BC Geological Survey
Coal Assessment Report
1033

DMT Geosciences

Final Report

Coal Assessment Report for the Year 2016 for the Murray River Coal Property, Peace River Coalfield, British Columbia

Effective Date: December 31, 2016
Report Date: November 30, 2017
DMT File Number: 2012CMAA.038

Prepared for:

HD Mining International Ltd.
Vancouver, British Columbia

Prepared by:

DMT Geosciences Ltd.
Calgary, AB, Canada

This page has been intentionally left blank.

COAL ASSESSMENT REPORT TITLE PAGE AND SUMMARY

Coal Assessment Report for the Year 2016 for the Murray River Coal Property, Peace River Coalfield, British Columbia

TOTAL COST:

$5,911,308

AUTHOR(S):

Peter Cain, Ph.D., P.Eng. (AB, BC, SK, NS.), DMT Geosciences, Ltd., Calgary, Alberta.
Jin Zhang, HD Mining International Ltd., Vancouver, British Columbia.

SIGNATURE(S):

The effective date of publication of this report is December 31, 2016. The date of publication is November 30, 2017

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA P. CAIN # 37063

Peter Cain, Ph.D., P.Eng
(EGBC Registration 171620)
Director, Engineering and Consulting
DMT Geosciences Ltd

Jin Zhang.
Project Manager
H.D. Mining international Ltd.

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

1. January-December 2016 CX.9.44

STATEMENT OF WORK EVENT NUMBER(S)/DATE(S):

1. January-December 2016

YEAR(S) OF WORK:

2016

PROPERTY NAME:

Murray River Coal Project

CLAIM NAME(S) (on which work was done):

417452 (Decline), 417426 (Hydrogeological Hole)

COMMODITIES SOUGHT:

COAL

MINERAL INVENTORY MINFILE NUMBER(S),IF KNOWN:

093I 035

MINING DIVISION:

Liard Mining Division

NTS / BCGS (at centre of work):

55°00’54”N, 121°02’38”E
UTM Zone 10 (NAD83), 622865E, 6104600N

OWNER AND OPERATOR:

HD MINING INTL. LTD.

MAILING ADDRESS:

Suite 2288 – 1177 West Hastings Street
Vancouver, BC
V6E 2K3

REPORT KEYWORDS

Murray River, Bituminous, Coal, Gates Formation, Underground bulk sample

Section 2.3 (pages 12-14) and Appendix 3 remain confidential under the terms of the Coal Act Regulation, and have been removed from the public version.

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

EXECUTIVE SUMMARY

The Murray River Coal Property lies to the southwest of Tumbler Ridge in the northeast of British Columbia. It was acquired by Canadian Dehua International Mines Group Inc. (Dehua) from Kennecott Canada Exploration Inc. (KCEI) in the summer of 2009. In that summer they drilled 11 boreholes and conducted an assessment of previous work. This drilling and assessment was summarized by Norwest (2010), and the Norwest report was accepted as the Coal Assessment Report required by the Coal Act for the 2010 exploration year.

In July 2009, Dehua signed an agreement with Huiyong Holding Group Co., Ltd (Huiyong) to develop the property and build a 6,000,000 tonne per year underground coal mine and associated infrastructure on the property. The property is now operated by HD (Huiyong Dehua) Mining International Ltd (HD) which is currently responsible for filing assessment reports on the property.

HD have retained DMT Geosciences Ltd. (DMT) of Calgary, AB to assist them with regulatory compliance and in late fall of 2014 DMT was requested to assist in the preparation of their coal assessment reports. This report is for the year 2016 and describes the following work:

- Completion of the closure of the decline and establishing the sites on a “care and maintenance” basis.
- Drilling and instrumenting of one deep hole for the purpose of refining the state of knowledge of the hydrogeological regime in the area. Testing included the measurement of the gas content of the coal seams. Drilling tasks also included the completion of a number of shallow monitoring and testing wells for hydrogeological data compilation.
- Improvements to the water treatment systems on site and water monitoring on and around the project site for compliance with BC guidelines and permit conditions.

Table 1 describes the work completed on the property and apportioned costs for the calendar year 2016.

The work was carried out by HD Mining International Ltd or their retained contractors and consultants.

Table 1: Summary of Work and Apportioned Costs

TYPE OF WORK IN THIS REPORT		EXTENT OF WORK (in metric units)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
TUNNELING (total metres)				
Tunnel	Total meters:	1356	417452	$5,481,800
	Width:	5.5 m		
	Height:	5 m		
	Azimuth	N11.59.41E		
	Gradient	-16 degrees		
	Portal Northing(1)	6096895		
	Portal Easting(1)	624881		
	Portal Elevation(1)	785.98 masl		
			COST	**$5,481,800**
DRILLING (total metres, number of holes, size, storage location)				
Core	Total meters:	623	417426	
	Number of holes:	1		
	Size	HQ.		
	Storage location: Charlie Lake, Tumbler Ridge			
			COST	**$429,508**
			TOTAL COST	**$5,911,308**

Note (1) UTM Zone 10 NAD83

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF DRAWINGS

(at end of report)

APPENDICES

Appendices are attached at the end of the report, in the following order:

1: Testing Results

2: Hole Details

3: "*Gas Content and Composition, Wells DH-01, DH-02, DH-03*" report to HD Mining International, Vancouver, B.C. by Petrologic Services Inc. Calgary, AB., April 18, 2016.

1.0 INTRODUCTION

1.1 Location

The Project is located 12.5 km southwest of the town of Tumbler Ridge, British Columbia (Figure 1-1). The coordinates are W 120°57'48"-121°7'38", N 54°59'42"-55°5'4". The property consists of 57 coal licences covering an area of 16,024 hectares and is situated on Crown land within the Peace River Regional District (PRRD).

The central position of the project area can be arrived at through going south for about 15 km from Tumbler Ridge to the Monkman Park Road, going west for 9 km to the Quintette Mesa mining field road, and going west for 4 km to the Quintette coal washery.

1.2 Accessibility and Infrastructure

The Project falls within the PRRD. The region has well established regional infrastructure to support resource activities, including forestry, oil and gas exploration, coal mining, wind energy. Existing infrastructure in the immediate vicinity of the Project include: BC Hydro transmission line; Pacific Northern Gas distribution system; CN Rail line; and forest service roads. The District of Tumbler Ridge and other regional communities have capacity to support growth.

The Murray River Coal Property lies about 1,184 km northeast of Vancouver and in the administrative district of the Tumbler Ridge (this area is part of the Peace River basin). The adjacent coal mines include Quintette, Perry Creek and Bullmoose. The exploration and development of the petroleum and natural gas in this area are active, and production wells of the natural gas and natural gas pipelines are distributed everywhere in the area. Some infrastructures owned by Quintette coal mine are still preserved in the Murray River Coal Property, including 13 km of belt conveying corridor from the Mesa mining area to the Quintette coal-washing plant closed for standby currently.

There are two Provincial highways from the Murray River Coal Property to Tumbler Ridge: going to the south from Chetwynd, then passing through No. 29 highway (95 km), or going through No. 97 highway from Dawson Creek to the southwest direction first, then passing No. 25 highway (Feller's Heights Road). The population of Tumbler Ridge is about 3,500, however, the infrastructure can accommodate 6,000 people.

The roads of Monkman Park and Quintette Mesa are in good service condition, and the two roads serve for the production of natural gas within the region. The Mast Creek Road traverses the western boundary of the property.

1.3 Physiography

The Murray River Coal Property is situated within the eastern foothills (Inner Foothills Belt) of the Rocky Mountains. The topography is comprised of a belt of hills and low mountains dominated by a series of northeast to southwest elongated ridges. Two major water courses, namely the Murray River in the south and east, and the Wolverine River in the north, flow through the project area and bisect the Inner Foothills Belt (Figure 1-2).

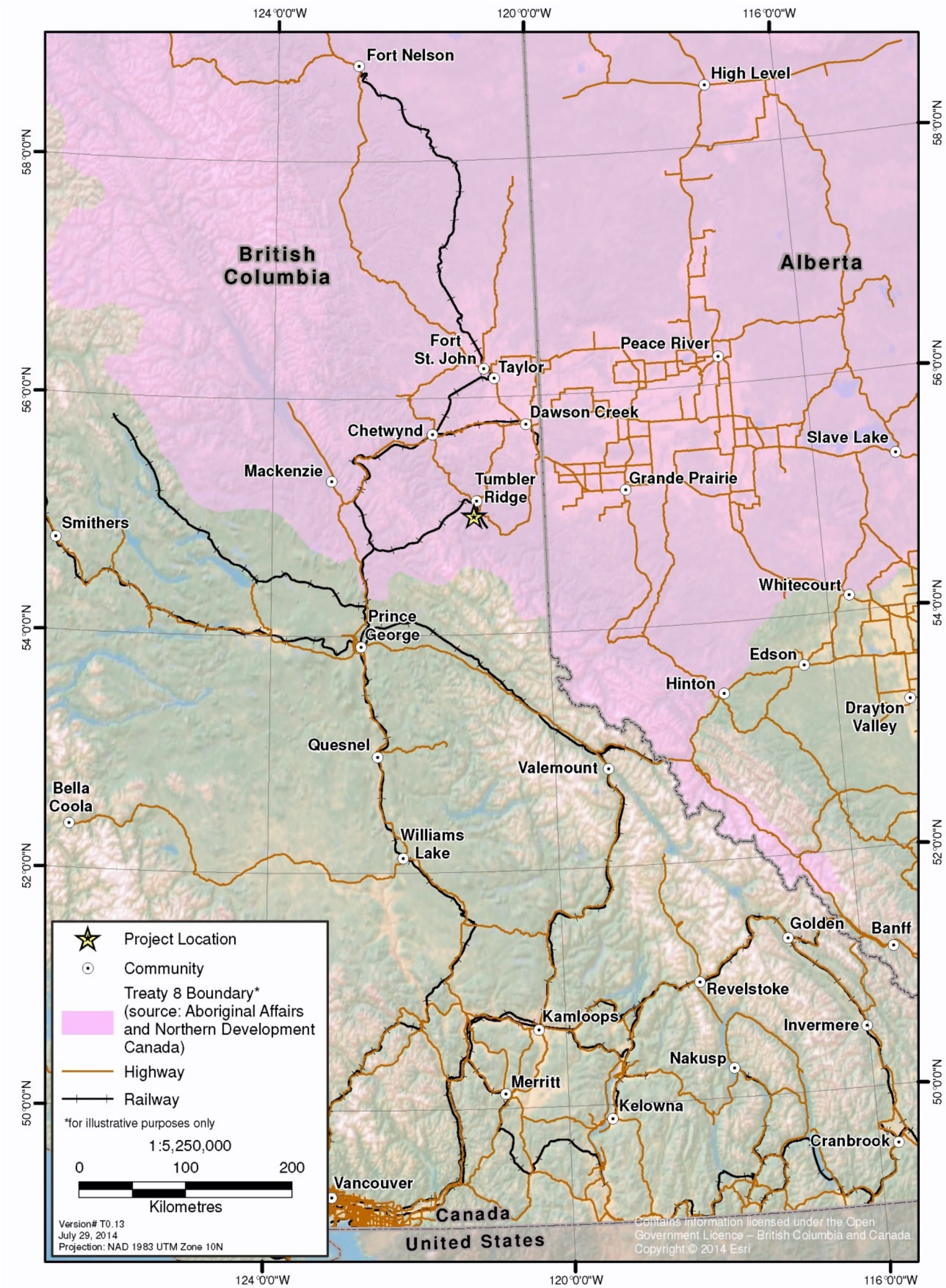


Figure 1-1: Project Location

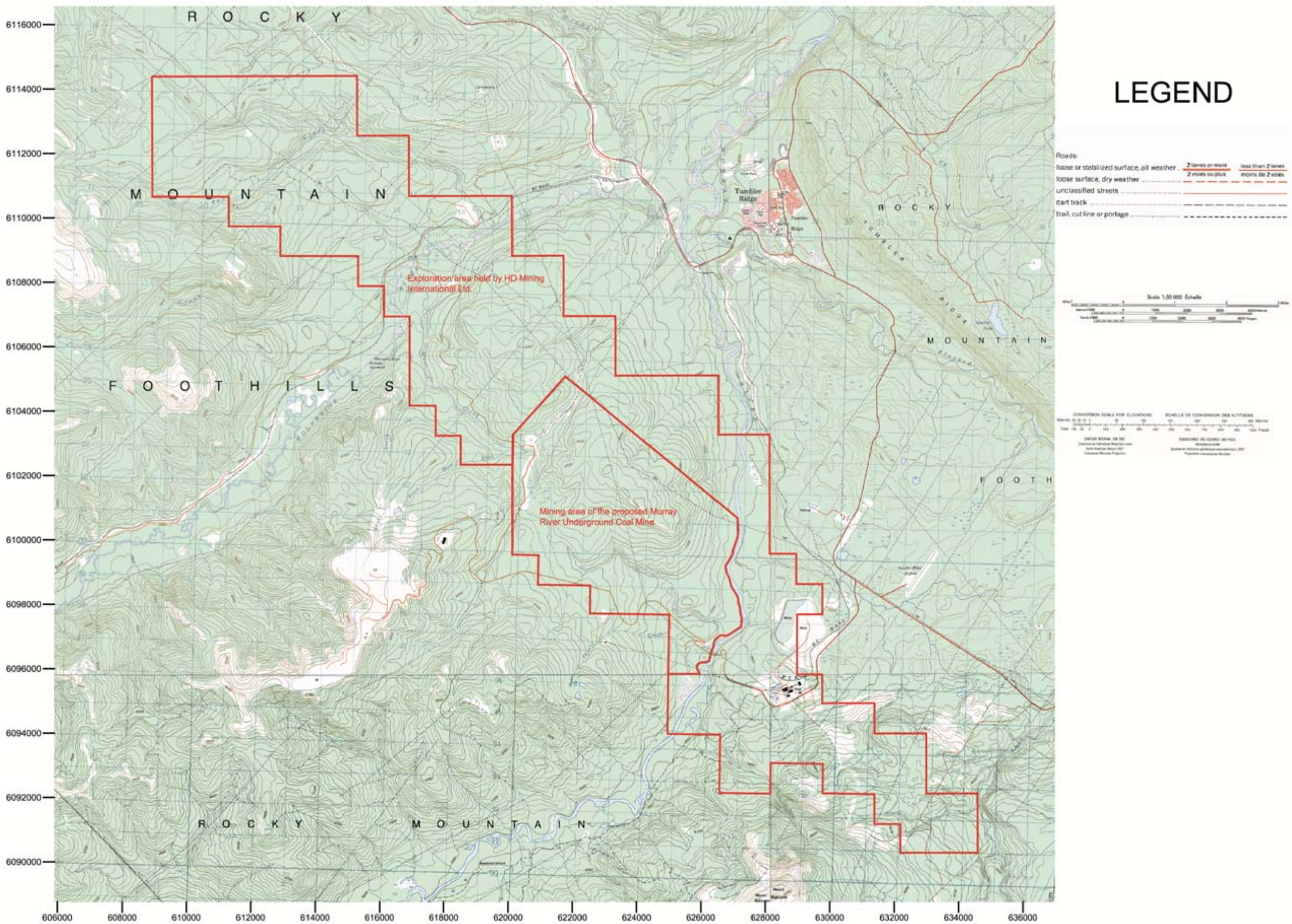


Figure 1-2: Topographic Map of the Exploration Area in the Murray River Coal Property

1.4 Climate

The climate in this area is characterized by a long, cold winter, a warm spring, and a short, cool summer because of the influences of the Rocky Mountains, the Pacific warm current, and the dry cold air from the northern polar region.

The average monthly temperature changes in the year are from -7.2°C to 15.2°C. The highest temperature recorded in history is 34°C and the lowest temperature of the year was -46.0°C, which are typical temperatures in the north east of British Columbia. The average temperatures in July and January in Tumbler Ridge are respectively 21°C and -5°C. Occasionally temperatures between -15 and -30°C occur in winter, generally from January to March.

The average annual rainfall in the area is 334 mm, and the snowfall is 1.85 m. Compared with the other regions in the Murray River Coal Property, the summer in the mountainous areas is cool and with heavy rainfall, and the winter is cold. Ice areas can be seen all year around, with continuous snow accumulation in winters between October and June. The dominant wind direction is southwest wind, and the wind with velocity of over 20 km/h is quite common in the top of the mountain ridge and the higher areas.

1.5 Mineral Tenure, Exploration and Permitting History

1.5.1 Mineral Tenure

The Murray River property consists of 57 coal licenses covering an area of 160 km2. The proposed underground mine and surface facilities are within 19 of the licence areas in the southeast portion of the licence block (Figure 1-2 and 1-3) with a total area of 37.45 km^2. As part of the Mines Act permitting process, HD Mining International Inc. (HD Mining) will seek to convert these licenses to a coal lease.

1.5.2 Exploration History

Previous exploration in the area was conducted by various major oil and gas companies in the 1970s (Lortie 2010), Quintette Coal Limited (Quintette) and more recently in 2006 and 2007 by Kennecott Coal Exploration Inc. (Kennecott). The exploration programs in the 1970s were generally regional in nature, comprised of widely spaced seismic lines and drilling of a small number of primarily oil and gas wells. These programs helped Quintette and Kennecott identify target areas for more detailed coal exploration and eventual mining. The target seams for the Project are part of the Gates Formation (Fort Saint John Group).

Kennecott's exploration program is the only known coal-specific exploration program previously conducted within the Murray River licence area. It consisted of one rotary (Lane 2006) and three core holes (BC MEMNG 2006) (two others were abandoned), surface mapping and interpretation of two seismic lines. Because of difficulties encountered during drilling, only one core hole was completed through the Gates Formation.

Du Pont completed two holes in 1979 west of the Murray River property as a preliminary investigation of the Gates Formation coal seams. One hole did not penetrate into the zone on contact between upper Gates and Hulcross formations due to the interception of a postulated fault zone (Du Pont of Canada Exploration Ltd. 1980).

Table 1-1: Claims Held by Dehua international forming the Murray River Coal Project

Coal Property No.	Map Sheet No.	Coal Property No.	Map Sheet No.	Coal Property No.	Map Sheet No.
417404	093P014	417423	093P005	417442	093P005
417405	093P014	417424	093P005	417443	093P005
417406	093P014	417425	093P005	417444	093P005
417407	093P014	417426	093P005	417445	093P005
417408	093P014	417427	093P005	417446	093P005
417409	093P014	417428	093P005	417447	093I095
417410	093P014	417429	093P005	417448	093P005
417411	093P014	417430	093P005	417449	093I095
417412	093P014	417431	093P005	417452	093I095
417413	093P014	417432	093P005	417453	093I095
417414	093P014	417433	093P005	417454	093I095
417415	093P014	417434	093P005	417455	093I095
417416	093P005	417435	093P005	417456	093I095
417417	093P015	417436	093P005	417457	093I095
417418	093P005	417437	093P005	417458	093I096
417419	093P005	417438	093P005	417459	093I096
417420	093P015	417439	093P005	417460	093I096
417421	093P005	417440	093P005	417461	093I096
417422	093P005	417441	093P005	417462	093I096

In 2009, Canadian Dehua International Mines Group Inc. obtained the Murray River coal property. Detailed exploration consisting of 12 drill holes was carried out in 2009 and 2010, focusing on the central part of the property (about 37.45 km^2). HD Mining took over responsibility for the exploration program in August 2010, and additional exploration was performed on the property. In total, 20 holes (17,850 m) have been drilled; two of the holes were tested for hydrogeologic properties.

1.5.3 Permitting History

As part of exploration of the coal deposit, HD Mining has received the following approvals from the BC Government to mine a 100,000 tonne bulk sample:

- Coal Exploration Permit CX-9-44 (BC Ministry of Energy, Mines, and Petroleum Resources), initially issued in December 2010, and amended in March 2012 to approve the Bulk Sample program;
- Occupant Licence to Cut (BC MFLNRO), issued in May 2011 to support exploration activities;
- Approval AE105825 under the BC Environmental Management Act (BC MOE), issued in February 2012, authorizes temporary discharge of effluent from the Murray River Bulk Sample initial surface preparation construction activity;

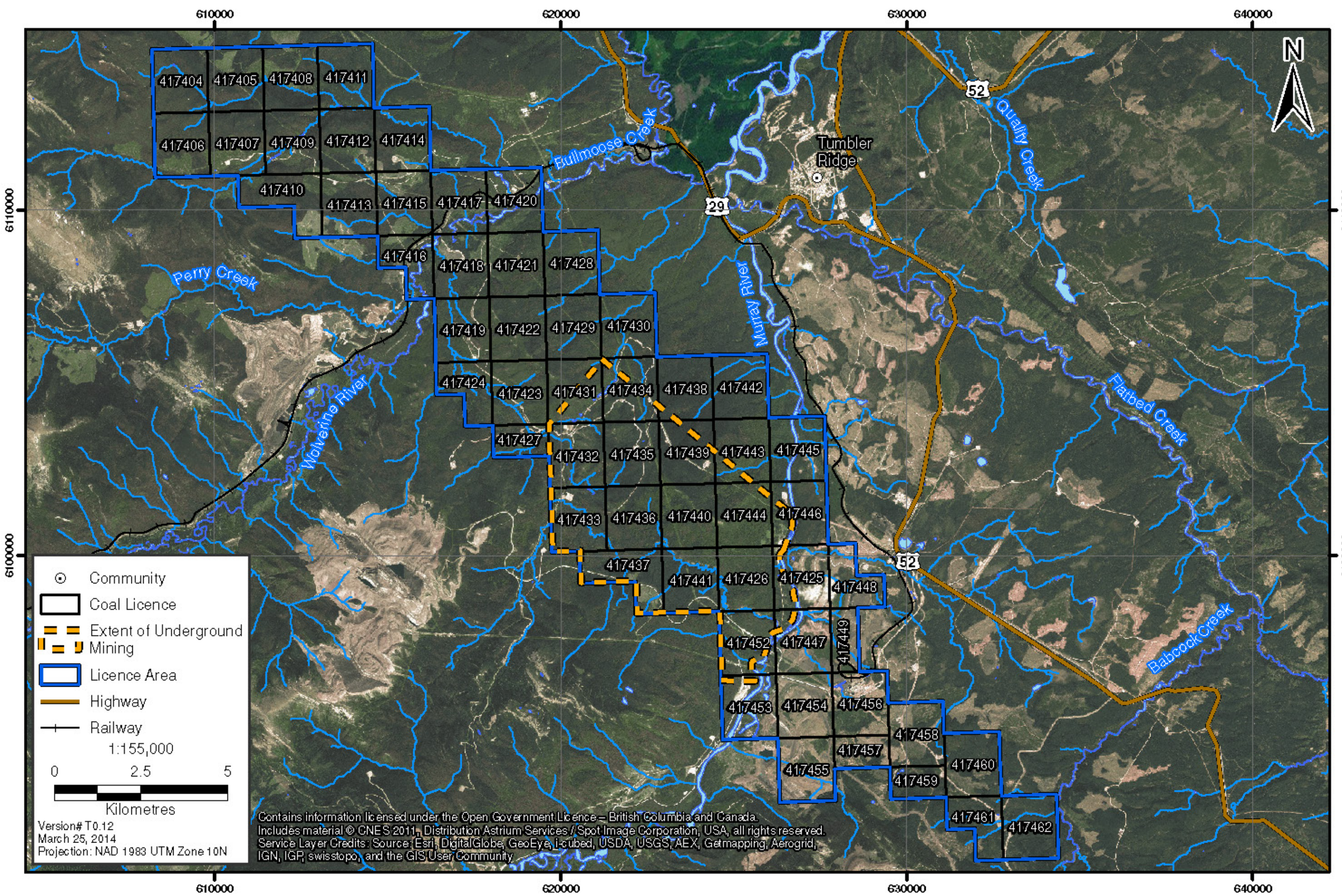


Figure 1-3: Murray River Coal Property and Proposed Underground Mining Area

- Approval AE105878 under the BC Environmental Management Act (BC MOE), issued in March 2012, authorizes discharge of effluents from the Murray River Bulk
- Sample construction and operation activities; and
- Permit 106666 under the BC Environmental Management Act (BC MOE), issued in October 2013, replacing Approval AE105878; authorizes discharge of effluents from the Murray River Bulk Sample construction and operation activities.

The purpose of the Bulk Sample program is to test the coal for use as a coking coal and to perform coal washability testing. The raw coal mined for the bulk sample will be shipped by train directly to the port in Prince Rupert for testing to be completed overseas.

In 2012 and into 2013, HD Mining completed surface preparations to mine the bulk sample. Following approval of mining equipment, underground development of a decline began in January 2014.

This page has been intentionally left blank.

2.0 GEOLOGY

2.1 Regional Setting

The Murray River property is located within the Peace River Coalfield (PRC) in the eastern foothills of the Canadian Rocky Mountains of northeastern BC. The western margin of the Foothills Belt is classified as the easternmost major thrust fault that emplaced Paleozoic strata over Mesozoic strata. The eastern margin is a series of echelon thrust faults that separate the Foothills from the gently dipping strata of the Alberta Plateau (Holland 1976). The Foothills Belt is characterized by folded and faulted Mesozoic sediments. The deformation within the Foothills Belt is variable – mostly decreasing in complexity toward the eastern margin. Deformation within the Rocky Mountains involves complicated folding and faulting. Regional axes for folding and faulting trend northwest, dipping to the southeast. In the Foothills Belt, dips tend to be 20° or less with local folds and undulations significantly modifying this value.

In the PRC there are two main coal-bearing units: the Gates Formation and the Gething Formation (British Columbia Geological Survey n.d.). Both Lower Cretaceous units were subjected to varying degrees of burial prior to the Laramide deformation and mountain-building episodes that took place approximately 40 to 70 million years ago when the Pacific and North American plates collided. The Laramide Orogeny increased the overall maturity of the coal seams. Based on drill core information from the neighbouring Quintette mine (immediately adjacent north of the Murray River Forest Service Road), coal seams of the Gates Formation can be comprised of up to 10 separate seams and the average cumulative thickness of the coal seams is as high as 17 metres.

2.2 Stratigraphy

The regional geology and stratigraphy of the PRC is provided in Figure 2-1 and Figure 2-2. Descriptions of the formations are provided below. The information is sourced primarily from Johnson (1985).

2.2.1 Moosebar Formation

The basal sequence of the Moosebar Formation is a dark grey to black marine shale with sideritic concretions, bentonite, and siltstone. The upper parts comprise banded or fissile sandy shale, very fine-grained sandstone, and sandstone intercalated shale. This transition is a pro-deltaic (highstand systems tract) transition from marine sediments to the massive continental sandstones that mark the overlying Gates Formation. The Bluesky Member is a chert pebble conglomerate that is found locally at the base of the Moosebar Formation.

2.2.2 Gates Formation (Fort St. John Group)

The Gates Formation conformably overlies the Moosebar Formation. The lower portion of the formation is termed the Quintette or Torrens member and consists of massive, light gray, mediumgrained sandstone, with minor carbonaceous and conglomeratic horizons.

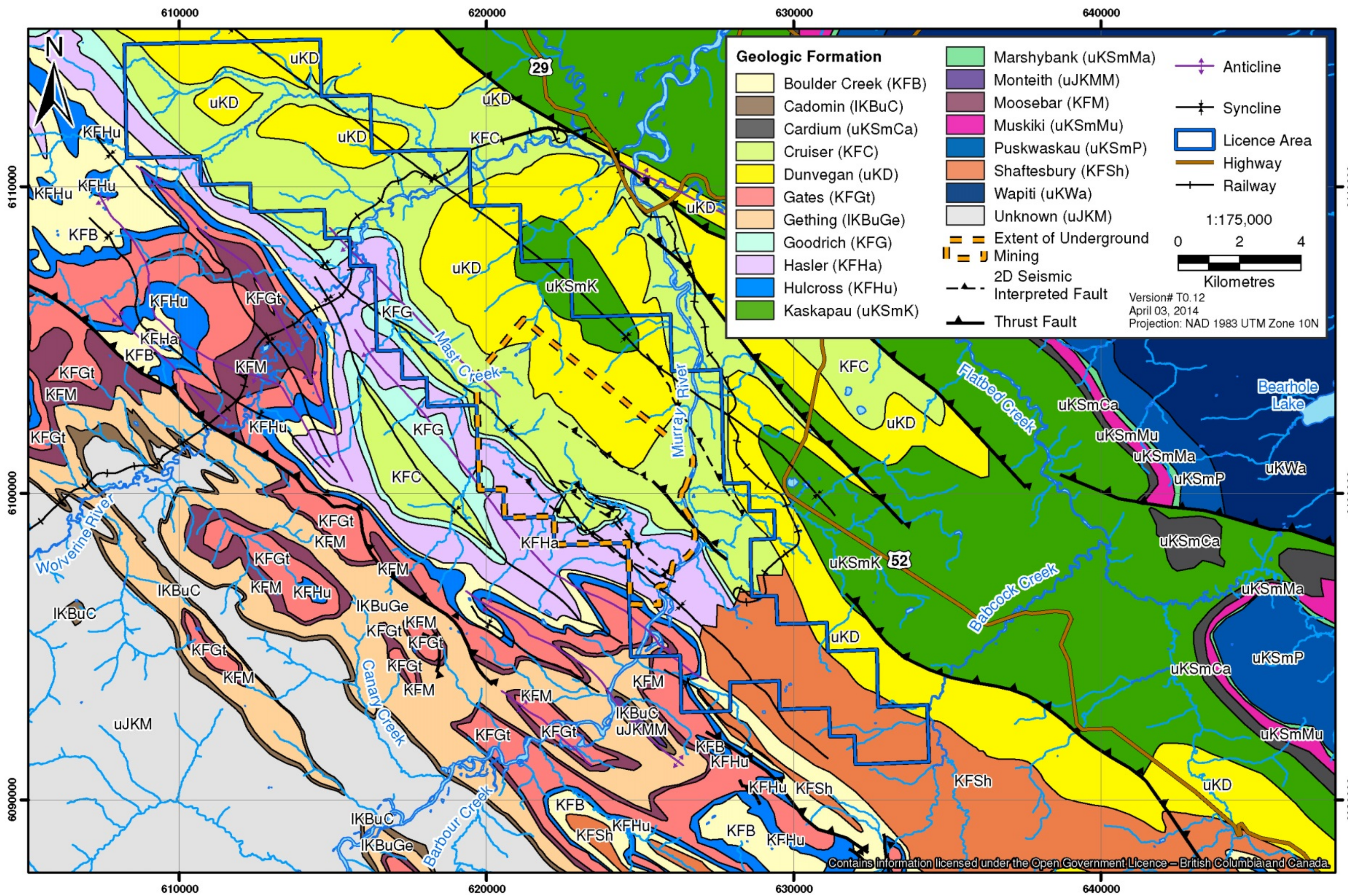
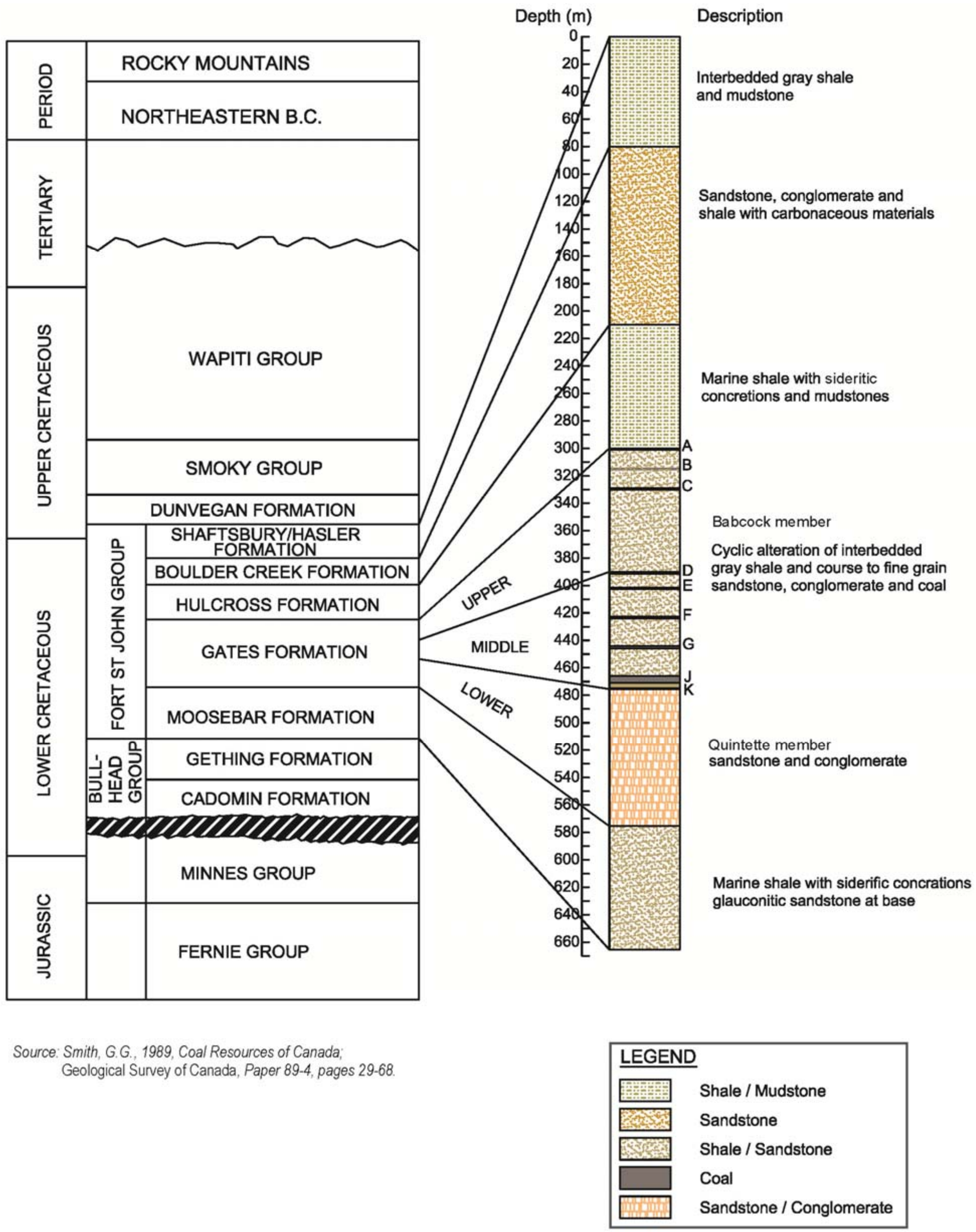


Figure 2-1: Regional Geological Setting of the Murray River Project

Earth | Insight | Values

DMT



Source: Smith, G.G., 1989, Coal Resources of Canada; Geological Survey of Canada, Paper 89-4, pages 29-68.

Figure 2-2: Typical Stratigraphic Column in the Murray River Project Area

The Quintette member is overlain by several cyclical sequences of coal deposition that occur over a stratigraphic interval of approximately 80 m collectively referred to as the Middle Gates. Each cycle normally begins with laminated, medium- to fine-grained sandstone at the base, transitioning to carbonaceous shale and coal. Coal seams are thickest and more continuous in the lowermost cycle: the D through K seams are economical to mine. Individual coal seams within the higher cycles may coalesce to form a single seam, e.g., the G and I seams are typically referred to as the G/I seam. The lower portion of the Upper Gates is massive, medium- to coarse-grained sandstone and overlain by a predominantly shale sequence containing two to three poorly developed coal seams (A to C) intercalated with sandy shale and very fine sandstone. A very thin bed of chert pebbles with ferruginous cement marks the contact of the Upper Gates with the overlying marine sediments of the Hulcross Formation.

2.2.3 Hulcross Formation

The Hulcross Formation is comprised predominantly of dark grey marine shale approximately 100 metres thick. The base of the Formation is more homogeneous and arenaceous, and can contain sideritic concretions. The upper portion of the Formation is dominated by thinly laminated interbeds of siltstone and very fine-grained sandstone. A few kaolinitic beds have also been observed. The Hulcross Formation is usually distinguished from the Moosebar Formation by the absence of glauconitic sandstones at the base of the Hulcross.

2.2.4 Boulder Creek Formation

The Boulder Creek Formation is a 130 to 200 metre thick sequence of shale, greywacke, and conglomerate that conformably overlies the Hulcross Formation. The Boulder Creek Formation is a coarsening upward sequence with massive conglomerate and conglomeratic sandstone in the upper portions of the Formation and alternating medium- to fine-grained sandstones and shale in the middle of the Formation (Du Pont of Canada Exploration Ltd. 1980).

2.2.5 Hasler Formation

The Hasler Formation is predominantly dark grey marine shale with sideritic concretions and a minor sandstone and pebble conglomerate component; the basal layer is frequently pebbly (British Columbia Ministry of Energy and Mines 2011).

Above the Hasler Formation, the Goodrich and Cruiser Formations form the uppermost units in the Fort St. John Group. According to regional geology maps, the Hasler, Goodrich, and Dunvegan formations comprise the majority of bedrock outcrop on the property.

2.3 Mineral Resources and Reserves

[redacted]

[redacted]

3.0 CONSTRUCTION OF THE AUXILIARY DECLINE

Table 3-1 shows the details of the construction of the auxiliary decline.

Table 3-1: Summary of the Details of the Auxiliary Decline Construction

Approval number	CX-9-44
Period	January to December, 2016
Claims	417453
Number of Tunnels	1
Total meters	1356
Size	5.5 m wide, 4.5 m high, nominal
Core storage location	None
Cost	$5,481,800[1]

[1] sum of all on-site activities at the Bulk Sample Decline Site

Work at the Bulk sample decline Site began in 2013. Excavation began mid-January, 2015 and was undertaken according to the conditions set out in the Bulk Sample Permit CX-9-44. Excavation was complete late 2015. The work on-site for 2016 included site clean-up and storage of materials, maintenance of environmental and other statutory sampling, security and visits from HD staff.

Details of monthly costs are shown in Table 3-2.

Table 3-2: Summary of Expenditure, 2016

Canadian $ (000)						**2016**							
Description	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Civil Engineering	21	6	0	0	0	0	0	0	0	0	0	0	27
Equipment Installation	73	0	0	0	0	0	0	0	0	0	0	0	73
Materials, Spare Parts &Maintenance	3332	62	26	22	1.2	0	0	0	0	0	0	0	3443.2
Surface Site Preparation & Portal	0	0	0	0	0	0	0	0	0	0	0	0	0
Onsite Environmental Monitoring	0	0	0	0	0	0	0	0	0	0	0	0	0
Field Review & Security	65	50	29	29	29	29	29	29	29	29	29	29	405
Onsite Mine Management Consulting	0	0	0	0	0	0	0	0	0	24	22	21	67
Wages & Direct Onsite Supervisory	425	38	38	38	38	38	38	38	38	17	17	17	780
Waste Disposal	2.5	8.5	1.8	0	1.6	1.9	0	0	0	0	0	0	16.3
Land Survey	0	2.8	0	0	0	0	0	0	0	0	0	0	2.8
Rent - onsite	47	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	129.5
Equipment Rental	19	0	0	0	0	0	0	0	0	0	0	0	19
General & Administration - Onsite	140	96	13	13	13	13	13	13	13	13	13	13	366
Supplies & Maintenance on site	145	0	0.8	2.2	0	0	0	0	0	0	5	0	153
Total Construction in Progress	**4269.5**	**270.8**	**116.1**	**111.7**	**90.3**	**89.4**	**87.5**	**87.5**	**87.5**	**90.5**	**93.5**	**87.5**	**5481.8**

The bulk of the costs occurred in January while the mining teams cleaned up the site and stored equipment.

4.0 HYDROGEOLOGICAL DRILLING

Table 4-1 shows the details of the hydrogeological drilling.

Table 4-1: Summary of the Details of the Hydrogeological Drilling

Approval number	1640459-201402
Period	March - April, 2016
Claims	417426
Number of Holes	1
Total metres drilled	623
Total metres cored	623
Size	HQ
Core storage location	Mine Site
Cost	$429,508

In 2016 a single hydrogeological exploration and test hole was drilled on claim 417426 to obtain additional regional information on the hydrogeology and to install monitoring instruments to determine the behaviour of deep aquifer systems. This information is required to provide background information for the mine permit application currently being prepared. The hole was the last of a three-hole deep program. The shallow program and the two preceding deep holes were described in the Coal Assessment Report for 2015.

Drawing 4-1 (at end of report) shows the locations of all of the boreholes in the program. Note that H20 was a check survey and DH-03 was the only hole drilled in 2016.

DH-03 was 623 m deep and 608 m of rock core was recovered. It was halted 36 m below J Seam. Table 4-2 summarises the major units encountered. Samples were taken for geotechnical testing, with the results included as Appendix 1.

Hole details, including bore logs and geophysical are given in Appendix 2a and Appendix 2b respectively

Samples of each of the coal seams encountered were collected for gas content analysis by Petrologic of Calgary, AB. Results appear to be somewhat counter-intuitive, with the shallower holes giving the higher gas content, although the deeper hole was closer to the gas well at the NW end of the mining area. The Petrologic report is presented in Appendix 3.

Table 4-2: Major Units Encountered in DH-03

Formation	From	To	Thickness
Q	0	14.7	14.7
Hasler	14.7	205.1	190.3
Boulder Creek	205.1	327.2	122.1
Hulcross	327.2	413.4	86.2
Gates	413.4	623	209.6
C Seam	454.7	455.4	0.68
D Seam	496.2	497.7	1.47
E Seam	515.1	517.5	2.07
F Seam	539.6	543.8	3.7
G/I Seam	565.5	566.0	0.54
J Seam	581.2	587.3	5.26
EOH @ 623 m			

5.0 CERTIFICATES

5.1 Peter Cain, Ph.D., P.Eng.

As the co-author of this report entitled "Coal Assessment Report for the year 2016 for the Murray River Coal Property, Peace River Coalfield, British Columbia" dated March 31, 2017 ("the Report"), I, Peter Cain, do hereby certify that:

1. I am employed by and carried out this assignment for:

    DMT Geosciences Ltd.,
    Suite 415 – 708 11th Avenue SW,
    Calgary, Alberta, T2R 0E4, Canada.
    Telephone: (403) 264-9496
    Fax: (403) 263-7641

2. I hold the following academic qualifications:
    - Bachelor of Science – University of Wales, University College Cardiff, 1977
    - Doctor of Philosophy – University of Wales, 1982

3. I am a registered member of the:
    - Association of Professional Engineers and Geoscientists of British Columbia, Licence - 37663.
    - Association of Professional Engineers, Geologists and Geophysicists of Alberta, Member - 63684.
    - Association of Professional Engineers and Geoscientists of Saskatchewan, Licence - 25843.
    - Association of Professional Engineers of Nova Scotia, Licence 6015

4. I have worked as a mining engineer for a total of 38 years since my undergraduate degree from university. I have worked in grassroots to advanced stage mining projects. I have experience with underground and open pit and quarry operations from the pre-production stage to closure. I have the following experience in coal and coal mining:
    - I hold a First Class Certificate of Competency – Underground Coal - from the Province of BC.
    - I hold an Underground Coal Mine Manager's Certificate from the Province of Alberta.
    - Preparation of a coal resource/coal reserve estimate of the PT Senemas Energindo Mineral coal mine in Kalimantan, Indonesia for Agritrade Resources Ltd (2012)
    - Completed a due diligence review of coal lands owned by Chugach Alaska Corporation in the Chugach hills for Canada Coal Inc.
    - Engineering work on the feasibility study for a new underground coal mine development near Cucuta in Norte de Santander Department in northwest Colombia for Compañia Minera Cerro Tasajero (2010-2011).
    - Engineering lead for DMT on the PT Indika Energy technical team working on the potential acquisition of PT Bayan Resources, Citibank as financial advisor (2010).

- Engineering lead for DMT on the PT Indika Energy technical team working on the potential acquisition of PT Berau, Citibank as financial advisor (2009).
- Due diligence review of certain coal assets in Cordoba Department, Colombia, on behalf of Prime Natural Resources.
- A technical review of various coal assets in Norte del Santander Department, Colombia on behalf of Vitol SA.
- Technical assistance to several coal mines in the Cucuta area in Norte del Santander Department, Colombia on behalf of a potential investor. Included safety audits and operational assistance as well as reviewing the design of exploration projects.
- Review of certain coal assets on the island of Borneo on behalf of Indika Energy Inc. (2007-2008) including the South Gobi and PT Berau properties.
- Technical due diligence on the assets of the Taiyuan Sanxing Coal Gasification (Group) Co Ltd. owned by China Coal Energy Holdings Ltd. of Hong Kong. Completed for Pine Street Capital (Elliott Advisors (HK) Ltd.

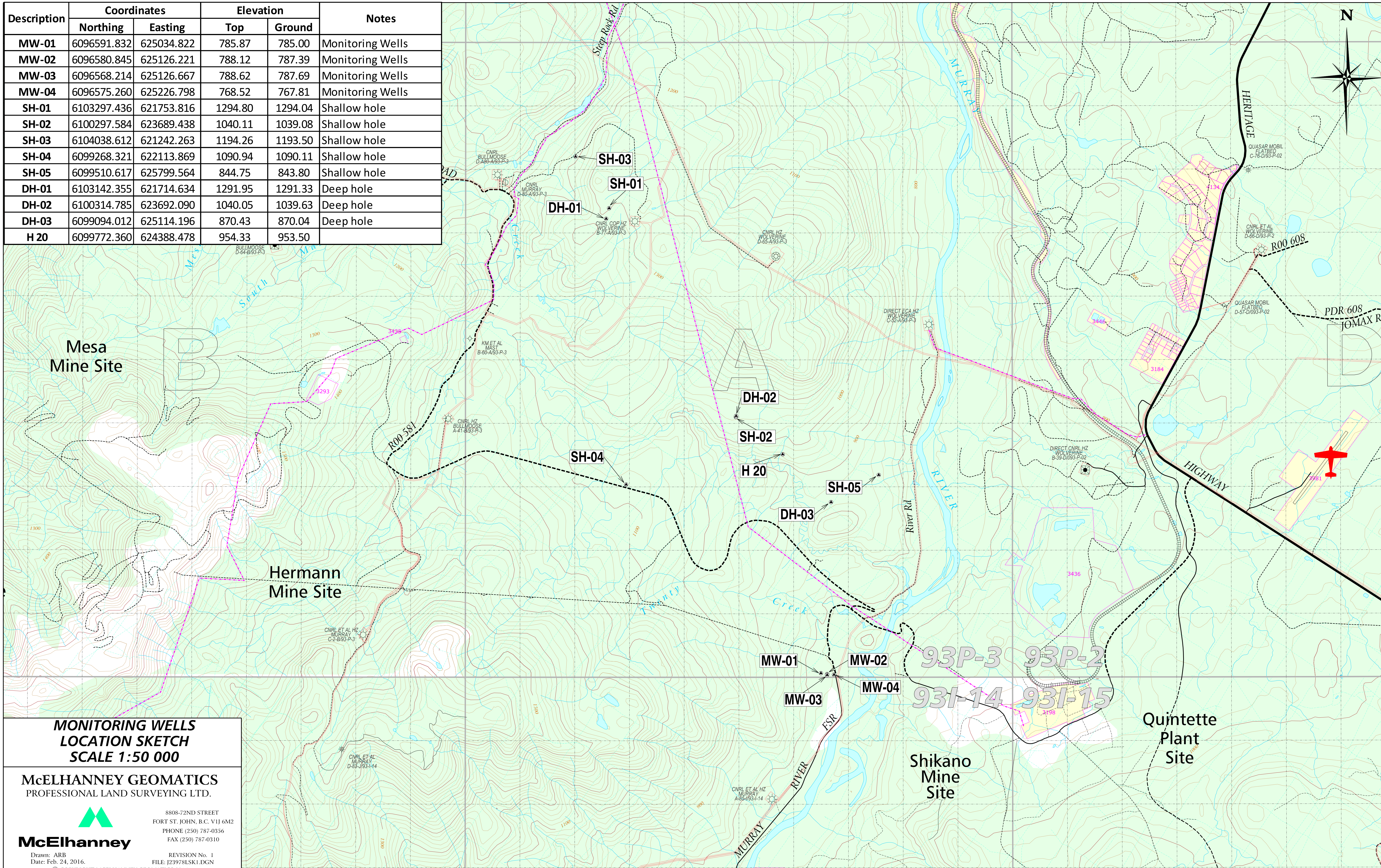
5. Prior to joining DMT I spent six months designing an underground coal mine in Iran and two months writing an NI 43-101 Technical Report on coal mining properties in Colombia.
6. From 2000 to 2004 I was Mine Manager for Grande Cache Coal Corporation responsible for all aspects of mine design, planning and costing for their No. 7 Mine, including preparation for a successful stock market launch in 2004. Prior work experience includes:

1998 – 2000 **Smoky River Coal Limited**
Senior Geotechnical Engineer.
1993 – 1998 **NRCan – CANMET-CRL**
Group Leader - Strata Control.
1987 – 1993 **Jacques Whitford and Associates Ltd.**
Senior Mining Engineer.
1986 – 1987 **Webster Machine Company Ltd.**
Mining Engineer.
1982 – 1986 **NRCan – CANMET-CRL**
Research Scientist.

Dated at Calgary, AB. this 30th Day of November, 2017.

Peter Cain, Ph.D., P.Eng.
Director, Engineering and Consulting
DMT Geosciences Ltd.

Description	Coordinates		Elevation		Notes
	Northing	Easting	Top	Ground	
MW-01	6096591.832	625034.822	785.87	785.00	Monitoring Wells
MW-02	6096580.845	625126.221	788.12	787.39	Monitoring Wells
MW-03	6096568.214	625126.667	788.62	787.69	Monitoring Wells
MW-04	6096575.260	625226.798	768.52	767.81	Monitoring Wells
SH-01	6103297.436	621753.816	1294.80	1294.04	Shallow hole
SH-02	6100297.584	623689.438	1040.11	1039.08	Shallow hole
SH-03	6104038.612	621242.263	1194.26	1193.50	Shallow hole
SH-04	6099268.321	622113.869	1090.94	1090.11	Shallow hole
SH-05	6099510.617	625799.564	844.75	843.80	Shallow hole
DH-01	6103142.355	621714.634	1291.95	1291.33	Deep hole
DH-02	6100314.785	623692.090	1040.05	1039.63	Deep hole
DH-03	6099094.012	625114.196	870.43	870.04	Deep hole
H 20	6099772.360	624388.478	954.33	953.50	



MONITORING WELLS LOCATION SKETCH SCALE 1:50 000

McELHANNEY GEOMATICS
PROFESSIONAL LAND SURVEYING LTD.
8808-72ND STREET
FORT ST. JOHN, B.C. V1J 6M2
PHONE (250) 787-0356
FAX (250) 787-0310

McElhanney

Drawn: ARB
Date: Feb. 24, 2016.
REVISION No. 1
FILE: J23978LSK1.DGN

Drawing 4-1: Borehole Locations (including Table of Coordinates)

Appendix 1

Testing Results

Rock Testing Results, DH-02 and DH-03

Hole	ID #	From	To	Seam	Lithology	Comment	Slake Durability	Point Load Index	Uniaxial Comp. Strength
DH-02	1	701.2	701.4	D	Sandstone, grey FS with black MS			1.34	121.3
DH-02	2	703.54	703.81	D	Sandstone, grey FS with black MS			0.40	72.9
DH-02	3	704.7	704.9	D	Sandstone, grey FS with black MS	Immediate Roof	VH	6.29	49.6
DH-02	4	707	707.17	D	Sandstone, black, fine sandstone, carbonaceous	Immediate Floor	H	0.43	
DH-02	5	708.2	708.36	D	Mudstone, dark grey				82.9
DH-02	6	708.64	708.81	D	Mudstone, dark grey				107.7
DH-02	7	723.29	723.4	E	Mudstone, dark, carbonaceous	Immediate Roof	H	0.49	
DH-02	8	723.72	723.86	E	Mudstone, dark, carbonaceous	Immediate Floor	MH	0.60	
DH-02	9	759.3	759.45	F1	Mudstone, dark grey		M	0.94	
DH-02	10a	761	761.25	F1	Mudstone, dark grey		H		
DH-02	10b	761	761.25	F1	Mudstone, dark grey		MH		
DH-02	11	779.65	779.79	F2	Mudstone, black, carbonaceous			0.48	
DH-02	12	780.18	780.38	F2	Mudstone, black, carbonaceous		VH		67.1
DH-02	13	783.56	783.75	F2	Mudstone, black, carbonaceous		MH	0.35	
DH-02	14	783.8	784	F2	Mudstone, black, carbonaceous		H	0.45	
DH-02	15	806.7	806.9	G/I	Mudstone, black, carbonaceous			1.74	59.8
DH-02	16	807.23	807.4	G/I	Mudstone, black, carbonaceous		VH	0.68	
DH-02	17	808.1	808.18	G/I	Mudstone, black, carbonaceous		H	0.63	
DH-02	18	808.18	808.3	G/I	Sandstone, grey, fine with dark grey mudstone		H	0.98	
DH-02	19	831	831.15	J	Mudstone, black, silty laminations		VH	1.28	
DH-02	20	837.34	837.44	J	Mudstone, black with coal stringers			0.82	
DH-02	21	840.1	840.2	J	Mudstone, black, carbonaceous		VH	1.94	
DH-02	22	840.7	840.9	J	Sandstone, grey, with dark grey mudstone.		VH		34.3
DH-03	1	496.77	497	D	Coarse conglomeratic sandstone	Immediate roof		19.86	
DH-03	2	497.7	498	D	Mudstone, black, carbonaceous	Floor	H	1.46	
DH-03	3	498.3	498.5	D	Dark grey siltstone	Floor	VH		62.9
DH-03	4	514.95	515.08	E	Mudstone, black, carbonaceous	Immediate roof	MH	1.04	
DH-03	5	516.7	517	E	Mudstone, black, carbonaceous	Immediate floor		1.40	
DH-03	6	517.46	517.7	E	Dark grey siltstone	Floor	H		57.1
DH-03	7	539.41	539.6	F	Mudstone, hard black, carbonaceous	Immediate Roof	MH	1.75	
DH-03	8	543.8	544	F	Mudstone, black, carbonaceous	Floor	MH	1.54	
DH-03	9	544.5	544.7	F	Silty mudstone, hard black, carbonaceous	Floor	MH	1.05	
DH-03	10	565.22	565.46	G/I	Banded mudstone and fine sandstone	Immediate roof	VH	2.54	69.0
DH-03	11	566	566.3	G/I	Mudstone, black, carbonaceous, fissile	Immediate floor	MH		
DH-03	12	568.16	568.38	G/I	Mid-grey siltsone	Floor	VH	6.50	74.2
DH-03	13	581	581.18	F2	Siltstone/fine sandstone, carbonaceous at base	Roof	VH		60.4
DH-03	14a	587.27	588.08	J	Siltstone/fine sandstone	Immediate Roof		5.51	48.1
DH-03	14b	587.27	588.08	J	Siltstone/fine sandstone	Immediate Roof		7.03	63.0
DH-03	15	582.74	582.97	J	Coal	Coal Seam		0.50	3.9
DH-03	16	583.8	584	J	Coal	Coal Seam			18.5
DH-03	17	584.05	584.2	J	Coal	Coal Seam			12.2

Durability Characteristics at Stage 1 and Stage 2 of a Slake Durability Test

Category	Percent Retained Stage 1	Percent Retained Stage 2
Very High	>99	>98
High	98-99	95-98
Moderately High	95-98	85-95
Moderately High	85-95	60-85
Low	60-85	30-60
Very Low	<60	<30

Appendix 2

Hole Details

Appendix 2a

Borehole Logs

HD Mining International Ltd.

Drilling Company: Geotech Drilling Services Ltd
Rig Type: A 5
Total Depth: 623.00
Start Date: 2016-01-28
Finished Date: 2016-02-12
Core Size: HQ

Hole No.: DH-03
Collar Elevation: 870.04
Northing: 6099094.012
Easting: 625114.196
Logging Geologist: George
Note: Hydrogeology logged sampled by ERM staff seperately, this log for charactering resource

Strata	Coal Seam	Interval (m)		Thickness(m)		Dip	Floor Elevation	Sample ID		Fractures		Hardness	Rock Name	Lithology Description
		From	To	Thick	TRUE			Coal	Rock	Type	Angle			
Q		0	14.78	14.78									Overburden	cobbles, sanstone,mudstone
		14.78	20.60	5.82		<5							Mudstone	grey weathered mudstone laminated with fine sandsstone
		20.60	21.30	0.70									Sandstone	grey fine sandstone
		21.30	36.80	15.50									Mudstone	Dark grey mudstone with 10% grey fine sandstone, micro horizontal bedding
		36.80	39.52	2.72		<5							Mudstone	dark grey mudstone laminated with grey siltstone, sandy increase
		39.52	56.94	17.42		<5							Mudstone	dark Grey mudstone laminated with fine sandstone. Py bleb present. Mechanical breaks
		56.94	65.20	8.26		<5							Mudstone	dark Grey mudstone laminated with grey siltstone
		65.20	73.00	7.80		<5							Mudstone	dark grey mudstone with grey fine sandstone, sand increase, micro horizontal bedding
Hasler		73.00	77.00	4.00									Mudstone	dark grey mudstone laminated with grey fine sandstone
		77.00	77.70	0.70									Sandstone	grey fine mudstone
		77.70	96.72	19.02		<5							Mudstone	dark grey mudstone laminated with grey fine sandstone, micro horizontal bedding
		96.72	115.81	19.09		<5							Mudstone	dark grey mudstone laminated with sandstone, 70-85 degree breaks present
		115.81	136.40	20.59		<5							Mudstone	dark grey MSinterbeded with grey FS(up to 5cm thick, py bleb and 70 degree break present
		136.40	155.27	18.87									Mudstone	dark grey MSinterbeded with grey FS, sand increase locally
		155.27	177.52	22.25		<5							Mudstone	dark grey mudstone with grey FS,carbonate veins, and 60-70 degree breaks
		177.52	200.98	23.46									Mudstone	dark grey MS with grey FS. 2cm conglomerate at 200.98-201
		200.98	205.10	4.12		<5							Mudstone	grey bauxitic MS, slickensides visible
		205.10	205.70	0.60									Sandstone	grey Fine sandstone with dark grey MS
		205.70	210.35	4.65									Sandstone	grey medium-coarse sandstone with conglomerate locally
		210.35	215.00	4.65		<5							Sandstone	grey sandstone with bauxitic
		215.00	217.12	2.12		<5							Sandstone	grey FS with coal stringers
		217.12	224.50	7.38									Mudstone	dark grey MS with grey FS.
		224.50	230.60	6.10		<5							Sandstone	grey medium grain sandstone with dark grey mudstone
		230.60	233.20	2.60									Sandstone	grey coarse sandstone with carbonaceous
		233.20	234.50	1.30									Sandstone	grey coarse sandstone with dark grey conglomerate
		234.50	242.00	7.50									Sandstone	grey coarse sandstone with conglomerate and coal stringers
		242.00	244.28	2.28		<5							Sandstone	grey fines grained
		244.28	251.20	6.92									Mudstone	dark grey MS with grey fine sandstone. Slickensides
		251.20	252.74	1.54		<5							Mudstone	light brown MS, siliconized
		252.74	253.60	0.86									Mudstone	light brown MS, siliconized
		253.60	254.65	1.05									Mudstone	dark grey MS
		254.65	254.90	0.25									Mudstone	black carb MS, broken pieces
Boulder Ceeek		254.90	257.15	2.25									Siltstone	dark grey siltstone, 45 degree slickenside
		257.15	257.60	0.45									Sandstone	grey fines grained
		257.60	259.05	1.45									Mudstone	dark grey mudstone
		259.05	261.43	2.38									Siltstone	grey siltstone, silicified
		261.43	261.48	0.05									Coal	black bright stringer
		261.48	271.88	10.40		<5							Mudstone	dark grey MS eith grey siltstone. Slickenside present
		271.88	274.40	2.52		<5							Sandstone	grey fine sandstone with silt, silicified
		274.40	284.32	9.92									Mudstone	dark grey mudstone with grey fine sandstoen. Core broken pieces
		284.32	290.70	6.38									Mudstone	dark grey
		290.70	292.85	2.15									Sandstone	grey fine sandstone laminated with dark grey MS
		292.85	299.30	6.45		<5							Siltstone	dark grey siltstone
		299.30	300.00	0.70									Mudstone	black carb MS
		300.00	300.21	0.21									Coal	
		300.21	312.12	11.91									Conglomerate	grey, grain size 2-12mm, sub angular, SS, MS, Silt. Massive
		312.12	326.30	14.18									Sandstone	grey coarse SS, well sorted, quartz, feldspar,debris
		326.30	327.24	0.94									Sandstone	grey SS laminated with dark grey MS
		327.24	343.86	16.62		<5							Mustone	dark grey MS with grey fine sandstone.
		343.86	377.47	33.61									Mudstone	dark grey MS with grey FS. Micro horizontal bedding. Py bleb and 70 degree breaks present
Hulcross		377.47	401.00	23.53									Mudstone	dark grey mudstone laminated with grey FS
		401.00	408.80	7.80									Mudstone	dark grey mudstone laminated with grey FS
		408.80	409.40	0.60									Sandstone	grey fine sandstone with mudstone
		409.40	413.46	4.06									Mudstone	dark grey MS interbeded with grey FS
		413.46	413.78	0.32									Conglomerate	grey conglomerate, grain size 2-20mm, poor sorted, sub angular, massive
		413.78	415.31	1.53									Sandstone	grey FS-MS
		415.31	419.66	4.35		<5							Mudstone	dark grey MS with grey FS and minor coal stringers
		419.66	420.87	1.21									Mudstone	dark grey MS
		420.87	421.00	0.13									coal	
		421.00	424.82	3.82									Mudstone	dark grey MS and carb MS. Py blebs present
		424.82	425.00	0.18									coal	crushed
		425.00	427.20	2.20									Sandstone	grey FS laminated with MS
		427.20	429.10	1.90									Mudstone	black carb MS with 6 coal stringers present
		429.10	454.60	25.50									Sandstone	grey medium SS with coarse SS
		454.60	454.72	0.12		<5							Mudstone	black carb MS
	C	454.72	455.40	0.68									Coal	black bright, recover 82%
		455.40	456.20	0.80									Mudstone	black carb
		456.20	456.30	0.10									coal	
		456.30	456.80	0.50									Mudstone	black carb
		456.80	457.01	0.21									coal	
		457.01	458.00	0.99									Mudstone	dark grey MS laminated with FS
		458.00	461.25	3.25									Sandstone	grey medium-coarse sandstone
		461.25	461.50	0.25									Conglomerate	grain size 2- 5mm, mudstone, sand.
		461.50	465.30	3.80		<5							Sandstone	grey medium-coarse sandstone
		465.30	470.40	5.10									Sandstone	grey medium sandstone with MS
		470.40	473.42	3.02									Mudstone	dark grey, core broken
		473.42	474.90	1.48		8							Sandstone	grey SS
		474.90	486.70	11.80									Sandstone	grey SS with black MS.slickensides and carbonate veins present
		486.70	491.09	4.39									Sandstone	grey SS
		491.09	495.90	4.81									Sandstone	grey SS with black MS
		495.90	496.23	0.33									Conglomerate	dark grey. Grain size 2-20mm, poor sorted
	D	496.23	497.70	1.47									coal	black bright, recover 20%
		497.70	498.07	0.37		<5							Mudstone	black MS
		498.07	498.17	0.10									coal	bony
		498.17	499.10	0.93									Mudstone	black
Gates		499.10	505.70	6.60		10							Sandstone	grey FS with black MS
		505.70	511.03	5.33									Sandstone	grey FS-Medium sandstone
		511.03	511.58	0.55									Mudstone	black Carb mudstone
		511.58	513.20	1.62		<5							Sandstone	Grey sandstone with dark grey MS
		513.20	514.49	1.29									Mudstone	black Carb mudstone
		514.49	515.08	0.59									Mudstone	dark grey MS
	E	515.08	517.15	2.07									Coal	black, shiny
		517.15	517.76	0.61									Mudstone	black Carb mudstone
		517.76	517.88	0.12									coal	
		517.88	518.20	0.32									Mudstone	black Carb mudstone
		518.20	518.46	0.26									coal	black
		518.46	521.13	2.67									Mudstone	black Carb mudstone
		521.13	532.25	11.12		<5							Sandstone	grey medium sandstone
		532.25	536.52	4.27									Sandstone	grey FS with dark grey MS, micro horizontal
		536.52	539.60	3.08									Sandstone	grey Fs
	F	539.60	543.82	4.22									Coal	black shiny, recover 49.5%. 542-542.5 mudstone(partings)
		543.82	545.08	1.26		<5							Mudstone	black carb MS
		545.08	564.66	19.58									Sandstone	grey medium SS
		564.66	565.46	0.80									Mudstone	black carb MS. 564.66-565.06m broken pieces
	G/I	565.46	566.00	0.54									Coal	black
		566.00	570.54	4.54		<5							Mudstone	black carb MS with dark MS. 566-566.9m broken pieces
		570.54	577.93	7.39									Sandstone	grey FS laminated with MS
		577.93	581.18	3.25									Mudstone	black Carb MS,580-580.30 broken pieces
	J	581.18	587.27	6.09		<5							Coal	black, shiny,CLT,gassy, 95% recovery, 584.85-585.52 MS(parting), 585.62-585.68 MS
		587.27	589.40	2.13									Sandstone	grey FS laminated with MS
		589.40	593.69	4.29									Mudstone	dark brown MS with grey SS
	K	593.69	593.84	0.15		<5							coal	bony coal
		593.84	605.30	11.46									Sandstone	grey FS-medium sandstone,
		605.30	611.00	5.70									Mudstone	dark grey
		611.00	615.67	4.67		<5							Sandstone	grey fine sandstone laminated with dark grey MS
		615.67	618.85	3.18									Sandstone	grey fine sandstone
		618.85	623.00	4.15									Mudstone	dark grey mudstone with grey siltstone

Appendix 2b

Geophysical Logs

COMPENSATED DENSITY GAMMA, RESISTIVITY DH-03-16

Century Wireline Services

COMPANY HD MINING
WELL DH-03-16
WELL EXT
FIELD
COUNTY TUMBLER RIDGE
PROVINCE BRITISH COLUMBIA
COUNTRY CANADA
LICENSE N/A

COMPANY	: HD MINING
WELL	: DH-03-16
WELL EXT	:
FIELD	:
COUNTY	: TUMBLER RIDGE
PROVINCE	: BRITISH COLUMBIA
COUNTRY	: CANADA
LICENSE	: N/A
UNIQ ID	: N/A
LSD	: N/A SECTION: N/A TOWNSHIP: N/A RANGE: N/A
LOCATION	: N/A
LATI. GPS	: N/A
LONG.GPS	: N/A

DISPLAY7_JL37

			Elevations:			Other Services:
PERMANENT DATUM	GL		KB	N/A	M	DIP, ATV
DRL MEASURED FROM	GL		DF	N/A	M	DEN TP
LOG MEASURED FROM	GL		GL	N/A	M	NEU TP
ELEV. PERM. DATUM	GL	M				

DATE	02/15/16 20:23	
DEPTH -- DRILLER	625.00	M
DEPTH -- LOGGER	624.45	M
LOG TOP	3.00	M
LOG BOTTOM	624.21	M
BIT SIZE	96.00	MM
CASING -- DRILLER	40.50	M
CASING -- LOGGER	41.00	M
CASING O.D.	114.30	MM
CASING TYPE	SURFACE	
FLUID TYPE	H2O	
FLUID DENSITY	1.00	G/CC
FLUID VISCOSITY	N/A	
FLUID PH	N/A	
MUD SOURCE	N/A	
RM @ MEAS TEMP	N/A @ N/A C	
RMF @ MEAS TEMP	N/A @ N/A C	
RMC @ MEAS TEMP	N/A @ N/A C	
CIRC STOPPED	N/A	
RIG NUMBER	DR254	
FLUID LEVEL	586.60	
RECORDED BY	J.STAPELBERG	
WITNESSED BY	C. LI	
REMARKS 1		
REMARKS 2		
REMARKS 3		

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

BULK DENSITY 1:200 DH-03-16 02/15/16

LOG PARAMETERS

MATRIX DENSITY : 2.65 NEUTRON MATRIX : SANDSTONE MATRIX DELTA T : 177
MAGNETIC DECL : 14.50 ELECT. CUTOFF : 99999 BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: HD BULK DENSITY.0 09/15/2015 DISPLAY7_JL37

BULK DENSITY 1:200 DH-03-16 02/15/16

LOG PARAMETERS

MATRIX DENSITY : 2.65 NEUTRON MATRIX : SANDSTONE MATRIX DELTA T : 177
MAGNETIC DECL : 14.50 ELECT. CUTOFF : 99999 BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: HD BULK DENSITY.0 09/15/2015 DISPLAY7_JL37

TOOL CALIBRATION DH-03-16 02/15/16 20:23
TOOL 9239C1 TM VERSION 5026
SERIAL NUMBER 2383

					STANDARD		RESPONSE [CPS]	
	DATE	TIME	SENSOR		Point1	Point2	Point1	Point2
1	Feb13,16	21:27:57	GAMMA	[API-GR]	0.000	545.000	0.100	689
2	Feb13,16	21:28:56	VOLTAGE	[MV]	29.300	231.400	14404	41211
3	Feb10,16	16:14:47	CALIPER	[MM]	100.000	200.000	217645	473840
4	Feb13,16	21:29:52	DEN(LS)	[G/CC]	1.620	2.612	16010	2189
5	Feb13,16	21:30:23	DEN(SS)	[G/CC]	1.590	2.580	47079	19153
6	Feb13,16	21:31:24	CALIPERL	[MM]	127.000	228.000	194328	307189
7	Feb13,16	21:32:11	CURRENT	[UA]	29.300	231.400	7781	25445
8	Feb13,16	21:32:15	F	[CPS]	Default		Default	
9	Feb13,16	21:32:17	X	[CPS]	Default		Default	

Century
WIRELINE SERVICES

GAMMA-DENSITY (CPS)
LOG THRU DRILL PIPE
DH-03-16

COMPANY	HD MINING
WELL	DH-03-16
WELL EXT	
FIELD	
COUNTY	TUMBLER RIDGE
PROVINCE	BRITISH COLUMBIA
COUNTRY	CANADA
LICENSE	N/A

COMPANY	: HD MINING
WELL	: DH-03-16
WELL EXT	:
FIELD	:
COUNTY	: TUMBLER RIDGE
PROVINCE	: BRITISH COLUMBIA
COUNTRY	: CANADA
LICENSE	: N/A
UNIQ ID	: N/A
LSD	: N/A SECTION: N/A TOWNSHIP: N/A RANGE: N/A
LOCATION	: N/A
LATI. GPS	N/A
LONG.GPS	: N/A

DISPLAY7_JL37

			Elevations:		Other Services:
PERMANENT DATUM	GL		KB	N/A M	DEN, DIP
DRL MEASURED FROM	GL		DF	N/A M	ATV
LOG MEASURED FROM	GL		GL	N/A M	NEU TP
ELEV. PERM. DATUM	GL	M			

DATE	02/13/16 18:24	
DEPTH -- DRILLER	625.00	M
DEPTH -- LOGGER	624.45	M
LOG TOP	-2.250	M
LOG BOTTOM	618.150	M
BIT SIZE	96.00	MM
CASING -- DRILLER	40.50	M
CASING -- LOGGER	41.00	M
CASING O.D.	114.30	MM
CASING TYPE	SURFACE	
FLUID TYPE	H2O	
FLUID DENSITY	1.00	G/CC
FLUID VISCOSITY	N/A	
FLUID PH	N/A	
MUD SOURCE	N/A	
RM @ MEAS TEMP	N/A @ N/A C	
RMF @ MEAS TEMP	N/A @ N/A C	
RMC @ MEAS TEMP	N/A @ N/A C	
CIRC STOPPED	N/A	
RIG NUMBER	DR254	
FLUID LEVEL	N/A	
RECORDED BY	M. LEBEDA	
WITNESSED BY	C. LI	
REMARKS 1	PIPE SET @ 619.0M	
REMARKS 2		
REMARKS 3		

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

SLIM DENSITY TP 1:200 DH-03-16 02/13/16

LOG PARAMETERS

MATRIX DENSITY : 2.65 NEUTRON MATRIX : SANDSTONE MATRIX DELTA T : 177
MAGNETIC DECL : 14.50 ELECT. CUTOFF : 99999 BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: 9068A.0 02/13/2016 DISPLAY7_JL37

SLIM DENSITY TP 1:200 DH-03-16 02/13/16

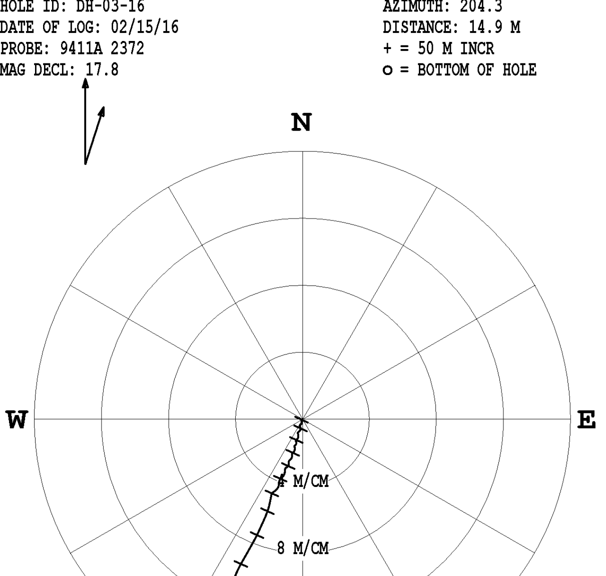
LOG PARAMETERS

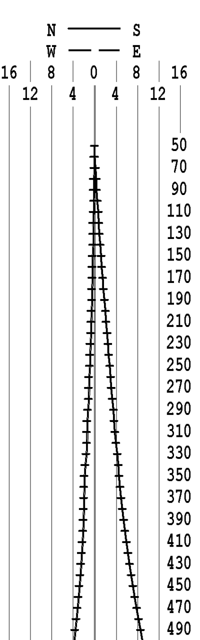
MATRIX DENSITY : 2.65 NEUTRON MATRIX : SANDSTONE MATRIX DELTA T : 177
MAGNETIC DECL : 14.50 ELECT. CUTOFF : 99999 BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: 9068A.0 02/13/2016 DISPLAY7_JL37

PLAN VIEW
COMPU-LOG DEVIATION

CLIENT: HD MINING
LOCATION:
HOLE ID: DH-03-16
DATE OF LOG: 02/15/16
PROBE: 9411A 2372
MAG DECL: 17.8

SCALE: 2 M/CM
TRUE DEPTH: 623.97 M
AZIMUTH: 204.3
DISTANCE: 14.9 M
+ = 50 M INCR
o = BOTTOM OF HOLE





* * * * * * * COMPU-LOG - VERTICAL DEVIATION * * * * * * *

CLIENT : HD MINING
FIELD OFFICE : CENTURY GEO
DATA FROM : N/A
MAG. DECL. : 17.80
HOLE ID. : DH-03-16
DATE OF LOG : 02/15/16
PROBE : 9411A ,2372
DEPTH UNITS : METERS
LOG: DH-03-16_02-15-16_16-53_9411A_005_45.000_624.210_DEVI.log

CABLE DEPTH	TRUE DEPTH	NORTH DEV.	EAST DEV.	DISTANCE	AZIMUTH	SANG	SANGB
45.00	45.00	-0.00	-0.00	0.0	216.8	0.9	239.4
46.00	46.00	-0.01	-0.02	0.0	238.4	0.8	244.5
47.00	47.00	-0.02	-0.03	0.0	241.4	0.8	246.8
48.00	48.00	-0.02	-0.04	0.0	243.1	0.8	250.2
49.00	49.00	-0.03	-0.05	0.1	244.4	0.7	250.0
50.00	50.00	-0.03	-0.06	0.1	245.6	0.6	251.6
51.00	51.00	-0.03	-0.07	0.1	246.4	0.5	252.3
52.00	52.00	-0.03	-0.08	0.1	246.9	0.4	251.1
53.00	53.00	-0.04	-0.09	0.1	247.0	0.3	241.4
54.00	54.00	-0.04	-0.09	0.1	246.6	0.2	228.3
55.00	55.00	-0.04	-0.09	0.1	245.5	0.2	179.6
56.00	56.00	-0.05	-0.09	0.1	243.6	0.2	170.2
57.00	57.00	-0.05	-0.09	0.1	240.9	0.3	160.7
58.00	58.00	-0.06	-0.09	0.1	237.5	0.4	157.6
59.00	59.00	-0.06	-0.08	0.1	233.3	0.5	155.0
60.00	60.00	-0.07	-0.08	0.1	228.5	0.6	152.3
61.00	61.00	-0.08	-0.08	0.1	223.3	0.6	158.0
62.00	62.00	-0.09	-0.07	0.1	218.0	0.7	157.0
63.00	63.00	-0.10	-0.07	0.1	212.7	0.8	161.8
64.00	64.00	-0.12	-0.06	0.1	207.9	0.9	163.7
65.00	65.00	-0.13	-0.06	0.1	203.7	0.9	166.1
66.00	66.00	-0.15	-0.05	0.2	200.2	1.0	168.5
67.00	67.00	-0.17	-0.05	0.2	197.6	1.0	176.3
68.00	68.00	-0.18	-0.05	0.2	195.7	1.0	179.8
69.00	69.00	-0.20	-0.05	0.2	194.7	1.1	187.3
70.00	70.00	-0.22	-0.06	0.2	194.3	1.1	192.6
71.00	71.00	-0.24	-0.06	0.2	194.4	1.1	198.6
72.00	72.00	-0.26	-0.07	0.3	195.0	1.1	208.2
73.00	73.00	-0.27	-0.08	0.3	195.9	1.1	213.2
74.00	74.00	-0.29	-0.09	0.3	197.1	1.1	218.9
75.00	75.00	-0.30	-0.10	0.3	198.4	1.0	224.7
76.00	76.00	-0.31	-0.11	0.3	199.7	0.9	228.1
77.00	77.00	-0.32	-0.12	0.3	201.0	0.8	235.1
78.00	78.00	-0.33	-0.13	0.4	202.2	0.7	236.8
79.00	79.00	-0.34	-0.14	0.4	203.2	0.6	236.0
80.00	80.00	-0.34	-0.15	0.4	204.1	0.5	234.3
81.00	81.00	-0.35	-0.16	0.4	204.7	0.4	232.7
82.00	82.00	-0.35	-0.17	0.4	205.1	0.3	223.4
83.00	83.00	-0.36	-0.17	0.4	205.4	0.3	217.9
84.00	84.00	-0.36	-0.17	0.4	205.4	0.3	201.4
85.00	85.00	-0.37	-0.17	0.4	205.2	0.3	178.0
86.00	86.00	-0.37	-0.17	0.4	204.9	0.3	172.1
87.00	87.00	-0.38	-0.17	0.4	204.4	0.4	166.0
88.00	88.00	-0.38	-0.17	0.4	203.7	0.5	160.4
89.00	89.00	-0.39	-0.17	0.4	202.9	0.5	158.3
90.00	90.00	-0.40	-0.16	0.4	202.0	0.6	155.0
91.00	91.00	-0.41	-0.16	0.4	201.0	0.6	157.7
92.00	92.00	-0.42	-0.15	0.4	200.0	0.7	158.3
93.00	93.00	-0.43	-0.15	0.5	198.9	0.8	160.9
94.00	94.00	-0.45	-0.14	0.5	197.8	0.8	159.5
95.00	95.00	-0.46	-0.14	0.5	196.8	0.9	162.7
96.00	96.00	-0.48	-0.13	0.5	195.8	1.0	164.7
97.00	97.00	-0.49	-0.13	0.5	194.9	1.0	164.8
98.00	98.00	-0.51	-0.13	0.5	194.1	1.0	172.0
99.00	99.00	-0.53	-0.13	0.5	193.4	1.1	176.2
100.00	100.00	-0.55	-0.13	0.6	192.9	1.1	179.5
101.00	101.00	-0.57	-0.13	0.6	192.5	1.1	184.3
102.00	102.00	-0.59	-0.13	0.6	192.3	1.2	188.6
103.00	103.00	-0.61	-0.13	0.6	192.3	1.2	193.5
104.00	104.00	-0.63	-0.14	0.6	192.4	1.2	200.0
105.00	105.00	-0.65	-0.15	0.7	192.7	1.2	204.2
106.00	106.00	-0.67	-0.16	0.7	193.1	1.2	209.4
107.00	107.00	-0.68	-0.17	0.7	193.6	1.1	215.4
108.00	108.00	-0.70	-0.18	0.7	194.3	1.1	217.7
109.00	109.00	-0.71	-0.19	0.7	194.9	1.0	223.0
110.00	110.00	-0.73	-0.20	0.8	195.6	1.0	227.6
111.00	111.00	-0.74	-0.21	0.8	196.3	0.9	229.0
112.00	112.00	-0.75	-0.23	0.8	196.9	0.8	230.8
113.00	113.00	-0.75	-0.24	0.8	197.5	0.8	232.2
114.00	114.00	-0.76	-0.25	0.8	198.0	0.7	231.5
115.00	115.00	-0.77	-0.26	0.8	198.5	0.7	230.4
116.00	116.00	-0.78	-0.27	0.8	198.9	0.6	229.7
117.00	117.00	-0.78	-0.27	0.8	199.2	0.5	223.8
118.00	118.00	-0.79	-0.28	0.8	199.5	0.5	217.6
119.00	119.00	-0.80	-0.28	0.8	199.6	0.4	213.3
120.00	120.00	-0.80	-0.29	0.9	199.7	0.3	190.8
121.00	121.00	-0.81	-0.29	0.9	199.7	0.4	189.2
122.00	122.00	-0.82	-0.29	0.9	199.5	0.5	180.8
123.00	123.00	-0.82	-0.29	0.9	199.3	0.5	171.3
124.00	124.00	-0.83	-0.29	0.9	199.0	0.5	166.3
125.00	125.00	-0.84	-0.28	0.9	198.7	0.6	166.2
126.00	126.00	-0.85	-0.28	0.9	198.3	0.6	162.8
127.00	127.00	-0.86	-0.28	0.9	197.9	0.7	159.0
128.00	128.00	-0.87	-0.27	0.9	197.4	0.8	162.7
129.00	129.00	-0.89	-0.27	0.9	197.0	0.8	163.0
130.00	130.00	-0.90	-0.27	0.9	196.5	0.9	165.4
131.00	131.00	-0.92	-0.26	1.0	196.0	1.0	167.3
132.00	132.00	-0.94	-0.26	1.0	195.5	1.0	169.3
133.00	133.00	-0.95	-0.26	1.0	195.0	1.1	172.1
134.00	134.00	-0.97	-0.25	1.0	194.6	1.1	174.5
135.00	135.00	-0.99	-0.25	1.0	194.3	1.1	177.3
136.00	136.00	-1.01	-0.25	1.0	194.0	1.2	182.2
137.00	137.00	-1.04	-0.25	1.1	193.8	1.2	185.5
138.00	138.00	-1.06	-0.26	1.1	193.7	1.3	191.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
367.00	366.96	-4.74	-1.90	5.1	201.9	1.2	191.0
368.00	367.96	-4.76	-1.91	5.1	201.9	1.2	190.4
369.00	368.96	-4.78	-1.91	5.1	201.8	1.3	191.2
370.00	369.96	-4.80	-1.92	5.2	201.8	1.3	191.2
371.00	370.96	-4.82	-1.92	5.2	201.7	1.3	191.8
372.00	371.96	-4.85	-1.93	5.2	201.7	1.3	191.1
373.00	372.96	-4.87	-1.93	5.2	201.6	1.3	190.5
374.00	373.96	-4.89	-1.94	5.3	201.6	1.3	191.0
375.00	374.96	-4.91	-1.94	5.3	201.6	1.3	190.9
376.00	375.96	-4.93	-1.94	5.3	201.5	1.3	189.7
377.00	376.96	-4.96	-1.95	5.3	201.5	1.3	191.9
378.00	377.96	-4.98	-1.95	5.3	201.4	1.3	192.4
379.00	378.96	-5.00	-1.96	5.4	201.4	1.3	192.6
380.00	379.96	-5.02	-1.96	5.4	201.4	1.3	192.6
381.00	380.96	-5.04	-1.97	5.4	201.3	1.3	194.6
382.00	381.96	-5.07	-1.97	5.4	201.3	1.3	192.3
383.00	382.96	-5.09	-1.98	5.5	201.2	1.3	193.7
384.00	383.96	-5.11	-1.98	5.5	201.2	1.4	193.2
385.00	384.96	-5.14	-1.99	5.5	201.2	1.3	191.8
386.00	385.96	-5.16	-2.00	5.5	201.2	1.4	191.9
387.00	386.96	-5.18	-2.00	5.6	201.1	1.3	192.5
388.00	387.96	-5.21	-2.01	5.6	201.1	1.4	193.8
389.00	388.96	-5.23	-2.01	5.6	201.1	1.4	193.4
390.00	389.96	-5.25	-2.02	5.6	201.0	1.4	194.5
391.00	390.96	-5.28	-2.03	5.7	201.0	1.4	195.8
392.00	391.96	-5.30	-2.03	5.7	201.0	1.4	195.9
393.00	392.95	-5.32	-2.04	5.7	201.0	1.4	194.8
394.00	393.95	-5.35	-2.05	5.7	200.9	1.4	197.2
395.00	394.95	-5.37	-2.05	5.7	200.9	1.3	198.9
396.00	395.95	-5.39	-2.06	5.8	200.9	1.5	198.4
397.00	396.95	-5.42	-2.07	5.8	200.9	1.5	197.2
398.00	397.95	-5.44	-2.08	5.8	200.9	1.5	197.7
399.00	398.95	-5.47	-2.09	5.9	200.9	1.5	199.4
400.00	399.95	-5.49	-2.09	5.9	200.9	1.5	199.9
401.00	400.95	-5.52	-2.10	5.9	200.9	1.6	200.1
402.00	401.95	-5.54	-2.11	5.9	200.9	1.5	205.5
403.00	402.95	-5.57	-2.12	6.0	200.9	1.6	205.7
404.00	403.95	-5.59	-2.14	6.0	200.9	1.6	200.5
405.00	404.95	-5.62	-2.15	6.0	200.9	1.6	200.8
406.00	405.95	-5.65	-2.16	6.0	200.9	1.6	200.2
407.00	406.95	-5.67	-2.16	6.1	200.9	1.6	200.3
408.00	407.95	-5.70	-2.18	6.1	200.9	1.6	201.9
409.00	408.95	-5.73	-2.19	6.1	200.9	1.6	201.3
410.00	409.95	-5.75	-2.20	6.2	200.9	1.7	202.0
411.00	410.95	-5.78	-2.21	6.2	200.9	1.6	200.1
412.00	411.95	-5.80	-2.22	6.2	200.9	1.6	202.2
413.00	412.95	-5.83	-2.23	6.2	200.9	1.7	200.0
414.00	413.95	-5.86	-2.24	6.3	200.9	1.7	200.8
415.00	414.95	-5.89	-2.25	6.3	200.9	1.9	201.9
416.00	415.95	-5.91	-2.26	6.3	200.9	1.7	200.8
417.00	416.95	-5.94	-2.28	6.4	201.0	1.7	205.2
418.00	417.95	-5.97	-2.29	6.4	201.0	1.7	203.9
419.00	418.94	-6.00	-2.30	6.4	201.0	1.8	207.3
420.00	419.94	-6.02	-2.31	6.5	201.0	1.7	204.6
421.00	420.94	-6.05	-2.33	6.5	201.0	1.7	204.2
422.00	421.94	-6.08	-2.34	6.5	201.0	1.8	205.4
423.00	422.94	-6.11	-2.35	6.5	201.0	1.8	203.5
424.00	423.94	-6.14	-2.36	6.6	201.1	1.8	202.9
425.00	424.94	-6.17	-2.38	6.6	201.1	1.8	209.5
426.00	425.94	-6.19	-2.39	6.6	201.1	1.8	204.5
427.00	426.94	-6.22	-2.40	6.7	201.1	1.9	205.1
428.00	427.94	-6.25	-2.42	6.7	201.1	1.8	203.3
429.00	428.94	-6.28	-2.43	6.7	201.1	1.8	203.8
430.00	429.94	-6.31	-2.44	6.8	201.2	1.8	204.9
431.00	430.94	-6.34	-2.45	6.8	201.2	1.8	203.5
432.00	431.94	-6.37	-2.47	6.8	201.2	1.7	199.3
433.00	432.94	-6.40	-2.48	6.9	201.2	1.9	204.0
434.00	433.94	-6.43	-2.50	6.9	201.2	2.0	206.0
435.00	434.94	-6.46	-2.51	6.9	201.2	1.8	206.8
436.00	435.94	-6.49	-2.52	7.0	201.3	2.0	205.1
437.00	436.94	-6.52	-2.54	7.0	201.3	1.8	201.2
438.00	437.94	-6.55	-2.55	7.0	201.3	1.9	204.4
439.00	438.93	-6.58	-2.56	7.1	201.3	2.2	204.8
440.00	439.93	-6.61	-2.58	7.1	201.3	1.9	203.9
441.00	440.93	-6.64	-2.59	7.1	201.3	1.9	206.7
442.00	441.93	-6.67	-2.60	7.2	201.3	1.9	205.3
443.00	442.93	-6.70	-2.62	7.2	201.4	1.9	206.6
444.00	443.93	-6.73	-2.63	7.2	201.4	2.0	205.4
445.00	444.93	-6.76	-2.65	7.3	201.4	2.0	206.4
446.00	445.93	-6.79	-2.66	7.3	201.4	2.0	205.0
447.00	446.93	-6.82	-2.68	7.3	201.4	2.1	204.8
448.00	447.93	-6.85	-2.69	7.4	201.4	2.1	204.8
449.00	448.93	-6.88	-2.71	7.4	201.5	2.1	209.1
450.00	449.93	-6.92	-2.72	7.4	201.5	1.9	206.8
451.00	450.93	-6.95	-2.74	7.5	201.5	2.0	206.7
452.00	451.93	-6.98	-2.75	7.5	201.5	2.1	208.2
453.00	452.93	-7.01	-2.77	7.5	201.6	2.0	206.4
454.00	453.93	-7.04	-2.79	7.6	201.6	2.0	204.6
455.00	454.92	-7.08	-2.80	7.6	201.6	2.0	209.6
456.00	455.92	-7.11	-2.82	7.6	201.6	2.2	211.8
457.00	456.92	-7.14	-2.84	7.7	201.7	1.9	206.5
458.00	457.92	-7.18	-2.86	7.7	201.7	1.9	207.8
459.00	458.92	-7.21	-2.87	7.8	201.7	2.2	209.8
460.00	459.92	-7.24	-2.89	7.8	201.8	2.1	209.2
461.00	460.92	-7.27	-2.91	7.8	201.8	2.3	210.9
462.00	461.92	-7.31	-2.93	7.9	201.8	2.2	208.5
463.00	462.92	-7.34	-2.95	7.9	201.9	2.2	210.6
464.00	463.92	-7.37	-2.97	7.9	201.9	2.3	209.4
465.00	464.92	-7.41	-2.99	8.0	202.0	2.3	209.6
466.00	465.92	-7.44	-3.00	8.0	202.0	2.2	209.4
467.00	466.92	-7.48	-3.02	8.1	202.0	2.2	209.5
468.00	467.92	-7.51	-3.04	8.1	202.1	2.2	209.5
469.00	468.91	-7.54	-3.06	8.1	202.1	2.0	208.8
470.00	469.91	-7.58	-3.08	8.2	202.1	2.0	205.4
471.00	470.91	-7.61	-3.10	8.2	202.2	2.3	212.9
472.00	471.91	-7.65	-3.12	8.3	202.2	2.3	213.0
473.00	472.91	-7.68	-3.14	8.3	202.2	2.4	209.8
474.00	473.91	-7.72	-3.16	8.3	202.3	2.3	208.6
475.00	474.91	-7.75	-3.18	8.4	202.3	2.5	210.2
476.00	475.91	-7.78	-3.20	8.4	202.3	2.2	208.8
477.00	476.91	-7.82	-3.21	8.5	202.3	2.2	207.5
478.00	477.91	-7.85	-3.23	8.5	202.4	2.3	210.0
479.00	478.91	-7.89	-3.25	8.5	202.4	2.3	209.9
480.00	479.91	-7.92	-3.27	8.6	202.4	2.3	208.2
481.00	480.91	-7.96	-3.29	8.6	202.5	2.3	208.2
482.00	481.90	-7.99	-3.31	8.7	202.5	2.3	209.4
483.00	482.90	-8.03	-3.33	8.7	202.5	2.3	208.6
484.00	483.90	-8.07	-3.35	8.7	202.6	2.3	208.2
485.00	484.90	-8.10	-3.37	8.8	202.6	2.4	210.8
486.00	485.90	-8.14	-3.39	8.8	202.6	2.4	209.0
487.00	486.90	-8.17	-3.41	8.9	202.7	2.4	210.1
488.00	487.90	-8.21	-3.43	8.9	202.7	2.4	211.0
489.00	488.90	-8.24	-3.45	8.9	202.7	2.3	211.7
490.00	489.90	-8.28	-3.48	9.0	202.8	2.4	208.8
491.00	490.90	-8.31	-3.50	9.0	202.8	2.4	210.2
492.00	491.90	-8.35	-3.52	9.1	202.8	2.4	210.6
493.00	492.90	-8.39	-3.54	9.1	202.9	2.4	210.6
494.00	493.89	-8.42	-3.56	9.1	202.9	2.4	210.5
495.00	494.89	-8.46	-3.58	9.2	202.9	2.3	207.8
496.00	495.89	-8.49	-3.60	9.2	203.0	2.4	208.9
497.00	496.89	-8.53	-3.62	9.3	203.0	2.4	209.5
498.00	497.89	-8.57	-3.64	9.3	203.0	2.3	209.2
499.00	498.89	-8.60	-3.66	9.3	203.0	2.4	209.1
500.00	499.89	-8.64	-3.68	9.4	203.1	2.4	209.7
501.00	500.89	-8.67	-3.70	9.4	203.1	2.3	209.6
502.00	501.89	-8.71	-3.72	9.5	203.1	2.3	208.5
503.00	502.89	-8.74	-3.74	9.5	203.1	2.3	207.7
504.00	503.89	-8.78	-3.76	9.5	203.2	2.3	207.7
505.00	504.89	-8.82	-3.77	9.6	203.2	2.3	207.2
506.00	505.88	-8.85	-3.79	9.6	203.2	2.3	207.4
507.00	506.88	-8.89	-3.81	9.7	203.2	2.3	207.2
508.00	507.88	-8.92	-3.83	9.7	203.2	2.3	207.1
509.00	508.88	-8.96	-3.85	9.8	203.2	2.3	205.5
510.00	509.88	-9.00	-3.86	9.8	203.2	2.3	204.0
511.00	510.88	-9.03	-3.88	9.8	203.2	2.3	204.6
512.00	511.88	-9.07	-3.90	9.9	203.3	2.3	206.3
513.00	512.88	-9.11	-3.91	9.9	203.3	2.3	205.4
514.00	513.88	-9.14	-3.93	10.0	203.3	2.3	201.6
515.00	514.88	-9.18	-3.95	10.0	203.3	2.3	202.1
516.00	515.88	-9.22	-3.96	10.0	203.3	2.4	199.9
517.00	516.88	-9.25	-3.98	10.1	203.2	2.2	202.4
518.00	517.87	-9.29	-3.99	10.1	203.2	2.3	201.4
519.00	518.87	-9.33	-4.00	10.1	203.2	2.2	199.5
520.00	519.87	-9.36	-4.02	10.2	203.2	2.2	199.6
521.00	520.87	-9.40	-4.03	10.2	203.2	2.2	199.7
522.00	521.87	-9.44	-4.05	10.3	203.2	2.3	202.0
523.00	522.87	-9.47	-4.06	10.3	203.2	2.3	201.5
524.00	523.87	-9.51	-4.08	10.3	203.2	2.3	201.2
525.00	524.87	-9.55	-4.09	10.4	203.2	2.3	199.2
526.00	525.87	-9.59	-4.11	10.4	203.2	2.3	202.2
527.00	526.87	-9.63	-4.12	10.5	203.2	2.4	199.8
528.00	527.87	-9.66	-4.14	10.5	203.2	2.4	201.8
529.00	528.87	-9.70	-4.15	10.6	203.2	2.4	201.4
530.00	529.86	-9.74	-4.17	10.6	203.2	2.4	201.1
531.00	530.86	-9.78	-4.18	10.6	203.1	2.4	202.6
532.00	531.86	-9.82	-4.20	10.7	203.1	2.4	201.3
533.00	532.86	-9.86	-4.21	10.7	203.1	2.4	199.9
534.00	533.86	-9.90	-4.23	10.8	203.1	2.4	202.3
535.00	534.86	-9.94	-4.24	10.8	203.1	2.4	202.0
536.00	535.86	-9.97	-4.26	10.8	203.1	2.4	202.7
537.00	536.86	-10.01	-4.28	10.9	203.1	2.4	202.8
538.00	537.86	-10.05	-4.29	10.9	203.1	2.4	203.0
539.00	538.86	-10.09	-4.31	11.0	203.1	2.5	202.6
540.00	539.86	-10.13	-4.33	11.0	203.1	2.6	198.9
541.00	540.85	-10.17	-4.34	11.1	203.1	2.5	201.4
542.00	541.85	-10.21	-4.36	11.1	203.1	2.5	202.9
543.00	542.85	-10.25	-4.38	11.1	203.1	2.5	203.1
544.00	543.85	-10.29	-4.39	11.2	203.1	2.5	203.2
545.00	544.85	-10.33	-4.41	11.2	203.1	2.6	203.4
546.00	545.85	-10.37	-4.43	11.3	203.1	2.6	204.7
547.00	546.85	-10.41	-4.45	11.3	203.1	2.6	204.9
548.00	547.85	-10.46	-4.47	11.4	203.1	2.6	205.5
549.00	548.85	-10.50	-4.49	11.4	203.2	2.6	205.3
550.00	549.85	-10.54	-4.51	11.5	203.2	2.6	207.3
551.00	550.84	-10.58	-4.53	11.5	203.2	2.7	207.4
552.00	551.84	-10.62	-4.56	11.6	203.2	2.7	208.5
553.00	552.84	-10.66	-4.58	11.6	203.2	2.6	208.6
554.00	553.84	-10.70	-4.60	11.6	203.3	2.7	209.5
555.00	554.84	-10.74	-4.62	11.7	203.3	2.7	208.6
556.00	555.84	-10.78	-4.65	11.7	203.3	2.7	209.6
557.00	556.84	-10.82	-4.67	11.8	203.3	2.7	211.1
558.00	557.84	-10.86	-4.69	11.8	203.4	2.7	210.0
559.00	558.84	-10.90	-4.72	11.9	203.4	2.7	210.9
560.00	559.83	-10.95	-4.74	11.9	203.4	2.7	208.9
561.00	560.83	-10.99	-4.76	12.0	203.4	2.7	209.1
562.00	561.83	-11.03	-4.78	12.0	203.5	2.7	210.3
563.00	562.83	-11.07	-4.81	12.1	203.5	2.7	209.5
564.00	563.83	-11.11	-4.83	12.1	203.5	2.7	208.8
565.00	564.83	-11.15	-4.85	12.2	203.5	2.7	210.0
566.00	565.83	-11.19	-4.87	12.2	203.5	2.7	210.3
567.00	566.83	-11.23	-4.89	12.3	203.5	2.7	208.2
568.00	567.83	-11.27	-4.92	12.3	203.6	2.7	208.7
569.00	568.83	-11.31	-4.94	12.3	203.6	2.7	208.6
570.00	569.82	-11.36	-4.96	12.4	203.6	2.7	208.1
571.00	570.82	-11.40	-4.98	12.4	203.6	2.7	206.1
572.00	571.82	-11.44	-5.00	12.5	203.6	2.7	206.4
573.00	572.82	-11.48	-5.02	12.5	203.6	2.7	205.7
574.00	573.82	-11.52	-5.05	12.6	203.6	2.7	205.5
575.00	574.82	-11.57	-5.07	12.6	203.7	2.7	207.6
576.00	575.82	-11.61	-5.09	12.7	203.7	2.7	206.4
577.00	576.82	-11.65	-5.11	12.7	203.7	2.7	205.2
578.00	577.82	-11.69	-5.13	12.8	203.7	2.7	205.2
579.00	578.81	-11.74	-5.15	12.8	203.7	2.7	205.7
580.00	579.81	-11.78	-5.17	12.9	203.7	2.7	205.3
581.00	580.81	-11.82	-5.19	12.9	203.7	2.7	208.4
582.00	581.81	-11.86	-5.21	13.0	203.7	2.8	209.6
583.00	582.81	-11.91	-5.24	13.0	203.7	2.8	208.9
584.00	583.81	-11.95	-5.26	13.1	203.8	2.8	208.3
585.00	584.81	-11.99	-5.28	13.1	203.8	2.8	210.5
586.00	585.81	-12.03	-5.31	13.2	203.8	2.8	208.0
587.00	586.80	-12.07	-5.33	13.2	203.8	2.7	210.0
588.00	587.80	-12.11	-5.36	13.2	203.9	2.7	210.2
589.00	588.80	-12.15	-5.38	13.3	203.9	2.7	209.6
590.00	589.80	-12.20	-5.40	13.3	203.9	2.7	211.6
591.00	590.80	-12.24	-5.43	13.4	203.9	2.7	210.0
592.00	591.80	-12.28	-5.45	13.4	203.9	2.7	210.4
593.00	592.80	-12.32	-5.48	13.5	204.0	2.7	210.7
594.00	593.80	-12.36	-5.50	13.5	204.0	2.8	210.0
595.00	594.80	-12.40	-5.52	13.6	204.0	2.7	210.6
596.00	595.79	-12.44	-5.55	13.6	204.0	2.7	211.9
597.00	596.79	-12.48	-5.57	13.7	204.1	2.7	210.5
598.00	597.79	-12.52	-5.60	13.7	204.1	2.7	211.3
599.00	598.79	-12.56	-5.62	13.8	204.1	2.7	211.5
600.00	599.79	-12.60	-5.65	13.8	204.1	2.7	210.1
601.00	600.79	-12.64	-5.67	13.9	204.2	2.7	211.2
602.00	601.79	-12.68	-5.69	13.9	204.2	2.7	212.0
603.00	602.79	-12.73	-5.72	14.0	204.2	2.7	212.9
604.00	603.79	-12.77	-5.74	14.0	204.2	2.8	211.2
605.00	604.78	-12.81	-5.77	14.0	204.2	2.8	210.8
606.00	605.78	-12.85	-5.79	14.1	204.3	2.8	211.2
607.00	606.78	-12.89	-5.82	14.1	204.3	2.8	210.0
608.00	607.78	-12.93	-5.84	14.2	204.3	2.8	209.2
609.00	608.78	-12.97	-5.86	14.2	204.3	2.8	209.9
610.00	609.78	-13.02	-5.89	14.3	204.3	2.7	206.4
611.00	610.78	-13.06	-5.91	14.3	204.4	2.8	207.9
612.00	611.78	-13.10	-5.93	14.4	204.4	2.7	210.7
613.00	612.78	-13.14	-5.96	14.4	204.4	2.7	208.1
614.00	613.77	-13.19	-5.98	14.5	204.4	2.8	204.9
615.00	614.77	-13.23	-6.00	14.5	204.4	2.8	201.1
616.00	615.77	-13.28	-6.02	14.6	204.4	2.7	203.5
617.00	616.77	-13.32	-6.03	14.6	204.4	2.7	203.1
618.00	617.77	-13.36	-6.05	14.7	204.4	2.6	200.4
619.00	618.77	-13.40	-6.07	14.7	204.4	2.6	200.2
620.00	619.77	-13.45	-6.08	14.8	204.3	2.5	199.2
621.00	620.77	-13.49	-6.10	14.8	204.3	2.5	198.3
622.00	621.77	-13.53	-6.11	14.8	204.3	2.4	198.9
623.00	622.76	-13.57	-6.12	14.9	204.3	2.4	200.6
624.00	623.76	-13.61	-6.14	14.9	204.3	2.3	196.4
624.21	623.96	-13.61	-6.14	14.9	204.3	2.3	198.4

DIPMETER ANALYSIS
DH-03-16

Century Wireline Services

COMPANY	HD MINING
WELL	DH-03-16
WELL EXT	
FIELD	
COUNTY	TUMBLER RIDGE
PROVINCE	BRITISH COLUMBIA
COUNTRY	CANADA
LICENSE	N/A

COMPANY	: HD MINING
WELL	: DH-03-16
WELL EXT	:
FIELD	:
COUNTY	: TUMBLER RIDGE
PROVINCE	: BRITISH COLUMBIA
COUNTRY	: CANADA
LICENSE	: N/A
UNIQ ID	: N/A
LSD	: N/A SECTION: N/A TOWNSHIP: N/A RANGE: N/A
LOCATION	: N/A
LATI. GPS	: 55.0229
LONG.GPS	: -121.0425

DISPLAY7_JL37

PERMANENT DATUM	GL	Elevations:	Other Services:
DRL MEASURED FROM	GL	KB N/A M	DEN, ATV
LOG MEASURED FROM	GL	DF N/A M	DEN TP
ELEV. PERM. DATUM	881.90 M	GL 881.90 M	NEU TP

DATE	02/15/16 16:53		
DEPTH -- DRILLER	625.00 M		
DEPTH -- LOGGER	624.45 M		
LOG TOP	37.00 M		
LOG BOTTOM	622.50 M		
BIT SIZE	96.00 MM		
CASING -- DRILLER	40.50 M		
CASING -- LOGGER	41.00 M		
CASING O.D.	114.30 MM		
CASING TYPE	SURFACE		
FLUID TYPE	H2O		
FLUID DENSITY	1.00 G/CC		
FLUID VISCOSITY	N/A		
FLUID PH	N/A		
MUD SOURCE	N/A		
RM @ MEAS TEMP	N/A @ N/A C		
RMF @ MEAS TEMP	N/A @ N/A C		
RMC @ MEAS TEMP	N/A @ N/A C		
CIRC STOPPED	N/A		
RIG NUMBER	DR254		
FLUID LEVEL	N/A		
RECORDED BY	J.STAPELBERG		
WITNESSED BY	C. LI		
REMARKS 1			
REMARKS 2			
REMARKS 3			

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

TOOL CALIBRATION DH-03-16 02/15/16 16:53
TOOL 9411A TM VERSION 7
SERIAL NUMBER 2372

	DATE	TIME	SENSOR		STANDARD Point1	STANDARD Point2	RESPONSE [CPS] Point1	RESPONSE [CPS] Point2
1	Feb10,16	16:13:42	GAMMA	[API-GR]	0.100	545.000	0.000	526
2	Feb10,16	16:13:45	VOLTAGE	[MV]	45.500	115.700	360	815
3	Feb10,16	16:13:49	CUR1	[UA]	3.400	7.300	6390	13265
4	Feb10,16	16:13:53	CUR2	[UA]	3.400	7.300	6210	12920
5	Feb10,16	16:13:55	CUR3	[UA]	3.700	7.300	6322	13145
6	Feb10,16	16:14:04	CUR4	[UA]	3.400	7.300	6345	13180
7	Feb10,16	16:14:13	CALIPER1	[MM]	100.000	200.000	5635	9589
8	Feb10,16	16:14:18	CALIPER2	[MM]	100.000	200.000	4512	8440

Century WIRELINE SERVICES

GAMMA NEUTRON THRU PIPE DH-03-16

COMPANY	HD MINING
WELL	DH-03-16
WELL EXT	
FIELD	
COUNTY	TUMBLER RIDGE
PROVINCE	BRITISH COLUMBIA
COUNTRY	CANADA
LICENSE	N/A

COMPANY : HD MINING
WELL : DH-03-16
WELL EXT :
FIELD :
COUNTY : TUMBLER RIDGE
PROVINCE : BRITISH COLUMBIA
COUNTRY : CANADA
LICENSE : N/A
UNIQ ID : N/A
LSD : N/A
LOCATION : N/A SECTION: N/A TOWNSHIP: N/A RANGE: N/A
LATI. GPS : N/A
LONG.GPS : N/A
DISPLAY7_JL37

			Elevations:		Other Services:
PERMANENT DATUM	GL		KB	N/A M	DEN, DIP
DRL MEASURED FROM	GL		DF	N/A M	ATV
LOG MEASURED FROM	GL		GL	N/A M	DEN TP
ELEV. PERM. DATUM	GL	M			

DATE	02/14/16 16:14	
DEPTH -- DRILLER	625.00	M
DEPTH -- LOGGER	624.45	M
LOG TOP	0.00	M
LOG BOTTOM	618.28	M
BIT SIZE	96.00	MM
CASING -- DRILLER	40.50	M
CASING -- LOGGER	41.00	M
CASING O.D.	114.30	MM
CASING TYPE	SURFACE	
FLUID TYPE	H2O	
FLUID DENSITY	1.00	G/CC
FLUID VISCOSITY	N/A	
FLUID PH	N/A	
MUD SOURCE	N/A	
RM @ MEAS TEMP	N/A @ N/A C	
RMF @ MEAS TEMP	N/A @ N/A C	
RMC @ MEAS TEMP	N/A @ N/A C	
CIRC STOPPED	N/A	
RIG NUMBER	DR254	
FLUID LEVEL	N/A	
RECORDED BY	M. LEBEDA	
WITNESSED BY	C. LI	
REMARKS 1	PIPE SET @ 619.0M	
REMARKS 2		
REMARKS 3		

NEUTRON TP 1:200 DH-03-16 02/14/16

LOG PARAMETERS

MATRIX DENSITY : 2.65
NEUTRON MATRIX : SANDSTONE
MATRIX DELTA T : 177
MAGNETIC DECL : 17.80
ELECT. CUTOFF : 99999
BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: HD NEUTRON TP.0 09/15/2015
DISPLAY7_JL37

NEUTRON TP 1:200 DH-03-16 02/14/16

LOG PARAMETERS

MATRIX DENSITY : 2.65
NEUTRON MATRIX : SANDSTONE
MATRIX DELTA T : 177
MAGNETIC DECL : 17.80
ELECT. CUTOFF : 99999
BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: HD NEUTRON TP.0 09/15/2015
DISPLAY7_JL37

TOOL CALIBRATION DH-03-16 02/14/16 16:14
TOOL 9058A TM VERSION 2004
SERIAL NUMBER 2635

					STANDARD		RESPONSE [CPS]	
	DATE	TIME	SENSOR		Point1	Point2	Point1	Point2
1	Apr17,15	15:05:47	GAMMA	[API-GR]	0.100	545.000	0.000	575
2	Apr01,14	08:58:36	TEMP	[DEG-F]	5.000	50.000	333776	398824
3	Jul27,15	15:18:53	NEUTRON	[API-N]	0.000	271.000	1.000	66.800
4	Jul27,15	15:19:00	POR(NEU)	[PERCEN	100.000		66.800	

Century WIRELINE SERVICES

TEMPERATURE LOG

DH-03-16

COMPANY	HD MINING
WELL	DH-03-16
WELL EXT	
FIELD	
COUNTY	TUMBLER RIDGE
PROVINCE	BRITISH COLUMBIA
COUNTRY	CANADA
LICENSE	N/A

COMPANY : HD MINING
WELL : DH-03-16
WELL EXT :
FIELD :
COUNTY : TUMBLER RIDGE
PROVINCE : BRITISH COLUMBIA
COUNTRY : CANADA
LICENSE : N/A
UNIQ ID : N/A
LSD : N/A SECTION: N/A TOWNSHIP: N/A RANGE: N/A
LOCATION : N/A
LATI. GPS 55.0229
LONG.GPS : -121.0425

DISPLAY7_JL37

PERMANENT DATUM	GL	Elevations:		Other Services:
DRL MEASURED FROM	GL	KB	N/A M	DEN, DIP
LOG MEASURED FROM	GL	DF	N/A M	ATV
ELEV. PERM. DATUM	881.90 M	GL	881.90 M	DEN TP

DATE	02/14/16 16:14	
DEPTH -- DRILLER	625.00	M
DEPTH -- LOGGER	624.45	M
LOG TOP	0.00	M
LOG BOTTOM	618.28	M
BIT SIZE	96.00	MM
CASING -- DRILLER	40.50	M
CASING -- LOGGER	41.00	M
CASING O.D.	114.30	MM
CASING TYPE	SURFACE	
FLUID TYPE	H2O	
FLUID DENSITY	1.00	G/CC
FLUID VISCOSITY	N/A	
FLUID PH	N/A	
MUD SOURCE	N/A	
RM @ MEAS TEMP	N/A @ N/A C	
RMF @ MEAS TEMP	N/A @ N/A C	
RMC @ MEAS TEMP	N/A @ N/A C	
CIRC STOPPED	N/A	
RIG NUMBER	DR254	
FLUID LEVEL	N/A	
RECORDED BY	M. LEBEDA	
WITNESSED BY	C. LI	
REMARKS 1	PIPE SET @ 619.0M	
REMARKS 2		
REMARKS 3		

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

TEMPERATURE LOG 1:200 DH-03-16 02/14/16

LOG PARAMETERS

MATRIX DENSITY : 2.65 | NEUTRON MATRIX : SANDSTONE | MATRIX DELTA T : 177
MAGNETIC DECL : 17.80 | ELECT. CUTOFF : 99999 | BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: HD TEMPERATURE.0 02/18/2016 | DISPLAY7_JL37

TEMPERATURE LOG 1:200 DH-03-16 02/14/16

LOG PARAMETERS

MATRIX DENSITY : 2.65 | NEUTRON MATRIX : SANDSTONE | MATRIX DELTA T : 177
MAGNETIC DECL : 17.80 | ELECT. CUTOFF : 99999 | BIT SIZE : 96.00 MM
PRESENTATION NAME/DATE: HD TEMPERATURE.0 02/18/2016 | DISPLAY7_JL37

TOOL CALIBRATION DH-03-16 02/14/16 16:14
TOOL 9058A TM VERSION 2004
SERIAL NUMBER 2635

	DATE	TIME	SENSOR		STANDARD Point1	STANDARD Point2	RESPONSE [CPS] Point1	RESPONSE [CPS] Point2
1	Apr17,15	15:05:47	GAMMA	[API-GR]	0.100	545.000	0.000	575
2	Apr01,14	08:58:36	TEMP	[DEG-F]	5.000	50.000	333776	398824
3	Jul27,15	15:18:53	NEUTRON	[API-N]	0.000	271.000	1.000	66.800
4	Jul27,15	15:19:00	POR(NEU)	[PERCEN	100.000		66.800	

Appendix 3

Gas Desorption Testing Report

Gas Content and Composition
Wells DH-01, DH-02, DH-03

Report to

HD Mining International Ltd.

1 Bentall Tower 1

595 Burrard Street

Vancouver BC V7X 1J1

By

Petro Logic Services Inc.

439 11A Street NW

Calgary T2N 1Y2

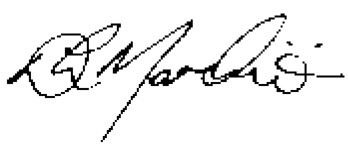
April 18, 2016

Limitations and Disclaimer

Petro Logic Services Inc., was contracted by HD Mining International Ltd. to undertake wellsite sampling and analyses for gas content and composition from core samples from wells HD-01 and HD-02 on their property near Tumbler Ridge, B.C.

The assessments, interpretations and opinions expressed in this report reflect the best judgment of Petro-Logic Services and its agents. Due to the inherent risks in geological assessment and the reliance on some third party data-sources, neither Petro-Logic Services Inc., nor any person acting on the company's behalf, assumes any responsibility nor makes any warranty or representation whatsoever, either expressed or implied, in connection with the analyses and interpretations and opinions presented herein.

Petro-Logic Services does not represent that digital versions of this report, including any attached files are free from computer viruses or other defects.



…………………………………
David L. Marchioni Ph.D., P.Geol.
President
Petro-Logic Services
439 11A Street N.W.
Calgary T2N 1Y2

April118, 2016
Permit No: P11004

Contents

Tables

Figures

Appendix (on CD)

Summary

Petro Logic Services Inc. (PL) was contracted by HD Mining International Ltd. (HD) to determine gas content and composition in coals and associated strata from three cored wells: DH-01, DH-02 and DH-03, drilled on their mine property near Tumbler Ridge BC.

DH-01: Six coal and three carbonaceous shale samples were tested in the depth range 926 to 1002 m.

DH-02: twelve coal, one carbonaceous shale and two shale samples were tested in the depth range 705 to 835 m.

DH-03: fourteen coal, two carbonaceous shale and two shale samples were tested in the depth range 497 to 586 m.

Volatile matter (daf) for the coal samples with low to moderate ash in these wells is 24.1% to 25.0% indicating medium volatile bituminous rank. This is well within the thermogenic gas window and high gas contents could be expected.

In DH-01 samples were taken from seams D and F as well as an unnamed seam. For the coals, the gas content ranges from 10.29 to 12.50 m^3/t at ISO STP (15^oC and 101.3 kPa).

In DH-02 samples were collected from seams D,?E, F1, F2, G/I and J. For the coals the gas content ranges from 7.76 to 17.13 m^3/t at ISO STP.

In DH-03 samples were desorbed from seams D, E, F1, F2 and J and gas contents range from 12.88 to 19.36 m^3/t at ISO STP.

It could be expected that gas content on a dry ash-free basis would increase with sample depth, as gas is retained by reservoir pressure. In these wells however, the gas content decreases with depth. This suggests that there could be gas “domains” within the exploration area; where different relationships pertain between parameters including gas content, gas composition, depth and coal quality, due to differences in factors such as geological history and/or reservoir pressure.

Gas samples were taken from several desorption vessels during the course of testing. Multiple samples are required as gas composition typically changes over time, due to the different diffusion rates of different gas components.

In all wells methane is the dominant component (mean >90%). In DH-01 there is a significant proportion of carbon dioxide (mean 5 to 6%) but in DH-02 and DH-03, no carbon dioxide was reported in any of the analyses. Higher hydrocarbons are minor components in both wells. The difference in carbon dioxide content between the wells suggests that there could be different gas “domains” present across the exploration area.

1.0 Introduction

Petro Logic Services Inc. (PL) was contracted by HD Mining International Ltd. (HD) to determine gas content and composition in coals and associated strata from three cored wells: DH-01, DH-02 and DH-03, drilled on their mine property near Tumbler Ridge BC. Coals and associated strata of the Cretaceous Gates Formation were tested.

2.0 Drilling and Sampling

The wells were continuously cored using split inner barrels and wireline retrieval. Core recoveries varied and in some cases a length of core greater than the length of the desorption canisters could be placed in those vessels. The cores were often quite broken, some of which could be due to drilling, but in several cases there is clear evidence of shearing in the coal, reflecting the structural deformation in the region (see images in Appendix).

DH-01: Six coal and three carbonaceous shale samples were tested in the depth range 926 to 1002 m.

DH-02: twelve coal, one carbonaceous shale and two shale samples were tested in the depth range 705 to 835 m.

DH-03: fifteen coal, two carbonaceous shales and two shale samples were tested in the depth range 497 to 586 m

In each well, gas samples were collected from selected desorption canisters for compositional analyses. Following desorption, coal samples were analysed at GWIL-Birtley Laboratories, Calgary and gas composition samples at CoreLab, Calgary.

3.0 Desorption Testing for Gas Content and Composition

Gas content in coal can be determined by both direct and indirect methods. It is widely accepted that direct methods are preferred and offer more accurate assessments of gas content than do indirect methods. Several direct methods have been proposed and utilized since the early 1970's.

ASTM Standard D7569-10 outlines procedures for gas content and composition testing. The PL approach to determining coal gas content follows the ASTM Standard in most aspects, with the exception of the determination of "residual gas" (or Q3). In this "slow desorption" procedure, samples are placed into desorption vessels which are maintained at constant temperature and the volume of desorbed gas is measured over an extended time period and until the volume of desorbed gas is negligible. Desorbed gas volumes are corrected to standard temperature and pressure conditions.

The total gas content comprises three components:

- *Lost Gas (Q1)*: the volume of gas estimated to have desorbed during core retrieval and handling at surface, before samples are in desorption vessels - estimated graphically.

- *Desorbed Gas (Q2):* the volume of gas desorbed from the time of sealing until the process is terminated, when a negligible volume of gas is desorbing.

- *Residual Gas (Q3):* the minor amount of gas retained within the sample when desorption is terminated and which would require an extremely long time to desorb. This volume can be estimated graphically or by crushing the coal to release all remaining gas.

The PL approach to the "slow desorption method" in these boreholes was:

- *Lost Gas (Q1):* The estimate of lost gas is influenced by the selection of desorption temperature as this impacts the rate of gas desorption. Ideally this temperature would reflect the mean temperature of the core during core recovery and surface handling. In DH-01, the desorption temperature was selected based on the mean temperature of the inflow and outflow drilling fluid, plus 10%; an approach recommended by Gas Research Institute (Matt Mavor; pers. comm.) During the drilling of DH-02 and DH-03 the ambient temperature was much lower, which impacted the drilling fluid temperature. The desorption temperature was calculated as the mean of the estimated temperature at sampling depth (based on geothermal gradient) and the measured temperature at the base of the core, immediately following core retrieval. This yielded similar temperatures to the method used in DH-01

  Three methods are typically applied in the CBM industry to estimate the volume of lost gas; the "USBM", "Smith & Williams" and "Amoco" methods. Nelson (1999)[1] concluded that the "USBM" method was the most accurate and is used herein. Cumulative desorbed gas volume was plotted against the square root of desorption time and regression analysis applied to the steepest linear portion of the curve. This regression line was projected back to "time zero" (when gas began to desorb from the core) to estimate gas volume lost before the test canister was sealed. Lost gas charts are shown in the desorption files in the Appendix.

- *Desorbed Gas (Q2):* the samples were maintained at the calculated desorption temperature (18-21^{o}C) and desorbed gas released and volume measured at frequent intervals. The measuring interval is quite short in the early stages of testing due to the high desorption rate, but is reduced as this rate declines with time (e.g. Figure 3.1). This temperature was maintained until the desorption rate had declined significantly (e.g. Figure 3.1). The temperature was then increased to accelerate desorption and reduce the time required for completion of the test.

1. *Nelson C.R., 1999: Critical assessment of coalbed reservoir gas-in-place analysis methods; Internat. Coalbed Methane Conference, Univ. Alabama; May 1999, p77-79*

After 250 to 300 hours the desorption temperature was increased to approximately 50°C - a temperature well below the calculated maximum paleo-temperature (derived from the coal rank).

Desorption was continued until the time when the desorption curve (e.g. Figure 3.1) was essentially flat, when the increase in gas content declined below 1% in one week and when estimated residual gas was less than 5% of the total gas content. Desorption curves are included in the desorption files in the Appendix.

- *Residual Gas (Q3):* When desorption was terminated, the remaining residual gas was estimated graphically – a common approach in gas testing. With the exception of a carbonaceous shale sample in DH-03, in all cases residual gas is less than 5% of the total gas content. Residual gas charts are also part of the desorption files in the Appendix.

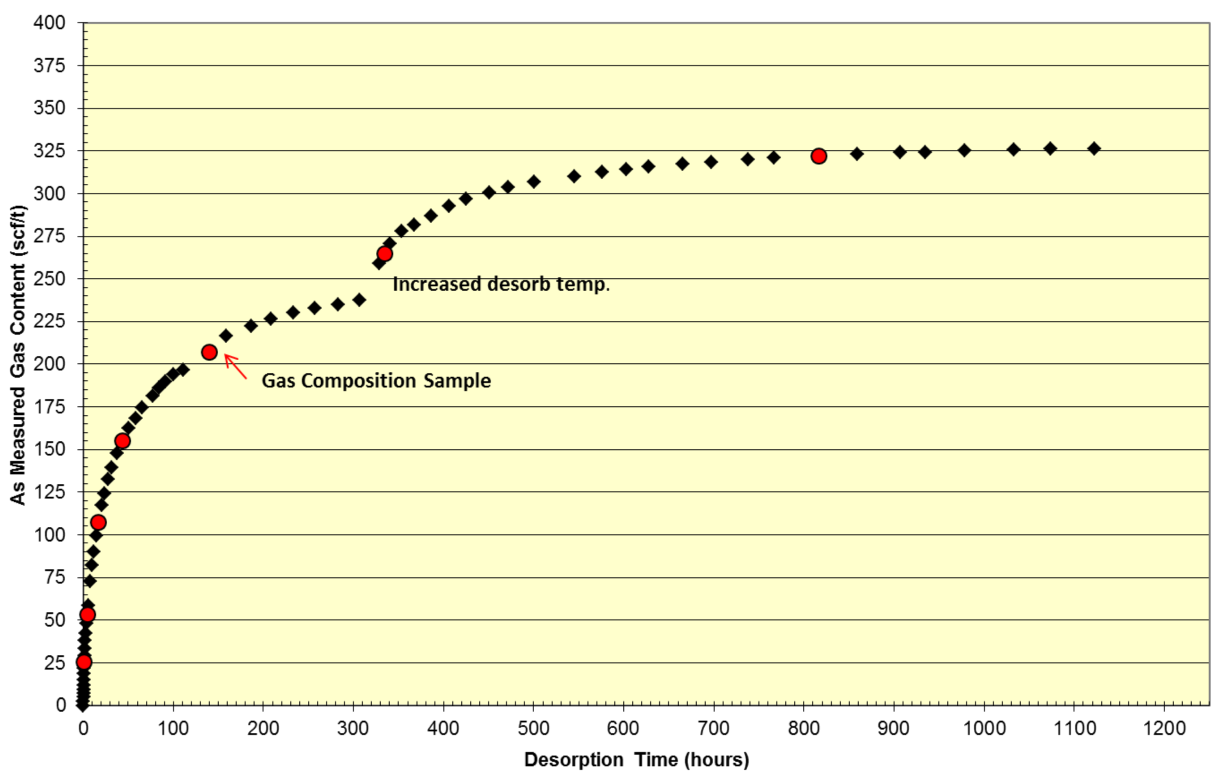


Figure 3.1: Measured Gas Content vs Desorption Time – Sample 1 – DH-01

Desorbed gas was sampled for compositional analyses. Several gas samples were drawn from one desorption vessel in each major seam during the complete desorption period. Multiple samples are required to determine mean gas composition as the composition changes during the desorption period, due to differences in the diffusion rates of the component gases in the desorption stream.

4.0 Coal Quality

Samples that were analysed for gas content were also forwarded to Birtley Laboratories, Calgary, for a range of chemical tests (Tables 5.1, 5.2 and 5.3).

Gas content is related to coal rank, which influences thermogenic gas generation; by ash (or inorganic content), as inorganics neither generate nor retain gas and by moisture content, as in-situ moisture can displace gas from adsorption sites.

Volatile matter (dry ash-free) is a good rank parameter in the higher rank coals. Volatile matter for those coal samples with low to moderate ash is 24.1% in DH-01, 25.0% in DH-02 and 24.5% in DH-03, indicating medium volatile bituminous rank. This is well within the thermogenic gas window and high gas contents could be expected.

Proximate analyses and specific gravity values are shown in Tables 5.1, 5.2 and 5.3. Ash content for the desorption samples is quite varied, reflecting sampling of coals, carbonaceous shales and shales. At this rank level, significant gas volumes could be expected to occur within the non-coal strata associated with the target seams and with the potential to be released during mining. Figure 4.1 illustrates the relationship between ash content and specific gravity for all samples.

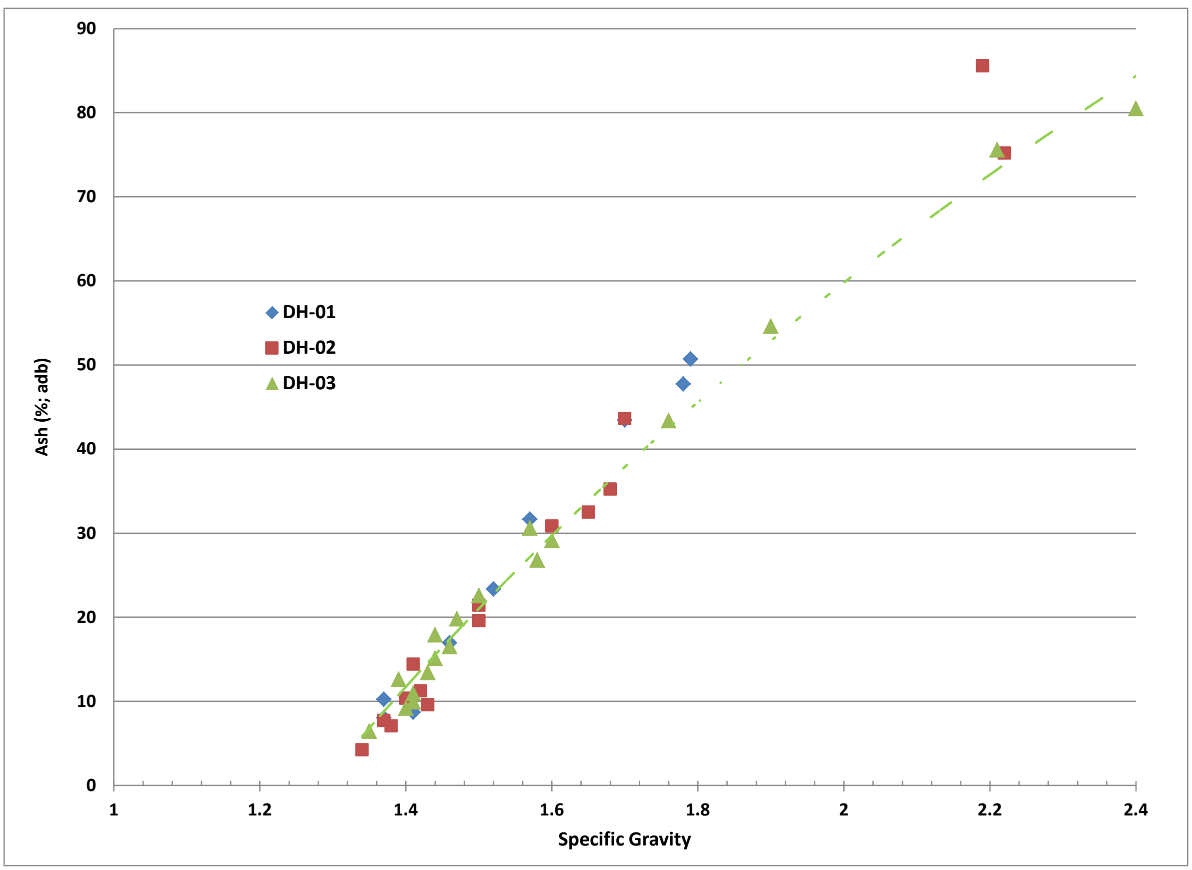


Figure 4.1: Ash vs Specific Gravity – 3 wells

5.0 Gas Content

In all wells, samples were derived from several target seams. Coals, carbonaceous shales and shales were sampled to develop relationships between gas content and parameters such as ash content and specific gravity. Gas contents are shown in Tables 5.1, 5.2 and 5.3

DH-01

Samples were taken from seams D and F as well as an unnamed seam (samples 2 and 3). For the coals, the gas content ranges from 10.29 to 12.50 m^3/t at ISO STP (15°C and 101.3 kPa)

DH-02

In this well coals were sampled from seams D,?E, F1, F2, G/I and J. For the coals the gas content ranges from 7.76 to 17.13 m^3/t at ISO STP.

DH-03

Coals were sampled from seams D, E, F1, F2 and J and gas content ranges from 13.74 to 19.36 m^3/t at ISO STP

It could be expected that there would be close relationships between gas content and ash, as ash components do not generate or store gas. Figure 5.1 illustrates these linear relationships for each well.

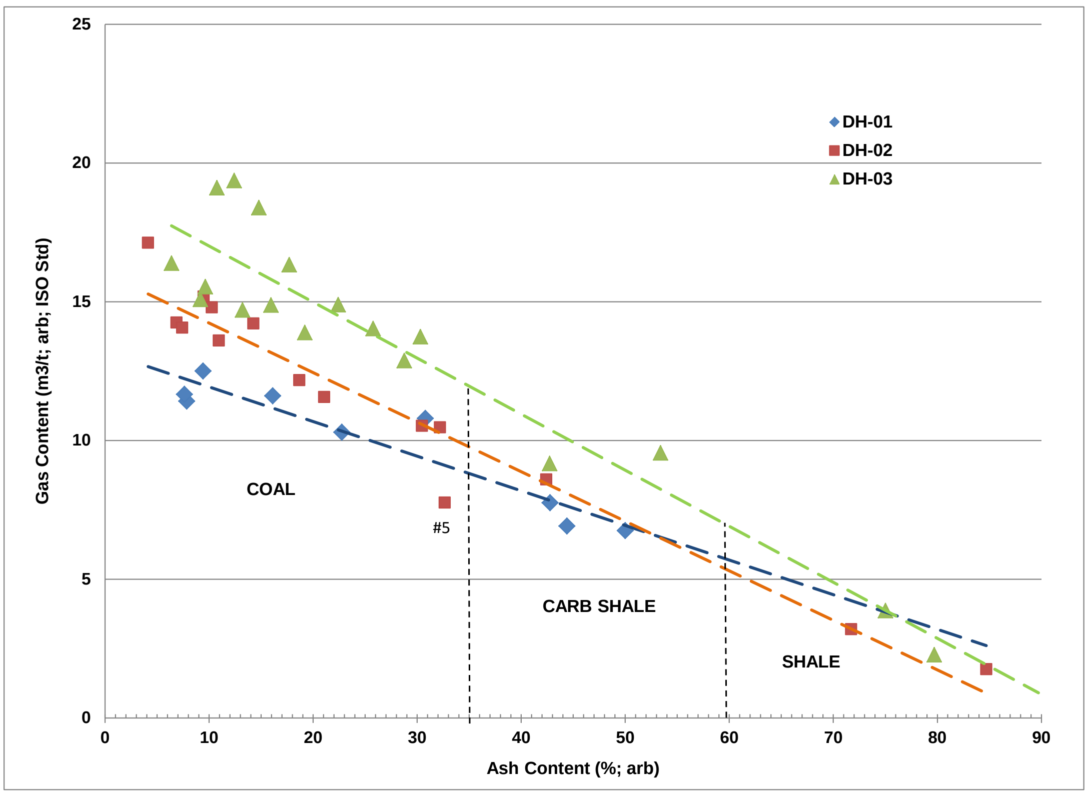


Figure 5.1: Gas Content vs Ash in DH-01, DH-02 & DH-03

Sample 5 in DH-02 has anomalously low gas content (Figure 5.1). This coal was very sheared (images in Appendix) which could have resulted in gas release in-situ over geologic time.

This chart (Figure 5.1) also offers a guide to gas contents in those portions of seams that were not desorption-tested, through the relationship between gas content and ash. It also illustrates that there is significant gas contained in carbonaceous shales and shales closely associated with target seams.

The relationship between gas content and ash in these wells can be expressed as:

DH-01 Gas Content (m^3/t; ISO Std) = -0.124 x Ash (arb) + 13.18 (r^2=0.90)

DH-02 Gas Content (m^3/t; ISO Std) = -0.178 x Ash (arb) + 16.012 (r^2=0.95)

DH-03 Gas Content (m3/t; ISO Std) = -0.202 x Ash (arb) + 19.03 (r^2=0.90)

Table 5.1: Gas Content and Coal Quality – DH-01

Seam	Can #	Depth (m)		Gas Content (75F & 30.01" Hg) Lost	Desorb	Resid	Total Gas Content				Gas Content 15C & 101.3kpa
		top	base	(scf/t; arb)			(scf/t; arb)	(scf/t; adb)	(scf/t; daf)	m^3/t; arb	(m^3/t; arb)
D	1	926.15	926.52	24.52	326.25	5.65	356.42	366.54	540.94	11.12	10.79
?	2	985.70	986.00	22.20	202.06	2.79	228.27	245.39	473.99	7.13	6.91
?	3	987.62	987.96	18.65	234.19	3.31	256.15	260.22	465.10	8.00	7.76
F	4	997.00	997.30	18.44	195.88	8.70	223.02	226.14	464.06	6.96	6.75
F	5	998.25	998.55	22.89	342.86	11.18	376.93	417.70	459.76	11.77	11.41
F	6	998.95	999.30	17.30	309.64	13.06	340.00	349.13	459.26	10.61	10.29
F	7	999.30	999.50	20.22	347.34	15.81	383.37	403.30	489.08	11.97	11.61
F	8	1001.24	1001.52	34.08	372.58	6.24	412.90	448.66	501.96	12.89	12.50
F	9	1002.02	1002.29	30.99	349.56	4.64	385.19	406.16	443.84	12.02	11.66
										Mean (Coal Only)	**11.38**

				Analytical Data															
Seam	Can #	Depth (m)		Wet	Dry	ADM	Moisture		Ash			Volatile Matter				Fixed Carbon			S.G.
		top	base	Wt.	Wt.	%	%adb	%arb	%adb	%arb	%db	%adb	%arb	%db	%daf	%adb	%arb	%db	
D	1	926.15	926.52	1304	1268	2.76	0.57	3.315	31.67	30.80	31.85	18.46	17.95	18.566	27.24	49.3	47.94	49.58	1.57
?	2	985.70	986.00	1319	1227	6.97	0.50	7.44	47.73	44.40	47.97	15.54	14.46	15.62		36.23	33.70	36.41	1.78
?	3	987.62	987.96	1151	1133	1.56	0.59	2.14	43.46	42.78	43.72	17.34	17.07	17.44		38.61	38.01	38.84	1.70
F	4	997.00	997.30	1233	1216	1.38	0.57	1.94	50.70	50.00	50.99	15.18	14.97	15.27		33.55	33.09	33.74	1.79
F	5	998.25	998.55	1035	934	9.76	0.45	10.16	8.70	7.85	8.74	18.22	16.44	18.30	20.06	72.63	65.54	72.96	1.41
F	6	998.95	999.30	1070	1042	2.62	0.61	3.21	23.37	22.76	23.51	17.09	16.64	17.19	22.48	58.93	57.39	59.29	1.52
F	7	999.30	999.50	1012	962	4.94	0.59	5.50	16.95	16.11	17.05	20.05	19.06	20.17	24.31	62.41	59.33	62.78	1.46
F	8	1001.24	1001.52	891	820	7.97	0.39	8.33	10.23	9.41	10.27	20.61	18.97	20.69	23.06	68.77	63.29	69.04	1.37
F	9	1002.02	1002.29	988	937	5.16	0.44	5.58	8.05	7.63	8.09	24.91	23.62	25.02	27.22	66.60	63.16	66.89	1.37
														Mean	**24.06**				

Table 5.2: Gas Content and Coal Quality-DH-02

Seam	Can #	Depth (m)		Gas Content (75F & 30.01" Hg) Lost	Desorb	Resid	Total Gas Content				Gas Content 15C & 101.3kpa
		top	base	(scf/t; arb)			(scf/t; arb)	(scf/t; adb)	(scf/t; daf)	m^3/t; arb	(m^3/t; arb)
D	1	705.05	705.34	44.40	451.84	5.36	501.61	509.14	565.58	15.66	15.19
D	2	705.52	705.84	67.71	484.44	13.56	565.71	581.94	609.68	17.66	17.13
D	3	706.54	706.87	22.77	256.08	4.92	283.76	291.88	522.14	8.86	8.59
?E	4	723.40	723.72	8.10	93.20	4.40	105.70	110.84	457.07	3.30	3.20
F1	5	759.64	759.98	24.92	225.14	6.36	256.42	276.67	429.82	8.00	7.76
F2	6	780.38	780.70	21.22	452.65	14.85	488.72	493.86	552.67	15.25	14.80
?	7	786.27	786.58	4.35	51.98	1.62	57.96	58.56	425.56	1.81	1.75
G/I	8	807.68	808.00	20.49	431.62	17.38	469.48	474.97	557.60	14.65	14.21
J	9	833.57	833.87	23.20	314.42	10.08	347.69	352.01	512.84	10.85	10.53
J	10	834.04	834.34	30.09	340.99	10.81	381.89	388.60	498.14	11.92	11.56
J	11	834.39	834.70	20.45	312.66	12.84	345.95	349.32	520.91	10.80	10.47
J	12	834.82	835.14	32.62	432.04	5.96	470.62	484.97	524.46	14.69	14.25
J	13	835.63	835.92	37.51	419.37	7.63	464.51	484.29	527.55	14.50	14.06
J	14	836.46	836.77	27.24	415.14	6.86	449.24	462.33	523.94	14.02	13.60
J	15	837.04	837.34	29.66	367.62	4.78	402.06	422.16	528.09	12.55	12.17
										Mean (coal only)	12.98

Analytical Data

Seam	Can #	Depth (m)		Wet	Dry	ADM	Moisture		Ash			Volatile Matter				Fixed Carbon			S.G.
		top	base	Wt.	Wt.	%	%adb	%arb	%adb	%arb	%db	%adb	%arb	%db	%daf	%adb	%arb	%db	
D	1	705.05	705.34	1149	1132	1.48	0.37	1.844	9.61	9.47	9.65	21.7	21.38	21.781	24.11	68.32	67.31	68.57	1.43
D	2	705.52	705.84	1076	1046	2.79	0.30	3.08	4.25	4.13	4.26	24.51	23.83	24.58	25.68	70.94	68.96	71.15	1.34
D	3	706.54	706.87	1583	1539	2.78	0.47	3.24	43.63	42.42	43.84	16.74	16.27	16.82		39.16	38.07	39.34	1.70
?E	4	723.40	723.72	1530	1459	4.64	0.55	5.17	75.20	71.71	75.62	-	-	-		-	-	-	2.22
F1	5	759.64	759.98	1257	1165	7.32	0.40	7.69	35.23	32.65	35.37	14.81	13.73	14.87		49.56	45.93	49.76	1.68
F2	6	780.38	780.70	1151	1139	1.04	0.28	1.32	10.36	10.25	10.39	22.26	22.03	22.32	24.91	67.10	66.40	67.29	1.40
?	7	786.27	786.58	2046	2025	1.03	0.66	1.68	85.58	84.70	86.15	-	-	-		-	-	-	2.19
G/I	8	807.68	808.00	1126	1113	1.15	0.40	1.55	14.42	14.25	14.48	21.08	20.84	21.16	24.75	64.10	63.36	64.36	1.41
J	9	833.57	833.87	1304	1288	1.23	0.52	1.74	30.84	30.46	31.00	17.75	17.53	17.84		50.89	50.27	51.16	1.60
J	10	834.04	834.34	1159	1139	1.73	0.55	2.27	21.44	21.07	21.56	20.74	20.38	20.85	26.59	57.27	56.28	57.59	1.50
J	11	834.39	834.70	1346	1333	0.97	0.44	1.40	32.50	32.19	32.64	15.84	15.69	15.91		51.22	50.73	51.45	1.65
J	12	834.82	835.14	1014	984	2.96	0.46	3.40	7.07	6.86	7.10	21.60	20.96	21.70	23.36	70.87	68.77	71.20	1.38
J	13	835.63	835.92	1053	1010	4.08	0.48	4.54	7.72	7.40	7.76	19.56	18.76	19.65	21.31	72.24	69.29	72.59	1.37
J	14	836.46	836.77	989	961	2.83	0.51	3.33	11.25	10.93	11.31	23.20	22.54	23.32	26.29	65.04	63.20	65.37	1.42
J	15	837.04	837.34	1071	1020	4.76	0.45	5.19	19.61	18.68	19.70	22.13	21.08	22.23	27.68	57.81	55.06	58.07	1.50
														Mean	24.96				

Table 5.3: Gas Content & Coal Quality- DH-03

Seam	Can #	Depth (m)		Gas Content (75F & 30.01" Hg) Lost	Desorb	Resid	Total Gas Content				Gas Content 15C & 101.3kpa
		top	base	(scf/t; arb)			(scf/t; arb)	(scf/t; adb)	(scf/t; daf)	(m^3/t; arb)	(m^3/t; arb)
D	1	497.00	497.30	21.34	278.89	15.11	315.34	322.54		9.84	9.55
Carb Shale	2	514.19	514.49	5.55	118.55	3.65	127.75	128.71		3.99	3.87
E	3	515.30	515.60	37.86	440.32	13.68	491.86	495.30	645.25	15.35	14.89
E	4	515.60	515.90	61.37	555.30	22.90	639.57	649.45	747.96	19.96	19.36
E	5	516.11	516.41	64.65	552.42	13.98	631.05	642.24	724.30	19.70	19.11
E	6	516.41	516.71	54.88	542.95	9.55	607.38	621.02	735.63	18.96	18.39
E	7	518.20	518.46	33.59	382.05	9.75	425.39	430.96	613.21	13.28	12.88
Undefined	8	*Testing terminated due to leaking desorption vessel*									
F1	9	541.70	542.00	13.88	271.91	17.09	302.89	307.30		9.45	9.17
F1	10	542.50	542.80	32.52	414.06	16.94	463.52	481.86	664.08	14.47	14.03
F2	11	565.36	565.66	33.45	484.23	21.77	539.46	545.86	669.36	16.84	16.33
F2	12	565.66	565.90	31.74	409.96	12.04	453.73	457.84	665.47	14.16	13.74
Carb Shale	13	567.14	567.44	5.21	64.67	5.20	75.08	75.81		2.34	2.27
J	14	581.18	581.48	24.37	447.62	19.38	491.36	509.10	614.11	15.34	14.88
J	15	582.02	582.34	33.29	407.62	17.78	458.69	472.95	593.56	14.32	13.89
J	16	582.34	582.66	24.70	440.06	20.84	485.60	492.91	573.49	15.16	14.70
J	17	583.03	583.34	26.60	451.34	20.26	498.20	499.47	555.21	15.55	15.08
J	18	584.30	584.62	32.31	462.46	18.54	513.30	527.76	589.41	16.02	15.54
J	19	586.17	586.49	35.36	481.16	24.84	541.35	545.76	587.02	16.90	16.39
										Mean (coal only)	**15.66**

Seam	Can #	Depth (m)		Analytical Data Wet	Dry	ADM	Moisture		Ash			Volatile Matter				Fixed Carbon			S.G.
		top	base	Wt.	Wt.	%	%adb	%arb	%adb	%arb	%db	%adb	%arb	%db	% daf	%adb	%arb	%db	
D	1	497.00	497.30	1298	1269	2.23	0.97	3.183	54.61	53.39	55.14								1.90
Carb Shale	2	514.19	514.49	1751	1738	0.74	1.07	1.80	75.58	75.02	76.40								2.21
E	3	515.30	515.60	1297	1288	0.69	0.68	1.37	22.56	22.40	22.71	19.29	19.16	19.422	25.13	57.47	57.07	57.86	1.50
E	4	515.60	515.90	986	971	1.52	0.56	2.07	12.61	12.42	12.68	20.47	20.16	20.59	23.57	66.36	65.35	66.73	1.39
E	5	516.11	516.41	976	959	1.74	0.39	2.13	10.94	10.75	10.98	23.06	22.66	23.15	26.01	65.61	64.47	65.87	1.41
E	6	516.41	516.71	1047	1024	2.20	0.47	2.66	15.11	14.78	15.18	21.38	20.91	21.48	25.33	63.04	61.66	63.34	1.44
E	7	518.20	518.46	927	915	1.29	0.58	1.87	29.14	28.76	29.31	18.57	18.33	18.68	26.42	51.71	51.04	52.01	1.60
Undefined	8			*Testing terminated due to leaking desorption vessel*															
F1	9	541.70	542.00	1114	1098	1.44	0.64	2.07	43.37	42.75	43.65	16.32	16.09	16.43		39.67	39.10	39.93	1.76
F1	10	542.50	542.80	867	834	3.81	0.65	4.43	26.79	25.77	26.97	18.94	18.22	19.06	26.10	53.62	51.58	53.97	1.58
F2	11	565.36	565.66	1023	1011	1.17	0.54	1.71	17.91	17.70	18.01	20.32	20.08	20.43	24.92	61.23	60.51	61.56	1.44
F2	12	565.66	565.90	1003	994	0.90	0.61	1.50	30.59	30.32	30.78	18.87	18.70	18.99	27.43	49.93	49.48	50.24	1.57
Carb Shale	13	567.14	567.44	1872	1854	0.96	0.87	1.82	80.49	79.72	81.20								2.40
J	14	581.18	581.48	1148	1108	3.48	0.58	4.04	16.52	15.94	16.62	17.65	17.04	17.75	21.29	65.25	62.98	65.63	1.46
J	15	582.02	582.34	1294	1255	3.01	0.53	3.53	19.79	19.19	19.90	17.02	16.51	17.11	21.36	62.66	60.77	62.99	1.47
J	16	582.34	582.66	1213	1195	1.48	0.63	2.10	13.42	13.22	13.51	18.67	18.39	18.79	21.72	67.28	66.28	67.71	1.43
J	17	583.03	583.34	1182	1179	0.25	0.86	1.11	9.18	9.16	9.26	18.62	18.57	18.78	20.70	71.34	71.16	71.96	1.40
J	18	584.30	584.62	1132	1101	2.74	0.55	3.27	9.91	9.64	9.96	22.24	21.63	22.36	24.84	67.30	65.46	67.67	1.41
J	19	586.17	586.49	1116	1107	0.81	0.59	1.39	6.44	6.39	6.48	21.26	21.09	21.39	22.87	71.71	71.13	72.14	1.35
														Mean	**24.12**				

It could be expected that gas content on a dry ash-free basis would increase with sample depth, as gas is retained by reservoir pressure. In these wells however, the gas content decreases with increased depth (Figure 5.2). Highest gas contents were recorded in DH-03 where sample depths are around 400m shallower than in DH-01.

This in turn suggests that there could be gas "domains" within the exploration area; where different relationships pertain between parameters including gas content, gas composition, depth and coal quality, due to differences in factors such as geological history and/or reservoir pressure.

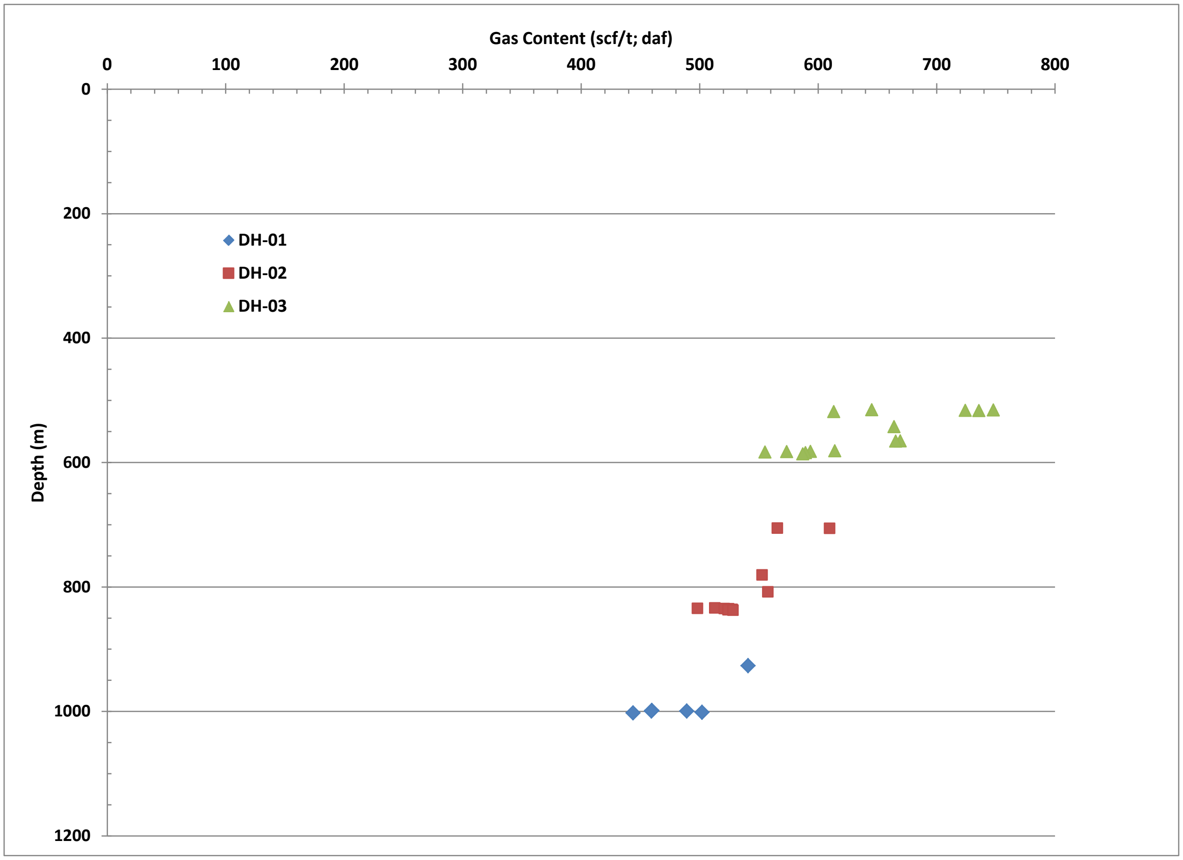


Figure 5.2: Gas Content (daf) vs Depth for Coals in DH-01, DH-02 & DH-03

The Desorption Time Constant (Tau; τ) is defined as the time required to desorb 63.2% of the total gas content during a slow desorption test from intact core. This parameter is intended to give an indication of the rate of gas release from tested coals.

Reported values for Tau are varied. Williams (pers. comm.) has reported that Hunter Valley coals (Australia) have Tau values from 10-30 days while higher rank, softer and more fractured coals from the Bowen Basin (Australia) have much lower Tau values (0.5 to 5 days). Tau could be expected to be influenced by the degree of fracturing in core, by the core diameter, by ash content and by the desorption temperature.

In DH-01 only 3 samples could be considered “intact” core (samples 6, 7 & 9) although even in these samples there was some evidence of shearing. DH-02 samples 5, 12, 13 and 15 are quite sheared and samples 3, 4 and 7 are carbonaceous shale or shale. In DH-03 there is little evidence of shearing except in sample 1. Samples 1, 2, 9 and 13 are shale or carbonaceous shale and sample 8 was terminated due to a leaking desorption vessel. Results for the Desorption Time Constant are quite varied in all wells (Table 5.4).

Table 5.4: Desorption Time Constants (“intact” coals)

DH-01		DH-02		DH-03	
Sample #	Tau (days)	Sample #	Tau (days)	Sample #	Tau (days)
1	4.8	1	9.5	3	3.6
5	10.5	2	4.1	4	6.8
6	11	6	10.3	5	5.5
7	10.2	8	14.3	6	5.4
8	5.2	9	30.5	7	7.3
9	5.7	10	21.1	10	11.2
		11	32.2	11	8.9
		14	10.9	12	7.2
				14	9.7
				15	16.2
				16	11.5
				17	12.1
				18	8.4
				19	10.2

6.0 Gas Composition

Gas samples were taken from several desorption vessels during the course of testing (e.g. Figure 1). Multiple samples are required as gas composition typically changes over time, due to the different diffusion rates of different gas components. Average gas compositions have been calculated based on the desorption time and the proportion of the total gas volume desorbed at the time of each analysis (Tables 6.1, 6.2 and 6.3).

Note that helium is reported in some early-time raw analyses (Appendix). All analyses have been recalculated to a helium-free basis (Tables 6.1, 6.2 and 6.3). The reported helium values are minimal and are very unlikely to be derived from the tested coals. The presence of helium is the result of flushing the desorption vessels with this inert gas, in order to minimise oxidation during desorption testing.

In all wells methane is the dominant component (>90% in DH-01and >95% in DH-02 and DH-03). In DH-01 there is a significant proportion of carbon dioxide (5 to 6%) but in DH-02 and DH-03 no carbon dioxide was reported in any of the analyses. Higher hydrocarbons are minor components in all wells.

The difference in carbon dioxide content between the wells suggests that there could be different gas “domains” present across the exploration area.

Detailed analyses for all samples are included in the Appendix.

Table 6.1: Gas Composition (air-free basis) DH-01

Canister #	Desorb	Prop'tn (%) of	Proportion of Gas Components (%)							Weighted Means	
Seam	Hours	Total Gas Vol.	H2	N2	CO2	C1	C2	C3+	Total	CO2	C1
1	1.38	14.3	0.01	0.63	6.44	92.88	0.03	0.01	100.00		
	4.73	22.3	0.00	1.65	8.28	89.81	0.22	0.04	100.00		
	16.81	37.5	0.01	0.14	6.19	93.61	0.04	0.01	100.00		
Seam D	43.81	51.2	0.01	0.24	5.38	94.31	0.05	0.01	100.00		
	139.61	64.9	0.02	0.12	4.03	95.75	0.06	0.02	100.00		
	334.73	82.4	0.02	0.08	6.51	93.20	0.12	0.07	100.00		
	816.45	98.7	0.09	0.47	4.85	94.22	0.24	0.13	100.00		
										5.8	93.6
2	1.44	17.8	0.00	3.09	6.07	89.93	0.86	0.05	100.00		
	10.26	40.2	0.01	1.12	5.70	92.00	1.09	0.08	100.00		
	19.41	49.2	0.01	0.70	4.87	93.20	1.14	0.08	100.00		
Seam ?	53.53	61.1	0.03	0.25	4.16	94.19	1.27	0.10	100.00		
	219.00	74.8	0.02	0.18	3.20	95.07	1.42	0.11	100.00		
	302.81	87.8	0.02	0.17	6.39	89.63	3.36	0.43	100.00		
	778.65	99.2	0.04	0.46	6.60	85.30	6.60	1.00	100.00		
										5.4	91.3
5	1.50	11.2	0.00	3.35	6.07	89.11	1.43	0.04	100.00		
	5.23	20.2	0.01	1.49	5.63	91.20	1.62	0.05	100.00		
	13.03	29.3	0.00	0.96	5.54	91.67	1.78	0.05	100.00		
	32.73	38.4	0.01	0.57	4.59	92.97	1.81	0.05	100.00		
Seam F	99.90	52.0	0.02	0.24	4.16	93.42	2.09	0.07	100.00		
	276.16	73.2	0.01	0.16	6.90	88.69	4.04	0.20	100.00		
	757.81	97.2	0.03	0.45	3.90	87.67	7.51	0.44	100.00		
										5.2	90.0
7	1.56	9.6	0.00	3.40	6.36	88.91	1.29	0.04	100.00		
	5.38	18.4	0.00	0.94	6.31	91.26	1.45	0.04	100.00		
	13.09	27.5	0.00	0.68	6.20	91.51	1.56	0.05	100.00		
Seam F	32.78	32.9	0.01	0.51	5.38	92.44	1.61	0.05	100.00		
	175.20	58.7	0.01	0.38	4.18	93.46	1.91	0.06	100.00		
	276.21	74.1	0.01	0.20	6.73	89.33	3.55	0.18	100.00		
	1231	96.6	0.12	0.47	3.71	88.55	6.77	0.38	100.00		
										5.5	90.7

Table 6.2: Gas Composition (air-free basis) DH-02

Canister #	Desorb	Prop'tn (%) of	Proportion of Gas Components (%)							Weighted Means	
Seam	Hours	Total Gas Vol.	H2	N2	CO2	C1	C2	C3+	Total	CO2	C1
2	0.90	18.0	0.00	1.64	0.00	98.34	0.01	0.01	100.00		
	12.00	49.8	0.01	0.00	0.00	99.97	0.02	0.00	100.00		
Seam D	68.00	71.8	0.02	0.03	0.00	99.92	0.03	0.00	100.00		
	493.72	91.9	0.02	0.08	0.00	99.80	0.09	0.01	100.00		
										0.0	**99.6**
5	1.71	18.9	0.02	3.33	0.00	94.11	2.45	0.09	100.00		
	34.75	53.4	0.01	0.54	0.00	96.27	3.07	0.11	100.00		
Seam F1	190.40	70.3	0.04	0.00	0.00	96.76	3.10	0.10	100.00		
										0.0	**96.1**
6	1.43	10.2	0.00	0.41	0.00	99.47	0.10	0.03	100.00		
	37.75	39.9	0.01	0.26	0.00	99.57	0.12	0.04	100.00		
Seam F2	406.65	78.7	0.01	0.01	0.00	99.57	0.28	0.13	100.00		
	958.21	98.6	0.05	0.22	0.00	98.78	0.58	0.37	100.00		
										0.0	**99.4**
8	54.83	40.7	0.01	0.27	0.00	99.60	0.09	0.03	100.00		
	215.40	58.3	0.00	3.60	0.00	96.32	0.05	0.03	100.00		
Seam G/I	386.83	75.9	0.02	0.05	0.00	99.75	0.11	0.07	100.00		
	938.92	98.6	0.08	0.25	0.00	99.35	0.15	0.17	100.00		
										0.0	**99.0**
10	1.65	16.3	0.00	1.14	0.00	96.94	1.83	0.08	100.00		
	15.21	39.6	0.01	0.24	0.00	97.86	1.81	0.08	100.00		
Seam J	179.61	75.0	0.02	0.23	0.00	96.88	2.76	0.11	100.00		
	373.94	89.6	0.03	0.03	0.00	93.58	6.03	0.33	100.00		
										0.0	**96.3**

Table 6.3: Gas Composition (air-free basis) DH-03

Canister #	Desorb	Prop'tn (%) of	Proportion of Gas Components (%)							Weighted Means	
Seam	Hours	Total Gas Vol.	H2	N2	CO2	C1	C2	C3+	Total	CO2	C1
1	4.10	21.8	0.01	0.50	0.00	99.45	0.03	0.01	100.00		
	17.90	38.2	0.03	0.06	0.00	99.82	0.07	0.02	100.00		
	157.70	65.1	0.01	0.85	0.00	99.09	0.04	0.01	100.00		
	484.60	84.3	0.02	0.07	0.00	99.88	0.03	0.00	100.00		
										0.0	**99.6**
6	1.65	18.2	0.01	0.02	0.00	99.93	0.03	0.01	100.00		
	10.28	41.4	0.02	0.00	0.00	99.92	0.05	0.01	100.00		
	46.58	60.6	0.01	0.00	0.00	99.94	0.04	0.01	100.00		
	272.16	79.1	0.01	0.06	0.00	99.87	0.05	0.01	100.00		
	739.93	98.3	0.05	0.18	0.00	99.45	0.24	0.08	100.00		
										0.0	**99.8**
10	2.81	19.4	0.00	0.54	0.00	99.42	0.03	0.01	100.00		
	141.98	63.6	0.02	0.00	0.00	99.92	0.04	0.02	100.00		
	443.53	83.0	0.03	0.17	0.00	99.65	0.10	0.05	100.00		
										0.0	**99.7**
11	8.23	26.9	0.01	0.10	0.00	99.87	0.02	0.00	100.00		
	435.23	83.4	0.02	0.06	0.00	99.85	0.07	0.00	100.00		
										0.0	**99.9**
18	2.86	18.3	0.00	0.32	0.00	98.24	1.41	0.03	100.00		
	21.15	38.0	0.01	0.23	0.00	98.14	1.59	0.03	100.00		
	426.15	84.3	0.01	0.00	0.00	93.85	5.90	0.24	100.00		
										0.0	**95.5**