59.8	60.6	0.8	R	
60.6	60.85	0.25	CR	
60.85	61.4	0.55	C	A7
61.4	61.65	0.25	DC	A7
61.65	61.9	0.25	CBSH	
61.9	68.2	6.3	R	
68.2	69.05	0.85	CBSH	A55
69.05	74.1	5.05	R	
74.1	74.4	0.3	CR	A53

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-32 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
74.4	74.9	0.5	R	
74.9	75.2	0.3	CBSH	A51
75.2	76.6	1.4	R	
76.6	77.3	0.7	C	A5
77.3	77.5	0.2	CBSH	
77.5	81.3	3.8	R	
81.3	81.58	0.28	ND	
-----	-----			
Log interpretation of WC18-33 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.7	2.7	DRIFT	DRIFT
2.7	5.6	2.9	R	
5.6	5.9	0.3	CR	430?
5.9	8.75	2.85	R	
8.75	8.9	0.15	CR	
8.9	9.15	0.25	DC	410
9.15	9.5	0.35	CBSH	
9.5	9.7	0.2	R	
9.7	10.35	0.65	CBSH	
10.35	10.5	0.15	R	
10.5	10.7	0.2	CBSH	
10.7	11.6	0.9	R	
11.6	11.9	0.3	CR	
11.9	12.15	0.25	DC	401
12.15	12.75	0.6	C	401
12.75	13.8	1.05	C	400
13.8	14	0.2	DC	420
14	14.25	0.25	CBSH	
14.25	14.9	0.65	R	
14.9	15.05	0.15	CBSH	
15.05	15.6	0.55	DC	440
15.6	15.75	0.15	C	440
15.75	16	0.25	CBSH	
16	17.4	1.4	R	
17.4	17.8	0.4	CBSH	442
17.8	23.85	6.05	R	
23.85	24	0.15	CBSH	463

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-33 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
24	29.45	5.45	R	
29.45	29.6	0.15	CBSH	
29.6	29.8	0.2	DC	460
29.8	30	0.2	CBSH	
30	34.55	4.55	R	
34.55	34.9	0.35	CBSH	483
34.9	40.35	5.45	R	
40.35	40.6	0.25	CBSH	
40.6	40.7	0.1	CR	
40.7	40.8	0.1	CBSH	
40.8	41	0.2	CR	
41	41.25	0.25	DC	480
41.25	41.5	0.25	C	480
41.5	41.7	0.2	DC	480
41.7	41.9	0.2	CBSH	
41.9	44.3	2.4	R	
44.3	44.65	0.35	CBSH	
44.65	48	3.35	R	
48	48.2	0.2	CBSH	
48.2	48.5	0.3	DC	A71
48.5	49.95	1.45	R	
49.95	50.55	0.6	C	A7
50.55	50.8	0.25	DC	A7
50.8	51	0.2	CBSH	
51	57.8	6.8	R	
57.8	58.7	0.9	CBSH	A55
58.7	64.85	6.15	R	
64.85	65.2	0.35	CBSH	A53
65.2	65.75	0.55	R	
65.75	66.05	0.3	CBSH	A51
66.05	67.55	1.5	R	
67.55	67.7	0.15	CBSH	
67.7	68.85	1.15	C	A5
68.85	69.05	0.2	CBSH	
69.05	80.25	11.2	R	
80.25	80.65	0.4	CBSH	
80.65	81.05	0.4	R	
81.05	81.25	0.2	CR	
81.25	81.4	0.15	CBSH	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-33 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
81.4	81.6	0.2	DC	A3
81.6	81.8	0.2	C	A3
81.8	81.9	0.1	DC	A3
81.9	82.1	0.2	CR	
82.1	82.25	0.15	DC	A1
82.25	82.5	0.25	CR	
82.5	82.65	0.15	CBSH	
82.65	82.8	0.15	CR	
82.8	83	0.2	DC	A0
83	95.2	12.2	R	
95.2	96.1	0.9	CBSH	
96.1	96.32	0.22	R	
96.32	96.58	0.26	ND	
-----	-----			
Log interpretation of WC18-34 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	1.15	1.15	DRIFT	DRIFT
1.15	6.3	5.15	R	
6.3	6.55	0.25	CR	150
6.55	6.65	0.1	C	150
6.65	6.8	0.15	CR	150
6.8	6.95	0.15	C	150
6.95	7.1	0.15	CR	150
7.1	7.2	0.1	DC	150
7.2	7.4	0.2	CR	150
7.4	7.55	0.15	DC	150
7.55	7.8	0.25	CR	150
7.8	8.05	0.25	CBSH	
8.05	9.75	1.7	R	
9.75	9.9	0.15	FAULT	ESTABLISHED
9.9	10	0.1	C	150
10	10.3	0.3	CR	150
10.3	10.5	0.2	CBSH	
10.5	11	0.5	R	
11	11.3	0.3	CBSH	
11.3	11.45	0.15	R	
11.45	11.65	0.2	CR	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-34 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
11.65	11.85	0.2	CBSH	
11.85	12.5	0.65	R	
12.5	12.75	0.25	FAULT	PROBABLE
12.75	13	0.25	R	
13	13.2	0.2	C	130
13.2	13.5	0.3	CBSH	
13.5	14.3	0.8	R	
14.3	14.5	0.2	CBSH	
14.5	14.7	0.2	DC	111
14.7	14.9	0.2	CBSH	
14.9	15.55	0.65	R	
15.55	15.8	0.25	CBSH	
15.8	15.95	0.15	C	110
15.95	16.1	0.15	CR	110
16.1	16.2	0.1	DC	110
16.2	16.4	0.2	CR	
16.4	17.4	1	R	
17.4	17.7	0.3	CBSH	
17.7	18.5	0.8	C	101
18.5	18.7	0.2	DC	100
18.7	20.3	1.6	C	100
20.3	20.55	0.25	CR	
20.55	21.2	0.65	CBSH	
21.2	25.2	4	R	
25.2	25.4	0.2	CR	
25.4	25.85	0.45	C	201
25.85	26.05	0.2	CBSH	
26.05	28.45	2.4	R	
28.45	28.7	0.25	CBSH	
28.7	28.9	0.2	C	202
28.9	29	0.1	CR	202
29	29.15	0.15	DC	202
29.15	29.25	0.1	CR	202
29.25	29.4	0.15	DC	202
29.4	29.55	0.15	CBSH	
29.55	47.2	17.65	R	
47.2	47.3	0.1	CBSH	
47.3	47.75	0.45	DC	300
47.75	48	0.25	C	300

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-34 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
48	48.15	0.15	CR	
48.15	50.35	2.2	R	
50.35	50.5	0.15	CBSH	320
50.5	50.7	0.2	DC	320
50.7	50.9	0.2	CBSH	320
50.9	54.2	3.3	R	
54.2	54.6	0.4	CBSH	340
54.6	54.85	0.25	R	340
54.85	55.35	0.5	CBSH	340
55.35	56.4	1.05	R	340
56.4	56.9	0.5	CBSH	340
56.9	73.9	17	R	
73.9	74.3	0.4	CBSH	430
74.3	75.45	1.15	R	
75.45	75.8	0.35	IRST	IRONSTONE
75.8	76.2	0.4	R	
76.2	77	0.8	C	410
77	77.55	0.55	R	
77.55	77.8	0.25	CR	
77.8	78.4	0.6	C	401
78.4	78.5	0.1	DC	400
78.5	79.85	1.35	C	400
79.85	80.1	0.25	DC	420
80.1	80.3	0.2	C	420
80.3	80.5	0.2	CR	
80.5	80.9	0.4	R	
80.9	81.1	0.2	CBSH	
81.1	81.2	0.1	FAULT	PROBABLE
81.2	81.4	0.2	CR	
81.4	84.9	3.5	R	
84.9	85	0.1	FAULT	POSSIBLE
85	85.15	0.15	CR	
85.15	85.7	0.55	DC	440
85.7	85.9	0.2	CBSH	
85.9	87.15	1.25	R	
87.15	87.4	0.25	CBSH	442
87.4	88	0.6	R	
88	88.3	0.3	CBSH	463
88.3	89.6	1.3	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-34 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
89.6	89.7	0.1	CBSH	
89.7	89.8	0.1	CR	460
89.8	90.05	0.25	DC	460
90.05	90.5	0.45	CBSH	
90.5	91.2	0.7	R	
91.2	91.5	0.3	CBSH	483
91.5	95.3	3.8	R	
95.3	95.7	0.4	CBSH	480
95.7	99.02	3.32	R	
99.02	99.29	0.27	ND	
-----	-----			
Log interpretation of WC18-35 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	5.4	5.4	DRIFT	DRIFT
5.4	6	0.6	R	
6	6.4	0.4	CBSH	130
6.4	9.4	3	R	
9.4	9.6	0.2	CBSH	
9.6	9.9	0.3	R	
9.9	10.1	0.2	CBSH	
10.1	10.4	0.3	C	111
10.4	10.9	0.5	CBSH	
10.9	11.15	0.25	R	
11.15	11.3	0.15	CBSH	
11.3	11.5	0.2	CR	
11.5	11.65	0.15	DC	110
11.65	11.95	0.3	CR	
11.95	13.2	1.25	R	
13.2	13.5	0.3	CR	
13.5	14.5	1	C	101
14.5	16.4	1.9	C	100
16.4	16.65	0.25	DC	100
16.65	16.9	0.25	CR	
16.9	17.7	0.8	CBSH	
17.7	20.3	2.6	R	
20.3	20.45	0.15	CBSH	
20.45	21	0.55	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-35 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
21	21.2	0.2	CBSH	
21.2	23.3	2.1	R	
23.3	23.6	0.3	CBSH	203
23.6	23.75	0.15	CR	203
23.75	25.2	1.45	R	
25.2	25.5	0.3	CBSH	
25.5	25.85	0.35	CR	
25.85	26.5	0.65	C	201
26.5	26.8	0.3	CBSH	
26.8	29.15	2.35	R	
29.15	29.4	0.25	CBSH	
29.4	29.6	0.2	CR	
29.6	29.7	0.1	DC	202
29.7	29.9	0.2	C	202
29.9	30.1	0.2	DC	202
30.1	30.25	0.15	CR	202
30.25	30.4	0.15	DC	202
30.4	30.65	0.25	CBSH	
30.65	32.15	1.5	R	
32.15	32.25	0.1	FAULT	POSSIBLE
32.25	32.35	0.1	CBSH	
32.35	43.65	11.3	R	
43.65	43.8	0.15	CBSH	310
43.8	44	0.2	FAULT	PROBABLE
44	44.2	0.2	CBSH	310
44.2	50.6	6.4	R	
50.6	51.15	0.55	CR	
51.15	51.4	0.25	C	300
51.4	51.65	0.25	CR	
51.65	54.4	2.75	R	
54.4	54.6	0.2	CBSH	320
54.6	54.85	0.25	DC	320
54.85	55	0.15	CBSH	320
55	60	5	R	
60	60.3	0.3	CBSH	340
60.3	61.8	1.5	R	340
61.8	61.9	0.1	CBSH	340
61.9	65.6	3.7	R	
65.6	66	0.4	CBSH	360

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-35 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
66	84.1	18.1	R	
84.1	84.3	0.2	CBSH	430
84.3	84.5	0.2	DC	430
84.5	84.6	0.1	CBSH	430
84.6	87.4	2.8	R	
87.4	87.6	0.2	CR	
87.6	88.3	0.7	C	410
88.3	88.5	0.2	CR	
88.5	89.5	1	R	
89.5	90.5	1	C	401
90.5	91.2	0.7	C	400
91.2	91.4	0.2	CR	
91.4	91.75	0.35	CBSH	
91.75	92	0.25	C	420
92	92.2	0.2	CR	
92.2	94.1	1.9	R	
94.1	94.3	0.2	CBSH	
94.3	94.45	0.15	DC	440
94.45	94.6	0.15	C	440
94.6	95.15	0.55	DC	440
95.15	96.5	1.35	R	
96.5	97	0.5	CR	442
97	102.5	5.5	R	
102.5	102.6	0.1	CBSH	463
102.6	107	4.4	R	
107	107.2	0.2	CBSH	460
107.2	107.3	0.1	CR	460
107.3	107.5	0.2	CBSH	460
107.5	117.1	9.6	R	
117.1	117.7	0.6	CBSH	
117.7	118.1	0.4	C	480
118.1	118.4	0.3	DC	480
118.4	118.5	0.1	CBSH	
118.5	120.86	2.36	R	
120.86	121.13	0.27	ND	
-----	-----			

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-36 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2	2	DRIFT	DRIFT
2	3.2	1.2	R	
3.2	3.4	0.2	CR	
3.4	4.65	1.25	R	
4.65	4.8	0.15	CBSH	130
4.8	5	0.2	CR	130
5	5.15	0.15	CBSH	130
5.15	8.2	3.05	R	
8.2	8.4	0.2	CBSH	
8.4	8.65	0.25	C	111
8.65	8.8	0.15	CBSH	
8.8	9.7	0.9	R	
9.7	9.9	0.2	CBSH	
9.9	10.4	0.5	C	110
10.4	10.5	0.1	CBSH	
10.5	17	6.5	R	
17	17.2	0.2	CBSH	
17.2	17.3	0.1	DC	101
17.3	17.5	0.2	C	101
17.5	17.6	0.1	DC	101
17.6	17.9	0.3	C	101
17.9	19.4	1.5	C	100
19.4	19.5	0.1	DC	100
19.5	19.7	0.2	CBSH	
19.7	20.15	0.45	R	
20.15	20.6	0.45	CBSH	
20.6	23	2.4	R	
23	23.2	0.2	CBSH	
23.2	23.35	0.15	CR	
23.35	23.5	0.15	DC	201
23.5	23.9	0.4	C	201
23.9	24.2	0.3	CR	
24.2	28.4	4.2	R	
28.4	28.65	0.25	CR	
28.65	28.8	0.15	C	202
28.8	28.9	0.1	CR	202
28.9	29.05	0.15	DC	202
29.05	29.15	0.1	ASH	202
29.15	29.3	0.15	C	202

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-36 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
29.3	29.5	0.2	CBSH	
29.5	42.1	12.6	R	
42.1	42.4	0.3	DC	300
42.4	42.5	0.1	C	300
42.5	42.6	0.1	CR	300
42.6	43	0.4	C	300
43	43.15	0.15	CBSH	
43.15	45.5	2.35	R	
45.5	45.8	0.3	CBSH	320
45.8	45.9	0.1	DC	320
45.9	46.15	0.25	CBSH	320
46.15	48.65	2.5	R	
48.65	48.9	0.25	CBSH	340
48.9	49.3	0.4	CR	340
49.3	49.4	0.1	CBSH	340
49.4	49.8	0.4	R	340
49.8	50.5	0.7	CBSH	340
50.5	71.3	20.8	R	
71.3	71.5	0.2	CBSH	410
71.5	71.6	0.1	CR	410
71.6	71.8	0.2	CBSH	410
71.8	72.8	1	R	
72.8	73	0.2	CR	
73	73.55	0.55	C	401
73.55	75.25	1.7	C	400
75.25	75.55	0.3	C	420
75.55	75.8	0.25	CBSH	
75.8	76.4	0.6	R	
76.4	76.7	0.3	CBSH	
76.7	77.05	0.35	DC	440
77.05	77.25	0.2	CR	
77.25	78.3	1.05	R	
78.3	78.5	0.2	CBSH	442
78.5	84.25	5.75	R	
84.25	84.35	0.1	CBSH	463
84.35	87.85	3.5	R	
87.85	88	0.15	CBSH	460?
88	103.7	15.7	R	
103.7	103.95	0.25	CR	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-36 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
103.95	105.6	1.65	C	480
105.6	105.7	0.1	FAULT	POSSIBLE
105.7	106.7	1	DC	480?
106.7	106.9	0.2	C	480?
106.9	107	0.1	DC	480?
107	107.25	0.25	C	480?
107.25	107.55	0.3	DC	480?
107.55	108.2	0.65	CR	
108.2	120.95	12.75	R	
120.95	121.5	0.55	CBSH	
121.5	121.9	0.4	C	A7
121.9	122.1	0.2	DC	A7
122.1	128.2	6.1	R	
128.2	128.35	0.15	CBSH	
128.35	128.5	0.15	DC	A51
128.5	128.7	0.2	CBSH	
128.7	129.2	0.5	R	
129.2	129.4	0.2	CBSH	
129.4	129.9	0.5	C	A5
129.9	130.15	0.25	DC	A5
130.15	130.4	0.25	CBSH	
130.4	137.35	6.95	R	
137.35	138.05	0.7	CBSH	A3?
138.05	138.48	0.43	R	
138.48	138.74	0.26	ND	
-----	-----			
Log interpretation of WC18-37 (metres)				
From	To	Drilled thickness	Interpreted lithology	Name
0	2.9	2.9	DRIFT	DRIFT
2.9	3.2	0.3	CR	130
3.2	6.05	2.85	R	
6.05	6.3	0.25	CBSH	
6.3	6.55	0.25	C	111
6.55	6.8	0.25	CR	
6.8	7.5	0.7	R	
7.5	7.8	0.3	DC	110
7.8	9.25	1.45	R	

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-37 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
9.25	9.45	0.2	CBSH	
9.45	10.45	1	C	101
10.45	12	1.55	C	100
12	12.35	0.35	DC	100
12.35	12.6	0.25	CR	
12.6	12.7	0.1	CBSH	
12.7	12.8	0.1	CR	
12.8	12.9	0.1	DC	
12.9	13.1	0.2	CR	
13.1	13.45	0.35	CBSH	
13.45	17.7	4.25	R	
17.7	17.8	0.1	CBSH	203
17.8	19.95	2.15	R	
19.95	20.3	0.35	CR	
20.3	20.6	0.3	C	201
20.6	20.7	0.1	DC	201
20.7	20.8	0.1	C	201
20.8	21.05	0.25	CR	
21.05	21.4	0.35	R	
21.4	21.7	0.3	CBSH	
21.7	21.8	0.1	CR	
21.8	22.15	0.35	CBSH	
22.15	23.65	1.5	R	
23.65	23.8	0.15	CR	
23.8	24.05	0.25	C	202
24.05	24.3	0.25	DC	202
24.3	24.4	0.1	CR	202
24.4	24.55	0.15	DC	202
24.55	24.75	0.2	CBSH	
24.75	28.2	3.45	R	
28.2	28.4	0.2	CBSH	
28.4	31.05	2.65	R	
31.05	31.4	0.35	CBSH	
31.4	42.9	11.5	R	
42.9	43.1	0.2	CBSH	
43.1	43.35	0.25	C	300
43.35	43.6	0.25	CBSH	
43.6	46.25	2.65	R	
46.25	46.4	0.15	CBSH	320

Table A-2: Lithological interpretation of geophysical logs				
Log interpretation of WC18-37 (metres) -- continued				
From	To	Drilled thickness	Interpreted lithology	Name
46.4	46.7	0.3	CR	320
46.7	46.95	0.25	CBSH	320
46.95	51.95	5	R	
51.95	52.3	0.35	CBSH	340
52.3	55.55	3.25	R	
55.55	55.9	0.35	CBSH	360
55.9	72.5	16.6	R	
72.5	72.65	0.15	CBSH	430
72.65	72.8	0.15	DC	430
72.8	73	0.2	CBSH	430
73	75.6	2.6	R	
75.6	75.8	0.2	CR	
75.8	76.4	0.6	C	410
76.4	76.6	0.2	CR	
76.6	77.45	0.85	R	
77.45	77.7	0.25	CR	
77.7	78.5	0.8	C	401
78.5	80.25	1.75	C	400
80.25	80.75	0.5	R	
80.75	81.05	0.3	C	420
81.05	81.25	0.2	CR	
81.25	82.95	1.7	R	
82.95	83.2	0.25	CR	
83.2	83.35	0.15	C	440
83.35	83.5	0.15	CR	440
83.5	83.6	0.1	DC	440
83.6	83.7	0.1	CR	440
83.7	83.9	0.2	C	440
83.9	84.05	0.15	CBSH	
84.05	85.25	1.2	R	
85.25	85.4	0.15	CBSH	
85.4	85.7	0.3	DC	442
85.7	91.45	5.75	R	
91.45	91.75	0.3	CBSH	463
91.75	95.9	4.15	R	
95.9	96.3	0.4	CR	460
96.3	97.78	1.48	R	
97.78	98.04	0.26	ND	

Willow-2018-Table-A-2_190310a.doc

Table A-3: Cross-reference of PDF scan-files to borehole core descriptions

Borehole	*Scanfile*	*File parts*				*Number of hard copy log pages*
18-01C	0733	001	011	022		23
18-02C	0734	001	012			17
18-03C	0735	001	010	030		28
18-04C	0736	001	011	020	030	34
18-05C	0737	001	011			20
18-06C	0738	001	010	021		25
18-07C	0740	001	007	016	026	27
18-08C	0741	001	007	013		14
18-09C	0742	001	011			19
18-10C	0743	001	012	023		31
18-11C	0744	001	011			19
18-12C	0745	001	011	022	033	37
18-13C	0746	001	011	022		27
18-14C	0747	001	012	024		25
18-15C	0748	001	012			18
18-16C	0749	001	012			20
18-17C	0750	001	011	021		27
18-18C	0751	001	012			21
18-19C	0752	001	013			13
18-20C	0753	001	011	021		24
18-21C	0754	001	011			12
18-22C	0755	001	011			18
18-23C	0756	001				11
18-24C	0757	001	012			12
18-25C	0758	001	011	022		23
18-26C	0759	001	010			15
18-27C	0760	001	010	021		24

Example: core description of WC18-27C is presented as three files: 0760_001.pdf, 0760_010.pdf, and 0760_021.pdf

Table A-4: Authorship of core descriptions

Consulting geologists, working for Apex Geoscience, logged and sampled the year-2018 diamond-drill cores under the author's guidance and direction. Standard forms, including directions on descriptive format, were designed and provided by the author, allowing for large-format handwritten data entry, and for reproduction and scanning on commonly-available office equipment. The logging forms were printed at tabloid (11 x 17 inch) format, initially on waterproof paper, but subsequently on untreated paper (as the waterproof paper was found to rapidly attract dirt, and become readily smeared).

Hardcopy geophysical logs were made available for consultation during logging; this was found to be a helpful means of identifying subtle metre- to dekametre-scale changes in apparent clay content of the drilled and logged strata.

Core logs focus on describing the rock type and physical state of the cores, including documentation of recovered thicknesses of core with respect to lithological boundaries, core box ends, and drillers' depth blocks.

The following personnel worked on the cores:

Initial	*Name*	*Title*
AA	Andres Acevado	Geologist
EP	Ernie Popyk,	Geologist
JH	Jerry Holmes	Project Geologist
KT	Karys Leonard-Fortune,	Geologist
TH	Tyler Hnatiuk	Geological Technician

Original manuscript core description forms are stored in the minesite archives at Willow Creek Mine. Xerographic copies are presented following this table, within the printed version of this report; scanned copies (as PDF files) are presented on the flash-drive copies of this report, and also archived within Conuma's technical network.

Raw-coal quality data: Appendix B

On this page is presented the flowsheet used for head raw analyses of coal and rock core samples taken from the year-2018 boreholes. Analytical work in this programme was undertaken by Birtley Coal & Minerals Testing in Calgary, Alberta. Provision was made for splitting-out samples to be retained for further work, which has not commenced at the time of this report's compilation (March 17, 2019).

Table B-1 presents a sample inventory, a cross-reference between sample tag numbers (as assigned by Apex Geoscience) and lab numbers (assigned by Birtley Coal & Minerals Testing). Also presented in this table are results of head raw analyses.

Following the table are copies of analytical certificates from Birtley Coal & Minerals Testing.

Flowsheet used for head raw analyses:

Weigh sample as-received
||
Air-dry
||
Crush to pass 9.5 mm and homogenise
||
Split out 1/8 for head raw analysis; reserve 7/8 for future work ==== future work to include single-point wash at 1.60 s.g., and ash chemistry, fluidity, petrography and vitrinite reflectance
||
Head raw analysis
||
Proximate + total sulphur + apparent specific gravity, and (on samples with 40% ash or less): free swelling index (FSI) and light transmission

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 1 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-01C					DC	111	5.75	6.1	111	5.75	6.75	1.00	1.00	Not recovered	0.0%										
					CBSH		6.1	6.45																	
					DC		6.45	6.75																	
WC18-01C			186371	4501	C	110	8.90	9.80	110	8.90	9.80	0.90	0.44	Coal	8.9%	4.04	0.67	37.97	30.58	30.78	0.59	1.5	94.8	1.81	
WC18-01C			186372	4502	DC	101	18.65	18.95	101/100	18.65	23.80	5.15	2.18	Coal	39.2%	1.77	0.72	4.09	21.35	73.84	0.54	3.0	97.4	1.32	
					C		18.95	20.55																	
					C	100	20.55	23.8																	
WC18-01C					CR	none	38.35	38.55		38.35	38.55	0.20	0.20	Carb mudstone	0.0%										
WC18-01C			186373	4503	C	201	38.55	40.05	201	38.55	40.05	1.50	0.70	Coal	6.7%	2.10	0.66	11.25	19.05	69.04	0.52	2.0	98.0	1.40	
WC18-01C			188197	4951	CR	none	40.05	40.30		40.05	40.30	0.25	0.12	Coaly mudstone	36.0%	0.78	0.61	54.91	14.67	29.81	0.25	--	--	1.92	
WC18-01C			186374	4504	DC	202	42.2	42.45	202	42.20	43.35	1.15	0.54	Lost coal seam?, 15 cm siltstone, 10cm coal	8.7%	1.37	0.86	69.74	9.90	19.50	0.24	n/a	n/a	2.07	
					ASH		42.45	42.65																	
					CR		42.65	42.8																	
					DC		42.8	43.02																	
					C		43.02	43.35																	
WC18-01C					C	310	55.2	55.6	310	55.20	55.60	0.40	0.18	Coaly mudstone	70.0%										
WC18-01C			186375	4505	C	300	61.6	61.9	300	61.60	62.60	1.00	0.44	Coal and broken chunks of carbonaceous mudstone	5.0%	1.64	0.83	50.15	13.94	35.08	0.43	n/a	n/a	1.82	
					DC		61.9	62.05																	
					C		62.05	62.6																	
WC18-01C			186376	4506	DC	320	69.2	69.5	320	69.20	69.80	0.60	0.26	Stony coal, coal, sheared coal	65.0%	2.35	0.76	12.41	18.23	68.60	0.72	2.0	96.5	1.38	
					C		69.5	69.8																	
					CBSH	340	73.9	74.7	340																
WC18-01C			188198	4952	CR		74.7	74.95		74.70	75.90	1.20	0.53	Coaly mudstone	64.2%	3.51	0.84	58.65	12.41	28.10	0.53	--	--	1.89	
					DC		74.95	75.15																	
					CR		75.15	75.6																	
					DC		75.6	75.9																	
WC18-01C					CBSH		75.9	76.25	340																
					R		76.25	76.4																	
					CBSH		76.4	76.8																	
					CR		76.8	77.2																	
					CBSH		77.2	77.65																	
					CR		77.65	78.35																	
					CBSH		78.35	78.55																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 2 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-01C			186377	4507	CBSH	410?	111.65	112.2	410?	111.65	111.90	0.25	0.12	Stony coal	0.0%	3.99	0.76	19.51	20.10	59.63	0.42	6.5	98.3	1.42	110.50-113.50m there was no core recovery, noted by the drillers
					CR	none	112.2	112.4							0.0%										
					C	401	112.4	113.6	401	111.90	113.60	1.70	0.82	Coal	44.1%										
					C	400	113.6	115.6	400	113.60	115.60	2.00	0.97	Coal	1.0%										
WC18-01C					C	420	115.6	115.8	420	115.60	115.80	0.20	0.10	Not recovered	0.0%										
WC18-01C			186378	4508	C	440	118.90	119.65	440	118.90	119.65	0.75	0.52	Coal	26.7%	6.40	0.74	17.77	18.56	62.93	0.69	4.0	98.3	1.42	
					CBSH	463	129.30	130.40																	
WC18-01C					CR	460	137.1	137.3	460	137.10	137.50	0.40	0.19	Coal	5.0%										
					CBSH		137.3	137.5																	
					CBSH	483?	139.55	139.9																	
					Fault	Poss.	139.9	140.1																	
WC18-01C					CR	460	144.40	144.60	460	144.40	144.60	0.20	0.10	Coal	35.0%										
					CBSH		144.6	144.8	460																
WC18-01C			188199	4953	CR	none	156.40	156.65		156.40	156.65	0.25	0.12	Coaly rock, coaly mudstone	152.0%	1.76	0.36	22.65	30.35	46.64	0.75	2.0	97.7	1.60	More coaly mudstone in box than in geophysical log
WC18-01C			186379	4509	C	480	156.65	157.05	480	156.65	157.90	1.25	0.61	Coal	46.4%	1.63	0.66	14.92	24.89	59.53	0.90	7.0	94.8	1.44	
					DC		157.05	157.25																	
					C		157.25	157.65																	
WC18-01C			186380	4510	C	A7	172.85	173.80	A7	172.85	173.80	0.95	0.60	Coal	28.4%	1.73	0.64	13.67	17.82	67.87	0.87	3.0	98.6	1.39	
					CBSH	170?	6.05	6.3																	
WC18-02C			188200	4954	C	150	9.8	10.1	150	9.80	10.40	0.60	0.34	Coal	50.0%	3.10	0.66	20.95	21.72	56.67	0.84	8.0	97.4	1.46	
					DC		10.1	10.4																	
WC18-02C					CR	none	10.40	10.60		10.40	10.60	0.20	0.11	Carb mudstone	100.0%										
WC18-02C					CBSH	130	16.65	17.05	130	16.65	17.05	0.40	0.36	Carb mudstone	25.0%										
WC18-02C			188233	4987	DC	111	20.55	20.90	111	20.55	20.90	0.35	0.32	Coal	48.6%	1.81	0.47	17.08	26.30	56.15	0.92	4.5	96.8	1.45	
WC18-02C			186381	4511	DC	110	22	22.43	110	22.00	22.60	0.60	0.55	Coal	5.0%	2.71	1.57	12.64	17.94	67.85	0.70	2.5	98.3	1.39	
					C		22.43	22.6																	
WC18-02C			186382	4512	C	101	26.00	26.55	101	26.00	26.55	0.55	0.49	Coal	98.2%	2.27	0.74	4.08	21.84	73.34	0.45	4.0	97.7	1.33	
WC18-02C			186383	4513	C	100	26.55	27.80	100	26.55	27.80	1.25	1.11	Coal	42.4%	2.90	0.74	10.22	23.94	65.10	0.43	8.5	96.2	1.35	
WC18-02C			186384	4514	DC	201	32.5	32.59	201	32.50	33.30	0.80	0.73	Stony coal, coal	61.3%	2.03	0.86	13.38	20.15	65.61	0.57	4.0	94.2	1.38	
					C		32.59	33.3																	
WC18-02C			186385	4515	C	202	35.5	35.7	202	35.50	36.06	0.56	0.55	Coal	75.0%	1.89	0.68	8.05	19.85	71.42	0.64	3.0	98.3	1.35	0.16m added from picked 0.35m parting
					DC		35.7	35.83																	
					C		35.83	36.03																	
					DC		36.03	36.05																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 3 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-02C			186386	4516	ASH	202 (continued)	36.05	36.16	202 (continued)	36.06	36.17	0.11	0.11	Sandstone (very fine-grained, pale grey, massive)	100.0%	0.86	0.62	81.24	13.67	4.47	0.07	n/a	n/a	2.37	Dirty coal top (0.16m applied to sample 4515) and bottom (0.08m applied to sample 4517) with sandstone parting of 0.11m
WC18-02C			186387	4517	DC		36.16	36.25		36.17	36.55	0.38	0.38	Stony coal, Coal	102.6%	1.59	0.60	6.74	22.41	70.25	0.75	8.5	97.1	1.31	0.08m added from picked 0.35m parting
					C		36.25	36.55																	
WC18-02C					CBSH	310	44.75	45.10	310	44.75	45.10	0.35	0.33	Mudstone with coal spars	68.6%										
WC18-02C			188234	4988	DC	300	49.75	49.88	300	49.75	49.88	0.13	0.13	Stony coal	100.0%	1.83	0.61	64.23	12.95	22.21	0.30	--	--	1.97	
WC18-02C			186388	4518	C		49.88	50.40		49.88	50.40	0.52	0.52	Coal	75.0%	6.19	0.87	22.98	21.49	54.66	0.60	1.5	95.4	1.50	
WC18-02C					C	320	54.20	54.35	320	54.20	54.46	0.26	0.21	Coal/mudstone/coal	100.0%										
					R		54.35	54.39																	
					C		54.39	54.46																	
WC18-02C					CBSH	340	56.15	57.55	340	56.15	57.55	1.40	1.13	Not recovered?	67.9%										
WC18-02C			188240	4994	C	410	79.35	79.50	410	79.35	79.50	0.15	0.13	Coal	100.0%	0.52	0.38	10.63	19.35	69.64	0.71	3.5	98.3	1.36	
WC18-02C			186389	4519	C	401	80.05	80.6	401/400	80.05	81.40	1.35	1.13	Coal	25.2%	3.08	1.09	11.55	17.04	70.32	0.44	1.0	98.3	1.36	
					C	400	80.6	81.4																	
WC18-02C			186390	4520	DC	420	83.55	83.79	420	83.55	83.79	0.24	0.20	Coal	108.3%	1.62	0.60	22.19	26.81	50.40	0.55	1.5	98.6	1.61	
WC18-02C			188238	4992	C		83.79	84.05	420	83.79	84.05	0.26	0.22	Sheared carb. mudstone	65.4%	3.12	0.51	56.50	14.93	28.06	0.66	--	--	1.93	
WC18-02C			186391	4521	DC		84.05	84.60	420	84.05	84.60	0.55	0.46	Coal	50.9%	1.91	0.70	6.17	20.80	72.33	0.73	1.5	98.0	1.34	
WC18-02C			188239	4993	DC	422	85.00	85.40	422	85.00	85.40	0.40	0.34	Coal	37.5%	6.78	0.46	60.43	11.73	27.38	0.35	--	--	1.91	
WC18-02C			188235	4989	C	440	89.25	89.6	440	89.25	89.60	0.35	0.34	Coal, dirty coal	22.9%	2.18	0.47	33.51	17.72	48.30	0.48	1.5	98.6	1.59	Corrected log page 13.5
WC18-02C			188236	4990	R	none	89.6	89.77	440	89.60	89.77	0.17	0.17	Ash band	58.8%	0.97	0.36	57.71	16.11	25.82	0.26	--	--	1.96	May have been two ash layers
WC18-02C			186392	4522	DC	442	89.77	89.90	440	89.77	89.90	0.13	0.13	Coal	100.0%	1.38	0.70	19.53	18.81	60.96	0.65	3.0	98.6	1.44	
WC18-02C			188237	4991	CR	none	89.9	90		89.90	90.00	0.10	0.10	Coaly rock	80.0%	0.67	0.46	44.98	12.46	42.10	0.44	--	--	1.68	Not in log - upon resampling seam, noticed the coaly rock
WC18-02C			186393	4523	DC	460	105.1	105.33	460	105.10	105.50	0.40	0.37	Coal	42.5%	0.88	0.48	16.33	18.48	64.71	0.80	2.5	99.1	1.46	
					C		105.33	105.39																	
					DC		105.39	105.5																	
WC18-02C			186394	4524	DC	480	115.2	115.44	480	115.20	116.10	0.90	0.85	Coal	73.3%	1.20	0.49	15.76	20.27	63.48	0.89	7.0	99.1	1.46	
					R		115.44	115.55																	
					C		115.55	116.1																	
WC18-03C			186395	4525	DC	Bird	34.6	35.6	Bird	34.60	35.60	1.00	0.95	Coal, coaly mdst, coal	87.0%	1.68	0.75	36.96	21.59	40.70	2.69	5.0	96.2	1.63	
					CBSH	190	41.7	41.95																	
WC18-03C			186396	4526	DC	150	55.35	55.90	150	55.35	55.90	0.55	0.53	Coal, siltstone, coal, siltstone, coal	98.2%	1.65	0.73	28.83	20.30	50.14	0.82	7.5	99.4	1.52	
WC18-03C					CBSH	130	60.25	60.70	130	60.25	60.70	0.45	0.42	Not recovered	0.0%										
WC18-03C					DC	111	64.20	64.50	111	64.20	64.50	0.30	0.28	Coal	43.3%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 4 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-03C			186397	4527	C	110	65.55	65.90	110	65.55	65.90	0.35	0.35	Dirty coal / coal	74.3%	1.54	0.57	4.20	23.77	71.46	0.93	8.0	98.0	1.31	
WC18-03C			186398	4528	C	101	69.05	69.60	101	69.05	69.60	0.55	0.53	Coal	94.5%	1.66	0.81	4.39	20.40	74.40	0.59	2.0	99.1	1.32	
WC18-03C			186399	4529	C	100	69.9	71.8	100	69.60	72.00	2.40	2.32	Coal	58.7%	2.78	0.97	2.48	22.73	73.82	0.53	4.5	98.8	1.29	
					DC		71.8	72																	
WC18-03C			186400	4530	C	201	85.6	86.42	201	85.60	86.55	0.95	0.90	Dirty coal, coal, mudstone parting, coal	70.5%	1.80	0.65	8.19	22.43	68.73	0.71	7.0	98.8	1.32	
					DC		86.42	86.55																	
WC18-03C			186401	4531	C	202	87.20	87.65	202	87.20	87.65	0.45	0.42	Coal	77.8%	1.79	0.79	7.13	20.61	71.47	0.58	2.5	98.3	1.33	
WC18-03C			186402	4532	ASH		87.65	88.02	202	87.65	88.02	0.37	0.36	Mudstone/siltstone	40.5%	0.78	0.60	82.96	12.62	3.82	0.05	n/a	n/a	2.41	
WC18-03C			186403	4533	C		88.02	88.40	202	88.02	88.40	0.38	0.36	Coal	13.2%	1.86	0.55	17.55	18.55	63.25	0.63	3.0	98.8	1.42	
WC18-03C					CBSH	330	94.25	94.55	330	94.25	94.55	0.30	0.28	Mudstone with coal spars?	100.0%										
WC18-03C					CR	310	95.85	96.00	310	95.85	96.70	0.85	0.78	Not recovered	0.0%										
					DC		96	96.15																	
					CR		96.15	96.7																	
WC18-03C			186404	4534	CR	none	97	97.1	300	97.00	97.40	0.40	0.37	Ground coal, dirty coal	92.5%	3.53	0.66	38.16	16.04	45.14	0.39	2.5	98.6	1.61	
					DC	300	97.1	97.3																	
					CR		97.3	97.4																	
					CBSH		97.4	97.55																	
WC18-03C			186405	4535	DC		97.55	97.7	300	97.55	98.40	0.85	0.80	Coal	20.0%	1.59	0.61	6.60	19.93	72.86	0.59	2.5	98.6	1.33	
					C		97.7	98.4																	
					CBSH	320?	101.3	101.75																	
WC18-03C					CR		101.75	102.2	320?	101.75	102.20	0.45	0.41	Not sampled	100.0%										
WC18-03C					CBSH	340	105.40	105.65	340	105.40	105.65	0.25	0.23	Mudstone	100.0%										
WC18-03C					CBSH	410	121.35	121.55	410	121.35	121.55	0.20	0.20	Carb mudstone	145.0%										
WC18-03C			186406	4536	C	401	121.55	122.4	401/400	121.55	123.70	2.15	2.14	Coal	7.4%	22.12	0.86	33.90	15.24	50.00	0.40	1.0	94.5	1.56	16cm of ground core represents the 401 and 400
					C	400	122.4	123.7																	
WC18-03C					DC		123.7	123.95	400	123.70	123.95	0.25	0.25	Not recovered	0.0%										
WC18-03C					CBSH	420	125.00	125.35	420	125.00	125.35	0.35	0.35	Carb mudstone	100.0%										
WC18-03C			186407	4537	DC	440	131.20	131.50	440	131.20	131.50	0.30	0.30	Coal	100.0%	1.04	0.52	33.44	17.72	48.32	0.60	2.5	95.4	1.58	
					CBSH	442	133.80	134.05																	
WC18-03C			188241	4995	CBSH	463	135.95	136.65	463	135.95	136.65	0.70	0.69	Coal - pyrite	8.6%	1.36	0.34	39.44	27.63	32.59	2.55	2.5	96.2	1.80	
					CBSH	460	140.50	140.80																	
					CBSH	483	143.75	143.90																	
WC18-03C			186408	4538	C	480	148.45	149.05	480	148.45	149.35	0.90	0.90	Coal	61.1%	1.21	0.48	16.64	26.41	56.47	1.08	7.0	98.6	1.46	
					DC		149.05	149.35																	
WC18-03C			186409	4539	C	A7	159.3	159.7	A7	159.30	159.90	0.60	0.60	Coal	38.3%	1.45	0.73	10.63	19.78	68.86	0.94	3.0	98.8	1.36	
					DC		159.7	159.9																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 5 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)										Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis					
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Appar-ent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-03C					CR	none	180.9	181		180.90	181.00	0.10	0.10	Not recovered	0.0%										
WC18-03C			186410	4540	C	A5	181.00	181.40	A5	181.00	181.40	0.40	0.38	Coal	72.5%	7.23	0.64	17.89	18.35	63.12	0.99	9.0	97.4	1.41	
WC18-03C					CR	none	189.80	190.00		189.80	190.00	0.20	0.19	Not recovered	0.0%										
WC18-03C			186411	4541	DC	A3	190	190.2	A3	190.00	190.45	0.45	0.42	Coal	93.3%	2.47	0.83	25.60	18.28	55.29	0.78	8.0	98.6	1.47	
					C		190.2	190.45																	
WC18-03C					CR	A1	192.90	193.20	A1	192.90	193.20	0.30	0.30	Carb mudstone	100.0%										
					CR	A0	194.05	194.45	A0																
WC18-03C					DC	511	216.20	216.65	511	216.20	216.65	0.45	0.45	Mudstone with coal beds	4.4%										
WC18-03C			186412	4542	CR	510	217.20	217.50	510	217.20	217.50	0.30	0.30	Coal	33.3%	2.67	0.83	46.43	14.13	38.61	0.59	n/a	n/a	1.72	
WC18-04C			186413	4543	DC	Bird	53.26	53.74	Bird	53.26	53.74	0.48	0.37	Coal rock	12.5%	2.23	0.94	35.16	21.92	41.98	3.07	5.5	94.5	1.58	Very little dirty coal recovery at top of Bird; coaly rock only after top 6 cm.
WC18-04C					CR		53.74	53.85		53.74	54.62	0.88	0.68	Coaly mudstone and carbonaceous mudstone	98.9%										.
					DC		53.85	53.97																	
					CR		53.97	54.29																	
					DC		54.29	54.42																	
					CR	none	54.42	54.62																	
					CR	190	62.4	62.7																	
					CBSH	170	77.7	78																	
WC18-04C					CR	none	82.74	82.98		82.74	82.98	0.24	0.14	Not recovered?	0.0%										
WC18-04C			186414	4544	C	150	82.98	83.14	150	82.98	83.63	0.65	0.37	Coal, coaly rock (carbonaceous mudstone?), coal	90.8%	1.93	0.87	61.51	17.22	20.40	0.31	n/a	n/a	1.96	No apparent coaly rock above DD 83m, nor coaly rock below ground 7 cm of coal at base
					CR		83.14	83.27																	
					DC		83.27	83.33																	
					C		83.33	86.14																	
					DC		83.41	83.63																	
WC18-04C					CR	none	83.63	83.82		83.63	83.82	0.19	0.15	Carb mudstone	100.0%										
WC18-04C					CR	130	89.7	90	130	89.70	90.00	0.30	0.20	Carb mudstone	100.0%										
WC18-04C			186415	4545	CR	111	95.5	95.78	111	95.50	96.06	0.56	0.34	Coal	92.9%	1.46	0.74	8.85	23.99	66.42	0.57	7.0	98.0	1.36	
					DC		95.78	95.9																	
					CR		95.9	96.06																	
WC18-04C					DC	110	97.7	97.95	110	97.70	98.21	0.51	0.29	Coal	49.0%										
					C		97.95	98.04																	
					DC		98.04	98.21																	
WC18-04C			186416	4546	CR	none	101.83	101.93	101/100	101.83	105.94	4.11	2.96	Coal	60.6%	2.07	0.81	2.95	21.08	75.16	0.51	3.0	98.3	1.29	No visible separation, so one sample
					C	101	101.93	103.01																	
					C	100	103.01	105.85																	
					DC		105.85	105.94																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 6 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-04C			186417	4547	DC	201	125.71	125.82	201	125.71	127.03	1.32	0.98	Coal	45.5%	3.03	0.78	13.67	21.22	64.33	0.56	7.0	98.0	1.36	
					C		125.82	126.78																	
					DC		126.78	127.03																	
WC18-04C					CR	none	127.03	127.17		127.03	127.17	0.14	0.10	Not recovered	100.0%										
WC18-04C			186418	4548	CR	none	127.89	128	202	127.89	128.60	0.71	0.50	Coal	95.8%	1.77	0.71	11.24	20.73	67.32	0.58	0.40	97.1	1.35	
					DC	202	128	128.09																	
					C		128.09	128.6																	
WC18-04C			186419	4549	ASH		128.6	128.77		128.60	128.77	0.17	0.12	Ash	100.0%	1.10	0.68	74.09	14.47	10.76	0.12	n/a	n/a	2.15	
WC18-04C			186420	4550	CR	202	128.77	129.02	202	128.77	129.48	0.71	0.50	Dirty coal, coal	83.1%	1.77	0.65	7.13	25.57	66.65	0.77	8.5	96.0	1.32	
					C		129.02	129.48																	
WC18-04C					CBSH	310	140.2	140.6	310	140.20	140.60	0.40	0.22	Carb mudstone	50.0%										
WC18-04C					CR	none	141.85	141.94		141.85	141.94	0.09	0.07	Not recovered	0.0%										
WC18-04C					DC	300	141.94	141.98	300	141.94	141.98	0.04	0.03	Not recovered	0.0%										
WC18-04C					C		141.98	142.64		141.98	142.64	0.66	0.49	Not recovered	0.0%										
					Fault	Poss.	142.64	142.85																	
WC18-04C			186421	4551	C	300	142.85	144.12	300	142.85	144.12	1.27	0.94	Coal	11.8%	2.05	0.60	24.58	29.63	45.19	0.49	2.5	97.7	1.60	No recovery of 310 above, or only recovery for both?
WC18-04C					CR	none	144.66	144.74		144.66	144.74	0.08	0.06	Carb mudstone	100.0%										
WC18-04C			186422	4552	DC	320	144.74	145.02	320	144.74	145.82	1.08	0.80	Coal	66.7%	3.56	0.76	9.62	23.97	65.65	0.58	4.5	97.1	1.37	
					C		145.02	145.82																	
WC18-04C					CR	340	149.5	150.25	340	149.50	151.15	1.65	1.17	Coaly mudstone	34.5%										
					CBSH		150.25	150.4																	
					CR		150.4	150.55																	
					CBSH		150.55	151.15																	
WC18-04C					CBSH	360	155.45	155.62	360	155.45	155.62	0.17	0.13	Carb mudstone	100.0%										
WC18-04C					CBSH	410	180.30	180.48	410	180.30	180.48	0.18	0.12	Coaly mudstone	227.8%										
WC18-04C					CR	none	181.00	181.08		181.00	181.08	0.08	0.06	Ash?	50.0%										
WC18-04C			186423	4553	DC	401	181.08	181.2	401/400/ Fault/ 400	181.08	187.80	6.72	4.58	Coal	28.7%	5.23	0.75	2.85	19.94	76.46	0.47	2.0	95.7	1.29	
					C		181.2	182.63																	
					C	400	182.63	183.02																	
					Fault	Poss.	183.02	183.1																	
					C	400	183.1	187.56																	
					DC		187.56	187.65																	
					C		187.65	187.8																	
WC18-04C					DC		187.8	187.91		187.80	188.01	0.21	0.14	Not recovered?	0.0%										
					CR	none	187.91	188.01																	
WC18-04C					CR	420	191.00	191.40	420	191.00	191.40	0.40	0.29	Coal, coaly mudstone	42.5%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 7 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Appar-ent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-04C					CR	none	198.74	198.84		198.74	198.84	0.10	0.07	Not recovered	0.0%										
WC18-04C			186424	4554	DC	440	198.84	198.9	440	198.84	199.55	0.71	0.48	Coal, dirty coal with ash?, coal	84.5%	0.95	0.55	16.90	19.80	62.75	0.78	4.0	95.4	1.42	
					C		198.9	199.12																	
					DC		199.12	199.16																	
					C		199.16	199.33																	
					DC		199.33	199.36																	
					C		199.36	199.46																	
					DC		199.46	199.55																	
WC18-04C					CR	none	199.55	199.64		199.55	199.64	0.09	0.06	Carb mudstone	100.0%										
WC18-04C					CR	none	205.70	205.90		205.70	205.90	0.20	0.13	Carb mudstone	35.0%										
WC18-04C					CR	463	207.00	207.40	463	207.00	207.40	0.40	0.27	Not recovered?	0.0%										
					CBSH	460?	213.70	214.10																	
					CBSH	483?	218.39	219.25																	
WC18-04C			186425	4555	DC	480	225.12	225.19	480	225.12	226.40	1.28	0.98	Coal	16.4%	1.59	0.61	8.41	20.46	70.52	1.01	7.0	97.1	1.34	
					C		225.19	226.25																	
					DC		226.25	226.40																	
WC18-04C					DC	none	232.7	233.02		232.70	233.02	0.32	0.24	Coal	50.0%										
WC18-05C					CBSH	130	10.5	10.85	130	10.50	10.85	0.35	0.32	Carb mudstone	48.6%										
WC18-05C					DC	111	14.04	14.18	111	14.04	14.42	0.38	0.34	not recovered	0.0%										
					CR	none	14.18	14.42																	
WC18-05C			188201	4955	C	110	15.6	15.94	110	15.60	15.94	0.34	0.32	DC/coaly mudstone	23.5%	0.74	0.37	49.11	43.54	6.98	0.24	--	--	2.37	
WC18-05C			186426	4556	C	101	17.93	18.95	101/100	17.93	20.95	3.02	2.80	Coal	22.5%	2.30	0.79	2.77	21.03	75.41	0.49	3/5	96.8	1.31	
					C	100	18.95	20.87																	
					DC		20.87	20.95																	
WC18-05C					CR	none	28.44	28.56		28.44	28.56	0.12	0.11	Carb mudstone	58.3%										
WC18-05C			188231	4985	C	201	28.56	29.21	201	28.56	29.31	0.75	0.72	Coal/Coaly mudstone	9.3%	1.49	0.38	52.38	14.65	32.59	0.27	--	--	1.83	Bad recovery- chips of carbonaceous mudstone were hard to sort out from dirty coal.
					DC		29.21	29.31																	
WC18-05C					C	202	30.3	30.51	202	30.30	30.60	0.30	0.28	Black blocky mud	16.7%										
					CR	none	30.51	30.6																	
WC18-05C					CBSH	310	35.3	35.7	310	35.30	36.40	1.10	1.03	Coaly mudstone / carb mudstone	72.7%										Carbonaceous mudstone and 3cm of coaly mudstone
					R		35.7	36																	
					CBSH		36	36.4																	
WC18-05C			186427	4557	C	300	41.16	41.28	300	41.16	41.53	0.37	0.36	Coal / two competent pieces of dirty coal, coal	97.3%	2.21	0.67	19.60	25.08	54.65	0.68	5.0	98.0	1.47	
					ASH?		41.28	41.35																	
					C		41.35	41.53																	
WC18-05C					CR	none	41.53	41.7		41.53	41.70	0.17	0.17	Carb mudstone	100.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 8 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-05C			186428	4558	C	320	45.62	45.8	320	45.62	45.80	0.18	0.17	DC/C	177.8%	1.99	0.79	24.74	17.32	57.15	0.75	2.5	98.6	1.49	Sampled as per log: 0.15m of dirty coal and 0.17m of coal
WC18-05C					CBSH	340	48.02	48.23	340	48.02	49.42	1.40	1.39	Coaly rock and carbonaceous mudstone	55.0%										Recovery is all grinding and gouge according to log
					CR		48.23	48.36																	
					CBSH		48.36	48.53																	
					R		48.53	48.74																	
					CBSH		48.74	49.42																	
WC18-05C					CBSH	360	52.3	52.6	360	52.30	52.60	0.30	0.30	Not recovered	0.0%										
WC18-05C					DC	410	70.7	70.88	410	70.70	70.88	0.18	0.17	Dirty coal	38.9%										
WC18-05C			186429	4559	C	401	71.48	72.3	401/400	71.48	73.51	2.03	1.95	DC/C	100.0%	3.14	0.81	7.58	18.79	72.84	0.51	1.0	98.3	1.35	100% recovery? Depths for seams 401-400 and 440 work right, what happened to 0.35m of rock? 420 was found downhole of the 4 seam.
					C	400	72.3	73.24																	
					DC		73.24	73.35																	
					CR	none	73.35	73.51																	
WC18-05C			188232	4986	C	420	73.7	74.6	420	73.70	74.68	0.98	0.91	Coal	7.1%	5.01	0.54	47.23	17.18	35.05	0.65	--	--	1.73	Very bad recovery - coal is ground into mud and carbon-aceous mudstone chips are hard to sort out. Original log identified it as a broken area with shearing.
					DC		74.6	74.68																	
WC18-05C					CR	none	74.68	74.8		74.68	74.80	0.12	0.11	Not recovered?	0.0%										
WC18-05C			186430	4560	DC	440	77.32	77.42	440	77.32	77.94	0.62	0.58	Coal, ash band?, coal, dirty coal	66.1%	1.68	0.71	25.05	18.04	56.20	0.55	2.0	98.8	1.48	
					C		77.42	77.53																	
					DC		77.53	77.63																	
					C		77.63	77.75																	
					DC		77.75	77.94																	
					CBSH	442	80.45	80.7																	
					CBSH	463	98.05	89.6																	
WC18-05C					CR	460	93.55	93.85	460	93.55	93.85	0.30	0.29	Coal rock	60.0%	1.60	0.61	18.44	26.58	54.37	0.85	7.0	98.0	1.49	
WC18-05C			186431	4561	C	480	102.54	103.13	480	102.54	103.35	0.81	0.79	Dirty coal, coal, coalified wood parting, coal, dirty coal	84.0%										
					DC		103.13	103.35																	
WC18-05C					CR	none	113.81	113.94		113.81	113.94	0.13	0.12	Carb mudstone	100.0%	1.84	0.83	6.80	19.56	72.81	0.96	6.5	98.0	1.32	
WC18-05C			186432	4562	C	A7	113.94	114.78	A7	113.94	114.78	0.84	0.79	Coal	61.9%										
					CBSH	A5?	122.35	123																	
WC18-06C					DC	130	4.65	4.9	130	4.65	4.90	0.25	0.25		0.0%										
WC18-06C			186433	4563	CR		4.9	5.1	130	4.90	5.40	0.50	0.50	Coaly rock/coal	62.0%	4.21	0.97	81.70	13.44	3.89	0.24	n/a	n/a	2.19	Sampled as parting, mixed with coal? Ground blocky core
					C		5.1	5.4																	
WC18-06C					C	111	8.94	9.25	111	8.94	9.25	0.31	0.30	Dirty coal/coal	100.0%										
WC18-06C					CR	none	10.32	10.43		10.32	10.43	0.11	0.11	Not recovered?	0.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 9 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-06C			186434	4564	C	110	10.43	10.84	110	10.43	10.84	0.41	0.40	Coal	100.0%	2.42	0.70	15.38	22.96	60.96	0.74	3.0	97.4	1.41	
WC18-06C					CR	none	10.84	11.03		10.84	11.03	0.19	0.18	Carb mudstone	100.0%										
WC18-06C			186435	4565	C	101	17.34	17.85	101/100	17.34	19.47	2.13	2.06	Dirty coal/coal	15.5%	11.42	1.06	41.49	16.92	40.53	0.31	1.0	92.8	1.63	
					C	100	17.85	19.37																	
					DC		19.37	19.47																	
WC18-06C				4565?	CR	none	19.47	19.58		19.47	19.58	0.11	0.11	Chunky mud	100.0%										May have been sampled in 4565 as recovery is a chunky mud
WC18-06C					CR	none	23.24	23.42		23.24	23.42	0.18	0.18	Carb mudstone	100.0%										
WC18-06C			186436	4566	C	201	23.42	24	201	23.42	24.07	0.65	0.64	Dirty coal / coal	115.4%	2.96	0.82	10.85	22.47	65.86	0.64	7.0	95.4	1.32	Sampled as logged, coal recovered 0.75m
					DC		24	24.07																	
WC18-06C					CR	none	24.07	24.22		24.07	24.22	0.15	0.15	Carb mudstone	53.3%										
WC18-06C					CR	none	27.35	27.44		27.35	27.44	0.09	0.09	Ash band?	22.2%										
WC18-06C			186437	4567	C	202	27.44	27.66	202	27.44	27.88	0.44	0.43	Dirty coal / coal	100.0%	1.81	0.80	8.10	20.26	70.84	0.65	3.5	97.1	1.35	Sampled with interpreted coaly rock, no coaly rock recovered
					DC		27.66	27.7																	
					CR		27.7	27.88																	
WC18-06C			186438	4568	ASH		27.88	28.04		27.88	28.04	0.16	0.16	Ash band?	100.0%	1.47	0.75	74.04	13.37	11.84	0.10	n/a	n/a	2.15	
WC18-06C			188202	4956	C		28.04	28.18		28.04	28.18	0.14	0.14	Coal	100.0%	1.44	0.49	20.89	20.90	57.72	0.60	7.5	93.4	1.42	
					CR	none	28.18	28.3																	
WC18-06C					CR	none	40.24	40.42		40.24	40.40	0.16	0.16	Ash band and coaly rock	75.0%										Ash parting was recovered, however all coal was ground out.
WC18-06C			188203	4957	DC	300	40.42	40.64	300	40.40	40.70	0.30	0.29	Ash parting / coal	96.7%	3.51	0.81	19.74	18.36	61.09	0.49	1.0	92.8	1.44	
					CR		40.64	40.77																	
WC18-06C			188204	4958	DC		40.77	40.97		40.70	40.97	0.27	0.26	Coalified wood? Parting, coal	59.3%	2.63	0.41	26.10	30.61	42.88	0.40	1.5	97.7	1.67	
WC18-06C					CR	320	45.25	45.6	320	45.25	45.60	0.35	0.34	Coal? Ground to mud	17.1%										
					CBSH		45.6	45.9																	
WC18-06C					CR	340	48.3	48.6	340	48.30	48.60	0.30	0.30	Coal / coal rock / Carbonaceous mudstone	70.0%										
					R		48.6	49																	
					CBSH		49	49.7																	
WC18-06C					CR	410	70.62	70.83	410	70.62	70.83	0.21	0.21	Mdst with coal spars	100.0%										
WC18-06C			186439	4569	C	401	71.96	72.63	401/400	71.96	75.20	3.24	3.17	Coal / dirty coal	16.7%	11.64	0.75	7.96	18.99	72.30	0.39	1.5	96.8	1.35	
					C	400	72.63	74.84																	
					DC		74.84	75.2																	
					CBSH	420	75.85	76.22																	
WC18-06C			186440	4570	DC	440	78.84	78.95	440	78.84	79.22	0.38	0.37	Coal / dirty coal	52.6%	3.39	0.69	8.03	20.70	70.58	0.70	3.5	94.2	1.36	
					C		78.95	79.14																	
					DC		79.14	79.22																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 10 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
					CBSH	442	80.74	80.94																		
					CBSH	463	87.1	87.35																		
					CBSH	460	91.4	91.8																		
WC18-06C					CR	none	103.33	103.43		103.30	103.43	0.13	0.13	Hornfels? Ironstone?	100.0%										
WC18-06C			186441	4571	C	480	103.43	104.12	480	103.43	104.28	0.85	0.79	Coal / dirty coal	45.9%	3.31	0.70	8.08	23.94	67.28	1.07	8.0	94.2	1.32	
					DC		104.12	104.28																		
WC18-06C					CR	none	104.28	104.48		104.28	104.48	0.20	0.19	Carb mudstone	25.0%										
					CBSH	A71?	114.70	115.05	A71?																	
WC18-06C					CR	none	118.37	118.44		118.37	118.78	0.41	0.19		95.1%										
					DC	A7?	118.44	118.53	A7?																	
					C		118.53	118.68																		
					CR	none	118.68	118.78																		
WC18-06C					CR	none	122.37	122.53		122.37	122.53	0.16	0.01	Carb mudstone	100.0%										
WC18-06C			188205	4959	DC	A5	122.53	122.77	A5	122.53	123.10	0.57	0.26	Coaly mudstone	17.5%	1.52	0.58	61.79	13.16	24.47	0.35	--	--	1.96	
					CR		122.77	123.1																		
WC18-06C			186442	4572	DC		123.1	123.32		123.10	124.30	1.20	0.53	Dirty coal / coal	40.0%	2.32	0.68	9.27	22.05	68.00	0.83	6.0	95.4	1.35	
					C		123.32	124.2																		
					DC		124.2	124.3																		
WC18-06C					CR	none	124.3	124.76		124.30	124.76	0.46	0.19	Carb mudstone	21.7%										
					CBSH	A3	141.9	142.2	A3																	
					CBSH	A1?	147.05	147.35	A1?																	
					CBSH	A0?	147.85	148.5	A0?																	
WC18-07C			186857	4573	CBSH	none	5.9	6.1	150	5.90	6.30	0.40	0.38	Coaly mudstone	37.5%	5.64	1.12	20.15	23.75	54.98	0.98	1.5	58.1	1.47	
					DC	150	6.1	6.3																		
WC18-07C			186858	4574	CBSH		6.3	6.4		6.30	6.55	0.25	0.24	Mudstone pieces	48.0%	4.49	1.32	83.71	7.70	7.27	0.14	n/a	n/a	2.35	
					CR		6.4	6.6																		
WC18-07C			186859	4575	DC		6.6	6.8		6.55	6.90	0.35	0.33	Ground coal	88.6%	9.59	0.76	27.01	22.05	50.18	0.82	6.5	91.1	1.50	
					CBSH	130	11.2	11.6	130																	
WC18-07C			186860	4576	C	111	15	15.3	111	14.95	15.25	0.30	0.28	Coal, dirty coal, ground coal, dirty muddy coal.	113.3%	1.78	0.63	10.97	26.35	62.05	0.87	7.5	88.0	1.39	
WC18-07C			186861	4577	C	110	16.60	17.15	110	16.60	17.15	0.55	0.52	Dirty coal	96.4%	1.70	0.57	15.16	25.53	58.74	0.74	6.0	94.2	1.44	
WC18-07C			186862	4578	C	101	24.45	25.08	101	24.45	25.08	0.63	0.61	Coal	77.8%	2.10	0.62	2.52	22.70	74.16	0.65	5.0	95.7	1.31	
WC18-07C			186863	4579	C	100	25.08	26.42	100	25.08	26.42	1.34	1.30	Coal	99.3%	2.67	0.60	5.74	24.59	69.07	0.50	5.5	93.7	1.32	
					CR	none	26.42	26.70		26.42	26.70	0.28	0.27	Coaly mudstone	10.7%										
WC18-07C			186864	4580	C	201	30.15	30.70	201	30.15	30.70	0.55	0.54	Coal	80.0%	2.50	0.46	11.45	21.92	66.17	0.69	6.5	97.1	1.38	
WC18-07C			186865	4581	DC		30.70	31.00		30.70	31.00	0.30	0.30	Coaly mudstone	23.3%	2.11	0.73	46.91	16.98	35.38	0.39	n/a	n/a	1.77	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 11 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-07C			186866	4582	C	202	34.4	34.75	202	34.40	35.00	0.60	0.60	Dirty (stony?) coal, coal	76.7%	2.11	0.74	5.61	20.44	73.21	0.73	3.5	98.6	1.33	
					CR		34.75	34.9																	
					DC		34.9	35																	
WC18-07C			188206	4960	CR		35	35.12		35.00	35.12	0.12	0.12	Ash	91.7%	1.38	0.62	79.24	11.86	8.28	0.08	--	--	2.36	
WC18-07C			186867	4583	C		35.12	35.42		35.12	35.42	0.30	0.30	Dirty coal	26.7%	1.24	0.66	11.00	21.70	66.64	0.72	3.5	97.7	1.36	
WC18-07C			188207	4961	CR	none	46.40	46.55		46.40	46.55	0.15	0.15	Ash band (minor coal inside it)	73.3%	0.66	0.51	66.72	14.43	18.34	0.17	--	--	2.16	Coal uphole of ash has not been recovered
WC18-07C			186868	4584	DC	300	46.55	46.65	300	46.55	47.20	0.65	0.65	Dirty coal	30.8%	2.07	0.56	5.49	22.15	71.80	0.67	4	97.4	1.33	
					C		46.65	47.2																	
WC18-07C					CBSH		51.2	51.5																	
					CR	320	51.50	51.65	320	51.50	51.65	0.15	0.15	Coaly mudstone	160.0%										
					CBSH		51.65	52.10																	
					CBSH		53.65	54.08																	
WC18-07C					CR	340	54.08	54.40	340	54.08	54.40	0.32	0.31	Carb mudstone	100.0%										
					CBSH		54.40	55.35																	
WC18-07C			186869	4585	CR	410	76.05	76.50	410	76.05	76.50	0.45	0.45	Coal / carb mudstone	37.8%	1.84	0.61	13.53	19.24	66.62	0.73	2.5	98.3	1.39	
WC18-07C			186870	4586	C	401	77.42	77.72	401/400	77.42	79.00	1.58	1.54	Coal	22.2%	3.19	0.64	15.48	18.04	65.84	0.41	1.5	99.1	1.39	401/400 were mixed together and were sampled together
					C	400	77.72	78.74																	
					DC		78.74	79																	
WC18-07C			186871	4587	DC	420	80.80	81.25	420	80.80	81.25	0.45	0.44	Coal / dirty coal	77.8%	2.46	0.79	48.43	14.17	36.61	0.50	n/a	n/a	1.76	
WC18-07C					CR	440	86.30	86.55	440	86.30	86.55	0.25	0.24	Carb mudstone	72.0%										
					CBSH	442	87.15	87.00	442																
WC18-07C			186872	4588	CR	463	91.65	92.02	463?	91.65	92.02	0.37	0.35	Dirty coal / coaly mudstone	24.3%	1.09	0.60	23.31	23.99	52.10	0.83	6.5	98.6	1.50	
WC18-07C					CR	460	97.45	97.60	460	97.45	97.60	0.15	0.14		100.0%										
					Fault	Poss.	99.90	100.00																	
					CR	460	108.90	109.00																	
WC18-07C			186873	4589	CR	480	121.65	122.05	480	121.70	122.90	1.20	0.43	Dirty coal	19.2%	5.10	0.72	44.45	16.95	37.88	1.35	n/a	n/a	1.70	
					CBSH		122.05	122.2																	
					CR		122.2	122.45																	
					DC		122.45	122.9																	
WC18-07C					CR	none	128.40	128.70		128.40	128.70	0.30	0.22	Mudstone with coal spars	100.0%										
					CBSH	A71?	133.10	133.45	A71?																
WC18-07C			186874	4590	C	A7	136	136.5	A7	136.00	136.65	0.65	0.64	Coal	6.2%	1.43	0.50	27.82	16.48	55.20	0.57	1.0	96.0	0.59	
					DC		136.5	136.65																	
WC18-07C					CR	none	150.35	150.65		150.35	150.65	0.30	0.28	Carb mudstone	106.7%										
WC18-07C			186875	4591	C	A5	154.1	154.7	A5	154.10	154.95	0.85	0.78	Coal	23.5%	2.64	0.57	2.67	24.23	72.53	0.96	9.0	96.5	1.28	
					DC		154.7	154.95																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 12 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-07C			186876	4592	C	A3	161.28	161.48	A3	161.30	161.75	0.45	0.41	Coal	22.2%	1.48	0.66	23.43	17.67	58.24	0.69	4.0	98.3	1.49	
					DC		161.48	161.75																	
WC18-07C			186877	4593	CR	A1	162.45	162.65	A1	162.50	163.10	0.60	0.54	Coal	33.3%	1.39	0.63	13.96	17.82	67.59	0.74	2.5	98.3	1.39	
					C		162.65	162.9																	
					CR		162.9	163.1																	
WC18-07C			186878	4594	CR	none	163.9	164.2	A0	163.90	164.30	0.40	0.36	Coal	20.0%	1.25	0.54	14.85	19.16	65.45	0.85	7.5	97.1	1.40	
					DC	A0	164.2	164.3																	
					CBSH	310?	2.9	3.55	310?																
WC18-08C			186879	4595	DC	300	17.65	18.05	300	17.65	18.05	0.40	0.39	Coal	55.0%	1.60	0.50	8.46	23.75	67.29	0.80	7.0	92.5	1.35	
					CBSH	320	21.05	21.45	320																
WC18-08C					CBSH		24.1	24.6		24.10	24.70	0.60	0.57	Coaly mudstone	30.0%										
					CR		24.6	24.7																	
					CBSH	340	24.7	24.95	340																
					R		24.95	25.4																	
					CBSH		25.4	26.1																	
WC18-08C			188208	4962	CR	410	46.70	47.10	410	46.70	47.10	0.40	0.40	Coaly mudstone	37.5%	1.09	0.51	15.49	19.57	64.43	0.79	3.0	98.8	1.42	
WC18-08C			186880	4596	C	401	48.50	49.10	401	48.50	49.10	0.60	0.57	Coal	16.7%	3.29	0.67	26.73	16.16	56.44	0.45	0.0	96.5	1.53	
WC18-08C					Fault	Estab.	49.10	49.20	Fault	49.10	49.20	0.10	0.10	Not recovered	0.0%										
WC18-08C			188209	4963	CBSH	none	49.30	49.55		49.30	49.55	0.25	0.25	Coaly mudstone	28.0%	2.08	0.67	37.81	13.77	47.75	0.66	0.5	99.7	1.69	Carbonaceous shale to coaly mudstone above the coal of 401
WC18-08C			186881	4597	DC	401	49.55	49.6	401	49.55	52.20	2.65	2.60	Coal	80.4%	6.77	0.69	6.81	19.10	73.40	0.44	1.0	96.0	1.35	
					C		49.6	50.75																	
					Fault	Estab.	50.75	50.85																	
					DC	401	50.85	50.9																	
					C		50.9	52.2																	
WC18-08C			186882	4598	DC	400	52.2	52.7	400	52.20	54.80	2.60	2.55	Coal	102.7%	4.13	0.42	13.23	19.42	66.93	0.38	4.0	96.8	1.37	Sampled as logged, coal recovered 2.67m
					C		52.70	54.80																	
					Fault	Prob.	54.80	55.10	Fault																
WC18-08C			186883	4599	C	420	55.65	56.10	420	55.65	56.10	0.45	0.45	Coal	51.1%	4.36	0.37	14.31	19.67	65.65	0.45	6.0	95.7	1.40	
WC18-08C			186884	4600	C	440	58.85	59.50	440	58.85	59.50	0.65	0.61	Coal	78.5%	3.73	0.46	9.05	19.09	71.40	0.64	2.5	96.2	1.36	
					CBSH	442	60.90	61.30	442																
WC18-08C					DC	460	76.10	76.50	460	76.10	76.50	0.40	0.37	Not recovered	0.0%										
WC18-08C			186885	4601	DC	480	86.20	86.50	480	86.20	87.10	0.90	0.89	Dirty coal	45.6%	1.40	0.30	21.28	27.66	50.76	0.73	5.5	96.0	1.55	
					C		86.50	86.90																	
					DC		86.90	87.10																	
WC18-08C			188210	4964	DC	A71	92.87	93.30	A71	92.87	93.30	0.43	0.42	Coal	65.1%	1.66	0.51	26.68	17.93	54.88	1.11	8.0	99.7	1.50	
WC18-08C			186886	4602	C	A7	94.55	95.18	A7	94.55	95.18	0.63	0.63	Coal	61.9%	3.25	0.44	14.14	18.50	66.92	0.81	3.5	94.0	1.41	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 13 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Appar-ent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-08C					CR	none	95.18	95.40		95.18	95.40	0.22	0.22	Mudstone with coal spars	72.7%										
WC18-09C					DC	111	2.00	2.35	111	2.00	2.55	0.55	0.54	Not recovered	0.0%										Inside casing - not recovered
WC18-09C			188211	4965	C	110	3.70	4.00	110	3.50	4.00	0.50	0.49	Coal	8.0%	1.89	0.71	9.78	21.58	67.93	0.79	2.0	66.4	1.39	
WC18-09C			186887	4603	CR	none	9.80	10.00	101/100	9.80	12.05	2.25	2.23	Coal	59.6%	3.15	0.48	6.95	22.76	69.81	0.54	5.0	92.3	1.33	Does not look like any coaly rock was taken with the sample
					C	101	10.00	10.55																	
					C	100	10.55	11.95																	
					DC		11.95	12.05																	
WC18-09C					CR	none	15.30	15.40		15.30	15.40	0.10	0.10	Coal	30.0%										
WC18-09C			186888	4604	DC	201	15.50	15.60	201	15.50	16.95	1.45	1.36	Coal	4.8%	2.02	0.77	46.14	15.04	38.05	0.35	n/a	n/a	1.80	Very poor recovery, just a few chunks of coal.
					CR		15.60	15.70																	
					DC		15.70	15.98																	
					C		15.98	16.95																	
WC18-09C			186889	4605	C	202	20.90	21.10	202	20.90	21.40	0.50	0.49	Coal	96.0%	2.43	0.61	5.63	20.50	73.26	0.71	3.5	97.1	1.33	All coal no rock
					CR		21.10	21.30																	
					DC		21.30	21.40																	
WC18-09C			186890	4606	CR		21.40	21.55		21.40	21.55	0.15	0.15	Siltstone (sandstone in log)	100.0%	1.53	0.58	84.82	12.94	1.66	0.03	n/a	n/a	2.51	
WC18-09C			186891	4607	C		21.55	21.70		21.55	21.70	0.15	0.15	Coal	160.0%	2.56	0.49	9.62	23.13	66.76	0.75	8.0	94.8	1.34	Thickness measured in core box was 24cm
					CBSH	310	30.80	31.20	310																
					ASH		31.20	31.30																	
					CBSH		31.30	31.40																	
WC18-09C					C	300	37.30	37.60	300	37.30	37.60	0.30	0.29	Coal	33.3%										
					CR	320	40.80	41.00	320																
					CBSH		41.00	41.30																	
					CBSH	340	43.75	44.50	340																
					R		44.50	45.20																	
					CBSH		45.20	45.65																	
					CBSH	360	50.15	50.50	360																
					CBSH	430	65.55	66.00	430																
WC18-09C			186892	4608	C	410	67.60	68.15	410	67.40	68.15	0.75	0.74	Coal	89.3%	2.01	0.63	7.04	18.39	73.94	0.56	0.5	99.4	1.35	
WC18-09C			186893	4609	DC	401	68.65	68.80	401	68.65	69.97	1.32	1.31	Dirty coal / coal	56.8%	2.02	0.56	4.61	19.97	74.86	0.41	2.0	98.3	1.32	
					C		68.80	69.97																	
WC18-09C			186894	4610	DC	400	69.97	70.02	400	69.97	71.50	1.53	1.52	Dirty coal / coal	45.1%	6.77	0.59	9.64	20.62	69.15	0.39	4.0	98.8	1.37	
					C		70.02	71.30																	
					DC		71.30	71.50																	
WC18-09C			188212	4966	DC	420	72.30	72.60	420	72.30	72.60	0.30	0.29	Coal	10.0%	1.74	0.45	11.72	18.65	69.18	0.43	4.0	98.8	1.41	
WC18-09C			188213	4967	CR	none	72.60	72.80		72.60	72.80	0.20	0.20	Ash parting / coal	90.0%	1.57	0.50	32.37	19.98	47.15	0.37	8.0	99.4	1.56	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 14 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-09C					CR	none	75.80	75.95		75.80	75.95	0.15	0.15	Silty mudstone	100.0%										
WC18-09C			187334	4611	DC	440	75.95	76.10	440	75.95	76.80	0.85	0.84	Coal, dirty coal, coal, 6cm ash band, coal	65.9%	2.16	0.64	22.44	18.83	58.09	0.55	3.5	96.2	1.45	
					C		76.10	76.28																	
					DC		76.28	76.40																	
					C		76.40	76.50																	
					DC		76.50	76.65																	
					C		76.65	76.80																	
					CBSH	442	78.30	78.70	442																
					CBSH	463	83.30	83.70	463																
					CBSH	460	87.95	88.40	460																
WC18-09C			187335	4612	C	480	100.00	100.65	480	100.00	100.90	0.90	0.87	Coal	21.1%	2.36	0.57	21.45	30.80	47.18	0.69	2.5	96.8	1.57	
					DC		100.65	100.90																	
WC18-09C					DC	A71	107.95	108.15	A71	107.95	108.15	0.20	0.20	Coal	100.0%										
WC18-09C			187336	4613	C	A7	109.12	109.75	A7	109.12	109.95	0.83	0.81	Coal	45.8%	1.54	0.65	23.20	17.85	58.30	0.70	5.0	98.6	1.48	
					DC		109.75	110.20																	
WC18-10C			187337	4614	C	150	7.10	7.20	150	7.09	7.20	0.11	0.11	Coal	100.0%	3.46	1.23	5.64	23.31	69.82	1.21	1.5	65.6	1.33	
WC18-10C			187338	4615	CR		7.20	7.30		7.20	7.30	0.10	0.10	Coaly mudstone	40.0%	1.17	0.75	69.62	15.62	14.01	0.22	n/a	n/a	2.09	
WC18-10C			187339	4616	C		7.30	7.45		7.30	7.45	0.15	0.15	Coal	53.3%	3.29	0.96	35.12	18.92	45.00	0.69	1.5	74.7	1.57	
WC18-10C					CR		7.45	7.65		7.45	7.80	0.35	0.34	Not recovered	0.0%										
					DC		7.65	7.80																	
					CBSH	130	12.50	12.90	130																
					CBSH	111	15.75	15.95	111																
					R		15.95	16.10																	
					CBSH		16.10	16.60																	
WC18-10C			187340	4617	C	110	17.35	17.70	110	17.35	17.70	0.35	0.35	Coal	105.7%	2.39	0.69	7.52	21.74	70.05	0.75	4.5	96.5	1.33	
WC18-10C			187341	4618	C	101	20.30	21.09	101	20.30	21.09	0.79	0.78	Coal	75.9%	2.10	0.84	9.32	20.18	69.66	0.45	1.5	98.3	1.35	It was difficult to find 5cm dirty coal contact
WC18-10C			187342	4619	DC	100	21.09	21.14	100	21.09	23.14	2.05	2.03	Coal	71.2%	1.60	0.84	3.45	22.90	72.81	0.44	7.0	98.6	1.29	
					C		21.14	23.10																	
WC18-10C			187343	4620	C	201	27.50	28.10	201	27.50	28.26	0.76	0.75	Coal	100.0%	1.65	0.54	11.57	22.38	65.51	0.70	7.5	98.0	1.36	
					DC		28.10	28.25																	
WC18-10C			187344	4621	C	202	30.95	31.10	202	30.95	31.40	0.45	0.43	Coal	80.0%	1.64	0.69	7.18	20.56	71.57	0.66	3.0	98.6	1.35	
					DC		31.10	31.40																	
WC18-10C			187345	4622	CR		31.40	31.50		31.40	31.53	0.13	0.13	Ash	100.0%	1.20	0.62	74.12	12.87	12.39	0.13	0.0	99.4	2.21	
WC18-10C			187346	4623	DC		31.50	31.60		31.53	31.69	0.16	0.15	Coal	100.0%	1.75	0.78	17.83	22.13	59.26	0.64	7.5	98.3	1.47	
WC18-10C			187347	4624	C	300	43.05	43.60	300	43.05	43.60	0.55	0.54	Coal	70.9%	1.86	0.68	26.19	18.05	55.08	0.48	1.5	98.8	1.50	
WC18-10C					DC	320	47.95	48.40	320	47.95	48.40	0.45	0.45	Carb. mudstone	100.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 15 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
					CBSH	340	51.05	51.80																	
WC18-10C					R		51.80	52.50	340																
					CBSH		52.50	53.20																	
WC18-10C					CBSH	430	73.60	73.75	430																
WC18-10C					CBSH	410	76.18	76.23	410																
WC18-10C			187348	4625	CR	none	76.40	76.68	401/400	76.40	81.08	4.68	4.59	Coal	15.0%	6.39	0.91	10.99	19.28	68.82	0.37	2.0	97.4	1.38	Coal is broken into chunks down to powder, impossible to discern 401 from 400, therefore one sample. Does not look like any coaly rock was taken.
					C	401	76.68	78.48																	
					DC	400	78.48	78.53																	
					C		78.53	81.08																	
WC18-10C			188214	4968	CR	420	83.80	84.25	420	83.80	84.25	0.45	0.41	Coal	26.7%	6.47	0.60	54.18	14.56	30.66	0.28	--	--	1.84	
WC18-10C			187349	4626	C	440	86.40	86.75	440	86.34	87.31	0.97	0.89	Stony coal, mudstone, coal, ash band, coal	100.0%	2.65	0.84	15.77	18.65	64.74	0.55	3.0	98.3	1.41	
					DC		86.75	86.90																	
					C		86.90	87.05																	
					DC		87.05	87.25																	
					CBSH	442	88.70	89.20	442																
					CBSH	463	93.15	93.55	463																
					CBSH	460	97.50	98.00	460																
WC18-10C			187350	4627	C	480	109.15	109.95	480	109.15	110.10	0.95	0.88	Coal	33.7%	1.34	0.73	31.79	22.275	44.73	0.90	4.5	98.8	1.61	
					DC		109.95	110.10																	
WC18-10C					C	A71	116.85	117.00	A71	116.85	117.00	0.15	0.14	Coal	80.0%										
WC18-10C			187351	4628	C	A7	117.85	118.40	A7	117.85	118.60	0.75	0.70	Coal, dirty coal, coal	92.0%	2.54	0.85	11.00	19.25	68.90	0.84	7.0	99.1	1.35	
					DC		118.40	118.60																	
WC18-10C			187352	4629	C	A5	137.40	138.15	A5	137.40	138.15	0.75	0.70	Coal	42.7%	0.93	0.46	14.29	17.01	68.24	0.73	1.5	99.1	1.41	
WC18-10C					CR	none	142.80	143.05		142.80	143.05	0.25	0.25	Carb mudstone	88.0%										
WC18-10C			187535	4630	C	A3	143.05	143.20	A3	143.05	143.60	0.55	0.54	Coal	54.5%	1.84	0.55	17.47	17.15	64.83	0.69	2.0	99.4	1.42	No coaly rock was put into the bag - depths should be shortened to reflect this.
					DC		143.20	143.30																	
					C		143.30	143.40																	
					CR	none	143.40	143.60																	
WC18-10C					C	A1	144.20	144.40	A1	144.20	144.40	0.20	0.20	Coal	90.0%										
WC18-10C			187354	4631	CR	A0	145.45	145.90	A0	145.45	145.90	0.45	0.44	Coal, dirty coal with ash?, coal	40.0%	1.42	0.49	35.71	15.19	48.61	0.79	2.5	99.4	1.59	
WC18-10C			187355	4632	DC	530	165.40	165.60	530	165.40	165.80	0.40	0.39	Coal	32.5%	1.20	0.44	9.35	21.41	68.80	1.31	9.0	98.8	1.36	
					C		165.60	165.80																	
					CBSH	510	166.80	167.20	510																

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 16 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-10C			187356	4633	C	501	168.95	169.80	501	168.95	169.80	0.85	0.82	Coal	70.6%	1.74	0.54	4.12	16.79	78.55	0.74	2.0	99.4	1.33	
WC18-10C			188215	4969	C	502	170.60	171.05	502	170.60	171.05	0.45	0.45	Coal	8.9%	2.09	0.37	16.36	15.45	67.82	0.75	0.5	99.1	1.43	Rounded, ground out coal - very bad recovery and hard to separate the coal from the carb. mudstone and surrounding rock. Not a representative sample.
					CBSH	520	174.40	174.80	520																
WC18-10C			188216	4970	CR	none	176.95	177.15		176.95	177.15	0.20	0.20	Coaly mudstone	40.0%	1.61	0.49	51.96	10.78	36.77	0.40	--	--	1.81	
WC18-10C			187357	4634	C	540	177.15	177.40	540	177.15	177.40	0.25	0.25	Coal	68.0%	6.56	0.41	6.96	17.71	74.91	0.92	2.5	98.3	1.34	
WC18-10C			187359	4636	C	630	189.70	189.90	630	189.70	190.20	0.50	0.49	Coal	60.0%	2.52	0.40	17.93	16.74	64.93	0.91	2.5	97.1	1.42	
					CR	none	189.90	190.20																	
WC18-10C			187360	4637	DC	610	191.20	191.40	610	191.20	191.40	0.20	0.20	Coaly mudstone	25.0%	2.36	0.61	31.91	16.28	51.20	2.04	4.0	97.1	1.57	
WC18-10C			187361	4638	C	601	192.50	193.40	601	192.50	193.60	1.10	1.08	Coal	78.2%	2.54	0.83	3.38	16.95	78.84	0.66	0.5	98.3	1.33	
					DC		193.40	193.60																	
WC18-10C			187362	4639	CR	none	193.80	194.00	600	193.80	194.65	0.85	0.82	Coal	24.7%	4.16	0.76	26.09	13.24	59.91	0.58	0.5	98.3	1.33	
					C	600	194.00	194.65																	
					CBSH	770	204.10	204.60	770																
					CBSH	750	207.60	207.80	750																
WC18-10C			187358	4635	CR	none	211.55	211.80	730	211.55	212.00	0.45	0.43	Coal	42.2%	1.40	0.37	14.97	16.38	68.28	0.96	3.0	98.3	1.41	
					C	730	211.80	212.00																	
					CR	710	214.05	214.25	710																
WC18-11C					CR	none	15.20	15.40		15.20	15.30	0.10	0.10	Siltstone locally carb	100.0%										
WC18-11C			187363	4640	C	300	15.40	15.60	300	15.30	15.60	0.30	0.30	Coal	100.0%	1.57	0.51	14.79	19.02	65.68	0.82	4.5	97.4	1.41	Thickness adjusted: 20 to 30cm
WC18-11C					CR	none	15.60	15.80		15.60	15.80	0.20	0.20	Mudstone with coal lens	100.0%										
					CBSH	320	19.00	19.70	320																
					CBSH	340	22.15	23.05	340																
					R		23.05	23.85																	
					CBSH		23.85	24.65																	
					Fault	Poss.	28.55	28.65	Fault																
WC18-11C					CR	430	43.70	43.95	430	43.70	43.95	0.25	0.24	Carb mudstone	64.0%										
					Fault	Poss.	44.35	44.40	Fault																
WC18-11C			187364	4641	C	410	46.50	47.20	410	46.50	47.20	0.70	0.68	Coal	97.1%	1.77	0.84	6.23	18.60	74.33	0.58	0.5	98.8	1.32	
WC18-11C					CR	none	48.15	48.40		48.15	48.40	0.25	0.24	Siltstone and carbonaceous rock	52.0%										
WC18-11C			187365	4642	C	401	48.40	49.65	401	48.40	49.90	1.50	1.45	Coal	46.7%	2.26	0.81	7.21	18.92	73.06	0.38	1.0	99.1	1.30	
					DC		49.65	49.70																	
					C		49.70	49.90																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 17 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-11C			187366	4643	DC	400	49.90	49.95	400	49.90	52.40	2.50	2.45	Coal	56.0%	2.42	0.68	2.52	21.35	75.45	0.39	4.0	97.1	1.28	
					C		49.95	52.13																	
					DC		52.13	52.28																	
					C		52.28	52.40																	
WC18-11C			188217	4971	CR	none	52.40	52.50	420	52.40	53.05	0.65	0.64	Carbonaceous mudstone and ash parting / coal	21.5%	2.91	0.52	68.58	13.08	17.82	0.12	--	--	2.07	Two partings (carbonaceous mudstone and ash layer) back to back.
					DC	420	62.50	52.62																	
					CR		52.62	52.80																	
					DC		52.80	52.95																	
WC18-11C			187367	4644	C	440	55.42	55.60	440	55.42	56.30	0.88	0.88	Coal, ash band, coal	46.6%	0.94	0.49	5.37	23.34	70.80	1.16	8.5	98.3	1.29	5cm ash band parting
					DC		55.60	55.85																	
					C		55.85	56.00																	
					DC		56.00	56.10																	
					C		56.10	56.30																	
					CBSH	442	58.15	58.65	442																
					CBSH	463	66.25	66.85	463																
WC18-11C					CR	460	70.75	70.90	460	70.75	70.90	0.15	0.15	Jarosite	33.3%										
WC18-11C					DC		70.90	71.02		70.90	71.02	0.12	0.12	Coal	33.3%										
					CBSH	483	78.95	79.32	483																
WC18-11C			187368	4645	C	480	82.15	82.80	480	82.15	83.00	0.85	0.81	Coal	8.2%	1.75	0.62	29.80	28.05	41.53	0.75	3.5	98.0	1.62	Dirty sample due to crushed coal with mixed mudstone
					DC		82.80	83.00																	
WC18-11C			187369	4646	DC	A71	88.30	88.60	A71	88.30	88.60	0.30	0.29	Coal	60.0%	1.39	0.66	25.01	16.65	57.68	0.51	1.0	98.6	1.50	
WC18-11C					CR	none	89.70	89.98		89.70	89.98	0.28	0.27	Carb mudstone	32.1%										
WC18-11C			187370	4647	C	A7	89.98	90.65	A7	89.98	90.90	0.92	0.79	Coal	8.7%	1.81	0.62	32.90	21.93	44.55	0.69	4.0	99.4	1.54	
					DC		90.65	90.90																	
WC18-11C					CR	A5	98.80	99.10	A5	98.80	99.10	0.30	0.29	Siltstone with coal spars	100.0%										
WC18-11C					DC		99.10	99.20		99.10	99.20	0.10	0.10		100.0%										
					CBSH	170	16.45	16.80	170																
WC18-12C					CR	none	21.60	21.70		21.60	21.70	0.10	0.07	Muddy siltstone	100.0%										
WC18-12C			187371	4648	DC	150	21.70	21.90	150	21.70	22.80	1.10	0.74	Coal	88.2%	3.72	1.32	26.56	21.93	50.19	0.76	0.5	97.7	1.50	
					C		21.90	22.10																	
					DC		22.10	22.22																	
					C		22.22	22.60																	
					DC		22.60	22.80																	
WC18-12C					DC	130	29.08	29.20	130	29.08	29.20	0.12	0.08	Not recovered	0.0%										
WC18-12C					CR		29.20	29.45		29.20	29.45	0.25	0.17	Mudstone with coal spars	100.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 18 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-12C			187372	4649	DC	111	35.02	35.30	111	35.02	35.30	0.28	0.25	Coal	92.9%	1.91	0.67	10.24	25.86	63.23	0.84	7.0	98.3	1.37	
WC18-12C			187373	4650	CR		35.30	35.50		35.30	35.50	0.20	0.18	Coaly rock / Ash?	85.0%	1.00	0.44	47.81	43.54	8.21	0.29	-	-	2.27	
WC18-12C			187374	4651	DC		35.50	35.92		35.50	35.92	0.42	0.38	Coal	88.1%	1.71	0.64	13.82	25.45	60.09	0.88	5.0	9.74	1.43	
WC18-12C			187375	4652	DC	110	37.25	37.50	110	37.25	37.90	0.65	0.50	Coal	36.9%	1.99	0.63	2.97	24.08	72.32	0.73	8.0	97.4	1.26	
					C		37.50	37.75																	
					DC		37.75	37.90																	
WC18-12C			187376	4653	DC	101	39.80	40.18	101	39.80	41.10	1.30	1.06	Coal	100.0%	1.59	0.52	11.46	20.65	67.37	0.41	2.0	97.7	1.34	5cm parting of coaly rock sampled in 4653
					C		40.18	41.10																	
WC18-12C			187377	4654	C	100	41.10	44.80	100	41.10	44.80	3.70	3.24	Coal	80.3%	1.59	0.57	2.72	24.44	72.27	0.42	8.0	97.7	1.25	
WC18-12C					CR	none	44.80	45.05		44.80	45.05	0.25	0.22	Carbonaceous mudstone	60.0%										
WC18-12C			187378	4655	DC	201	53.00	53.20	201	53.00	54.60	1.60	1.13	Coal	23.8%	2.87	0.47	9.02	22.57	67.94	0.71	7.0	97.7	1.30	
					C		53.20	54.30																	
					DC		54.30	54.60																	
WC18-12C			187379	4656	DC	202	56.40	56.60	202	56.40	57.10	0.70	0.61	Coal	58.6%	1.88	0.81	4.33	20.55	74.31	0.63	3.0	98.6	1.28	
					C		56.60	57.10																	
WC18-12C			187380	4657	R		57.10	57.35		57.10	57.55	0.45	0.39	Ash	35.6%	1.89	0.71	80.10	12.90	6.29	0.63	-	-	2.31	
					CR		57.35	57.55																	
WC18-12C			187381	4658	C		57.55	57.90		57.55	57.90	0.35	0.31	Coal	85.7%	1.40	0.51	6.77	25.41	67.31	0.80	8.0	97.1	1.31	
					CBSH	330	62.70	62.90	330																
					Fault	Poss.	62.90	63.00	Fault																
					CBSH	330	68.50	68.75	330																
WC18-12C			188218	4972	DC	310	71.15	71.50	310	71.15	71.50	0.35	0.24	Dirty coal	14.3%	1.03	0.35	25.91	10.43	54.31	0.69	6.5	98.0	1.47	
WC18-12C			188219	4973	CR		71.50	71.65		71.50	71.65	0.15	0.10	Coaly rock	53.3%	0.96	0.61	58.67	12.55	28.17	0.38	--	--	1.86	
WC18-12C			187382	4659	DC	300	73.90	74.15	300	73.90	75.12	1.22	0.80	Coal/Dirty coal	65.6%	3.05	0.56	23.96	18.18	57.30	0.53	1.0	98.8	1.46	
					C		74.15	74.53																	
					R		74.53	74.68																	
					C		74.68	75.12																	
WC18-12C			187383	4660	C	320	79.80	80.28	320	79.80	80.28	0.48	0.31	Coal	79.2%	2.44	0.47	7.91	19.56	72.06	0.74	2.0	98.8	1.33	
					CBSH	340	85.10	85.80	340																
					CR		85.80	85.90																	
					CBSH		85.90	86.15																	
					CR		86.15	86.30																	
					CBSH		86.30	86.55																	
					R		86.55	87.45																	
					CBSH		87.45	88.00																	
					R		88.00	88.15																	
					CBSH		88.15	88.35																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 19 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-12C					DC	410	118.85	119.20	410	118.85	119.20	0.35	0.25	Coal	48.6%										
WC18-12C					CR	none	120.00	120.20		120.00	120.20	0.20	0.14	Mudstone	100.0%										
WC18-12C			187384	4661	C	401	120.20	121.85	401	120.20	121.85	1.65	1.17	Dirty coal	14.5%	1.62	0.64	22.17	22.07	55.12	0.40	2.0	98.6	1.48	
WC18-12C			187385	4662	C	400	121.85	123.70	400	121.85	123.70	1.85	1.31	Coal	20.0%	5.11	0.60	18.46	19.82	61.12	0.40	4.0	98.6	1.40	
WC18-12C					CR	none	123.70	124.00		123.70	124.00	0.30	0.21	Carbonaceous muddy siltstone	33.3%										
WC18-12C					C	420	125.50	125.75	420	125.50	125.75	0.25	0.18	Coal with ash parting	44.0%										
WC18-12C			187386	4663	DC	440	127.22	127.34	440	127.22	128.20	0.98	0.69	Coal	90.8%	2.07	0.74	14.59	18.45	66.22	0.59	2.0	98.8	1.38	
					C		127.34	127.80																	
					DC		127.80	127.90																	
					C		127.90	128.20																	
WC18-12C			187387	4664	CR		128.20	128.38		128.20	128.38	0.18	0.13	Ash	83.3%	1.27	0.52	80.58	12.08	6.82	0.08	-	-	2.37	
WC18-12C			187388	4665	C		128.38	128.70		128.38	128.70	0.32	0.23	Coal	12.5%	1.34	0.63	41.46	15.40	42.51	0.41	-	-	1.64	
					CR	442	131.56	131.75	442																
WC18-12C					CR		132.80	133.20		132.80	133.20	0.40	0.30	Coal	12.5%										
					CBSH	463	136.60	137.00	463																
WC18-12C					DC	460	143.40	143.70	460	143.40	143.70	0.30	0.25	Dirty coal	36.7%										
					CBSH	483	150.32	150.50	483																
WC18-12C					CR	none	159.20	159.35		159.20	159.35	0.15	0.10	Silty mudstone	100.0%										
WC18-12C			187389	4666	C	480	159.35	159.60	480	159.35	160.70	1.35	0.90	Coal, Coaly mudstone, Dirty coal	68.9%	3.00	0.46	19.51	28.22	51.81	0.86	7.5	98.6	1.47	
					CBSH		159.60	159.75																	
					DC		159.75	159.95																	
					C		159.95	160.70																	
WC18-12C					DC	A71	175.45	175.80	A71	175.45	175.80	0.35	0.24	Coal/Dirty coal	31.4%										
WC18-12C			187390	4667	C	A7	177.25	178.30	A7	177.25	178.50	1.25	0.84	Coal/Coaly mudstone	13.6%	1.29	0.51	20.17	17.45	61.87	0.79	2.5	99.1	1.43	
					DC		178.30	178.50																	
					CBSH	A5	186.70	187.60	A5																
					CR		187.60	187.90																	
					CBSH		187.90	188.10																	
WC18-12C					DC	A3	193.95	194.30	A3	193.95	194.30	0.35	0.23	Coal	45.7%										
					CBSH	A1	195.30	195.70	A1																
WC18-13C			187391	4668	DC	150	3.00	3.15	150	3.00	4.60	1.60	1.07	Coal	31.3%	8.53	3.37	25.57	22.52	48.54	0.76	0.5	9.4	1.55	
					C		3.15	3.65																	
					CR		3.65	3.80																	
					C		3.80	3.95																	
					DC		3.95	4.10																	
					C		4.10	4.30																	
					DC		4.30	4.60																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 20 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Appar-ent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-13C					CR	none	4.60	4.85		4.60	4.85	0.25	0.17	Not recovered	0.0%										
WC18-13C					CR	none	5.85	6.20		5.85	6.20	0.35	0.23	Powdered mudstone	37.1%										
WC18-13C					CR	none	6.35	6.80		6.35	6.80	0.45	0.30	Muddy siltstone	31.1%										
WC18-13C					DC	none	6.80	7.10		6.80	7.10	0.30	0.20	Not recovered	0.0%										
WC18-13C			188220	4974	CR	130	11.32	11.80	130	11.32	11.80	0.48	0.32	Powdered mudstone and coal	41.7%	5.35	0.77	64.67	11.77	22.79	0.42	--	--	1.97	Bad recovery with mudstone contamination - hard to separate
WC18-13C			187392	4669	DC	111	16.70	16.85	111	16.70	17.00	0.30	0.22	Coal	86.7%	1.74	0.66	7.59	26.23	65.52	0.87	7.0	85.8	1.33	17.00 to 17.20 picked as dirty coal, however core shows a small sandy siltstone [rock] interval separating the coals
					C		16.85	17.00																	
			187393	4670	DC [R]		17.00	17.20		17.00	17.20	0.20	0.15	Sandy siltstone	80.0%	1.40	0.70	87.86	5.52	5.92	0.09	-	-	2.40	
			187394	4671	C		17.20	17.60		17.20	17.60	0.40	0.29	Coal	90.0%	1.51	0.54	10.96	25.43	63.07	0.80	7.5	97.1	1.40	
WC18-13C			187395	4672	C	110	19.45	20.20	110	19.45	20.20	0.75	0.47	Coal	14.7%	2.07	1.51	10.12	22.27	67.10	0.79	7.0	92.3	1.38	
WC18-13C			187396	4673	DC	101	28.45	28.60	101	28.45	29.95	1.50	1.18	Coal	30.0%	2.75	1.05	18.20	19.63	71.12	0.50	1.5	99.1	1.35	
					C		28.60	29.95																	
WC18-13C			187397	4674	C	100	29.95	32.65	100	29.95	32.90	2.95	2.32	Coal	57.6%	5.75	0.85	10.32	21.39	67.44	0.49	3.5	91.1	1.35	
					DC		32.65	32.90																	
WC18-13C			187398	4675	C	201	39.95	40.90	201	39.95	40.90	0.95	0.64	Coal/Coaly rock	33.7%	3.69	0.45	15.63	22.47	61.45	0.66	7.5	98.0	1.37	Carbonaceous mudstone on either side of the coal has been ground into small pieces and are hard to pick out of the crushed coal. A 1cm intact ash layer was bagged.
WC18-13C			187399	4676	DC	202	46.90	47.00	202	46.90	47.40	0.50	0.38	Coal	96.0%	1.82	0.65	7.26	20.25	71.84	0.74	2.2	97.7	1.33	
					C		47.00	47.40																	
WC18-13C			187400	4677	CBSH		47.40	47.60		47.40	47.60	0.20	0.15	Ash layer	85.0%	1.33	0.64	77.07	13.94	8.35	0.10	-	-	2.27	Carbonaceous shale--> Ash layer.
WC18-13C			187401	4678	CR		47.60	47.80		47.60	48.30	0.70	0.53	Coal	58.6%	1.75	0.61	9.90	23.43	66.06	0.81	9.0	98.3	1.32	
					C		47.80	48.30																	
					CBSH	330	54.55	55.10	330																
					CBSH	310	58.00	58.55	310																
WC18-13C			187402	4679	CR	none	68.25	68.40	300	68.25	69.65	1.40	0.99	Coal	64.3%	2.53	0.58	14.30	19.64	65.48	0.70	4.0	97.1	1.39	The geophysical picks and the geo-physical log display a ~50cm parting, labelled as carbonaceous shale and rock, with a small amount of coal on either side. In the box there is evidence that this parting of rock does not exist. The amount of coal (as seen in photo and box) is a relatively intact broken stick and exceeds the predicted amount of coal. There is a small (9cm) ash layer uphole of the coal, followed by 90cm of broken stick coal, directly followed by rock.
					C	300	68.40	68.62																	
					DC		68.62	68.85																	
					R		68.85	69.15																	
					CBSH		69.15	69.35																	
					C		69.35	69.65																	
WC18-13C			187403	4680	C	320	74.62	75.18	320	74.62	75.18	0.56	0.36	Coal, dirty coal	96.4%	1.47	0.57	19.56	18.93	60.94	0.86	4.5	98.3	1.42	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 21 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth From (m)	Depth To (m)	Bed	Depth From (m)	Depth To (m)	Thickness Apparent	Thickness True	Lithological details	Core recovery (percent)	Proximate analysis Mar	Mad	Aad	VMad	FCad	Additional analysis Sad	FSIad	%LT	SGad	
					CBSH	340	81.20	81.90	340																
					CR		81.90	82.05																	
					CBSH		82.05	82.15																	
					CR		82.15	82.32																	
					CBSH		82.32	82.80																	
					R		82.80	83.85																	
					CBSH		83.85	85.30																	
					CBSH	360	90.55	90.95	360																
WC18-13C					CR	430	112.75	112.85	430	112.75	113.15	0.40	0.29	Coal	55.0%										
					C		112.85	113.15																	
WC18-13C			187404	4681	DC	410	115.60	115.85	410	115.60	117.05	1.45	0.87	Coal	66.2%	1.91	0.73	7.79	18.23	73.25	0.54	1.0	99.7	1.34	Contamination from adjacent rock - a lot of broken up rounded mudstone pebbles, hard to sort out from blocky, pieced coal.
					C		115.85	117.05																	
WC18-13C			187405	4682	C	401	117.55	119.60	401	117.55	119.60	2.05	1.23	Coal	96.1%	4.06	0.76	4.91	19.74	74.59	0.43	2.0	99.7	1.31	
WC18-13C			187406	4683	C	400	119.60	122.80	400	119.60	122.80	3.20	1.93	Coal	61.9%	3.10	0.81	9.69	20.25	69.25	0.37	4.5	96.8	1.33	
WC18-13C			187407	4684	DC	420	125.60	125.75	420	125.60	126.20	0.60	0.39	Coal, ash parting	20.0%	2.70	0.69	63.06	13.08	23.17	0.18	-	-	2.03	A thin 5cm ash band is found in between the coal.
					C		125.75	126.00																	
					DC		126.00	126.20																	
WC18-13C					DC		130.18	130.28		130.18	130.28	0.10	0.06	Carbonate coal	50.0%										Coal with ample carbonate veins running through it at contact between rock and coal. Not sampled as it abuts the uphole rock and is not in between mineable coal.
WC18-13C			187408	4685	C	440	130.28	130.63	440	130.28	131.05	0.77	0.48	Coal/ upper thin ash parting	31.2%	1.93	0.63	23.05	19.07	57.25	0.51	5.5	99.4	1.45	The geophysical interpretation was altered within the 440 band in order to adjust for two ash bands being labelled as rock and dirty coal. Two samples were taken (1st bag with coal and thin parting and coal, 2nd bag with thin parting and remaining coal).
					DC		130.63	130.75																	
					C		130.75	130.90																	
					DC		130.90	131.05																	
WC18-13C			187409	4686	R		131.05	131.20		131.05	131.60	0.55	0.35	lower thicker ash parting/coal	12.7%	1.48	0.62	24.63	18.70	56.05	0.51	4.5	99.4	1.48	
					C		131.20	131.35																	
					DC		131.35	131.45																	
					C		131.45	131.60																	
					DC	442	133.72	133.90	442																
					CBSH	463	139.85	140.30	463																
					DC	460	145.50	145.65	460																
					CBSH	483	157.00	157.50	483																
WC18-14C					CR	none	14.95	15.10		14.95	15.10	0.15	0.15	Siltstone	100.0%										
WC18-14C			187933	4687	C	150	15.10	15.70	150	15.10	15.95	0.85	0.85	Coal	22.4%	3.12	1.47	34.17	19.16	45.20	0.69	1.5	76.8	1.57	Dirty sample due to crushed coal with mixed coaly mudstone
					DC		15.70	15.95																	
WC18-14C					CR	130	20.50	20.70	130	20.50	20.70	0.20	0.20	Siltstone with coal spars	0.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 22 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth From (m)	Depth To (m)	Bed	Depth From (m)	Depth To (m)	Thickness Apparent	Thickness True	Lithological details	Core recovery (percent)	Proximate analysis Mar	Mad	Aad	VMad	FCad	Additional analysis Sad	FSIad	%LT	SGad	
WC18-14C			187934	4688	C	111	24.00	24.50	111	24.00	24.50	0.50	0.50	Coal	102.0%	1.74	0.50	15.90	28.73	54.87	0.75	6.5	96.5	1.44	Interval changed, more coal in box than in geophysics log
WC18-14C			187935	4689	C	110	25.30	25.60	110	25.30	25.60	0.30	0.30	Coal	140.0%	1.74	0.71	5.88	23.70	69.71	0.68	8.0	96.5	1.30	More coal in box than in geophysics log
WC18-14C			187936	4690	C	101	27.00	28.12	101	27.00	28.12	1.12	1.11	Coal/Ash	90.2%	1.98	0.80	10.08	21.14	67.98	0.44	2.0	97.7	1.36	1cm ash band included in sample
WC18-14C			187937	4691	C	100	28.12	30.00	100	28.12	30.18	2.06	2.04	Coal/Ash	87.9%	1.93	0.65	3.06	24.38	71.91	0.40	8.0	97.7	1.28	1cm ash band included in sample
					DC		30.00	30.18																	
WC18-14C			187938	4692	CR	none	30.18	30.40		30.18	30.40	0.22	0.22	Coaly mud	54.5%	3.34	0.57	21.35	21.60	56.48	0.35	7.5	97.7	1.41	coaly mud, soft, black
WC18-14C			187939	4693	CR		34.82	35.05		34.82	35.05	0.23	0.22	Coaly mudstone	65.2%	1.52	0.60	52.28	14.79	32.33	0.30	-	-	1.81	
WC18-14C			187940	4694	C	201	35.05	35.80	201	35.05	35.80	0.75	0.70	Coal	84.0%	2.37	0.61	7.88	22.65	68.86	0.64	8.0	97.7	1.30	
WC18-14C			187941	4695	CR		35.80	36.00		35.80	36.00	0.20	0.19	Coaly mudstone	15.0%	1.45	0.79	59.04	14.28	25.89	0.24	-	-	1.89	
WC18-14C			187942	4696	DC	202	37.15	37.22	202	37.15	37.22	0.07	0.07	Coaly mudstone	71.4%	1.20	0.55	59.84	14.47	25.14	0.25	-	-	1.94	
WC18-14C			187943	4697	C		37.22	37.50		37.22	37.50	0.28	0.26	Coal	142.9%	2.65	0.81	4.85	20.80	73.54	0.61	3.0	99.1	1.30	More coal in box than in geophysical log
WC18-14C			187944	4698	DC		37.50	37.87		37.50	37.87	0.37	0.35	Ash/Coal	97.3%	1.92	0.43	33.40	20.12	46.05	0.50	7.5	96.0	1.55	6cm ash band sampled with 30cm of coal
					C		37.87	38.10																	
WC18-14C					CR	none	46.35	46.60		46.35	46.60	0.25	0.23	Carb. mudstone	88.0%										
WC18-14C			187945	4699	C	300	48.45	48.80	300	48.45	49.00	0.55	0.51	Dirty coal/Coal	80.0%	3.14	0.53	19.52	18.26	61.69	0.55	2.0	97.4	1.42	
					DC		48.80	49.00																	
WC18-14C			187946	4700	C		49.00	49.15		49.00	49.40	0.40	0.37	Ash(?)/Coal	85.0%	1.53	0.40	15.70	26.88	57.02	0.46	4.0	96.2	1.45	Sample includes a 7cm ash(?) band
					CR	none	49.15	49.40																	
WC18-14C			187947	4701	C	320	51.75	52.12	320	51.75	52.12	0.37	0.35	Coal	89.2%	1.35	0.38	16.70	21.01	61.91	0.66	3.0	97.4	1.40	
					CBSH		54.80	55.35																	
WC18-14C					CR		55.35	55.45	340	55.35	55.45	0.10	0.10	Coaly mudstone	20.0%										
					CBSH	340	55.45	55.50																	
					R		55.50	55.90																	
					CBSH		55.90	56.55																	
WC18-14C					CR	410	77.60	78.00	410	77.60	78.00	0.40	0.39	Not recovered	0.0%										
WC18-14C			187948	4702	C	401	78.60	79.05	401	78.60	79.05	0.45	0.44	Coal	66.7%	2.51	0.37	27.93	20.35	51.35	0.42	0.5	97.7	1.55	
WC18-14C			187949	4703	DC	400	79.05	79.40	400	79.05	80.00	0.95	0.93	Ash/Coal	101.1%	5.50	0.66	4.38	20.18	74.78	0.45	1.0	92.0	1.30	2cm ash parting in sample
					C		79.40	80.00																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 23 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-14C			187950	4704	Fault	Estab.	80.00	80.10	401/400	80.00	86.90	6.90	6.77	Coal/Dirty coal	40.1%	5.30	0.61	4.79	21.09	73.51	0.43	4.0	96.8	1.29	Crushed coal, not able to separate 401 from 400
					C	401	80.10	81.20																	
					DC	400	81.20	81.75																	
					C		81.75	81.80																	
					Fault	Poss.	81.80	81.85	Fault																
					C	400	81.85	85.05																	
					DC		85.05	85.40																	
					Fault	Estab.	85.40	85.50	Fault																
					C	400	85.50	86.90	400																
WC18-14C			187951	4705	DC		86.90	87.38		86.90	87.38	0.48	0.47	Coaly mudstone/Coal	37.5%	7.48	0.79	50.75	14.40	34.06	0.28	-	-	1.78	
WC18-14C					CR	none	88.45	88.70		88.45	88.70	0.25	0.25	Silty mudstone	100.0%										
WC18-14C			187952	4706	C	420	88.70	88.95	420	88.70	88.95	0.25	0.25	Coal	64.0%	2.92	0.54	23.70	20.63	55.13	0.38	1.0	97.1	1.50	
WC18-14C			187953	4707	DC		92.25	92.32		92.25	92.32	0.07	0.07	Coaly mudstone	214.3%	1.78	0.65	55.21	11.84	32.30	0.35	-	-	1.80	
WC18-14C			187954	4708	C		92.32	92.70		92.32	92.70	0.38	0.37	Coal/Ash	97.4%	3.02	0.51	9.89	18.24	71.36	0.62	1.0	97.4	1.34	2cm ash parting in sample
WC18-14C			187955	4709	DC	440	92.70	92.90	440	92.70	93.30	0.60	0.59	Ash/Coal	38.3%	1.42	0.56	33.58	18.21	47.65	0.46	3.5	97.7	1.56	7cm ash parting in sample
					C		92.90	93.05																	
					DC		93.05	93.30																	
					CBSH	442	95.50	96.00	442																
					CBSH	463	102.10	102.60	463																
					CBSH	460	106.90	107.05	460																
WC18-14C					CR		107.05	107.30		107.05	107.30	0.25	0.25	Coal	20.0%										
					CBSH	483	114.20	114.70	483																
WC18-14C			187956	4710	C	480	118.80	119.15	480	118.80	119.30	0.50	0.50	Coal	62.0%	1.52	0.45	11.31	25.19	63.05	1.00	8.0	95.4	1.36	
					DC		119.15	119.30																	
WC18-14C			188230	4984	CBSH	none	127.00	127.20	A71	127.00	127.45	0.45	0.45	Dirty coal, Coal	82.2%	1.66	0.58	31.38	16.42	51.62	0.79	8.0	98.6	1.52	Carbonaceous shale--> dirty coal, picks were combined in order to accommodate for high amount of coal logged.
					DC	A71	127.20	127.45																	
WC18-14C			187957	4711	DC	A7	127.95	128.40	A7	127.95	128.95	1.00	0.99	Coal	86.0%	1.76	0.54	19.45	17.85	62.16	0.79	5.0	98.0	1.40	
					C		128.40	128.95																	
WC18-14C			187958	4712	DC		128.95	129.10		128.95	129.10	0.15	0.15	Stony coal	126.7%	1.34	0.60	38.62	16.04	44.74	0.76	7.0	98.3	1.59	
					CBSH	A5	135.70	136.40	A5																
					CBSH	310	5.20	5.42	310																
WC18-15C					DC		5.42	5.60		5.42	5.60	0.18	0.18	Not recovered	0.0%										
WC18-15C					CR		5.60	5.82		5.60	5.82	0.22	0.21	Not recovered	0.0%										
WC18-15C			187959	4713	DC	300	11.95	12.10	300	11.95	12.60	0.65	0.65	Coal	73.8%	4.17	0.74	21.84	17.84	59.58	0.67	0.5	79.0	1.46	
					C		12.10	12.60																	
					CBSH	320	15.60	16.50	320																

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 24 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
					CBSH	340	19.40	20.70	340																
					R		20.70	22.35																	
					CBSH		22.35	23.20																	
					CBSH	360	32.72	32.90	360																
WC18-15C					DC	430	41.70	42.05	430	41.70	42.05	0.35	0.33	Carbonaceous rubble	28.6%										
WC18-15C			187960	4714	DC	410	45.12	45.35	410	45.12	46.18	1.06	1.04	Coal	12.3%	1.35	0.65	6.33	18.10	74.92	0.65	1.0	98.6	1.32	Hard to cleanly separate broken siltstone/mudstone from the broken coal. There may be some mixing
					C		45.35	46.18																	
WC18-15C					CR		47.38	47.58		47.38	47.58	0.20	0.20	Muddy siltstone	0.0%										Not sampled - muddy siltstone
WC18-15C			187961	4715	C	401	47.58	48.55	401	47.58	48.55	0.97	0.95	Coal	89.7%	1.59	0.58	4.32	19.36	75.74	0.45	3.0	96.0	1.29	No parting found between seams 401/400. Distinction between seams was chosen based on a slightly harder coal that transitioned into ground up softer coal. .
WC18-15C			187962	4716	DC	400	48.55	48.65	400	48.55	50.30	1.75	1.71	Coal	28.6%	1.67	0.39	2.98	21.43	75.20	0.44	5.0	96.0	1.28	
					C		48.65	50.30																	
WC18-15C			187963	4717	DC		50.30	50.65		50.30	50.65	0.35	0.34	Ash parting, coal	37.1%	2.99	0.70	37.47	17.25	44.58	0.34	1.0	96.2	1.60	
WC18-15C					CR		50.65	50.85		50.65	50.85	0.20	0.20	Carbonaceous silty mudstone	0.0%										
WC18-15C					DC	420	51.05	51.30	420	51.05	51.30	0.25	0.24	Coal	12.0%										
WC18-15C			187964	4718	C	440	53.82	54.27	440	53.82	54.45	0.63	0.61	Coal	39.7%	1.38	0.37	12.54	18.21	68.88	0.57	2.5	98.0	1.37	
					DC		54.27	54.37																	
					C		54.37	54.45																	
WC18-15C			187965	4719	DC		54.45	54.52		54.45	54.85	0.40	0.38	Ash, Coal	45.0%	1.02	0.37	51.80	16.39	31.44	0.28	-	-	1.82	
					C		54.52	54.85																	
WC18-15C					CR	442	56.70	57.10	442	56.70	57.10	0.40	0.38	Siltstone	0.0%										
					CBSH	463	63.90	64.50	463																
WC18-15C					DC	460	68.60	68.80	460	68.60	68.80	0.20	0.20	Dirty coal	55.0%										
WC18-15C			187966	4720	C	480	79.05	79.20	480	79.05	79.20	0.15	0.15	Coal	80.0%	1.45	0.52	10.99	24.29	64.20	1.03	7.0	97.7	1.38	
WC18-15C			187967	4721	DC		79.20	79.35		79.20	80.00	0.80	0.79	Ash parting,Coal/Dirty Coal	103.8%	2.78	0.62	20.59	22.36	56.43	0.91	7.5	97.7	1.45	
					C		79.35	79.80																	
					DC		79.80	80.00																	
WC18-15C			187968	4722	C	A71	85.70	86.12	A71	85.70	86.12	0.42	0.40	Coal	69.0%	1.37	0.54	7.92	24.78	66.76	1.10	8.0	97.1	1.31	
WC18-15C			187969	4723	C	A7	87.10	87.50	A7	87.10	87.60	0.50	0.46	Coal dust	20.0%	7.62	0.58	25.18	18.42	55.82	0.85	7.0	96.5	1.46	
					DC		87.50	87.60																	
WC18-15C					DC	A72	88.13	88.30	A72	88.13	88.30	0.17	0.13	Not recovered	0.0%										
					CR	A5	95.72	96.00	A5																
WC18-16C					DC	110	2.50	2.90	110	2.50	2.90	0.40	0.38	Not recovered	0.0%										Inside casing -- not recovered
WC18-16C			187970	4724	C	101	8.80	9.25	101	8.80	9.25	0.45	0.43	Coal	88.9%	1.76	0.64	10.64	20.48	68.24	0.54	2.0	92.3	1.37	
WC18-16C			187971	4725	C	100	9.25	10.65	100	9.25	10.65	1.40	1.35	Coal	35.7%	6.60	0.55	5.86	27.06	66.53	0.53	7.5	89.4	1.28	
WC18-16C					CR		10.65	10.93		10.65	10.93	0.28	0.27	Carbonaceous muddy siltstone	60.7%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 25 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-16C			187972	4726	C	201	15.40	16.00	201	15.40	16.15	0.75	0.72	Coal	16.0%	2.44	0.72	25.77	20.36	53.15	0.58	7.0	94.0	1.48	
					DC		16.00	16.15																	
WC18-16C			187973	4727	CR		18.55	18.70		18.53	18.62	0.09	0.09	Ashy/Coaly mudstone?	100.0%	1.25	0.52	72.84	12.39	14.25	0.20	-	-	2.17	Less than 35cm - however it is the abutting roof of seam 202 and appears coaly.
WC18-16C			187974	4728	C	202	18.70	18.85	202	18.62	19.03	0.41	0.39	Coal	100.0%	1.78	0.62	11.53	18.85	69.00	0.66	1.5	99.7	1.37	Picks for seam 202 were expanded up and downhole to accommodate for the large amount of recovered coal in the box. Ash bands present in coal seam.
WC18-16C			187975	4729	DC		18.85	19.20		19.03	19.35	0.32	0.31	Ash parting, coal	100.0%	1.87	0.69	44.36	17.61	37.34	0.45	-	-	1.70	
WC18-16C			187976	4730	CBSH		37.55	37.75		37.55	37.75	0.20	0.18	Coal and altered coaly rock?	95.0%	1.04	0.48	35.14	35.21	29.17	0.49	1.0	98.0	1.86	Carb, shale--> Coaly rock/Coal. Carbonaceous shale was cho-sen to represent this interval of coal and coaly rock.
WC18-16C			187977	4731	C	300	37.75	38.12	300	37.75	38.12	0.37	0.34	Coal	59.5%	4.60	0.62	13.61	20.82	64.95	0.82	6.5	96.8	1.37	
WC18-16C					CBSH	320	41.20	41.45	320																
					CR		41.45	41.60		41.45	41.60	0.15	0.13	Carbonaceous siltstone	0.0%										
					CBSH		41.60	41.85																	
					CBSH	340	44.85	45.45	340																
WC18-16C					CR		45.45	45.60		45.45	45.60	0.15	0.13	Carbonaceous silty mudstone	53.3%										
					CBSH		45.60	45.85																	
					R		45.85	46.63																	
					CBSH		46.63	47.50																	
WC18-16C					DC	430	66.12	66.40	430	66.12	66.40	0.28	0.26	Coal	29.6%										
WC18-16C			187978	4732	C	410	68.55	68.95	410	68.55	68.89	0.34	0.32	Coal	100.0%	5.09	0.61	16.91	17.52	64.96	0.54	1.0	98.6	1.42	Picks were changed in order to accommodate for large amount of coal recovery in box.
WC18-16C			187979	4733	Fault	Poss.	68.95	69.05	Possible	68.89	69.03	0.14	0.13	Siltstone parting	92.9%	2.49	1.07	87.47	5.72	5.74	0.70	-	-	2.41	
WC18-16C			187980	4734	C	410	69.05	69.30	410	69.03	69.30	0.27	0.25	Coal	96.3%	7.92	0.66	8.71	18.03	72.60	0.58	1.5	98.3	1.35	
WC18-16C			187981	4735	C	401	70.28	71.00	401	70.28	71.00	0.72	0.67	Coal	51.4%	5.32	0.71	13.70	17.99	67.60	0.41	0.5	99.4	1.39	Coal-on-coal contact between 401 and 400 was chosen based on the 400's harder dirty coal (ground out at upper contact) underlying the top 401's extremely crushed and pulverised coal.
WC18-16C			187982	4736	DC	400	71.00	71.38	400	71.00	73.08	2.08	1.94	Dirty Coal/Coal	82.7%	2.78	0.63	8.45	19.44	71.48	0.40	2/5	98.3	1.35	
					C		71.38	72.60																	
					DC		72.60	73.08																	
WC18-16C			187983	4737	DC	420	73.80	73.95	420	73.80	73.95	0.15	0.14	Coal	33.3%	1.88	0.61	18.88	18.88	61.63	0.40	4.0	96.8	1.45	
WC18-16C			187984	4738	CR		73.95	74.20		73.95	74.20	0.25	0.23	Ash Parting/Coal	60.0%	0.75	0.47	48.11	18.25	33.17	0.27	-	-	1.80	CR mislabelled - ash band and coal rather than CR
WC18-16C			187985	4739	C	440	77.70	77.92	440	77.70	77.90	0.20	0.19	Coal	40.0%	1.72	0.50	10.18	19.52	69.80	0.66	4.5	99.1	1.36	Picks were changed in order to accommodate for one thin and one thick ash parting.
WC18-16C			187986	4740	DC		77.92	78.28		77.90	78.09	0.19	0.18	Ash parting/Coal	89.5%	1.33	0.55	30.46	19.12	49.87	0.52	6.5	98.6	1.57	
WC18-16C			187987	4741						78.09	78.20	0.11	0.10	Ash parting	90.9%	0.72	0.54	62.21	15.64	21.61	0.23	-	-	2.05	
WC18-16C			187988	4742	C		78.28	78.50		78.20	78.50	0.30	0.28	Coal/Dirty coal	96.7%	1.79	0.42	9.50	20.01	70.07	0.70	5.5	98.0	1.34	
					CBSH	442	79.90	80.30	442																
					CBSH	463	84.75	85.15	463																
WC18-16C					CR	460	89.22	89.55	460	89.22	89.55	0.33	0.31	Coal	39.4%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 26 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-16C			187989	4743	DC	480	101.30	101.53	480	101.30	101.53	0.23	0.22	Coal/Coaly rock	43.5%	1.69	0.41	29.87	35.04	34.68	0.63	8.0	92.5	1.75	
WC18-16C			187990	4744	C		101.53	102.10		101.53	102.30	0.77	0.74	Coal	83.1%	2.59	0.54	16.72	21.26	61.48	1.00	2.0	97.1	1.39	
					DC		102.10	102.30																	
WC18-16C			187991	4745	CBSH		102.30	102.48		102.30	102.48	0.18	0.17	Coaly mudstone/ Mudstone	83.3%	2.48	0.69	57.95	13.06	28.30	1.01	-	-	1.86	Carbonaceous shale--> Coaly rock, this interval was chosen to reflect the coaly mudstone
WC18-16C			187992	4746	C	A71	108.00	108.35	A71	108.00	108.35	0.35	0.34	Coal/Dirty Coal	80.0%	1.25	0.40	12.30	20.50	66.80	0.97	8.5	97.7	1.34	
WC18-16C			187993	4747	C	A7	109.30	110.15	A7	109.30	110.30	1.00	0.86	Coal/Dirty coal	52.0%	1.46	0.50	14.22	19.41	65.87	0.85	1.5	97.7	1.36	
					DC		110.15	110.30																	
					CR	A5	117.00	117.15																	
WC18-16C					DC	A3	122.45	122.75	A3	122.45	122.75	0.30	0.27	Not recovered	0.0%										
WC18-16C					CBSH	A1	123.40	123.60	A1	123.40	123.75	0.35	0.32	Coaly mdst	20.0%										
					CR		123.60	123.75																	
WC18-17C			187994	4748	C	150	16.80	17.00	150	16.80	17.00	0.20	0.19	Coal	25.0%	3.31	0.97	15.01	21.57	62.45	0.90	1.0	91.7	1.36	
WC18-17C			187995	4749	DC		17.00	17.60		17.00	17.60	0.60	0.58	Ash parting/Coal	61.7%	3.32	1.14	35.19	18.43	45.24	0.69	1.5	94.2	1.58	
WC18-17C					CR	130	21.35	21.80	130	21.35	21.80	0.45	0.43	Carbonaceous siltstone	15.6%										
WC18-17C			187996	4750	C	111	27.05	27.35	111	27.05	27.20	0.15	0.15	Coal	93.3%	3.49	0.96	20.30	19.48	59.26	0.75	0.0	94.5	1.45	Picks were altered in order to accommodate for ashy dirty coal
WC18-17C			187997	4751	CBSH		27.35	27.60		27.20	27.60	0.40	0.40	Dirty ashy coal?, Coal	97.5%	3.48	1.10	20.20	23.93	54.77	0.58	0.0	97.4	1.51	
WC18-17C			187998	4752	C	110	28.30	28.65	110	28.30	28.65	0.35	0.35	Coal	62.9%	3.33	0.83	5.05	22.37	71.75	0.66	0.5	96.2	1.34	
WC18-17C					CR		28.65	28.80		28.65	28.80	0.15	0.15	Not recovered (brown mud?)	33.3%										Brown mud with little evidence of being coaly rock
WC18-17C			187999	4753	C	101	29.40	30.35	101	29.40	30.35	0.95	0.94	Coal	70.5%	2.04	0.65	10.26	20.42	68.67	0.47	2.0	98.3	1.38	Coal on coal contact was chosen based on slight change of coal quality within a broken stick
WC18-17C			188000	4754	C	100	30.35	32.05	100	30.35	32.05	1.70	1.68	Coal	86.5%	1.74	0.58	3.17	24.29	71.96	0.45	8.0	96.5	1.02	
WC18-17C			188001	4755	C	201	39.60	40.12	201	39.60	40.00	0.40	0.39	Coal	50.0%	2.53	0.49	7.73	19.93	69.85	0.95	7.0	97.4	1.33	Picks adjusted to change dirty coal to ash and coal layers
WC18-17C			188002	4756						40.00	40.12	0.12	0.12	Ash parting, Coal	83.3%	1.57	0.43	30.37	19.51	49.69	0.65	7.0	96.8	1.54	
WC18-17C			188003	4757	DC		40.12	40.20		40.12	40.20	0.08	0.08	Ash parting, Coal	87.5%	4.93	0.56	37.45	18.17	43.82	0.60	6.0	97.7	1.62	
WC18-17C			188004	4758	C	202	43.40	43.75	202	43.40	43.75	0.35	0.34	Coal	71.4%	1.77	0.53	7.00	19.26	73.21	0.68	2.5	98.6	1.34	
WC18-17C			188005	4759	CR		43.75	43.85		43.75	43.89	0.14	0.13	Dirty Ash	85.7%	1.13	0.43	74.54	14.62	10.41	0.13	-	-	2.26	Coaly rock width changed to accommodate thick ash layer.
WC18-17C			188006	4760	DC		43.85	43.98		43.89	44.20	0.31	0.30	Coal/Dirty Coal	38.7%	4.20	0.44	17.34	20.47	61.75	0.68	7.0	97.4	1.41	
					CR		43.98	44.08																	
					DC		44.08	44.20																	
WC18-17C					CR		44.20	44.30		44.20	44.30	0.10	0.10	Siltstone	100.0%										
					CBSH	310	52.80	53.20	310																
WC18-17C			188007	4761	C	300	64.45	64.83	300	64.45	64.83	0.38	0.35	Dirty coal and siltstone?	28.9%	5.66	0.64	54.12	13.36	31.88	0.43	0.5	98.6	1.86	Badly crushed and pulverised with mixed rock.
WC18-17C			188008	4762	CR	320	68.00	68.20	320	68.00	68.20	0.20	0.19	Coal	15.0%	1.91	0.45	28.01	16.18	55.36	0.62	1.0	99.7	1.52	
WC18-17C			188009	4763	DC		68.20	68.40	320	68.20	68.40	0.20	0.19	Ash/Coal	70.0%	1.84	0.53	48.42	15.48	35.57	0.50	-	-	1.79	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 27 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
					CBSH	340	74.25	74.60	340																
					R		74.60	74.92																	
					CBSH		74.92	75.39																	
					R		75.39	75.80																	
					CBSH		75.80	76.20																	
					R		76.20	79.20																	
					CBSH		79.20	79.80																	
WC18-17C					DC	430	93.90	94.20	430	93.90	94.20	0.30	0.28	Not recovered	0.0%										
WC18-17C			188010	4764	C	410	97.48	98.30	410	97.48	98.30	0.82	0.77	Coal	70.7%	2.36	0.63	15.77	17.14	66.46	0.51	1.0	98.0	1.42	
WC18-17C					CR		98.80	99.03		98.80	99.03	0.23	0.22	Siltstone	100.0%										
WC18-17C			188011	4765	C	401	99.03	99.80	401	99.03	99.80	0.77	0.70	Coal	62.3%	2.35	0.73	5.14	19.53	74.60	0.40	2.0	98.6	1.33	
WC18-17C			188012	4766	DC	400	99.80	100.00	400	99.80	101.50	1.70	1.54	Coal	75.3%	2.55	0.54	6.30	20.19	72.97	0.37	2.5	97.4	1.33	
					C		100.00	101.20																	
					DC		101.20	101.50																	
WC18-17C			188228	4982	DC	420	104.25	104.40	420	104.25	104.40	0.15	0.14	Coal	33.3%	2.08	0.39	15.22	22.78	61.61	0.53	5.0	98.3	1.41	
WC18-17C			188229	4983	CR		104.40	104.60		104.40	104.60	0.20	0.18	Ash parting and coal	75.0%	1.40	0.51	43.25	18.78	37.46	0.38	--	--	1.70	
WC18-17C			188013	4767	C	440	107.00	107.20	440	107.00	107.20	0.20	0.18	Coal	110.0%	1.40	0.45	7.06	19.62	72.87	0.67	3/5	98.8	1.34	
WC18-17C			188014	4768	DC		107.20	107.30		107.20	107.42	0.22	0.20	Ash/Coal	45.5%	0.95	0.55	44.80	18.17	36.48	0.38	4.0	97.1	1.74	
					C		107.30	107.42																	
WC18-17C			188015	4769	DC		107.42	107.58		107.42	107.85	0.43	0.40	Carb. siltstone/Ash/Coal	62.8%	1.11	0.50	37.85	17.16	44.49	0.42	1.0	97.7	1.65	
					C		107.58	107.85																	
WC18-17C					DC	442	109.05	109.20	442	109.05	109.20	0.15	0.14	Coal, Dirty coal, Coaly rock	106.7%										
					CBSH	463	113.30	113.80	463																
					CBSH	460	117.60	117.80	460																
WC18-17C					CR		117.80	118.00		117.80	118.00	0.20	0.19	Coal	50.0%										
					CBSH		118.00	118.12																	
WC18-17C			188016	4770	C	480	126.26	127.10	480	126.26	127.20	0.94	0.92	Coal/Dirty coal	98.9%	1.39	0.42	31.05	22.80	45.73	0.85	1.0	97.7	1.59	
					DC		127.10	127.20																	
WC18-17C			188017	4771	DC	A71	133.35	133.75	A71	133.35	133.75	0.40	0.36	Coal	67.5%	1.03	0.41	6.97	23.05	69.57	1.13	8.5	98.3	1.31	
WC18-17C			188018	4772	C	A7	134.45	134.65	A7	134.45	134.65	0.20	0.18	Coal	30.0%	2.69	0.59	37.25	15.90	46.26	0.64	4.5	97.1	1.61	
WC18-17C			188019	4773	DC		134.65	135.05		134.65	135.05	0.40	0.36	Carb. Mdst/DC/C	45.0%	1.61	0.80	31.03	16.47	51.80	0.66	5.0	99.1	1.55	
WC18-17C			188020	4774	CR		135.05	135.15		135.05	135.35	0.30	0.27	Carb. mudstone / Coal and mudstone	123.3%	1.16	0.53	48.11	12.79	38.57	0.58	6.5	99.1	1.73	
					DC		135.15	135.35																	
WC18-18C					CR		11.15	11.43		11.15	11.43	0.28	0.19	Silty mudstone	100.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 28 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-18C			188021	4775	C	150	11.43	11.60	150	11.43	11.64	0.21	0.14	Coal	100.0%	5.27	1.44	19.55	21.66	57.35	0.92	0.5	62.8	1.49	
WC18-18C			188022	4776	R		11.60	11.80		11.64	11.80	0.16	0.11	Coaly siltstone?	31.3%	1.29	0.83	66.24	15.33	17.60	0.29	0.0	93.1	2.12	
					DC		11.80	12.05																	
WC18-18C			188023	4777	C		12.05	12.15		11.80	12.15	0.35	0.24	Coal	51.4%	5.03	1.12	18.94	20.57	59.37	0.85	0.5	91.1	1.40	
WC18-18C			188024	4778	DC		12.15	12.45		12.15	12.46	0.31	0.21	Coaly mudstone	100.0%	3.01	1.20	54.30	12.71	31.79	0.44	0.0	94.0	1.85	
WC18-18C					CR	130	18.85	19.20	130	18.90	19.30	0.40	0.24	Not recovered	0.0%										
WC18-18C			188025	4779	DC	111	23.05	23.38	111	23.05	23.38	0.33	0.23	Coal	51.5%	3.82	1.14	10.03	22.80	66.03	0.76	0.0	95.4	1.40	
WC18-18C			188026	4780	CR		23.38	23.48		23.38	23.80	0.42	0.29	Ash/Coal	35.7%	2.88	1.11	19.35	25.41	54.13	0.61	0.0	93.4	1.52	
					DC		23.48	23.80																	
WC18-18C			188027	4781	C	110	25.30	25.75	110	25.30	25.75	0.45	0.31	Coal	68.9%	3.11	1.12	4.07	22.68	72.13	0.65	0.5	94.8	1.32	
WC18-18C			188028	4782	C	101	27.65	29.30	101	27.65	29.30	1.65	1.13	Coal/Ash	86.7%	2.82	1.23	9.48	20.00	69.29	0.47	0.0	98.0	1.40	5cm ash band in sample
WC18-18C			188029	4783	C	100	29.30	31.50	100	29.30	31.75	2.45	1.67	Coal/Dirty coal/Coalified wood	50.2%	2.74	0.89	2.37	24.13	72.61	0.52	3.5	97.4	1.29	6cm coalified wood in sample
					DC		31.50	31.75																	
WC18-18C					CR		31.75	32.05		31.75	32.05	0.30	0.15	Carbonaceous mudst.	40.0%										
WC18-18C			188030	4784	C	201	40.30	41.35	201	40.30	41.35	1.05	0.60	Coal	14.3%	6.97	0.64	35.50	16.58	47.28	0.57	3.5	98.3	1.57	
WC18-18C			188031	4785	DC	202	45.70	45.90	202	45.70	46.40	0.70	0.42	Coal	55.7%	1.65	0.50	12.60	18.85	68.05	0.66	1.5	98.6	1.39	
					C		45.90	46.40																	
WC18-18C			188032	4786	CBSH		46.40	46.60		46.40	46.60	0.20	0.13	Ash	80.0%	1.09	0.66	79.39	14.92	5.03	0.08	-	-	2.37	Carb. shale --> ash layer.
WC18-18C			188033	4787	CR		46.60	46.82		46.60	47.23	0.63	0.40	Coal/Dirty coal	38.1%	1.30	0.45	9.05	21.56	68.94	0.75	7.5	98.0	1.33	
					C		46.82	47.05																	
					DC		47.05	47.23																	
					CBSH	310?	58.70	59.75	310?																
WC18-18C					CR		76.05	76.30		76.05	76.30	0.25	0.15	Carb. mudstone / ash	100.0%										Not sampled - ash
WC18-18C			188034	4788	DC	300	76.30	76.55	300	76.30	76.75	0.45	0.26	Coal	28.9%	1.13	0.58	18.92	16.03	64.47	0.56	2.0	99.7	1.47	
					C		76.55	76.75																	
WC18-18C			188035	4789	R		76.75	77.00		76.75	77.00	0.25	0.15	Carbonaceous mudst.	68.0%	1.58	0.71	82.78	6.90	9.61	0.15	-	-	2.34	
WC18-18C			188036	4790	DC		77.00	77.08		77.00	77.60	0.60	0.35	Coal/Dirty coal	85.0%	1.59	0.48	5.44	21.03	73.05	0.82	7.0	98.6	1.30	
					C		77.08	77.60																	
WC18-18C					CR	320	81.80	82.00	320	81.80	82.22	0.42	0.26	powdered mudstone and coal	33.3%										
					C		82.00	82.22																	
					CBSH	340	90.80	92.60	340																
					R		92.60	94.30																	
					CBSH		94.30	95.45																	
					R		95.45	95.65																	
					CBSH		95.65	95.95																	
					CBSH	360	101.60	101.80	360																

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 29 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Appar-ent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-18C			188037	4791	CR	430	121.15	121.25	430	121.15	121.65	0.50	0.39	Dirty coal/Coal	98.0%	1.34	0.49	21.32	16.58	61.61	0.89	1.0	99.7	1.47	
					DC		121.25	121.40																	
					CR		121.40	121.65																	
WC18-18C					CR		125.70	125.97		125.70	125.97	0.27	0.19	Siltstone	100.0%										
WC18-18C			188038	4792	C	410	125.97	126.50	410	125.97	126.50	0.53	0.39	Coal/mudstone	32.1%	3.19	0.48	58.77	14.93	25.82	0.31	-	-	2.00	
WC18-18C			188039	4793	Fault	Prob-able	126.50	126.63		126.50	126.63	0.13	0.10	Ash	53.8%	2.44	0.46	80.64	20.02	-1.12	0.13	-	-	2.41	
WC18-18C					C	410	126.63	126.95	410	126.63	126.95	0.32	0.32		0.0%										
WC18-18C			188040	4794	R		126.95	127.40		126.95	127.40	0.45	0.33	Coal/Dirty coal	64.4%	2.32	0.85	58.73	10.65	29.77	0.24	-	-	1.95	
WC18-18C			188041	4795	C	401	127.40	128.40	401	127.40	128.40	1.00	0.74	Coal	75.0%	2.76	0.61	3.14	19.60	76.65	0.43	1.0	98.0	1.32	
WC18-18C			188042	4796	DC	400	128.40	128.60	400	128.40	130.40	2.00	1.49	Coal	91.0%	2.13	0.52	5.52	20.79	73.17	0.43	4.5	98.6	1.34	
					C		128.60	130.15																	
					DC		130.15	130.40																	
WC18-18C					DC	420	133.50	133.70	420	133.50	133.70	0.20	0.15	Coal	60.0%										
WC18-18C			188043	4797	DC		139.00	139.10		139.00	139.41	0.41	0.30	Coal	100.0%	1.16	0.54	3.91	19.29	76.26	0.69	1.5	99.1	1.29	
					C		139.10	139.40																	
WC18-18C			188044	4798	DC	440	139.40	139.52	440	139.41	139.53	0.12	0.09	Ash/Coal	100.0%	1.06	0.50	35.19	18.88	45.43	0.43	4.0	98.8	1.59	4cm ash parting was included in sample
WC18-18C			188045	4799	CR		139.52	139.75		139.53	139.75	0.22	0.16	Mudstone/Ash	86.4%	0.56	0.36	67.63	15.41	16.60	0.15	-	-	2.13	
WC18-18C			188046	4800	DC		139.75	140.15		139.75	140.15	0.40	0.30	Coal/Dirty coal	85.0%	1.06	0.47	6.03	20.69	72.81	0.65	5.5	98.0	1.35	4cm ash band in sample
WC18-18C			188047	4801	CR		140.15	140.60		140.15	140.37	0.22	0.16	Mudstone with coal	100.0%	0.72	0.48	63.93	9.91	25.68	0.25	-	-	1.90	Floor sample
WC18-18C					C		142.65	143.05		142.65	143.05	0.40	0.28	Dirty coal	27.5%										
					CBSH	310?	8.15	8.55	310?																
WC18-19C			188048	4802	C	300	16.00	16.52	300	16.00	16.52	0.52	0.51	Coal	100.0%	3.28	1.14	14.95	18.39	65.52	0.67	0.5	95.7	1.41	
					CBSH	320	19.80	20.60	320																
					CBSH	340	25.40	25.50	340																
					R		25.50	30.20																	
					CBSH		30.20	30.80																	
					CBSH	360	36.25	36.75	360																
WC18-19C					DC	430	46.80	47.05	430	46.80	47.05	0.25	0.23	Not recovered	0.0%										
WC18-19C			188221	4975	DC	410	50.45	50.60	410	50.45	51.40	0.95	0.88	Coaly rock	21.1%	1.12	0.54	22.55	17.45	59.46	0.51	1.0	99.4	1.48	Bad recovery
					C		50.60	51.40																	
WC18-19C			188049	4803	C	401	52.95	53.90	401	52.95	53.90	0.95	0.88	Coal, ash	107.4%	2.08	0.52	14.50	19.85	65.13	0.37	1.5	99.1	1.40	
WC18-19C					DC	400	53.90	54.10	400	53.90	55.85	1.95	1.84	Not recovered	0.0%										
					C		54.10	55.40																	
					DC		55.40	55.85																	
WC18-19C					C	420	55.85	56.00	420	55.85	56.10	0.25	0.24	Not recovered	0.0%										
					DC		56.00	56.10																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 30 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-19C					CR		56.10	56.30		56.10	56.30	0.20	0.19	Not recovered	0.0%										
WC18-19C					C	440	57.60	57.90	440	57.60	58.50	0.90	0.83	Not recovered	0.0%										
					DC		57.90	58.00																	
					C		58.00	58.10																	
					DC		58.10	58.20																	
					C		58.20	58.30																	
					DC		58.30	58.50																	
WC18-19C					DC	442	60.30	60.60	442	60.30	60.60	0.30	0.28	Not recovered	0.0%										
					CBSH	463	68.00	68.80	463																
WC18-19C					DC	460	72.52	72.90	460	72.52	72.90	0.38	0.35	Not recovered	0.0%										
					CBSH	483	75.70	76.00	483																
WC18-19C			188050	4804	C	480	82.50	83.18	480	82.50	83.18	0.68	0.65	Dirty coal/Coal	13.2%	1.12	0.42	9.62	25.54	64.42	1.01	7.5	98.0	1.35	Bad recovery
WC18-20C			188051	4805	C	150	9.70	9.90	150	9.70	10.00	0.30	0.26	Coal	83.3%	6.18	1.34	17.29	22.26	59.11	0.97	1.0	42.8	1.40	
					DC		9.90	10.00																	
WC18-20C			188052	4806	C		10.00	10.15		10.00	10.50	0.50	0.43	Powdered mudstone, coal, coaly rock	32.0%	5.53	0.87	56.29	13.14	29.70	0.52	-	-	1.81	
					DC		10.15	10.50																	
					CBSH	130	16.30	16.70	130																
WC18-20C			188053	4807	C	111	19.55	20.45	111	19.55	20.45	0.90	0.78	Dirty coal/Coal	84.4%	1.62	0.57	10.10	25.89	63.44	0.91	5.5	97.4	1.36	
WC18-20C			188054	4808	CR		21.40	21.65		21.40	21.65	0.25	0.22	Coaly mudstone	52.0%	1.27	0.58	34.97	16.99	47.46	0.45	2.0	98.3	1.58	
WC18-20C			188055	4809	C	110	21.65	22.05	110	21.65	22.05	0.40	0.35	Dirty coal	95.0%	1.37	0.75	13.30	19.59	66.36	0.42	1.5	97.4	1.40	
WC18-20C			188056	4810	DC	101	22.05	22.40	101	22.05	22.65	0.60	0.52	Dirty coal / Coaly rock	93.3%	1.77	0.78	28.58	18.54	52.10	0.55	3.0	98.6	1.53	
					C		22.40	22.65																	
WC18-20C			188057	4811	C	100	22.65	24.25	100	22.65	24.50	1.85	1.75	Coal/Coaly rock/Dirty coal/powdered mudstone	66.5%	3.27	0.87	15.45	21.59	62.09	0.42	7.5	97.7	1.41	
					DC		24.25	24.50																	
WC18-20C			188058	4812	C	201	28.25	28.80	201	28.25	28.80	0.55	0.52	Dirty Coal/Coal	61.8%	4.37	0.79	18.15	21.37	59.69	0.56	7.5	97.1	1.41	
WC18-20C					CR		28.80	29.00		28.80	29.00	0.20	0.19	Carbonaceous mudst.	60.0%										
WC18-20C			188059	4813	C	202	30.55	30.75	202	30.55	30.82	0.27	0.27	Coal	70.4%	1.27	0.68	4.67	20.34	74.31	0.57	4.0	97.1	1.32	
					CR		30.75	30.85																	
WC18-20C			188060	4814	DC		30.85	30.98		30.82	31.00	0.18	0.18	Carb. mudstone/Ash	83.3%	1.33	0.75	81.24	14.46	3.53	0.12	-	-	2.38	
WC18-20C			188061	4815	CR		30.98	31.07		31.00	31.32	0.32	0.31	Dirty coal/Coal	71.9%	3.17	0.66	17.80	20.47	61.07	0.57	7.0	98.0	1.42	
					DC		31.07	31.32																	
					CBSH	310?	37.00	37.20	310?																
WC18-20C			188062	4816	C	300	41.70	42.35	300	41.70	42.45	0.75	0.70	Coal	49.3%	2.03	0.52	12.03	19.56	67.89	0.65	4.5	98.3	1.37	
					DC		42.35	42.45																	
					CBSH	320	44.65	44.85																	
WC18-20C			188063	4817	DC	430	70.65	71.10	430	70.65	71.10	0.45	0.44	Coaly mudstone	20.0%	0.72	0.53	25.32	16.03	58.12	0.78	1.0	98.8	1.52	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 31 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-20C			188064	4818	C	410	74.20	74.80	410	74.20	74.27	0.07	0.07	Sub-canneloid coal/ash	100.0%	0.68	0.44	69.20	14.06	16.30	0.27	-	-	2.21	
WC18-20C			188065	4819						74.27	74.80	0.53	0.52	Sub-canneloid coal	86.8%	1.04	0.53	8.31	18.25	72.91	0.71	1.5	99.1	1.41	
WC18-20C			188066	4820	C	401	76.00	76.75	401	76.00	76.75	0.75	0.72	Coal	89.3%	1.67	0.57	6.25	19.63	73.55	0.63	1.5	98.6	1.35	
WC18-20C			188067	4821	C	400	82.42	83.00	400	82.42	83.21	0.79	0.73	Coal	50.6%	1.18	0.44	2.51	21.34	75.71	0.63	5.5	98.8	1.31	Interval from 83.42 to 83.55 was either entirely lost or was partly mixed in with sample 4822.
WC18-20C			188068	4822	DC		83.00	83.42		83.21	83.42	0.21	0.19	Ash/Coal	85.7%	3.54	0.41	22.96	18.36	58.27	0.39	1.5	98.3	1.48	Ash band from 83.26 to 83.28 included in sample
WC18-20C			188069	4823	C	420	83.55	83.70	420	83.55	83.85	0.30	0.28	Coal	83.3%	1.31	0.38	2.84	20.19	76.59	0.42	4.0	98.6	1.31	
					DC		83.70	83.80																	
WC18-20C			188070	4824	C		83.80	83.90		83.85	83.95	0.10	0.09	Ash/Coal	60.0%	0.78	0.53	65.32	15.42	18.73	0.12	1.0	99.1	2.06	Ash band from 83.80 to 83.84 included in sample
WC18-20C			188071	4825	C	440	84.95	85.30	440	84.95	85.30	0.35	0.34	Coal	74.3%	1.25	0.52	15.88	17.21	66.39	0.43	2.0	99.4	1.41	
WC18-20C			188072	4826	DC		85.30	85.40		85.30	85.85	0.55	0.53	Ash/Coal	94.5%	1.13	0.54	26.71	18.99	53.76	0.41	2.0	98.3	1.52	From 85.30 to 85.35, ash band
					C		85.40	85.65																	
					DC		85.65	85.85																	
WC18-20C			188073	4827	DC	442	86.50	86.75	442	86.50	86.75	0.25	0.24	Coal	100.0%	1.86	0.61	8.13	21.56	69.70	0.66	7.5	99.1	1.33	
					CBSH	463	97.50	97.75																	
					CBSH	460	103.35	103.50	460																
WC18-20C					CR		103.50	103.70		103.50	103.70	0.20	0.20	Coal	55.0%										
					CBSH		103.70	103.85																	
					CBSH	483	106.40	106.75	483																
WC18-20C			188074	4828	C	480	109.15	109.45	480	109.15	110.20	1.05	0.98	Coal	83.8%	1.69	0.51	14.41	21.64	63.44	0.86	7.0	99.4	1.40	
					DC		109.45	109.60																	
					C		109.60	110.20																	
WC18-20C			188075	4829	DC	A71	114.60	114.80	A71	114.60	114.80	0.20	0.20	Coaly mudstone	85.0%	0.71	0.47	46.78	13.23	39.52	0.53	1.0	99.7	1.74	
WC18-20C			188076	4830	CR		114.80	114.90		114.80	114.95	0.15	0.15	Ash	100.0%	0.58	0.32	45.51	42.84	11.33	0.30	1.5	98.8	2.22	Very poor quality sample
WC18-20C			188077	4831	DC		114.90	115.00		114.95	115.15	0.20	0.20	Coal	80.0%	1.19	0.56	10.23	21.03	68.18	1.10	9.0	99.4	1.34	
WC18-20C			188078	4832	C	A7	117.70	117.95	A7	117.70	117.95	0.25	0.25	Coal & Carb siltstone	100.0%	1.28	0.67	29.81	17.59	51.93	0.75	7.5	99.4	1.55	
					CR	A72	119.20	119.45	A72																
					CBSH	A5	125.30	125.80	A5																
					CR		125.80	125.90																	
					CBSH		125.90	126.15																	
WC18-20C			188079	4833	DC	A3	132.75	133.15	A3	132.75	133.15	0.40	0.39	Dirty Coal/Coal	60.0%	1.30	0.51	10.31	19.66	69.50	0.99	7.5	99.1	1.35	
WC18-20C			188080	4834	C	A1	135.50	136.15	A1	135.50	136.35	0.85	0.84	Coal	95.3%	1.09	0.49	12.21	19.37	67.93	0.75	3.0	99.4	1.40	The density tool was unable to pick the bottom of the seam, therefore thickness was changed
WC18-21C			188081	4835	DC	430	24.85	25.15	430	24.85	25.15	0.30	0.29	Coal/Coaly Rock	66.7%	2.65	0.66	20.26	17.30	61.78	0.93	1.0	97.7	1.49	
WC18-21C					CR		28.40	28.55		28.40	28.55	0.15	0.15	Siltstone	100.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 32 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-21C			188082	4836	C	410	28.55	29.35	410	28.55	29.35	0.80	0.78	Dirty Coal	20.0%	1.96	0.61	15.69	16.63	67.07	0.91	1.0	99.1	1.44	
WC18-21C			188083	4837	C	401	30.85	31.80	401	30.85	31.80	0.95	0.93	Coal/Dirty Coal	74.7%	7.22	0.73	7.39	19.15	72.73	0.70	1.5	93.1	1.36	
WC18-21C					CR		31.80	32.00		31.80	32.00	0.20	0.20	Carbonaceous siltstone	100.0%										
WC18-21C			188084	4838	C	400	34.20	35.75	400	34.20	35.90	1.70	1.59	Coal/Dirty Coal	44.1%	2.28	0.52	8.06	20.92	70.48	0.49	6.0	97.7	1.34	
					DC		35.75	35.90																	
WC18-21C			188085	4839	C	420	35.90	36.05	420	35.90	36.08	0.18	0.17	Coal/Dirty Coal	100.0%	2.09	0.62	3.00	19.35	77.03	0.35	2.0	98.8	1.33	
WC18-21C					CR		36.05	36.30		36.08	36.30	0.22	0.21	Ash	22.7%										
WC18-21C			188086	4840	C	440	37.10	37.40	440	37.10	37.55	0.45	0.42	Coal/Dirty Coal	84.4%	2.10	0.56	21.92	19.51	58.01	0.35	2.5	97.4	1.48	
WC18-21C			188087	4841	DC		37.40	37.70	440	37.55	37.65	0.10	0.09	Ash	50.0%	1.52	0.53	79.49	14.79	5.21	0.14	-	-	2.24	Ash band is consistently seen in 440 seam, thickness of the ash was picked off the resistivity log.
WC18-21C			188088	4842	C		37.70	38.00		37.65	38.00	0.35	0.33	Coal/Dirty Coal	91.4%	5.54	0.56	11.26	19.44	68.74	0.47	3.0	99.7	1.37	
WC18-21C			188089	4843	C	442	38.80	39.10	442	38.80	39.10	0.30	0.28	Coal	100.0%	4.65	0.57	13.45	23.66	62.32	0.63	8.5	97.4	1.36	
WC18-21C			188222	4976	CBSH	460	55.05	55.25	460	55.05	55.25	0.20	0.19	Dirty coal	35.0%	1.27	0.49	15.61	29.89	54.01	1.30	7.0	98.3	1.46	Carbonaceous shale--> dirty coal. Fines that may have come from underneath the altered ashy layer are in this bag. Small mm-cm scale shards of carb.mdst were sorted out as best as possible.
WC18-21C			188223	4977	CR		55.25	55.40		55.25	55.40	0.15	0.14	Altered ash?	73.3%	0.42	0.23	63.62	40.86	-4.71	9.98	--	--	2.91	coaly rock--> ash with high sulphide content
WC18-21C					CBSH		55.40	55.50		55.40	55.50	0.10	0.09	Missing coal? and carbonaceous mudstone pieces	0.0%										Small (mm-cm scale) carb.mdst pieces were found mixed in with the dirty coal and ash. Upper interval of the next unit has been ground out - any coal after the parting as well as carbonaceous mud-stone lost in coring process?
					CBSH	483	57.90	60.00	483						0.0%										
WC18-21C			188224	4978	CBSH		60.55	60.70		60.55	60.70	0.15	0.15	Coaly rock	46.7%	0.39	0.39	40.89	20.57	38.15	2.37	--	--	1.80	There did not appear to be 15cm of carbonaceous shale in the box, hence why I used this interval to describe the coaly rock seen in the box/core log. Large pieces of pyrite (2mm-3cm) were sorted out as best as possible however some of the finer pieces may have ended up in the bag.
WC18-21C			188090	4844	C	480	60.70	61.55	480	60.70	61.55	0.85	0.79	Dirty coal/Coal	69.4%	2.23	0.42	17.71	23.29	58.58	1.21	7.0	98.0	1.45	
WC18-21C			188225	4979	CBSH	A71	64.80	65.10	A71	64.80	64.92	0.12	0.11	Dirty coal	91.7%	1.40	0.39	31.63	36.34	31.64	0.76	7.5	97.7	1.74	Carbonaceous shale--> dirty coal and parting. Picks were changed in order to accommodate for dirty coal and large parting - inconsistent width
WC18-21C			188226	4980						64.92	65.10	0.18	0.17	Coaly-ashy rock?	88.9%	0.68	0.32	56.15	49.08	-5.55	0.18	--	--	2.76	
WC18-21C			188091	4845	CR		65.10	65.30		65.10	65.30	0.20	0.19	Coal	105.0%	2.11	0.42	15.48	23.35	60.75	1.04	8.5	98.0	1.41	
WC18-21C					C	A7	67.70	68.20	A7	67.70	68.20	0.50	0.47	Carb. mudstone	72.5%										
WC18-21C			188227	4981	DC	A72	69.10	69.50	A72	69.10	69.50	0.40	0.37	Pulverised coal and carbonaceous mudstone	25.0%	4.00	0.48	40.12	17.29	42.11	0.77	--	--	1.62	Sorted out carbonaceous mud-stone pieces as best as possible, however as the coal and carb.mdst is pulverised so fine there will be contamination.

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 33 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-22C			188092	4846	C	150	9.30	9.45	150	9.30	9.80	0.50	0.48	Coal	64.0%	4.43	1.27	16.72	21.80	60.21	0.93	1.5	70.2	1.46	Bottom ply was thickened because more coal in the core box than the picks indicated. Same situation for the coaly rock under the seam.
					DC		9.45	9.80																	
WC18-22C			188093	4847	CR		9.80	9.95		9.80	9.95	0.15	0.14	Siltstone	40.0%	3.22	1.05	67.48	10.53	20.94	0.28	--	--	2.06	
WC18-22C			188094	4848	DC		9.95	10.05		9.95	10.20	0.25	0.24	Coal	84.0%	3.92	0.43	36.76	16.96	45.85	0.66	0.5	84.1	1.62	
					CR		10.05	10.10																	
WC18-22C			188095	4849	CBSH		10.10	10.90		10.20	10.35	0.15	0.14	Carbonaceous siltstone	73.3%	3.22	0.99	54.32	12.69	32.00	0.45	--	--	1.88	
WC18-22C			188096	4850	CBSH	130	14.95	15.50	130	14.95	15.50	0.55	0.53	Dirty Coal	16.4%	8.11	0.74	52.50	14.88	31.88	0.63	--	--	1.84	
WC18-22C			188097	4851	C	111	18.20	19.15	111	18.20	19.15	0.95	0.92	Coal	100.0%	5.36	1.04	9.89	22.21	66.86	0.84	1.5	60.1	1.36	
WC18-22C			188098	4852	C	110	20.85	21.30	110	20.85	21.00	0.15	0.14	Coal	26.7%	1.87	0.37	38.11	16.75	44.77	0.72	1.5	94.0	1.62	Coal interval broken into 2 samples due to thin ash parting
WC18-22C			188099	4853						21.00	21.30	0.30	0.29	Ash parting/Coal	80.0%	1.86	0.36	20.93	18.56	60.15	0.45	1.0	96.5	1.44	
WC18-22C			188100	4854	DC		21.30	21.60		21.30	21.60	0.30	0.29	Carb siltstone	53.3%	2.14	0.71	60.68	10.95	27.66	0.65	--	--	1.89	Dirty coal actually carb siltstone
WC18-22C			188101	4855	C	101	21.60	22.05	101	21.60	22.05	0.45	0.43	Dirty coal/coal	60.0%	2.20	0.45	13.80	18.90	66.85	2.09	3.5	96.0	1.39	
WC18-22C			188102	4856	C	100	22.05	23.70	100	22.05	23.50	1.45	1.40	Coal	62.8%	4.59	0.45	5.92	22.38	71.25	1.22	7.5	93.4	1.31	
WC18-22C			188103	4857						23.50	23.80	0.30	0.29	Carbonaceous siltstone	73.3%	3.05	0.71	51.27	13.93	34.09	0.61	--	--	1.74	This interval was chosen based on the geophysical logs increase in density over ~30cm which is believed to correspond to the carb siltstone parting.
WC18-22C			188104	4858	DC		23.70	24.12		23.80	24.12	0.32	0.31	Pulverised coal and pulverised siltstone	75.0%	4.06	0.56	42.40	15.23	41.81	0.59	--	--	1.63	This interval includes the remaining coal of the 100 pick
WC18-22C			188105	4859	C	201	27.55	28.10	201	27.55	28.10	0.55	0.54	Coal	100.0%	2.36	0.48	15.85	22.41	61.26	0.67	7.0	97.7	1.38	
WC18-22C					CR		28.10	28.30		28.10	28.30	0.20	0.20	Carbonaceous siltstone	10.0%										Very carbonaceous siltstone.
WC18-22C			188106	4860	C	202	29.80	30.20	202	29.80	30.20	0.40	0.39	Coal	92.5%	2.19	0.33	9.69	19.06	70.92	0.67	2.5	98.8	1.34	
WC18-22C			188107	4861	CR		30.20	30.30		30.20	30.30	0.10	0.10	Carb siltstone	140.0%	1.43	0.47	80.62	12.39	6.52	0.14	--	--	2.33	14cm parting of carbonaceous siltstone and ash in box
WC18-22C			188108	4862	DC		30.30	30.40		30.30	30.40	0.10	0.10	Dull banded coal	150.0%	2.68	0.39	9.72	20.84	69.05	0.78	4.5	98.3	1.34	15cm dull banded coal in box
WC18-22C			188109	4863	CR		30.40	30.50		30.40	30.72	0.32	0.31	Carb siltstone	28.1%	2.67	0.72	82.09	6.96	10.23	0.18	--	--	2.27	Carbonaceous siltstone with ground bottom end. No dirty coal as in picks. Ground top end on sandy siltstone that follows
					DC		30.50	30.72																	
WC18-22C			188110	4864	C	300	42.60	43.10	300	42.60	43.10	0.50	0.50	Coal	94.0%	3.91	1.02	10.37	17.773	70.88	0.57	0.5	98.3	1.38	
WC18-22C			188111	4865	CR		43.10	43.35		43.10	43.35	0.25	0.25	Carbonaceous siltstone parting / coal	68.0%	3.63	0.70	13.17	18.43	67.70	0.61	0.5	97.4	1.38	1 cm parting with possible coaly rock
WC18-22C					CBSH	320	46.50	46.70	320	46.50	47.20	0.70	0.67	Carbonaceous siltstone interlayer with coal	65.7%										Interlayered carbonaceous muddy siltstone
					CR		46.70	46.90																	
					CBSH		46.90	47.20																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 34 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-22C					CBSH	340	60.05	61.05	340	60.05	61.05	1.00	0.96	Carbonaceous siltstone, pyrite band, coal	73.0%										Interlayered carbonaceous siltstone/pyrite/minor coal
WC18-22C					R		61.05	64.60		61.05	66.40	5.35	5.12	siltstone, mudstone	71.8%										
					CBSH		64.60	65.00																	
					R		65.00	65.85																	
					CBSH		65.85	66.40																	
					R		66.40	75.10																	
WC18-22C			188242	4996	CR	430	75.10	75.25	430	75.10	75.60	0.50	0.46	Coal, subcanneloid coaly rock?	56.0%	1.09	0.36	17.70	17.47	64.47	0.97	2.0	99.1	1.43	
					C		75.25	75.60																	
WC18-22C			188112	4866	CR		79.20	79.40		79.20	79.40	0.20	0.19	Coaly rock	40.0%	0.97	0.43	42.57	15.76	41.24	0.44	--	--	0.69	
WC18-22C			188113	4867	C	410	79.40	80.10	410	79.40	80.10	0.70	0.65	9 cm ash parting / 54 cm coal	90.0%	2.18	0.41	20.06	17.46	62.07	0.53	2.0	99.1	1.47	
WC18-22C			188114	4868	DC	401	81.65	81.85	401	81.65	82.60	0.95	0.87	Coal / Dirty Coal	82.1%	2.09	0.52	4.34	19.51	75.63	0.39	2.5	97.4	1.31	Coaly rock at base ground up with dirty coal/coal. Not separable
					C		81.85	82.45																	
					CR		82.45	82.60																	
WC18-22C			188115	4869	C	400	82.95	84.60	400	82.95	84.60	1.65	1.51	Coaly rock/dirty coal/coal	84.8%	1.73	0.50	6.44	23.40	69.66	0.38	6.0	98.0	1.33	
WC18-22C			188116	4870	C	420	84.60	85.15	420	84.60	85.15	0.55	0.50	4 cm mudstone parting / 51 cm coal and dirty coal	100.0%	2.40	0.50	26.90	19.51	53.09	0.33	6.5	96.5	1.51	
WC18-22C					CR		85.15	85.40		85.15	85.40	0.25	0.23	Carbonaceous mudstone	56.0%										Carbonaceous mudstone; good coal above
WC18-22C			188117	4871	C	440	86.35	86.50	440	86.35	86.58	0.23	0.21	Coal	100.0%	1.39	0.43	19.42	18.07	62.08	0.42	1.5	96.3	1.45	440 coal above 4cm ash band parting (base of pick changed)
					DC		86.50	86.60																	
WC18-22C			188118	4872	C		86.60	86.70		86.58	87.15	0.57	0.72	Ash parting/Coal	61.2%	1.33	0.44	16.50	19.70	63.36	0.48	4.5	97.7	1.41	Parting plus coal below (top pick changed)
					DC		86.70	86.85																	
					C		86.85	87.15																	
WC18-22C					C	442	88.30	88.60	442	88.30	88.60	0.30	0.27	Coal	100.0%										
					CBSH	463	99.50	99.70	463																
WC18-22C			188119	4873	CR	460	103.75	104.15	460	103.75	104.15	0.40	0.37	Dirty Coal	40.0%	1.10	0.23	16.16	27.60	56.01	0.95	8.5	97.4	1.46	Sampled as dirty coal
					CBSH	340	10.00	10.15	340																
					R		10.15	10.30																	
					CBSH		10.30	10.60																	
					R		10.60	11.50																	
					CBSH		11.50	11.65																	
					R		11.65	14.60																	
					CBSH		14.60	15.10																	
					R		15.10	15.85																	
					CBSH		15.85	16.10																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 35 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-23C			188120	4874	CR		30.60	30.80		30.60	30.80	0.20	0.19	Coaly rock	75.0%	1.72	0.84	15.52	17.98	65.66	0.93	0.5	97.7	1.43	Sampled as upper shoulder to missing coal
WC18-23C					C	430	30.80	31.15	430	30.80	31.15	0.35	0.34	Not recovered	0.0%										
WC18-23C			188121	4875	CR		34.90	35.05		34.90	35.05	0.15	0.13	Coaly mudst. / dirty coal	66.7%	0.93	0.53	13.44	17.67	68.36	0.60	2.0	99.4	1.41	
WC18-23C			188122	4876	C	410	35.05	35.80	410	35.05	35.80	0.75	0.65	Coal	41.3%	1.52	0.56	4.05	18.90	76.49	0.62	2.5	98.0	1.33	
WC18-23C					CR		35.80	35.95		35.80	35.95	0.15	0.13	Carbonaceous mudst.	20.0%										No apparent coaly rock at base, Coal shattered at base in contact with shattered carbonaceous mudstone
WC18-23C			188123	4877	CR		37.15	37.40		37.15	37.40	0.25	0.23	Coaly rock	20.0%	0.99	0.49	37.56	14.46	47.49	0.28	1.5	98.8	1.64	
WC18-23C			188124	4878	C	401	37.40	38.05	401	37.40	38.30	0.90	0.85	Coal	28.9%	2.06	0.70	3.16	19.74	76.40	0.39	1.0	98.3	1.30	
					DC		38.05	38.30																	
WC18-23C			188125	4879	CR		38.30	38.45		38.30	38.45	0.15	0.14	Dirty coal/Coaly mudst.	33.3%	2.00	0.97	67.62	9.00	22.41	0.16	--	--	2.03	
WC18-23C			188126	4880	C	400	38.45	39.80	400	38.45	39.90	1.45	1.36	Coal/dirty coal	73.1%	1.97	0.70	7.71	22.75	68.84	0.34	3.0	98.0	1.37	Alternating clean/dirty coal, with very dirty looking last 10cm (dirty coal). Ground up coal at start of box 19 clean (420?)
					DC		39.80	39.90																	
WC18-23C			188127	4881	C	420	39.90	40.32	420	39.90	40.32	0.42	0.39	Coal	21.4%	1.25	0.32	5.21	22.17	72.30	0.39	7.0	97.4	1.30	
					CBSH	440	40.75	40.90	440																
					CBSH	442	41.60	41.85	442																
WC18-23C					CR		41.85	42.05		41.85	42.05	0.20	0.19	Coal	60.0%										
					CBSH	463	52.85	53.35	463																
WC18-23C					CBSH	460	57.70	58.03	460	57.70	58.03	0.33	0.32	Coal	81.8%										
					CBSH	483	61.70	62.10																	
WC18-23C			188128	4882	C	480	65.35	65.70	480	65.35	66.20	0.85	0.82	Dirty coal	50.6%	1.92	0.56	17.62	27.42	54.40	0.81	7.5	97.4	1.48	
					DC		65.70	65.85																	
					C		65.85	65.90																	
					DC		65.90	66.00																	
					C		66.00	66.20																	
WC18-23C			188129	4883	CR		66.20	66.40		66.20	66.40	0.20	0.19	Coaly rock	25.0%	0.93	0.59	68.18	23.52	7.71	0.24	--	--	2.36	
WC18-24C			188130	4884	DC	410	3.95	4.20	410	3.95	5.35	1.40	1.19	Coal	32.1%	8.44	2.74	10.50	18.50	68.26	0.67	0.0	32.0	1.42	Unit completely crushed at top of hole with casing; coaly rock included as indecipherable
					C		4.20	5.05																	
					CR		5.05	5.35																	
WC18-24C					CR		8.15	8.50		8.15	8.50	0.35	0.30	Carbonaceous mudstone?	20.0%										Ground end of mudstone. Coaly rock likely carbonaceous mudstone.
WC18-24C			188131	4885	C	401	8.50	10.00	401	8.50	10.00	1.50	1.27	Coal	42.0%	3.48	0.41	3.29	19.76	76.54	0.44	2.0	97.4	1.30	
WC18-24C			188132	4886	C	400	10.00	12.15	400	10.00	12.35	2.35	1.99	Coal/Dirty coal	55.7%	3.55	0.54	5.12	20.63	73.71	0.46	4.0	98.3	1.31	
					DC		12.15	12.35																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 36 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Appar-ent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-24C			188133	4887	C	420	12.35	12.70	420	12.35	12.70	0.35	0.30	Coal	62.9%	3.53	0.81	6.56	21.87	70.76	0.47	8.0	82.0	1.30	
WC18-24C			188134	4888	DC		12.70	12.80		12.70	12.95	0.25	0.21	Ash band/coal	32.0%	2.15	0.25	69.30	15.07	15.38	0.14	--	--	2.14	
					C		12.80	12.95																	
WC18-24C					CR		12.95	13.20		12.95	13.20	0.25	0.21	Carb mudstone	100.0%										High carbon content mudstone with ground end.
WC18-24C			188135	4889	CR		14.40	14.60		14.40	14.60	0.20	0.19	(Coal-Coaly mudstone?)	20.0%	0.99	0.28	5.29	18.98	75.45	0.52	2.5	98.0	1.35	
WC18-24C			188136	4890	C	440	14.60	14.80	440	14.60	14.80	0.20	0.19	Coal	100.0%	1.73	0.53	8.20	19.28	71.99	0.52	3.5	99.1	1.33	Sampled as part of larger 440 seam (2 samples due to parting)
WC18-24C			188137	4891	DC		14.80	14.90		14.80	14.90	0.10	0.10	Dirty coal with ash	80.0%	7.82	0.48	39.72	18.30	41.50	0.36	4.5	98.8	1.63	
WC18-24C			188138	4892	C		14.90	15.45		14.90	15.45	0.55	0.53	Ash band/coal	65.5%	2.27	0.83	16.54	18.58	64.05	0.55	1.0	98.6	1.43	
WC18-24C			188139	4893	DC	442	17.50	17.90	442	17.50	17.90	0.40	0.37	Coal	70.0%	4..60	0.68	7.55	21.43	70.34	0.99	2.5	95.4	1.32	
					CBSH	463	26.60	27.00	463																
WC18-24C			188140	4894	DC	460	31.35	31.70	460	31.35	31.70	0.35	0.34	Coal	40.0%	4.00	0.32	21.59	27.49	50.60	1.82	6.5	99.4	1.53	
					CBSH	483	35.10	35.35	483																
WC18-24C			188141	4895	C	480	41.50	42.50	480	41.50	42.50	1.00	0.98	Coal	48.0%	3.77	0.52	19.57	25.13	54.78	0.99	7.0	97.7	1.47	
WC18-24C					CR	A71	46.65	46.90	A71	46.65	46.90	0.25	0.25	Siltstone with coal spars	100.0%										Minor coal spars and coalified wood only.
WC18-24C			188142	4896	C		46.90	47.25		46.90	47.25	0.35	0.34	Dirty Coal	45.7%	2.03	0.58	24.49	29.84	45.09	0.83	1.5	95.7	1.59	Sampled as combined with the coaly rock it is thick enough
WC18-24C			188143	4897	C	A7	48.85	49.20	A7	48.85	49.20	0.35	0.33	Coal	34.3%	2.96	0.55	22.74	18.12	58.59	0.97	1.0	96.8	1.47	Sampled as combined with the coaly rock it is thick enough
WC18-24C			188144	4898	CR		49.20	49.30		49.20	49.30	0.10	0.09	Coal (laminated)	70.0%	2.82	0.88	25.68	18.54	54.90	0.88	0.5	98.3	1.69	
					CBSH	A72	49.80	50.00	A72																
					CR		50.00	50.15																	
					CBSH		50.15	50.35																	
					CR	A5	58.05	58.25	A5																
WC18-24C			188145	4899	DC	A3	64.10	64.50	A3	64.10	64.50	0.40	0.39	Coaly mudstone / Dirty Coal / Coal	50.0%	1.93	0.42	45.96	15.20	38.42	0.76	5.0	98.8	1.72	
					CBSH	170	6.55	6.90	170																
WC18-25C			188146	4900	C	150	14.95	15.10	150	14.95	15.10	0.15	0.14	Dirty Coal	60.0%	1.54	0.35	23.49	22.55	53.61	0.87	6.5	97.7	1.47	Sampled as part of the larger 150 total seam
WC18-25C			188147	4901	DC		15.10	15.20		15.10	15.60	0.50	0.46	Ash parting/coal	22.0%	1.64	0.41	32.27	22.22	45.10	0.79	7.5	96.8	1.54	
					C		15.20	15.60																	
WC18-25C					CR		15.60	15.90		15.60	15.90	0.30	0.28	Mudst with coal spars	36.7%										Coal spar rich mudstone
WC18-25C					CR	130	20.80	21.05	130	20.80	21.05	0.25	0.23	Mudst and coal powder	96.0%										Coal fragments mixed with mudstone
WC18-25C			188148	4902	C	111	23.60	24.30	111	23.60	24.30	0.70	0.65	Coal/Dirty Coal	100.0%	2.33	0.51	6.20	24.10	69.19	0.87	7.0	97.1	1.34	
WC18-25C			188149	4903	CR	110	25.20	25.45	110	25.20	25.45	0.25	0.23	Dirty Coal	48.0%	1.96	0.54	9.80	22.72	66.94	0.58	6.5	94.5	1.35	
WC18-25C			188150	4904	C		25.45	26.12		25.45	26.12	0.67	0.62	Dirty Coal/Coal	82.1%	2.03	0.47	10.32	20.39	68.82	0.40	2.0	95.7	1.37	
WC18-25C			188151	4905	C	101	26.12	26.60	101	26.12	26.60	0.48	0.44	Coaly Rock/Coal	83.3%	1.87	0.64	9.56	22.12	67.58	0.57	3.0	98.0	1.37	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 37 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-25C			188152	4906	C	100	26.60	28.50	100	26.60	28.50	1.90	1.75	Coal/Dirty Coal	67.9%	2.74	0.63	3.49	24.84	71.04	0.44	8.0	96.8	1.29	
WC18-25C					CR		28.50	29.10		28.50	29.10	0.60	0.55	ash band/trace coal grindings/carb mudstone	80.0%										Carbonaceous mudstone beneath the ash band.
WC18-25C			188153	4907	DC	201	32.10	32.25	201	32.10	32.80	0.70	0.64	Dirty Coal/Coal	100.0%	5.09	0.38	23.96	20.24	55.42	0.52	6.5	95.7	1.46	
					C		32.25	32.80																	
WC18-25C					CR		32.80	33.10		32.80	33.10	0.30	0.27	Carbonaceous mudstone	33.3%										Carbonaceous mudstone at base.
WC18-25C			188154	4908	DC	202	34.60	34.80	202	34.60	35.23	0.63	0.61	Coal/Dirty Coal	52.4%	1.49	0.36	5.93	20.49	73.22	0.58	3.5	98.0	1.32	
					C		34.80	35.03																	
					DC		35.03	35.23																	
WC18-25C			188157	4911	R		35.23	35.40		35.23	35.40	0.17	0.16	Muddy siltstone/Ash band	100.0%	1.45	0.68	65.88	13.47	19.97	0.19	1.5	98.6	2.06	Split seam sample between 20-35cm
WC18-25C			188155	4909	C		35.40	35.65		35.40	35.65	0.25	0.24	Coal	100.0%	1.34	0.15	7.15	25.68	67.02	0.65	7.0	95.7	1.31	
WC18-25C					CR	300	50.80	51.00	300	50.80	51.00	0.20	0.19		25.0%										
					CBSH	320	53.05	53.60	320																
WC18-25C			188156	4910	C	430	81.00	81.18	430	81.00	81.45	0.45	0.44	Coal/Coaly mudstone	75.6%	1.82	0.63	20.64	16.84	61.89	0.82	1.5	96.2	1.46	
					DC		81.18	81.45																	
WC18-25C			188158	4912	CR		85.15	85.35		85.15	85.35	0.20	0.20	Ash band, Coaly mudstone/Dirty coal	90.0%	1.13	0.64	29.90	16.29	53.17	0.48	0.5	99.1	1.57	
WC18-25C			188159	4913	C	410	85.35	86.18	410	85.35	86.18	0.83	0.82	Coal	24.1%	1.80	0.67	5.00	18.29	76.04	0.65	2.0	97.1	1.33	
WC18-25C			188160	4914	C	401	87.38	88.40	401	87.38	88.40	1.02	1.00	Coal	78.4%	2.00	0.59	4.26	20.83	74.32	0.55	3.5	96.2	1.31	
WC18-25C			188161	4915	C	400	90.75	92.10	400	90.75	92.10	1.35	1.32	Coal	98.5%	2.08	0.42	2.27	20.95	76.36	0.57	6.0	96.8	1.28	
WC18-25C			188162	4916	DC		92.10	92.60		92.10	92.60	0.50	0.49	Coal Dust/Drill Mud	40.0%	10.40	0.40	43.37	17.02	39.21	0.29	1.5	96.8	1.66	
WC18-25C			188163	4917	C	420	92.60	92.80	420	92.60	92.80	0.20	0.20	Coal	50.0%	10.95	0.40	8.87	19.31	71.42	0.44	2.5	98.3	1.33	
WC18-25C			188164	4918	DC		92.80	93.00		92.80	93.00	0.20	0.20	Ash Band/Coal	95.0%	1.72	0.48	27.91	19.36	52.25	0.36	6.5	98.6	1.50	
WC18-25C			188165	4919	CR		94.05	94.35		94.05	94.35	0.30	0.30	Coaly mudstone	100.0%	1.74	0.71	15.86	18.75	64.68	0.51	3.0	99.7	1.40	
WC18-25C			188166	4920	DC	440	94.35	94.70	440	94.35	95.10	0.75	0.74	Ash parting/Dirty coal	68.0%	2.18	0.75	18.11	18.22	62.92	0.53	3.0	99.4	1.40	
					C		94.70	95.10																	
WC18-25C			188167	4921	C	442	96.00	96.45	442	96.00	96.45	0.45	0.44	Dirty Coal/Coal	57.8%	2.38	0.36	12.90	21.05	65.69	0.83	9.0	99.7	1.33	
					CBSH	463	105.70	105.95	463																
					CBSH	460	111.20	111.40	460																
WC18-25C					CR		111.40	111.55		111.40	111.55	0.15	0.15	Coal, ash parting, coal	173.3%										
					CBSH		111.55	111.75																	
					CBSH	483	114.90	115.30	483																
WC18-25C			188168	4922	CR		118.55	118.65		118.55	118.65	0.10	0.10	Coal	100.0%	3.24	0.23	25.91	28.13	45.73	0.69	5.0	97.7	1.55	
WC18-25C			188169	4923	DC	480	118.65	118.98	480	118.65	119.50	0.85	0.84	Ash/Dirty coal/Coal	63.5%	2.06	0.44	26.33	21.35	51.88	0.81	6.0	98.3	1.48	
					C		118.98	119.50																	
WC18-25C			188170	4924	C	A71	124.00	124.48	A71	124.00	124.48	0.48	0.45	Coal	95.8%	3.11	0.37	15.47	20.50	63.66	0.99	9.0	98.0	1.34	
WC18-25C					DC	A7	126.75	127.07	A7	126.75	127.07	0.32	0.30	Coal	75.0%										

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 38 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
							Depth			Depth		Thickness				Proximate analysis					Additional analysis				
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	From (m)	To (m)	Bed	From (m)	To (m)	Apparent	True	Lithological details	Core recovery (percent)	Mar	Mad	Aad	VMad	FCad	Sad	FSlad	%LT	SGad	
WC18-25C			188171	4925	CR	A72	128.40	128.80	A72	128.40	128.80	0.40	0.40	Coaly rock and Coal	37.5%	3.57	0.36	22.09	19.03	58.52	0.91	7.5	97.7	1.41	
WC18-25C					CR	A5	135.40	135.60	A5	135.40	135.60	0.20	0.20	Coal	45.0%										
					CBSH	320	2.70	3.00	320																
					CBSH		18.70	18.80																	
WC18-26C					CR		18.80	18.95	340	18.80	18.95	0.15	0.13	Coal	60.0%										
					CBSH	340	18.95	19.10																	
					R		19.10	22.60																	
WC18-26C					CBSH		22.60	22.80		22.60	22.80	0.20	0.20	Carbonaceous siltstone	25.0%										
WC18-26C					CBSH	430	29.40	29.85	430	29.40	29.85	0.45	0.44	Canneloid? mudstone	13.3%										
WC18-26C			188172	4926	CR	none	34.00	34.25	410	34.00	34.90	0.90	0.87	Coal	25.6%	1.11	0.55	20.01	17.66	61.78	0.57	1.5	97.1	1.43	Majority of coal destroyed in coring process. Sampled with coaly rock above as mixed together subrounded fragments
					C	410	34.25	34.90																	
WC18-26C			188173	4927	C	401	36.30	37.15	401	36.30	37.15	0.85	0.82	Coal	96.5%	1.88	0.94	6.97	19.73	72.36	0.56	4.0	98.6	1.34	
WC18-26C			188174	4928	C	400	42.30	43.40	400	42.30	44.20	1.90	1.68	Coal/Ash	11.1%	1.35	0.56	5.16	19.27	75.01	0.54	2.0	99.4	1.32	Almost total core loss. Combined all units/seams
					C	420	43.40	43.65	420																
					DC		43.65	43.75																	
					C		43.75	43.90																	
					CR		43.90	44.20																	
WC18-26C			188175	4929	C	440	45.00	45.75	440	45.00	45.16	0.16	0.14	Coal	100.0%	1.76	0.49	10.34	18.73	70.44	0.47	3.5	98.8	1.36	Divided coal unit due to parting
WC18-26C			188176	4930						45.16	45.75	0.59	0.52	Ash/Coal	100.0%	1.55	0.69	14.18	18.37	66.76	0.46	1.5	99.1	1.39	
WC18-26C					C	442	46.30	46.65	442	46.30	46.65	0.35	0.31	Coal	97.1%										
					CBSH	460	62.70	63.05	460																
					CBSH	483	65.25	65.85	483																
WC18-26C			188177	4931	C	480	68.50	69.40	480	68.50	69.40	0.90	0.87	Coal/Dirty coal	42.2%	1.19	0.43	17.91	18.92	62.74	0.81	3.0	98.8	1.44	
WC18-26C			188178	4932	DC		69.40	69.50		69.40	69.50	0.10	0.10	Coaly rock	100.0%	1.54	0.36	18.78	18.08	62.78	0.87	6.0	99.1	1.41	
WC18-26C					CR	A71	74.30	74.60	A71	74.30	74.60	0.30	0.28	Coaly mudst. and coal	36.7%										
WC18-26C					DC	A7	78.45	78.65	A7	78.45	78.75	0.30	0.28	Not recovered	0.0%										
					C		78.65	78.75																	
WC18-26C			188179	4933	CR	A72	79.90	80.30	A72	79.90	80.30	0.40	0.38	Dirty Coal/Coal	37.5%	1.01	0.65	19.71	18.35	61.29	0.92	6.5	99.4	1.44	
					CBSH	A5	86.35	87.20	A5																
WC18-26C					DC	A3	94.20	94.45	A3	94.20	94.45	0.25	0.22	Coal	60.0%										
WC18-26C			188180	4934	C	A1	96.35	96.95	A1	96.35	96.95	0.60	0.56	Coal/Dirty Coal	46.7%	1.20	0.39	21.55	16.40	61.66	0.76	2.0	99.7	1.47	
					CBSH	170	11.45	11.65																	
					CR		11.65	11.75																	
					CBSH		11.75	12.00																	
WC18-27C					C	150	18.75	19.60	150	18.75	19.60	0.85	0.74		0.0%										
WC18-27C			188181	4935	CR	none	19.60	19.80		19.60	19.80	0.20	0.17	Ash/Coal	60.0%	1.22	0.39	25.32	22.16	52.13	0.87	7.0	98.3	1.49	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 39 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
					CBSH	130	24.10	24.60	130																
WC18-27C			188182	4936	C	111	27.05	28.00	111	27.05	28.00	0.95	0.92	Coal	89.5%	1.70	0.46	9.45	23.45	66.64	0.77	8.0	97.4	1.35	
WC18-27C			188183	4937	C	110	28.70	29.00	110	28.70	28.96	0.26	0.25	Dirty Coal	38.5%	1.40	0.48	27.95	19.96	51.61	2.03	3.5	98.3	1.54	Changed pick - more of a dirty coal than coal
WC18-27C			188184	4938	DC		29.00	29.10		28.96	29.35	0.39	0.38	Ash band/Coal	100.0%	1.21	0.50	14.40	20.96	64.14	0.50	3.0	98.6	1.40	
					C		29.10	29.35																	
WC18-27C			188185	4939	DC	101	29.35	29.50	101	29.35	29.81	0.46	0.44	Dirty Coal/Coal	97.8%	1.82	0.46	12.19	23.81	63.54	0.37	2.0	99.1	1.44	Changed pick. Matches well with coal characteristics and logging
					C		29.50	29.65																	
					DC		29.65	29.80																	
WC18-27C			188186	4940	C		29.80	29.95		29.81	31.50	1.69	1.63	Coal	100.0%	1.41	0.41	3.46	24.52	71.61	0.42	8.0	98.3	1.29	
					C	100	29.95	31.50																	
WC18-27C			188187	4941	DC		31.50	31.55	100	31.50	31.62	0.12	0.12	Ashy siltstone/Coal	100.0%	2.49	0.43	53.18	15.31	31.08	0.34	--	--	1.81	
WC18-27C					CR	none	31.55	31.75		31.62	31.75	0.13	0.13		100.0%										Carbonaceous siltstone
WC18-27C					CR	none	34.70	34.90		34.70	34.90	0.20	0.19		15.0%										Carbonaceous siltstone
WC18-27C			188188	4942	C	201	34.90	35.30	201	34.90	35.45	0.55	0.53	Coal	29.1%	4.94	0.31	6.98	23.42	69.29	0.58	6.5	97.4	1.31	
					DC		35.30	35.45																	
WC18-27C			188189	4943	CR	none	35.45	35.60		35.45	35.60	0.15	0.14	Coaly rock	46.7%	0.93	0.48	37.26	17.79	44.47	0.38	5.5	98.6	1.63	
WC18-27C					DC	202	36.95	37.15	202	36.95	37.15	0.20	0.19		0.0%										
WC18-27C					C		37.15	37.30		37.15	37.30	0.15	0.14		0.0%										
WC18-27C					DC		37.30	37.85		37.30	37.85	0.55	0.53		0.0%										
WC18-27C			188190	4944	CR	300	53.20	53.35	300	53.20	53.35	0.15	0.14	Coal/mixed coal and mud	93.3%	6.86	0.60	72.80	8.72	17.88	0.23	--	--	2.14	Destroyed core. Coal bits mixed with mud
					CBSH	320	56.75	56.97	320	56.97	57.12	0.15	0.14		66.7%										
WC18-27C					CR		56.97	57.12																	Carbonaceous siltstone
					CBSH		57.12	57.35																	
					CBSH	340	71.10	71.50	340																
					R		71.50	74.10																	
					R		74.35	75.10																	
					CBSH		75.10	75.50																	
WC18-27C			188191	4945	C	430	82.05	82.45	430	82.05	82.45	0.40	0.39	Dirty Coal/Coal	75.0%	2.82	0.49	19.32	17.47	62.72	0.81	2.5	97.1	1.45	
WC18-27C			188192	4946	C	410	86.85	87.40	410	86.85	87.40	0.55	0.54	Coal	83.6%	1.78	0.57	7.44	18.03	73.96	0.61	1.0	99.4	1.36	
WC18-27C					CR		87.40	87.70		87.40	87.70	0.30	0.30	Coal/coaly rock particles	26.7%										The last 5cm was crushed (coal and coaly rock particles) and the next mudstone unit not carb
WC18-27C			188193	4947	C	401	88.55	89.45	401	88.55	89.45	0.90	0.86	Coal, dirty coal	44.44%	2.28	0.33	5.60	19.63	74.44	0.57	2.0	99.7	1.33	
WC18-27C			188194	4948	C	400	95.35	96.08	400	95.35	96.08	0.73	0.70	Coal	86.30%	1.29	0.28	4.33	20.45	74.94	0.63	4.5	99.1	1.31	
WC18-27C			188195	4949	C	420	96.08	96.30	420	96.08	96.45	0.37	0.35	Coal	48.65%	1.90	0.48	12.15	21.33	66.04	0.56	8.0	96.8	1.36	
					DC		96.30	96.45																	

Head raw analyses and cross-reference to composite samples **Table B-1** - sheet 40 of 40

Borehole	Cross-reference to composites		Head (raw) samples		Geophysical log interpretation				Sample characterisation							Head raw analysis (air dried basis unless otherwise stated)									Comments
	Birtley lab no.	Composite no.	Birtley lab no.	Sample no.	Lithology	Bed	Depth		Bed	Depth		Thickness		Lithological details	Core recovery (percent)	Proximate analysis					Additional analysis				
							From (m)	To (m)		From (m)	To (m)	Apparent	True			Mar	Mad	Aad	VMad	FCad	Sad	FSIad	%LT	SGad	
WC18-27C			188196	4950	DC	440	97.80	98.15	440	97.80	99.00	1.20	1.18	Coaly Ash/Dirty Coal	29.17%	1.68	0.59	26.47	18.04	54.90	0.44	2.5	98.3	1.51	It is possible the coring process destroyed the whole 440 coal seam and this is just the dirty coal upper portion.
					C		98.15	99.00																	
WC18-27C			188243	4997	C	442	99.50	99.75	442	99.45	99.85	0.40	0.39	Coal	97.50%	1.58	0.48	17.26	19.39	62.87	0.60	7.5	98.6	1.40	Changed pick from 99.5 to 99.75, to 99.45 to 99.85 due to amount of coal in box
					CBSH	460	116.95	117.30	460						48.6%										
					CBSH	483	120.55	121.00	483						100%										
WC18-27C			188244	4998	CR		123.95	124.20		123.95	124.20	0.25	0.24	Dirty Coal	68.0%	0.85	0.52	37.85	15.29	46.34	0.52	1,0	98.8	1.67	
WC18-27C			188245	4999	C	480	124.20	124.35	480	124.20	125.00	0.80	0.77	Coal/Dirty Coal	0.00%	1.19	0.48	12.24	23.29	63.99	0.97	8.0	98.8	1.39	
					DC		124.35	124.50																	
					C		124.50	125.00																	
WC18-27C			188246	5000	CR	A71	129.00	129.20	A71	129.00	129.20	0.20	0.19	Coaly Ash	85.00%	0.40	0.29	38.20	40.63	20.88	0.52	1.5	98.8	1.97	
WC18-27C			188247	5251	DC		129.20	129.40		129.20	129.40	0.20	0.19	Coal	30.00%	0.66	0.39	12.41	23.02	64.18	1.15	8.5	98.3	1.37	
WC18-27C			188248	5252	DC	A7	133.05	133.30	A7	133.05	133.30	0.25	0.24	Coal	20.00%	1.02	0.45	12.82	19.60	67.13	1.01	8.0	98.6	1.36	Crushed sample. Looks like chunks of coaly rock in with coal
WC18-27C			188249	5253	CR		133.30	133.45		133.30	133.45	0.15	0.14	Carb. mudstone	13.33%	1.50	0.67	80.15	6.70	12.48	0.15	--	--	2.24	Sampled as possibly the very end of coaly rock. Likely coaly rock in sample 5252
WC18-27C			188250	5254	CR	A72	134.50	134.88	A72	134.50	134.88	0.38	0.36	Coal/mudstone	10.53%	3.43	0.50	53.06	13.83	32.61	0.52	--	--	1.80	Seam lost to coring process. Tried to separate out coal shards from mudstone shards

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-01C**

LAB#: 186371-380

REPORT DATE: November 14, 2018 Coreceted December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
186371	**4501**	678	655	561	3.39	0.67	37.97	30.58	30.78	0.59	1.5	94.8	1.81	adb	*
						4.04	36.68	29.54	29.74	0.57				arb	
							38.23	30.79	30.99	0.59				db	
186372	**4502**	6227	6161	5357	1.06	0.72	4.09	21.35	73.84	0.54	3.0	97.4	1.32	adb	
						1.77	4.05	21.12	73.06	0.53				arb	
							4.12	21.50	74.38	0.54				db	
186373	**4503**	276	272	238	1.45	0.66	11.25	19.05	69.04	0.52	2.0	98.0	1.40	adb	
						2.10	11.09	18.77	68.04	0.51				arb	
							11.32	19.18	69.50	0.52				db	
186374	**4504**	1369	1362	1165	0.51	0.86	69.74	9.90	19.50	0.24	-	-	2.07	adb	
						1.37	69.38	9.85	19.40	0.24				arb	
							70.34	9.99	19.67	0.24				db	
186375	**4505**	244	242	217	0.82	0.83	50.15	13.94	35.08	0.43	-	-	1.82	adb	
						1.64	49.74	13.83	34.79	0.43				arb	
							50.57	14.06	35.37	0.43				db	
186376	**4506**	1621	1595	1405	1.60	0.76	12.41	18.23	68.60	0.72	2.0	96.5	1.38	adb	
						2.35	12.21	17.94	67.50	0.71				arb	
							12.51	18.37	69.13	0.73				db	
186377	**4507**	2795	2704	2355	3.26	0.76	19.51	20.10	59.63	0.42	6.5	98.3	1.42	adb	
						3.99	18.87	19.45	57.69	0.41				arb	
							19.66	20.25	60.09	0.42				db	
186378	**4508**	333	314	270	5.71	0.74	17.77	18.56	62.93	0.69	4.0	98.3	1.42	adb	
						6.40	16.76	17.50	59.34	0.65				arb	
							17.90	18.70	63.40	0.70				db	
186379	**4509**	2570	2545	2204	0.97	0.66	14.92	24.89	59.53	0.90	7.0	94.8	1.44	adb	
						1.63	14.77	24.65	58.95	0.89				arb	
							15.02	25.06	59.93	0.91				db	
186380	**4510**	999	988	850	1.10	0.64	13.67	17.82	67.87	0.87	3.0	98.6	1.39	adb	
						1.73	13.52	17.62	67.12	0.86				arb	
							13.76	17.93	68.31	0.88				db	

*Prox & SG checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-02C**

LAB#: 186381-394

REPORT DATE: November 14, 2018 Coreceted December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186381	**4511**	172	170	152	1.16	1.57	12.64	17.94	67.85	0.70	2.5	98.3	1.39	adb
						2.71	12.49	17.73	67.06	0.69				arb
							12.84	18.23	68.93	0.71				db
186382	**4512**	1748	1721	1494	1.54	0.74	4.08	21.84	73.34	0.45	4.0	97.7	1.33	adb
						2.27	4.02	21.50	72.21	0.44				arb
							4.11	22.00	73.89	0.45				db
186383	**4513**	2303	2253	1952	2.17	0.74	10.22	23.94	65.10	0.43	8.5	96.2	1.35	adb
						2.90	10.00	23.42	63.69	0.42				arb
							10.30	24.12	65.59	0.43				db
186384	**4514**	1443	1426	1236	1.18	0.86	13.38	20.15	65.61	0.57	4.0	94.2	1.38	adb
						2.03	13.22	19.91	64.84	0.56				arb
							13.50	20.32	66.18	0.57				db
186385	**4515**	1227	1212	843	1.22	0.68	8.05	19.85	71.42	0.64	3.0	98.3	1.35	adb
						1.89	7.95	19.61	70.55	0.63				arb
							8.11	19.99	71.91	0.64				db
186386	**4516**	825	823	727	0.24	0.62	81.24	13.67	4.47	0.07	-	-	2.37	adb
						0.86	81.04	13.64	4.46	0.07				arb
							81.75	13.76	4.50	0.07				db
186387	**4517**	1107	1096	945	0.99	0.60	6.74	22.41	70.25	0.75	8.5	97.1	1.31	adb
						1.59	6.67	22.19	69.55	0.74				arb
							6.78	22.55	70.67	0.75				db
186388	**4518**	1621	1534	1282	5.37	0.87	22.98	21.49	54.66	0.60	1.5	95.4	1.50	adb
						6.19	21.75	20.34	51.73	0.57				arb
							23.18	21.68	55.14	0.61				db
186389	**4519**	1343	1316	1132	2.01	1.09	11.55	17.04	70.32	0.44	1.0	98.3	1.36	adb
						3.08	11.32	16.70	68.91	0.43				arb
							11.68	17.23	71.09	0.44				db
186390	**4520**	1166	1154	1009	1.03	0.60	22.19	26.81	50.40	0.55	1.5	98.6	1.61	adb*
						1.62	21.96	26.53	49.88	0.54				arb
							22.32	26.97	50.70	0.55				db
186391	**4521**	983	971	832	1.22	0.70	6.17	20.80	72.33	0.73	1.5	98.0	1.34	adb
						1.91	6.09	20.55	71.45	0.72				arb
							6.21	20.95	72.84	0.74				db
186392	**4522**	436	433	369	0.69	0.70	19.53	18.81	60.96	0.65	3.0	98.6	1.44	adb
						1.38	19.40	18.68	60.54	0.65				arb
							19.67	18.94	61.39	0.65				db
186393	**4523**	751	748	659	0.40	0.48	16.33	18.48	64.71	0.80	2.5	99.1	1.46	adb
						0.88	16.26	18.41	64.45	0.80				arb
							16.41	18.57	65.02	0.80				db
186394	**4524**	2665	2646	2291	0.71	0.49	15.76	20.27	63.48	0.89	7.0	99.1	1.46	adb
						1.20	15.65	20.13	63.03	0.88				arb
							15.84	20.37	63.79	0.89				db

*SG checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-03C**

LAB#: 186395-415

REPORT DATE: November 14, 2018 Coreceted December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186395	**4525**	3536	3503	3038	0.93	0.75	36.96	21.59	40.70	2.69	5.0	96.2	1.63	adb*
						1.68	36.62	21.39	40.32	2.66				arb
							37.24	21.75	41.01	2.71				db
186396	**4526**	2044	2025	1738	0.93	0.73	28.83	20.30	50.14	0.82	7.5	99.4	1.52	adb
						1.65	28.56	20.11	49.67	0.81				arb
							29.04	20.45	50.51	0.83				db
186397	**4527**	1022	1012	877	0.98	0.57	4.20	23.77	71.46	0.93	8.0	98.0	1.31	adb
						1.54	4.16	23.54	70.76	0.92				arb
							4.22	23.91	71.87	0.94				db
186398	**4528**	1874	1858	1627	0.85	0.81	4.39	20.40	74.40	0.59	2.0	99.1	1.32	adb
						1.66	4.35	20.23	73.76	0.58				arb
							4.43	20.57	75.01	0.59				db
186399	**4529**	5300	5203	4556	1.83	0.97	2.48	22.73	73.82	0.53	4.5	98.8	1.29	adb
						2.78	2.43	22.31	72.47	0.52				arb
							2.50	22.95	74.54	0.54				db
186400	**4530**	2599	2569	2248	1.15	0.65	8.19	22.43	68.73	0.71	7.0	98.8	1.32	adb
						1.80	8.10	22.17	67.94	0.70				arb
							8.24	22.58	69.18	0.71				db
186401	**4531**	1484	1469	1282	1.01	0.79	7.13	20.61	71.47	0.58	2.5	98.3	1.33	adb
						1.79	7.06	20.40	70.75	0.57				arb
							7.19	20.77	72.04	0.58				db
186402	**4532**	1122	1120	954	0.18	0.60	82.96	12.62	3.82	0.05	-	-	2.41	adb**
						0.78	82.81	12.60	3.81	0.05				arb
							83.46	12.70	3.84	0.05				db
186403	**4533**	164	162	144	1.22	0.65	17.55	18.55	63.25	0.63	3.0	98.8	1.42	adb
						1.86	17.34	18.32	62.48	0.62				arb
							17.66	18.67	63.66	0.63				db
186404	**4534**	1559	1514	1299	2.89	0.66	38.16	16.04	45.14	0.39	2.5	98.6	1.61	adb
						3.53	37.06	15.58	43.84	0.38				arb
							38.41	16.15	45.44	0.39				db
186405	**4535**	611	605	530	0.98	0.61	6.60	19.93	72.86	0.59	2.5	98.6	1.33	adb
						1.59	6.54	19.73	72.14	0.58				arb
							6.64	20.05	73.31	0.59				db
186406	**4536**	569	447	378	21.44	0.86	33.90	15.24	50.00	0.40	1.0	94.5	1.56	adb
						22.12	26.63	11.97	39.28	0.31				arb
							34.19	15.37	50.43	0.40				db
186407	**4537**	1536	1528	1320	0.52	0.52	33.44	17.72	48.32	0.60	2.5	95.4	1.58	adb
						1.04	33.27	17.63	48.07	0.60				arb
							33.61	17.81	48.57	0.60				db
186408	**4538**	2322	2305	2000	0.73	0.48	16.64	26.41	56.47	1.08	7.0	98.6	1.46	adb
						1.21	16.52	26.22	56.06	1.07				arb
							16.72	26.54	56.74	1.09				db
186409	**4539**	968	961	835	0.72	0.73	10.63	19.78	68.86	0.94	3.0	98.8	1.36	adb
						1.45	10.55	19.64	68.36	0.93				arb
							10.71	19.93	69.37	0.95				db
186410	**4540**	1297	1211	1040	6.63	0.64	17.89	18.35	63.12	0.99	9.0	97.4	1.41	adb
						7.23	16.70	17.13	58.93	0.92				arb
							18.01	18.47	63.53	1.00				db
186411	**4541**	2121	2086	1803	1.65	0.83	25.60	18.28	55.29	0.78	8.0	98.6	1.47	adb
						2.47	25.18	17.98	54.38	0.77				arb
							25.81	18.43	55.75	0.79				db
186412	**4542**	432	424	373	1.85	0.83	46.43	14.13	38.61	0.59	-	-	1.72	adb
						2.67	45.57	13.87	37.90	0.58				arb
							46.82	14.25	38.93	0.59				db
186413	**4543**	459	453	394	1.31	0.94	35.16	21.92	41.98	3.07	5.5	94.5	1.58	adb*
						2.23	34.70	21.63	41.43	3.03				arb
							35.49	22.13	42.38	3.10				db
186414	**4544**	3182	3148	2716	1.07	0.87	61.51	17.22	20.40	0.31	-	-	1.96	adb
						1.93	60.85	17.04	20.18	0.31				arb
							62.05	17.37	20.58	0.31				db
186415	**4545**	2221	2205	1939	0.72	0.74	8.85	23.99	66.42	0.57	7.0	98.0	1.36	adb
						1.46	8.79	23.82	65.94	0.57				arb
							8.92	24.17	66.92	0.57				db

*Sulphur checked *SG checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-04C**

LAB#: 186416-425

REPORT DATE: November 14, 2018 Coreceted December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
186416	**4546**	10030	9903	8696	1.27	0.81	2.95	21.08	75.16	0.51	3.0	98.3	1.29	adb	
						2.07	2.91	20.81	74.21	0.50				arb	
							2.97	21.25	75.77	0.51				db	
186417	**4547**	2642	2582	2264	2.27	0.78	13.67	21.22	64.33	0.66	7.0	98.0	1.36	adb	
						3.03	13.36	20.74	62.87	0.65				arb	
							13.78	21.39	64.84	0.67				db	
186418	**4548**	2806	2776	2429	1.07	0.71	11.24	20.73	67.32	0.58	4.0	97.1	1.35	adb	
						1.77	11.12	20.51	66.60	0.57				arb	
							11.32	20.88	67.80	0.58				db	
186419	**4549**	1178	1173	1012	0.42	0.68	74.09	14.47	10.76	0.12	-	-	2.15	adb	
						1.10	73.78	14.41	10.71	0.12				arb	
							74.60	14.57	10.83	0.12				db	
186420	**4550**	2211	2186	1918	1.13	0.65	7.13	25.57	66.65	0.77	8.5	96.0	1.32	adb	
						1.77	7.05	25.28	65.90	0.76				arb	
							7.18	25.74	67.09	0.78				db	
186421	**4551**	617	608	530	1.46	0.60	24.58	29.63	45.19	0.49	2.5	97.7	1.60	adb	*
						2.05	24.22	29.20	44.53	0.48				arb	
							24.73	29.81	45.46	0.49				db	
186422	**4552**	2873	2792	2389	2.82	0.76	9.62	23.97	65.65	0.58	4.5	97.1	1.37	adb	
						3.56	9.35	23.29	63.80	0.56				arb	
							9.69	24.15	66.15	0.58				db	
186423	**4553**	7683	7336	6376	4.52	0.75	2.85	19.94	76.46	0.47	2.0	95.7	1.29	adb	
						5.23	2.72	19.04	73.01	0.45				arb	
							2.87	20.09	77.04	0.47				db	
186424	**4554**	2493	2483	2165	0.40	0.55	16.90	19.80	62.75	0.78	4.0	95.4	1.42	adb	
						0.95	16.83	19.72	62.50	0.78				arb	
							16.99	19.91	63.10	0.78				db	
186425	**4555**	707	700	1008	0.99	0.61	8.41	20.46	70.52	1.01	7.0	97.1	1.34	adb	
						1.59	8.33	20.26	69.82	1.00				arb	
							8.46	20.59	70.95	1.02				db	

*SG checked

Heather Dexter
Operations Manager
GWIL Industries

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-05C**

LAB#: 186426-432

REPORT DATE: November 14, 2018 Coreceted December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186426	**4546**	2237	2203	1908	1.52	0.79	2.77	21.03	75.41	0.49	3.5	96.8	1.31	adb
						2.30	2.73	20.71	74.26	0.48				arb
							2.79	21.20	76.01	0.49				db
186427	**4547**	1481	1458	1269	1.55	0.67	19.60	25.08	54.65	0.68	5.0	98.0	1.47	adb
						2.21	19.30	24.69	53.80	0.67				arb
							19.73	25.25	55.02	0.68				db
186428	**4548**	1483	1465	1265	1.21	0.79	24.74	17.32	57.15	0.75	2.5	98.6	1.49	adb
						1.99	24.44	17.11	56.46	0.74				arb
							24.94	17.46	57.61	0.76				db
186429	**4549**	9181	8965	7795	2.35	0.81	7.56	18.79	72.84	0.51	1.0	98.3	1.35	adb
						3.14	7.38	18.35	71.13	0.50				arb
							7.62	18.94	73.43	0.51				db
186430	**4550**	2139	2118	1860	0.98	0.71	25.05	18.04	56.20	0.55	2.0	98.8	1.48	adb
						1.68	24.80	17.86	55.65	0.54				arb
							25.23	18.17	56.60	0.55				db
186431	**4551**	2917	2888	2518	0.99	0.61	18.44	26.58	54.37	0.85	7.0	98.0	1.49	adb
						1.60	18.26	26.32	53.83	0.84				arb
							18.55	26.74	54.70	0.86				db
186432	**4552**	2067	2046	1597	1.02	0.83	6.80	19.56	72.81	0.96	6.5	98.0	1.32	adb
						1.84	6.73	19.36	72.07	0.95				arb
							6.86	19.72	73.42	0.97				db

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-06C**

LAB#: 186433-442

REPORT DATE: November 14, 2018 Coreceted December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186433	**4563**	1836	1776	1555	3.27	0.97	81.70	13.44	3.89	0.24	-	-	2.19	adb
						4.21	79.03	13.00	3.76	0.23				arb
							82.50	13.57	3.93	0.24				db
186434	**4564**	1732	1702	1445	1.73	0.70	15.38	22.96	60.96	0.74	3.0	97.4	1.41	adb
						2.42	15.11	22.56	59.90	0.73				arb
							15.49	23.12	61.39	0.75				db
186435	**4565**	1919	1718	1487	10.47	1.06	41.49	16.92	40.53	0.31	1.0	92.8	1.63	adb
						11.42	37.14	15.15	36.28	0.28				arb
							41.93	17.10	40.96	0.31				db
186436	**4566**	2830	2769	2378	2.16	0.82	10.85	22.47	65.86	0.64	7.0	95.4	1.32	adb
						2.96	10.62	21.99	64.44	0.63				arb
							10.94	22.66	66.40	0.65				
186437	**4567**	1858	1839	1596	1.02	0.80	8.10	20.26	70.84	0.65	3.5	97.1	1.35	adb
						1.81	8.02	20.05	70.12	0.64				arb
							8.17	20.42	71.41	0.66				db
186438	**4568**	1101	1093	954	0.73	0.75	74.04	13.37	11.84	0.10	-	-	2.15	adb
						1.47	73.50	13.27	11.75	0.10				arb
							74.60	13.47	11.93	0.10				db
186439	**4569**	2206	1964	1707	10.97	0.75	7.96	18.99	72.30	0.39	1.5	96.8	1.35	adb
						11.64	7.09	16.91	64.37	0.35				arb
							8.02	19.13	72.85	0.39				db
186440	**4570**	700	681	597	2.71	0.69	8.03	20.70	70.58	0.70	3.5	94.2	1.36	adb
						3.39	7.81	20.14	68.66	0.68				arb
							8.09	20.84	71.07	0.70				db
186441	**4571**	1180	1149	991	2.63	0.70	8.08	23.94	67.28	1.07	8.0	94.2	1.32	adb
						3.31	7.87	23.31	65.51	1.04				arb
							8.14	24.11	67.75	1.08				db
186442	**4572**	2242	2205	1926	1.65	0.68	9.27	22.05	68.00	0.83	6.0	95.4	1.35	adb
						2.32	9.12	21.69	66.88	0.82				arb
							9.33	22.20	68.47	0.84				db

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-07C**

LAB#: 186857-894

REPORT DATE: November 29, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186857	**4573**	657	627	549	4.57	1.12	20.15	23.75	54.98	0.98	1.5	58.1	1.47	adb
						5.64	19.23	22.67	52.47	0.94				arb
							20.38	24.02	55.60	0.99				db
186858	**4574**	715	692	604	3.22	1.32	83.71	7.70	7.27	0.14	n/a	n/a	2.35	adb
						4.49	81.02	7.45	7.04	0.14				arb
							84.83	7.80	7.37	0.14				db
186859	**4575**	1430	1303	1136	8.88	0.76	27.01	22.05	50.18	0.82	6.5	91.1	1.50	adb
						9.57	24.61	20.09	45.72	0.75				arb
							27.22	22.22	50.56	0.83				db
186860	**4576**	1470	1453	1262	1.16	0.63	10.97	26.35	62.05	0.87	7.5	88.0	1.39	adb
						1.78	10.84	26.05	61.33	0.86				arb
							11.04	26.52	62.44	0.88				db
186861	**4577**	2466	2438	2128	1.14	0.57	15.16	25.53	58.74	0.74	6.0	94.2	1.44	adb
						1.70	14.99	25.24	58.07	0.73				arb
							15.25	25.68	59.08	0.74				db
186862	**4578**	1682	1657	1451	1.49	0.62	2.52	22.70	74.16	0.65	5.0	95.7	1.31	adb
						2.10	2.48	22.36	73.06	0.64				arb
							2.54	22.84	74.62	0.65				db
186863	**4579**	5963	5839	5111	2.08	0.60	5.74	24.59	69.07	0.50	5.5	93.7	1.32	adb
						2.67	5.62	24.08	67.63	0.49				arb
							5.77	24.74	69.49	0.50				db
186864	**4580**	1999	1958	1697	2.05	0.46	11.45	21.92	66.17	0.69	6.5	97.1	1.38	adb
						2.50	11.22	21.47	64.81	0.68				arb
							11.50	22.02	66.48	0.69				db
186865	**4581**	432	426	375	1.39	0.73	46.91	16.98	35.38	0.39	n/a	n/a	1.77	adb
						2.11	46.26	16.74	34.89	0.38				arb
							47.25	17.10	35.64	0.39				db
186866	**4582**	1591	1569	1378	1.38	0.74	5.61	20.44	73.21	0.73	3.5	98.6	1.33	adb
						2.11	5.53	20.16	72.20	0.72				arb
							5.65	20.59	73.76	0.74				db

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-07C**

LAB#: 186857-894

REPORT DATE: November 29, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186867	**4583**	341	339	299	0.59	0.66	11.00	21.70	66.64	0.72	3.5	97.7	1.36	adb
						1.24	10.94	21.57	66.25	0.72				arb
							11.07	21.84	67.08	0.72				db
186868	**4584**	986	971	849	1.52	0.56	5.49	22.15	71.80	0.67	4.0	97.4	1.33	adb
						2.07	5.41	21.81	70.71	0.66				arb
							5.52	22.27	72.20	0.67				db
186869	**4585**	805	795	696	1.24	0.61	13.53	19.24	66.62	0.73	2.5	98.3	1.39	adb
						1.84	13.36	19.00	65.79	0.72				arb
							13.61	19.36	67.03	0.73				db
186870	**4586**	1482	1444	1249	2.56	0.64	15.48	18.04	65.84	0.41	1.5	99.1	1.39	adb
						3.19	15.08	17.58	64.15	0.40				
							15.58	18.16	66.26	0.41				
186871	**4587**	416	409	359	1.68	0.79	48.43	14.17	36.61	0.50	n/a	n/a	1.76	adb
						2.46	47.62	13.93	35.99	0.49				arb
							48.82	14.28	36.90	0.50				db
186872	**4588**	408	406	360	0.49	0.60	23.31	23.99	52.10	0.83	6.5	98.6	1.50	adb
						1.09	23.20	23.87	51.84	0.83				arb
							23.45	24.13	52.41	0.84				db
186873	**4589**	1178	1126	992	4.41	0.72	44.45	16.95	37.88	1.35	n/a	n/a	1.70	adb *
						5.10	42.49	16.20	36.21	1.29				arb
							44.77	17.07	38.15	1.36				db
186874	**4590**	214	212	185	0.93	0.50	27.82	16.48	55.20	0.57	1.0	96.0	1.59	adb
						1.43	27.56	16.33	54.68	0.56				arb
							27.96	16.56	55.48	0.57				db
186875	**4591**	913	894	789	2.08	0.57	2.67	24.23	72.53	0.96	9.0	96.5	1.28	adb
						2.64	2.61	23.73	71.02	0.94				arb
							2.69	24.37	72.95	0.97				db
186876	**4592**	241	239	209	0.83	0.66	23.43	17.67	58.24	0.69	4.0	98.3	1.49	adb
						1.48	23.24	17.52	57.76	0.68				arb
							23.59	17.79	58.63	0.69				db

*SG checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-07C**

LAB#: 186857-894

REPORT DATE: November 29, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
186877	**4593**	1951	1936	1687	0.77	0.63	13.96	17.82	67.59	0.74	2.5	98.3	1.39	adb	
						1.39	13.85	17.68	67.07	0.73				arb	
							14.05	17.93	68.02	0.74				db	
186878	**4594**	564	560	493	0.71	0.54	14.85	19.16	65.45	0.85	7.5	97.1	1.40	adb	
						1.25	14.74	19.02	64.99	0.84				arb	
							14.93	19.26	65.81	0.85				db	
186879	**4595**	901	891	784	1.11	0.50	8.46	23.75	67.29	0.80	7.0	92.5	1.35	adb	
						1.60	8.37	23.49	66.54	0.79				arb	
							8.50	23.87	67.63	0.80				db	
186880	**4596**	871	848	741	2.64	0.67	26.73	16.16	56.44	0.45	0.0	96.5	1.53	adb	
						3.29	26.02	15.73	54.95	0.44				arb	
							26.91	16.27	56.82	0.45				db	
186881	**4597**	7525	7064	6131	6.13	0.69	6.81	19.10	73.40	0.44	1.0	96.0	1.35	adb	
						6.77	6.39	17.93	68.90	0.41				arb	
							6.86	19.23	73.91	0.44				db	
186882	**4598**	8788	8461	7413	3.72	0.42	13.23	19.42	66.93	0.38	4.0	96.8	1.37	adb	
						4.13	12.74	18.70	64.44	0.37				arb	
							13.29	19.50	67.21	0.38				db	
186883	**4599**	998	958	833	4.01	0.37	14.31	19.67	65.65	0.45	6.0	95.7	1.40	adb	
						4.36	13.74	18.88	63.02	0.43				arb	
							14.36	19.74	65.89	0.45				db	
186884	**4600**	1950	1886	1643	3.28	0.46	9.05	19.09	71.40	0.64	2.5	96.2	1.36	adb	
						3.73	8.75	18.46	69.06	0.62				arb	
							9.09	19.18	71.73	0.64				db	
186885	**4601**	1633	1615	1417	1.10	0.30	21.28	27.66	50.76	0.73	5.5	96.0	1.55	adb	*
						1.40	21.05	27.36	50.20	0.72				arb	
							21.34	27.74	50.91	0.73				db	
186886	**4602**	1875	1822	1592	2.83	0.44	14.14	18.50	66.92	0.81	3.5	94.0	1.41	adb	
						3.25	13.74	17.98	65.03	0.79				arb	
							14.20	18.58	67.22	0.81				db	

***Prox, SG checked**

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-07C**

LAB#: 186857-894

REPORT DATE: November 29, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
186887	**4603**	4765	4637	4068	2.69	0.48	6.95	22.76	69.81	0.54	5.0	92.3	1.33	adb
						3.15	6.76	22.15	67.93	0.53				arb
							6.98	22.87	70.15	0.54				db
186888	**4604**	238	235	209	1.26	0.77	46.14	15.04	38.05	0.35	n/a	n/a	1.80	adb
						2.02	45.56	14.85	37.57	0.35				arb
							46.50	15.16	38.35	0.35				db
186889	**4605**	1805	1772	1516	1.83	0.61	5.63	20.50	73.26	0.71	3.5	97.1	1.33	adb
						2.43	5.53	20.13	71.92	0.70				arb
							5.66	20.63	73.71	0.71				db
186890	**4606**	1050	1040	896	0.95	0.58	84.82	12.94	1.66	0.03	n/a	n/a	2.51	adb
						1.53	84.01	12.82	1.64	0.03				arb
							85.31	13.02	1.67	0.03				db
186891	**4607**	1056	1034	902	2.08	0.49	9.62	23.13	66.76	0.75	8.0	94.8	1.34	adb
						2.56	9.42	22.65	65.37	0.73				arb
							9.67	23.24	67.09	0.75				db
186892	**4608**	2739	2701	2338	1.39	0.63	7.04	18.39	73.94	0.56	0.5	99.4	1.35	adb
						2.01	6.94	18.13	72.91	0.55				arb
							7.08	18.51	74.41	0.56				db
186893	**4609**	3002	2958	2576	1.47	0.56	4.61	19.97	74.86	0.41	2.0	98.3	1.32	adb
						2.02	4.54	19.68	73.76	0.40				arb
							4.64	20.08	75.28	0.41				db
186894	**4610**	3171	2974	2613	6.21	0.59	9.64	20.62	69.15	0.39	4.0	98.8	1.37	adb
						6.77	9.04	19.34	64.85	0.37				arb
							9.70	20.74	69.56	0.39				db

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-08C**

LAB#: 187334-353

REPORT DATE: December 10, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
187334	**4611**	2875	2831	2427	1.53	0.64	22.44	18.83	58.09	0.55	3.5	96.2	1.45	adb	
						2.16	22.10	18.54	57.20	0.54				arb	
							22.58	18.95	58.46	0.55				db	
187335	**4612**	499	490	401	1.80	0.57	21.45	30.80	47.18	0.69	2.5	96.8	1.57	adb	*
						2.36	21.06	30.24	46.33	0.68				arb	
							21.57	30.98	47.45	0.69				db	
187336	**4613**	1555	1541	1301	0.90	0.65	23.20	17.85	58.30	0.70	5.0	98.6	1.48	adb	
						1.54	22.99	17.69	57.78	0.69				arb	
							23.35	17.97	58.68	0.70				db	
187337	**4614**	531	519	404	2.26	1.23	5.64	23.31	69.82	1.21	1.5	65.6	1.33	adb	
						3.46	5.51	22.78	68.24	1.18				arb	
							5.71	23.60	70.69	1.23				db	
187338	**4615**	235	234	175	0.43	0.75	69.62	15.62	14.01	0.22	-	-	2.09	adb	
						1.17	69.32	15.55	13.95	0.22				arb	
							70.15	15.74	14.12	0.22				db	
187339	**4616**	468	457	368	2.35	0.96	35.12	18.92	45.00	0.69	1.5	74.7	1.57	adb	*
						3.29	34.29	18.48	43.94	0.67				arb	
							35.46	19.10	45.44	0.70				db	
187340	**4617**	1342	1319	1104	1.71	0.69	7.52	21.74	70.05	0.75	4.5	96.5	1.33	adb	
						2.39	7.39	21.37	68.85	0.74				arb	
							7.57	21.89	70.54	0.76				db	
187341	**4618**	2437	2406	2075	1.27	0.84	9.32	20.18	69.66	0.45	1.5	98.3	1.35	adb	
						2.10	9.20	19.92	68.77	0.44				arb	
							9.40	20.35	70.25	0.45				db	
187342	**4619**	5381	5340	4622	0.76	0.84	3.45	22.90	72.81	0.44	7.0	98.6	1.29	adb	
						1.60	3.42	22.73	72.26	0.44				arb	
							3.48	23.09	73.43	0.44				db	
187343	**4620**	2420	2393	2053	1.12	0.54	11.57	22.38	65.51	0.70	7.5	98.0	1.36	adb	
						1.65	11.44	22.13	64.78	0.69				arb	
							11.63	22.50	65.87	0.70				db	
187344	**4621**	1461	1447	1216	0.96	0.69	7.18	20.56	71.57	0.66	3.0	98.6	1.35	adb	
						1.64	7.11	20.36	70.88	0.65				arb	
							7.23	20.70	72.07	0.66				db	
187345	**4622**	860	855	718	0.58	0.62	74.12	12.87	12.39	0.13	0.0	99.4	2.21	adb	
						1.20	73.69	12.80	12.32	0.13				arb	
							74.58	12.95	12.47	0.13				db	
187346	**4623**	513	508	414	0.97	0.78	17.83	22.13	59.26	0.64	7.5	98.3	1.47	adb	
						1.75	17.66	21.91	58.68	0.63				arb	
							17.97	22.30	59.73	0.65				db	
187347	**4624**	1345	1329	1102	1.19	0.68	26.19	18.05	55.08	0.48	1.5	98.8	1.50	adb	
						1.86	25.88	17.84	54.42	0.47				arb	
							26.37	18.17	55.46	0.48				db	
187348	**4625**	2080	1965	1695	5.53	0.91	10.99	19.28	68.82	0.37	2.0	97.4	1.38	adb	
						6.39	10.38	18.21	65.02	0.35				arb	
							11.09	19.46	69.45	0.37				db	
187349	**4626**	4109	4034	3500	1.83	0.84	15.77	18.65	64.74	0.55	3.0	98.3	1.41	adb	
						2.65	15.48	18.31	63.56	0.54				arb	
							15.90	18.81	65.29	0.55				db	
187350	**4627**	1312	1304	1102	0.61	0.73	31.79	22.75	44.73	0.90	4.5	98.8	1.61	adb	
						1.34	31.60	22.61	44.46	0.89				arb	
							32.02	22.92	45.06	0.91				db	
187351	**4628**	2579	2535	2175	1.71	0.85	11.00	19.25	68.90	0.84	7.0	99.1	1.35	adb	
						2.54	10.81	18.92	67.72	0.83				arb	
							11.09	19.42	69.49	0.85				db	
187352	**4629**	841	837	701	0.48	0.46	14.29	17.01	68.24	0.73	1.5	99.1	1.41	adb	
						0.93	14.22	16.93	67.92	0.73				arb	
							14.36	17.09	68.56	0.73				db	
187353	**4630**	1083	1069	890	1.29	0.55	17.47	17.15	64.83	0.69	2.0	99.4	1.42	adb	
						1.84	17.24	16.93	63.99	0.68				arb	
							17.57	17.24	65.19	0.69				db	

* Ash, SG checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-10C**

LAB#: 187354-362

REPORT DATE: December 10, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
187354	**4631**	752	745	610	0.93	0.49	35.71	15.19	48.61	0.79	2.5	99.4	1.59	adb *
						1.42	35.38	15.05	48.16	0.78				arb
							35.89	15.26	48.85	0.79				db
187355	**4632**	521	517	412	0.77	0.44	9.35	21.41	68.80	1.31	9.0	98.8	1.36	adb **
						1.20	9.28	21.25	68.27	1.30				arb
							9.39	21.50	69.10	1.32				db
187356	**4633**	1992	1968	1685	1.20	0.54	4.12	16.79	78.55	0.74	2.0	99.4	1.33	adb
						1.74	4.07	16.59	77.60	0.73				arb
							4.14	16.88	78.98	0.74				db
187357	**4634**	583	547	438	6.17	0.41	6.96	17.72	74.91	0.92	2.5	98.3	1.34	adb
						6.56	6.53	16.63	70.28	0.86				
							6.99	17.79	75.22	0.92				
187358	**4635**	675	668	544	1.04	0.37	14.97	16.38	68.28	0.96	3.0	98.3	1.41	adb
						1.40	14.81	16.21	67.57	0.95				arb
							15.03	16.44	68.53	0.96				db
187359	**4636**	1220	1194	1010	2.13	0.40	17.93	16.74	64.93	0.91	2.5	97.1	1.42	adb
						2.52	17.55	16.38	63.55	0.89				arb
							18.00	16.81	65.19	0.91				db
187360	**4637**	341	335	275	1.76	0.61	31.91	16.28	51.20	2.04	4.0	97.1	1.57	adb **
						2.36	31.35	15.99	50.30	2.00				arb
							32.11	16.38	51.51	2.05				db
187361	**4638**	3303	3246	2811	1.73	0.83	3.38	16.95	78.84	0.66	0.5	98.3	1.33	adb *
						2.54	3.32	16.66	77.48	0.65				arb
							3.41	17.09	79.50	0.67				db
187362	**4639**	1166	1126	955	3.43	0.76	26.09	13.24	59.91	0.58	0.5	98.6	1.51	adb
						4.16	25.19	12.79	57.85	0.56				arb
							26.29	13.34	60.37	0.58				db

* Ash, SG checked
** Sulphur checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-11C**

LAB#: 187363-370

REPORT DATE: December 10, 2018 Corrected December 31,2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
187363	**4640**	1028	1017	859	1.07	0.51	14.79	19.02	65.68	0.82	4.5	97.4	1.41	adb
						1.57	14.63	18.82	64.98	0.81				arb
							14.87	19.12	66.02	0.82				db
187364	**4641**	2565	2541	2170	0.94	0.84	6.23	18.60	74.33	0.58	0.5	98.8	1.32	adb
						1.77	6.17	18.43	73.63	0.57				arb
							6.28	18.76	74.96	0.58				db
187365	**4642**	2669	2630	2270	1.46	0.81	7.21	18.92	73.06	0.38	1.0	99.1	1.30	adb
						2.26	7.10	18.64	71.99	0.37				arb
							7.27	19.07	73.66	0.38				db
187366	**4643**	3942	3873	3348	1.75	0.68	2.52	21.35	75.45	0.39	4.0	97.1	1.28	adb
						2.42	2.48	20.98	74.13	0.38				arb
							2.54	21.50	75.97	0.39				db
187367	**4644**	660	657	544	0.45	0.49	5.37	23.34	70.80	1.16	8.5	98.3	1.29	adb **
						0.94	5.35	23.23	70.48	1.15				arb
							5.40	23.45	71.15	1.17				db
187368	**4645**	176	174	110	1.14	0.62	29.80	28.05	41.53	0.75	3.5	98.0	1.62	adb
						1.75	29.46	27.73	41.06	0.74				arb
							29.99	18.55	41.79	0.75				db
187369	**4646**	1902	1888	1632	0.74	0.66	25.01	16.65	57.68	0.51	1.0	98.6	1.50	adb
						1.39	24.83	16.53	57.26	0.51				arb
							25.18	16.76	58.06	0.51				db
187370	**4647**	250	247	190	1.20	0.62	32.90	21.93	44.55	0.69	4.0	99.4	1.54	adb
						1.81	32.51	21.67	44.02	0.68				arb
							33.11	22.07	44.83	0.69				db

** Sulphur checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-12C**

LAB#: 187371-390

REPORT DATE: December 28, 2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
187371	**4648**	3543	3457	3001	2.43	1.32	26.56	21.93	50.19	0.76	0.5	97.7	1.50	adb
						3.72	25.92	21.40	48.97	0.74				arb
							26.92	22.22	50.86	0.77				db
187372	**4649**	959	947	801	1.25	0.67	10.24	25.86	63.23	0.84	7.0	98.3	1.37	adb
						1.91	10.11	25.54	62.44	0.83				arb
							10.31	26.03	63.66	0.85				db
187373	**4650**	1240	1233	1048	0.56	0.44	47.81	43.54	8.21	0.29	-	-	2.27	adb**
						1.00	47.54	43.29	8.16	0.29				arb
							48.02	43.73	8.25	0.29				db
187374	**4651**	1023	1012	845	1.08	0.64	13.82	25.45	60.09	0.68	5.0	97.4	1.43	adb
						1.71	13.67	25.18	59.44	0.67				arb
							13.91	25.61	60.48	0.68				db
187375	**4652**	874	862	714	1.37	0.63	2.97	24.08	72.32	0.73	8.0	97.4	1.26	adb
						1.99	2.93	23.75	71.33	0.72				arb
							2.99	24.23	72.78	0.73				db
187376	**4653**	5199	5143	4460	1.08	0.52	11.46	20.65	67.37	0.41	2.0	97.7	1.34	adb
						1.59	11.34	20.43	66.64	0.41				arb
							11.52	20.76	67.72	0.41				db
187377	**4654**	10153	10049	8823	1.02	0.57	2.72	24.44	72.27	0.42	8.0	97.7	1.25	adb
						1.59	2.69	24.19	71.53	0.42				arb
							2.74	24.58	72.68	0.42				db
187378	**4655**	1618	1579	1413	2.41	0.47	9.02	22.57	67.94	0.71	7.0	97.7	1.30	adb
						2.87	8.80	22.03	66.30	0.69				arb
							9.06	22.68	68.26	0.71				db
187379	**4656**	1676	1658	1442	1.07	0.81	4.33	20.55	74.31	0.63	3.0	98.6	1.28	adb
						1.88	4.28	20.33	73.51	0.62				arb
							4.37	20.72	74.92	0.64				db
187380	**4657**	1597	1578	1412	1.19	0.71	80.10	12.90	6.29	0.63	-	-	2.31	adb
						1.89	79.15	12.75	6.22	0.62				arb
							80.67	12.99	6.33	0.63				db
187381	**4658**	1454	1441	1270	0.89	0.51	6.77	25.41	67.31	0.80	8.0	97.1	1.31	adb
						1.40	6.71	25.18	66.71	0.79				arb
							6.80	25.54	67.66	0.80				db
187382	**4659**	2631	2565	2229	2.51	0.56	23.96	18.18	57.30	0.53	1.0	98.8	1.46	adb
						3.05	23.36	17.72	55.86	0.52				arb
							24.09	18.28	57.62	0.53				db
187383	**4660**	1263	1238	1083	1.98	0.47	7.91	19.56	72.06	0.74	2.0	98.8	1.33	adb
						2.44	7.75	19.17	70.63	0.73				arb
							7.95	19.65	72.40	0.74				db
187384	**4661**	1012	1002	864	0.99	0.64	22.17	22.07	55.12	0.40	2.0	98.6	1.48	adb
						1.62	21.95	21.85	54.58	0.40				arb
							22.31	22.21	55.48	0.40				db
187385	**4662**	1212	1157	1011	4.54	0.60	18.46	19.82	61.12	0.40	4.0	98.6	1.40	adb
						5.11	17.62	18.92	58.35	0.38				arb
							18.57	19.94	61.49	0.40				db
187386	**4663**	3347	3302	2924	1.34	0.74	14.59	18.45	66.22	0.59	2.0	98.8	1.38	adb
						2.07	14.39	18.20	65.33	0.58				arb
							14.70	18.59	66.71	0.59				db
187387	**4664**	1599	1587	1400	0.75	0.52	80.58	12.08	6.82	0.08	-	-	2.37	adb
						1.27	79.98	11.99	6.77	0.08				arb
							81.00	12.14	6.86	0.08				db
187388	**4665**	139	138	121	0.72	0.63	41.46	15.40	42.51	0.41	-	-	1.64	adb*
						1.34	41.16	15.29	42.20	0.41				arb
							41.72	15.50	42.78	0.41				db
187389	**4666**	3951	3850	3378	2.56	0.46	19.51	28.22	51.81	0.86	7.5	98.6	1.47	adb*
						3.00	19.01	27.50	50.49	0.84				arb
							19.60	28.35	52.05	0.86				db
187390	**4667**	634	629	559	0.79	0.51	20.17	17.45	61.87	0.79	2.5	99.1	1.43	adb
						1.29	20.01	17.31	61.38	0.78				arb
							20.27	17.54	62.19	0.79				db

*% Volatile checked ** Prox & SG checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**

PO#: **326969WC**

HOLE: **WC18-13C**

LAB#: 187391-409

REPORT DATE: December 28, 2018

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
187391	**4668**	1818	1721	1498	5.34	3.37	25.57	22.52	48.54	0.76	0.5	9.4	1.55	adb
						8.53	24.21	21.32	45.95	0.72				arb
							26.46	23.31	50.23	0.79				db
187392	**4669**	922	912	787	1.08	0.66	7.59	26.23	65.52	0.87	7.0	85.8	1.33	adb
						1.74	7.51	25.95	64.81	0.86				arb
							7.64	26.40	65.96	0.88				db
187393	**4670**	1272	1263	1121	0.71	0.70	87.86	5.52	5.92	0.09	-	-	2.40	adb*
						1.40	87.24	5.48	5.88	0.09				arb
							88.48	5.56	5.96	0.09				db
187394	**4671**	1539	1524	1330	0.97	0.54	10.96	25.43	63.07	0.80	7.5	97.1	1.40	adb
						1.51	10.85	25.18	62.46	0.79				arb
							11.02	25.57	63.41	0.80				db
187395	**4672**	575	566	489	1.57	0.51	10.12	22.27	67.10	0.79	7.0	92.3	1.38	adb
						2.07	9.96	21.92	66.05	0.78				arb
							10.17	22.38	67.44	0.79				db
187396	**4673**	2383	2342	2028	1.72	1.05	8.20	19.63	71.12	0.50	1.5	99.1	1.35	adb
						2.75	8.06	19.29	69.90	0.49				arb
							8.29	19.84	71.87	0.51				db
187397	**4674**	5484	5213	4516	4.94	0.85	10.32	21.39	67.44	0.49	3.5	97.1	1.35	adb
						5.75	9.81	20.33	64.11	0.47				arb
							10.41	21.57	68.02	0.49				db
187398	**4675**	1381	1336	1170	3.26	0.45	15.63	22.47	61.45	0.66	7.5	98.0	1.37	adb
						3.69	15.12	21.74	59.45	0.64				arb
							15.70	22.57	61.73	0.66				db
187399	**4676**	2122	2097	1811	1.18	0.65	7.26	20.25	71.84	0.74	2.2	97.7	1.33	adb
						1.82	7.17	20.01	70.99	0.73				arb
							7.31	20.38	72.31	0.74				db
187400	**4677**	1436	1426	1237	0.70	0.64	77.07	13.94	8.35	0.10	-	-	2.27	adb
						1.33	76.53	13.84	8.29	0.09				arb
							77.57	14.03	8.40	0.10				db
187401	**4678**	1750	1730	1498	1.14	0.61	9.90	23.43	66.06	0.81	9.0	98.3	1.32	adb
						1.75	9.79	23.16	65.31	0.80				arb
							9.96	23.57	66.47	0.81				db
187402	**4679**	3566	3496	3037	1.96	0.58	14.30	19.64	65.48	0.70	4.0	97.1	1.39	adb
						2.53	14.02	19.25	64.19	0.69				arb
							14.38	19.75	65.86	0.70				db
187403	**4680**	1996	1978	1730	0.90	0.57	19.56	18.93	60.94	0.86	4.5	98.3	1.42	adb
						1.47	19.38	18.76	60.39	0.85				arb
							19.67	19.04	61.29	0.86				db
187404	**4681**	2104	2079	1806	1.19	0.73	7.79	18.23	73.25	0.54	1.0	99.7	1.34	adb
						1.91	7.70	18.01	72.38	0.53				arb
							7.85	18.36	73.79	0.54				db
187405	**4682**	5117	4947	4348	3.32	0.76	4.91	19.74	74.59	0.43	2.0	99.7	1.31	adb
						4.06	4.75	19.08	72.11	0.42				arb
							4.95	19.89	75.16	0.43				db
187406	**4683**	7116	6952	6040	2.30	0.81	9.69	20.25	69.25	0.37	4.5	96.8	1.33	adb
						3.10	9.47	19.78	67.65	0.36				arb
							9.77	20.42	69.82	0.37				db
187407	**4684**	1085	1063	924	2.03	0.69	63.06	13.08	23.17	0.18	-	-	2.03	adb
						2.70	61.78	12.81	22.70	0.18				arb
							63.50	13.17	23.33	0.18				db
187408	**4685**	2369	2338	2064	1.31	0.63	23.05	19.07	57.25	0.51	5.5	99.4	1.45	adb
						1.93	22.75	18.82	56.50	0.50				arb
							23.20	19.19	57.61	0.51				db
187409	**4686**	1735	1720	1519	0.86	0.62	24.63	18.70	56.05	0.51	4.5	99.4	1.48	adb
						1.48	24.42	18.54	55.57	0.51				arb
							24.78	18.82	56.40	0.51				db

*% Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-14C**

LAB#: 187933-188012

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
187933	**4687**	957	941	823	1.67	1.47	34.17	19.16	45.20	0.69	1.5	76.8	1.57	adb	
						3.12	33.60	18.84	44.44	0.68				arb	
							34.68	19.45	45.87	0.70				db	
187934	**4688**	1770	1748	1509	1.24	0.50	15.90	28.73	54.87	0.75	6.5	96.5	1.44	adb	+ -
						1.74	15.70	28.37	54.19	0.74				arb	
							15.98	28.87	55.15	0.75				db	
187935	**4689**	1450	1435	1261	1.03	0.71	5.88	23.70	69.71	0.68	8.0	96.5	1.30	adb	
						1.74	5.82	23.45	68.99	0.67				arb	
							5.92	23.87	70.21	0.68				db	
187936	**4690**	3708	3664	3203	1.19	0.80	10.08	21.14	67.98	0.44	2.0	97.7	1.36	adb	
						1.98	9.96	20.89	67.17	0.43				arb	
							10.16	21.31	68.53	0.44				db	
187937	**4691**	6199	6119	5350	1.29	0.65	3.06	24.38	71.91	0.40	8.0	97.7	1.28	adb	
						1.93	3.02	24.07	70.98	0.39				arb	
							3.08	24.54	72.38	0.40				db	
187938	**4692**	646	628	507	2.79	0.57	21.35	21.60	56.48	0.35	7.5	97.7	1.41	adb	* +
						3.34	20.76	21.00	54.91	0.34				arb	
							21.47	21.72	56.80	0.35				db	
187939	**4693**	760	753	652	0.92	0.60	52.28	14.79	32.33	0.30	-	-	1.81	adb	
						1.52	51.80	14.65	32.03	0.30				arb	
							52.60	14.88	32.53	0.30				db	
187940	**4694**	1697	1667	1434	1.77	0.61	7.88	22.65	68.86	0.64	8.0	97.7	1.30	adb	
						2.37	7.74	22.25	67.64	0.63				arb	
							7.93	22.79	69.28	0.64				db	
187941	**4695**	151	150	121	0.66	0.79	59.04	14.28	25.89	0.24	-	-	1.89	adb	
						1.45	58.65	14.19	25.72	0.24				arb	
							59.51	14.39	26.10	0.24				db	
187942	**4696**	461	458	404	0.65	0.55	59.84	14.47	25.14	0.25	-	-	1.94	adb	* +
						1.20	59.45	14.38	24.98	0.25				arb	
							60.17	14.55	25.28	0.25				db	
187943	**4697**	1510	1482	1304	1.85	0.81	4.85	20.80	73.54	0.61	3.0	99.1	1.30	adb	
						2.65	4.76	20.41	72.18	0.60				arb	
							4.89	20.97	74.14	0.61				db	
187944	**4698**	1542	1519	1329	1.49	0.43	33.40	20.12	46.05	0.50	7.5	96.0	1.55	adb	* +
						1.92	32.90	19.82	45.36	0.49				arb	
							33.54	20.21	46.25	0.50				db	
187945	**4699**	1639	1596	1411	2.62	0.53	19.52	18.26	61.69	0.55	2.0	97.4	1.42	adb	
						3.14	19.01	17.78	60.07	0.54				arb	
							19.62	18.36	62.02	0.55				db	
187946	**4700**	1147	1134	991	1.13	0.40	15.70	26.88	57.02	0.56	4.0	96.2	1.45	adb	+ -
						1.53	15.52	26.58	56.37	0.55				arb	
							15.76	26.99	57.25	0.56				db	
187947	**4701**	717	710	627	0.98	0.38	16.70	21.01	61.91	0.66	3.0	97.4	1.40	adb	
						1.35	16.54	20.80	61.31	0.65				arb	
							16.76	21.09	62.15	0.66				db	
187948	**4702**	977	956	827	2.15	0.37	27.93	20.35	51.35	0.42	0.5	97.7	1.55	adb	
						2.51	27.33	19.91	50.25	0.41				arb	
							28.03	20.43	51.54	0.42				db	
187949	**4703**	3799	3614	3125	4.87	0.66	4.38	20.18	74.78	0.45	1.0	92.0	1.30	adb	+ -
						5.50	4.17	19.20	71.14	0.43				arb	
							4.41	20.31	75.28	0.45				db	
187950	**4704**	8837	8420	7306	4.72	0.61	4.79	21.09	73.51	0.43	4.0	96.8	1.29	adb	
						5.30	4.56	20.09	70.04	0.41				arb	
							4.82	21.22	73.96	0.43				db	
187951	**4705**	1394	1300	1125	6.74	0.79	50.75	14.40	34.06	0.28	-	-	1.78	adb	* +
						7.48	47.33	13.43	31.76	0.26				arb	
							51.15	14.51	34.33	0.28				db	
187952	**4706**	585	571	490	2.39	0.54	23.70	20.63	55.13	0.38	1.0	97.1	1.50	adb	
						2.92	23.13	20.14	53.81	0.37				arb	
							23.83	20.74	55.43	0.38				db	

* SG checked
\+ Ash checked
\- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-14C, WC18-15C & WC18-16C**

LAB#: 187933-188012

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
187953	**4707**	616	609	531	1.14	0.65	55.21	11.84	32.30	0.35	-	-	1.80	adb
						1.78	54.58	11.71	31.93	0.35				arb
							55.57	11.92	32.51	0.35				db
187954	**4708**	873	851	724	2.52	0.51	9.89	18.24	71.36	0.62	1.0	97.4	1.34	adb
						3.02	9.64	17.78	69.56	0.60				arb
							9.94	18.33	71.73	0.62				db
187955	**4709**	1382	1370	1179	0.87	0.56	33.58	18.21	47.65	0.46	3.5	97.7	1.56	adb*
						1.42	33.29	18.05	47.24	0.46				arb
							33.77	18.31	47.92	0.46				db
187956	**4710**	1020	1009	872	1.08	0.45	11.31	25.19	63.05	1.00	8.0	95.4	1.36	adb
						1.52	11.19	24.92	62.37	0.99				arb
							11.36	25.30	63.34	1.00				db
187957	**4711**	2361	2332	2021	1.23	0.54	19.45	17.85	62.16	0.79	5.0	98.0	1.40	adb
						1.76	19.21	17.63	61.40	0.78				arb
							19.56	17.95	62.50	0.79				db
187958	**4712**	1073	1065	939	0.75	0.60	38.62	16.04	44.74	0.76	7.0	98.3	1.59	adb*
						1.34	38.33	15.92	44.41	0.75				arb
							38.85	16.14	45.01	0.76				db
187959	**4713**	1706	1647	1461	3.46	0.74	21.84	17.84	59.58	0.67	0.5	79.0	1.46	adb
						4.17	21.08	17.22	57.52	0.65				arb
							22.00	17.97	60.02	0.67				db
187960	**4714**	423	420	360	0.71	0.65	6.33	18.10	74.92	0.65	1.0	98.6	1.32	adb
						1.35	6.29	17.97	74.39	0.65				arb
							6.37	18.22	75.41	0.65				db
187961	**4715**	3247	3214	2825	1.02	0.58	4.32	19.36	75.74	0.45	3.0	96.0	1.29	adb
						1.59	4.28	19.16	74.97	0.45				arb
							4.35	19.47	76.18	0.45				db
187962	**4716**	1554	1534	1320	1.29	0.39	2.98	21.43	75.20	0.44	5.0	96.0	1.28	adb
						1.67	2.94	21.15	74.23	0.43				arb
							2.99	21.51	75.49	0.44				db
187963	**4717**	607	593	523	2.31	0.70	37.47	17.25	44.58	0.34	1.0	96.2	1.60	adb
						2.99	36.61	16.85	43.55	0.33				arb
							37.73	17.37	44.89	0.34				db
187964	**4718**	691	684	593	1.01	0.37	12.54	18.21	68.88	0.57	2.5	98.0	1.37	adb
						1.38	12.41	18.03	68.18	0.56				arb
							12.59	18.28	69.14	0.57				db
187965	**4719**	921	915	799	0.65	0.37	51.80	16.39	31.44	0.28	-	-	1.82	adb* +
						1.02	51.46	16.28	31.24	0.28				arb
							51.99	16.45	31.56	0.28				db
187966	**4720**	532	527	457	0.94	0.52	10.99	24.29	64.20	1.03	7.0	97.7	1.38	adb
						1.45	10.89	24.06	63.60	1.02				arb
							11.05	24.42	64.54	1.04				db
187967	**4721**	3444	3369	2931	2.18	0.62	20.59	22.36	56.43	0.91	7.5	97.7	1.45	adb
						2.78	20.14	21.87	55.20	0.89				arb
							20.72	22.50	56.78	0.92				db
187968	**4722**	842	835	727	0.83	0.54	7.92	24.78	66.76	1.10	8.0	97.1	1.31	adb
						1.37	7.85	24.57	66.20	1.09				arb
							7.96	24.91	67.12	1.11				db
187969	**4723**	494	459	392	7.09	0.58	25.18	18.42	55.82	0.85	7.0	96.5	1.46	adb
						7.62	23.40	17.11	51.87	0.79				arb
							25.33	18.53	56.15	0.85				db
187970	**4724**	2302	2276	1975	1.13	0.64	10.64	20.48	68.24	0.54	2.0	92.3	1.37	adb
						1.76	10.52	20.25	67.47	0.53				arb
							10.71	20.61	68.68	0.54				db
187971	**4725**	1233	1158	1001	6.08	0.55	5.86	27.06	66.53	0.53	7.5	89.4	1.28	adb* +
						6.60	5.50	25.41	62.48	0.50				arb
							5.89	27.21	66.90	0.53				db
187972	**4726**	521	512	432	1.73	0.72	25.77	20.36	53.15	0.58	7.0	94.0	1.48	adb
						2.44	25.32	20.01	52.23	0.57				arb
							25.96	20.51	53.54	0.58				db

* SG checked
\+ Ash checked
\- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-16C**

LAB#: 187933-188012

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
187973	**4727**	546	542	474	0.73	0.52	72.84	12.39	14.25	0.2	-	-	2.17	adb*
						1.25	72.31	12.30	14.15	0.18				arb
							73.22	12.45	14.32	0.18				db
187974	**4728**	1540	1522	1328	1.17	0.62	11.53	18.85	69.00	0.66	1.5	99.7	1.37	adb
						1.78	11.40	18.63	68.19	0.65				arb
							11.60	18.97	69.43	0.66				db
187975	**4729**	1677	1657	1432	1.19	0.69	44.36	17.61	37.34	0.45	-	-	1.70	adb
						1.87	43.83	17.40	36.89	0.44				arb
							44.67	17.73	37.60	0.45				db
187976	**4730**	894	889	775	0.56	0.48	35.14	35.21	29.17	0.49	1.0	98.0	1.86	adb* + -
						1.04	34.94	35.01	29.01	0.49				arb
							35.31	35.38	29.31	0.49				db
187977	**4731**	825	792	690	4.00	0.62	13.61	20.82	64.95	0.82	6.5	96.8	1.37	adb
						4.60	13.07	19.99	62.35	0.79				arb
							13.69	20.95	65.36	0.83				db
187978	**4732**	1287	1229	1085	4.51	0.61	16.91	17.52	64.96	0.54	1.0	98.6	1.42	adb
						5.09	16.15	16.73	62.03	0.52				arb
							17.01	17.63	65.36	0.54				db
187979	**4733**	835	823	716	1.44	1.07	87.47	5.72	5.74	0.70	-	-	2.41	adb* + -
						2.49	86.21	5.64	5.66	0.69				arb
							88.42	5.78	5.80	0.71				db
187980	**4734**	903	837	735	7.31	0.66	8.71	18.03	72.60	0.58	1.5	98.3	1.35	adb
						7.92	8.07	16.71	67.29	0.54				arb
							8.77	18.15	73.08	0.58				db
187981	**4735**	1420	1354	1180	4.65	0.71	13.70	17.99	67.60	0.41	0.5	99.4	1.39	adb
						5.32	13.06	17.15	64.46	0.39				arb
							13.80	18.12	68.08	0.41				db
187982	**4736**	5812	5686	4942	2.17	0.63	8.45	19.44	71.48	0.40	2.5	98.3	1.35	adb
						2.78	8.27	19.02	69.93	0.39				arb
							8.50	19.56	71.93	0.40				db
187983	**4737**	313	309	271	1.28	0.61	18.88	18.88	61.63	0.40	4.0	96.8	1.45	adb
						1.88	18.64	18.64	60.84	0.39				arb
							19.00	19.00	62.01	0.40				db
187984	**4738**	702	700	605	0.28	0.47	48.11	18.25	33.17	0.27	-	-	1.80	adb
						0.75	47.97	18.20	33.08	0.27				arb
							48.34	18.34	33.33	0.27				db
187985	**4739**	327	323	283	1.22	0.50	10.18	19.52	69.80	0.66	4.5	99.1	1.36	adb
						1.72	10.06	19.28	68.95	0.65				arb
							10.23	19.62	70.15	0.66				db
187986	**4740**	896	889	779	0.78	0.55	30.46	19.12	49.87	0.52	6.5	98.6	1.57	adb
						1.33	30.22	18.97	49.48	0.52				arb
							30.63	19.23	50.15	0.52				db
187987	**4741**	567	566	489	0.18	0.54	62.21	15.64	21.61	0.23	-	-	2.05	adb*
						0.72	62.10	15.61	21.57	0.23				arb
							62.55	15.72	21.73	0.23				db
187988	**4742**	1235	1218	1067	1.38	0.42	9.50	20.01	70.07	0.70	5.5	98.0	1.34	adb
						1.79	9.37	19.73	69.11	0.69				arb
							9.54	20.09	70.37	0.70				db
187989	**4743**	859	848	732	1.28	0.41	29.87	35.04	34.68	0.63	8.0	92.5	1.75	adb* + -
						1.69	29.49	34.59	34.24	0.62				arb
							29.99	35.18	34.82	0.63				db
187990	**4744**	2326	2278	1990	2.06	0.54	16.72	21.26	61.48	1.00	2.0	97.1	1.39	adb
						2.59	16.37	20.82	60.21	0.98				arb
							16.81	21.38	61.81	1.01				db
187991	**4745**	610	599	528	1.80	0.69	57.95	13.06	28.30	1.01	-	-	1.86	adb*
						2.48	56.91	12.82	27.79	0.99				arb
							58.35	13.15	28.50	1.02				db
187992	**4746**	1412	1400	1227	0.85	0.40	12.30	20.50	66.80	0.97	8.5	97.7	1.34	adb* +
						1.25	12.20	20.33	66.23	0.96				arb
							12.35	20.58	67.07	0.97				db

* SG checked
\+ Ash checked
\- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-16C & WC18-17C**

LAB#: 187933-188012

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
187993	**4747**	2280	2258	1946	0.96	0.50	14.22	19.41	65.87	0.85	1.5	97.7	1.36	adb	
						1.46	14.08	19.22	65.23	0.84				arb	
							14.29	19.51	66.20	0.85				db	
187994	**4748**	169	165	147	2.37	0.97	15.01	21.57	62.45	0.90	1.0	91.7	1.42	adb	
						3.31	14.65	21.06	60.97	0.88				arb	
							15.16	21.78	63.06	0.91				db	
187995	**4749**	2132	2085	1779	2.20	1.14	35.19	18.43	45.24	0.69	1.5	94.2	1.58	adb	
						3.32	34.41	18.02	44.24	0.67				arb	
							35.60	18.64	45.76	0.70				db	
187996	**4750**	706	688	595	2.55	0.96	20.30	19.48	59.26	0.75	0.0	94.5	1.45	adb	
						3.49	19.78	18.98	57.75	0.73				arb	
							20.50	19.67	59.83	0.76				db	
187997	**4751**	1621	1582	1382	2.41	1.10	20.20	23.93	54.77	0.58	0.0	97.4	1.51	adb	+ -
						3.48	19.71	23.35	53.45	0.57				arb	
							20.42	24.20	55.38	0.59				db	
187998	**4752**	911	888	771	2.52	0.83	5.05	22.37	71.75	0.66	0.5	96.2	1.34	adb	
						3.33	4.92	21.81	69.94	0.64				arb	
							5.09	22.56	72.35	0.67				db	
187999	**4753**	2637	2600	2250	1.40	0.65	10.26	20.42	68.67	0.47	2.0	98.3	1.38	adb	
						2.04	10.12	20.13	67.71	0.46				arb	
							10.33	20.55	69.12	0.47				db	
188000	**4754**	5805	5737	4974	1.17	0.58	3.17	24.29	71.96	0.45	8.0	96.5	1.02	adb	
						1.74	3.13	24.01	71.12	0.44				arb	
							3.19	24.43	72.38	0.45				db	
188001	**4755**	880	862	746	2.05	0.49	7.73	21.93	69.85	0.95	7.0	97.4	1.33	adb	
						2.53	7.57	21.48	68.42	0.93				arb	
							7.77	22.04	70.19	0.95				db	
188002	**4756**	525	519	452	1.14	0.43	30.37	19.51	49.69	0.65	7.0	96.8	1.54	adb	
						1.57	30.02	19.29	49.12	0.64				arb	
							30.50	19.59	49.90	0.65				db	
188003	**4757**	455	435	388	4.40	0.56	37.45	18.17	43.82	0.60	6.0	97.7	1.62	adb	
						4.93	35.80	17.37	41.89	0.57				arb	
							37.66	18.27	44.07	0.60				db	
188004	**4758**	1126	1112	962	1.24	0.53	7.00	19.26	73.21	0.68	2.5	98.6	1.34	adb	
						1.77	6.91	19.02	72.30	0.67				arb	
							7.04	19.36	73.60	0.68				db	
188005	**4759**	1135	1127	1000	0.70	0.43	74.54	14.62	10.41	0.13	-	-	2.26	adb	* +
						1.13	74.01	14.52	10.34	0.13				arb	
							74.86	14.68	10.45	0.13				db	
188006	**4760**	636	612	526	3.77	0.44	17.34	20.47	61.75	0.68	7.0	97.4	1.41	adb	
						4.20	16.69	19.70	59.42	0.65				arb	
							17.42	20.56	62.02	0.68				db	
188007	**4761**	693	658	576	5.05	0.64	54.12	13.36	31.88	0.43	0.5	98.6	1.86	adb	
						5.66	51.39	12.69	30.27	0.41				arb	
							54.47	13.45	32.09	0.43				db	
188008	**4762**	205	202	164	1.46	0.45	28.01	16.18	55.36	0.63	1.0	99.7	1.52	adb	
						1.91	27.60	15.94	54.55	0.62				arb	
							28.14	16.25	55.61	0.63				db	
188009	**4763**	681	672	585	1.32	0.53	48.42	15.48	35.57	0.50	-	-	1.79	adb	
						1.84	47.78	15.28	35.10	0.49				arb	
							48.68	15.56	35.76	0.50				db	
188010	**4764**	2352	2311	1961	1.74	0.63	15.77	17.14	66.46	0.51	1.0	98.0	1.42	adb	
						2.36	15.50	16.84	65.30	0.50				arb	
							15.87	17.25	66.88	0.51				db	
188011	**4765**	1957	1925	1658	1.64	0.73	5.14	19.53	74.60	0.40	2.0	98.6	1.33	adb	
						2.35	5.06	19.21	73.38	0.39				arb	
							5.18	19.67	75.15	0.40				db	
188012	**4766**	5245	5139	4504	2.02	0.54	6.30	20.19	72.97	0.37	2.5	97.4	1.33	adb	
						2.55	6.17	19.78	71.50	0.36				arb	
							6.33	20.30	73.37	0.37				db	

* SG checked
\+ Ash checked
\- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-17C & WC18-18C**

LAB#: 188013-188092

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
188013	**4767**	834	826	729	0.96	0.45	7.06	19.62	72.87	0.67	3.5	98.8	1.34	adb
						1.40	6.99	19.43	72.17	0.66				arb
							7.09	19.71	73.20	0.67				db
188014	**4768**	741	738	646	0.40	0.55	44.80	18.17	36.48	0.38	4.0	97.1	1.74	adb
						0.95	44.62	18.10	36.33	0.38				arb
							45.05	18.27	36.68	0.38				db
188015	**4769**	1145	1138	836	0.61	0.50	37.85	17.16	44.49	0.42	1.0	97.7	1.65	adb
						1.11	37.62	17.06	44.22	0.42				arb
							38.04	17.25	44.71	0.42				db
188016	**4770**	3277	3245	2812	0.98	0.42	31.05	22.80	45.73	0.85	1.0	97.7	1.59	adb
						1.39	30.75	22.58	45.28	0.84				arb
							31.18	22.90	45.92	0.85				db
188017	**4771**	959	953	831	0.63	0.41	6.97	23.05	69.57	1.13	8.5	98.3	1.31	adb
						1.03	6.93	22.91	69.13	1.12				arb
							7.00	23.14	69.86	1.13				db
188018	**4772**	568	556	479	2.11	0.59	37.25	15.90	46.26	0.64	4.5	97.1	1.61	adb
						2.69	36.46	15.56	45.28	0.63				arb
							37.47	15.99	46.53	0.64				db
188019	**4773**	739	733	637	0.81	0.80	31.03	16.37	51.80	0.66	5.0	99.1	1.55	adb
						1.61	30.78	16.24	51.38	0.65				arb
							31.28	16.50	52.22	0.67				db
188020	**4774**	1590	1580	1384	0.63	0.53	48.11	12.79	38.57	0.58	6.5	99.1	1.73	adb
						1.16	47.81	12.71	38.33	0.58				arb
							48.37	12.86	38.78	0.58				db
188021	**4775**	977	939	829	3.89	1.44	19.55	21.66	57.35	0.92	0.5	62.8	1.49	adb
						5.27	18.79	20.82	55.12	0.88				arb
							19.84	21.98	58.19	0.93				db
188022	**4776**	216	215	179	0.46	0.83	66.24	15.33	17.60	0.29	0.0	93.1	2.12	adb
						1.29	65.93	15.26	17.52	0.29				arb
							66.79	15.46	17.75	0.29				db
188023	**4777**	911	875	774	3.95	1.12	18.94	20.57	59.37	0.85	0.5	91.1	1.40	adb
						5.03	18.19	19.76	57.02	0.82				arb
							19.15	20.80	60.04	0.86				db
188024	**4778**	1313	1289	1119	1.83	1.20	54.30	12.71	31.79	0.44	0.0	94.0	1.86	adb
						3.01	53.31	12.48	31.21	0.43				arb
							54.96	12.86	32.18	0.45				db
188025	**4779**	517	503	441	2.71	1.14	10.03	22.80	66.03	0.76	0.0	95.4	1.40	adb
						3.82	9.76	22.18	64.24	0.74				arb
							10.15	23.06	66.79	0.77				db
188026	**4780**	1005	987	862	1.79	1.11	19.35	25.41	54.13	0.61	0.0	93.4	1.52	adb-+
						2.88	19.00	24.95	53.16	0.60				arb
							19.57	25.70	54.74	0.62				db
188027	**4781**	1195	1171	1017	2.01	1.12	4.07	22.68	72.13	0.65	0.5	94.8	1.32	adb
						3.11	3.99	22.22	70.68	0.64				arb
							4.12	22.94	72.95	0.66				db
188028	**4782**	6665	6558	5733	1.61	1.23	9.48	20.00	69.29	0.47	0.0	98.0	1.40	adb
						2.82	9.33	19.68	68.18	0.46				arb
							9.60	20.25	70.15	0.48				db
188029	**4783**	5567	5463	4766	1.87	0.89	2.37	24.13	72.61	0.52	3.5	97.4	1.29	adb
						2.74	2.33	23.68	71.25	0.51				arb
							2.39	24.35	73.26	0.52				db
188030	**4784**	1005	941	841	6.37	0.64	35.50	16.58	47.28	0.57	3.5	98.3	1.57	adb
						6.97	33.24	15.52	44.27	0.53				arb
							35.73	16.69	47.58	0.57				db
188031	**4785**	1817	1796	1550	1.16	0.50	12.60	18.85	68.05	0.66	1.5	98.6	1.39	adb
						1.65	12.45	18.63	67.26	0.65				arb
							12.66	18.94	68.39	0.66				db
188032	**4786**	1164	1159	1010	0.43	0.66	79.39	14.92	5.03	0.08	-	-	2.37	adb-+
						1.09	79.05	14.86	5.01	0.08				arb
							79.92	15.02	5.06	0.08				db

*** SG checked**
+ Ash checked
- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-18C, WC18-19C & WC18-20C**

LAB#: 188013-188092

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis

LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
188033	**4787**	1058	1049	910	0.85	0.45	9.05	21.56	68.94	0.75	7.5	98.0	1.33	adb
						1.30	8.97	21.38	68.35	0.74				arb
							9.09	21.66	69.25	0.75				db
188034	**4788**	542	539	488	0.55	0.58	18.92	16.03	64.47	0.56	2.0	99.7	1.47	adb
						1.13	18.82	15.94	64.11	0.56				arb
							19.03	16.12	64.85	0.56				db
188035	**4789**	798	791	696	0.88	0.71	82.78	6.90	9.61	0.15	-	-	2.34	adb*+
						1.58	82.05	6.84	9.53	0.15				arb
							83.37	6.95	9.68	0.15				db
188036	**4790**	1787	1767	1553	1.12	0.48	5.44	21.03	73.05	0.82	7.0	98.6	1.30	adb
						1.59	5.38	20.79	72.23	0.81				arb
							5.47	21.13	73.40	0.82				db
188037	**4791**	1867	1851	1620	0.86	0.49	21.32	16.58	61.61	0.89	1.0	99.7	1.47	adb
						1.34	21.14	16.44	61.08	0.88				arb
							21.42	16.66	61.91	0.89				db
188038	**4792**	440	428	386	2.73	0.48	58.77	14.93	25.82	0.31	-	-	2.00	adb
						3.19	57.17	14.52	25.12	0.30				arb
							59.05	15.00	25.94	0.31				db
188039	**4793**	403	395	351	1.99	0.46	80.64	20.02	-1.12	0.13	-	-	2.41	adb* -
						2.44	79.04	19.62	-1.10	0.13				arb
							81.01	20.11	-1.13	0.13				db
188040	**4794**	1217	1199	1045	1.48	0.85	58.73	10.65	29.77	0.24	-	-	1.95	adb
						2.32	57.86	10.49	29.33	0.24				arb
							59.23	10.74	30.03	0.24				db
188041	**4795**	3055	2989	2629	2.16	0.61	3.14	19.60	76.65	0.43	1.0	98.0	1.32	adb
						2.76	3.07	19.18	74.99	0.42				arb
							3.16	19.72	77.12	0.43				db
188042	**4796**	6416	6312	5513	1.62	0.52	5.52	20.79	73.17	0.43	4.5	98.6	1.34	adb
						2.13	5.43	20.45	71.98	0.42				arb
							5.55	20.90	73.55	0.43				db
188043	**4797**	1593	1583	1384	0.63	0.54	3.91	19.29	76.26	0.69	1.5	99.1	1.29	adb
						1.16	3.89	19.17	75.78	0.69				arb
							3.93	19.39	76.67	0.69				db
188044	**4798**	887	882	777	0.56	0.50	35.19	18.88	45.43	0.43	4.0	98.8	1.59	adb
						1.06	34.99	18.77	45.17	0.43				arb
							35.37	18.97	45.66	0.43				db
188045	**4799**	1016	1014	902	0.20	0.36	67.63	15.41	16.60	0.15	-	-	2.13	adb
						0.56	67.50	15.38	16.57	0.15				arb
							67.87	15.47	16.66	0.15				db
188046	**4800**	1514	1505	1323	0.59	0.47	6.03	20.69	72.81	0.65	5.5	98.0	1.35	adb
						1.06	5.99	20.57	72.38	0.65				arb
							6.06	20.79	73.15	0.65				db
188047	**4801**	1261	1258	1108	0.24	0.48	63.93	9.91	25.68	0.25	-	-	1.90	adb*
						0.72	63.78	9.89	25.62	0.25				arb
							64.24	9.96	25.80	0.25				db
188048	**4802**	1894	1853	1618	2.16	1.14	14.95	18.39	65.52	0.67	0.5	95.7	1.41	adb
						3.28	14.63	17.99	64.10	0.66				arb
							15.12	18.60	66.28	0.68				db
188049	**4803**	3576	3520	3120	1.57	0.52	14.50	19.85	65.13	0.37	1.5	99.1	1.40	adb
						2.08	14.27	19.54	64.11	0.36				arb
							14.58	19.95	65.47	0.37				db
188050	**4804**	425	422	350	0.71	0.42	9.62	25.54	64.42	1.01	7.5	98.0	1.35	adb-+
						1.12	9.55	25.36	63.97	1.00				arb
							9.66	25.65	64.69	1.01				db
188051	**4805**	1122	1067	934	4.90	1.34	17.29	22.26	59.11	0.97	1.0	42.8	1.40	adb
						6.18	16.44	21.17	56.21	0.92				arb
							17.52	22.56	59.91	0.98				db
188052	**4806**	425	405	368	4.71	0.87	56.29	13.14	29.70	0.52	-	-	1.81	adb
						5.53	53.64	12.52	28.30	0.50				arb
							56.78	13.26	29.96	0.52				db

*** SG checked**
+ Ash checked
- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-20C**

LAB#: 188013-188092

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
188053	**4807**	2743	2714	2378	1.06	0.57	10.10	25.89	63.44	0.91	5.5	97.4	1.36	adb-
						1.62	9.99	25.62	62.77	0.90				arb
							10.16	26.04	63.80	0.92				db
188054	**4808**	860	854	738	0.70	0.58	34.97	16.99	47.46	0.45	2.0	98.3	1.58	adb
						1.27	34.73	16.87	47.13	0.45				arb
							35.17	17.09	47.74	0.45				db
188055	**4809**	1281	1273	1112	0.62	0.75	13.30	19.59	66.36	0.42	1.5	97.4	1.40	adb
						1.37	13.22	19.47	65.95	0.42				arb
							13.40	19.74	66.86	0.42				db
188056	**4810**	2195	2173	1895	1.00	0.78	28.58	18.54	52.10	0.55	3.0	98.6	1.53	adb
						1.77	28.29	18.35	51.58	0.54				arb
							28.80	18.69	52.51	0.55				db
188057	**4811**	5255	5128	4466	2.42	0.87	15.45	21.59	62.09	0.42	7.5	97.7	1.41	adb
						3.27	15.08	21.07	60.59	0.41				arb
							15.59	21.78	62.63	0.42				db
188058	**4812**	1690	1629	1498	3.61	0.79	18.15	21.37	59.69	0.56	7.5	97.1	1.41	adb
						4.37	17.49	20.60	57.54	0.54				arb
							18.29	21.54	60.17	0.56				db
188059	**4813**	678	674	587	0.59	0.68	4.67	20.34	74.31	0.57	4.0	97.1	1.32	adb
						1.27	4.64	20.22	73.87	0.57				arb
							4.70	20.48	74.82	0.57				db
188060	**4814**	1033	1027	894	0.58	0.75	81.24	14.48	3.53	0.12	-	-	2.38	adb*
						1.33	80.77	14.40	3.51	0.12				arb
							81.86	14.59	3.55	0.12				db
188061	**4815**	830	809	715	2.53	0.66	17.80	20.47	61.07	0.57	7.0	98.0	1.42	adb
						3.17	17.35	19.95	59.52	0.56				arb
							17.92	20.61	61.48	0.57				db
188062	**4816**	1186	1168	1034	1.52	0.52	12.03	19.56	67.89	0.65	4.5	98.3	1.37	adb
						2.03	11.85	19.26	66.86	0.64				arb
							12.09	19.66	68.24	0.65				db
188063	**4817**	514	513	443	0.19	0.53	25.32	16.03	58.12	0.78	1.0	98.8	1.52	adb
						0.72	25.27	16.00	58.01	0.78				arb
							25.45	16.12	58.43	0.78				db
188064	**4818**	421	420	358	0.24	0.44	69.20	14.06	16.30	0.27	-	-	2.21	adb
						0.68	69.04	14.03	16.26	0.27				arb
							69.51	14.12	16.37	0.27				db
188065	**4819**	1958	1948	1703	0.51	0.53	8.31	18.25	72.91	0.71	1.5	99.1	1.41	adb
						1.04	8.27	18.16	72.54	0.71				arb
							8.35	18.35	73.30	0.71				db
188066	**4820**	2264	2239	1932	1.10	0.57	6.25	19.63	73.55	0.63	1.5	98.6	1.35	adb
						1.67	6.18	19.41	72.74	0.62				arb
							6.29	19.74	73.97	0.63				db
188067	**4821**	1214	1205	934	0.74	0.44	2.51	21.34	75.71	0.63	5.5	98.8	1.31	adb
						1.18	2.49	21.18	75.15	0.63				arb
							2.52	21.43	76.04	0.63				db
188068	**4822**	892	864	742	3.14	0.41	22.96	18.36	58.27	0.39	1.5	98.3	1.48	adb
						3.54	22.24	17.78	56.44	0.38				arb
							23.05	18.44	58.51	0.39				db
188069	**4823**	751	744	647	0.93	0.38	2.84	20.19	76.59	0.42	4.0	98.6	1.31	adb
						1.31	2.81	20.00	75.88	0.42				arb
							2.85	20.27	76.88	0.42				db
188070	**4824**	400	399	342	0.25	0.53	65.32	15.42	18.73	0.12	1.0	99.1	2.08	adb
						0.78	65.16	15.38	18.68	0.12				arb
							65.67	15.50	18.83	0.12				db
188071	**4825**	948	941	825	0.74	0.52	15.88	17.21	66.39	0.43	2.0	99.4	1.41	adb
						1.25	15.76	17.08	65.90	0.43				arb
							15.96	17.30	66.74	0.43				db
188072	**4826**	2015	2003	1442	0.60	0.54	26.71	18.99	53.76	0.41	2.0	98.3	1.52	adb
						1.13	26.55	18.88	53.44	0.41				arb
							26.86	19.09	54.05	0.41				db

*** SG checked**
+ Ash checked
- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-20C, WC18-21C &18C-22C**

LAB#: 188013-188092

UPDATED: February 14, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
188073	**4827**	1115	1101	829	1.26	0.61	8.13	21.56	69.70	0.66	7.5	99.1	1.33	adb	
						1.86	8.03	21.29	68.82	0.65				arb	
							8.18	21.69	70.13	0.66				db	
188074	**4828**	3866	3820	3350	1.19	0.51	14.41	21.64	63.44	0.86	7.0	99.4	1.40	adb	
						1.69	14.24	21.38	62.69	0.85				arb	
							14.48	21.75	63.77	0.86				db	
188075	**4829**	814	812	691	0.25	0.47	46.78	13.23	39.52	0.53	1.0	99.7	1.74	adb	
						0.71	46.67	13.20	39.42	0.53				arb	
							47.00	13.29	39.71	0.53				db	
188076	**4830**	1165	1162	998	0.26	0.32	45.51	42.84	11.33	0.30	1.5	98.8	2.22	adb	-+*
						0.58	45.39	42.73	11.30	0.30				arb	
							45.66	42.98	11.37	0.30				db	
188077	**4831**	634	630	552	0.63	0.56	10.23	21.03	68.18	1.10	9.0	99.4	1.34	adb	
						1.19	10.17	20.90	67.75	1.09				arb	
							10.29	21.15	68.56	1.11				db	
188078	**4832**	1472	1463	1286	0.61	0.67	29.81	17.59	51.93	0.75	7.5	99.4	1.55	adb	
						1.28	29.63	17.48	51.61	0.75				arb	
							30.01	17.71	52.28	0.76				db	
188079	**4833**	1007	999	889	0.79	0.51	10.31	19.68	69.50	0.99	7.5	99.1	1.35	adb	
						1.30	10.23	19.52	68.95	0.98				arb	
							10.36	19.78	69.86	1.00				db	
188080	**4834**	2981	2963	2618	0.60	0.49	12.21	19.37	67.93	0.75	3.0	99.4	1.40	adb	
						1.09	12.14	19.25	67.52	0.75				arb	
							12.27	19.47	68.26	0.75				db	
188081	**4835**	899	881	772	2.00	0.66	20.26	17.30	61.78	0.93	1.0	97.7	1.49	adb	
						2.65	19.85	16.95	60.54	0.91				arb	
							20.39	17.41	62.19	0.94				db	
188082	**4836**	662	653	573	1.36	0.61	15.69	16.63	67.07	0.91	1.0	99.1	1.44	adb	
						1.96	15.48	16.40	66.16	0.90				arb	
							15.79	16.73	67.48	0.92				db	
188083	**4837**	3000	2804	2448	6.53	0.73	7.39	19.15	72.73	0.70	1.5	93.1	1.36	adb	
						7.22	6.91	17.90	67.98	0.65				arb	
							7.44	19.29	73.26	0.71				db	
188084	**4838**	2087	2050	1772	1.77	0.52	8.08	20.92	70.48	0.49	6.0	97.7	1.34	adb	
						2.28	7.94	20.55	69.23	0.48				arb	
							8.12	21.03	70.85	0.49				db	
188085	**4839**	608	599	528	1.48	0.62	3.00	19.35	77.03	0.35	2.0	98.8	1.33	adb	
						2.09	2.96	19.06	75.89	0.34				arb	
							3.02	19.47	77.51	0.35				db	
188086	**4840**	1616	1591	1381	1.55	0.56	21.92	19.51	58.01	0.35	2.5	97.4	1.48	adb	
						2.10	21.58	19.21	57.11	0.34				arb	
							22.04	19.62	58.34	0.35				db	
188087	**4841**	300	297	264	1.00	0.53	79.47	14.79	5.21	0.14	-	-	2.24	adb	*
						1.52	78.68	14.64	5.16	0.14				arb	
							79.89	14.87	5.24	0.14				db	
188088	**4842**	1536	1459	1277	5.01	0.56	11.26	19.44	68.74	0.47	3.0	99.7	1.37	adb	
						5.54	10.70	18.47	65.29	0.45				arb	
							11.32	19.55	69.13	0.47				db	
188089	**4843**	1000	959	833	4.10	0.57	13.45	23.66	62.32	0.63	8.5	97.4	1.36	adb	
						4.65	12.90	22.69	59.76	0.60				arb	
							13.53	23.80	62.68	0.63				db	
188090	**4844**	3253	3194	2801	1.81	0.42	17.71	23.29	58.58	1.21	7.0	98.0	1.45	adb	
						2.23	17.39	22.87	57.52	1.19				arb	
							17.78	23.39	58.83	1.22				db	
188091	**4845**	825	811	700	1.70	0.42	15.48	23.35	60.75	1.04	8.5	98.0	1.41	adb	
						2.11	15.22	22.95	59.72	1.02				arb	
							15.55	23.45	61.01	1.04				db	
188092	**4846**	1435	1389	1220	3.21	1.27	16.72	21.80	60.21	0.93	1.5	70.2	1.46	adb	
						4.43	16.18	21.10	58.28	0.90				arb	
							16.94	22.08	60.98	0.94				db	

*** SG checked**
+ Ash checked
- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-22C**

LAB#: 188093-171

REPORT DATE: February 20, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
188093	**4847**	364	356	317	2.20	1.05	67.48	10.53	20.94	0.28	-	-	2.06	adb
						3.22	66.00	10.30	20.48	0.27				arb
							68.20	10.64	21.16	0.28				db
188094	**4848**	1113	1074	947	3.50	0.43	36.76	16.96	45.85	0.66	0.5	84.1	1.62	adb
						3.92	35.47	16.37	44.24	0.64				arb
							36.92	17.03	46.05	0.66				db
188095	**4849**	709	693	619	2.26	0.99	54.32	12.69	32.00	0.45	-	-	1.88	adb
						3.22	53.09	12.40	31.28	0.44				arb
							54.86	12.82	32.32	0.45				db
188096	**4850**	525	486	437	7.43	0.74	52.50	14.88	31.88	0.63	-	-	1.84	adb
						8.11	48.60	13.77	29.51	0.58				arb
							52.89	14.99	32.12	0.63				db
188097	**4851**	3759	3595	3130	4.36	1.04	9.89	22.21	66.86	0.84	1.5	60.1	1.36	adb
						5.36	9.46	21.24	63.94	0.80				arb
							9.99	22.44	67.56	0.85				db
188098	**4852**	533	525	462	1.50	0.37	38.11	16.75	44.77	0.72	1.5	94.0	1.62	adb
						1.87	37.54	16.50	44.10	0.71				arb
							38.25	16.81	44.94	0.72				db
188099	**4853**	1265	1246	1083	1.50	0.36	20.93	18.56	60.15	0.45	1.0	96.5	1.44	adb
						1.86	20.62	18.28	59.25	0.44				arb
							21.01	18.63	60.37	0.45				db
188100	**4854**	764	753	656	1.44	0.71	60.68	10.95	27.66	0.65	-	-	1.89	adb
						2.14	59.81	10.79	27.26	0.64				arb
							61.11	11.03	27.86	0.65				db
188101	**4855**	1079	1060	922	1.76	0.45	13.80	18.90	66.85	2.09	3.5	96.0	1.39	adb
						2.20	13.56	18.57	65.67	2.05				arb
							13.86	18.99	67.15	2.10				db
188102	**4856**	3799	3641	3170	4.16	0.45	5.92	22.38	71.25	1.22	7.5	93.4	1.31	adb
						4.59	5.67	21.45	68.29	1.17				arb
							5.95	22.48	71.57	1.23				db
188103	**4857**	1189	1161	1027	2.35	0.71	51.27	13.93	34.09	0.61	-	-	1.74	adb
						3.05	50.06	13.60	33.29	0.60				arb
							51.64	14.03	34.33	0.61				db
188104	**4858**	1193	1151	1004	3.52	0.56	42.40	15.23	41.81	0.59	-	-	1.63	adb
						4.06	40.91	14.69	40.34	0.57				arb
							42.64	15.32	42.05	0.59				db
188105	**4859**	2016	1978	1727	1.88	0.48	15.85	22.41	61.26	0.67	7.0	97.7	1.38	adb
						2.36	15.55	21.99	60.11	0.66				arb
							15.93	22.52	61.56	0.67				db
188106	**4860**	1555	1526	1339	1.86	0.33	9.69	19.06	70.92	0.67	2.5	98.8	1.34	adb
						2.19	9.51	18.70	69.60	0.66				arb
							9.72	19.12	71.15	0.67				db
188107	**4861**	930	921	807	0.97	0.47	80.62	12.39	6.52	0.14	-	-	2.33	adb
						1.43	79.84	12.27	6.46	0.14				arb
							81.00	12.45	6.55	0.14				db
188108	**4862**	696	680	601	2.30	0.39	9.72	20.84	69.05	0.78	4.5	98.3	1.34	adb
						2.68	9.50	20.36	67.46	0.76				arb
							9.76	20.92	69.32	0.78				db
188109	**4863**	663	650	566	1.96	0.72	82.09	6.96	10.23	0.18	-	-	2.27	adb+-
						2.67	80.48	6.82	10.03	0.18				arb
							82.69	7.01	10.30	0.18				db
188110	**4864**	2020	1961	1708	2.92	1.02	10.37	17.73	70.88	0.57	0.5	98.3	1.38	adb
						3.91	10.07	17.21	68.81	0.55				arb
							10.48	17.91	71.61	0.58				db
188111	**4865**	577	560	496	2.95	0.70	13.17	18.43	67.70	0.61	0.5	97.4	1.38	adb
						3.63	12.78	17.89	65.71	0.59				arb
							13.26	18.56	68.18	0.61				db
188112	**4866**	369	367	326	0.54	0.43	42.57	15.76	41.24	0.44	-	-	1.69	adb
						0.97	42.34	15.67	41.02	0.44				arb
							42.75	15.83	41.42	0.44				db

+ Ash checked
- Volatile checked

Heather Dexter
Operations Manager
GWIL Industries

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-22C, WC18-23C & WC18-24C**

LAB#: 188093-171

REPORT DATE: February 20, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
188113	**4867**	2929	2877	2519	1.78	0.41	20.06	17.46	62.07	0.53	2.0	99.1	1.47	adb
						2.18	19.70	17.15	60.97	0.52				arb
							20.14	17.53	62.33	0.53				db
188114	**4868**	2729	2686	2332	1.58	0.52	4.34	19.51	75.63	0.39	2.5	97.4	1.31	adb
						2.09	4.27	19.20	74.44	0.38				arb
							4.36	19.61	76.03	0.39				db
188115	**4869**	5009	4947	4320	1.24	0.50	6.44	23.40	69.66	0.38	6.0	98.0	1.33	adb
						1.73	6.36	23.11	68.80	0.38				arb
							6.47	23.52	70.01	0.38				db
188116	**4870**	2099	2059	1794	1.91	0.50	26.90	19.51	53.09	0.33	6.5	96.5	1.51	adb
						2.40	26.39	19.14	52.08	0.32				arb
							27.04	19.61	53.36	0.33				db
188117	**4871**	1138	1127	979	0.97	0.43	19.42	18.07	62.08	0.42	1.5	98.3	1.45	adb
						1.39	19.23	17.90	61.48	0.42				arb
							19.50	18.15	62.35	0.42				db
188118	**4872**	2021	2003	1707	0.89	0.44	16.50	19.70	63.36	0.48	4.5	97.7	1.41	adb
						1.33	16.35	19.52	62.80	0.48				arb
							16.57	19.79	63.64	0.48				db
188119	**4873**	687	681	596	0.87	0.23	16.16	27.60	56.01	0.95	8.5	97.4	1.46	adb
						1.10	16.02	27.36	55.52	0.94				arb
							16.20	27.66	56.14	0.95				db
188120	**4874**	565	560	493	0.88	0.84	15.52	17.98	65.66	0.93	0.5	97.7	1.43	adb
						1.72	15.38	17.82	65.08	0.92				arb
							15.65	18.13	66.22	0.94				db
188121	**4875**	493	491	428	0.41	0.53	13.44	17.67	68.36	0.60	2.0	99.4	1.41	adb
						0.93	13.39	17.60	68.08	0.60				arb
							13.51	17.76	68.72	0.60				db
188122	**4876**	1859	1841	1599	0.97	0.56	4.05	18.90	76.49	0.62	2.5	98.0	1.33	adb
						1.52	4.01	18.72	75.75	0.61				arb
							4.07	19.01	76.92	0.62				db
188123	**4877**	199	198	177	0.50	0.49	37.56	14.46	47.49	0.28	1.5	98.8	1.64	adb
						0.99	37.37	14.39	47.25	0.28				arb
							37.74	14.53	47.72	0.28				db
188124	**4878**	1318	1300	1121	1.37	0.70	3.16	19.74	76.40	0.39	1.0	98.3	1.30	adb
						2.06	3.12	19.47	75.36	0.38				arb
							3.18	19.88	76.94	0.39				db
188125	**4879**	383	379	331	1.04	0.97	67.62	9.00	22.41	0.16	-	-	2.03	adb
						2.00	66.91	8.91	22.18	0.16				arb
							68.28	9.09	22.63	0.16				db
188126	**4880**	4388	4332	3797	1.28	0.70	7.71	22.75	68.84	0.34	3.0	98.0	1.37	adb
						1.97	7.61	22.46	67.96	0.34				arb
							7.76	22.91	69.33	0.34				db
188127	**4881**	320	317	269	0.94	0.32	5.21	22.17	72.30	0.39	7.0	97.4	1.30	adb
						1.25	5.16	21.96	71.62	0.39				arb
							5.23	22.24	72.53	0.39				db
188128	**4882**	2416	2383	2101	1.37	0.56	17.62	27.42	54.40	0.81	7.5	97.4	1.48	adb
						1.92	17.38	27.05	53.66	0.80				arb
							17.72	27.57	54.71	0.81				db
188129	**4883**	294	293	259	0.34	0.59	68.18	23.52	7.71	0.24	-	-	2.36	adb *
						0.93	67.95	23.44	7.68	0.24				arb
							68.58	23.66	7.76	0.24				db
188130	**4884**	1588	1495	1293	5.86	2.74	10.50	18.50	68.26	0.67	0.0	32.0	1.42	adb
						8.44	9.89	17.42	64.26	0.63				arb
							10.80	19.02	70.18	0.69				db
188131	**4885**	2726	2642	2280	3.08	0.41	3.29	19.76	76.54	0.44	2.0	97.4	1.30	adb
						3.48	3.19	19.15	74.18	0.43				arb
							3.30	19.84	76.86	0.44				db
188132	**4886**	4787	4642	4014	3.03	0.54	5.12	20.63	73.71	0.46	4.0	98.3	1.31	adb
						3.55	4.96	20.01	71.48	0.45				arb
							5.15	20.74	74.11	0.46				db

*** SG checked**

Heather Dexter
Operations Manager
GWIL Industries

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-24C & WC18-25C**

LAB#: 188093-171

REPORT DATE: February 20, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
188133	**4887**	1130	1099	948	2.74	0.81	6.56	21.87	70.76	0.47	8.0	82.0	1.30	adb	
						3.53	6.38	21.27	68.82	0.46				arb	
							6.61	22.05	71.34	0.47				db	
188134	**4888**	473	464	407	1.90	0.25	69.30	15.07	15.38	0.14	-	-	2.14	adb	
						2.15	67.98	14.78	15.09	0.14				arb	
							69.47	15.11	15.42	0.14				db	
188135	**4889**	140	139	121	0.71	0.28	5.29	18.98	75.45	0.52	2.5	98.0	1.35	adb	
						0.99	5.25	18.84	74.91	0.52				arb	
							5.30	19.03	75.66	0.52				db	
188136	**4890**	746	737	640	1.21	0.53	8.20	19.28	71.99	0.52	3.5	99.1	1.33	adb	
						1.73	8.10	19.05	71.12	0.51				arb	
							8.24	19.38	72.37	0.52				db	
188137	**4891**	502	465	402	7.37	0.48	39.72	18.30	41.50	0.36	4.5	98.8	1.63	adb	
						7.82	36.79	16.95	38.44	0.33				arb	
							39.91	18.39	41.70	0.36				db	
188138	**4892**	1587	1564	1380	1.45	0.83	16.54	18.58	64.05	0.55	1.0	98.6	1.43	adb	
						2.27	16.30	18.31	63.12	0.54				arb	
							16.68	18.74	64.59	0.55				db	
188139	**4893**	964	926	803	3.94	0.68	7.55	21.43	70.34	0.99	2.5	95.4	1.32	adb	
						4.60	7.25	20.59	67.57	0.95				arb	
							7.60	21.58	70.82	1.00				db	
188140	**4894**	1003	966	847	3.69	0.32	21.59	27.49	50.60	1.82	6.5	99.4	1.53	adb	
						4.00	20.79	26.48	48.73	1.75				arb	
							21.66	27.58	50.76	1.83				db	
188141	**4895**	2666	2579	2248	3.26	0.52	19.57	25.13	54.78	0.99	7.0	97.7	1.47	adb	
						3.77	18.93	24.31	52.99	0.96				arb	
							19.67	25.26	55.07	1.00				db	
188142	**4896**	685	675	586	1.46	0.58	24.49	29.84	45.09	0.83	1.5	95.7	1.59	adb	+-
						2.03	24.13	29.40	44.43	0.82				arb	
							24.63	30.01	45.35	0.83				db	
188143	**4897**	783	764	669	2.43	0.55	22.74	18.12	58.59	0.97	1.0	96.8	1.47	adb	
						2.96	22.19	17.68	57.17	0.95				arb	
							22.87	18.22	58.91	0.98				db	
188144	**4898**	153	150	138	1.96	0.88	25.68	18.54	54.90	0.88	0.5	98.3	1.69	adb	*
						2.82	25.18	18.18	53.82	0.86				arb	
							25.91	18.70	55.39	0.89				db	
188145	**4899**	859	846	732	1.51	0.42	45.96	15.20	38.42	0.76	5.0	98.8	1.72	adb	
						1.93	45.26	14.97	37.84	0.75				arb	
							46.15	15.26	38.58	0.76				db	
188146	**4900**	334	330	285	1.20	0.35	23.49	22.55	53.61	0.87	6.5	97.7	1.47	adb	
						1.54	23.21	22.28	52.97	0.86				arb	
							23.57	22.63	53.80	0.87				db	
188147	**4901**	567	560	491	1.23	0.41	32.27	22.22	45.10	0.79	7.5	96.8	1.54	adb	
						1.64	31.87	21.95	44.54	0.78				arb	
							32.40	22.31	45.29	0.79				db	
188148	**4902**	2576	2529	2201	1.82	0.51	6.20	24.10	69.19	0.87	7.0	97.1	1.34	adb	
						2.33	6.09	23.66	67.93	0.85				arb	
							6.23	24.22	69.54	0.87				db	
188149	**4903**	420	414	360	1.43	0.54	9.80	22.72	66.94	0.58	6.5	94.5	1.35	adb	
						1.96	9.66	22.40	65.98	0.57				arb	
							9.85	22.84	67.30	0.58				db	
188150	**4904**	2228	2193	1911	1.57	0.47	10.32	20.39	68.82	0.40	2.0	95.7	1.37	adb	
						2.03	10.16	20.07	67.74	0.39				arb	
							10.37	20.49	69.14	0.40				db	
188151	**4905**	1780	1758	1533	1.24	0.64	9.66	22.12	67.58	0.57	3.0	98.0	1.37	adb	
						1.87	9.54	21.85	66.74	0.56				arb	
							9.72	22.26	68.02	0.57				db	
188152	**4906**	5130	5021	4382	2.12	0.63	3.49	24.84	71.04	0.44	8.0	96.8	1.29	adb	
						2.74	3.42	24.31	69.53	0.43				arb	
							3.51	25.00	71.49	0.44				db	

*** SG checked**
+ Ash checked
- Volatile checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-25C**

LAB#: 188093-171

REPORT DATE: February 20, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
188153	**4907**	2794	2662	2318	4.72	0.38	23.96	20.24	55.42	0.52	6.5	95.7	1.46	adb	
						5.09	22.83	19.28	52.80	0.50				arb	
							24.05	20.32	55.63	0.52				db	
188154	**4908**	1058	1046	923	1.13	0.36	5.93	20.49	73.22	0.58	3.5	98.0	1.32	adb	
						1.49	5.86	20.26	72.39	0.57				arb	
							5.95	20.56	73.48	0.58				db	
188155	**4909**	755	746	653	1.19	0.15	7.15	25.68	67.02	0.65	7.0	95.7	1.31	adb	
						1.34	7.06	25.37	66.22	0.64				arb	
							7.16	25.72	67.12	0.65				db	
188156	**4910**	1586	1567	1361	1.20	0.63	20.64	16.84	61.89	0.82	1.5	96.2	1.46	adb	
						1.82	20.39	16.64	61.15	0.81				arb	
							20.77	16.95	62.28	0.83				db	
188157	**4911**	1154	1145	1003	0.78	0.68	65.88	13.47	19.97	0.19	1.5	98.6	2.06	adb	
						1.45	65.37	13.36	19.81	0.19				arb	
							66.33	13.56	20.11	0.19				db	
188158	**4912**	804	800	711	0.50	0.64	29.90	16.29	53.17	0.48	0.5	99.1	1.57	adb	
						1.13	29.75	16.21	52.91	0.48				arb	
							30.09	16.39	53.51	0.48				db	
188159	**4913**	878	868	764	1.14	0.67	5.00	18.29	76.04	0.65	2.0	97.1	1.33	adb	*+
						1.80	4.94	18.08	75.17	0.64				arb	
							5.03	18.41	76.55	0.65				db	
188160	**4914**	3109	3065	2673	1.42	0.59	4.26	20.83	74.32	0.55	3.5	96.2	1.31	adb	
						2.00	4.20	20.54	73.27	0.54				arb	
							4.29	20.95	74.76	0.55				db	
188161	**4915**	4693	4615	4044	1.66	0.42	2.27	20.95	76.36	0.57	6.0	96.8	1.28	adb	
						2.08	2.23	20.60	75.09	0.56				arb	
							2.28	21.04	76.68	0.57				db	
188162	**4916**	1026	923	820	10.04	0.40	43.37	17.02	39.21	0.29	1.5	96.8	1.66	adb	*
						10.40	39.02	15.31	35.27	0.26				arb	
							43.54	17.09	39.37	0.29				db	
188163	**4917**	576	515	447	10.59	0.40	8.87	19.31	71.42	0.44	2.5	98.3	1.33	adb	
						10.95	7.93	17.27	63.86	0.39				arb	
							8.91	19.39	71.71	0.44				db	
188164	**4918**	1126	1112	971	1.24	0.48	27.91	19.36	52.25	0.36	6.5	98.6	1.50	adb	
						1.72	27.56	19.12	51.60	0.36				arb	
							28.04	19.45	52.50	0.36				db	
188165	**4919**	1155	1143	998	1.04	0.71	15.86	18.75	64.68	0.51	3.0	99.7	1.40	adb	
						1.74	15.70	18.56	64.01	0.50				arb	
							15.97	18.88	65.14	0.51				db	
188166	**4920**	2150	2119	1799	1.44	0.75	18.11	18.22	62.92	0.53	3.0	99.4	1.40	adb	
						2.18	17.85	17.96	62.01	0.52				arb	
							18.25	18.36	63.40	0.53				db	
188167	**4921**	1087	1065	812	2.02	0.36	12.90	21.05	65.69	0.83	9.0	99.7	1.33	adb	
						2.38	12.64	20.62	64.36	0.81				arb	
							12.95	21.13	65.93	0.83				db	
188168	**4922**	398	386	320	3.02	0.23	25.91	28.13	45.73	0.69	5.0	97.7	1.55	adb	
						3.24	25.13	27.28	44.35	0.67				arb	
							25.97	28.19	45.84	0.69				db	
188169	**4923**	2208	2172	1988	1.63	0.44	26.33	21.35	51.88	0.81	6.0	98.3	1.48	adb	
						2.06	25.90	21.00	51.03	0.80				arb	
							26.45	21.44	52.11	0.81				db	
188170	**4924**	1780	1731	1493	2.75	0.37	15.47	20.50	63.66	0.99	9.0	98.0	1.34	adb	
						3.11	15.04	19.94	61.91	0.96				arb	
							15.53	20.58	63.90	0.99				db	
188171	**4925**	496	480	424	3.23	0.36	22.09	19.03	58.52	0.91	7.5	97.7	1.41	adb	
						3.57	21.38	18.42	56.63	0.88				arb	
							22.17	19.10	58.73	0.91				db	

*** SG checked**
+ Ash checked

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-26C & WC18-27C**

LAB#: 188172-188250

REPORT DATE: March 12, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis														
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS
188172	4926	705	701	615	0.57	0.55	20.01	17.66	61.78	0.57	1.5	97.1	1.43	adb
						1.11	19.90	17.56	61.43	0.57				arb
							20.12	17.76	62.12	0.57				db
188173	4927	3273	3242	2813	0.95	0.94	6.97	19.73	72.36	0.56	4.0	98.6	1.34	adb
						1.88	6.90	19.54	71.67	0.55				arb
							7.04	19.92	73.05	0.57				db
188174	4928	505	501	433	0.79	0.56	5.16	19.27	75.01	0.54	2.0	99.4	1.32	adb
						1.35	5.12	19.12	74.42	0.54				arb
							5.19	19.38	75.44	0.54				db
188175	4929	625	617	538	1.28	0.49	10.34	18.73	70.44	0.47	3.5	98.8	1.36	adb
						1.76	10.21	18.49	69.54	0.46				arb
							10.39	18.82	70.79	0.47				db
188176	4930	2761	2737	2385	0.87	0.69	14.18	18.37	66.76	0.46	1.5	99.1	1.39	adb
						1.55	14.06	18.21	66.18	0.46				arb
							14.28	18.50	67.22	0.46				db
188177	4931	1181	1172	1021	0.76	0.43	17.91	18.92	62.74	0.81	3.0	98.8	1.44	adb
						1.19	17.77	18.78	62.26	0.80				arb
							17.99	19.00	63.01	0.81				db
188178	4932	589	582	511	1.19	0.36	18.78	18.08	62.78	0.87	6.0	99.1	1.41	adb
						1.54	18.56	17.87	62.03	0.86				arb
							18.85	18.15	63.01	0.87				db
188179	4933	554	552	475	0.36	0.65	19.71	18.35	61.29	0.92	6.5	99.4	1.44	adb
						1.01	19.64	18.28	61.07	0.92				arb
							19.84	18.47	61.69	0.93				db
188180	4934	1100	1091	942	0.82	0.39	21.55	16.40	61.66	0.76	2.0	99.7	1.47	adb
						1.20	21.37	16.27	61.16	0.75				arb
							21.63	16.46	61.90	0.76				db
188181	4935	479	475	407	0.84	0.39	25.32	22.16	52.13	0.87	7.0	98.3	1.49	adb
						1.22	25.11	21.97	51.69	0.86				arb
							25.42	22.25	52.33	0.87				db
188182	4936	3360	3318	2886	1.25	0.46	9.45	23.45	66.64	0.77	8.0	97.4	1.35	adb
						1.70	9.33	23.16	65.81	0.76				arb
							9.49	23.56	66.95	0.77				db
188183	4937	648	642	557	0.93	0.48	27.95	19.96	51.61	2.03	3.5	98.3	1.54	adb
						1.40	27.69	19.78	51.13	2.01				arb
							28.08	20.06	51.86	2.04				db
188184	4938	1677	1665	1156	0.72	0.50	14.40	20.96	64.14	0.50	3.0	98.6	1.40	adb
						1.21	14.30	20.81	63.68	0.50				arb
							14.47	21.07	64.46	0.50				db
188185	4939	1832	1807	1583	1.36	0.46	12.19	23.81	63.54	0.37	2.0	99.1	1.44	adb
						1.82	12.02	23.49	62.67	0.36				arb
							12.25	23.92	63.83	0.37				db
188186	4940	5983	5923	5175	1.00	0.41	3.46	24.52	71.61	0.42	8.0	98.3	1.29	adb
						1.41	3.43	24.27	70.89	0.42				arb
							3.47	24.62	71.90	0.42				db
188187	4941	678	664	583	2.06	0.43	53.18	15.31	31.08	0.34	-	-	1.81	adb
						2.49	52.08	14.99	30.44	0.33				arb
							53.41	15.38	31.21	0.34				db
188188	4942	581	554	473	4.65	0.31	6.98	23.42	69.29	0.58	6.5	97.4	1.31	adb
						4.94	6.66	22.33	66.07	0.55				arb
							7.00	23.49	69.51	0.58				db
188189	4943	444	442	377	0.45	0.48	37.26	17.79	44.47	0.38	5.5	98.6	1.63	adb
						0.93	37.09	17.71	44.27	0.38				arb
							37.44	17.88	44.68	0.38				db
188190	4944	937	878	768	6.30	0.60	72.80	8.72	17.88	0.23	-	-	2.14	adb** +
						6.86	68.22	8.17	16.75	0.22				arb
							73.24	8.77	17.99	0.23				db
188191	4945	1279	1249	1098	2.35	0.49	19.32	17.47	62.72	0.81	2.5	97.1	1.45	adb
						2.82	18.87	17.06	61.25	0.79				arb
							19.42	17.56	63.03	0.81				db
188192	4946	2144	2118	1862	1.21	0.57	7.44	18.03	73.96	0.61	1.0	99.4	1.36	adb
						1.78	7.35	17.81	73.06	0.60				arb
							7.48	18.13	74.38	0.61				db

**** Ash, VOL & SG checked**
+ Possibly carbonates present (vigorously fizzed with 10% hot HCl)

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-27C , WC18-01C, WC18-02C, WC18-05C,WC18-06C , WC18-07C,WC18-08C& WC18-09**

LAB#: 188172-188250

REPORT DATE: March 12, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
188193	4947	1533	1503	1304	1.96	0.33	5.60	19.63	74.44	0.57	2.0	99.7	1.33	adb	
						2.28	5.49	19.25	72.98	0.56				arb	
							5.62	19.69	74.69	0.57				db	
188194	4948	2564	2538	2203	1.01	0.28	4.33	20.45	74.94	0.63	4.5	99.1	1.31	adb	
						1.29	4.29	20.24	74.18	0.62				arb	
							4.34	20.51	75.15	0.63				db	
188195	4949	771	760	658	1.43	0.48	12.15	21.33	66.04	0.56	8.0	96.8	1.36	adb	
						1.90	11.98	21.03	65.10	0.55				arb	
							12.21	21.43	66.36	0.56				db	
188196	4950	1557	1540	1343	1.09	0.59	26.47	18.04	54.90	0.44	2.5	98.3	1.51	adb	
						1.68	26.18	17.84	54.30	0.44				arb	
							26.63	18.15	55.23	0.44				db	
188197	4951	587	586	518	0.17	0.61	54.91	14.67	29.81	0.25	-	-	1.92	adb	
						0.78	54.82	14.65	29.76	0.25				arb	
							55.25	14.76	29.99	0.25				db	
188198	4952	4126	4015	3550	2.69	0.84	58.65	12.41	28.10	0.53	-	-	1.89	adb	
						3.51	57.07	12.08	27.34	0.52				arb	
							59.15	12.52	28.34	0.53				db	
188199	4953	1493	1472	1276	1.41	0.36	22.65	30.35	46.64	0.75	2.0	97.7	1.60	adb	**+
						1.76	22.33	29.92	45.98	0.74				arb	
							22.73	30.46	46.81	0.75				db	
188200	4954	1219	1189	1032	2.46	0.66	20.95	21.72	56.67	0.84	8.0	97.4	1.46	adb	
						3.10	20.43	21.19	55.28	0.82				arb	
							21.09	21.86	57.05	0.85				db	
188201	4955	532	530	468	0.38	0.37	49.11	43.54	6.98	0.24	-	-	2.37	adb	**
						0.74	48.93	43.38	6.95	0.24				arb	
							49.29	43.70	7.01	0.24				db	
188202	4956	730	723	634	0.96	0.49	20.89	20.90	57.72	0.60	7.5	93.4	1.42	adb	
						1.44	20.69	20.70	57.17	0.59				arb	
							20.99	21.00	58.00	0.60				db	
188203	4957	1432	1393	1222	2.72	0.81	19.74	18.36	61.09	0.49	1.0	92.8	1.44	adb	
						3.51	19.20	17.86	59.43	0.48				arb	
							19.90	18.51	61.59	0.49				db	
188204	4958	896	876	764	2.23	0.41	26.10	30.61	42.88	0.40	1.5	97.7	1.67	adb	**
						2.63	25.52	29.93	41.92	0.39				arb	
							26.21	30.74	43.06	0.40				db	
188205	4959	422	418	374	0.95	0.58	61.79	13.16	24.47	0.35	-	-	1.96	adb	
						1.52	61.20	13.04	24.24	0.35				arb	
							62.15	13.24	24.61	0.35				db	
188206	4960	1048	1040	907	0.76	0.62	79.24	11.86	8.28	0.08	-	-	2.36	adb	**
						1.38	78.64	11.77	8.22	0.08				arb	
							79.73	11.93	8.33	0.08				db	
188207	4961	647	646	556	0.15	0.51	66.72	14.43	18.34	0.17	-	-	2.16	adb	
						0.66	66.62	14.41	18.31	0.17				arb	
							67.06	14.50	18.43	0.17				db	
188208	4962	519	516	462	0.58	0.51	15.49	19.57	64.43	0.79	3.0	98.8	1.42	adb	
						1.09	15.40	19.46	64.06	0.79				arb	
							15.57	19.67	64.76	0.79				db	
188209	4963	352	347	300	1.42	0.67	37.81	13.77	47.75	0.66	0.5	99.7	1.69	adb	
						2.08	37.27	13.57	47.07	0.65				arb	
							38.07	13.86	48.07	0.66				db	
188210	4964	863	853	744	1.16	0.51	26.68	17.93	54.88	1.11	8.0	99.7	1.50	adb	*
						1.66	26.37	17.72	54.24	1.10				arb	
							26.82	18.02	55.16	1.12				db	
188211	4965	84	83	35	1.19	0.71	9.78	21.58	67.93	0.79	2.0	66.4	1.39	adb	
						1.89	9.66	21.32	67.12	0.78				arb	
							9.85	21.73	68.42	0.80				db	
188212	4966	154	152	133	1.30	0.45	11.72	18.65	69.18	0.43	4.0	98.8	1.41	adb	
						1.74	11.57	18.41	68.28	0.42				arb	
							11.77	18.73	69.49	0.43				db	
188213	4967	934	924	803	1.07	0.50	32.37	19.98	47.15	0.37	8.0	99.4	1.56	adb	
						1.57	32.02	19.77	46.65	0.37				arb	
							32.53	20.08	47.39	0.37				db	

*** %S checked** **** Ash, VOL & SG checked**

+ Possibly carbonates present (vigorously fizzed with 10% hot HCl)

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-10C,WC18-11C,WC18-12C,WC18-13C, WC18-19C,WC18-21C,WC18-17C,WC18-14C & WC18-05C**

LAB#: 188172-188250

REPORT DATE: March 12, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
188214	4968	423	398	347	5.91	0.60	54.18	14.56	30.66	0.28	-	-	1.84	adb	
						6.47	50.98	13.70	28.85	0.26				arb	
							54.51	14.65	30.85	0.28				db	
188215	4969	58	57	34	1.72	0.37	16.36	15.45	67.82	0.75	0.5	99.1	1.43	adb	**+
						2.09	16.08	15.18	66.65	0.74				arb	
							16.42	15.51	68.07	0.75				db	
188216	4970	444	439	384	1.13	0.49	51.96	10.78	36.77	0.40	-	-	1.81	adb	
						1.61	51.37	10.66	36.36	0.40				arb	
							52.22	10.83	36.95	0.40				db	
188217	4971	1080	1054	935	2.41	0.52	68.58	13.08	17.82	0.12	-	-	2.07	adb	
						2.91	66.93	12.77	17.39	0.12				arb	
							68.94	13.15	17.91	0.12				db	
188218	4972	294	292	259	0.68	0.35	25.91	19.43	54.31	0.69	6.5	98.0	1.47	adb	
						1.03	25.73	19.30	53.94	0.69				arb	
							26.00	19.50	54.50	0.69				db	
188219	4973	569	567	491	0.35	0.61	58.67	12.55	28.17	0.38	-	-	1.86	adb	
						0.96	58.46	12.51	28.07	0.38				arb	
							59.03	12.63	28.34	0.38				db	
188220	4974	542	517	445	4.61	0.77	64.67	11.77	22.79	0.42	-	-	1.97	adb	
						5.35	61.69	11.23	21.74	0.40				arb	
							65.17	11.86	22.97	0.42				db	
188221	4975	690	686	597	0.58	0.54	22.55	17.45	59.46	0.51	1.0	99.4	1.48	adb	
						1.12	22.42	17.35	59.12	0.51				arb	
							22.67	17.54	59.78	0.51				db	
188222	4976	510	506	439	0.78	0.49	15.61	29.89	54.01	1.30	7.0	98.3	1.46	adb	** +
						1.27	15.49	29.66	53.59	1.29				arb	
							15.69	30.04	54.28	1.31				db	
188223	4977	534	533	451	0.19	0.23	63.62	40.86	-4.71	9.98	-	-	2.91	adb	**+
						0.42	63.50	40.78	-4.70	9.96				arb	
							63.77	40.95	-4.72	10.00				db	
188224	4978	140	140	112	0.00	0.39	40.89	20.57	38.15	2.37	-	-	1.80	adb	*
						0.39	40.89	20.57	38.15	2.37				arb	
							41.05	20.65	38.30	2.38				db	
188225	4979	493	488	420	1.01	0.39	31.63	36.34	31.64	0.76	7.5	97.7	1.74	adb	**
						1.40	31.31	35.97	31.32	0.75				arb	
							31.75	36.48	31.76	0.76				db	
188226	4980	1374	1369	1210	0.36	0.32	56.15	49.08	-5.55	0.18	-	-	2.76	adb	**+
						0.68	55.95	48.90	-5.53	0.18				arb	
							56.33	49.24	-5.57	0.18				db	
188227	4981	198	191	163	3.54	0.48	40.12	17.29	42.11	0.77	-	-	1.62	adb	
						4.00	38.70	16.68	40.62	0.74				arb	
							40.31	17.37	42.31	0.77				db	
188228	4982	236	232	197	1.69	0.39	15.22	22.78	61.61	0.53	5.0	98.3	1.41	adb	
						2.08	14.96	22.39	60.57	0.52				arb	
							15.28	22.87	61.85	0.53				db	
188229	4983	892	884	762	0.90	0.51	43.25	18.78	37.46	0.38	-	-	1.70	adb	
						1.40	42.86	18.61	37.12	0.38				arb	
							43.47	18.88	37.65	0.38				db	
188230	4984	917	907	790	1.09	0.58	31.38	16.42	51.62	0.79	8.0	98.6	1.52	adb	
						1.66	31.04	16.24	51.06	0.78				arb	
							31.56	16.52	51.92	0.79				db	
188231	4985	270	267	234	1.11	0.38	52.38	14.65	32.59	0.27	-	-	1.83	adb	
						1.49	51.80	14.49	32.23	0.27				arb	
							52.58	14.71	32.71	0.27				db	
188232	4986	178	170	125	4.49	0.54	47.23	17.18	35.05	0.65	-	-	1.73	adb	
						5.01	45.11	16.41	33.47	0.62				arb	
							47.49	17.27	35.24	0.65				db	

*** %S checked** **** Ash, VOL & SG checked**

+ Possibly carbonates present (vigorously fizzed with 10% hot HCl)

Heather Dexter
Operations Manager

GWIL INDUSTRIES Birtley Coal & Minerals Testing Division

Gwil Industries Inc.
7784 - 62nd St SE
Calgary, AB
T2C 5K2
Tel: (403) 253-8273
Email: info@birtley.ca
www.birtley.ca

CERTIFICATE OF ANALYSIS

CLIENT: **CONUMA COAL RESOURCES**

PROJECT: **Willow Creek development drilling**
PO#: **326969WC**

HOLE: **WC18-02C,WC18-03C,WC18-22C& WC18-27C**

LAB#: 188172-188250

REPORT DATE: March 12, 2019

Samples were air dried & crushed to pass 9.5mm homogenized & representative split taken out for HR (1/8th) and prepped for lab analysis

HEAD RAW ANALYSIS, air dried basis															
LAB #	Sample ID:	Wet Wt(g)	Dry Wt (g)	Retain Wt (g) 7/8	ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	FSI	%LT	SG	BASIS	
188233	4987	596	588	519	1.34	0.47	17.08	26.30	56.15	0.92	4.5	96.8	1.45	adb	**+
						1.81	16.85	25.95	55.40	0.91				arb	
							17.16	26.42	56.42	0.92				db	
188234	4988	736	727	644	1.22	0.61	64.23	12.95	22.21	0.30	-	-	1.97	adb	
						1.83	63.44	12.79	21.94	0.30				arb	
							64.62	13.03	22.35	0.30				db	
188235	4989	524	515	462	1.72	0.47	33.51	17.72	48.30	0.46	1.5	98.6	1.59	adb	
						2.18	32.93	17.42	47.47	0.45				arb	
							33.67	17.80	48.53	0.46				db	
188236	4990	492	489	434	0.61	0.36	57.71	16.11	25.82	0.26	-	-	1.96	adb	
						0.97	57.36	16.01	25.66	0.26				arb	
							57.92	16.17	25.91	0.26				db	
188237	4991	473	472	404	0.21	0.46	44.98	12.46	42.10	0.44	-	-	1.68	adb	
						0.67	44.88	12.43	42.01	0.44				arb	
							45.19	12.52	42.29	0.44				db	
188238	4992	1031	1004	864	2.62	0.51	56.50	14.93	28.06	0.66	-	-	1.93	adb	
						3.12	55.02	14.54	27.33	0.64				arb	
							56.79	15.01	28.20	0.66				db	
188239	4993	740	693	613	6.35	0.46	60.43	11.73	27.38	0.35	-	-	1.91	adb	
						6.78	56.59	10.98	25.64	0.33				arb	
							60.71	11.78	27.51	0.35				db	
188240	4994	699	698	596	0.14	0.38	10.63	19.35	69.64	0.71	3.5	98.3	1.36	adb	
						0.52	10.61	19.32	69.54	0.71				arb	
							10.67	19.42	69.91	0.71				db	
188241	4995	293	290	211	1.02	0.34	39.44	27.63	32.59	2.55	2.5	96.2	1.80	adb	**+
						1.36	39.04	27.35	32.26	2.52				arb	
							39.57	27.72	32.70	2.56				db	
188242	4996	1085	1077	939	0.74	0.36	17.70	17.47	64.47	0.97	2.0	99.1	1.43	adb	
						1.09	17.57	17.34	63.99	0.96				arb	
							17.76	17.53	64.70	0.97				db	
188243	4997	1720	1701	1482	1.10	0.48	17.26	19.39	62.87	0.60	7.5	98.6	1.40	adb	
						1.58	17.07	19.18	62.18	0.59				arb	
							17.34	19.48	63.17	0.60				db	
188244	4998	306	305	224	0.33	0.52	37.85	15.29	46.34	0.52	1.0	98.8	1.67	adb	
						0.85	37.73	15.24	46.19	0.52				arb	
							38.05	15.37	46.58	0.52				db	
188245	4999	3097	3075	2718	0.71	0.48	12.24	23.29	63.99	0.97	8.0	98.8	1.39	adb	
						1.19	12.15	23.12	63.54	0.96				arb	
							12.30	23.40	64.30	0.97				db	
188246	5000	916	915	815	0.11	0.29	38.20	40.63	20.88	0.52	1.5	98.8	1.97	adb	**+
						0.40	38.16	40.59	20.86	0.52				arb	
							38.31	40.75	20.94	0.52				db	
188247	5251	368	367	275	0.27	0.39	12.41	23.02	64.18	1.15	8.5	98.3	1.37	adb	
						0.66	12.38	22.96	64.01	1.15				arb	
							12.46	23.11	64.43	1.15				db	
188248	5252	350	348	259	0.57	0.45	12.82	19.60	67.13	1.01	8.0	98.6	1.36	adb	
						1.02	12.75	19.49	66.75	1.00				arb	
							12.88	19.69	67.43	1.01				db	
188249	5253	119	118	49	0.84	0.67	80.15	6.70	12.48	0.15	-	-	2.24	adb	
						1.50	79.48	6.64	12.38	0.15				arb	
							80.69	6.75	12.56	0.15				db	
188250	5254	34	33	-	2.94	0.50	53.06	13.83	32.61	0.52	-	-	1.80	adb	
						3.43	51.50	13.42	31.65	0.50				arb	
							53.33	13.90	32.77	0.52				db	

***%S checked**
**** Ash, VOL & SG checked**

Heather Dexter
Operations Manager
GWIL Industries