

**BC Geological Survey  
Coal Assessment Report  
1001**



**COAL ASSESSMENT REPORT TITLE PAGE AND SUMMARY**

**TITLE OF REPORT: Coal assessment report for the Willow Creek coal lease --  
Volume 4: Year-1997 borehole records**

TOTAL COST: **n/a**

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

SIGNATURE(S):

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

YEAR OF WORK: **1997**

PROPERTY NAME: **Willow Creek**

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

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: **930.008**

MINING DIVISION: **Liard**

NTS / BCGS: **NTS 930/9 / BCGS 930.059 and 930.069**

LATITUDE: **55° 35' 33.3" North**; LONGITUDE: **122° 14' 18.1" West** (at centre of work)

UTM Zone: **10N** EASTING: **548000** NORTHING: **6161000**

OWNER(S): **Pine Valley Coal Ltd.**

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

OPERATOR(S) [who paid for the work]: **Willow Creek Coal Partnership**

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

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

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: **Coal Assessment Reports 984, 986, and 988**

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SUMMARY OF TYPES OF WORK IN THIS REPORT		EXTENT OF WORK (in metric units)	ON WHICH TENURES
GEOLOGICAL (scale, area)			
	Ground, mapping	<b>nil</b>	
	Photo interpretation	<b>nil</b>	
GEOPHYSICAL (line-kilometres)			
	Ground (Specify types)	<b>nil</b>	
	Airborne (Specify types)	<b>nil</b>	
	<b>Borehole: 119 boreholes logged</b>		
	Gamma-density	<b>4,621.32 metres</b>	<b>389294</b>
	Resistivity	<b>4,621.32 metres</b>	<b>389294</b>
	Caliper	<b>4,621.32 metres</b>	<b>389294</b>
	Deviation	<b>4,534.13 metres</b>	<b>389294</b>
	Dipmeter	<b>47 metres</b>	<b>389294</b>
	Others ( <b>gamma-neutron</b> )	<b>4,419.86 metres</b>	<b>389294</b>
	<b>Core drilling: 76 boreholes</b>	<b>2,262.87 metres</b>	<b>389294</b>
	<b>Non-core (rotary) drilling: 117 boreholes</b>	<b>4,651.23 metres</b>	<b>389294</b>
SAMPLING AND ANALYSES			
	Total number of samples	<b>unknown</b>	
	Proximate	<b>unknown</b>	
	Ultimate	<b>unknown</b>	
	Petrographic	<b>unknown</b>	
	Vitrinite reflectance	<b>unknown</b>	
	Coking	<b>unknown</b>	
	Wash tests	<b>unknown</b>	
	PROSPECTING (scale/area)	<b>nil</b>	
PREPARATORY/PHYSICAL			
	Line/grid (km)	<b>nil</b>	
	Trench (number, metres)	<b>nil</b>	
	Bulk sample(s):	<b>nil</b>	

# Coal assessment report for the Willow Creek coal lease -- Volume 4: Year-1997 borehole records

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## Appendix A: Geophysical logs and borehole statistics A-1

### 1.1 List of tables

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## 2 Introduction

This report documents (insofar as is possible given the incomplete state of technical records), year-1997 drilling within coal lands now covered by the Willow Creek coal lease. The Willow Creek coal lease, although held as one tenure, has in recent years for operational reasons been explored and developed as three distinct blocks, although these blocks do not have independent identities as mineral tenures in their own right:

- Willow Creek Mine block, situated along the northeastern bank of Willow Creek, and northwest of the adjoining Willow South block;
- Willow West block, situated along the southwestern bank of Willow Creek, and thus lying to the west of Willow Creek Mine;
- Willow South block, situated along the northeastern bank of Willow Creek, and thus lying to the southeast of Willow West; and

Each of these blocks are reported within a three-volume series of coal-assessment reports (Reports 984, 986, and 988, all of which were submitted in earlier in year-2015), following upon which the present report is a fourth (supplementary) volume. Here-presented are scanned and tabulated geophysical and drilling records (presented as **Tables 3-1** and **A-1**, and as scanned images on the accompanying optical data disc) concerning previously-undocumented year-1997 historic drilling.

Information within this report is derived from hard-copy exploration files assembled by Pine Valley Coal Ltd., which although suspected to be incomplete are still a relevant addition to the technical record. The present report does not concern disturbant exploratory work, which has already been documented in Coal-Assessment Reports No. 984, 986, and 988. No additional disturbant work is known to have been done since the submission of those reports, and at the moment no further exploratory work plans have been made.

### 2.1 Scope of report

This report has been compiled and submitted by Willow Creek Coal Partnership (WCCP) in keeping with the provisions of the *Coal Act* and the *Coal Act Regulation*, with respect of exploratory activities on Crown coal tenures within British Columbia.

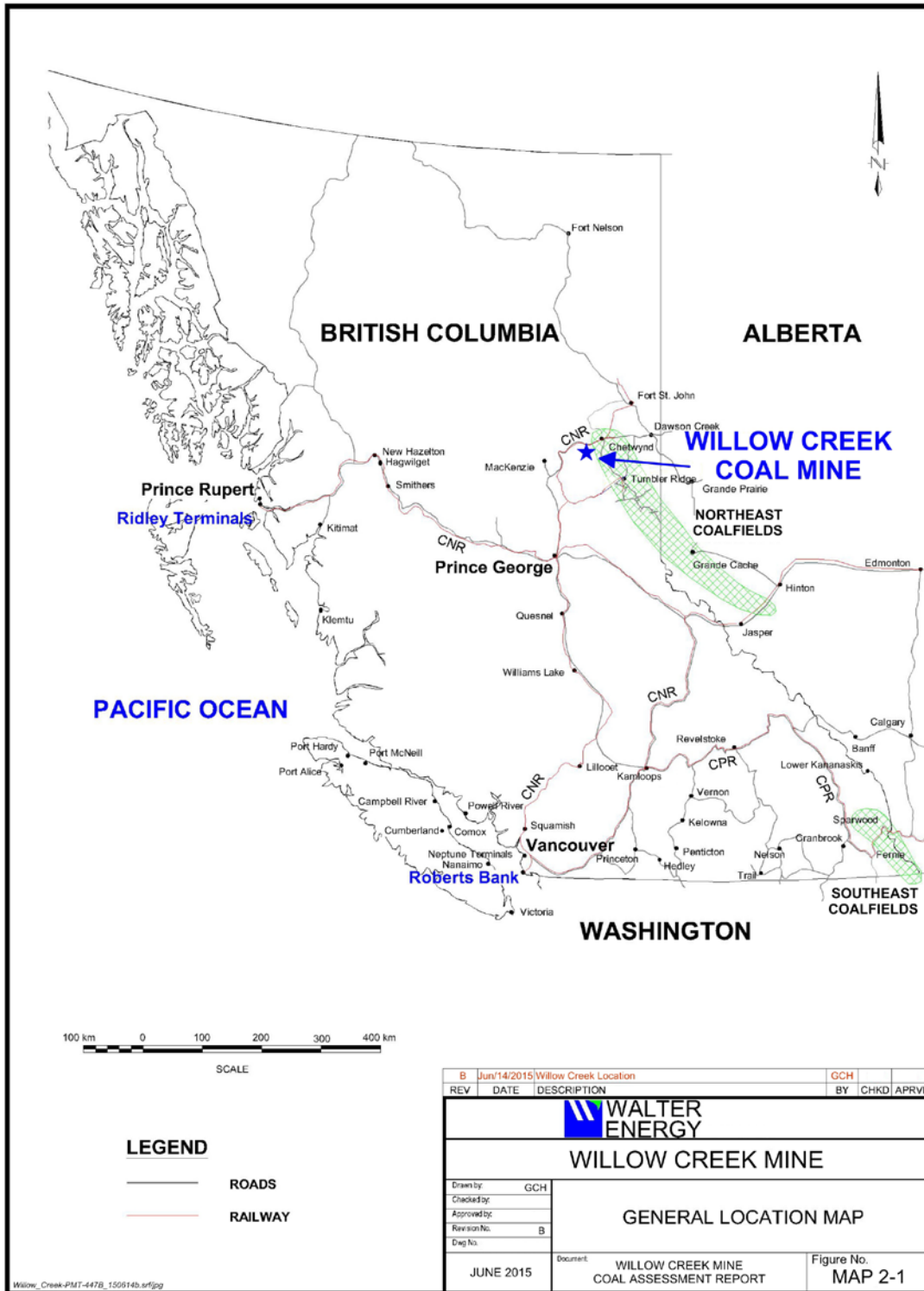
### 2.2 Situation and objectives

The Willow Creek coal lease (**Map 2-1**) is located in the Peace River region of northeastern British Columbia, an area which has seen considerable coal-exploration activity since the late 1960s. Walter Energy Inc., and predecessor and associated firms such as Willow Creek Coal Partnership, have for some years operated metallurgical-coal mines within this area. From 1980 onward to 2013, the Willow Creek lease has been drilled for coal (as reported in Coal Assessment Reports 984, 986, and 988).

### 2.3 Property description

The Willow Creek coal lease (Tenure 389294), is situated within the Liard Mining District of northeastern British Columbia, lying within the eastern half of map-area 930/9 of Canada's National Topographic System. The aggregate area of the Willow Creek coal lease is 6151 hectares. Tenure 389294 (detailed in **Table 2-1**) was granted by the Crown on March 31, 1998.

Coal assessment report for the Willow Creek coal lease -- Volume 4: Year-1997 borehole records



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

Tenure Number	Map	Block	Units	Date Acquired	Area (hectares)	Former coal lease number
389294 (84 units)	930/9E	B	61, 62, 63, 64, 71, 72, 73, 74, 81, 82, 83, 84, 85, 86, 87, 88, 91, 92, 93, 94, 95, 96, 97, 98	March 31, 1998	6151	Coal Lease 15
	930/9 W	F	1, 2, 11, 12, 21, 22, 31, 32, 41, 42, 51, 52, 61, 62, 63, 64, 71, 72, 73, 74, 83, 84, 93, 94			
	930/9E	G	3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 25, 26, 27, 28, 29, 30, 35, 36, 37, 38, 39, 40, 47, 48, 49, 50, 57, 58, 59, 60			
Totals:	1 tenure		84 units		6,151 hectares	

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

## 2.4 Geological synopsis of the Willow Creek coal lease

Near-surface sedimentary rocks within and adjacent to the Willow Creek coal lease are of Lower Cretaceous age, comprising (from youngest to oldest) the basal formations of the Fort St. John Group, and the entirety of the Bullhead Group, and the uppermost part of the Minnes Group (refer to the table of formation, presented as **Table 4-1**).

Other than the coals which have been the focus of exploratory activities within at Willow Creek, associated sedimentary rocks comprise conglomerates, sandstones, siltstones, mudstones, carbonaceous mudstones, concretionary ironstone, accompanied by thin but distinctive bands of igneous tuff. Marine mudstones and siltstones occur within the Fort St. John Group (Wickenden and Shaw, 1943; Hughes, 1963). The local occurrence of bioturbated mudstones and siltstones in the basal half of the Gething Formation's Gaylard Member hints at the presence of marine conditions during deposition. The facies of the majority of the Gaylard Member, and also of the underlying Cadomin and Bickford formations, are otherwise fluvial.

Bedrock at Willow Creek is moderately- to complexly-deformed. Southwest-verging thrust-faults, some of which may be folded, and associated northwest-striking, southwest-verging folds predominate within the open-pit workings of Willow Creek Mine, consistent with a structural setting within a passive-roof duplex system. Folding of the near-surface thrust-faults, and refolding of some of the folds, are very likely the result of tectonic ramping of younger, underlying, northeast-verging thrust-faults. The opposing vergences of the shallow and deep structures is consistent with the triangle-zone structure which is well-established to be present within the Pine Pass area (McMechan, 1985; Lingrey, 1996).

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

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

## **2.5 Location and access**

Chetwynd town, located on Highway 97 and situated approximately 50 kilometres northeast of the Willow Creek coal lease, is the closest incorporated settlement to Willow Creek Mine (**Map 2-1**). Chetwynd's population was reported as 2,633 persons in the year-2006 census. In the context of more-distant communities within British Columbia, the Willow Creek lease is located 130 kilometres south of Fort St John, 95 kilometres west of Dawson Creek, and 315 kilometres northeast of Prince George. Vancouver is situated 730 kilometres to the south-southwest of the property. Commercially-scheduled aircraft flights connect Vancouver to Fort St. John.

A coal-loading facility is situated on the southern bank of the Pine River, 5 kilometres to the northeast of Willow Creek Mine. This loadout site, which fills railway cars with coal produced from Brule Mine and from the Willow Creek coal washery, allows rail access to ports along the Pacific Coast of Canada, and elsewhere within the North American railway network. CN Rail are the operator of the former BC Rail line to which the loadout site is connected.

## **2.6 Climate**

The nearest climate station to the Willow Creek lease is at Chetwynd, with 'cool continental' climate of frigid winters and warm summers. Average annual rainfall and snowfall at Chetwynd are 306 millimetres and 169 centimetres respectively. The average frost free period ranges between 84 to 91 days, and about 30 foggy days are expected per year. The mean daily temperature at Chetwynd is 15.4 C in July and -10.7 C in January. Winter temperatures below -40C are not uncommon, with the coldest weather occurring in January and February of most years. The Pine Pass area in general, and Willow Creek in particular, is susceptible to episodes of freezing rain and sleet, which at times render highway travel difficult.

## **2.7 Landforms and forest cover**

The Willow Creek coal lease lies within the Inner Foothills of the Rocky Mountains. Topography comprises deeply-dissected, steep-sided, rounded hills and mountains. Prior to land-clearance in advance of mining operations, the lease area was heavily forested, chiefly with lodgepole pine, trembling aspen, balsam poplar, white and black spruce, and tamarack.

The property lies within Tree Farm Licence 48, part of the Dawson Creek Timber Supply Area. Some cut-blocks have been operated for timber harvesting. As a result, forest cover exhibits a range of ages and states of maturity.

## 2.8 Acknowledgements and professional responsibility

Thanks are due to Mr. Preetpal Singh, formerly data analyst at Walter Energy, who scanned the borehole records presented within this report, and who compiled the listing (**Table A-1**) of geophysical logs. Thanks are also due to Mr. Francis Eshun P.Geol., formerly mine geologist at Walter Energy, who with Mr. Singh retrieved archived exploratory records from minesite buildings at Willow Creek. Gwyneth Cathyl-Huhn P.Geol. (BC) Lic.Geol. (WA) RMSME accepts professional responsibility for data and conclusions presented within this report.



### 3 Summary of year-1997 drilling

Exploration history of the Willow Creek coal property has been previously reported in Coal Assessment Reports No.984 (Willow South area, by Cathyl-Huhn, 2015), No.986 (Willow West area, by Cathyl-Huhn, LeMay, and Singh, 2015a) , and No.988 (Willow Creek Mine, by Cathyl-Huhn, LeMay, and Singh, 2015b). Year-1997 drilling, records of which are presented in this report, took place in all three of those areas within the Willow Creek coal lease.

Locations are known for some of the year-1997 boreholes, but many (including the majority of cored coal-quality boreholes) do not yet have locational details associated with their geological and/or geophysical records. Logs of the year-1997 boreholes are held in hard-copy format within Pine Valley Coal Ltd.'s technical files, but heretofore have not been available in scanned format via the British Columbia Geological Survey Branch's COALFILE coal-assessment reporting system, and it is possible that the borehole records were either accidentally misfiled some years ago, or were not previously submitted to the Province.

**Table 3-1:** Year-1997 borehole statistics

Area	Core drilling		Rotary drilling		All boreholes	
	Number of boreholes	Total metres	Number of boreholes	Total metres	Number of boreholes	Total metres
Willow South	2	81.00	25	879.00	27	960.00
Willow West	1	129.57	25	652.35	26	781.92
Willow Mine	73	2052.30	67	3119.88	140	5172.18
<b>Totals</b>	<b>76</b>	<b>2262.87</b>	<b>117</b>	<b>4651.23</b>	<b>193</b>	<b>6914.10</b>

*Note: this table is compiled from data presented in Coal Assessment Reports 984, 986, and 988.*

In all, 193 boreholes, totalling 6914.10 metres' length (**Table 3-1**) are known to have been drilled within the three sub-areas of the Willow Creek coal lease.

#### 3.1 Borehole geophysics

Scanned copies of available downhole geophysical logs are presented in **Appendix A**, with an inventory of logs presented as **Table A-1**.

#### 4 Table of Formations

Geology of the Willow Creek coal lease, and of the surrounding areas of northeastern British Columbia, is summarised in **Section 2.4**, above, and discussed in greater detail within the previously-submitted Coal Assessment Reports Nos. 984, 986, and 988, to which reference may be made.

**Table 4-1:** Table of formations and subdivisions

Group/Formation/Member		Map-unit	Lithology and thickness			
Quaternary Drift		D	Alluvium; lodgement till; moraines; talus; glaciolacustrine silts, up to ?150 m thick within Pine Valley.			
Fort St. John Group	Hasler Fm.		8a	Siltstone and mudstone; minor sandstone; ironstone as bands of concretions; at least 180 m thick		
	Boulder Creek Fm.		7	Sandstone and siltstone; conglomerate; coal; 75 to 95 m thick	<i>Presence of coal not yet proven at Willow Creek</i>	
	Hulcross Fm.		6	Siltstone and mudstone; minor sandstone and tuff; basal pebbly gritstone; 120 to 130 m thick		
	Gates Fm.		5	Siltstone, sandstone and conglomerate; minor coal; 190 to 230 m thick	<i>Presence of coal not yet proven at Willow Creek</i>	
	Moosebar Fm.	Spieker Mb.		4c	Siltstone, sandstone; minor mudstone; 60 to 90 m thick	<i>May be locally structurally-thickened due to internal thrust-induced telescoping, or repeated outright by thrusting. Possible detachment zones at base of Cowmoose Member and Bullmoose Member.</i>
		Cowmoose Mb.		4b	Mudstone; minor tuff and ironstone; erosive-based basal glauconitic grit; 80 to 100 m thick	
		Green Marker		4a	Locally-glauconitic siltstone and sandstone; 0.1 to 1 m thick	
		Chamberlain Mb.		4 3d	Sandstone and siltstone; 3 to 6 m thick	
Bullmoose Mb.		3c	Siltstone and sandstone; mudstone; minor tuff; 100 to 120 m thick			
Bluesky Fm.		3b	Glauconitic sandstone and gritstone; siltstone and mudstone; 1 to 8 m thick			
Bullhead Group	Gething Fm.	Gaylard Mb.	3a	3a5	Siltstone, sandstone, mudstone and coal (zones 'Bird' and 1 through 4); minor tuff	
				3a4	Siltstone and mudstone; coal (zones A, 5 and 6)	
				3a3	Sandstone; minor siltstone and mudstone; coal (zones 7 and 8)	
				3a2	Siltstone and mudstone; minor sandstone and coal (zone 9)	
				3a1	Basal sandy unit: sandstone and siltstone; minor coal (zones 10 to 12 -- correlations tentative)	
	Cadomin Fm.		2	Gritty to pebbly, siliceous sandstone and sandy conglomerate with distinctive 'blocky' gamma-log response; minor siltstone and coal; 2.5 to 14? m thick; erosional base		
Minnes Gp.	Bickford Fm.		1	Siltstone, sandstone, conglomerate, and mudstone; minor coal; 285 to 300 m thick		
	Monach Fm.			Sandstone and conglomerate; siltstone; 210 to 260 m thick		
	Beattie Peaks Fm.			Siltstone, sandstone and mudstone; minor coal; 285 to 350 m thick		
	Monteith Fm.			Quartzite and sandstone; minor siltstone; 340 to 425 m thick		

Note: table revised October, 2015

## 5 Coal quality and coal-resource estimation

Scanned borehole records presented in **Appendix 'A'** of this report make reference to coal-quality sample intervals. Owing to the relatively old vintage of these records (year-1997), study and reconciliation of these historic samples to the vast body of historic analytical reports inherited by Walter Energy from Pine Valley Coal is thus far not brought to reportable completion, owing to lack of staff time to devote to the matter.

Future study of coal-quality data of this vintage would be rendered much easier if coordinate survey data could be located for the many cored boreholes whose positions are not presently known, as the correlation and comparison of analytical results is hampered by lack of knowledge of their spatial origin.

The present report does not address the estimation of coal resources. More detailed discussion of resources is presented in previously-submitted Coal Assessment Reports Nos. 984, 986, and 988.

## **6 Reclamation**

No additional information is here presented concerning reclamation of the year-1997 borehole sites, although it may be reasonably presumed that drill pads and access trails were deactivated, reclaimed, or in some cases stabilised for future re-use, according to the standards of the day.

## 7 Cost data

No additional cost data have been located in the course of the present study. Public records (*e.g.* historic coal-assessment reports) do not address the drilling, analytical and reclamation costs associated with the year-1997 drilling programme, although such costs can be expected to have been substantial, owing to the large number of boreholes drilled.

In the absence of readily-accessible historic cost template information for 1997-era work within northeastern coalfields of British Columbia, and given the demonstrably-incomplete state of the technical record, the author considers it not possible to make a meaningful back-calculation of programme costs.

## 8 References

The following reference materials were used in the compilation of this report, with citations given at relevant points within the report's text. All coal-assessment reports here cited are available in digital versions via the British Columbia Geological Survey Branch's webspace, with the exception that year-2015 reports are still confidential at the time of this writing, with expected public release in 2018.

### **Cathyl-Huhn, C.G.**

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

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

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

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

### **Hughes, J.E.**

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

### **James, K.**

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

### **Jordan, G. and Acott, P.**

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

### **Lingrey, S.**

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

### **McKechnie, N.D.**

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

### **McMechan, M.E.**

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

### **Wallis, G.R. and Jordan, G.R.**

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

### **Wickenden, R.T.D. and Shaw, G.**

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

## **9 Conclusions**

As this report mainly concerns the assembly of archival exploratory data, minimal conclusions are warranted, other than to note that the year-1997 drilling records still lack complete positional details. Given the current state of knowledge, it remains unclear whether all of the year-1997 boreholes were surveyed for location and elevation -- this is an obvious obstacle to their utility.

## 10 Statement of qualifications

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

- a) I am currently employed on a full-time basis by Walter Canadian Coal Partnership, a subsidiary of Walter Energy Inc., in their Canadian head office in Tumbler Ridge, British Columbia.
- b) This certificate applies to the current report, titled *Coal Assessment Report for the Willow Creek coal lease -- Volume 4: Year-1997 borehole records*, dated October 21, 2015.
- c) I am a member (Professional Geoscientist, Licence No.20550) of the Association of Professional Engineers and Geoscientists of British Columbia, licensed as a geologist (Licence No.2089) in Washington State, a member (No.152081) of the Association for Iron & Steel Technology, and a founding Registered Member of the Society for Mining, Metallurgy and Exploration (SME, Member No.518350). I have worked as a colliery geologist in four countries for over 37 years since my graduation from university.
- d) I certify that by reason of my education, affiliation with professional associations, and past relevant work experience, having written numerous published and private geological reports and technical papers concerning coalfield geology, coal-mining geology and coal-resource estimation, that I am qualified as a Qualified Person as defined by Canadian *National Instrument 43-101* and a Competent Person as defined by the Australian *JORC Code*.
- e) I have worked as senior colliery geologist for Walter Canadian Coal Partnership's Canadian operations since November of 2011.
- f) My most recent visit to the Willow Creek coal property was in the summer of 2014.
- g) I am the author of this report, titled *Coal Assessment Report for the Willow Creek coal lease -- Volume 4: Year-1997 borehole records*, dated October 21, 2015, concerning the Willow Creek coal property.
- h) I accept professional responsibility for this report.
- i) As of the date of this report, I am not independent of Walter Canadian Coal Partnership and Walter Energy, pursuant to the tests in Section 1.4 of *National Instrument 43-101*, for the reason that I am a full-time employee of Walter Canadian Coal Partnership.
- j) The effective date of this report is October 21, 2015.

“original signed and sealed by”

Dated this 21st day of October, 2015.

C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME



## Appendix A: Geophysical logs and borehole statistics

Geophysical logging and the pertinent statistics of the known year-1997 boreholes are summarised in **Table A-1** (commencing on the following page). Copies of the geophysical logs are submitted as digital files on a CD (optically-readable compact disk) accompanying this report, PDF format. PDF is a secondary format, derived from scanning of hard-copy logs from Pine Valley Coal Ltd.'s files.

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

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

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

Year-1997 borehole details and logs run: **Table A-1**

Borehole	UTM NAD83 (Zone 10) in metres		metres		degrees		Drilling method	Area	Pit	Comments	Density/ Gamma/ Caliper/ Resistivity	Gamma/ Density (through rods)	Gamma/ Neutron	Gamma/ Neutron (through rods)	Deviation	Dipmeter	Borehole
	Easting	Northing	Elevation	Depth	Azimuth	Dip											
WRH97001	548885.5	6164057.56	739.25	40			Rotary	Willow Mine	7N		<i>geophysical logs not run</i>					WRH97001	
WRH97002	548891.17	6164021.8	735.43	34.52			Rotary	Willow Mine	7N		34.44			34.52	34.5		WRH97002
WRH97003	548839.34	6163987.78	732.93	40	32.3	-88.3	Rotary	Willow Mine	7N		35.45			35.6	35.5		WRH97003
WRH97004	548804.48	6163953.47	734.2	7			Rotary	Willow Mine	7N		<i>geophysical logs not run</i>					WRH97004	
WRH97005	548737.92	6163894.12	738.86	50			Rotary	Willow Mine	7N		<i>geophysical logs not run</i>					WRH97005	
WRH97006	548718.63	6163880.25	739.16	50	275.1	-89.1	Rotary	Willow Mine	7N		48.1			48.3	48.2		WRH97006
WRH97007	548664.9	6163816.75	738.58	40	156	-86.3	Rotary	Willow Mine	7N		39.38			39.78	39.7		WRH97007
WRH97008	548934.2	6163840.31	754.11	55	206.1	-60.5	Rotary	Willow Mine	7N		53.89			52.46	52.4		WRH97008
WRH97009	548968.91	6163867.84	757.45	65	171.9	-88.8	Rotary	Willow Mine	7N		62.43			62.61	62.6		WRH97009
WRH97010	549005.39	6163897.43	765.12	40	31.5	-87.5	Rotary	Willow Mine	7N		35.78			35.72	35.7		WRH97010
WRH97011	549141.52	6163976.43	794.84	40	45.1	-88.1	Rotary	Willow Mine	7N		35.54			35.68	35.6		WRH97011
WRH97012	549190.9	6164088.8	785.77	30	227.9	-59.3	Rotary	Willow Mine	4Nex		29.39			29.67	29.6		WRH97012
WRH97013	549237.05	6164135.65	796.69	36	257.3	-65.3	Rotary	Willow Mine	4N		33.67			33.95	33.9		WRH97013
WRH97014	549386.57	6163710.15	861.23	35	113	-88.1	Rotary	Willow Mine	4N		32.38			32.52	32.5		WRH97014
WRH97015	548968.95	6164465.24	708.65	40	277.3	-59.3	Rotary	Willow Mine	4Nex		35.1			35.02	35		WRH97015
WRH97016	548567.97	6163969.26	713.73	55	178.1	-60.7	Rotary	Willow Mine	7N		14.09			14.21	14.2		WRH97016
WRH97017	548698.77	6164118.81	708.28	65			Rotary	Willow Mine	7N		<i>geophysical logs not run</i>					WRH97017	
WRH97018	548729.81	6164151.32	709.75	70			Rotary	Willow Mine	7N		<i>geophysical logs not run</i>					WRH97018	
WRH97019	551874	6160247	1191	30	105.6	-87.7	Rotary	Willow South			29.59			30.21	30.2		WRH97019
WRH97020	551823	6160227	1183	30	73.4	-68.3	Rotary	Willow South			30.33			30.41	30.4		WRH97020
WRH97021	551247	6160279	1128	30	240.8	-59.1	Rotary	Willow South						29.85	29.8		WRH97021
WRH97022	551221	6160269	1126	14			Rotary	Willow South						11.52			WRH97022
WRH97023	551192	6160260	1122	24	154.7	-88.9	Rotary	Willow South			21.35			21.53	21.5		WRH97023
WRH97024	551161	6160241	1119	14			Rotary	Willow South									WRH97024
WRH97025	550987	6160102	1099	7			Rotary	Willow South									WRH97025
WRH97026	551124	6160211	1116	6	311.5	-89	Rotary	Willow South			5.81			5.87	5.8		WRH97026
WRH97027	551129	6160218	1116	18	107.9	-88.4	Rotary	Willow South			12.38			12.64	12.6		WRH97027
WRH97028	551279	6160288	1132	30	41.1	-87.7	Rotary	Willow South						28.87	28.8		WRH97028
WRH97029	551232	6160272	1127	26	172.5	-85	Rotary	Willow South			26.94			26.1	26.5		WRH97029
WRH97030	551492	6160248	1159	30			Rotary	Willow South			<i>geophysical logs not run</i>					WRH97030	
WRH97031	548520.2	6164407.17	658.41	74.76	91	-88.9	Rotary	Willow Mine	7N		74.64			74.76	74.7		WRH97031
WRH97032	548548.63	6164431.36	660.24	82.45	184.8	-89.5	Rotary	Willow Mine	7N		82.45			82.47	82.4		WRH97032
WRH97033	549183.67	6163822.68	829.71	35.3	248	-88.9	Rotary	Willow Mine	7N		35.1			35.3	35.2		WRH97033
WRH97034	549093.02	6163567.19	800.42	65.83	180.9	-88.9	Rotary	Willow Mine	7N		65.79			65.69	65.6		WRH97034
WRH97035	549116.25	6163618.75	805.25	39.7	295.9	-88.9	Rotary	Willow Mine	7N		39.64			39.7	39.6		WRH97035
WRH97036C	549181.44	6163820.11	829.89	25	326.5	-88.9	Core	Willow Mine	7N		25.01			24.97	24.9		WRH97036C
WRH97037C	549182.22	6163821.3	829.8	23.85	252.2	-89.2	Core	Willow Mine	7N		23.48			23.68	23.6		WRH97037C
WRH97038C	549451.11	6163903.98	824.24	11.73	337.2	-89.5	Core	Willow Mine	4N		11.54			11.44	11.4		WRH97038C
WRH97039C	549454.35	6163904.7	824.14	12.92	333.5	-88.7	Core	Willow Mine	4N		12.84			12.72	12.7		WRH97039C
WRH97040C	549447	6163903.11	824.34	9.87	334	-89.5	Core	Willow Mine	4N		9.65			9.79	9.7		WRH97040C

Year-1997 borehole details and logs run: **Table A-1** (continued)

Borehole	Easting	Northing	Elevation	Depth	Azimuth	Dip	Method	Area	Pit	Comments	Density/ Gamma/ Caliper/ Resistivity	Gamma/ Density (through rods)	Gamma/ Neutron	Gamma/ Neutron (through rods)	Deviation	Dipmeter	Borehole
WRH97041	548785.01	6163939.35	735.97	50.91	219.2	-89.4	Rotary	Willow Mine	7N		48.85			48.14	48.9		WRH97041
WRH97042	548754.39	6163907.14	737.86	44.2	189.5	-89.5	Rotary	Willow Mine	7N		44			44.06	44		WRH97042
WRH97043	550167.02	6161772.5	1076.89	116.46			Rotary	Willow Mine	7C-S		116.3			116.46			WRH97043
WRH97044	550191.65	6161794.92	1082.04	81.1	315.7	-89	Rotary	Willow Mine	7C-S		80.79			80.81	80.8		WRH97044
WRH97045	550277.78	6161875.63	1077.84	105.49	118.9	-89.2	Rotary	Willow Mine	7C-S		105.25			105.11	105.1		WRH97045
WRH97046C	550144.78	6161753.48	1078.5	38.55	246.9	-88.7	Core	Willow Mine	MO		38.55			38.63	38.6		WRH97046C
WRH97047	550045.8	6161218.95	1077.71	74.7	209.2	-89.5	Rotary	Willow Mine	PEN		74.21			74.29	74.2		WRH97047
WRH97048C	550202.28	6161311.16	1087.15	29.44	32.5	-89.4	Core	Willow Mine	PEN		29.15			29.29	29.2		WRH97048C
WRH97049	550298.18	6161222.71	1086.41	33			Rotary	Willow Mine	PEN	<i>missing file</i>							WRH97049
WRH97050	550205.76	6161064.95	1089.71	45.95	117.8	-88.8	Rotary	Willow Mine	PEN		45.75			45.73	45.9		WRH97050
WRH97051	553110	6159470	1100	69	171	-89.9	Rotary	Willow South			68.69			68.69	68.6		WRH97051
WRH97052	552247	6159915	1158	74	196.7	-89.3	Rotary	Willow South			74.11			74.11	74.1		WRH97052
WRH97053	552763	6159487	1120	1			Rotary	Willow South			<i>geophysical logs not run</i>					WRH97053	
WRH97054	552438	6159695	1132	64	318.9	-89.6	Rotary	Willow South			64.2			64.42	64.4		WRH97054
WRH97055	552114	6160395	1202	67	188.2	-88	Rotary	Willow South			66.67			67.02	67		WRH97055
WRH97056	551770	6160217	1180	67	311.3	-89	Rotary	Willow South			66.92			66.98	66.9		WRH97056
WRH97057C	552244	6159904	1157	61	277	-89.4	Rotary	Willow South			61.33			61.35	61.3		WRH97057C
WRH97058	550018.36	6162037.23	1060.51	102.44	198.2	-89.9	Rotary	Willow Mine	7C-N		102.07				102.1		WRH97058
WRH97059	550027.37	6161992.53	1058.64	72.6	194	-89	Rotary	Willow Mine	7C-N		71.96			72.71	72.8		WRH97059
<i>WRH97060</i>										<i>not drilled</i>							WRH97060
WRH97061	551453	6160207	1154	7			Rotary	Willow South									WRH97061
WRH97062	551415	6160198	1148	30	21.1	-84.7	Rotary	Willow South			21.95			29.67	29.6		WRH97062
WRH97063	551562	6160215	1169	23	200.7	-87	Rotary	Willow South			14.98			17.99	17.9		WRH97063
WRH97064	551633	6160180	1170	30	200.1	-84.9	Rotary	Willow South			29.97			30.01	30		WRH97064
WRH97065	551590	6160193	1168	30	204	-87.5	Rotary	Willow South			30.47			30.57	30.5		WRH97065
WRH97066	550315.29	6161935.13	1095.56	30	275.9	-88	Rotary	Willow Mine	7C-S		24.97			25.25	25.2		WRH97066
WRH97067	550205.72	6161585.08	1096.15	25	202	-84.5	Rotary	Willow Mine	MO		24.32			23.4	23.5		WRH97067
WRH97068	550278.88	6161146.23	1083.72	30	310.2	-88.3	Rotary	Willow Mine	PEN		27.18			27.58	27.6		WRH97068
WRH97069	550275.24	6161135.92	1083.37	30	310	-87.9	Rotary	Willow Mine	PEN		27.18			27.58	27.5		WRH97069
WRH97070	546515.88	6161621.95	775.61	30	41.1	-68.5	Rotary	Willow West			21.87			28.02	28		WRH97070
WRH97071	546546.31	6161648.85	774.84	18			Rotary	Willow West									WRH97071
WRH97072	548476.32	6160672.99	1015.22	30.49	60.1	-88.5	Rotary	Willow West			29.89			30.47	30.4		WRH97072
WRH97073	548505.16	6160692.9	1020.3	40	40.1	-64.6	Rotary	Willow West			36.74			9.81	9.8		WRH97073
WRH97074	548455.1	6160648.31	1019.43	20	20.9	-80.1	Rotary	Willow West			15.92			16.32	16.3		WRH97074
WRH97075	548425.44	6160620.59	1021.78	30	40.4	-77.7	Rotary	Willow West			23.98			24.3	24.2		WRH97075
WRH97076	548361.31	6160551.21	1017.91	30	342.5	-82	Rotary	Willow West			18.65			18.87	18.8		WRH97076
WRH97077	548387.49	6160581.88	1017.14	30	13.3	-79	Rotary	Willow West			23.38			24.66	24.6		WRH97077
WRH97078	548305.598	6160489.949	1019.1				Rotary	Willow West		<i>file missing</i>							WRH97078
WRH97079	548331.14	6160519.57	1018.35	30	21.3	-82	Rotary	Willow West			19.18			19.24	19.3		WRH97079

Year-1997 borehole details and logs run: **Table A-1** (continued)

Borehole	Easting	Northing	Elevation	Depth	Azimuth	Dip	Method	Area	Pit	Comments	Density/ Gamma/ Caliper/ Resistivity	Gamma/ Density (through rods)	Gamma/ Neutron	Gamma/ Neutron (through rods)	Deviation	Dipmeter	Borehole
WRH97080	548493.67	6160684.54	1019.75	23	63.6	-88	Rotary	Willow West			21.03			21.07	21		WRH97080
WRH97081	547489.91	6161708.13	883.61	24.86	232.4	-88	Rotary	Willow West			24.86			24.6	24.6		WRH97081
WRH97082	547498.75	6161737.46	885.47	30			Rotary	Willow West		<i>file missing</i>	<i>geophysical logs not run?</i>					WRH97082	
WRH97083	546856.74	6161546.36	856.24	30	12.5	-79.9	Rotary	Willow West			22.45			24.62	24.6		WRH97083
WRH97084	546836.8	6161519.21	857.54	35	271	-84.9	Rotary	Willow West			32.97			33.17	33.1		WRH97084
WRH97085	547095.38	6161318.41	884.23	20	250.7	-88.5	Rotary	Willow West			17.45			17.45	17.4		WRH97085
WRH97086	547552.06	6160774.3	966.84	20	50.4	-81	Rotary	Willow West			16.82			16.9	16.9		WRH97086
WRH97087	548348.5	6160537.94	1021.54	23	11.4	-79.7	Rotary	Willow West			8.76			21.15	21.1		WRH97087
WRH97088	548370.65	6160563.39	1016.28	28	342.8	-83	Rotary	Willow West			24.12			24.3	24.2		WRH97088
WRH97089	548443.24	6160635.76	1021.12	20	24.5	-83.7	Rotary	Willow West			16.3			18.15	18.1		WRH97089
WRH97090	548465.58	6160659.95	1018.33	30	41.4	-78.7	Rotary	Willow West			8.42			30.96	30.9		WRH97090
WRH97091	548484.89	6160679.8	1017.92	30	241.9	-84	Rotary	Willow West			25.83			25.91	25.9		WRH97091
WRH97092	548355.86	6160545.76	1020.06	20	14.2	-84	Rotary	Willow West			9.93			10.17	10.1		WRH97092
WRH97093	548221.37	6160381.92	1017.84	30	12.7	-81.9	Rotary	Willow West			23.72			23.76	23.7		WRH97093
WRH97094	546824.69	6161497.12	854.14	30	123	-86.7	Rotary	Willow West			23.54			23.74	23.7		WRH97094
WRH97095	551255	6160288	1128	103	39.9	-88.9	Rotary	Willow South			103.44			103.64	102.5		WRH97095
WRH97096C	546544.77	6161647.48	774.84	129.57	35.3	-78	Core	Willow West			129.31			129.39	129.3		WRH97096C
WRH97097	551486	6160243	1159	55	336	-87.9	Rotary	Willow South			54.8			55.26	55.2		WRH97097
WRH97098										<i>not drilled?</i>							WRH97098
WRH97099										<i>not drilled?</i>							WRH97099
WRH97100C	551396	6160431	1164	20			Core	Willow South			19.56			19.58			WRH97100C
WRH97101C				35	178.7	-89	Core				34.69			34.77	34.7		WRH97101C
WRH97102C	548954.7	6164457.28	709.56	33.53	194.2	-89.5	Core	Willow Mine	4N		32.36			32.97	32.9		WRH97102C
WRH97103C				33.48			Core	Willow Mine	4N								WRH97103C
WRH97104C				27.38			Core	Willow Mine	4N								WRH97104C
WRH97105C				29.42			Core	Willow Mine	4N								WRH97105C
WRH97106C				28.85			Core	Willow Mine	4N								WRH97106C
WRH97107C	548996.71	6164503.3	706.02	31.17			Core	Willow Mine									WRH97107C
WRH97108C				28.9			Core	Willow Mine									WRH97108C
WRH97109C				20.83			Core	Willow Mine									WRH97109C
WRH97110C				23.87			Core	Willow Mine									WRH97110C
WRH97111C				23.47			Core	Willow Mine									WRH97111C
WRH97112C				19.71			Core	Willow Mine									WRH97112C
WRH97113C							Core	Willow Mine		<i>file missing</i>							WRH97113C
WRH97114C				19.51			Core	Willow Mine									WRH97114C
WRH97115C				20.65			Core	Willow Mine									WRH97115C
WRH97116C				8.24			Core	Willow Mine									WRH97116C
WRH97117.1C				11.81			Core	Willow Mine									WRH97117.1C
WRH97117C				8.23			Core	Willow Mine									WRH97117C

Year-1997 borehole details and logs run: **Table A-1** (continued)

Borehole	Easting	Northing	Elevation	Depth	Azimuth	Dip	Method	Area	Pit	Comments	Density/ Gamma/ Caliper/ Resistivity	Gamma/ Density (through rods)	Gamma/ Neutron	Gamma/ Neutron (through rods)	Deviation	Dipmeter	Borehole
WRH97118C	549846.98	6162765	1087.17	15.32			Core	Willow Mine									WRH97118C
WRH97119C	549847.85	6162766.2	1087.16	23.42			Core	Willow Mine	7N								WRH97119C
WRH97120C				25.23			Core	Willow Mine	7N								WRH97120C
WRH97121C				19.8			Core	Willow Mine	7N								WRH97121C
WRH97122C				39.42			Core	Willow Mine									WRH97122C
WRH97123C				26.87			Core	Willow Mine									WRH97123C
WRH97124C				37.79			Core	Willow Mine									WRH97124C
WRH97125C				38.1			Core	Willow Mine									WRH97125C
WRH97126C				40.73			Core	Willow Mine									WRH97126C
WRH97127C				33.1			Core	Willow Mine									WRH97127C
WRH97128C				32.87			Core	Willow Mine									WRH97128C
WRH97129C				19.55			Core	Willow Mine									WRH97129C
WRH97130C				31.6			Core	Willow Mine									WRH97130C
WRH97131C				30.56			Core	Willow Mine									WRH97131C
WRH97132C				19.65			Core	Willow Mine									WRH97132C
WRH97133C				28.19			Core	Willow Mine	7C-N								WRH97133C
WRH97134C				28.53			Core	Willow Mine	7C-N								WRH97134C
WRH97135C				28.73			Core	Willow Mine	7C-N								WRH97135C
WRH97136C				37.96			Core	Willow Mine									WRH97136C
WRH97137	548571.47	6164440.52	662.44	41	57.9	-87	Rotary	Willow Mine	7N		39.4			39.62	39.6		WRH97137
WRH97138	548780.36	6164459.79	702.72	20	30	-89.4	Rotary	Willow Mine	7N		19			18.81	18.7		WRH97138
WRH97139	548756.59	6164429.71	700.19	20	120	-88.2	Rotary	Willow Mine	7N		18.6			18.43	18.4		WRH97139
WRH97140	548730.42	6164399.34	698.41	20	111.6	-88	Rotary	Willow Mine	7N		18.9			18.73	18.7		WRH97140
WRH97141	548764.71	6164188.22	716.09	60	54.5	-87	Rotary	Willow Mine	7N		57.39			57.33	57.3		WRH97141
WRH97142	548762.29	6164154.33	713.66	50	172	-89.1	Rotary	Willow Mine	7N		49.45			49.47	49.4		WRH97142
WRH97143	548728.38	6164151.66	710.25	60	30.4	-86.5	Rotary	Willow Mine	7N		59.64			59.68	59		WRH97143
WRH97144	548855.46	6164599.07	683.71	5			Rotary	Willow Mine	4N	<i>file missing</i>							WRH97144
WRH97145	548804.94	6163955.43	737.57	5			Rotary	Willow Mine	7N	<i>file missing</i>							WRH97145
WRH97146	548669.2	6163816.01	738.58	51.7	240.1	-56	Rotary	Willow Mine	7N		51.7			51.76	51.7		WRH97146
WRH97147	549165.65	6163746.9	822.34	15.85	160.5	-88.6	Rotary	Willow Mine	7N		14.98			14.83	14.8		WRH97147
WRH97148	549152.3	6163729.04	822.95	14.02	110.6	-89	Rotary	Willow Mine	7N		13.65			13.65	13.6		WRH97148
WRH97149	549195.23	6163843.3	829.36	20.12	199	-88.4	Rotary	Willow Mine	7N		19.72			19.68	19.6		WRH97149
WRH97150	549057.05	6163941.26	784.97	64.62	73	-84.6	Rotary	Willow Mine	7N		64.42			64.38	64.3		WRH97150
WRH97151	549075.78	6163955.38	792.82	31.08	127.2	-89	Rotary	Willow Mine	7N		31.06			31.08	31		WRH97151
WRH97152	548941.72	6164102.13	756.88	34.14	225.2	-62	Rotary	Willow Mine	7N		33.61			33.63	33.63		WRH97152
WRH97153	548645.7	6164333.12	695.05	50	17.7	-89	Rotary	Willow Mine	7N		43.24			43.24	43.2		WRH97153
WRH97154	548621.72	6164314.14	690.39	70.59	305.6	-89	Rotary	Willow Mine	7N		70.59			70.55	70.5		WRH97154
WRH97155	548620.96	6164314.49	691.08	75.98	236.5	-57	Rotary	Willow Mine	7N		75.98			76.04	76		WRH97155
WRH97156	548544.65	6164403.85	659.67	46.6	60.4	-88.5	Rotary	Willow Mine	7N		46.33			46.37	46.3		WRH97156

Year-1997 borehole details and logs run: **Table A-1 (concluded)**

Borehole	Easting	Northing	Elevation	Depth	Azimuth	Dip	Method	Area	Pit	Comments	Density/ Gamma/ Caliper/ Resistivity	Gamma/ Density (through rods)	Gamma/ Neutron	Gamma/ Neutron (through rods)	Deviation	Dipmeter	Borehole
WRH97157	549026.46	6163920.04	771.88	37	119.9	-89.1	Rotary	Willow Mine	7N		35.68			35.68	35.6		WRH97157
WRH97158	548835.46	6163761.77	766.36	52	237.2	-60	Rotary	Willow Mine	7N		51.88			51.92	51.9		WRH97158
WRH97159	548757.56	6163697.02	774.64	65	225.8	-55	Rotary	Willow Mine	7N		63.22			63.74	59		WRH97159
WRH97160	548873.15	6163789.46	766.06	32.6	219.8	-59.8	Rotary	Willow Mine	7N		32.08			32.04	32		WRH97160
WRH97161	548897.21	6163803.67	764.02	46.6	154.3	-89	Rotary	Willow Mine	7N		46.21			46.19	46.1		WRH97161
WRH97162	549025.62	6163760.93	782.22	30.63	129.3	-88	Rotary	Willow Mine	7N		30.61			30.63	30.6		WRH97162
WRH97163	548892.07	6164352.46	736.17	34.44	257.2	-88.6	Rotary	Willow Mine	7N		34.15			34.15			WRH97163
WRH97164	548572.15	6164257.32	688.99	39.01	91.6	-88.6	Rotary	Willow Mine	7N		38.47			38.51	38.4		WRH97164
WRH97165	548529.72	6164213.5	687.52	48.77	222	-58.6	Rotary	Willow Mine	7N		48.4			48.58	48.5		WRH97165
WRH97166	548482.97	6164169.97	681.39	45.72	234	-59.3	Rotary	Willow Mine	7N		45.39			45.33	45.3		WRH97166
WRH97167C	548497.94	6164400.28	657.83	35.5	77.5	-88.6	Core	Willow Mine	7N		35.08			35.1	35		WRH97167C
WRH97168C	548964	6164127	756.25	29.92	220.5	-89.3	Core	Willow Mine	7N		30.03			30.05	30		WRH97168C
WRH97169C				21.79			Core	Willow Mine									WRH97169C
WRH97170C				44.12			Core	Willow Mine									WRH97170C
WRH97171C				49.73			Core	Willow Mine									WRH97171C
WRH97172C				48			Core	Willow Mine									WRH97172C
WRH97173C				44.9			Core	Willow Mine									WRH97173C
WRH97174C				42.24			Core	Willow Mine		6-inch-core							WRH97174C
WRH97175C				40.61			Core	Willow Mine		6-inch-core							WRH97175C
WRH97176C				38.39			Core	Willow Mine		6-inch-core							WRH97176C
WRH97177C				25.05	333	-89.8	Core	Willow Mine			25.05				25	24	WRH97177C
WRH97178C				22.93			Core	Willow Mine		6-inch-core							WRH97178C
WRH97179C				21.94			Core	Willow Mine									WRH97179C
WRH97180C				23.17			Core	Willow Mine		6-inch-core							WRH97180C
WRH97181C				21.94			Core	Willow Mine									WRH97181C
WRH97182C				36.34	88.7	-88.5	Core	Willow Mine		6-inch-core	36.34				36.2		WRH97182C
WRH97183C				36.66			Core	Willow Mine		6-inch-core							WRH97183C
WRH97184C				37.18			Core	Willow Mine		6-inch-core							WRH97184C
WRH97185C				37.18			Core	Willow Mine									WRH97185C
WRH97186C				33.37	251.3	-89.6	Core	Willow Mine		6-inch-core	32.74				32.8		WRH97186C
WRH97187C				35.25			Core	Willow Mine									WRH97187C
WRH97188C				37.18			Core	Willow Mine									WRH97188C
WRH97189C				36.84	206	-88.8	Core	Willow Mine			36.54				36.4		WRH97189C
WRH97190C				24.5	336	-89.4	Core	Willow Mine			24.26				23	23	WRH97190C
WRH97191C				24.53	170.8	-89.1	Core	Willow Mine			23.04				22.8		WRH97191C
WRH97192C				28.8	138	-89.9	Core	Willow Mine			28.52				28		WRH97192C
WRH97193C				21.79			Core	Willow Mine									WRH97193C
WRH97194C				39.62			Core	Willow Mine									WRH97194C
WSH97008							Core	Willow Mine									WSH97008