

**Memorandum Report of Work 2020**

**on the**

**Dempster Vanadium Property**

**DV1 to 100 YF75801 to YF75900  
DV101 to 196 YE94041 to YE94136**

**in the**

**Dawson Mining District, Yukon**

**NTS Sheet 116I16  
66°54' N. Lat., 136°18' W. Long.**

**Operator**

**DVY196 Holdings Ltd. (100%)**

**by**

**Mark Fekete, P.Geol. and Marty Huber, P.Geol.**

**March 30, 2021**

**YMEP Grant No. 2020-020**

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**Table of Contents**

<i>Table of Contents</i> .....	<i>i</i>
<i>List of Figures</i> .....	<i>i</i>
<i>List of Tables</i> .....	<i>ii</i>
<i>Certificate of Qualifications</i> .....	<i>iii</i>
<i>Certificate of Qualifications</i> .....	<i>iv</i>
1. Introduction and Terms of Reference.....	1
2. Location, Access and Claim Information.....	1
3. Exploration History .....	3
4. Geological Setting and Mineralization.....	5
5. Deposit Type.....	8
6. 2020 Exploration.....	9
6.1. Introduction .....	9
6.2. Surface Rock and Soil Geochemistry Procedures.....	12
6.3. McGill Study Procedures.....	12
7. Results.....	13
7.1. Surface Rock and Soil Geochemistry Results .....	13
7.2. McGill Study Results.....	24
8. Interpretation and Conclusions .....	24
8.1. Rock and Soil Geochemistry Discussion .....	24
8.2. McGill Study Discussion .....	24
9. Recommendations.....	24
10. References.....	25
Appendix A: Rock and Soil Descriptions	
Appendix B: Analytical Certificates	
Appendix C: McGill Study	

**List of Figures**

Figure 1: Location Map.....	1
Figure 2: Claim Map.....	2
Figure 3: Compilation of previous work .....	4
Figure 4: Regional geology .....	5
Figure 5: Stratigraphic section (after Dumala, 2007a).....	6
Figure 6: Property geology .....	7
Figure 7: Vanadium mining and advanced exploration projects (after Kerr et al., 2013)) .....	9
Figure 8: 2020 Rock sample locations .....	10
Figure 9: Soil sample locations 2020 .....	11
Figure 10: 2020 Vanadium in rock, Héon site.....	14
Figure 11: 2020 Zinc in rock, Héon site .....	15
Figure 12: 2020 Silver in rock, Héon site .....	16
Figure 13: 2020 Ni in rock, Héon site.....	17
Figure 14: 2020 Vanadium in soil .....	18
Figure 15: 2020 Zinc in soil .....	19
Figure 16: 2020 Silver in soil.....	20
Figure 17: 2020 Nickel in soil.....	21
Figure 18: 2020 Barium in soil .....	22
Figure 20: 2020 Vanadium rock and soil compilation .....	23

**List of Tables**

Table 1: Claim information ..... 3  
Table 2: Weight averages for selected elements ..... 3  
Table 3: McGill study samples ..... 13  
Table 4: Soil correlation matrix ..... 13  
Table 5: Cost Estimate ..... 25

### **Certificate of Qualifications**

I, Mark Fekete, having my place of residence at 4281 rue Saint-Hubert in Montréal in the Province of Quebec do hereby certify that:

1. I obtained a Bachelor of Science Degree in Geology from the University of British Columbia (1986), I have been engaged as a Geologist continuously since 1986, I am a Member in good standing of the Order of Geologists of Quebec (OGQ #553) and the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC #31440), and I am a “qualified person” as defined in Section 1.2 in and for the purposes of National Instrument 43-101;
2. I inspected the Dempster Vanadium property most recently over a six-day period ending September 14, 2019;
3. I co-wrote this technical report entitled “Report of Work 2020 on the Dempster Vanadium Property, DV1 to 100 (YF75801 to YF75900) and DV101 to 196 (YE94041 to YE94136) in the Dawson Mining District, Yukon” based on my professional experience, a review of relevant reports and maps made available to me from government and corporate sources and my participation in the work programs described in the report;
4. I am not aware of any material fact or material change with respect to the subject matter of the report that is not disclosed in the report which, by its omission, makes the report misleading;
5. I hold a direct interest in the Dempster Vanadium property as a result of my current involvement with the Property; and
6. I have read, and this report has not been prepared for the purposes, nor in full compliance with, National Instrument 43-101 and according to Form 43-101F1.

Respectfully submitted this 30<sup>th</sup> day of March 2021,

***(s) “Mark Fekete”***

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Mark Fekete, P.Geo.

### **Certificate of Qualifications**

I, Marty Huber, having my place of residence at 16 Flax Mill Dr. in Conestogo in the Province of Ontario do hereby certify that:

1. I obtained a Bachelor of Science Degree in Geology from Acadia University (2011) and a Master of Science Degree in Mineral Exploration from Laurentian University (2018), I have been engaged as a Geologist continuously since May 2011, I am a Member in good standing of the Association of Professional Geoscientists of Nova Scotia (APGNS #232), and I am a “qualified person” as defined in Section 1.2 in and for the purposes of National Instrument 43-101;
2. I inspected the Dempster Vanadium property most recently over a eight-day period ending August 11, 2020;
3. I co-wrote this technical report entitled “Report of Work 2020 on the Dempster Vanadium Property, DV1 to 100 (YF75801 to YF75900) and DV101 to 196 (YE94041 to YE94136) in the Dawson Mining District, Yukon” based on my professional experience, a review of relevant reports and maps made available to me from government and corporate sources and my participation in the work programs described in the report;
4. I am not aware of any material fact or material change with respect to the subject matter of the report that is not disclosed in the report which, by its omission, makes the report misleading;
5. I hold a direct interest in the Dempster Vanadium property as a result of my current involvement with the Property; and
6. I have read, and this report has not been prepared for the purposes, nor in full compliance with, National Instrument 43-101 and according to Form 43-101F1.

Respectfully submitted this 30<sup>th</sup> day of March 2021,

(s) “Marty Huber”

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Marty Huber, P.Geo.

## 1. Introduction and Terms of Reference

This technical report (the “Report”) describes the exploration work done in 2020 on the Dempster Vanadium property (the “Property”) in Northeastern Yukon. It was prepared by Breakaway Exploration Management Inc. at the request of DVY196 Holdings Corp. It was written to satisfy assessment work requirements under the Yukon Quartz Mining Act and is not intended for the purposes of National Instrument 43-101 nor is it in accordance with Form 43-101F1. The work was partially funded by a Yukon Mining Exploration Program (“YMEP”) grant No. 2020-020

The Report refers to publicly available data primarily found on the Yukon Energy Mines and Resources (n.d.) website. The discussion of past exploration, geological setting and mineralization is largely derived from Dumala (2007a) and Dumala (2007b) and Héon (2006). Field work was done on the Property over an eight-day period ending August 11, 2020.

The goal of the exploration work was to evaluate the vanadium potential of the Property. Specifically, it focused on the areas of the Property where significant vanadium was previously found in surface and drill core samples. The work was done as a Class 1 activity that as such did not require a Quartz Mining Land Use Permit or Class 1 Notification.

## 2. Location, Access and Claim Information

The Property is in Northern Yukon approximately 65 kilometres north of Eagle River (Figure 1). Excellent access is provided by the Dempster Highway that runs along the entire length of the Property. The distance to any point on the claim block from the highway is less than 1.8km.



Figure 1: Location Map

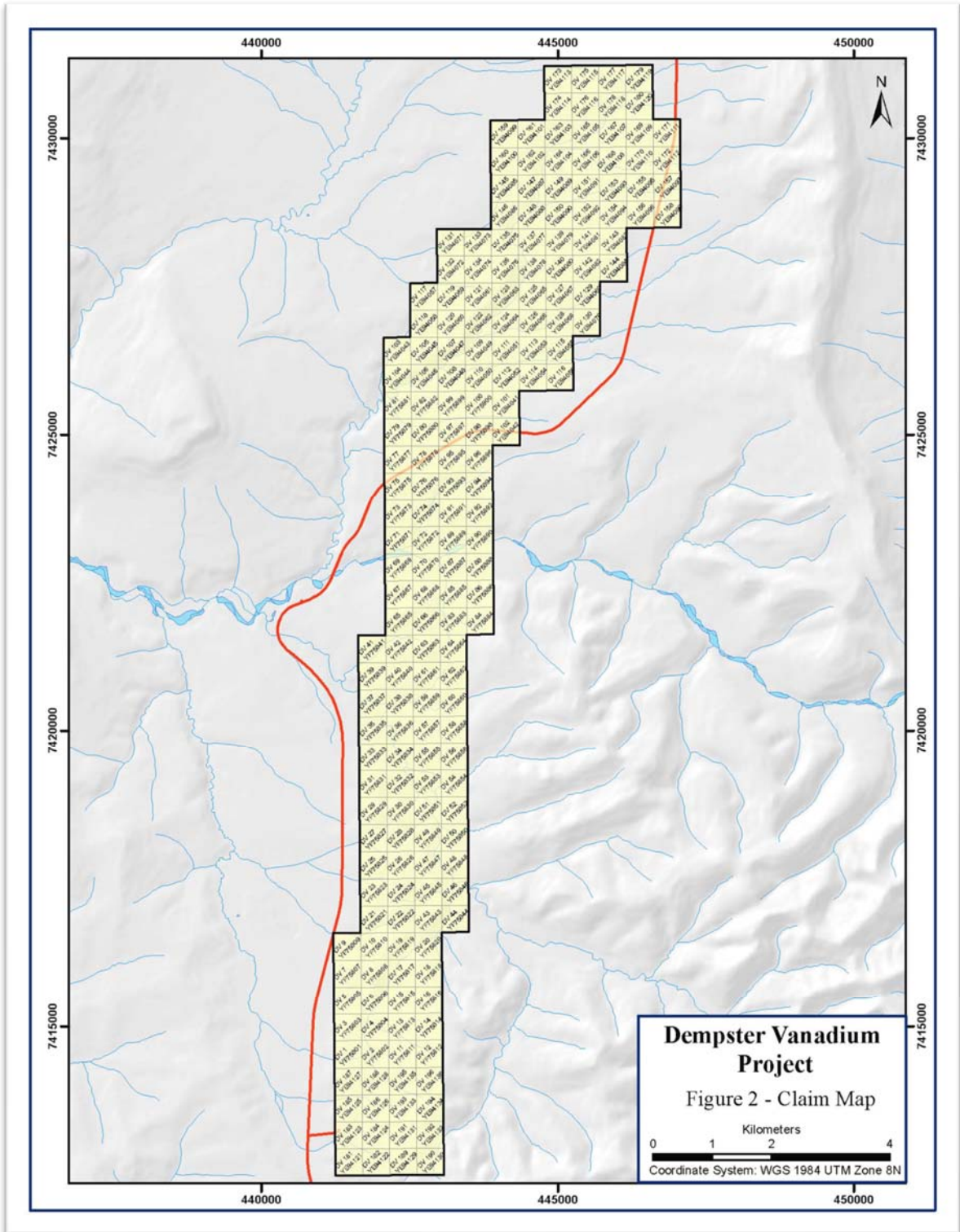


Figure 2: Claim Map

The Property includes 196 mineral titles covering an area of approximately 40.96km<sup>2</sup> detailed in Table 1 (Figure 2). Annual work assessment requirements are \$19,600, and filing fees are estimated at \$980. The claims are recorded to DVY196 Holdings Corp. (the “Company”), a corporation with registered office at 3081 Third Avenue, Whitehorse. Mark Fekete, P.Geo. and Marty Huber, P.Geo. (the “Authors”) are the principal shareholders of the Company.

**Table 1: Claim information**

Claim No.	Grant No.	Expiry Date
DV 1 to DV 100	YF75801 to YF75900	April 5, 2022
DV 101 to DV 196	YE94041 to YE94136	April 5, 2022

### 3. Exploration History

Previous work on the Property was focused on nickel mineralization but ignored the vanadium potential. Significant vanadium values were first reported by Héon (2006) from a road cut on the Dempster Highway at Km 450 where chip sampling returned 0.26% V<sub>2</sub>O<sub>5</sub> over 7.3m (Figure 3). Numerous grab samples in this area also returned high vanadium values.

In 2007 Southampton Ventures Inc. did exploration work on its Fox (Dumala, 2007a) and Sun (Dumala, 2007b) properties for nickel. This work was done along a 12km segment of the Canol Formation underlying the Property and included surface geochemical sampling followed by diamond drilling. A total of 417 soil sample, 63 silt and 7 rock samples were collected at random and along widely spaced grid lines. A total of 720.9m of core drilling in seven holes was done. The soil geochemistry showed anomalous vanadium values (Figure 3)

In 2019 and 2020, the Company re-logged three of the previous drill holes and collected 326 core samples (Fekete & Huber, 2019). Significant vanadium intersections were determined in all three holes over broad intervals (Table 2, Figure 3).

**Table 2: Weight averages for selected elements**

Old No.	Hole No.	Unit	From m	To m	Int. m	% V <sub>2</sub> O <sub>5</sub> <sup>1</sup>		% Zn	ppm Ag	% CaO <sup>1</sup>	% MgO <sup>1</sup>	
						Min	Max					
<b>SU07-01</b>	<b>DV-01</b>	All	14.10	121.92	107.82	0.33	0.03	0.54	0.18	2.3	7.10	1.93
	<b>Incl.</b>	Canol	14.10	90.00	75.90	0.39	0.03	0.54	0.22	2.8	5.44	1.31
	<b>Incl.</b>	RCTZ	90.00	97.73	7.73	0.09	0.04	0.26	0.09	2.1	9.42	3.81
	<b>Incl.</b>	Road River	97.73	121.92	24.19	0.22	0.06	0.50	0.08	1.1	11.59	3.28
<b>FX07-02</b>	<b>DV-05</b>	All	6.10	106.70	100.60	0.25	0.05	0.47	0.12	1.6	3.88	0.99
	<b>Incl.</b>	Imperial	6.10	68.50	62.40	0.21	0.05	0.40	0.03	1.1	3.08	0.81
	<b>Incl.</b>	Canol	68.50	106.70	38.20	0.32	0.09	0.47	0.26	2.4	5.19	1.28
<b>FX07-02</b>	<b>DV-06</b>	All	12.34	141.20	128.86	0.34	0.04	0.55	0.22	1.6	4.90	1.08
	<b>Incl.</b>	Canol	12.34	102.50	90.16	0.39%	0.17	0.55	0.27	1.3	3.62	0.49
	<b>Incl.</b>	RCTZ	102.50	108.70	6.20	0.14%	0.12	0.17	0.07	3.1	7.03	2.09
	<b>Incl.</b>	Road River	108.70	141.20	32.50	0.23%	0.04	0.35	0.11	2.1	8.05	2.53

1. Conversion factors: 1.785 for ppm V to %V<sub>2</sub>O<sub>5</sub>, 1.399 for %Ca to %CaO, 1.658 for %Mg to %MgO (Bureau Veritas, 2020)



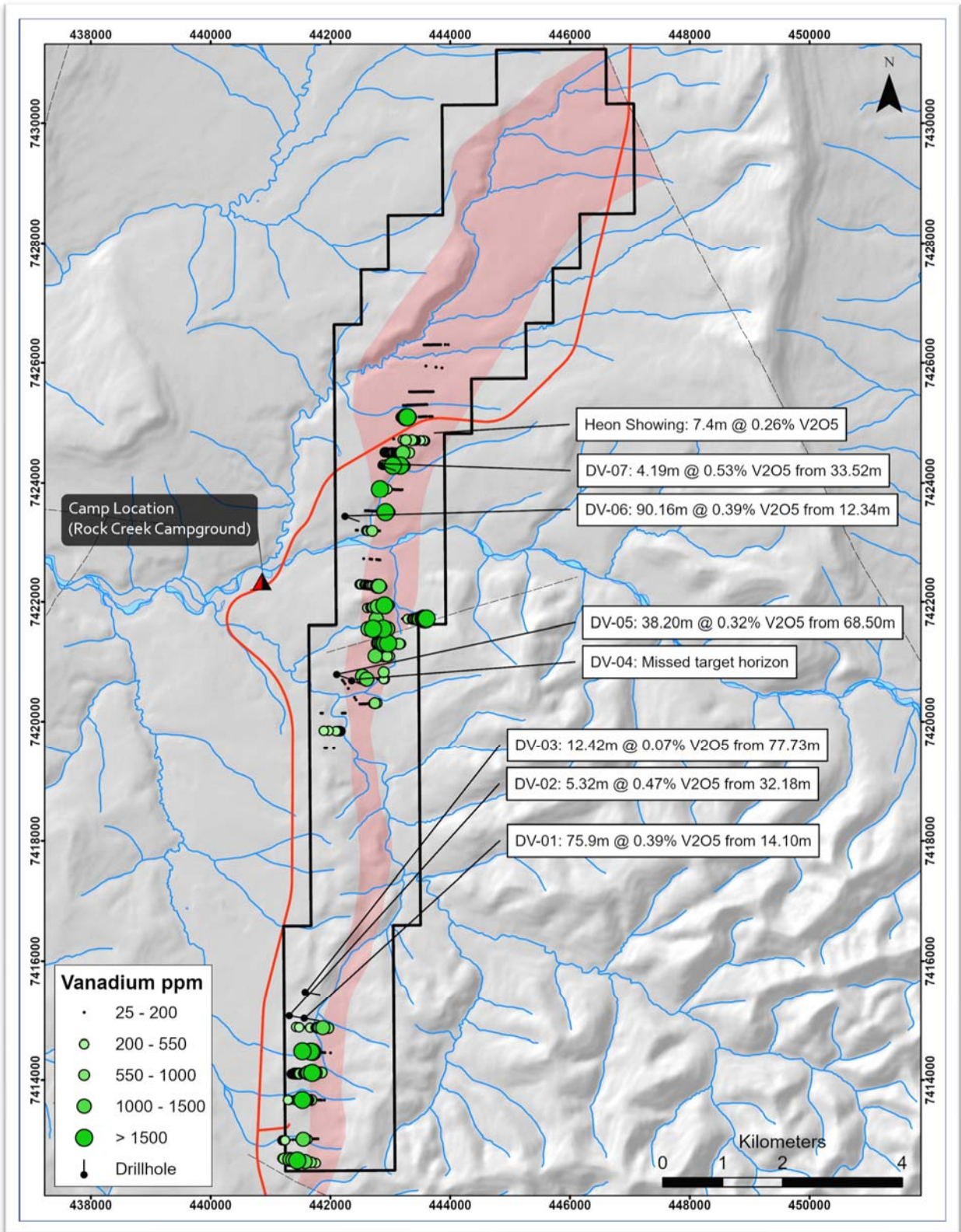


Figure 3: Compilation of previous work

#### 4. Geological Setting and Mineralization

Regionally the Property is located on the west side of the Richardson Trough (Figure 4). This northwest-trending intracratonic depression was formed during Early to Middle Paleozoic time with the deposition of deep-water calcareous shales and argillaceous limestones of the Ordovician to Silurian Road River Group over Cambrian and Proterozoic age strata. The Road River is overlain unconformably by younger Paleozoic sediments. The entire stratigraphic section is folded by a large-scale anticline that plunges to the north. This anticline is called the Richardson Anticlinorium and its axis approximately coincides with the centre of the trough. To the east, the Richardson Trough is bound by the Trevor fault and to the West by the Deception fault.

Locally the Property is underlain by shallow west-southwest dipping calcareous shales of the Upper Cambrian to Middle Devonian Road River Group overlain by the Middle to Upper Devonian Earn Group (Figure 5). The Earn Group is comprised of dark grey siltstones, sandy shales and lithic sandstones belonging to the Imperial Formation that conformably overlies siliceous shale of the Canol Formation. The Canol forms a narrow north-south band along a 20km segment of Property that directly overlies the Road River (Figure 6). At this unconformity contact there is a distinct zone referred to by Fraser & Hutchison (2017) as the Road River - Canol transition zone ("RCTZ").

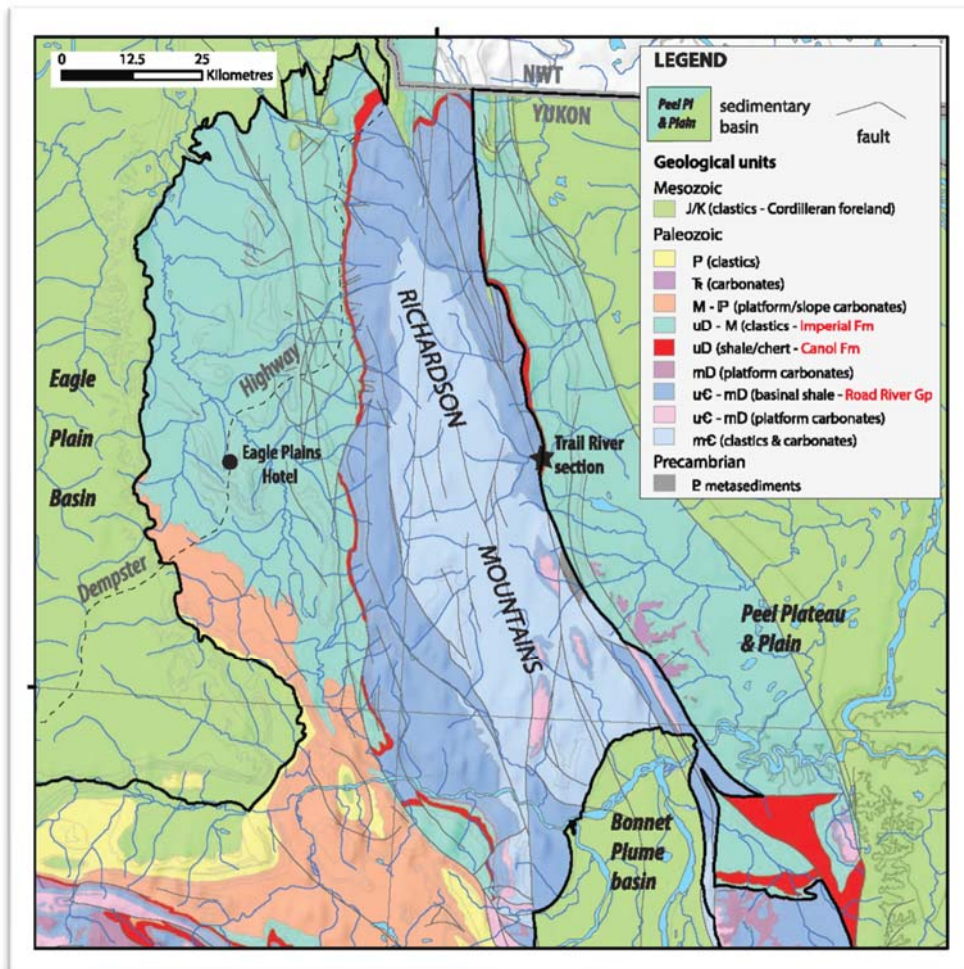


Figure 4: Regional geology

Sections of the RCTZ mapped at Trail River (Fraser & Hutchison, 2017) and Peel River (Fraser et al., 2018) consist of a 1 to 2m base layer of limestone and/or dolostone concretions, overlain by a 2 to 3m interval of calcareous, nodular mudstone capped by a discrete, 20 to 30cm horizon of organic-rich, non-calcareous black shale enriched in nickel, molybdenum and platinum group elements. This thin cap was first identified as the “NiMo” or “Nick” horizon on the Nick property located 245km south of the Property (Hulbert et al., 1992). It is continuous over >20,000km<sup>2</sup> in northeastern Yukon with an average thickness of 3 to 8cm. It is an example of a hyper metal-enriched black shales or “HEBS-type” mineralization (Fraser et al., 2018)

The HEBS-type mineralization in Northeastern Yukon is believed to be due to a large-scale syngenetic event caused by the reduction effects of organic material in a restricted anoxic basin (Hulbert et al., 1992). It is well documented that organic material in anoxic environments plays a critical role in metal enrichment processes in shales (Fraser et al., 2018).

The RCTZ was first recognized in the Dempster area by during a study to assess the mineral potential of the Eagle Plains area (Héon, 2006). It is continuous within the Property with minor offsets due to normal vertical faults. It continues south more than 150km outside the boundaries of the Property but becomes progressively more distant from the Dempster Highway. Eventually it passes into terrain where mineral exploration and development is prohibited.

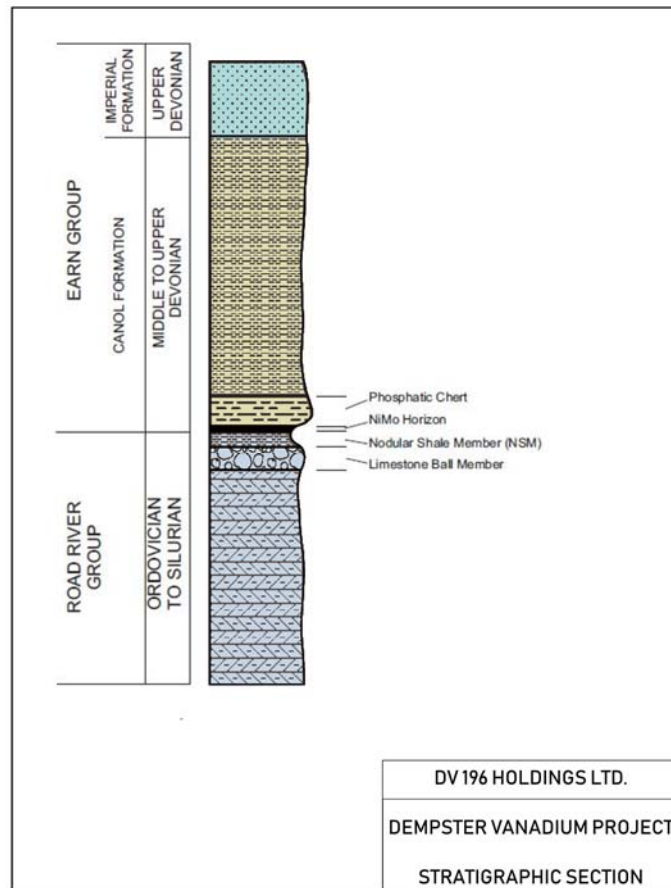


Figure 5: Stratigraphic section (after Dumala, 2007a)

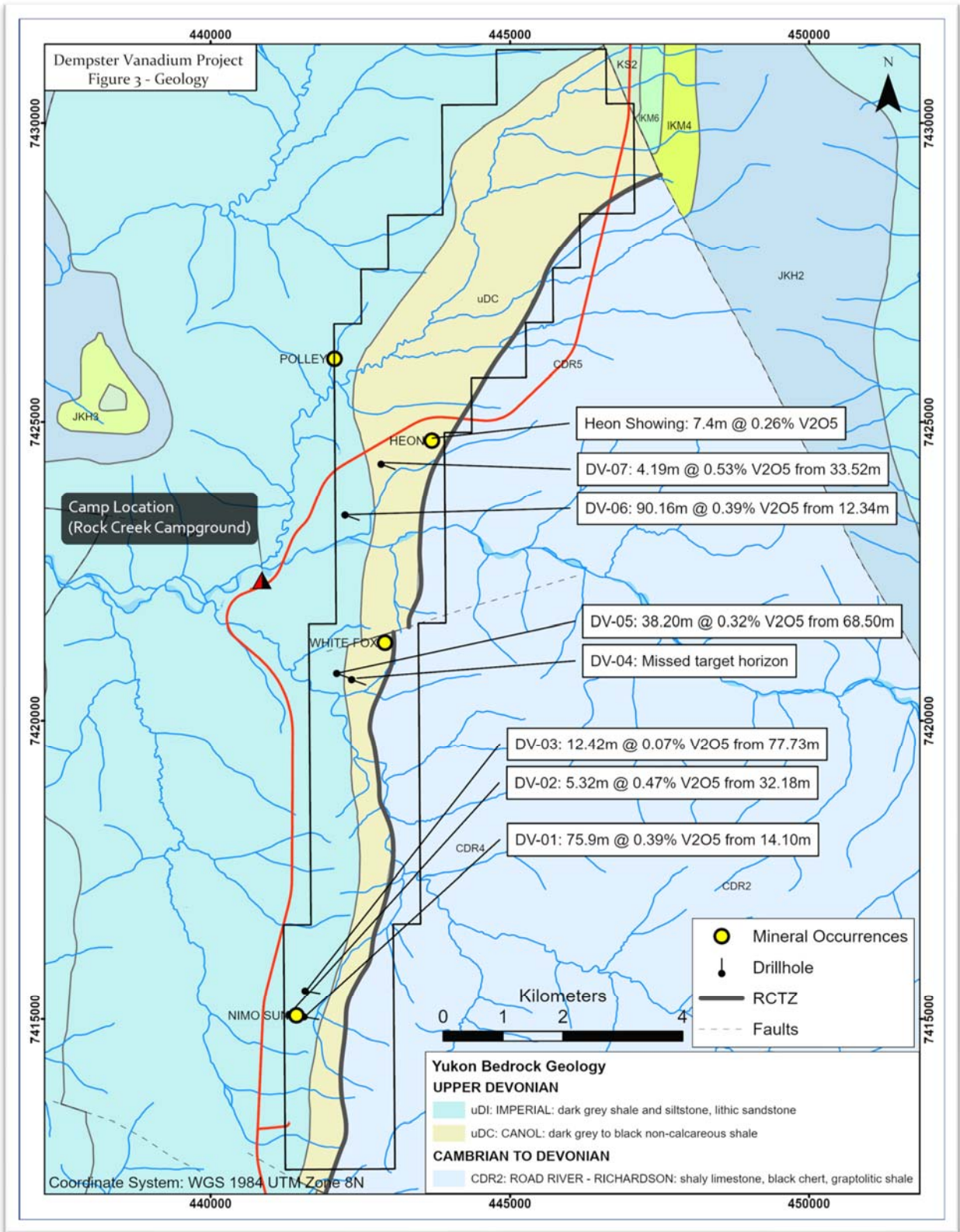


Figure 6: Property geology

## 5. Deposit Type

Currently 90% of the world's vanadium supply is used by the steel industry. Ferrovandium ("FeV") is an essential hardening agent in steel alloys used for the manufacture of axles, tools and structural rebar. Rebar is integral to emerging markets infrastructure projects. China is the largest producer of mined and recycled vanadium and is perceived as a threat to US steel industry and national security. In 2017 vanadium was declared a critical metal by the Trump administration because of its strategic importance and its limited domestic supply. This has led to an exploration and development boom for mineable vanadium in Nevada and the UraVan areas of the US.

Vanadium is also seeing increased usage in batteries for the expanding clean energy sector. Vanadium Redox Flow Battery (VRFB) are large batteries for grid and renewable energy storage. This type of battery has extremely large storage capacities (Megawatt scale) and is in a ready state for long periods due to its slow rate of self-discharge. These batteries are modular, scalable, long lasting (20-30 years), contained, non-combustible, stationary, very safe and require very little maintenance. Accelerated research and development is targeting a rapidly growing VRFB market estimated to increase by 3,100% in the next decade. These batteries require very pure (i.e. >98%) flake vanadium pentoxide ("V<sub>2</sub>O<sub>5</sub>").

Sharp price gains starting in July 2016 for FV and V<sub>2</sub>O<sub>5</sub> were attributable to tight supply and strong demand brought on by events in the steel industry and expanding VRFB use in the clean energy sector. Vanadium was the best price performing battery metal in 2017 and 2018. Ferrovandium prices peaked in October 2018 at US\$128.30 per kilogram for FV 80% and vanadium pentoxide prices in November 2018 US\$28.80 per pound for V<sub>2</sub>O<sub>5</sub> Flake 98%. Prices have since returned to prices slightly above traditional levels at US\$35.00 per kilogram for FV 80% and US\$7.90 per pound for V<sub>2</sub>O<sub>5</sub> Flake 98% as of March 30, 2021 (Vanadium Price, n.d.).

Vanadium-rich titanium magnetite (VTM-type) deposits are currently the largest and most important vanadium producers (Kelley et al., 2017). Such deposits consist of vanadium-rich sequences of iron or iron-titanium oxides found in large layered magmatic intrusions. Typical grades range from 0.2 to 1.2% V<sub>2</sub>O<sub>5</sub>. However, these are complex deposits with the vanadium tightly enclosed within ilmenite or magnetite. Not only is metal tenor important, but oxide mineralogy, grain size and intergrowth texture are all critical factors for efficient production of V<sub>2</sub>O<sub>5</sub> concentrate. Deposits of this type are presently mined in Brazil, China, Russia, Scandinavia and South Africa, and large deposits are currently being developed in Eastern Canada and Western Australia (Figure 7).

Sandstone vanadium-type (SSV-type) or UraVan deposits, where uranium, vanadium and other metals were dissolved, transported and deposited near-surface by the circulation of meteoric waters, are a small but important source of vanadium as a by-product of uranium mining on the Colorado Plateau in the American Southwest. Typical grades range from 0.2 to 1.7% V<sub>2</sub>O<sub>5</sub>.

Vanadium-rich black shale-type (BSV-type) are found mainly in late Proterozoic and Phanerozoic marine basins that were deposited in epeiric (inland) seas and on continental margins. Grades in BSV-type deposits typically exceed 0.2% V<sub>2</sub>O<sub>5</sub> but can be as high as 1.8% V<sub>2</sub>O<sub>5</sub>. These deposits are marked by large areal extent, steady grade, consistent geometry and simple mineralogy, all which favour low-cost mining and processing methods. However, most BSV beds are typically only a few meters thick and cannot be exploited economically. Limited mining of this deposit type is

currently underway in China and Sweden. Several large BSV-type deposits are currently being developed in Nevada, and dormant deposits are known in China and Madagascar. Related to BSV-type deposits, significant amounts of vanadium are recovered as by-product of coal, oil sand, and oil shale processing, and petroleum refining.

The geology, mineralization and vanadium grades observed to date on the Property suggest that it is an excellent candidate for exploration of BSV-type deposits. It is important to note that previous exploration concentrated on HEBS-type nickel mineralization rather than the BSV-type vanadium potential of the Property.

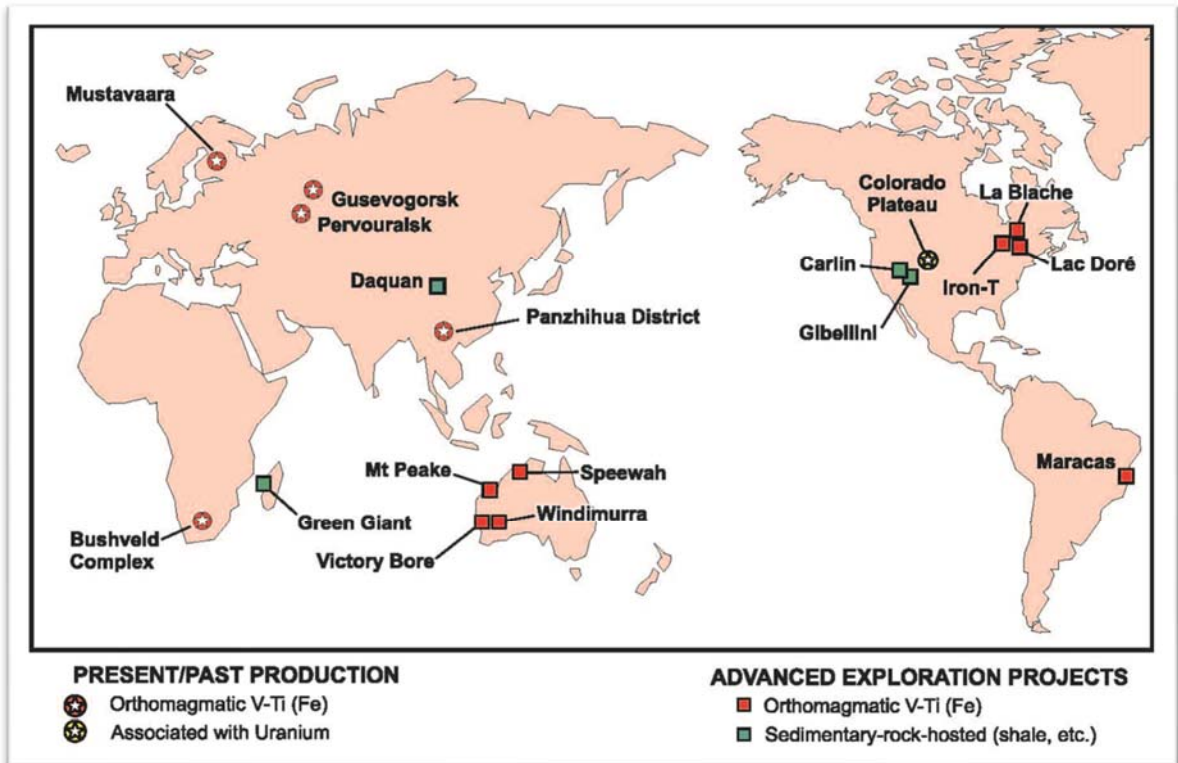


Figure 7: Vanadium mining and advanced exploration projects (after Kerr et al., 2013))

## 6. 2020 Exploration

### 6.1. Introduction

Exploration was completed in two phases. The first phase, done in August 2020, consisted of surface rock and soil geochemical sampling on the Property by Breakaway personnel. For the second phase, done from August 2020 to January 2021, DVY196 funded analytical work on a suite of core pulps obtained from the 2019-2020 sampling program. The data from this work is being incorporated into a larger research project being done by doctoral candidate Kyle Henderson at McGill University in Montréal, Québec. The work described in this Report was done as an informal collaboration whereby DVY196's participation is limited to funding the analytical work, and the research at McGill is being done independently of and with no commercial compensation from DVY196.

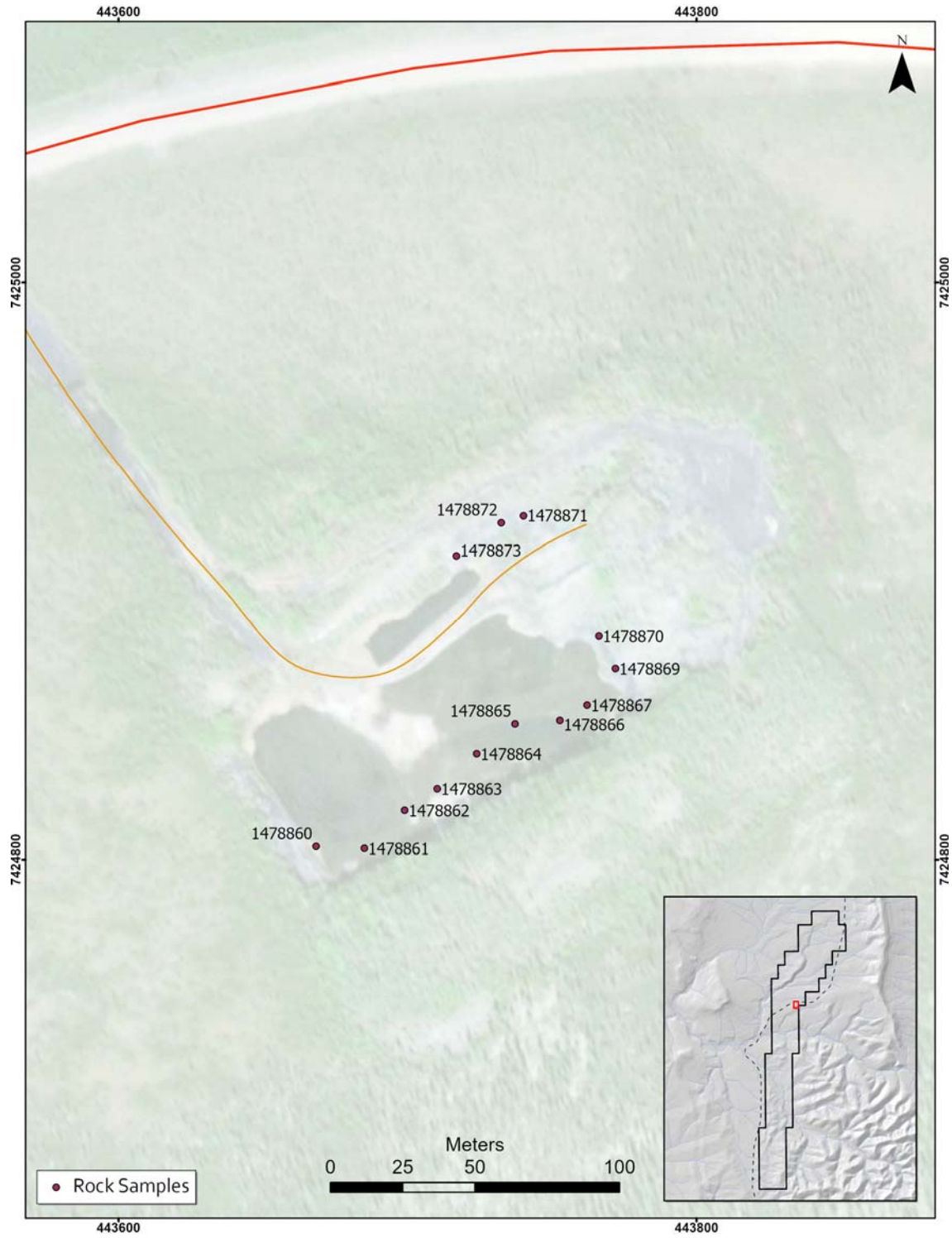


Figure 8: 2020 Rock sample locations



Figure 9: Soil sample locations 2020



## **6.2. Surface Rock and Soil Geochemistry Procedures**

The surface work was from a tent camp set up in a gravel pit just off the southwest corner of the Property over an eight-day period ending August 11, 2020. This included two days for mobilization to and from the Property. An additional man-day was spent in Whitehorse to deliver the samples to the laboratory and complete other miscellaneous tasks related to the exploration work. The sampling crew walked into the sampling sites daily from the Dempster Highway. The work program consisted of rock sampling at the Héon showing in the north-central part of the Property (Figure 8) and systematic soil sampling over a grid at the south end (Figure 9). A total of 14 rock and 179 soil samples were collected (Appendix A). The sampling targeted sections of the prospective Canol Formation.

The rock sampling was done to confirm previous chip sampling results obtained at the Héon showing from a road cut on the south side of the Dempster highway. Grab samples were collected at approximately 10m stations on two east-trending lines spaced approximately 60m apart along the edge of a highway borrow pit.

The soil grid was completed in the southern part of the Property just north of hole DV07-01 that was drilled in 2007 as part of an exploration program focused on HEBS-type nickel mineralization. In 2019, 108 core samples from this hole were submitted for analysis and an intersection of 0.39% V<sub>2</sub>O<sub>5</sub>, 0.22% Zn and 2.8gpt Ag over 75.9m from 14.1 to 90.0m was determined within a partial section of the Canol Formation 3 (Table 2). The vanadium grade and broad width of this intersection is comparable to BSV-type deposits being explored elsewhere, most notably in Nevada, USA. The soil grid was done to see if the Canol Formation could be traced north of drill hole DV07-01.

The soil grid measured 1,450 km long with east-west lines spaced every 100m. Samples were taken at 50m stations on lines varying from 300 to 1,000m long. Permafrost, thick moss cover and gravel debris in drainages prevented sampling at some stations. Despite these conditions, an adequate amount of samples were collected to be representative.

The field work followed a quality assurance and quality control (“QAQC”) program considered suitable and effective for the type of sampling conducted. The rock and soil samples were sealed in rice bags with security tags in the field and delivered in person by Breakaway personnel to Bureau Veritas Commodities Canada Ltd. (“BV”) facility in Whitehorse, Yukon. The rock samples were dried and crushed to  $\geq 70\% < 2\text{mm}$  and a 250g split was pulverized to  $\geq 85\% < 75\mu\text{m}$  (BV Code PRP70-250). The soil samples were dried and sieved to a 100g subsample to -80 mesh size (BV Code SS80). The rock and soil pulps were then sent to BV’s Vancouver facility where they were analysed for 35 elements by 0.25g multi-acid digestion, ICP-ES finish (BV Code MA300). All BV facilities are accredited under BV’s ISO 9001:2015 registration.

## **6.3. McGill Study Procedures**

The pulp samples used for the McGill study were prepared in 2019 from core samples taken from holes DV07-05 and DV07-06 (Table 3). The 200 pulps were selected to encompass a composite stratigraphic section 200.96 metres wide (not true thickness). The core samples were dried and crushed to  $\geq 70\% < 2\text{mm}$  and a 250g split was pulverized to  $\geq 85\% < 75\mu\text{m}$  (BV Code PRP70-250). The pulverizer was washed between samples with silica (BV Code PULSW) to prevent cross contamination between samples. Pulps were returned to the BV’s Whitehorse facility in early

2020. BV staff measured out two subsamples of each of the 200 pulps. One subsample was sent to BV's Vancouver facility for major-oxides analysis by 0.20g LiBO<sub>2</sub>/Li<sub>2</sub>B<sub>4</sub>O<sub>7</sub> fusion, ICP-ES finish (BV Code LF302). The second set of subsamples was sent to Kyle Henderson in Montréal, Québec for the McGill study. The analytical procedures used at McGill study are included in Appendix C.

**Table 3: McGill study samples**

Sample Numbers	Drill Hole	Drill Interval m	Drill Width m	Unit
1478526 to 1478566	DV07-05	34.60 to 70.50	35.90	Imperial
1478567 to 1478605	DV07-05	70.50 to 106.70	36.20	Canol
1478606 to 1478710	DV07-06	12.34 to 108.70	96.36	RCTZ
1478711 to 1478745	DV07-06	108.70 to 141.20	32.50	Road River

## 7. Results

### 7.1. Surface Rock and Soil Geochemistry Results

Analytical certificates for the surface rock and soil are included as Appendix B. All 14 grab samples collected from the Héon site returned strongly anomalous vanadium values ranging from 1,940 to 687 ppm V or from 0.35 to 0.12% V<sub>2</sub>O<sub>5</sub>. Thirteen of the 14 samples also returned strongly anomalous values for zinc ranging from 2,371 to 301ppm Zn and for silver ranging from 2.2 to 0.8gpt Ag. As expected, nickel values were weakly anomalous in these 13 samples from 478 to 85ppm. The northern line returned vanadium values from 1901 to 828ppm V (0.34 to 0.16% V<sub>2</sub>O<sub>5</sub>) across approximately 20m of the borrow pit's northern edge. Sampling west of the sample sites on this line was prevented by thick gravel. The southern line returned vanadium values from 1940 to 915ppm V (0.35 to 0.16% V<sub>2</sub>O<sub>5</sub>) across approximately 90m of the borrow pit's southern edge.

A total of 121 of the 179 soil samples returned vanadium values ranging from a maximum of 4,577ppm V (0.82% V<sub>2</sub>O<sub>5</sub>) down to a highly anomalous threshold value of 558ppm V (0.10% V<sub>2</sub>O<sub>5</sub>). Eighteen of these samples show values at greater or equal to 2,237ppm V (0.40% V<sub>2</sub>O<sub>5</sub>). Seventy-four samples returned zinc values ranging from a maximum of 8,827ppm (0.88%) Zn down to a highly anomalous threshold value of 952ppm (0.10%) Zn. Eight of these samples show very strong values greater or equal to 3,964ppm (0.40%) Zn. Eighty-six samples returned silver values ranging from a maximum of 19.0gpt Ag down to a highly anomalous threshold value of 2.5gpt Ag. Ten of these samples show very strong values greater or equal to 10.7gpt Ag. A total of 48 samples shows weakly anomalous nickel values ranging from a background of 196ppm Ni up to a maximum of 1,003ppm Ni. Barium values were unusually high with 146 samples returning values >1000ppm Ba with 36 of these samples registering over the limit of the analytical procedure (i.e., >10,000 ppm Ba). Vanadium shows moderate correlation with zinc and nickel and strong correlation with silver (Table 4). Zinc, silver and nickel show strong correlation with each other. Copper, cadmium and chromium all correlate well with the zinc, silver and nickel suite but they show low concentrations in soil overall. Barium shows a distinct negative correlation to the vanadium, zinc, silver and nickel suite.

**Table 4: Soil correlation matrix**

179	Zn	Ag	Ni	V	Ba
<b>Zn</b>	1.00	0.78	0.88	0.68	-0.26
<b>Ag</b>	0.78	1.00	0.78	0.77	-0.34
<b>Ni</b>	0.88	0.78	1.00	0.73	-0.28
<b>V</b>	0.68	0.77	0.73	1.00	-0.56
<b>Ba</b>	-0.26	-0.34	-0.28	-0.56	1.00



Figure 10: 2020 Vanadium in rock, Héon site

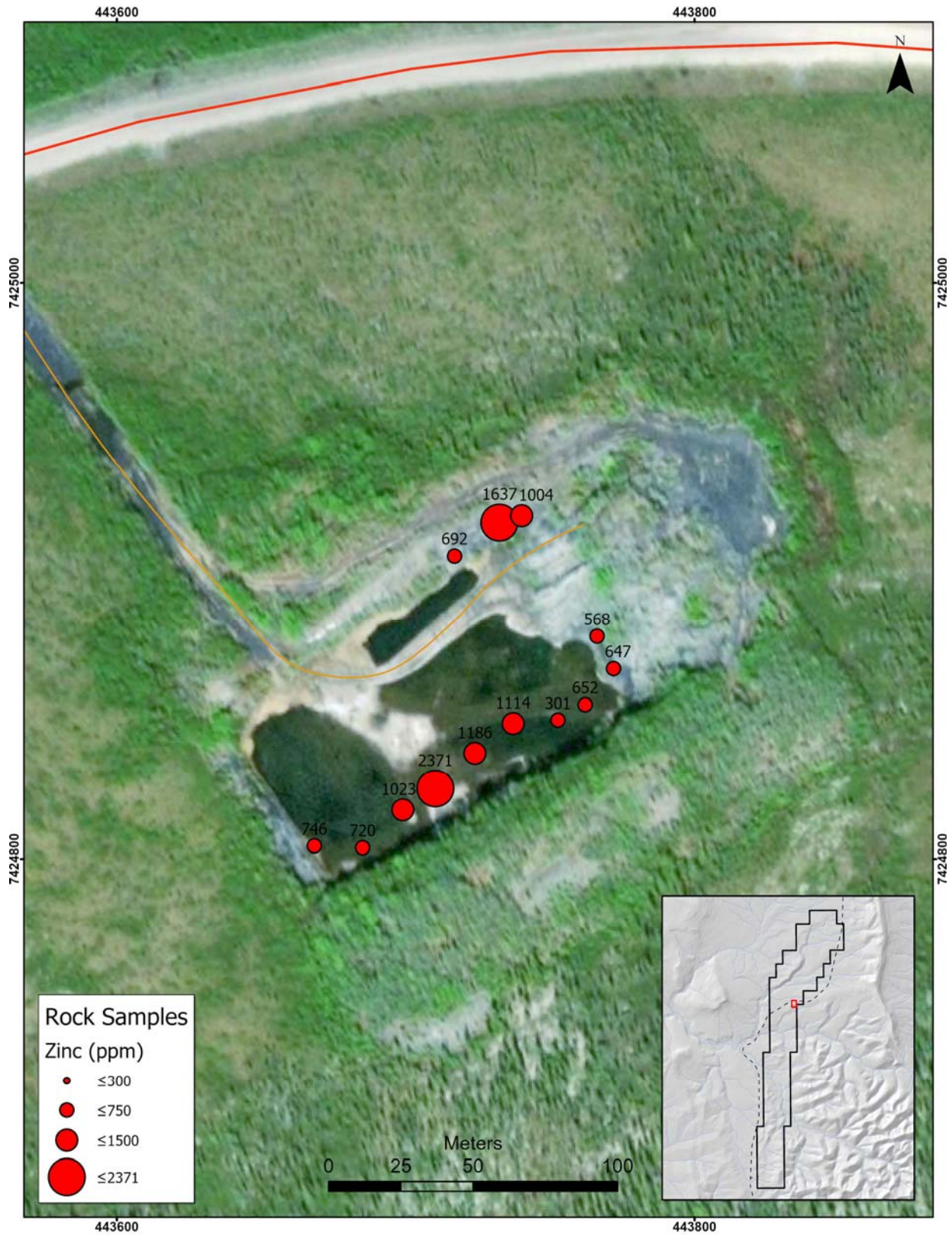


Figure 11: 2020 Zinc in rock, Héon site



Figure 12: 2020 Silver in rock, Héon site

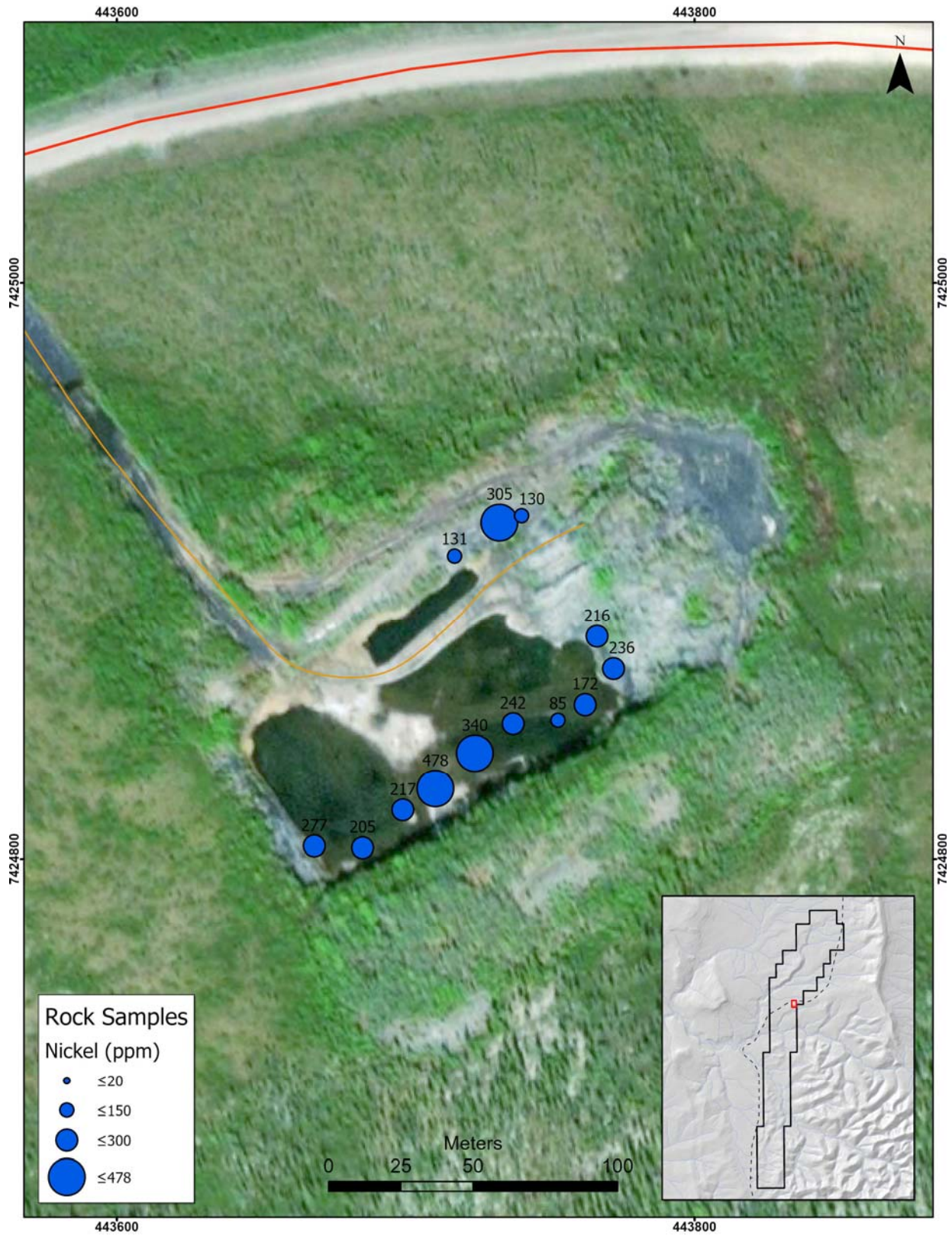


Figure 13: 2020 Ni in rock, Héon site

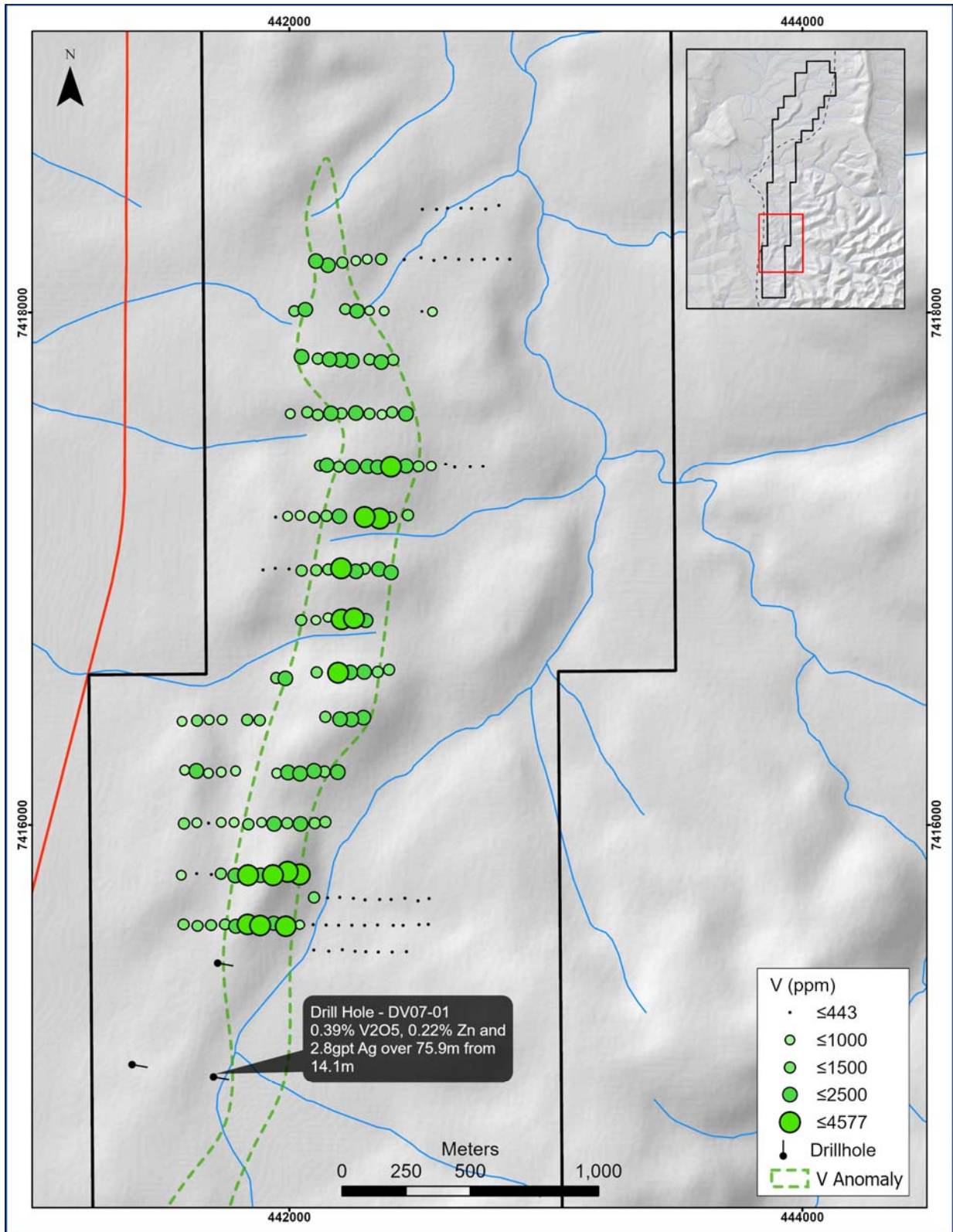


Figure 14: 2020 Vanadium in soil

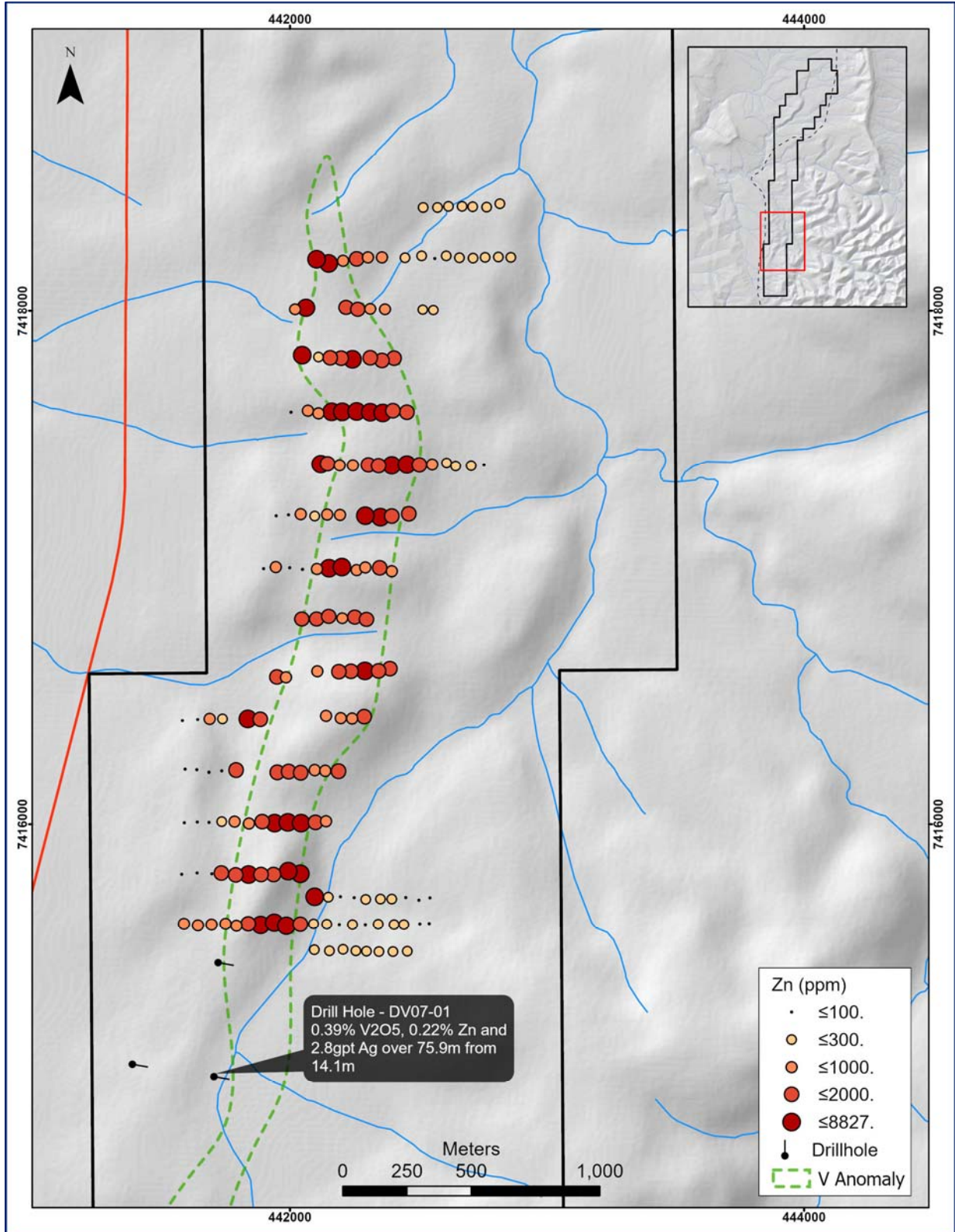


Figure 15: 2020 Zinc in soil



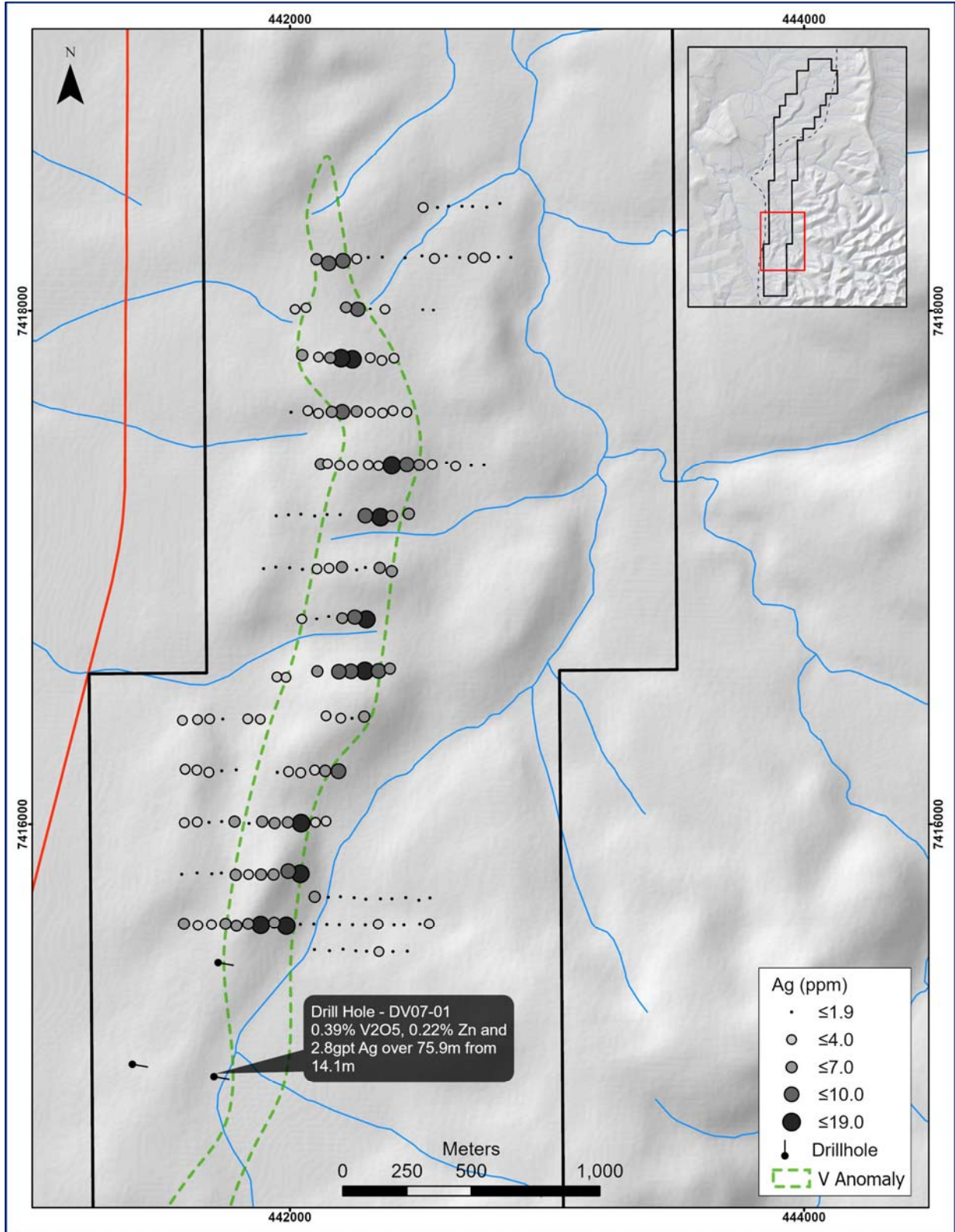


Figure 16: 2020 Silver in soil

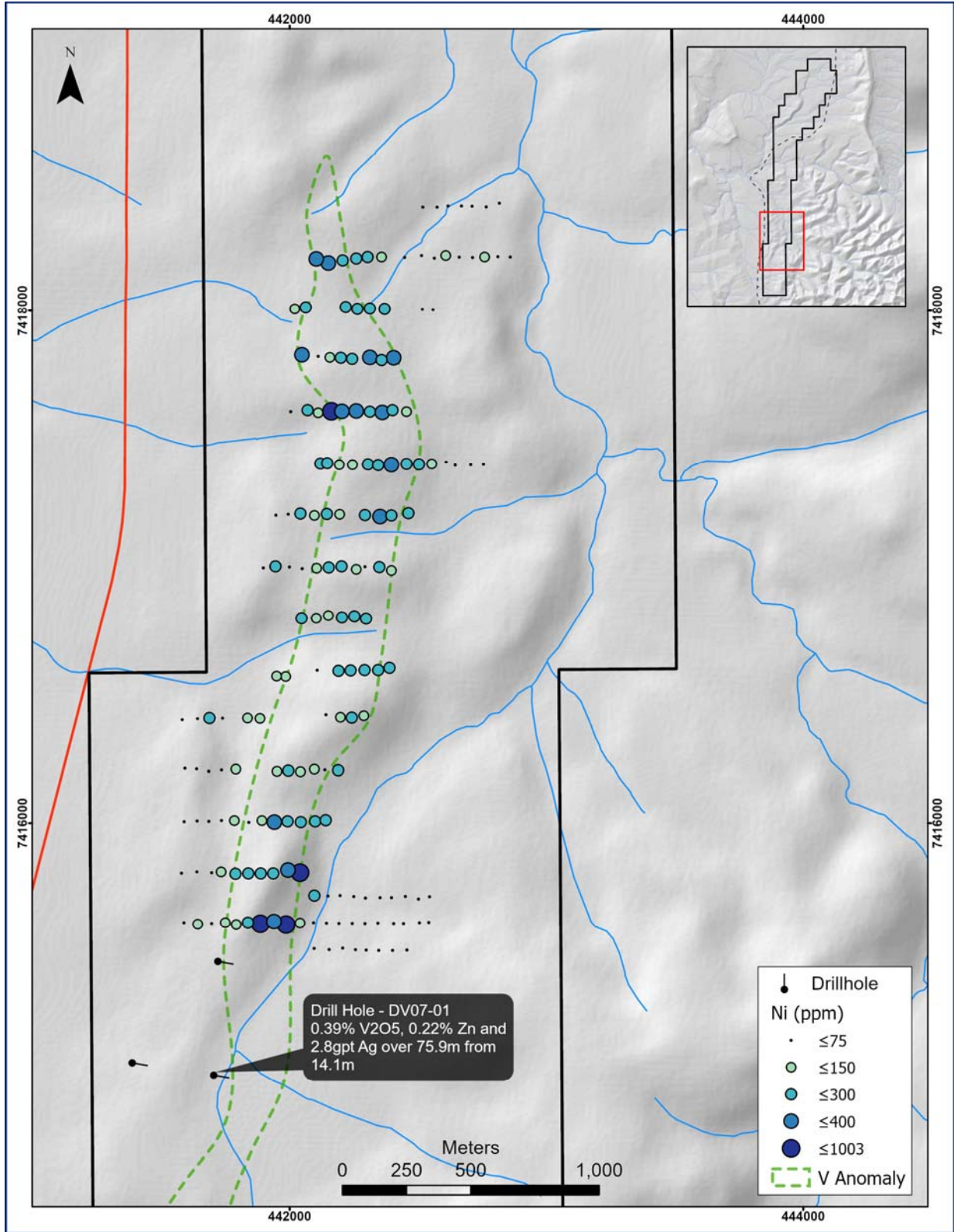


Figure 17: 2020 Nickel in soil

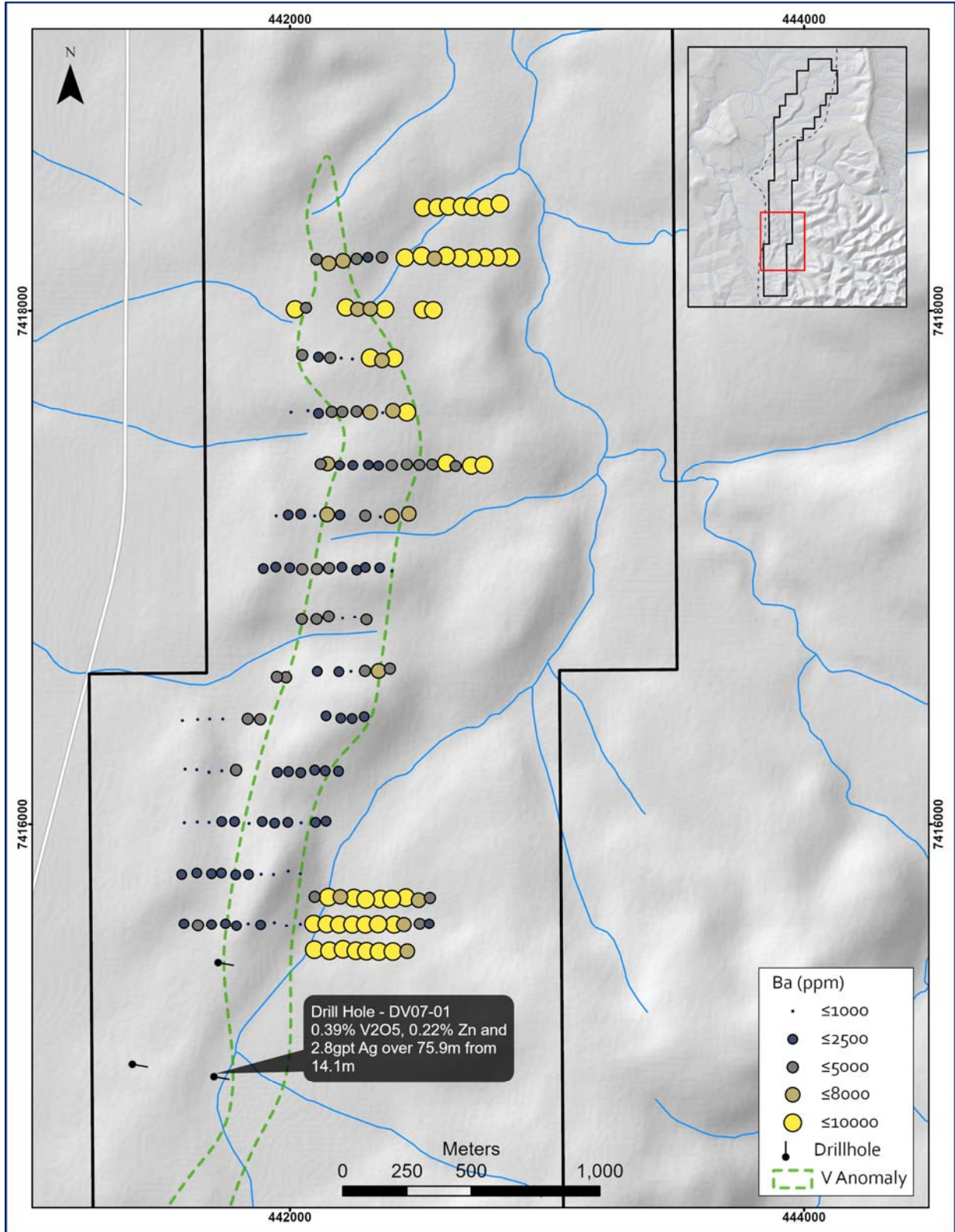


Figure 18: 2020 Barium in soil

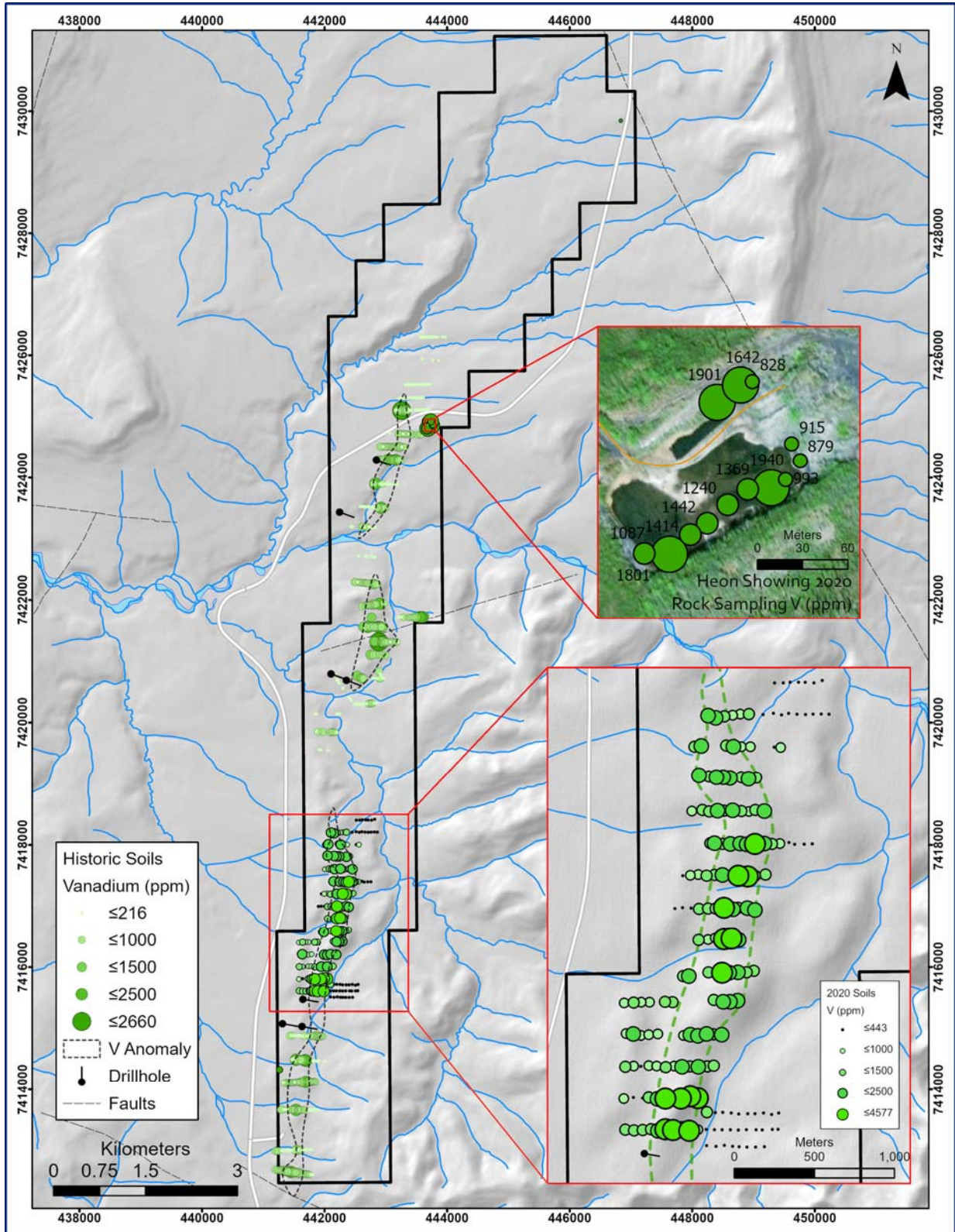


Figure 19: 2020 Vanadium rock and soil compilation

## **7.2. McGill Study Results**

The McGill study results are included in Appendix B.

## **8. Interpretation and Conclusions**

### **8.1. Rock and Soil Geochemistry Discussion**

The strong vanadium results confirm that the Héon site is prospective for vanadium mineralization and that the Canol Formation continues through this area (Figure 10). Strong zinc (Figure 11) and silver values (Figure 12) were also found at this site as well as weak nickel values (Figure 13).

The values for vanadium, zinc, silver, nickel and barium contained in soil are all much higher than values determined from core samples. This indicates that weathering of the bedrock leads to significant enrichment in the soil which is very helpful for soil geochemistry.

The very strong vanadium-in-soil values track a distinct linear vanadium zone for 1,300m through the survey area (Figure 14). The zone varies from 150 to 300m wide. Strong zinc (Figure 15) and silver values (Figure 16) also track the zone as well as weak nickel values (Figure 17). Correlation of vanadium to these other metals is not perfect but generally the best zinc, silver and nickel values echo the best vanadium values. Barium shows a negative correlation to the V-Zn-Ag-Ni suite. The strongest barium values consistently plot to the east of the vanadium trend and appear to mark the contact between relatively barium-rich (Road River) and barium-poor (Canol) soils. Kyle Henderson notes that barium-bearing feldspars are known in other black shale formations (Appendix C: McGill Study). Perhaps the strong barium signature of the soils derived from Road River in comparison to the Canol soils is associated to the relative abundance or nature of the barium-bearing feldspars in each unit. Or perhaps the Road River weathers more readily than the Canol. More study is needed on this subject.

In summary, the 2020 program has shown that soil geochemistry is a very effective tool to define the vanadium trend related to the Canol Formation and map important stratigraphic contacts such as the base of the Canol.

### **8.2. McGill Study Discussion**

The McGill study discussion is included in Appendix C.

## **9. Recommendations**

Further exploration is recommended on the Property based on the strong results of the 2020 soil geochemistry survey. These results define considerable breadth and linear extent of vanadium enrichment within a section of the Canol Formation and delineate a target horizon for more detailed exploration. Compilation and digitization of previous surface soil geochemical results, although widely spaced, indicate that the vanadium enrichment is present along the entire length of the Canol within the Property boundaries. The encouraging soil results reiterate the strong vanadium results values obtained over considerable drilled intervals of the Canol Formation from the 2018/2019 core sampling of 2007 drill holes DV-01, -05 and -06 (Fekete & Huber, 2019).

To define in detail the Canol Formation on surface, it is recommended that geological mapping, prospecting and soil and rock geochemical surveys be done over the entire length of the Property

as Phase I. The goal of the Phase I of work will be to identify and evaluate the best possible targets for the initial round of drilling in Phase II of the exploration work.

Phase II is not contingent upon Phase I. Drilling could forego the surface work and begin immediately as the first phase. The 2020 soil gird north of hole DV07-01 is very accessible and drilling could be done in this area with minimum impact on the surface terrain. The Héon site is also very easy to access, and drilling could be accomplished in this area too with very little surface disruption. A cost estimate for both phases is outlined in Table 5.

**Table 5: Cost Estimate**

	No.		Rate		Cost	Totals
<b>Phase I</b>						
Soil Geochemistry (all-in cost)	4,000	soils @	\$75	per soil	\$300,000	
Geologist (all-in cost)	30	days @	\$1,000	per day	\$30,000	
Rock Geochemistry	200	rocks @	\$50	per rock	\$10,000	
Report	1	report @	\$7,000	per report	\$7,000	
Travel to Yukon	2	flights @	\$1,500	per flight	\$3,000	
<b>Subtotal</b>					\$350,000	
<b>Contingency ~15%</b>					\$52,500	
<b>Total Surface Work</b>						<b>\$402,500</b>
<b>Phase II</b>						
Drilling (all-in cost)	2,000	m @	\$400	per m	\$800,000	
<b>Contingency ~15%</b>					\$120,000	
<b>Total Drilling</b>						<b>\$920,000</b>

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## **Appendix A: Rock and Soil Descriptions**



Rock Sample Locations and Descriptions

SampleNum	Sampler	Easting	Northing	EastNorthDatum	R_SampleType	R_Lithology	R_Colour	V2O5%	Zn%
1478859	MartyHuber	441268	7414323	UTMZ8N_WGS84	FloatGrab	Shale	Black	0.12%	0.00%
1478860	MartyHuber	443668	7424804	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.19%	0.07%
1478861	MartyHuber	443685	7424804	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.32%	0.07%
1478862	MartyHuber	443699	7424817	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.25%	0.10%
1478863	MartyHuber	443710	7424824	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.26%	0.24%
1478864	MartyHuber	443724	7424837	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.22%	0.12%
1478865	MartyHuber	443737	7424847	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.24%	0.11%
1478866	MartyHuber	443753	7424848	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.35%	0.03%
1478867	MartyHuber	443762	7424854	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.18%	0.07%
1478869	MartyHuber	443772	7424866	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.16%	0.06%
1478870	MartyHuber	443766	7424877	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.16%	0.06%
1478871	MartyHuber	443740	7424919	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.15%	0.10%
1478872	MartyHuber	443732	7424917	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.29%	0.16%
1478873	MartyHuber	443717	7424905	UTMZ8N_WGS84	OutcropChip	Shale	Black	0.34%	0.07%

## Soil Sample Locations and Descriptions

SampleNo.	Sampler	Elevation	Easting	Northing	SampleTyp	S_Colour	S_Texture	S_Terrain	Horizon	S_Depth	S_Moisture	S_Quality	S_Vegetation	V2O5_%	Zn_%
201640	DarrellKraemer	616	442095	7415511	Soil	BrownDark	Silt		B	20	Frozen	Poor	ForestMixed	0.04%	0.01%
201641	DarrellKraemer	623	442154	7415506	Soil	BrownDark	Silt		B	20	Frozen	Poor	ForestMixed	0.04%	0.01%
201642	DarrellKraemer	629	442206	7415512	Soil	BrownDark	Silt		B	80	Frozen	Poor	ForestMixed	0.03%	0.01%
201643	DarrellKraemer	634	442257	7415506	Soil	BrownDark	Silt		B	80	Frozen	Poor	ForestMixed	0.03%	0.01%
201644	DarrellKraemer	639	442298	7415504	Soil	Brown	Silt		B	20	Frozen	Poor	ForestMixed	0.04%	0.01%
201645	DarrellKraemer	659	442347	7415503	Soil	BrownDark	Silt		B	30	Frozen	Poor	ForestMixed	0.02%	0.01%
203461	MartyHuber	639	442404	7415609	Soil	BrownDark	Silt	ModerateW	B	45	Frozen	Good	ForestMixed	0.02%	0.01%
203462	MartyHuber	637	442443	7415608	Soil	Grey	Silt	ModerateW	B	40	Frozen	Good	ForestMixed	0.02%	0.01%
203463	MartyHuber	640	442505	7415612	Soil	BrownDark	Silt	ModerateW	B	45	Frozen	Good	ForestMixed	0.02%	0.01%
203464	MartyHuber	635	442541	7415613	Soil	Brown	Silt		B	25	Frozen	Poor	ForestMixed	0.02%	0.00%
203465	MartyHuber	642	442545	7415714	Soil	BrownDark	Silt	ModerateW	B	40	Frozen	Good	ForestMixed	0.03%	0.01%
203466	MartyHuber	638	442450	7415714	Soil	Grey	Silt	ModerateW	C	50	Moist	Good	ForestMixed	0.02%	0.01%
203467	MartyHuber	621	442352	7415709	Soil	BrownDark	Silt	Flat	B	25	Frozen	Poor	ForestMixed	0.03%	0.01%
203468	MartyHuber	610	442249	7415714	Soil	Grey	Silt	Flat	B	25	Frozen	Good	ForestMixed	0.02%	0.01%
203469	MartyHuber	606	442149	7415716	Soil	BrownDark	Silt	Drainage	B	20	Frozen	Poor	ForestMixed	0.03%	0.02%
203470	MartyHuber	614	442097	7415718	Soil	Black	Silt	Flat	B	30	Frozen	Poor	ForestMixed	0.24%	0.21%
203471	MartyHuber	601	442516	7418005	Soil	Grey	Silt	Flat	B	20	Frozen	Poor	ForestMixed	0.04%	0.02%
203472	MartyHuber	594	442558	7418003	Soil	BrownDark	Silt	Flat	B	25	Frozen	Poor	ForestMixed	0.09%	0.02%
203473	MartyHuber	621	442405	7417815	Soil	Black	Gravel	ModerateE	C	50	Wet	Good	AlpineBare	0.22%	0.15%
203474	MartyHuber	629	442357	7417807	Soil	Black	Gravel	ModerateE	C	55	Moist	Excellent	AlpineBare	0.27%	0.15%
203475	MartyHuber	630	442313	7417817	Frostboil	Black	Silt	ModerateE	B	60	Wet	Good	AlpineBare	0.23%	0.14%
203476	MartyHuber	639	442243	7417812	Soil	Black	Gravel	ModerateE	C	50	Moist	Excellent	AlpineBare	0.43%	0.30%
203477	MartyHuber	643	442199	7417816	Soil	BrownDark	Gravel	Ridge	C	30	Dry	Good	AlpineBare	0.33%	0.15%
203478	MartyHuber	633	442156	7417817	Soil	BrownDark	Gravel	Ridge	C	20	Dry	Good	AlpineBare	0.32%	0.16%
203479	MartyHuber	631	442110	7417820	Soil	Brown	Gravel	Ridge	B	25	Dry	Good	AlpineBare	0.19%	0.02%
203480	MartyHuber	630	442047	7417828	Soil	Black	Gravel	ModerateW	C	20	Dry	Excellent	AlpineBare	0.33%	0.57%
203481	MartyHuber	619	442019	7418006	Soil	BrownDark	Gravel	ModerateW	C	30	Dry	Excellent	AlpineBare	0.18%	0.09%
203483	MartyHuber	621	442062	7418013	Soil	Black	Gravel	ModerateW	C	25	Dry	Excellent	AlpineBare	0.29%	0.21%
203484	MartyHuber	617	442219	7418015	Soil	Brown	Gravel	ModerateE	B	20	Dry	Poor	AlpineBare	0.19%	0.15%
203485	MartyHuber	611	442264	7418006	Soil	Black	Gravel	ModerateE	C	40	Dry	Excellent	AlpineBare	0.28%	0.10%
203486	MartyHuber	606	442312	7418008	Soil	Black	Silt	ModerateE	B	50	Dry	Good	AlpineBare	0.10%	0.09%
203487	MartyHuber	599	442369	7418007	Soil	Black	Silt	ModerateE	B	50	Frozen	Poor	ForestMixed	0.14%	0.04%
203488	MartyHuber	581	442447	7418208	Soil	Grey	Silt	Flat	B	35	Frozen	Poor	ForestMixed	0.02%	0.01%
203489	MartyHuber	587	442359	7418210	Soil	Black	Silt	Flat	B	40	Frozen	Poor	ForestMixed	0.20%	0.04%
203490	MartyHuber	602	442304	7418209	Soil	Black	Silt	ModerateE	B	50	Frozen	Poor	ForestMixed	0.14%	0.08%
203491	MartyHuber	620	442259	7418204	Soil	Black	Silt	ModerateE	C	45	Moist	Good	AlpineBare	0.13%	0.13%
203492	MartyHuber	631	442207	7418196	Soil	Black	Gravel	Flat	C	30	Dry	Excellent	AlpineBare	0.25%	0.10%
203493	MartyHuber	637	442151	7418186	Soil	Brown	Gravel	RidgeAlpine	B	30	Moist	Good	AlpineBare	0.30%	0.45%
203494	MartyHuber	626	442104	7418202	Soil	Black	Gravel	Flat	C	40	Moist	Good	AlpineBare	0.41%	0.27%
203495	MartyHuber	651	441897	7416995	TalusFine	BrownDark	Gravel	RidgeAlpine	C	20	Dry	Excellent	AlpineBare	0.07%	0.00%
203496	MartyHuber	650	441945	7417000	TalusFine	Black	Gravel	Flat	C	25	Dry	Excellent	AlpineBare	0.06%	0.03%
203497	MartyHuber	645	441998	7416998	Soil	Black	Sand	Flat	C	50	Wet	Good	AlpineBare	0.06%	0.00%
203498	MartyHuber	648	442048	7416992	Frostboil	Black	Silt	Flat	C	40	Moist	Excellent	AlpineBare	0.20%	0.01%
203499	MartyHuber	651	442106	7416994	Frostboil	Black	Silt	ModerateE	B	50	Wet	Good	AlpineBare	0.26%	0.04%
203500	MartyHuber	652	442152	7416996	Soil	Black	Silt	ModerateW	C	40	Moist	Good	AlpineBare	0.24%	0.23%
203501	MartyHuber	659	442203	7417001	Soil	Black	Gravel	RidgeAlpine	C	30	Dry	Excellent	AlpineBare	0.46%	0.27%
203502	MartyHuber	665	442259	7416990	Soil	Brown	Gravel	Ridge	B	10	Moist	Poor	AlpineBare	0.28%	0.04%
203503	MartyHuber	658	442293	7416999	Soil	Brown	Gravel	ModerateN	B	25	Moist	Good	AlpineBare	0.21%	0.05%
203504	MartyHuber	653	442349	7416998	Soil	Black	Gravel	ModerateN	B	10	Dry	Poor	AlpineBare	0.33%	0.16%
203505	MartyHuber	652	442396	7416985	Soil	Brown	Gravel	ModerateE	B	10	Dry	Poor	AlpineBare	0.34%	0.06%
203506	MartyHuber	620	442463	7417208	Soil	Brown	Silt	ModerateE	B	40	Moist	Good	AlpineBare	0.19%	0.15%

## Soil Sample Locations and Descriptions

SampleNo.	Sampler	Elevation	Easting	Northing	SampleType	S_Colour	S_Texture	S_Terrain	Horizon	S_Depth	S_Moisture	S_Quality	S_Vegetation	V2O5_%	Zn_%
203507	MartyHuber	623	442396	7417199	Soil	Brown	Gravel	Flat	B	40	Moist	Good	AlpineBare	0.21%	0.14%
203508	MartyHuber	622	442351	7417196	Soil	Brown	Gravel	Flat	B	45	Moist	Good	AlpineBare	0.52%	0.28%
203509	MartyHuber	633	442293	7417201	Soil	Black	Gravel	ModerateE	C	40	Dry	Excellent	AlpineBare	0.53%	0.24%
203510	MartyHuber	644	442195	7417205	Soil	Brown	Gravel	RidgeAlpine	B	20	Dry	Good	AlpineBare	0.30%	0.06%
203511	MartyHuber	646	442144	7417205	Frostboil	Black	Silt	Flat	C	50	Moist	Excellent	AlpineBare	0.26%	0.06%
203512	MartyHuber	644	442096	7417200	Frostboil	Black	Silt	Flat	C	40	Moist	Excellent	AlpineBare	0.18%	0.01%
203513	MartyHuber	637	442042	7417207	Soil	Black	Silt	Flat	B	40	Wet	Good	AlpineBare	0.10%	0.04%
203514	MartyHuber	646	441994	7417204	Soil	Black	Gravel	Flat	C	10	Dry	Poor	AlpineBare	0.11%	0.00%
203515	MartyHuber	649	441946	7417200	Soil	Black	Sand	RidgeAlpine	C	40	Dry	Excellent	AlpineBare	0.05%	0.00%
203516	MartyHuber	630	442004	7417605	Soil	Grey	Gravel	ModerateE	B	10	Dry	Good	AlpineBare	0.11%	0.01%
203517	MartyHuber	632	442070	7417611	Soil	Grey	Silt	Drainage	B	40	Wet	Good	ForestMixed	0.21%	0.07%
203518	MartyHuber	633	442111	7417601	Soil	Brown	Gravel	Drainage	B	40	Wet	Poor	ForestMixed	0.26%	0.06%
203519	MartyHuber	637	442163	7417606	Soil	Black	Gravel	ModerateW	C	25	Dry	Good	AlpineBare	0.33%	0.45%
203520	MartyHuber	642	442204	7417607	Soil	Brown	Gravel	Flat	B	20	Dry	Good	AlpineBare	0.21%	0.34%
203521	MartyHuber	640	442259	7417608	Soil	Black	Gravel	Flat	C	30	Dry	Good	AlpineBare	0.39%	0.37%
203522	MartyHuber	640	442312	7417605	Soil	Black	Silt	ModerateE	C	20	Frozen	Poor	AlpineBare	0.19%	0.30%
203523	MartyHuber	645	441592	7416213	Soil	Black	Sand	ModerateW	C	30	Dry	Excellent	AlpineBare	0.14%	0.00%
203524	MartyHuber	656	441637	7416211	Soil	Brown	Gravel	Ridge	C	10	Dry	Good	AlpineBare	0.34%	0.01%
203525	MartyHuber	641	441684	7416202	Soil	Black	Gravel	ModerateE	C	10	Dry	Excellent	AlpineBare	0.14%	0.00%
203526	MartyHuber	612	441735	7416206	Soil	Brown	Gravel	ModerateE	C	20	Dry	Excellent	AlpineBare	0.16%	0.00%
201646	DarrellKraemer	666	442401	7415503	Soil	BrownDark	Silt		B	30	Moist	Poor	ForestMixed	0.02%	0.01%
201647	DarrellKraemer	674	442456	7415504	Soil	Brown	Gravel		B	30	Frozen	Good	AlpineBare	0.04%	0.02%
201648	DarrellKraemer	637	442501	7415704	Soil	Brown	Silt		B	20	Frozen	Poor	ForestMixed	0.02%	0.01%
201649	DarrellKraemer	631	442396	7415709	Soil	Brown	Silt		B	20	Wet	Poor	ForestMixed	0.05%	0.03%
201650	DarrellKraemer	625	442295	7415708	Soil	Brown	Silt		B	20	Frozen	Poor		0.03%	0.02%
201651	DarrellKraemer	607	442196	7415718	Soil	Brown	Silt		B	20	Frozen	Poor	ForestMixed	0.02%	0.01%
201652	DarrellKraemer	577	442518	7418404	Soil	Black	Silt		B	20	Frozen	Poor	ForestMixed	0.07%	0.02%
201653	DarrellKraemer	575	442574	7418404	Soil	Black	Silt		B	20	Frozen	Poor	ForestMixed	0.03%	0.02%
201654	DarrellKraemer	569	442616	7418408	Soil	Black	Silt		B	20	Frozen	Poor	ForestMixed	0.03%	0.02%
201655	DarrellKraemer	566	442669	7418408	Soil	Black	Silt		B	30	Frozen	Poor	ForestMixed	0.05%	0.01%
201656	DarrellKraemer	571	442710	7418407	Soil	BrownDark	Silt		B	20	Frozen	Poor	ForestMixed	0.04%	0.02%
201657	DarrellKraemer	562	442765	7418404	Soil	Black	Silt		B	20	Frozen	Poor	AlpineBare	0.02%	0.01%
201658	DarrellKraemer	599	442816	7418419	Soil	Black	Silt		B	25	Frozen	Poor	AlpineBare	0.02%	0.01%
201659	DarrellKraemer	580	442859	7418209	Soil	BrownLight	Gravel		C	30	Dry	Excellent	ForestMixed	0.05%	0.02%
201660	DarrellKraemer	591	442810	7418210	Soil	BrownDark	Clay		C	40	Moist	Good	ForestAspen	0.02%	0.01%
201661	DarrellKraemer	593	442759	7418209	Soil	BrownLight	Gravel		C	30	Moist	Excellent	AlpineBare	0.05%	0.03%
201662	DarrellKraemer	593	442712	7418207	Soil	Brown	Silt		B	20	Moist	Poor	AlpineBare	0.04%	0.02%
201663	DarrellKraemer	593	442660	7418209	Soil	Brown	Silt		B	30	Moist	Good	AlpineBare	0.04%	0.02%
201664	DarrellKraemer	595	442607	7418215	Soil	Brown	Gravel		C	40	Dry	Excellent	AlpineBare	0.02%	0.02%
201665	DarrellKraemer	597	442563	7418205	Soil	Brown	Silt		B	25	Frozen	Good	AlpineBare	0.03%	0.01%
201666	DarrellKraemer	591	442513	7418215	Soil	Brown	Silt		C	30	Frozen	Good	DrainageAlder	0.04%	0.02%
201667	DarrellKraemer	625	442119	7417403	Soil	Brown	Silt		B	30	Frozen	Good	ForestMixed	0.27%	0.22%
201668	DarrellKraemer	639	442146	7417404	Soil	Black	Silt		C	40	Dry	Excellent	ForestMixed	0.28%	0.11%
201669	DarrellKraemer	651	442193	7417398	Soil	BrownLight	Gravel		C	20	Moist	Poor	AlpineBare	0.26%	0.06%
201670	DarrellKraemer	661	442244	7417398	Soil	BrownLight	Gravel		B	20	Dry	Poor	AlpineBare	0.29%	0.05%
201671	DarrellKraemer	659	442305	7417400	Soil	BrownLight	Gravel		B	20	Dry	Poor	AlpineBare	0.39%	0.18%
201672	DarrellKraemer	650	442344	7417396	Soil	Brown	Gravel		B	20	Dry	Poor	AlpineBare	0.36%	0.10%
201673	DarrellKraemer	654	442396	7417398	Soil	Brown	Gravel		C	20	Dry	Good	AlpineBare	0.45%	0.51%
201674	DarrellKraemer	632	442455	7417401	Soil	Brown	Gravel		C	20	Dry	Good	AlpineBare	0.28%	0.23%
201675	DarrellKraemer	614	442504	7417400	Soil	BrownDark	Silt		B	20	Wet	Good	AlpineBare	0.18%	0.13%
201676	DarrellKraemer	605	442554	7417401	Soil	BrownDark	Silt		B	30	Frozen	Poor	ForestMixed	0.13%	0.04%

## Soil Sample Locations and Descriptions

SampleNo.	Sampler	Elevation	Easting	Northing	SampleType	S_Colour	S_Texture	S_Terrain	Horizon	S_Depth	S_Moisture	S_Quality	S_Vegetation	V2O5_%	Zn_%
201677	DarrellKraemer	596	442609	7417407	Soil	Brown	Silt		B	20	Frozen	Poor	ForestMixed	0.04%	0.03%
201678	DarrellKraemer	595	442644	7417396	Soil	Brown	Silt		C	30	Frozen	Good	ForestMixed	0.03%	0.02%
201679	DarrellKraemer	597	442704	7417397	Soil	Brown	Silt		B	30	Frozen	Good	ForestMixed	0.04%	0.02%
201680	DarrellKraemer	599	442755	7417399	Soil	Brown	Silt		B	20	Frozen	Good	ForestMixed	0.03%	0.01%
201681	DarrellKraemer	615	442455	7417605	Soil	Black	Silt		C	20	Wet	Poor	ForestMixed	0.27%	0.12%
201682	DarrellKraemer	621	442401	7417612	Soil	BrownDark	Silt		C	20	Wet	Poor	AlpineBare	0.19%	0.15%
201683	DarrellKraemer	621	442360	7417603	Soil	Brown	Silt		C	20	Wet	Poor	AlpineBare	0.15%	0.28%
203455	MartyHuber	617	442092	7415612	Soil	BrownDark	Silt	Flat	B	20	Frozen	Poor	ForestMixed	0.03%	0.03%
203456	MartyHuber	618	442143	7415610	Soil	BrownDark	Silt	Flat	B	20	Frozen	Poor	ForestMixed	0.03%	0.01%
203457	MartyHuber	620	442192	7415609	Soil	BrownDark	Silt	Flat	B	20	Frozen	Poor	ForestMixed	0.03%	0.01%
203458	MartyHuber	627	442243	7415609	Soil	Grey	Silt	Flat	B	60	Moist	Good	ForestMixed	0.03%	0.01%
203459	MartyHuber	629	442293	7415608	Soil	BrownDark	Silt	ModerateW	B	40	Dry	Good	ForestMixed	0.03%	0.01%
203460	MartyHuber	634	442344	7415610	Soil	Brown	Silt	ModerateW	B	20	Frozen	Poor	ForestMixed	0.03%	0.01%
203538	MartyHuber	614	441884	7416407	Soil	Grey	Silt	Flat	B	50	Moist	Poor		0.25%	0.10%
203539	MartyHuber	605	441837	7416409	Soil	Grey	Clay	Drainage	B	50	Wet	Poor	AlpineBare	0.20%	0.20%
203540	MartyHuber	605	441738	7416408	Soil	Black	Sand	ModerateE	C	20	Dry	Excellent	AlpineBare	0.11%	0.01%
203541	MartyHuber	621	441688	7416408	Soil	Black	Silt	ModerateN	B	10	Moist	Good	AlpineBare	0.12%	0.05%
203542	MartyHuber	624	441641	7416406	Soil	Black	Sand	ModerateN	C	5	Dry	Good	AlpineBare	0.19%	0.00%
203543	MartyHuber	618	441582	7416402	Soil	Black	Sand	ModerateN	C	50	Moist	Excellent	AlpineBare	0.12%	0.00%
203544	MartyHuber	626	442047	7416798	Soil	Brown	Gravel	ModerateW	B	10	Moist	Poor	ForestMixed	0.19%	0.20%
203545	MartyHuber	630	442104	7416799	Soil	Grey	Silt	ModerateW	B	20	Wet	Good	SubAlpineFir	0.12%	0.14%
203546	MartyHuber	638	442150	7416808	Soil	Brown	Silt	ModerateW	B	20	Moist	Good	ForestFir	0.17%	0.11%
203547	MartyHuber	635	442204	7416802	Soil	Brown	Gravel	ModerateS	B	30	Dry	Good	ForestMixed	0.47%	0.10%
203548	MartyHuber	639	442252	7416806	Soil	BrownDark	Gravel	ModerateS	C	30	Moist	Good	ForestMixed	0.59%	0.15%
203549	MartyHuber	638	442297	7416796	Soil	BrownDark	Gravel	ModerateE	C	40	Moist	Excellent	ForestMixed	0.36%	0.17%
203550	MartyHuber	645	442389	7416604	Soil	Black	Silt	ModerateE	C	40	Moist	Good	AlpineBare	0.23%	0.14%
203551	MartyHuber	651	442345	7416595	Soil	Black	Sand	ModerateN	C	40	Dry	Excellent	AlpineBare	0.24%	0.18%
203552	MartyHuber	652	442292	7416595	Soil	Black	Silt	ModerateN	B	25	Moist	Good	AlpineBare	0.34%	0.40%
203553	MartyHuber	652	442237	7416593	Soil	Black	Silt	ModerateN	C	30	Moist	Good	AlpineBare	0.43%	0.18%
203554	MartyHuber	649	442191	7416593	Soil	Black	Gravel	ModerateN	C	20	Moist	Good	AlpineBare	0.49%	0.17%
203555	MartyHuber	641	442107	7416595	Soil	Black	Gravel	ModerateN	C		Moist	Good	AlpineBare	0.27%	0.03%
203556	MartyHuber	623	441984	7416571	Soil	Brown	Silt	ModerateN	B	20	Moist	Poor	ForestMixed	0.31%	0.10%
203557	MartyHuber	616	441949	7416572	Soil	Brown	Gravel	ModerateW	B	20	Moist	Good	AlpineBare	0.22%	0.11%
201684	DarrellKraemer	627	441588	7415611	Soil	Brown	Silt		B	30	Moist	Poor	AlpineBare	0.19%	0.06%
201685	DarrellKraemer	640	441641	7415606	Soil	Brown	Gravel		B	20	Moist	Poor	AlpineBare	0.26%	0.07%
201686	DarrellKraemer	640	441696	7415609	Soil	Brown	Gravel		B	20	Moist	Poor	AlpineBare	0.19%	0.04%
201687	DarrellKraemer	649	441749	7415613	Soil	Brown	Gravel		C	30	Dry	Excellent	ForestBlackSpruce	0.21%	0.06%
201688	DarrellKraemer	668	441792	7415605	Soil	Brown	Gravel		C	30	Dry	Excellent	ForestBlackSpruce	0.28%	0.05%
201689	DarrellKraemer	675	441838	7415612	Soil	Brown	Gravel		C	20	Dry	Poor	AlpineBare	0.56%	0.12%
201690	DarrellKraemer	671	441886	7415608	Soil	Brown	Gravel		C	20	Dry	Good	AlpineBare	0.54%	0.49%
201691	DarrellKraemer	657	441939	7415616	Soil	Brown	Gravel		B	20	Dry	Poor	ForestBlackSpruce	0.27%	0.39%
201692	DarrellKraemer	632	441986	7415604	Soil	Brown	Gravel		C	20	Dry	Poor	ForestBlackSpruce	0.82%	0.88%
201693	DarrellKraemer	621	442040	7415611	Soil	Brown	Silt		C	20	Frozen	Poor	ForestMixed	0.18%	0.16%
201694	DarrellKraemer	651	442040	7415807	Soil	Brown	Gravel		C	20	Dry	Poor	AlpineBare	0.48%	0.86%
201695	DarrellKraemer	677	441993	7415818	Soil	Brown	Gravel	SteepNW	C	20	Dry	Poor	AlpineBare	0.55%	0.23%
201696	DarrellKraemer	702	441936	7415804	Soil	Brown	Gravel		C	20	Dry	Poor	AlpineBare	0.47%	0.16%
201697	DarrellKraemer	692	441888	7415805	Soil	Brown	Gravel		B	20	Dry	Poor	AlpineBare	0.39%	0.12%
201698	DarrellKraemer	675	441839	7415804	Soil	Brown	Gravel		B	30	Dry	Good	AlpineBare	0.45%	0.22%
201699	DarrellKraemer	658	441789	7415803	Soil	Brown	Gravel		C	25	Dry	Good	AlpineBare	0.33%	0.13%
201700	DarrellKraemer	647	441733	7415810	Soil	Brown	Gravel		C	30	Dry	Good	AlpineBare	0.20%	0.16%
201701	DarrellKraemer	651	441696	7415807	Soil	Brown	Gravel		B	30	Dry	Good	AlpineBare	0.08%	0.01%

## Soil Sample Locations and Descriptions

SampleNo.	Sampler	Elevation	Easting	Northing	SampleType	S_Colour	S_Texture	S_Terrain	Horizon	S_Depth	S_Moisture	S_Quality	S_Vegetation	V2O5_%	Zn_%
201702	DarrellKraemer	652	441638	7415810	Soil	Black	Sand		C	40	Dry	Excellent	AlpineBare	0.04%	0.00%
201703	DarrellKraemer	657	441579	7415805	Soil	Black	Sand		C	40	Dry	Excellent	AlpineBare	0.10%	0.00%
201704	DarrellKraemer	656	441589	7416006	Soil	BrownLight	Gravel		C	30	Dry	Excellent	AlpineBare	0.20%	0.01%
201705	DarrellKraemer	659	441639	7416008	Soil	Brown	Gravel		C	30	Dry	Excellent	AlpineBare	0.15%	0.01%
201706	DarrellKraemer	639	441685	7416007	Soil	Brown	Gravel		C	40	Dry	Good	AlpineBare	0.08%	0.00%
201707	DarrellKraemer	631	441734	7416011	Soil	BrownDark	Silt		C	20	Frozen	Poor	ForestBlackSpruce	0.12%	0.02%
201708	DarrellKraemer	633	441785	7416010	Soil	Brown	Silt		C	20	Frozen	Good	DrainageAlder	0.14%	0.08%
201709	DarrellKraemer	646	441841	7416003	Soil	Brown	Gravel		C	20	Dry	Poor	ForestBlackSpruce	0.21%	0.04%
201710	DarrellKraemer	648	441892	7416010	Soil	BrownDark	Silt		C	30	Frozen	Poor	AlpineBare	0.16%	0.15%
201711	DarrellKraemer	653	441941	7416004	Soil	BrownDark	Silt		C	20	Frozen	Poor	AlpineBare	0.29%	0.35%
201712	DarrellKraemer	651	441992	7416007	Soil	BrownLight	Silt		C	20	Dry	Poor	AlpineBare	0.21%	0.24%
201713	DarrellKraemer	643	442043	7416005	Soil	Brown	Silt		C	30	Dry	Good	AlpineBare	0.39%	0.24%
201714	DarrellKraemer	621	442100	7416007	Soil	Black	Silt		C	30	Frozen	Good	ForestBlackSpruce	0.19%	0.16%
201715	DarrellKraemer	608	442141	7416011	Soil	BrownDark	Silt		C	20	Frozen	Poor	ForestBlackSpruce	0.20%	0.09%
203527	MartyHuber	639	441791	7416210	Soil	Grey	Clay	Drainage	B	50	Moist	Good	AlpineBare	0.09%	0.16%
203528	MartyHuber	646	441951	7416201	Soil	Brown	Silt	Ridge	B		Moist	Poor	AlpineBare	0.08%	0.12%
203529	MartyHuber	652	441995	7416205	Soil	Brown	Gravel	Ridge	B	5	Dry	Good	AlpineBare	0.40%	0.15%
203530	MartyHuber	650	442042	7416199	Soil	Brown	Silt	ModerateE	B	5	Dry	Good	AlpineBare	0.30%	0.12%
203531	MartyHuber	648	442096	7416210	Soil	Brown	Gravel	ModerateE	B	10	Dry	Good	AlpineBare	0.35%	0.09%
203532	MartyHuber	640	442137	7416207	Soil	Brown	Gravel	ModerateE	B	10	Dry	Poor	AlpineBare	0.24%	0.04%
203533	MartyHuber	641	442189	7416206	Soil	BrownDark	Gravel	ModerateE	C	45	Dry	Excellent	AlpineBare	0.38%	0.18%
203534	MartyHuber	671	442288	7416417	Soil	Brown	Gravel	ModerateE	B	10	Dry	Good	AlpineBare	0.33%	0.14%
203535	MartyHuber	676	442241	7416411	Soil	Brown	Gravel	Ridge	B	5	Dry	Good	AlpineBare	0.36%	0.07%
203536	MartyHuber	675	442198	7416411	Soil	Brown	Silt	Ridge	B	5	Moist	Good	AlpineBare	0.31%	0.09%
203537	MartyHuber	672	442141	7416421	Soil	Brown	Silt	ModerateW	B	5	Dry	Good	AlpineBare	0.20%	0.04%

Core Samples - TOC and  $\delta^{13}C$ 

Hole ID	New ID	To_m	From_m	Width_m	Formation	Sample ID	TOC	$\delta^{13}C$
FX07-02	DV07-05	34.50	35.50	1.00	Imperial	1478526	RP	RP
FX07-02	DV07-05	35.50	36.30	0.80	Imperial	1478527	RP	RP
FX07-02	DV07-05	36.30	37.40	1.10	Imperial	1478528	4.39	-30.5
FX07-02	DV07-05	37.40	38.50	1.10	Imperial	1478529	4.52	-30.5
FX07-02	DV07-05	38.50	39.60	1.10	Imperial	1478530	3.59	-30.8
FX07-02	DV07-05	39.60	40.70	1.10	Imperial	1478531	5.12	-30.8
FX07-02	DV07-05	40.70	41.70	1.00	Imperial	1478532	4.62	-30.8
FX07-02	DV07-05	41.70	42.70	1.00	Imperial	1478534	5.40	-30.8
FX07-02	DV07-05	42.70	43.70	1.00	Imperial	1478535	4.95	-30.8
FX07-02	DV07-05	43.70	44.70	1.00	Imperial	1478536	5.14	-30.9
FX07-02	DV07-05	44.70	45.70	1.00	Imperial	1478537	5.02	-30.9
FX07-02	DV07-05	45.70	46.70	1.00	Imperial	1478538	4.79	-30.9
FX07-02	DV07-05	46.70	47.70	1.00	Imperial	1478539	5.12	-30.9
FX07-02	DV07-05	47.70	48.80	1.10	Imperial	1478540	4.99	-30.9
FX07-02	DV07-05	48.80	49.80	1.00	Imperial	1478541	5.07	-30.8
FX07-02	DV07-05	49.80	50.80	1.00	Imperial	1478542	5.45	-30.8
FX07-02	DV07-05	50.80	51.80	1.00	Imperial	1478544	4.76	-30.7
FX07-02	DV07-05	51.80	52.80	1.00	Imperial	1478545	5.35	-30.6
FX07-02	DV07-05	52.80	53.80	1.00	Imperial	1478546	4.79	-30.6
FX07-02	DV07-05	53.80	54.70	0.90	Imperial	1478547	5.29	-30.7
FX07-02	DV07-05	54.70	55.80	1.10	Imperial	1478548	5.01	-30.7
FX07-02	DV07-05	55.80	56.80	1.00	Imperial	1478549	5.88	-30.7
FX07-02	DV07-05	56.80	57.90	1.10	Imperial	1478550	6.94	-30.8
FX07-02	DV07-05	57.90	58.90	1.00	Imperial	1478552	6.38	-30.8
FX07-02	DV07-05	58.90	59.80	0.90	Imperial	1478553	5.97	-30.9
FX07-02	DV07-05	59.80	60.96	1.16	Imperial	1478554	4.60	-30.8
FX07-02	DV07-05	60.96	61.30	0.34	Imperial	1478555	4.43	-30.6
FX07-02	DV07-05	61.30	62.10	0.80	Imperial	1478556	4.84	-30.6
FX07-02	DV07-05	62.10	63.20	1.10	Imperial	1478557	5.88	-30.6
FX07-02	DV07-05	63.20	64.30	1.10	Imperial	1478558	5.00	-30.7
FX07-02	DV07-05	64.30	65.30	1.00	Imperial	1478559	5.39	-30.6
FX07-02	DV07-05	65.30	66.30	1.00	Imperial	1478560	5.41	-30.7
FX07-02	DV07-05	66.30	67.30	1.00	Imperial	1478561	5.85	-30.7
FX07-02	DV07-05	67.30	68.30	1.00	Imperial	1478562	5.49	-30.8
FX07-02	DV07-05	68.30	68.50	0.20	Imperial	1478563	6.10	-30.7
FX07-02	DV07-05	68.50	69.50	1.00	Canol	1478564	5.31	-30.8
FX07-02	DV07-05	69.50	70.50	1.00	Canol	1478565	2.89	-30.7
FX07-02	DV07-05	70.50	71.20	0.70	Canol	1478567	3.75	-30.8
FX07-02	DV07-05	71.20	72.20	1.00	Canol	1478568	4.47	-30.9
FX07-02	DV07-05	72.20	73.20	1.00	Canol	1478569	4.51	-30.9
FX07-02	DV07-05	73.20	74.20	1.00	Canol	1478570	RP	RP
FX07-02	DV07-05	74.20	75.20	1.00	Canol	1478572	RP	RP
FX07-02	DV07-05	75.20	76.20	1.00	Canol	1478573	RP	RP
FX07-02	DV07-05	76.20	77.20	1.00	Canol	1478574	3.95	-30.9
FX07-02	DV07-05	77.20	78.20	1.00	Canol	1478575	3.94	-30.9
FX07-02	DV07-05	78.20	79.20	1.00	Canol	1478576	4.70	-30.9
FX07-02	DV07-05	79.20	80.20	1.00	Canol	1478577	5.89	-30.8
FX07-02	DV07-05	80.20	81.20	1.00	Canol	1478578	4.91	-29.5
FX07-02	DV07-05	81.20	82.30	1.10	Canol	1478580	5.42	-31.3
FX07-02	DV07-05	82.30	83.30	1.00	Canol	1478581	6.90	-31.1
FX07-02	DV07-05	83.30	84.30	1.00	Canol	1478582	5.79	-31.1

Core Samples - TOC and  $\delta^{13}C$ 

Hole ID	New ID	To_m	From_m	Width_m	Formation	Sample ID	TOC	$\delta^{13}C$
FX07-02	DV07-05	84.30	85.30	1.00	Canol	1478583	7.11	-31.0
FX07-02	DV07-05	85.30	86.30	1.00	Canol	1478584	5.55	-31.1
FX07-02	DV07-05	86.30	87.40	1.10	Canol	1478585	5.20	-31.1
FX07-02	DV07-05	87.40	88.40	1.00	Canol	1478586	3.33	-31.1
FX07-02	DV07-05	88.40	89.40	1.00	Canol	1478588	4.03	-31.2
FX07-02	DV07-05	89.40	90.40	1.00	Canol	1478589	5.61	-31.3
FX07-02	DV07-05	90.40	91.40	1.00	Canol	1478590	7.07	-31.2
FX07-02	DV07-05	91.40	92.50	1.10	Canol	1478591	5.43	-31.3
FX07-02	DV07-05	92.50	93.50	1.00	Canol	1478592	6.62	-31.3
FX07-02	DV07-05	93.50	94.50	1.00	Canol	1478593	6.67	-31.3
FX07-02	DV07-05	94.50	95.50	1.00	Canol	1478594	4.72	-31.4
FX07-02	DV07-05	95.50	96.50	1.00	Canol	1478595	5.34	-31.3
FX07-02	DV07-05	96.50	97.50	1.00	Canol	1478596	4.00	-31.3
FX07-02	DV07-05	97.50	98.60	1.10	Canol	1478597	4.42	-31.4
FX07-02	DV07-05	98.60	99.60	1.00	Canol	1478598	4.16	-31.4
FX07-02	DV07-05	99.60	100.60	1.00	Canol	1478599	4.42	-31.3
FX07-02	DV07-05	100.60	101.50	0.90	Canol	1478600	5.04	-31.4
FX07-02	DV07-05	101.50	102.60	1.10	Canol	1478601	4.66	-31.4
FX07-02	DV07-05	102.60	103.60	1.00	Canol	1478602	6.66	-31.4
FX07-02	DV07-05	103.60	104.70	1.10	Canol	1478603	6.76	-31.3
FX07-02	DV07-05	104.70	105.70	1.00	Canol	1478604	6.38	-31.2
FX07-02	DV07-05	105.70	106.70	1.00	Canol	1478605	7.67	-31.4
FX07-03	DV07-06	12.34	13.50	1.16	Canol	1478606	5.18	-30.9
FX07-03	DV07-06	13.50	14.70	1.20	Canol	1478607	5.28	-30.8
FX07-03	DV07-06	14.70	15.30	0.60	Canol	1478609	2.07	-24.5
FX07-03	DV07-06	15.30	16.30	1.00	Canol	1478610	7.27	-30.6
FX07-03	DV07-06	16.30	17.30	1.00	Canol	1478611	5.93	-30.6
FX07-03	DV07-06	17.30	18.30	1.00	Canol	1478612	5.32	-30.9
FX07-03	DV07-06	18.30	19.30	1.00	Canol	1478613	6.07	-31.0
FX07-03	DV07-06	19.30	20.30	1.00	Canol	1478614	6.99	-30.9
FX07-03	DV07-06	20.30	21.30	1.00	Canol	1478615	6.75	-30.8
FX07-03	DV07-06	21.30	22.30	1.00	Canol	1478616	6.26	-30.9
FX07-03	DV07-06	22.30	23.30	1.00	Canol	1478618	6.55	-30.9
FX07-03	DV07-06	23.30	24.30	1.00	Canol	1478619	6.47	-30.9
FX07-03	DV07-06	24.30	25.30	1.00	Canol	1478620	4.86	-30.9
FX07-03	DV07-06	25.30	26.30	1.00	Canol	1478621	5.78	-31.0
FX07-03	DV07-06	26.30	27.30	1.00	Canol	1478622	5.82	-31.3
FX07-03	DV07-06	27.30	28.30	1.00	Canol	1478624	5.65	-31.1
FX07-03	DV07-06	28.30	29.30	1.00	Canol	1478625	7.55	-31.0
FX07-03	DV07-06	29.30	30.30	1.00	Canol	1478626	6.74	-31.1
FX07-03	DV07-06	30.30	31.30	1.00	Canol	1478627	5.84	-31.1
FX07-03	DV07-06	31.30	32.30	1.00	Canol	1478628	5.64	-31.0
FX07-03	DV07-06	32.30	33.30	1.00	Canol	1478629	4.45	-31.0
FX07-03	DV07-06	33.30	34.30	1.00	Canol	1478630	5.33	-31.1
FX07-03	DV07-06	34.30	35.50	1.20	Canol	1478631	5.80	-31.1
FX07-03	DV07-06	35.50	36.60	1.10	Canol	1478632	5.90	-31.0
FX07-03	DV07-06	36.60	37.60	1.00	Canol	1478633	7.23	-31.1
FX07-03	DV07-06	37.60	38.60	1.00	Canol	1478634	6.68	-31.0
FX07-03	DV07-06	38.60	39.60	1.00	Canol	1478635	6.61	-31.0
FX07-03	DV07-06	39.60	40.60	1.00	Canol	1478636	7.43	-31.0
FX07-03	DV07-06	40.60	41.60	1.00	Canol	1478638	7.22	-31.0

Core Samples - TOC and  $\delta^{13}C$ 

Hole ID	New ID	To_m	From_m	Width_m	Formation	Sample ID	TOC	$\delta^{13}C$
FX07-03	DV07-06	41.60	42.70	1.10	Canol	1478639	6.65	-31.1
FX07-03	DV07-06	42.70	43.70	1.00	Canol	1478640	5.75	-30.9
FX07-03	DV07-06	43.70	44.70	1.00	Canol	1478641	3.87	-30.9
FX07-03	DV07-06	44.70	45.70	1.00	Canol	1478642	4.70	-30.9
FX07-03	DV07-06	45.70	46.70	1.00	Canol	1478643	5.72	-30.9
FX07-03	DV07-06	46.70	47.70	1.00	Canol	1478644	6.21	-31.0
FX07-03	DV07-06	47.70	48.80	1.10	Canol	1478645	6.18	-31.0
FX07-03	DV07-06	48.80	49.80	1.00	Canol	1478646	5.92	-31.0
FX07-03	DV07-06	49.80	50.80	1.00	Canol	1478647	6.89	-31.0
FX07-03	DV07-06	50.80	51.80	1.00	Canol	1478648	5.75	-31.0
FX07-03	DV07-06	51.80	52.80	1.00	Canol	1478649	4.44	-31.0
FX07-03	DV07-06	52.80	53.80	1.00	Canol	1478650	5.64	-30.9
FX07-03	DV07-06	53.80	54.90	1.10	Canol	1478652	5.61	-30.9
FX07-03	DV07-06	54.90	55.90	1.00	Canol	1478653	6.69	-30.8
FX07-03	DV07-06	55.90	56.90	1.00	Canol	1478654	5.80	-30.9
FX07-03	DV07-06	56.90	57.90	1.00	Canol	1478655	5.27	-30.9
FX07-03	DV07-06	57.90	58.90	1.00	Canol	1478656	6.10	-30.9
FX07-03	DV07-06	58.90	59.90	1.00	Canol	1478657	6.02	-30.8
FX07-03	DV07-06	59.90	60.90	1.00	Canol	1478658	6.52	-30.9
FX07-03	DV07-06	60.90	62.00	1.10	Canol	1478659	5.83	-30.9
FX07-03	DV07-06	62.00	63.00	1.00	Canol	1478660	5.89	-30.8
FX07-03	DV07-06	63.00	64.00	1.00	Canol	1478661	5.84	-30.8
FX07-03	DV07-06	64.00	65.00	1.00	Canol	1478662	6.27	-30.8
FX07-03	DV07-06	65.00	66.00	1.00	Canol	1478663	6.47	-30.8
FX07-03	DV07-06	66.00	67.00	1.00	Canol	1478664	7.25	-31.3
FX07-03	DV07-06	67.00	68.00	1.00	Canol	1478665	7.26	-30.9
FX07-03	DV07-06	68.00	69.00	1.00	Canol	1478667	6.89	-30.9
FX07-03	DV07-06	69.00	70.00	1.00	Canol	1478668	6.39	-24.4
FX07-03	DV07-06	70.00	71.00	1.00	Canol	1478669	6.59	-30.9
FX07-03	DV07-06	71.00	72.00	1.00	Canol	1478670	6.93	-31.0
FX07-03	DV07-06	72.00	73.00	1.00	Canol	1478671	7.85	-31.1
FX07-03	DV07-06	73.00	74.00	1.00	Canol	1478672	8.90	-31.2
FX07-03	DV07-06	74.00	75.00	1.00	Canol	1478673	7.50	-31.3
FX07-03	DV07-06	75.00	76.00	1.00	Canol	1478674	6.34	-31.2
FX07-03	DV07-06	76.00	77.00	1.00	Canol	1478675	7.41	-31.2
FX07-03	DV07-06	77.00	78.00	1.00	Canol	1478676	7.68	-31.2
FX07-03	DV07-06	78.00	79.00	1.00	Canol	1478678	5.92	-31.1
FX07-03	DV07-06	79.00	79.80	0.80	Canol	1478679	5.87	-31.2
FX07-03	DV07-06	79.80	81.00	1.20	Canol	1478680	7.01	-31.3
FX07-03	DV07-06	81.00	82.20	1.20	Canol	1478681	6.50	-31.2
FX07-03	DV07-06	82.20	83.40	1.20	Canol	1478682	5.51	-31.2
FX07-03	DV07-06	83.40	84.40	1.00	Canol	1478683	6.41	-31.2
FX07-03	DV07-06	84.40	85.40	1.00	Canol	1478684	5.83	-31.3
FX07-03	DV07-06	85.40	86.40	1.00	Canol	1478685	6.97	-31.2
FX07-03	DV07-06	86.40	87.40	1.00	Canol	1478686	6.14	-31.2
FX07-03	DV07-06	87.40	88.40	1.00	Canol	1478688	6.08	-31.1
FX07-03	DV07-06	88.40	89.40	1.00	Canol	1478689	6.48	-31.1
FX07-03	DV07-06	89.40	90.40	1.00	Canol	1478690	6.15	-31.0
FX07-03	DV07-06	90.40	91.40	1.00	Canol	1478691	6.89	-31.1
FX07-03	DV07-06	91.40	92.40	1.00	Canol	1478692	8.48	-31.1
FX07-03	DV07-06	92.40	93.50	1.10	Canol	1478693	7.42	-31.2



Core Samples - TOC and  $\delta^{13}C$ 

Hole ID	New ID	To_m	From_m	Width_m	Formation	Sample ID	TOC	$\delta^{13}C$
FX07-03	DV07-06	93.50	94.50	1.00	Canol	1478694	8.56	-31.1
FX07-03	DV07-06	94.50	95.50	1.00	Canol	1478696	7.94	-31.1
FX07-03	DV07-06	95.50	96.50	1.00	Canol	1478697	7.79	-31.1
FX07-03	DV07-06	96.50	97.50	1.00	Canol	1478698	7.90	-31.1
FX07-03	DV07-06	97.50	98.50	1.00	Canol	1478699	7.26	-31.1
FX07-03	DV07-06	98.50	99.50	1.00	Canol	1478700	7.78	-31.0
FX07-03	DV07-06	99.50	100.50	1.00	Canol	1478701	8.02	-31.0
FX07-03	DV07-06	100.50	101.50	1.00	Canol	1478702	8.41	-31.1
FX07-03	DV07-06	101.50	102.50	1.00	Canol	1478703	7.39	-31.1
<b>FX07-03</b>	<b>DV07-06</b>	<b>102.50</b>	<b>103.60</b>	<b>1.10</b>	<b>RCTZ</b>	<b>1478704</b>	7.36	-31.1
<b>FX07-03</b>	<b>DV07-06</b>	<b>103.60</b>	<b>104.60</b>	<b>1.00</b>	<b>RCTZ</b>	<b>1478705</b>	6.25	-30.9
<b>FX07-03</b>	<b>DV07-06</b>	<b>104.60</b>	<b>105.60</b>	<b>1.00</b>	<b>RCTZ</b>	<b>1478706</b>	5.73	-31.0
<b>FX07-03</b>	<b>DV07-06</b>	<b>105.60</b>	<b>106.70</b>	<b>1.10</b>	<b>RCTZ</b>	<b>1478707</b>	6.74	-31.0
<b>FX07-03</b>	<b>DV07-06</b>	<b>106.70</b>	<b>107.70</b>	<b>1.00</b>	<b>RCTZ</b>	<b>1478708</b>	4.99	-31.2
<b>FX07-03</b>	<b>DV07-06</b>	<b>107.70</b>	<b>108.70</b>	<b>1.00</b>	<b>RCTZ</b>	<b>1478710</b>	4.98	-30.8
FX07-03	DV07-06	108.70	109.70	1.00	Road River	1478711	5.65	-30.9
FX07-03	DV07-06	109.70	110.70	1.00	Road River	1478712	5.75	-30.8
FX07-03	DV07-06	110.70	111.70	1.00	Road River	1478713	6.06	-30.9
FX07-03	DV07-06	111.70	112.70	1.00	Road River	1478714	6.15	-30.9
FX07-03	DV07-06	112.70	113.75	1.05	Road River	1478715	7.98	-30.8
FX07-03	DV07-06	113.75	114.56	0.81	Road River	1478716	7.27	-30.8
FX07-03	DV07-06	114.56	115.56	1.00	Road River	1478717	8.30	-30.9
FX07-03	DV07-06	115.56	116.84	1.28	Road River	1478718	9.35	-30.9
FX07-03	DV07-06	116.84	117.84	1.00	Road River	1478719	8.44	-30.9
FX07-03	DV07-06	117.84	118.90	1.06	Road River	1478720	5.74	-30.8
FX07-03	DV07-06	118.90	120.00	1.10	Road River	1478721	6.83	-31.0
FX07-03	DV07-06	120.00	121.30	1.30	Road River	1478722	6.02	-31.0
FX07-03	DV07-06	121.30	122.35	1.05	Road River	1478724	7.43	-30.8
FX07-03	DV07-06	122.35	123.40	1.05	Road River	1478725	5.83	-30.8
FX07-03	DV07-06	123.40	124.40	1.00	Road River	1478726	4.32	-30.8
FX07-03	DV07-06	124.40	125.40	1.00	Road River	1478727	7.94	-30.8
FX07-03	DV07-06	125.40	126.40	1.00	Road River	1478728	12.58	-30.7
FX07-03	DV07-06	126.40	127.40	1.00	Road River	1478729	12.24	-30.7
FX07-03	DV07-06	127.40	128.40	1.00	Road River	1478730	9.12	-30.7
FX07-03	DV07-06	128.40	129.40	1.00	Road River	1478732	5.97	-30.6
FX07-03	DV07-06	129.40	130.40	1.00	Road River	1478733	5.74	-30.8
FX07-03	DV07-06	130.40	131.40	1.00	Road River	1478734	8.68	-30.8
FX07-03	DV07-06	131.40	132.40	1.00	Road River	1478735	9.34	-30.6
FX07-03	DV07-06	132.40	133.40	1.00	Road River	1478736	5.94	-30.7
FX07-03	DV07-06	133.40	134.40	1.00	Road River	1478737	7.06	-30.1
FX07-03	DV07-06	134.40	135.20	0.80	Road River	1478738	8.49	-30.8
FX07-03	DV07-06	135.20	136.20	1.00	Road River	1478739	7.99	-30.8
FX07-03	DV07-06	136.20	137.20	1.00	Road River	1478741	8.27	-30.7
FX07-03	DV07-06	137.20	138.20	1.00	Road River	1478742	7.08	-30.9
FX07-03	DV07-06	138.20	139.20	1.00	Road River	1478743	6.06	-30.8
FX07-03	DV07-06	139.20	140.20	1.00	Road River	1478744	5.61	-30.7
FX07-03	DV07-06	140.20	141.20	1.00	Road River	1478745	5.82	-30.7

**Appendix B: Analytical Certificates**



**BUREAU VERITAS** MINERAL LABORATORIES  
Canada

[www.bureauveritas.com/um](http://www.bureauveritas.com/um)

Bureau Veritas Commodities Canada Ltd.  
9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada  
PHONE (604) 253-3158

**Client:** **Breakaway Expl. Mgmt. Inc.**  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7 Canada

Submitted By: Mark Fekete  
Receiving Lab: Canada-Whitehorse  
Received: August 21, 2020  
Analysis Start: October 27, 2020  
Report Date: November 20, 2020  
Page: 1 of 2

# CERTIFICATE OF ANALYSIS

WHI20000297.1

## CLIENT JOB INFORMATION

Project: DV  
Shipment ID:  
P.O. Number  
Number of Samples: 15

## SAMPLE DISPOSAL

DISP-PLP Dispose of Pulp After 90 days  
DISP-RJT Dispose of Reject After 60 days

Bureau Veritas does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: Breakaway Expl. Mgmt. Inc.  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7  
Canada

CC: Marty Huber

## SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Procedure Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
PRP70-250	14	Crush, split and pulverize 250 g rock to 200 mesh			WHI
SLBHP	0	Sort, label and box pulps			WHI
MA300	14	4 Acid digestion ICP-ES analysis	0.25	Completed	VAN
SHP01	14	Per sample shipping charges for branch shipments			VAN

## ADDITIONAL COMMENTS

  
JEFFREY CANNON  
Geochemistry Department Supervisor

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only. All results are considered the confidential property of the client. Bureau Veritas assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.  
\*\*\* asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.



**BUREAU VERITAS** MINERAL LABORATORIES  
Canada

www.bureauveritas.com/um

Bureau Veritas Commodities Canada Ltd.

9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

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Client: **Breakaway Expl. Mgmt. Inc.**

3081 Third Ave.

Whitehorse Yukon Y1A 4Z7 Canada

Project: DV

Report Date: November 20, 2020

Page: 2 of 2

Part: 1 of 2

# CERTIFICATE OF ANALYSIS

WHI20000297.1

Method	Analyte	WGHT	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Wgt	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P
Unit	MDL	kg	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	
		0.01	2	2	5	2	0.5	2	2	5	0.01	5	20	2	0.4	5	5	5	2	0.01	0.002
141922	Rock	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.
1478859	Rock	1.44	22	34	7	7	<0.5	23	<2	23	0.54	10	<20	<2	46	<0.4	7	<5	687	0.02	0.013
1478860	Rock	1.23	87	48	13	746	1.2	277	4	58	1.26	24	21	3	101	18.1	13	<5	1087	1.76	0.024
1478861	Rock	1.09	69	95	11	720	2.2	205	3	40	1.32	42	23	3	97	19.2	26	<5	1801	0.81	0.028
1478862	Rock	1.33	103	84	10	1023	1.2	217	<2	58	0.93	33	27	<2	196	57.8	14	<5	1414	2.51	0.022
1478863	Rock	1.65	53	85	13	2371	1.4	478	8	91	0.80	31	24	<2	330	27.8	16	<5	1442	3.74	0.023
1478864	Rock	1.47	95	55	8	1186	1.2	340	5	80	0.94	25	26	<2	263	19.6	12	<5	1240	2.18	0.055
1478865	Rock	1.57	48	93	11	1114	1.7	242	5	79	1.44	43	23	<2	333	21.8	21	<5	1369	4.19	0.037
1478866	Rock	1.84	37	466	34	301	1.8	85	<2	55	2.80	62	20	<2	585	14.8	44	<5	1940	5.32	1.337
1478867	Rock	1.52	49	55	12	652	1.1	172	5	185	1.18	24	21	3	412	9.5	10	<5	993	6.68	0.070
1478869	Rock	1.41	52	55	8	647	0.8	236	6	130	1.03	20	26	3	572	8.6	11	<5	879	6.74	0.031
1478870	Rock	1.33	67	55	10	568	0.9	216	5	126	1.14	22	26	3	457	9.9	10	<5	915	5.43	0.039
1478871	Rock	1.49	32	88	9	1004	0.9	130	3	126	0.49	21	23	<2	1812	44.3	14	<5	828	12.46	0.025
1478872	Rock	1.44	81	101	13	1637	1.8	305	6	92	1.21	43	28	<2	416	25.7	20	<5	1642	5.04	0.041
1478873	Rock	1.14	64	107	33	692	2.1	131	<2	20	2.49	53	25	<2	248	10.5	34	<5	1901	0.75	0.155



**BUREAU VERITAS** MINERAL LABORATORIES  
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9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada

PHONE (604) 253-3158

**Client:** Breakaway Expl. Mgmt. Inc.  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7 Canada

Project: DV  
Report Date: November 20, 2020

Page: 2 of 2

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000297.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
141922	Rock	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.
1478859	Rock	6	20	0.09	880	0.06	1.26	0.03	0.44	<4	19	<2	4	<2	<1	3	0.2
1478860	Rock	17	70	0.93	195	0.14	2.86	0.09	1.25	<4	63	<2	27	8	2	6	0.3
1478861	Rock	15	81	0.52	275	0.13	2.43	0.07	1.01	<4	58	<2	29	6	2	5	0.3
1478862	Rock	12	67	0.81	145	0.11	2.13	0.05	0.92	<4	73	<2	34	8	2	4	0.5
1478863	Rock	10	62	0.88	117	0.10	1.95	0.04	0.83	<4	50	<2	31	6	2	5	0.7
1478864	Rock	11	64	0.87	132	0.10	1.91	0.04	0.81	<4	46	<2	26	6	2	5	0.5
1478865	Rock	9	63	0.58	76	0.10	2.27	0.04	0.90	<4	69	<2	37	6	2	5	1.4
1478866	Rock	11	30	0.35	64	0.14	2.82	0.03	0.83	<4	15	<2	34	13	2	2	2.1
1478867	Rock	11	61	2.82	93	0.14	2.80	0.07	1.24	<4	61	<2	36	9	2	7	0.9
1478869	Rock	20	62	1.69	1185	0.14	2.86	0.07	1.23	<4	59	<2	40	6	2	6	<0.1
1478870	Rock	23	63	1.79	1418	0.15	3.10	0.10	1.32	<4	65	<2	37	7	2	6	<0.1
1478871	Rock	16	36	1.04	219	0.06	1.37	0.02	0.49	<4	83	<2	36	5	1	3	0.3
1478872	Rock	13	80	0.88	90	0.13	2.58	0.05	1.04	<4	69	<2	39	7	2	6	1.2
1478873	Rock	14	47	0.21	136	0.12	2.72	0.04	1.01	<4	86	<2	25	11	4	4	1.3



Bureau Veritas Commodities Canada Ltd.  
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**Client:** Breakaway Expl. Mgmt. Inc.  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7 Canada

Project: DV  
Report Date: November 20, 2020

Page: 1 of 1 Part: 1 of 2

# QUALITY CONTROL REPORT

WHI20000297.1

Method	WGHT	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
Analyte	Wgt	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P		
Unit	kg	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%		
MDL	0.01	2	2	5	2	0.5	2	2	5	0.01	5	20	2	2	0.4	5	5	2	0.01	0.002		
Pulp Duplicates																						
1478863	Rock	1.65	53	85	13	2371	1.4	478	8	91	0.80	31	24	<2	330	27.8	16	<5	1442	3.74	0.023	
REP 1478863	QC		52	84	11	2361	1.3	474	8	91	0.80	30	23	<2	327	27.8	17	<5	1417	3.74	0.023	
Reference Materials																						
STD OREAS25A-4A	Standard		2	30	25	43	<0.5	46	7	495	6.35	10	<20	13	46	<0.4	7	<5	157	0.28	0.050	
STD OREAS45E	Standard		<2	773	29	47	1.2	456	58	550	23.67	15	<20	10	16	<0.4	9	<5	316	0.06	0.034	
STD OREAS45E Expected			2.4	780	18.2	46.7	0.311	454	57	570	24.12	16.3	2.41	12.9	15.9		1		322	0.065	0.034	
STD OREAS25A-4A Expected			2.41	33.9	25.2	44.4		45.8	7.7	480	6.6	9.94	2.94	15.8	48.5		0.65		157	0.301	0.048	
BLK	Blank		<2	<2	<5	<2	<0.5	<2	<2	<5	<0.01	<5	<20	<2	<2	<0.4	<5	<5	<2	<0.01	<0.002	
Prep Wash																						
ROCK-WHI	Prep Blank		<2	6	6	31	<0.5	<2	4	620	2.17	<5	<20	<2	219	<0.4	<5	<5	36	1.59	0.043	
ROCK-WHI	Prep Blank		<2	<2	8	29	<0.5	<2	4	634	2.25	<5	<20	2	216	<0.4	<5	<5	35	1.59	0.043	



# QUALITY CONTROL REPORT

WHI20000297.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
Pulp Duplicates																	
1478863	Rock	10	62	0.88	117	0.10	1.95	0.04	0.83	<4	50	<2	31	6	2	5	0.7
REP 1478863	QC	9	61	0.87	109	0.10	1.94	0.04	0.82	<4	50	<2	30	6	2	5	0.7
Reference Materials																	
STD OREAS25A-4A	Standard	20	112	0.32	149	0.93	8.72	0.13	0.50	<4	159	5	10	18	<1	14	<0.1
STD OREAS45E	Standard	11	997	0.15	290	0.51	6.53	0.06	0.34	<4	100	<2	9	6	<1	92	<0.1
STD OREAS45E Expected		11	979	0.156	252	0.559	6.78	0.059	0.324	1.07	97	1.32	8.28	6.8	0.62	93	0.046
STD OREAS25A-4A Expected		21.8	115	0.327	147	0.93	8.87	0.131	0.482	2	155	4.06	10.5	20.9	0.93	13.7	0.047
BLK	Blank	<2	<2	<0.01	3	<0.01	<0.01	<0.01	<0.01	<4	<2	<2	<2	<2	<1	<1	<0.1
Prep Wash																	
ROCK-WHI	Prep Blank	13	3	0.49	879	0.20	7.03	3.34	1.71	<4	53	<2	17	5	1	7	<0.1
ROCK-WHI	Prep Blank	12	3	0.51	843	0.20	6.91	3.28	1.69	<4	54	<2	17	5	1	7	<0.1



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PHONE (604) 253-3158

**Client:** **Breakaway Expl. Mgmt. Inc.**  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7 Canada

Submitted By: Mark Fekete  
Receiving Lab: Canada-Whitehorse  
Received: August 21, 2020  
Analysis Start: September 17, 2020  
Report Date: November 20, 2020  
Page: 1 of 7

# CERTIFICATE OF ANALYSIS

WHI20000298.1

## CLIENT JOB INFORMATION

Project: DV  
Shipment ID:  
P.O. Number  
Number of Samples: 179

## SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Procedure Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
SS80	179	Dry at 60C sieve 100g to -80 mesh			WHI
SHP01	179	Per sample shipping charges for branch shipments			VAN
MA300	179	4 Acid digestion ICP-ES analysis	0.25	Completed	VAN

## SAMPLE DISPOSAL

DISP-PLP Dispose of Pulp After 90 days  
DISP-RJT-SOIL Immediate Disposal of Soil Reject

## ADDITIONAL COMMENTS

Bureau Veritas does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: Breakaway Expl. Mgmt. Inc.  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7  
Canada

CC: Marty Huber



This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only. All results are considered the confidential property of the client. Bureau Veritas assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.  
\*\*\* asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.





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Report Date: November 20, 2020

Page: 2 of 7

Part: 1 of 2

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WHI20000298.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	
Unit		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	
MDL		2	2	5	2	0.5	2	2	5	0.01	5	20	2	0.4	5	5	2	0.01	0.002	2		
201640	Soil	3	38	19	141	0.9	35	10	271	3.16	8	<20	6	109	0.9	<5	<5	200	0.67	0.086	33	
201641	Soil	4	23	18	105	1.2	31	13	374	3.30	5	<20	8	132	<0.4	<5	<5	208	1.00	0.084	28	
201642	Soil	5	36	18	130	1.1	34	13	374	3.88	6	<20	5	123	0.5	<5	<5	196	0.85	0.085	28	
201643	Soil	2	35	15	102	1.0	33	9	319	2.27	<5	<20	8	155	0.4	<5	<5	187	1.23	0.070	26	
201644	Soil	2	36	15	138	1.1	39	11	392	2.72	6	<20	7	183	0.6	<5	<5	228	1.31	0.091	25	
201645	Soil	<2	32	11	122	2.2	37	11	809	2.45	5	<20	5	188	<0.4	<5	<5	140	1.52	0.094	26	
201646	Soil	2	35	13	101	0.9	32	9	291	2.86	5	<20	6	124	0.5	<5	<5	125	1.16	0.082	26	
201647	Soil	<2	28	14	195	1.1	37	13	458	2.66	5	<20	7	102	<0.4	<5	<5	201	0.57	0.095	27	
201648	Soil	2	22	14	100	0.5	25	11	315	3.05	<5	<20	7	82	<0.4	<5	<5	120	0.62	0.074	28	
201649	Soil	4	57	21	272	1.7	60	15	297	3.83	11	<20	8	125	0.5	<5	<5	257	0.73	0.082	31	
201650	Soil	4	38	19	161	1.1	46	12	349	3.91	9	<20	7	108	<0.4	<5	<5	187	0.84	0.096	31	
201651	Soil	<2	32	15	87	0.7	26	7	221	2.69	<5	<20	8	105	<0.4	<5	<5	132	0.65	0.078	28	
201652	Soil	22	43	10	166	2.0	64	4	123	2.43	10	22	7	239	1.4	<5	<5	400	1.50	0.070	24	
201653	Soil	4	49	13	157	1.0	50	12	119	2.76	7	<20	8	120	<0.4	<5	<5	145	0.54	0.057	36	
201654	Soil	3	32	13	163	1.0	45	9	347	2.76	<5	<20	7	150	0.7	<5	<5	188	1.45	0.081	21	
201655	Soil	3	50	19	124	1.4	36	7	123	3.84	8	<20	7	78	<0.4	<5	<5	255	0.32	0.083	33	
201656	Soil	4	26	16	180	1.7	38	11	616	3.67	8	<20	8	192	0.7	<5	<5	231	1.39	0.096	26	
201657	Soil	<2	41	14	126	1.2	44	9	211	2.42	5	<20	6	423	0.8	<5	<5	131	2.76	0.099	22	
201658	Soil	5	34	17	115	1.0	48	13	913	2.88	<5	<20	7	170	0.4	<5	<5	122	1.53	0.110	26	
201659	Soil	4	71	20	228	1.8	65	11	119	3.29	12	<20	6	130	0.4	<5	<5	260	0.12	0.107	31	
201660	Soil	<2	33	16	104	0.6	51	14	560	3.67	<5	<20	8	147	<0.4	<5	<5	95	2.40	0.055	26	
201661	Soil	4	76	22	267	3.4	100	17	142	4.07	13	<20	8	182	1.0	<5	<5	281	0.41	0.104	32	
201662	Soil	3	43	17	164	2.5	55	12	710	2.91	8	<20	5	146	0.8	<5	<5	249	0.99	0.098	31	
201663	Soil	23	50	20	213	1.1	66	18	304	4.21	9	<20	7	70	0.7	<5	<5	238	0.31	0.076	31	
201664	Soil	10	43	14	176	1.4	77	16	799	6.65	8	<20	8	286	1.1	<5	<5	138	2.89	0.058	25	
201665	Soil	<2	24	12	53	2.0	19	3	41	2.50	7	<20	5	75	0.4	<5	<5	169	0.34	0.107	21	
201666	Soil	4	44	16	186	1.7	58	10	299	2.77	6	<20	6	172	0.7	<5	<5	200	1.09	0.079	25	
201667	Soil	36	111	15	2223	4.6	211	8	639	2.22	53	<20	6	154	23.8	25	<5	1489	1.05	0.094	23	
201668	Soil	44	101	11	1070	2.5	187	6	91	1.49	51	<20	4	85	9.9	14	<5	1560	0.39	0.050	22	
201669	Soil	70	42	20	631	3.7	116	4	153	3.05	74	<20	5	67	1.3	30	<5	1478	0.21	0.048	24	



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Page: 2 of 7

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
201640	Soil	89	0.54	8428	0.29	5.38	0.56	1.90	<4	74	3	23	10	2	11	<0.1
201641	Soil	90	0.52	>10000	0.28	5.57	0.45	1.97	<4	68	<2	20	8	2	10	<0.1
201642	Soil	87	0.47	>10000	0.25	5.24	0.45	1.80	<4	61	3	23	8	2	10	<0.1
201643	Soil	86	0.50	>10000	0.25	5.20	0.42	1.94	<4	64	<2	22	8	2	10	<0.1
201644	Soil	93	0.38	>10000	0.23	5.09	0.42	1.92	<4	58	2	22	7	2	9	<0.1
201645	Soil	78	0.39	>10000	0.22	4.76	0.39	1.65	<4	55	2	21	7	2	9	<0.1
201646	Soil	71	0.53	8149	0.21	5.00	0.51	1.75	<4	53	2	23	7	2	10	<0.1
201647	Soil	90	0.53	5025	0.28	5.22	0.69	1.63	<4	68	2	19	9	2	10	<0.1
201648	Soil	78	0.64	7302	0.29	5.56	0.50	2.08	<4	67	2	17	9	2	9	<0.1
201649	Soil	116	0.52	>10000	0.28	5.91	0.57	2.31	<4	76	3	26	9	2	12	<0.1
201650	Soil	93	0.66	>10000	0.30	6.07	0.54	2.12	<4	77	3	27	9	2	12	<0.1
201651	Soil	79	0.61	7075	0.28	5.47	0.59	1.84	<4	70	<2	20	9	2	11	<0.1
201652	Soil	83	0.37	>10000	0.21	4.34	0.44	1.55	<4	64	<2	24	8	2	9	<0.1
201653	Soil	107	0.49	>10000	0.32	6.32	0.55	2.54	<4	80	3	23	11	3	12	<0.1
201654	Soil	84	0.63	>10000	0.25	5.53	0.39	2.19	<4	62	2	18	8	2	10	<0.1
201655	Soil	119	0.47	>10000	0.28	6.20	0.67	2.49	<4	74	3	26	9	3	12	<0.1
201656	Soil	84	0.43	>10000	0.23	5.30	0.48	1.98	<4	57	2	22	7	2	9	<0.1
201657	Soil	66	0.24	>10000	0.14	3.60	0.31	1.28	<4	40	<2	24	4	1	8	<0.1
201658	Soil	75	0.62	>10000	0.25	5.68	0.70	2.10	<4	57	<2	24	8	2	11	<0.1
201659	Soil	114	0.47	8694	0.28	5.50	0.72	2.28	<4	73	3	22	9	3	11	<0.1
201660	Soil	78	1.07	>10000	0.28	6.02	0.44	2.34	<4	57	2	21	9	2	12	<0.1
201661	Soil	113	0.27	>10000	0.30	6.49	0.99	2.56	<4	78	3	30	9	3	14	<0.1
201662	Soil	96	0.42	>10000	0.24	5.61	0.58	1.98	<4	63	2	29	7	2	11	<0.1
201663	Soil	89	0.52	>10000	0.30	6.10	0.69	2.44	<4	76	3	31	9	2	12	<0.1
201664	Soil	78	1.54	>10000	0.22	5.52	0.56	2.20	<4	58	2	31	7	2	14	<0.1
201665	Soil	66	0.33	5854	0.22	4.38	0.46	1.41	<4	49	3	15	7	2	7	<0.1
201666	Soil	85	0.48	>10000	0.25	5.28	0.54	1.87	<4	60	2	20	8	2	11	<0.1
201667	Soil	129	0.46	4058	0.20	4.68	0.68	1.03	<4	76	<2	37	7	2	12	<0.1
201668	Soil	91	0.26	5461	0.19	3.90	0.31	1.22	<4	69	<2	41	8	2	8	<0.1
201669	Soil	100	0.33	1142	0.28	4.05	0.45	1.03	<4	77	3	16	8	<1	7	<0.1

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.



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Project: DV

Report Date: November 20, 2020

Page: 3 of 7

Part: 1 of 2

# CERTIFICATE OF ANALYSIS

# WHI20000298.1

Method	Analyte	Unit	MDL	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	
				Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P	La
				ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
				2	2	5	2	0.5	2	2	5	0.01	5	20	2	2	0.4	5	5	2	0.01	0.002	2
201670	Soil			44	31	21	483	2.5	88	3	105	2.26	62	<20	5	62	1.9	37	<5	1649	0.21	0.057	27
201671	Soil			74	110	30	1754	3.9	196	7	257	3.18	114	<20	6	70	5.3	60	<5	2180	0.28	0.139	23
201672	Soil			68	216	24	1008	3.8	208	8	134	1.67	59	<20	5	75	48.7	31	<5	2040	0.29	0.154	24
201673	Soil			54	211	33	5140	13.3	380	31	376	3.47	107	<20	5	208	76.5	62	<5	2515	0.50	0.144	37
201674	Soil			39	135	23	2316	9.1	243	10	193	2.61	68	<20	5	209	46.0	42	<5	1569	0.73	0.173	31
201675	Soil			20	109	11	1313	5.3	159	7	231	1.47	27	<20	8	248	22.3	13	<5	1008	1.55	0.153	25
201676	Soil			7	63	12	412	2.0	89	2	47	1.02	9	<20	5	149	9.6	8	<5	707	1.02	0.093	22
201677	Soil			18	37	18	279	1.2	40	27	907	6.38	12	<20	6	89	2.0	<5	<5	225	0.54	0.104	27
201678	Soil			9	34	17	228	2.2	40	30	2192	4.78	7	<20	8	118	2.4	<5	<5	156	1.53	0.122	21
201679	Soil			5	44	18	176	1.1	63	16	475	3.89	9	<20	6	102	1.0	<5	<5	233	1.16	0.075	30
201680	Soil			<2	29	17	86	1.6	30	6	99	2.90	6	<20	7	85	<0.4	<5	<5	185	0.42	0.078	27
201681	Soil			34	78	14	1204	2.7	109	4	54	1.87	42	<20	5	134	14.4	15	<5	1509	0.66	0.089	39
201682	Soil			43	100	11	1516	2.8	197	5	236	1.34	45	<20	6	172	15.8	14	<5	1073	1.13	0.094	33
201683	Soil			32	131	8	2767	2.4	343	3	146	0.82	22	<20	3	276	51.4	16	<5	859	2.84	0.087	12
201684	Soil			7	65	14	622	6.5	57	4	100	1.44	10	<20	5	95	17.0	8	<5	1049	0.39	0.142	20
201685	Soil			33	43	21	680	3.3	88	7	204	2.34	48	<20	6	93	4.0	21	<5	1465	0.32	0.078	27
201686	Soil			24	93	19	429	3.9	63	3	84	1.65	26	<20	6	64	7.3	15	<5	1082	0.27	0.118	20
201687	Soil			16	104	16	569	6.4	86	3	49	1.24	15	<20	4	64	24.5	10	<5	1165	0.24	0.136	17
201688	Soil			45	92	25	502	4.8	114	3	37	1.57	31	<20	3	43	13.1	26	<5	1541	0.14	0.057	25
201689	Soil			85	113	63	1166	4.9	228	5	118	2.61	112	<20	7	59	9.1	66	<5	3134	0.20	0.111	25
201690	Soil			246	310	36	4889	15.0	1003	17	386	4.13	162	<20	7	421	91.5	129	<5	3019	1.02	0.156	14
201691	Soil			54	179	549	3870	4.1	399	11	335	1.22	39	27	4	280	69.9	23	<5	1506	2.78	0.142	16
201692	Soil			131	402	48	8827	19.0	806	10	204	2.89	141	51	10	232	130.5	113	<5	4577	1.23	0.130	16
201693	Soil			77	29	46	1642	1.3	89	15	2152	4.10	65	<20	2	265	20.6	24	<5	990	2.95	0.119	7
201694	Soil			82	237	102	8641	14.7	601	11	250	2.28	92	23	8	230	97.1	74	<5	2708	0.98	0.171	19
201695	Soil			134	204	38	2262	9.6	397	15	438	2.69	116	28	7	96	60.2	83	<5	3054	0.38	0.268	22
201696	Soil			87	84	127	1588	5.0	263	6	235	2.02	73	<20	6	64	23.2	58	<5	2605	0.37	0.220	15
201697	Soil			71	70	137	1163	4.6	199	9	885	1.84	53	<20	5	81	23.3	45	<5	2185	0.56	0.194	18
201698	Soil			79	104	39	2230	3.9	232	7	253	2.45	75	<20	7	130	34.9	55	<5	2503	0.57	0.136	25
201699	Soil			54	147	25	1293	5.2	151	5	117	1.76	50	<20	5	94	39.1	35	<5	1864	0.42	0.105	20



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Project: DV

Report Date: November 20, 2020

Page: 3 of 7

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
201670	Soil	128	0.27	1182	0.31	3.46	0.34	1.00	<4	79	3	16	9	<1	7	<0.1
201671	Soil	156	0.47	1430	0.29	4.45	0.36	1.12	<4	88	5	25	9	1	11	0.1
201672	Soil	94	0.20	1614	0.12	2.90	0.18	0.84	<4	50	5	45	3	2	10	<0.1
201673	Soil	169	0.28	3541	0.20	3.89	0.23	1.39	<4	67	4	57	6	2	15	<0.1
201674	Soil	168	0.29	4370	0.20	3.94	0.31	1.32	<4	67	3	38	6	2	11	<0.1
201675	Soil	150	0.35	3489	0.17	3.38	0.28	1.13	<4	60	<2	39	6	2	10	<0.1
201676	Soil	107	0.27	2929	0.16	3.00	0.20	1.03	<4	59	2	30	7	1	8	<0.1
201677	Soil	90	0.50	>10000	0.25	5.61	0.48	2.07	<4	70	4	25	8	2	12	<0.1
201678	Soil	67	0.48	3928	0.17	4.03	0.31	1.40	<4	45	7	20	6	2	9	<0.1
201679	Soil	92	0.76	>10000	0.27	6.16	0.36	2.57	<4	68	3	27	8	3	13	<0.1
201680	Soil	95	0.49	9161	0.27	5.80	0.56	2.10	<4	72	2	17	10	2	10	<0.1
201681	Soil	94	0.27	>10000	0.20	4.13	0.18	1.59	<4	80	2	45	8	2	9	<0.1
201682	Soil	79	0.27	6928	0.17	3.44	0.17	1.38	<4	83	<2	46	8	2	8	<0.1
201683	Soil	72	0.25	619	0.07	1.66	0.07	0.58	<4	41	<2	28	3	<1	6	0.2
201684	Soil	102	0.39	1587	0.20	4.00	0.40	1.05	<4	62	4	28	6	1	9	<0.1
201685	Soil	120	0.42	3210	0.27	4.41	0.48	1.34	<4	87	11	19	9	1	8	<0.1
201686	Soil	88	0.27	1916	0.21	3.41	0.31	0.90	<4	60	5	22	7	1	8	<0.1
201687	Soil	92	0.24	1762	0.19	3.40	0.21	0.81	<4	63	4	35	6	1	9	<0.1
201688	Soil	102	0.21	1930	0.22	2.99	0.18	0.74	<4	72	8	24	7	<1	7	<0.1
201689	Soil	158	0.34	922	0.21	3.99	0.20	1.08	<4	78	32	33	6	1	10	0.1
201690	Soil	166	0.73	1092	0.19	5.98	0.08	1.20	<4	118	14	128	5	2	18	0.2
201691	Soil	133	0.36	394	0.10	2.20	0.17	0.69	<4	43	410	50	3	1	11	0.1
201692	Soil	274	0.44	720	0.21	4.72	0.17	1.42	<4	116	20	97	3	3	24	0.1
201693	Soil	35	0.23	346	0.06	1.52	0.12	0.43	<4	18	44	13	2	<1	4	0.3
201694	Soil	196	0.38	659	0.16	3.62	0.25	1.05	<4	79	67	60	5	2	17	0.1
201695	Soil	174	0.37	416	0.18	3.88	0.22	1.06	<4	97	16	67	5	2	16	0.2
201696	Soil	223	0.26	390	0.18	2.94	0.20	0.84	<4	76	86	32	5	1	12	0.2
201697	Soil	172	0.28	693	0.19	2.82	0.24	0.88	<4	63	89	25	5	1	9	0.2
201698	Soil	164	0.42	1733	0.23	3.89	0.48	1.01	<4	87	17	37	7	1	11	0.1
201699	Soil	160	0.30	1975	0.21	3.51	0.28	1.04	<4	73	8	34	6	1	11	<0.1



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Report Date: November 20, 2020

Page: 4 of 7

Part: 1 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method Analyte Unit MDL	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	
201700	Soil	31	66	15	1579	1.7	121	6	204	2.19	31	<20	6	145	16.4	22	<5	1103	0.68	0.098	31
201701	Soil	25	22	9	87	<0.5	39	<2	21	1.00	31	<20	4	73	1.2	<5	<5	425	0.08	0.039	12
201702	Soil	24	37	8	8	<0.5	9	<2	5	0.24	6	<20	3	27	<0.4	<5	<5	197	0.02	0.007	10
201703	Soil	42	56	6	7	0.6	11	<2	7	0.41	13	<20	4	55	<0.4	<5	<5	567	0.01	0.031	11
201704	Soil	122	149	21	68	2.3	65	<2	86	2.81	239	33	6	966	1.0	39	<5	1110	0.21	0.384	9
201705	Soil	137	45	33	71	2.0	17	<2	114	2.68	63	<20	6	175	0.7	19	<5	816	0.10	0.099	12
201706	Soil	73	27	22	21	<0.5	12	<2	17	1.55	35	<20	5	67	<0.4	6	<5	443	0.03	0.053	15
201707	Soil	14	19	16	166	1.5	37	<2	31	0.57	9	<20	6	81	2.5	5	<5	661	0.31	0.034	27
201708	Soil	12	62	39	796	4.1	76	3	70	1.02	8	<20	5	112	18.4	9	<5	795	0.73	0.114	16
201709	Soil	38	25	21	448	1.4	72	4	147	2.92	48	<20	6	75	0.9	18	<5	1197	0.27	0.038	26
201710	Soil	10	91	21	1530	5.8	114	4	144	1.19	10	25	7	162	30.4	13	<5	878	1.05	0.134	20
201711	Soil	58	143	19	3527	6.3	331	10	264	2.39	67	<20	9	205	33.0	45	<5	1644	1.20	0.152	27
201712	Soil	33	100	35	2409	5.4	200	4	154	1.13	32	<20	4	186	31.1	21	<5	1166	1.63	0.153	12
201713	Soil	63	172	26	2447	11.1	255	7	127	2.60	91	<20	6	205	43.8	52	<5	2195	0.94	0.155	20
201714	Soil	47	94	14	1576	4.0	246	7	84	1.85	36	<20	5	297	15.7	18	<5	1079	1.54	0.129	33
201715	Soil	40	98	17	930	2.3	211	4	122	1.28	28	<20	6	319	14.7	10	<5	1104	1.85	0.095	23
203455	Soil	3	36	16	270	0.9	45	8	654	3.00	6	<20	7	143	1.6	<5	<5	195	0.99	0.081	27
203456	Soil	<2	30	15	109	1.0	32	9	184	2.41	5	<20	5	122	0.4	<5	<5	166	0.67	0.077	32
203457	Soil	<2	24	14	90	0.9	27	9	219	2.80	<5	<20	5	130	<0.4	<5	<5	145	0.84	0.080	28
203458	Soil	3	26	17	114	1.0	27	10	234	3.67	9	<20	6	81	<0.4	<5	<5	184	0.34	0.071	26
203459	Soil	<2	22	14	57	0.9	18	3	47	1.89	6	<20	4	74	<0.4	<5	<5	190	0.34	0.057	22
203460	Soil	2	37	14	146	2.1	40	13	511	3.13	6	<20	4	182	0.5	<5	<5	180	1.40	0.079	23
203461	Soil	<2	27	10	127	1.6	33	7	435	1.87	<5	<20	4	278	0.5	<5	<5	140	1.95	0.102	19
203462	Soil	<2	30	12	129	0.6	38	14	1079	3.78	<5	<20	8	99	0.5	<5	<5	94	0.89	0.068	29
203463	Soil	<2	26	9	56	1.5	18	3	58	1.25	<5	<20	3	74	<0.4	<5	<5	123	0.42	0.072	22
203464	Soil	<2	35	11	42	2.8	18	<2	45	3.23	13	<20	5	66	<0.4	<5	<5	119	0.38	0.138	21
203465	Soil	2	23	14	80	1.6	22	11	420	2.96	6	<20	5	73	<0.4	<5	<5	156	0.38	0.090	21
203466	Soil	3	24	16	90	1.0	27	9	200	2.93	8	<20	6	76	<0.4	<5	<5	127	0.36	0.060	28
203467	Soil	<2	32	13	106	1.2	37	11	297	2.41	5	<20	7	121	<0.4	<5	<5	171	0.94	0.067	27
203468	Soil	<2	29	13	75	0.9	22	6	131	1.49	<5	<20	4	88	<0.4	<5	<5	138	0.53	0.074	26

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**Report Date:** November 20, 2020

**Page:** 4 of 7

**Part:** 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method Analyte Unit MDL	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
	Cr ppm	Mg %	Ba ppm	Ti %	Al %	Na %	K %	W ppm	Zr ppm	Sn ppm	Y ppm	Nb ppm	Be ppm	Sc ppm	S %	
201700	Soil	112	0.50	2171	0.30	4.38	0.72	1.32	<4	92	5	26	9	1	10	<0.1
201701	Soil	39	0.22	1794	0.12	2.57	0.05	0.82	<4	37	<2	10	4	1	5	0.1
201702	Soil	20	0.12	1889	0.12	1.69	0.03	0.65	<4	42	<2	9	5	1	4	0.1
201703	Soil	26	0.13	1266	0.09	1.94	0.03	0.67	<4	31	<2	9	4	1	5	0.2
201704	Soil	108	0.23	149	0.14	3.96	0.13	0.94	<4	58	12	19	5	<1	17	0.7
201705	Soil	58	0.27	123	0.18	3.00	0.14	1.10	<4	58	16	12	6	1	9	0.6
201706	Soil	42	0.14	212	0.12	1.95	0.05	0.77	<4	37	11	9	4	1	5	0.4
201707	Soil	64	0.36	1777	0.21	3.94	0.20	1.20	<4	52	5	12	7	1	7	0.1
201708	Soil	96	0.28	1577	0.18	3.16	0.34	0.85	<4	50	25	21	6	<1	9	0.1
201709	Soil	101	0.33	957	0.33	4.05	0.43	0.95	<4	75	7	13	10	<1	7	<0.1
201710	Soil	108	0.35	1861	0.21	3.61	0.43	0.93	<4	61	12	30	6	1	11	0.1
201711	Soil	139	0.43	1044	0.24	4.00	0.47	1.18	<4	80	6	45	7	2	11	<0.1
201712	Soil	76	0.39	1203	0.11	2.06	0.16	0.59	<4	42	25	28	3	1	9	0.1
201713	Soil	192	0.31	602	0.21	3.67	0.27	1.21	<4	72	6	44	6	2	11	0.2
201714	Soil	151	0.43	2140	0.18	3.56	0.19	1.24	<4	76	3	46	7	2	9	<0.1
201715	Soil	113	0.26	1155	0.14	2.55	0.15	0.89	<4	68	6	43	7	2	8	0.1
203455	Soil	90	0.56	8631	0.28	5.37	0.52	1.83	<4	72	3	23	9	2	11	<0.1
203456	Soil	86	0.51	>10000	0.30	5.19	0.58	1.80	<4	78	3	22	10	2	10	<0.1
203457	Soil	81	0.46	>10000	0.25	5.04	0.52	1.70	<4	67	4	19	9	2	9	<0.1
203458	Soil	96	0.53	>10000	0.32	5.23	0.60	1.94	<4	80	3	17	10	2	9	<0.1
203459	Soil	91	0.43	>10000	0.28	5.04	0.51	1.94	<4	68	3	14	9	2	8	<0.1
203460	Soil	89	0.41	>10000	0.24	4.84	0.40	1.81	<4	60	2	20	8	2	9	<0.1
203461	Soil	68	0.25	>10000	0.17	3.40	0.27	1.25	<4	44	<2	19	5	1	7	<0.1
203462	Soil	73	0.68	6952	0.26	5.30	0.42	1.79	<4	60	2	25	8	2	11	<0.1
203463	Soil	67	0.34	2775	0.23	3.86	0.49	1.28	<4	55	<2	15	7	1	8	<0.1
203464	Soil	63	0.30	2165	0.17	3.50	0.39	1.09	<4	45	3	14	6	1	7	<0.1
203465	Soil	78	0.62	3599	0.26	4.89	0.54	1.75	<4	65	2	13	8	2	10	<0.1
203466	Soil	86	0.66	8661	0.34	5.70	0.52	2.16	<4	81	3	15	11	2	10	<0.1
203467	Soil	84	0.55	>10000	0.26	5.08	0.49	1.76	<4	69	3	21	8	2	10	<0.1
203468	Soil	76	0.50	8391	0.26	4.96	0.55	1.76	<4	67	<2	18	9	2	9	<0.1

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**Page:** 5 of 7

**Part:** 1 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

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		Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P	La
Unit	MDL	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%	ppm
		2	2	5	2	0.5	2	2	5	0.01	5	20	2	2	0.4	5	5	2	0.01	0.002	2
203469	Soil	<2	24	18	169	0.8	35	11	343	3.49	8	<20	5	101	0.6	<5	<5	172	0.51	0.083	25
203470	Soil	14	133	9	2146	5.8	204	3	73	1.02	23	<20	6	432	47.5	17	<5	1339	1.88	0.139	16
203471	Soil	4	81	15	229	1.6	69	12	104	2.88	7	<20	7	126	0.9	<5	<5	240	0.66	0.071	28
203472	Soil	12	35	10	235	0.9	68	5	92	1.64	10	<20	3	145	2.4	<5	<5	493	0.66	0.094	39
203473	Soil	66	136	13	1493	3.4	329	8	230	1.92	46	23	7	297	22.5	15	<5	1244	1.60	0.107	39
203474	Soil	68	119	13	1544	3.7	269	7	132	1.83	43	<20	7	254	16.4	19	<5	1522	0.94	0.061	30
203475	Soil	35	126	11	1396	3.3	317	5	126	1.66	36	<20	8	481	13.9	18	<5	1282	2.08	0.116	34
203476	Soil	56	199	30	3016	12.5	295	13	163	4.16	126	<20	3	148	43.8	55	<5	2392	0.33	0.120	25
203477	Soil	48	181	37	1538	12.2	213	12	191	5.27	140	<20	2	268	20.1	60	<5	1868	0.69	0.117	10
203478	Soil	51	85	20	1615	4.2	150	7	508	2.77	56	<20	5	107	42.1	32	<5	1767	0.54	0.074	33
203479	Soil	26	44	17	227	2.9	46	4	141	2.35	48	<20	3	76	0.7	15	<5	1071	0.19	0.029	31
203480	Soil	58	209	14	5744	5.8	375	6	143	2.49	62	<20	6	181	65.6	47	<5	1825	0.77	0.118	29
203481	Soil	12	86	9	900	2.0	117	7	124	1.35	12	<20	4	144	12.8	7	<5	1009	0.43	0.097	28
203482	Soil	12	88	10	936	2.2	121	7	128	1.38	11	21	5	146	13.0	7	<5	1050	0.43	0.100	29
203483	Soil	53	177	12	2114	3.4	218	7	82	2.05	53	<20	4	144	38.0	34	<5	1627	0.43	0.112	27
203484	Soil	20	92	19	1519	5.0	168	27	1314	2.84	56	<20	5	487	38.1	18	<5	1090	1.60	0.152	24
203485	Soil	30	148	12	1006	8.6	171	6	69	2.12	49	<20	<2	145	40.3	25	<5	1548	0.46	0.211	20
203486	Soil	15	114	9	928	1.8	176	5	224	1.34	19	<20	5	280	14.2	8	<5	558	1.96	0.188	26
203487	Soil	57	55	13	421	2.3	196	17	415	2.21	26	21	3	154	4.8	7	<5	779	0.87	0.065	32
203488	Soil	2	43	14	134	<0.5	33	8	92	3.35	7	<20	6	89	<0.4	<5	<5	126	0.28	0.077	39
203489	Soil	11	71	10	430	1.2	120	4	147	0.97	17	<20	4	243	11.8	<5	<5	1120	1.35	0.066	23
203490	Soil	27	71	9	764	1.4	192	5	204	1.08	19	<20	5	236	14.0	9	<5	762	2.40	0.093	20
203491	Soil	13	100	8	1258	2.9	168	7	194	1.47	28	<20	5	334	15.1	14	<5	748	2.01	0.296	23
203492	Soil	33	124	11	962	7.3	196	8	105	2.13	54	<20	4	103	40.2	30	<5	1380	0.34	0.190	21
203493	Soil	56	345	20	4532	7.1	307	15	2451	2.62	83	<20	10	309	94.5	98	<5	1691	3.37	0.124	41
203494	Soil	92	185	20	2743	5.3	343	7	137	2.91	93	<20	7	169	29.3	59	<5	2269	0.65	0.133	34
203495	Soil	16	8	<5	29	1.2	9	<2	26	0.58	6	<20	<2	25	<0.4	<5	<5	401	0.05	0.019	15
203496	Soil	79	125	7	340	<0.5	194	4	285	1.93	71	<20	<2	453	1.7	20	<5	356	0.22	0.113	15
203497	Soil	16	30	7	10	<0.5	11	<2	8	0.14	<5	<20	<2	27	<0.4	6	<5	332	0.05	0.010	14
203498	Soil	49	57	13	92	1.2	61	2	33	2.03	44	24	5	98	1.3	11	<5	1140	0.14	0.042	35



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Project: DV

Report Date: November 20, 2020

Page: 5 of 7

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method Analyte	Unit	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
MDL		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
203469	Soil	87	0.59	9083	0.31	5.25	0.58	1.82	<4	74	3	19	10	2	10	<0.1
203470	Soil	137	0.31	3946	0.13	2.73	0.13	0.88	<4	52	2	42	4	1	10	<0.1
203471	Soil	105	0.48	>10000	0.28	5.57	0.56	2.10	<4	70	2	23	9	3	11	<0.1
203472	Soil	80	0.37	>10000	0.25	4.37	0.46	1.65	<4	74	<2	25	10	2	7	<0.1
203473	Soil	103	0.40	8405	0.18	3.43	0.16	1.21	<4	94	<2	59	10	2	11	<0.1
203474	Soil	115	0.32	7913	0.17	3.35	0.22	1.04	<4	78	<2	49	8	2	10	<0.1
203475	Soil	132	0.84	>10000	0.18	3.91	0.21	1.29	<4	96	<2	51	9	2	9	<0.1
203476	Soil	186	0.22	427	0.17	3.49	0.16	1.15	<4	59	<2	52	5	2	11	0.2
203477	Soil	224	0.20	343	0.18	3.27	0.17	1.19	<4	61	2	63	5	2	11	0.7
203478	Soil	123	0.44	4738	0.30	4.51	0.52	1.32	<4	79	3	30	9	2	12	<0.1
203479	Soil	84	0.32	1359	0.42	4.50	0.48	1.35	<4	88	3	13	13	1	8	<0.1
203480	Soil	175	0.49	4349	0.27	4.63	0.52	1.40	<4	99	3	40	9	2	14	<0.1
203481	Soil	121	0.43	8892	0.26	4.48	0.45	1.55	<4	78	<2	32	9	2	9	<0.1
203482	Soil	125	0.44	8880	0.27	4.55	0.46	1.57	<4	79	2	32	10	2	9	<0.1
203483	Soil	152	0.38	4648	0.27	4.46	0.34	1.52	<4	80	2	32	9	2	11	<0.1
203484	Soil	113	0.68	>10000	0.15	3.76	0.22	1.01	<4	51	<2	44	5	2	10	<0.1
203485	Soil	204	0.23	6425	0.19	4.05	0.13	1.45	<4	63	2	36	6	2	9	<0.1
203486	Soil	125	0.28	7458	0.15	2.94	0.20	0.92	<4	58	<2	37	6	1	8	<0.1
203487	Soil	75	0.27	>10000	0.21	4.04	0.29	1.45	<4	76	<2	38	10	2	8	<0.1
203488	Soil	105	0.50	>10000	0.35	6.36	0.53	2.64	<4	79	3	25	11	3	11	<0.1
203489	Soil	80	0.22	3638	0.12	2.34	0.13	0.79	<4	62	<2	38	7	1	6	<0.1
203490	Soil	82	0.24	1236	0.10	2.12	0.13	0.70	<4	48	<2	34	5	1	6	<0.1
203491	Soil	190	0.25	4784	0.14	3.04	0.17	0.99	<4	49	<2	40	5	1	8	<0.1
203492	Soil	192	0.21	5369	0.18	3.82	0.14	1.35	<4	63	<2	29	6	2	9	<0.1
203493	Soil	106	1.94	7480	0.23	5.09	0.46	1.25	<4	79	<2	87	7	3	30	<0.1
203494	Soil	167	0.45	3977	0.31	4.56	0.49	1.54	<4	104	2	47	9	2	14	<0.1
203495	Soil	33	0.13	1022	0.16	1.75	0.12	0.55	<4	38	<2	7	5	<1	3	<0.1
203496	Soil	41	0.17	1082	0.15	2.99	0.40	0.63	<4	70	<2	67	7	2	7	<0.1
203497	Soil	37	0.15	1674	0.12	1.81	0.09	0.71	<4	43	<2	10	5	1	5	<0.1
203498	Soil	91	0.37	3156	0.28	4.34	0.27	1.53	<4	84	2	23	10	2	9	<0.1





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**Project:** DV  
**Report Date:** November 20, 2020

**Page:** 6 of 7

**Part:** 1 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method Analyte Unit MDL	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	
	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	
203499	Soil	51	53	10	395	2.2	131	4	33	1.45	36	<20	3	44	2.2	9	<5	1474	0.19	0.041	24
203500	Soil	30	94	10	2297	2.7	176	4	543	1.28	41	<20	3	687	27.4	31	<5	1317	8.39	0.050	20
203501	Soil	93	153	17	2686	5.4	282	7	208	2.72	91	24	7	202	36.1	73	<5	2559	0.90	0.161	25
203502	Soil	37	32	22	429	1.6	83	4	127	2.53	62	<20	6	74	1.2	39	<5	1591	0.21	0.048	27
203503	Soil	24	40	21	485	1.6	58	5	220	3.36	46	<20	4	88	1.2	20	<5	1179	0.30	0.050	27
203504	Soil	64	114	19	1577	4.6	178	11	492	2.14	58	20	7	139	34.0	32	<5	1824	0.98	0.106	27
203505	Soil	40	72	29	606	4.8	94	7	96	3.15	81	<20	3	73	6.0	27	<5	1924	0.13	0.084	30
203506	Soil	20	115	10	1453	5.4	171	5	148	1.65	25	<20	5	244	16.0	13	<5	1064	0.89	0.167	25
203507	Soil	26	104	12	1446	4.7	157	8	195	2.01	34	<20	7	253	17.9	21	<5	1150	0.90	0.184	25
203508	Soil	95	185	27	2761	10.7	336	12	217	3.63	142	44	4	154	44.2	96	<5	2933	0.48	0.171	34
203509	Soil	92	146	17	2362	7.2	269	6	244	1.79	79	<20	4	147	28.4	45	<5	2944	0.49	0.105	31
203510	Soil	93	34	18	629	1.9	143	4	110	2.51	75	<20	5	53	1.3	47	<5	1695	0.15	0.039	23
203511	Soil	37	60	10	556	1.9	158	6	67	1.45	35	<20	3	45	6.3	8	<5	1482	0.22	0.023	28
203512	Soil	63	66	9	112	1.5	90	<2	17	1.32	37	26	3	109	1.2	10	<5	1018	0.12	0.066	23
203513	Soil	36	29	9	424	0.6	175	7	140	1.96	27	<20	4	110	3.2	10	<5	578	0.32	0.078	23
203514	Soil	23	18	7	38	<0.5	16	<2	29	0.59	10	<20	3	23	<0.4	<5	<5	597	0.04	0.017	23
203515	Soil	68	28	9	7	<0.5	7	<2	5	0.71	12	<20	<2	27	<0.4	<5	<5	297	0.01	0.020	13
203516	Soil	130	27	10	63	0.7	15	<2	21	1.46	28	<20	<2	108	<0.4	14	<5	623	0.03	0.036	18
203517	Soil	45	51	10	667	2.1	179	8	124	2.33	33	<20	3	121	4.9	9	<5	1153	0.29	0.035	25
203518	Soil	51	39	26	629	2.3	102	5	157	3.58	60	<20	6	106	1.7	28	<5	1450	0.24	0.065	30
203519	Soil	60	157	12	4498	6.7	405	8	362	1.98	56	<20	7	213	59.1	44	<5	1825	1.85	0.114	34
203520	Soil	49	116	17	3439	9.4	393	11	1531	2.45	115	<20	5	145	40.9	36	<5	1173	3.06	0.227	30
203521	Soil	85	178	18	3703	5.4	338	7	119	2.41	79	28	6	182	60.4	42	<5	2211	0.81	0.125	37
203522	Soil	25	160	8	2950	3.6	229	4	226	1.55	38	<20	5	342	46.2	26	<5	1041	2.25	0.289	25
203523	Soil	39	24	8	15	2.2	12	<2	34	0.80	11	<20	<2	130	<0.4	12	<5	784	0.07	0.034	13
203524	Soil	127	174	15	76	2.6	67	3	160	3.30	292	99	4	996	0.9	44	<5	1882	0.16	0.378	9
203525	Soil	197	48	17	42	2.5	19	<2	39	4.11	73	<20	2	60	<0.4	15	<5	780	0.07	0.070	11
203526	Soil	102	10	12	10	1.3	5	<2	7	2.09	27	<20	<2	20	<0.4	11	<5	877	0.01	0.023	14
203527	Soil	7	59	14	1603	1.6	119	10	351	2.35	9	<20	8	174	14.7	10	<5	524	0.92	0.091	30
203528	Soil	8	47	18	1150	1.5	79	15	424	3.93	29	<20	3	123	5.4	13	<5	460	0.46	0.062	27

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.



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Project: DV

Report Date: November 20, 2020

Page: 6 of 7

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
203499	Soil	101	0.23	3239	0.19	3.13	0.21	0.92	<4	59	<2	25	7	1	6	<0.1
203500	Soil	91	5.09	3170	0.16	3.21	0.79	0.66	<4	59	<2	28	6	1	9	<0.1
203501	Soil	186	0.51	2271	0.30	4.18	0.67	1.29	<4	103	<2	35	9	2	12	<0.1
203502	Soil	149	0.32	1206	0.41	4.14	0.43	1.41	<4	92	2	13	12	1	8	<0.1
203503	Soil	100	0.44	1019	0.39	4.73	0.57	1.31	<4	81	2	14	11	1	9	<0.1
203504	Soil	101	0.48	1825	0.22	3.53	0.30	0.98	<4	62	2	45	7	1	10	<0.1
203505	Soil	147	0.28	531	0.23	3.50	0.24	1.15	<4	72	2	19	7	1	7	0.2
203506	Soil	182	0.36	5693	0.23	3.90	0.34	1.33	<4	72	<2	34	7	2	10	<0.1
203507	Soil	180	0.41	5635	0.24	4.29	0.41	1.40	<4	74	2	31	8	2	10	<0.1
203508	Soil	230	0.43	726	0.31	4.48	0.38	1.65	<4	101	3	48	10	2	13	0.1
203509	Soil	132	0.24	2573	0.20	3.51	0.24	1.30	<4	73	<2	43	6	2	10	<0.1
203510	Soil	129	0.29	1048	0.32	3.18	0.33	0.91	<4	80	2	12	10	<1	7	<0.1
203511	Soil	81	0.22	6243	0.19	3.25	0.28	1.06	<4	59	<2	29	7	1	7	<0.1
203512	Soil	80	0.18	637	0.21	2.73	0.40	1.02	<4	81	<2	24	11	2	6	0.1
203513	Soil	53	0.29	2481	0.20	3.85	0.13	1.27	<4	62	<2	37	7	2	8	<0.1
203514	Soil	37	0.15	1407	0.14	1.79	0.08	0.62	<4	40	<2	16	5	1	4	<0.1
203515	Soil	39	0.13	250	0.13	1.86	0.03	0.84	<4	39	<2	8	5	1	5	0.2
203516	Soil	43	0.16	509	0.15	2.00	0.05	0.83	<4	44	<2	10	6	1	5	0.1
203517	Soil	79	0.33	744	0.21	3.69	0.07	1.35	<4	53	<2	29	7	2	8	0.1
203518	Soil	143	0.42	2392	0.36	4.47	0.43	1.13	<4	85	3	14	11	1	8	<0.1
203519	Soil	119	0.63	3613	0.19	3.40	0.32	1.16	<4	61	<2	45	5	2	13	<0.1
203520	Soil	188	0.23	3401	0.15	3.71	0.09	1.02	<4	63	2	95	5	2	12	<0.1
203521	Soil	179	0.33	3859	0.25	4.09	0.14	1.71	<4	98	3	51	10	2	11	<0.1
203522	Soil	177	0.31	5434	0.17	3.16	0.17	1.14	<4	65	<2	44	6	1	9	0.2
203523	Soil	34	0.22	236	0.17	2.83	0.15	1.02	<4	48	<2	13	6	1	6	0.2
203524	Soil	117	0.32	81	0.23	5.32	0.11	1.49	<4	99	4	27	9	1	23	1.0
203525	Soil	55	0.22	80	0.21	2.88	0.13	1.35	<4	72	<2	16	8	1	8	1.2
203526	Soil	33	0.14	110	0.14	1.88	0.04	0.75	<4	42	<2	9	5	1	4	0.4
203527	Soil	97	0.72	3454	0.34	5.32	0.83	1.54	<4	88	5	24	11	2	12	<0.1
203528	Soil	82	0.76	1311	0.37	5.86	0.83	1.43	<4	80	2	16	11	1	11	<0.1



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Page: 7 of 7

Part: 1 of 2

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Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	
		Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P	La
Unit		ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	
MDL		2	2	5	2	0.5	2	2	5	0.01	5	20	2	2	0.4	5	5	2	0.01	0.002	
203529	Soil	42	140	20	1523	3.2	188	11	401	2.41	78	<20	3	60	26.7	44	<5	2237	0.23	0.105	20
203530	Soil	37	65	23	1196	2.2	126	8	322	3.49	71	<20	3	90	3.9	29	<5	1705	0.35	0.078	25
203531	Soil	53	84	20	944	3.4	134	6	165	3.47	80	<20	<2	77	2.3	41	<5	1964	0.23	0.066	24
203532	Soil	28	125	19	373	4.5	73	5	186	2.07	39	<20	4	112	17.3	23	<5	1348	0.25	0.088	27
203533	Soil	44	141	22	1804	9.8	209	7	134	3.09	81	<20	6	273	30.1	46	<5	2130	0.62	0.185	30
203534	Soil	45	90	19	1409	4.9	144	14	414	2.10	56	<20	3	116	25.1	31	<5	1847	0.32	0.131	24
203535	Soil	72	45	23	729	1.7	185	4	107	2.76	77	<20	4	67	1.3	50	<5	2030	0.17	0.042	34
203536	Soil	50	51	22	934	3.7	118	7	273	4.25	72	<20	3	93	1.5	25	<5	1731	0.35	0.064	25
203537	Soil	20	29	21	376	2.0	53	6	238	3.93	43	<20	4	96	0.7	12	<5	1124	0.34	0.041	25
203538	Soil	33	56	9	1042	3.5	102	4	117	1.64	31	<20	<2	117	11.1	19	<5	1374	0.68	0.081	20
203539	Soil	8	100	10	2022	3.1	140	8	231	1.62	6	<20	3	141	23.5	11	<5	1130	0.61	0.099	29
203540	Soil	66	50	15	116	1.6	53	<2	43	1.82	22	<20	<2	67	2.2	6	<5	633	0.12	0.031	15
203541	Soil	75	223	13	492	2.7	248	6	275	2.85	62	<20	3	161	38.4	32	<5	659	0.24	0.114	11
203542	Soil	48	49	24	49	2.8	12	<2	38	1.44	27	<20	2	90	<0.4	26	<5	1086	0.06	0.045	9
203543	Soil	46	66	16	15	2.8	11	<2	26	1.05	18	<20	4	79	<0.4	30	<5	660	0.05	0.038	16
203544	Soil	36	87	17	1968	2.4	188	9	254	2.50	40	<20	6	162	22.4	23	<5	1085	0.59	0.117	32
203545	Soil	22	63	14	1440	1.8	142	8	201	2.34	27	<20	6	192	15.9	14	<5	691	0.73	0.126	33
203546	Soil	29	57	19	1113	1.5	117	13	396	2.79	45	<20	6	143	8.9	18	<5	951	0.61	0.120	32
203547	Soil	101	110	25	952	5.1	164	7	199	3.17	93	<20	7	104	6.6	58	<5	2615	0.24	0.126	43
203548	Soil	86	140	26	1470	7.8	205	15	189	2.49	102	<20	8	149	27.0	58	<5	3308	0.30	0.105	44
203549	Soil	39	156	22	1658	11.3	217	14	233	2.34	65	<20	3	279	45.4	37	<5	2042	0.63	0.224	23
203550	Soil	18	94	9	1361	4.2	166	5	167	1.35	30	<20	5	413	20.8	15	<5	1264	1.48	0.181	23
203551	Soil	27	123	13	1755	7.7	213	10	179	2.11	54	<20	4	272	40.7	25	<5	1324	0.81	0.261	23
203552	Soil	45	154	21	3964	10.9	267	12	258	2.76	72	<20	4	256	52.6	44	<5	1930	0.61	0.145	27
203553	Soil	107	150	31	1812	9.4	288	9	225	2.86	91	<20	4	159	22.4	60	<5	2422	0.48	0.141	21
203554	Soil	72	167	28	1747	9.0	240	15	518	2.63	93	<20	5	117	42.0	73	<5	2768	0.43	0.135	25
203555	Soil	25	77	16	307	4.9	75	<2	70	1.40	31	<20	4	50	7.7	28	<5	1493	0.21	0.126	18
203556	Soil	43	90	25	986	2.5	129	9	324	2.12	46	<20	5	79	14.5	34	<5	1722	0.26	0.105	28
203557	Soil	26	90	12	1075	2.0	111	7	218	2.07	32	<20	7	150	17.6	19	<5	1207	0.61	0.129	34



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Report Date: November 20, 2020

Page: 7 of 7

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000298.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
203529	Soil	186	0.42	2097	0.22	3.71	0.26	0.98	<4	69	<2	32	7	1	11	<0.1
203530	Soil	124	0.57	1537	0.36	4.87	0.55	1.29	<4	85	3	17	11	1	10	<0.1
203531	Soil	120	0.44	2045	0.32	4.78	0.47	1.25	<4	90	3	19	10	1	10	<0.1
203532	Soil	93	0.30	1875	0.26	3.81	0.34	1.02	<4	71	<2	25	7	1	9	<0.1
203533	Soil	160	0.36	1603	0.25	4.76	0.39	1.65	<4	82	3	43	8	2	12	<0.1
203534	Soil	130	0.32	2046	0.23	3.65	0.30	1.08	<4	68	2	25	7	1	10	<0.1
203535	Soil	103	0.31	1489	0.33	4.03	0.34	1.22	<4	84	3	15	10	1	8	<0.1
203536	Soil	110	0.59	1590	0.37	5.44	0.55	1.33	<4	87	2	19	11	1	11	<0.1
203537	Soil	93	0.50	1089	0.37	4.93	0.62	1.16	<4	75	3	12	11	1	9	<0.1
203538	Soil	129	0.36	2760	0.24	3.89	0.47	1.14	<4	72	2	20	8	1	9	<0.1
203539	Soil	128	0.57	3337	0.32	4.80	0.68	1.43	<4	91	3	27	10	2	11	<0.1
203540	Soil	36	0.15	104	0.15	2.01	0.06	0.84	<4	48	4	15	6	1	5	0.5
203541	Soil	63	0.23	129	0.18	4.21	0.27	0.93	<4	72	<2	38	7	2	11	0.5
203542	Soil	57	0.24	204	0.18	2.81	0.12	1.01	<4	51	10	11	6	1	6	0.2
203543	Soil	54	0.22	184	0.17	2.77	0.09	1.01	<4	58	<2	14	6	2	7	0.3
203544	Soil	109	0.51	4046	0.32	4.61	0.65	1.48	<4	96	5	31	11	2	10	<0.1
203545	Soil	90	0.52	4686	0.32	4.58	0.79	1.50	<4	88	4	26	10	1	9	<0.1
203546	Soil	107	0.54	3701	0.33	4.74	0.71	1.36	<4	82	5	27	10	1	9	<0.1
203547	Soil	158	0.42	384	0.30	4.69	0.35	1.59	<4	96	5	32	9	2	11	0.2
203548	Soil	184	0.27	437	0.22	3.95	0.15	1.49	<4	71	3	49	7	2	10	<0.1
203549	Soil	232	0.31	4010	0.20	4.31	0.22	1.34	<4	72	4	45	6	2	12	<0.1
203550	Soil	159	0.29	4737	0.16	3.33	0.16	1.12	<4	54	3	35	5	2	8	<0.1
203551	Soil	181	0.23	5440	0.20	3.95	0.19	1.37	<4	65	2	43	6	2	9	<0.1
203552	Soil	159	0.45	3627	0.26	4.58	0.53	1.21	<4	78	3	47	8	2	13	<0.1
203553	Soil	145	0.34	671	0.23	4.31	0.29	1.30	<4	88	10	45	7	2	13	0.1
203554	Soil	157	0.34	1988	0.24	3.89	0.31	1.25	<4	90	7	41	7	2	11	<0.1
203555	Soil	136	0.22	1643	0.19	2.82	0.29	0.82	<4	61	5	26	6	<1	8	0.1
203556	Soil	155	0.39	3078	0.32	4.05	0.43	1.35	<4	95	9	27	10	1	9	<0.1
203557	Soil	113	0.46	4242	0.30	4.29	0.64	1.34	<4	91	3	31	10	1	9	<0.1



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**Page:** 1 of 2 **Part:** 1 of 2

# QUALITY CONTROL REPORT

WHI20000298.1

Method	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	
Analyte	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	
Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	
MDL	2	2	5	2	0.5	2	2	5	0.01	5	20	2	2	0.4	5	5	2	0.01	0.002	2	
Pulp Duplicates																					
201646	Soil	2	35	13	101	0.9	32	9	291	2.86	5	<20	6	124	0.5	<5	<5	125	1.16	0.082	26
REP 201646	QC	3	36	14	100	0.7	32	9	287	2.85	5	<20	6	121	0.6	<5	<5	108	1.15	0.081	27
201682	Soil	43	100	11	1516	2.8	197	5	236	1.34	45	<20	6	172	15.8	14	<5	1073	1.13	0.094	33
REP 201682	QC	42	98	11	1521	3.1	195	5	232	1.30	45	<20	5	173	15.6	14	<5	1061	1.14	0.093	29
203457	Soil	<2	24	14	90	0.9	27	9	219	2.80	<5	<20	5	130	<0.4	<5	<5	145	0.84	0.080	28
REP 203457	QC	<2	23	12	88	0.8	26	8	203	2.65	<5	<20	4	120	<0.4	<5	<5	138	0.76	0.076	25
203493	Soil	56	345	20	4532	7.1	307	15	2451	2.62	83	<20	10	309	94.5	98	<5	1691	3.37	0.124	41
REP 203493	QC	55	337	19	4457	8.3	299	16	2403	2.56	83	21	9	303	91.5	98	<5	1659	3.31	0.125	41
203529	Soil	42	140	20	1523	3.2	188	11	401	2.41	78	<20	3	60	26.7	44	<5	2237	0.23	0.105	20
REP 203529	QC	44	139	21	1559	3.6	191	11	413	2.49	82	<20	<2	61	26.7	46	<5	2340	0.24	0.109	21
Reference Materials																					
STD OREAS25A-4A	Standard	2	28	24	44	<0.5	44	7	498	6.95	12	<20	10	47	<0.4	<5	<5	149	0.31	0.049	22
STD OREAS25A-4A	Standard	3	28	23	44	<0.5	45	7	475	6.68	10	<20	13	42	<0.4	<5	<5	157	0.27	0.048	21
STD OREAS25A-4A	Standard	3	28	23	44	<0.5	44	7	470	6.61	12	<20	8	42	<0.4	<5	<5	150	0.27	0.049	20
STD OREAS25A-4A	Standard	3	29	24	46	<0.5	46	7	504	6.91	11	<20	10	47	<0.4	<5	<5	157	0.31	0.051	23
STD OREAS25A-4A	Standard	3	29	23	41	<0.5	46	7	494	7.01	11	<20	12	45	<0.4	<5	<5	160	0.29	0.051	19
STD OREAS45H	Standard	2	768	9	41	<0.5	452	88	406	20.66	19	<20	7	28	<0.4	<5	<5	270	0.14	0.023	14
STD OREAS45H	Standard	2	779	9	41	<0.5	464	90	412	20.86	18	<20	2	28	<0.4	<5	<5	277	0.14	0.023	12
STD OREAS45E	Standard	3	760	10	47	<0.5	493	56	555	25.48	18	<20	8	16	<0.4	<5	<5	327	0.07	0.034	11
STD OREAS45E	Standard	3	784	11	48	0.8	493	57	573	25.48	19	<20	9	17	<0.4	7	<5	329	0.07	0.036	12
STD OREAS45E	Standard	3	778	17	43	0.9	489	57	563	26.48	18	<20	7	17	<0.4	6	<5	328	0.07	0.035	12
STD OREAS45H Expected		1.55	767	12.2	39.7		451	92	405	20.4	16.9		7.6	28				275	0.135	0.023	13.3
STD OREAS45E Expected		2.4	780	18.2	46.7	0.311	454	57	570	24.12	16.3	2.41	12.9	15.9		1		322	0.065	0.034	11
STD OREAS25A-4A Expected		2.41	33.9	25.2	44.4		45.8	7.7	480	6.6	9.94	2.94	15.8	48.5		0.65		157	0.301	0.048	21.8
BLK	Blank	<2	<2	<5	<2	<0.5	<2	<2	<5	<0.01	<5	<20	<2	<2	<0.4	<5	<5	<2	<0.01	<0.002	<2
BLK	Blank	<2	<2	<5	<2	<0.5	<2	<2	<5	<0.01	<5	<20	<2	<2	<0.4	<5	<5	<2	<0.01	<0.002	<2
BLK	Blank	<2	<2	<5	<2	<0.5	<2	<2	<5	<0.01	<5	<20	<2	<2	<0.4	<5	<5	<2	<0.01	<0.002	<2
BLK	Blank	<2	<2	<5	<2	<0.5	<2	<2	<5	<0.01	<5	<20	<2	<2	<0.4	<5	<5	<2	<0.01	<0.002	<2



# QUALITY CONTROL REPORT

WHI20000298.1

Method	Analyte	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
Unit		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
MDL		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
Pulp Duplicates																
201646	Soil	71	0.53	8149	0.21	5.00	0.51	1.75	<4	53	2	23	7	2	10	<0.1
REP 201646	QC	71	0.52	8344	0.23	5.01	0.50	1.70	<4	55	2	23	8	2	10	<0.1
201682	Soil	79	0.27	6928	0.17	3.44	0.17	1.38	<4	83	<2	46	8	2	8	<0.1
REP 201682	QC	79	0.26	6859	0.18	3.43	0.17	1.36	<4	81	<2	45	8	2	8	<0.1
203457	Soil	81	0.46	>10000	0.25	5.04	0.52	1.70	<4	67	4	19	9	2	9	<0.1
REP 203457	QC	78	0.44	>10000	0.25	4.68	0.49	1.61	<4	63	4	17	8	2	8	<0.1
203493	Soil	106	1.94	7480	0.23	5.09	0.46	1.25	<4	79	<2	87	7	3	30	<0.1
REP 203493	QC	106	1.90	7092	0.23	5.04	0.45	1.23	<4	74	2	85	7	3	29	<0.1
203529	Soil	186	0.42	2097	0.22	3.71	0.26	0.98	<4	69	<2	32	7	1	11	<0.1
REP 203529	QC	191	0.42	2299	0.24	3.85	0.27	1.02	<4	73	2	33	7	1	11	<0.1
Reference Materials																
STD OREAS25A-4A	Standard	105	0.34	155	0.90	9.27	0.13	0.51	<4	146	4	11	20	<1	14	<0.1
STD OREAS25A-4A	Standard	109	0.33	139	0.96	8.21	0.13	0.49	<4	147	5	10	22	<1	13	<0.1
STD OREAS25A-4A	Standard	107	0.32	146	0.92	8.15	0.12	0.49	<4	143	5	10	21	<1	12	<0.1
STD OREAS25A-4A	Standard	114	0.35	163	0.94	9.04	0.13	0.52	<4	146	5	11	21	<1	14	<0.1
STD OREAS25A-4A	Standard	112	0.34	153	0.96	8.96	0.13	0.51	<4	149	5	10	22	<1	13	<0.1
STD OREAS45H	Standard	653	0.25	343	0.89	8.02	0.09	0.22	<4	125	6	11	15	1	60	<0.1
STD OREAS45H	Standard	685	0.25	346	0.92	7.74	0.09	0.22	<4	125	6	10	16	1	57	<0.1
STD OREAS45E	Standard	1040	0.16	260	0.52	6.63	0.05	0.35	<4	98	6	8	7	<1	94	<0.1
STD OREAS45E	Standard	1039	0.16	265	0.54	6.81	0.05	0.35	<4	98	6	9	7	<1	97	<0.1
STD OREAS45E	Standard	1026	0.16	254	0.55	6.94	0.05	0.34	<4	97	6	9	8	<1	94	<0.1
STD OREAS45H Expected		660	0.2575	342	0.878	8.2	0.09	0.215		126	1.93	10.4	13.8	1.09	59	
STD OREAS45E Expected		979	0.156	252	0.559	6.78	0.059	0.324	1.07	97	1.32	8.28	6.8	0.62	93	0.046
STD OREAS25A-4A Expected		115	0.327	147	0.93	8.87	0.131	0.482	2	155	4.06	10.5	20.9	0.93	13.7	0.047
BLK	Blank	<2	<0.01	4	<0.01	<0.01	<0.01	<0.01	<4	<2	<2	<2	<2	<1	<1	<0.1
BLK	Blank	<2	<0.01	<1	<0.01	<0.01	<0.01	<0.01	<4	<2	<2	<2	<2	<1	<1	<0.1
BLK	Blank	<2	<0.01	<1	<0.01	<0.01	<0.01	<0.01	<4	<2	<2	<2	<2	<1	<1	<0.1
BLK	Blank	<2	<0.01	3	<0.01	<0.01	<0.01	<0.01	<4	<2	<2	<2	<2	<1	<1	<0.1



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Page: 2 of 2

Part: 1 of 2

# QUALITY CONTROL REPORT

WHI20000298.1

	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	
	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	
	2	2	5	2	0.5	2	2	5	0.01	5	20	2	2	0.4	5	5	2	0.01	0.002	2	
BLK	Blank	<2	<2	<5	<2	<0.5	<2	<2	<5	<0.01	<5	<20	<2	<2	<0.4	<5	<5	<2	<0.01	<0.002	<2



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Page: 2 of 2

Part: 2 of 2

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		MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	MA300	
		Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Sn	Y	Nb	Be	Sc	S
		ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
		2	0.01	1	0.01	0.01	0.01	0.01	4	2	2	2	2	1	1	0.1
BLK	Blank	<2	<0.01	<1	<0.01	<0.01	<0.01	<0.01	<4	<2	<2	<2	<2	<1	<1	<0.1





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Bureau Veritas Commodities Canada Ltd.  
9050 Shaughnessy St Vancouver British Columbia V6P 6E5 Canada  
PHONE (604) 253-3158

**Client:** **Breakaway Expl. Mgmt. Inc.**  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7 Canada

Submitted By: Mark Fekete  
Receiving Lab: Canada-Whitehorse  
Received: July 30, 2020  
Analysis Start: August 20, 2020  
Report Date: September 23, 2020  
Page: 1 of 8

# CERTIFICATE OF ANALYSIS

WHI20000198.1

## CLIENT JOB INFORMATION

Project: DV  
Shipment ID:  
P.O. Number: 2020-01  
Number of Samples: 200

## SAMPLE DISPOSAL

RTRN-PLP Return After 90 days

Bureau Veritas does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

Invoice To: Breakaway Expl. Mgmt. Inc.  
3081 Third Ave.  
Whitehorse Yukon Y1A 4Z7  
Canada

CC: Marty Huber  
Kyle Henderson

## SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Procedure Code	Number of Samples	Code Description	Test Wgt (g)	Report Status	Lab
SLBHP	200	Sorting, labeling and boxing samples received as pulps			WHI
LF302	200	LiBO2/Li2B4O7 fusion ICP-ES analysis	0.2	Completed	VAN
SPTPL	200	Splitting of pulp samples for client			WHI
SHP01	200	Per sample shipping charges for branch shipments			VAN

## ADDITIONAL COMMENTS

Major oxides do not sum to 100% due to possible incomplete fusion of some minerals or other element oxides may be present.



This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only. All results are considered the confidential property of the client. Bureau Veritas assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.  
\*\*\* asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.



# CERTIFICATE OF ANALYSIS

**WHI20000198.1**

Method	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
Analyte	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum	
Unit	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	
MDL	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01	
1478526	Pulp	13.47	3.26	2.81	8.56	28.77	0.56	0.51	0.14	0.18	0.07	0.004	4014	226	1162	39	25	8	5	33.9	92.86
1478527	Pulp	9.99	3.31	3.87	10.57	27.14	1.00	0.23	0.11	0.12	0.12	0.004	3013	381	1219	35	24	<5	5	34.9	91.86
1478528	Pulp	67.84	11.49	1.93	0.88	1.34	0.08	2.44	0.53	0.06	<0.01	0.014	3220	78	122	108	16	14	11	12.6	99.65
1478529	Pulp	68.62	11.46	1.27	0.90	1.33	0.06	2.51	0.55	0.05	<0.01	0.016	4022	46	84	108	16	13	12	12.5	99.71
1478530	Pulp	61.85	8.43	2.97	0.59	4.75	0.10	1.76	0.38	0.11	<0.01	0.014	5044	159	200	77	28	12	13	18.1	99.71
1478531	Pulp	65.43	4.58	4.23	0.41	5.19	0.06	0.90	0.22	0.09	0.03	0.011	2238	594	218	51	34	8	6	18.0	99.53
1478532	Pulp	72.47	3.72	3.03	0.34	3.53	0.02	0.74	0.19	0.07	0.02	0.010	1624	318	133	45	28	7	5	15.2	99.57
1478534	Pulp	75.83	4.39	1.96	0.35	1.94	0.02	0.87	0.22	0.11	<0.01	0.013	2418	133	98	53	22	7	7	13.6	99.63
1478535	Pulp	71.48	4.28	2.91	0.31	3.32	0.02	0.82	0.20	0.10	0.02	0.011	2480	256	136	48	27	5	6	15.8	99.58
1478536	Pulp	75.67	4.49	1.69	0.35	2.17	0.02	0.92	0.22	0.08	<0.01	0.012	2716	140	97	54	23	8	5	13.7	99.61
1478537	Pulp	71.84	5.12	2.46	0.40	2.86	0.02	1.07	0.25	0.15	0.02	0.012	3053	235	150	59	28	10	7	14.9	99.46
1478538	Pulp	74.60	4.69	1.91	0.36	2.52	0.02	0.97	0.23	0.07	<0.01	0.012	3022	165	101	54	22	6	6	13.8	99.61
1478539	Pulp	73.65	5.27	2.02	0.41	2.37	0.03	1.09	0.27	0.07	<0.01	0.013	3137	177	131	63	23	8	7	13.9	99.55
1478540	Pulp	68.81	6.33	2.36	0.47	3.25	0.06	1.33	0.32	0.09	<0.01	0.014	3490	224	160	75	39	10	8	16.0	99.52
1478541	Pulp	72.54	6.78	1.31	0.53	2.02	0.06	1.56	0.38	0.06	<0.01	0.017	4059	71	121	86	25	10	8	13.8	99.53
1478542	Pulp	76.76	5.65	1.11	0.43	1.52	0.03	1.24	0.31	0.03	<0.01	0.014	3670	63	79	71	14	13	7	12.1	99.64
1478544	Pulp	77.28	5.27	1.23	0.33	1.62	0.05	1.10	0.26	0.06	<0.01	0.012	4343	101	90	64	14	9	6	12.0	99.75
1478545	Pulp	75.02	5.42	1.45	0.30	1.91	0.07	1.12	0.27	0.07	<0.01	0.011	5694	127	122	66	16	11	6	13.5	99.86
1478546	Pulp	74.37	5.78	1.66	0.28	2.11	0.10	1.20	0.27	0.08	<0.01	0.010	6909	164	129	65	30	11	7	13.2	99.90
1478547	Pulp	71.96	4.76	2.30	0.53	3.23	0.11	0.98	0.22	0.05	0.02	0.008	5657	320	148	58	39	8	6	15.0	99.82
1478548	Pulp	75.54	6.56	0.92	0.43	1.28	0.08	1.45	0.36	0.13	<0.01	0.013	6765	63	146	102	27	18	8	12.2	99.77
1478549	Pulp	80.51	4.64	0.96	0.30	0.82	0.06	1.06	0.26	0.04	<0.01	0.010	4808	72	62	72	15	8	5	10.6	99.82
1478550	Pulp	77.94	4.59	0.94	0.31	1.32	0.10	1.03	0.25	0.10	<0.01	0.012	3839	90	149	73	19	10	5	12.7	99.77
1478552	Pulp	79.90	4.89	0.72	0.32	0.67	0.25	1.03	0.27	0.04	<0.01	0.013	3471	88	65	76	22	9	5	11.2	99.73
1478553	Pulp	79.70	4.69	0.86	0.33	0.91	0.05	1.07	0.25	0.15	<0.01	0.012	3726	79	101	67	23	6	6	11.2	99.70
1478554	Pulp	78.05	4.06	1.49	0.27	1.98	0.02	0.86	0.19	0.08	<0.01	0.012	2576	146	74	52	20	8	5	12.3	99.67
1478555	Pulp	68.49	4.56	2.52	0.26	5.07	0.01	0.86	0.18	0.12	0.02	0.011	2083	345	93	48	28	8	5	17.2	99.60
1478556	Pulp	76.34	4.60	1.46	0.31	2.03	0.04	0.98	0.21	0.19	<0.01	0.012	3162	187	102	56	27	7	5	13.1	99.65
1478557	Pulp	77.79	6.11	0.70	0.45	0.76	0.02	1.34	0.32	0.21	<0.01	0.016	4740	66	101	83	31	13	6	11.4	99.66
1478558	Pulp	73.12	5.47	1.71	0.65	2.53	0.02	1.27	0.27	0.06	0.01	0.014	4603	224	124	69	41	10	6	14.0	99.68



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**Client: Breakaway Expl. Mgmt. Inc.**

3081 Third Ave.

Whitehorse Yukon Y1A 4Z7 Canada

Project: DV

Report Date: September 23, 2020

Page: 2 of 8

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478526	Pulp	9.67 2.74
1478527	Pulp	9.14 3.18
1478528	Pulp	4.55 1.21
1478529	Pulp	4.64 1.17
1478530	Pulp	3.86 3.14
1478531	Pulp	4.76 2.97
1478532	Pulp	5.01 2.33
1478534	Pulp	5.69 1.72
1478535	Pulp	5.19 2.44
1478536	Pulp	5.53 1.77
1478537	Pulp	5.17 2.18
1478538	Pulp	5.08 2.02
1478539	Pulp	5.20 1.92
1478540	Pulp	5.19 2.36
1478541	Pulp	5.43 1.69
1478542	Pulp	5.38 1.37
1478544	Pulp	5.09 1.41
1478545	Pulp	5.58 1.64
1478546	Pulp	5.08 1.68
1478547	Pulp	5.34 2.06
1478548	Pulp	5.96 1.21
1478549	Pulp	5.79 0.96
1478550	Pulp	6.54 1.30
1478552	Pulp	6.51 0.90
1478553	Pulp	6.18 1.01
1478554	Pulp	5.12 1.72
1478555	Pulp	4.87 2.74
1478556	Pulp	5.34 1.72
1478557	Pulp	6.07 0.92
1478558	Pulp	5.39 1.85



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Whitehorse Yukon Y1A 4Z7 Canada

**Project:** DV  
**Report Date:** September 23, 2020

**Page:** 3 of 8

**Part:** 1 of 2

**CERTIFICATE OF ANALYSIS** **WHI20000198.1**

Method	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
Analyte	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum		
Unit	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%		
MDL	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01		
1478559	Pulp	76.28	5.46	0.88	0.40	1.64	0.07	1.26	0.26	0.23	<0.01	0.014	4616	177	213	65	27	9	6	12.7	99.74	
1478560	Pulp	77.17	6.21	0.80	0.46	0.92	0.05	1.40	0.29	0.10	<0.01	0.016	4708	162	88	68	20	10	6	11.7	99.68	
1478561	Pulp	76.47	7.04	0.57	0.51	0.67	0.09	1.58	0.33	0.04	<0.01	0.018	5966	209	44	80	17	9	7	11.6	99.67	
1478562	Pulp	75.35	6.13	1.28	0.43	1.28	0.05	1.42	0.29	0.07	<0.01	0.017	4951	130	61	75	24	12	6	12.7	99.63	
1478563	Pulp	72.29	7.49	1.74	0.54	0.70	0.04	1.76	0.35	0.12	<0.01	0.018	5971	197	75	90	34	9	7	13.9	99.64	
1478564	Pulp	73.57	5.27	2.24	0.39	1.97	0.03	1.21	0.23	0.10	0.01	0.016	3879	247	96	59	28	9	6	14.0	99.52	
1478565	Pulp	72.78	5.04	2.89	0.39	4.91	0.02	1.19	0.22	0.13	0.02	0.015	4298	489	313	56	31	11	6	11.3	99.46	
1478567	Pulp	80.74	3.46	2.25	0.26	1.98	0.02	0.77	0.16	0.02	0.01	0.013	3455	358	102	40	14	5	4	9.5	99.63	
1478568	Pulp	80.91	4.04	2.07	0.29	0.77	0.02	0.89	0.19	0.18	<0.01	0.015	3716	262	85	48	12	6	5	9.7	99.57	
1478569	Pulp	74.62	5.59	2.94	0.43	1.73	0.03	1.26	0.27	0.19	0.02	0.016	5513	492	107	64	34	9	6	11.7	99.47	
1478570	Pulp	28.68	3.10	1.32	12.52	20.46	0.88	0.41	0.14	0.02	0.08	0.008	2208	146	1034	44	25	<5	4	31.5	99.54	
1478572	Pulp	17.63	2.15	0.87	15.67	23.85	0.93	0.16	0.09	0.05	0.10	0.006	1063	102	1251	28	8	<5	3	37.8	99.59	
1478573	Pulp	31.55	3.98	1.68	12.00	18.59	0.53	0.68	0.16	0.16	0.09	0.011	4837	177	1057	42	22	7	4	29.4	99.47	
1478574	Pulp	79.27	4.12	2.61	0.34	1.57	0.02	0.87	0.19	0.04	0.01	0.018	4041	365	69	45	19	<5	5	9.7	99.29	
1478575	Pulp	79.06	3.60	1.95	0.31	2.94	0.02	0.79	0.17	0.06	0.01	0.018	3661	267	152	42	18	9	5	9.8	99.24	
1478576	Pulp	77.76	4.12	1.45	0.32	3.23	0.02	0.88	0.19	0.32	<0.01	0.022	3949	213	266	47	33	<5	6	10.3	99.12	
1478577	Pulp	75.97	5.02	1.85	0.38	1.89	0.02	1.08	0.23	0.06	<0.01	0.027	4383	254	130	55	16	8	7	12.0	99.07	
1478578	Pulp	72.75	3.27	1.39	0.40	7.14	0.02	0.73	0.15	0.10	<0.01	0.018	3171	216	388	40	32	5	5	13.1	99.44	
1478580	Pulp	73.30	2.02	0.95	1.06	7.96	0.01	0.44	0.09	0.17	0.01	0.017	1330	219	487	32	27	<5	4	12.9	99.19	
1478581	Pulp	82.08	2.10	1.12	0.20	2.72	0.02	0.44	0.09	0.09	<0.01	0.019	1333	220	216	32	22	<5	4	10.2	99.29	
1478582	Pulp	78.66	2.11	1.10	0.23	4.38	0.01	0.45	0.10	0.09	<0.01	0.018	1267	230	312	33	24	<5	4	11.8	99.13	
1478583	Pulp	71.06	2.58	1.29	0.32	7.31	0.01	0.58	0.12	0.13	<0.01	0.018	1501	324	499	44	35	7	5	15.5	99.19	
1478584	Pulp	74.93	2.25	1.13	0.27	7.05	0.02	0.52	0.10	0.15	<0.01	0.016	1726	210	496	46	38	<5	5	12.7	99.43	
1478585	Pulp	79.73	2.05	1.00	0.28	4.39	0.02	0.44	0.09	0.11	<0.01	0.018	1374	198	315	30	25	<5	4	10.8	99.17	
1478586	Pulp	84.96	1.77	1.11	0.22	3.04	0.03	0.36	0.08	0.12	<0.01	0.012	1347	166	232	25	15	<5	3	7.5	99.39	
1478588	Pulp	85.01	1.33	0.99	0.14	3.18	0.02	0.25	0.06	0.10	<0.01	0.012	943	162	268	21	17	<5	3	8.1	99.37	
1478589	Pulp	77.27	2.06	0.97	0.24	5.48	0.02	0.43	0.10	0.18	<0.01	0.017	1413	229	449	33	27	<5	5	12.0	98.97	
1478590	Pulp	74.54	2.31	1.03	0.42	5.83	0.04	0.52	0.10	0.12	<0.01	0.027	2084	228	466	35	37	<5	5	14.0	99.29	
1478591	Pulp	80.44	2.03	0.99	0.41	3.54	0.03	0.45	0.09	0.10	<0.01	0.022	1907	194	276	28	32	<5	4	11.0	99.39	
1478592	Pulp	80.98	2.14	1.18	0.24	2.47	0.02	0.47	0.10	0.15	<0.01	0.020	1691	216	196	32	18	<5	4	10.9	98.96	



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Project: DV

Report Date: September 23, 2020

Page: 3 of 8

Part: 2 of 2

## CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478559	Pulp	5.74 1.44
1478560	Pulp	5.48 1.12
1478561	Pulp	5.82 0.97
1478562	Pulp	5.89 1.25
1478563	Pulp	6.13 1.72
1478564	Pulp	5.43 2.01
1478565	Pulp	4.12 2.11
1478567	Pulp	4.13 1.59
1478568	Pulp	4.56 1.73
1478569	Pulp	4.55 2.36
1478570	Pulp	9.89 1.07
1478572	Pulp	11.82 0.76
1478573	Pulp	9.02 1.43
1478574	Pulp	4.26 1.70
1478575	Pulp	4.64 1.41
1478576	Pulp	5.65 1.52
1478577	Pulp	6.87 1.94
1478578	Pulp	6.55 1.41
1478580	Pulp	7.05 1.16
1478581	Pulp	6.13 1.16
1478582	Pulp	6.81 1.21
1478583	Pulp	8.70 1.46
1478584	Pulp	6.71 1.14
1478585	Pulp	6.38 1.18
1478586	Pulp	3.99 0.86
1478588	Pulp	4.73 0.78
1478589	Pulp	6.83 1.19
1478590	Pulp	8.32 1.23
1478591	Pulp	6.70 1.05
1478592	Pulp	7.03 1.25



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Report Date: September 23, 2020

Page: 4 of 8

Part: 1 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	Analyte	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	
		SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum		
		Unit	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
		MDL	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01	
1478593	Pulp	78.38	2.46	1.11	0.35	3.42	0.03	0.59	0.11	0.15	<0.01	0.023	2389	222	230	38	31	<5	5	12.3	99.24		
1478594	Pulp	76.91	1.54	0.92	0.42	6.96	0.02	0.37	0.07	0.18	0.01	0.014	1600	142	352	23	21	<5	3	11.8	99.47		
1478595	Pulp	78.89	1.99	1.01	0.24	5.10	0.02	0.49	0.09	0.09	<0.01	0.019	2197	187	253	27	36	<5	5	11.1	99.30		
1478596	Pulp	79.67	1.86	1.15	0.78	4.89	0.02	0.44	0.08	0.14	0.01	0.012	2167	147	374	25	21	<5	4	10.0	99.40		
1478597	Pulp	82.81	2.24	1.10	0.25	2.36	0.02	0.53	0.10	0.12	<0.01	0.015	2668	192	157	29	23	<5	4	9.4	99.32		
1478598	Pulp	79.65	2.12	1.12	0.33	4.65	0.02	0.52	0.10	0.22	<0.01	0.012	2433	173	228	27	19	<5	3	10.3	99.41		
1478599	Pulp	80.77	2.10	0.96	0.28	4.44	0.02	0.50	0.08	0.15	<0.01	0.012	2523	163	176	22	19	<5	4	9.7	99.34		
1478600	Pulp	75.86	2.31	1.16	0.32	6.22	0.02	0.57	0.11	0.12	0.01	0.013	2528	185	189	30	26	<5	4	12.2	99.20		
1478601	Pulp	68.87	1.96	1.09	0.28	11.13	0.01	0.52	0.09	0.11	0.02	0.015	1634	170	389	27	25	<5	4	15.0	99.30		
1478602	Pulp	74.62	2.92	1.31	0.35	4.34	0.02	0.80	0.13	0.21	<0.01	0.030	3131	240	291	39	28	<5	5	14.1	99.26		
1478603	Pulp	78.15	2.75	1.21	0.30	3.13	0.02	0.69	0.11	0.12	<0.01	0.024	3642	226	206	33	29	<5	5	12.2	99.21		
1478604	Pulp	78.92	2.94	1.35	0.32	1.95	0.02	0.73	0.13	0.17	<0.01	0.023	3354	257	155	38	33	<5	5	12.2	99.19		
1478605	Pulp	78.01	2.58	1.12	0.29	3.12	0.02	0.62	0.11	0.16	<0.01	0.019	2952	242	217	34	30	<5	5	12.6	99.08		
1478606	Pulp	80.01	3.59	1.43	0.23	1.55	0.02	0.72	0.15	0.04	<0.01	0.016	8106	159	165	34	15	<5	5	10.8	99.53		
1478607	Pulp	72.24	3.85	1.39	0.33	4.26	0.02	0.77	0.17	0.16	<0.01	0.021	9478	280	454	45	29	<5	6	14.6	98.99		
1478609	Pulp	57.66	2.56	1.16	0.35	17.34	<0.01	0.43	0.13	0.66	0.01	0.015	17601	95	4927	49	38	<5	6	16.8	99.64		
1478610	Pulp	70.41	5.30	1.89	0.37	2.42	0.03	1.11	0.25	0.07	<0.01	0.032	14415	296	288	64	30	7	7	15.5	99.04		
1478611	Pulp	74.45	3.90	1.61	0.29	3.88	0.02	0.81	0.17	0.11	<0.01	0.019	9158	249	533	47	28	5	6	13.0	99.39		
1478612	Pulp	78.18	2.24	1.15	0.22	4.17	0.02	0.45	0.10	0.17	<0.01	0.015	4245	228	519	33	22	<5	4	12.0	99.26		
1478613	Pulp	76.51	2.24	1.09	0.27	4.61	0.02	0.46	0.10	0.09	<0.01	0.023	3608	226	415	34	27	<5	5	13.3	99.20		
1478614	Pulp	77.55	2.03	1.05	0.22	4.26	0.01	0.41	0.10	0.07	<0.01	0.016	3323	237	520	33	25	<5	4	13.1	99.32		
1478615	Pulp	74.69	2.44	1.13	0.26	4.24	0.01	0.50	0.11	0.11	<0.01	0.021	3649	267	461	37	31	<5	5	14.9	98.93		
1478616	Pulp	73.63	2.37	1.17	0.29	5.23	0.01	0.49	0.11	0.14	<0.01	0.016	3636	294	552	37	30	<5	5	15.2	99.17		
1478618	Pulp	71.99	2.75	1.34	0.31	5.49	0.02	0.60	0.13	0.18	<0.01	0.017	4395	336	588	42	32	<5	5	15.9	99.30		
1478619	Pulp	74.37	2.66	1.16	0.29	4.43	0.02	0.57	0.12	0.13	<0.01	0.021	4212	230	483	39	29	<5	5	14.7	99.00		
1478620	Pulp	79.86	2.26	1.15	0.25	3.35	0.02	0.47	0.10	0.12	<0.01	0.018	3775	211	380	31	26	<5	4	11.2	99.26		
1478621	Pulp	77.60	1.99	1.04	0.23	4.32	0.01	0.40	0.09	0.12	<0.01	0.018	2910	231	453	32	31	<5	5	12.8	99.08		
1478622	Pulp	62.00	2.10	0.93	2.73	10.86	0.02	0.46	0.10	0.17	0.06	0.021	5017	218	1100	38	29	<5	4	19.0	99.13		
1478624	Pulp	72.63	2.10	1.01	1.43	6.09	0.03	0.46	0.09	0.14	0.03	0.025	4212	202	649	31	28	<5	5	14.8	99.45		
1478625	Pulp	76.14	2.47	1.09	0.29	3.75	0.02	0.54	0.11	0.11	<0.01	0.028	3858	244	388	38	36	<5	5	14.1	99.13		



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3081 Third Ave.

Whitehorse Yukon Y1A 4Z7 Canada

Project: DV

Report Date: September 23, 2020

Page: 4 of 8

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478593	Pulp	7.39 1.25
1478594	Pulp	6.16 0.80
1478595	Pulp	6.52 1.03
1478596	Pulp	5.13 0.87
1478597	Pulp	5.69 1.04
1478598	Pulp	5.76 1.03
1478599	Pulp	5.32 0.97
1478600	Pulp	6.30 1.13
1478601	Pulp	7.29 0.99
1478602	Pulp	8.55 1.42
1478603	Pulp	7.75 1.23
1478604	Pulp	7.93 1.38
1478605	Pulp	8.04 1.27
1478606	Pulp	5.11 1.26
1478607	Pulp	6.34 1.69
1478609	Pulp	6.48 0.76
1478610	Pulp	7.74 1.52
1478611	Pulp	6.62 1.13
1478612	Pulp	6.68 0.75
1478613	Pulp	7.15 1.11
1478614	Pulp	7.11 1.15
1478615	Pulp	7.71 1.45
1478616	Pulp	8.10 1.30
1478618	Pulp	8.25 1.39
1478619	Pulp	7.14 1.46
1478620	Pulp	5.55 1.10
1478621	Pulp	6.52 1.09
1478622	Pulp	9.25 1.09
1478624	Pulp	7.58 1.01
1478625	Pulp	7.79 1.25







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Report Date: September 23, 2020

Page: 5 of 8

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478626	Pulp	8.12 1.24
1478627	Pulp	7.14 0.96
1478628	Pulp	6.74 1.10
1478629	Pulp	5.53 0.98
1478630	Pulp	6.61 1.11
1478631	Pulp	6.99 1.00
1478632	Pulp	7.27 1.10
1478633	Pulp	8.00 1.25
1478634	Pulp	6.84 1.31
1478635	Pulp	7.24 1.23
1478636	Pulp	8.19 1.45
1478638	Pulp	8.30 1.32
1478639	Pulp	7.74 1.21
1478640	Pulp	6.27 1.09
1478641	Pulp	6.34 0.80
1478642	Pulp	6.43 0.96
1478643	Pulp	6.20 0.98
1478644	Pulp	6.33 1.08
1478645	Pulp	6.47 1.12
1478646	Pulp	6.67 1.09
1478647	Pulp	7.48 1.28
1478648	Pulp	6.40 1.15
1478649	Pulp	5.51 0.87
1478650	Pulp	6.13 1.15
1478652	Pulp	6.46 1.14
1478653	Pulp	6.72 1.18
1478654	Pulp	6.00 1.15
1478655	Pulp	5.77 1.16
1478656	Pulp	6.60 1.44
1478657	Pulp	6.56 1.41



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# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method Analyte Unit MDL	LF300 SiO2	LF300 Al2O3	LF300 Fe2O3	LF300 MgO	LF300 CaO	LF300 Na2O	LF300 K2O	LF300 TiO2	LF300 P2O5	LF300 MnO	LF300 Cr2O3	LF300 Ba	LF300 Ni	LF300 Sr	LF300 Zr	LF300 Y	LF300 Nb	LF300 Sc	LF300 LOI	LF300 Sum	
	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	
	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01	
1478658	Pulp	77.22	3.84	1.67	0.36	2.40	0.10	0.88	0.18	0.17	<0.01	0.016	5557	260	247	52	34	<5	6	11.7	99.25
1478659	Pulp	76.56	3.64	1.52	0.46	3.40	0.10	0.85	0.16	0.14	<0.01	0.012	5508	207	403	49	30	5	5	11.8	99.30
1478660	Pulp	78.90	3.92	1.72	0.42	1.79	0.12	0.90	0.18	0.17	<0.01	0.013	5474	210	197	51	32	<5	6	10.5	99.34
1478661	Pulp	78.17	3.79	1.60	0.38	2.14	0.11	0.88	0.18	0.21	<0.01	0.013	5498	224	219	51	33	<5	5	11.1	99.28
1478662	Pulp	77.55	3.46	1.54	0.41	2.88	0.10	0.80	0.17	0.24	<0.01	0.013	5291	221	341	48	35	<5	5	11.5	99.32
1478663	Pulp	77.04	4.12	1.69	0.48	2.03	0.13	0.95	0.20	0.30	<0.01	0.013	6292	244	263	55	38	<5	5	11.6	99.28
1478664	Pulp	75.94	4.41	1.96	0.50	1.68	0.15	1.03	0.22	0.15	<0.01	0.014	6107	284	204	59	38	<5	6	12.5	99.27
1478665	Pulp	73.95	4.93	2.05	0.64	2.26	0.16	1.16	0.23	0.35	0.01	0.018	7240	280	333	66	40	6	6	12.6	99.23
1478667	Pulp	71.75	5.47	2.37	0.90	2.50	0.17	1.32	0.26	0.22	0.01	0.014	8449	318	279	72	43	7	7	13.3	99.29
1478668	Pulp	48.35	4.19	1.75	7.57	11.84	0.14	1.04	0.20	0.15	0.06	0.011	7725	225	704	57	31	<5	6	23.1	99.37
1478669	Pulp	72.48	5.53	2.33	0.76	2.34	0.19	1.31	0.26	0.29	0.01	0.015	8575	305	305	70	38	6	7	12.7	99.28
1478670	Pulp	71.50	5.08	2.16	1.12	2.90	0.18	1.20	0.24	0.15	0.01	0.013	7585	301	276	65	37	6	7	13.8	99.30
1478671	Pulp	74.72	4.57	1.82	0.60	1.67	0.15	1.06	0.20	0.13	<0.01	0.014	5921	279	220	57	37	<5	5	13.4	99.11
1478672	Pulp	74.46	4.29	1.76	0.65	1.51	0.14	1.02	0.19	0.14	<0.01	0.016	5635	292	151	55	35	<5	6	14.3	99.16
1478673	Pulp	72.34	4.33	1.84	0.81	2.98	0.15	1.02	0.20	0.18	0.01	0.014	6078	248	327	54	32	<5	6	14.5	99.15
1478674	Pulp	72.43	4.32	1.72	0.73	4.14	0.13	1.02	0.19	0.10	0.01	0.013	6862	236	504	51	34	<5	6	13.5	99.17
1478675	Pulp	74.23	4.71	1.73	0.69	2.13	0.16	1.11	0.22	0.12	<0.01	0.019	6078	268	192	59	36	5	6	13.1	98.95
1478676	Pulp	69.26	5.33	2.12	1.17	3.75	0.18	1.26	0.25	0.14	0.01	0.020	7421	274	369	67	40	<5	7	14.4	98.87
1478678	Pulp	71.24	4.81	1.91	1.19	4.01	0.16	1.15	0.23	0.13	0.01	0.016	7266	253	312	57	35	5	7	13.3	99.07
1478679	Pulp	73.92	4.61	1.71	0.67	3.34	0.15	1.08	0.21	0.09	<0.01	0.015	7294	248	286	53	34	<5	6	12.4	99.05
1478680	Pulp	70.22	4.53	1.69	0.76	4.77	0.15	1.07	0.21	0.11	<0.01	0.016	6726	255	411	56	36	5	6	14.6	98.96
1478681	Pulp	70.33	5.31	2.04	0.81	3.93	0.18	1.26	0.25	0.25	0.01	0.020	8393	260	372	62	42	<5	8	13.5	98.91
1478682	Pulp	71.25	4.56	1.77	0.78	5.16	0.17	1.10	0.21	0.23	0.01	0.022	8540	202	508	53	33	<5	7	13.0	99.28
1478683	Pulp	70.10	4.44	1.68	0.82	5.49	0.16	1.06	0.21	0.20	0.01	0.023	7783	211	472	53	38	<5	7	14.1	99.28
1478684	Pulp	69.21	4.41	1.74	0.60	6.29	0.16	1.09	0.20	0.25	0.01	0.023	7866	214	586	53	41	<5	7	14.3	99.23
1478685	Pulp	68.36	4.94	1.65	0.50	5.42	0.17	1.19	0.22	0.22	<0.01	0.027	7973	239	530	58	47	<5	7	15.4	99.06
1478686	Pulp	71.92	4.38	1.67	0.47	4.80	0.16	1.05	0.20	0.24	<0.01	0.020	6678	224	463	53	42	<5	7	13.3	99.10
1478688	Pulp	70.12	4.11	1.64	0.45	6.17	0.15	0.98	0.19	0.15	<0.01	0.022	6855	219	559	49	42	<5	6	14.4	99.21
1478689	Pulp	69.01	3.87	1.67	0.40	6.90	0.15	0.93	0.18	0.24	<0.01	0.020	6881	201	644	48	41	<5	7	15.0	99.23
1478690	Pulp	71.41	3.96	1.61	0.47	5.47	0.15	0.93	0.18	0.17	<0.01	0.021	6865	214	507	48	44	<5	6	14.0	99.20



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Report Date: September 23, 2020

Page: 6 of 8

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478658	Pulp	7.42 1.55
1478659	Pulp	6.84 1.45
1478660	Pulp	6.42 1.54
1478661	Pulp	7.05 1.54
1478662	Pulp	7.00 1.47
1478663	Pulp	7.06 1.64
1478664	Pulp	7.89 1.85
1478665	Pulp	7.71 1.88
1478667	Pulp	7.71 2.18
1478668	Pulp	9.52 1.60
1478669	Pulp	7.30 2.14
1478670	Pulp	7.85 2.02
1478671	Pulp	8.57 1.86
1478672	Pulp	9.64 1.84
1478673	Pulp	9.02 1.91
1478674	Pulp	7.59 1.67
1478675	Pulp	8.02 1.75
1478676	Pulp	8.11 2.10
1478678	Pulp	6.98 1.71
1478679	Pulp	6.83 1.71
1478680	Pulp	8.34 1.76
1478681	Pulp	7.33 2.01
1478682	Pulp	6.65 1.52
1478683	Pulp	7.47 1.57
1478684	Pulp	7.46 1.63
1478685	Pulp	8.73 1.62
1478686	Pulp	7.52 1.54
1478688	Pulp	7.96 1.52
1478689	Pulp	8.11 1.53
1478690	Pulp	7.79 1.47



# CERTIFICATE OF ANALYSIS

WHI20000198.1

	Method Analyte Unit MDL	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
		SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum			
		%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%			
1478691	Pulp	72.89	4.43	1.55	0.42	3.73	0.16	1.07	0.20	0.17	<0.01	0.023	6341	251	359	54	50	<5	7	13.6	99.00			
1478692	Pulp	71.11	4.40	1.90	0.41	3.79	0.15	1.03	0.19	0.23	<0.01	0.025	5856	263	378	53	52	<5	7	15.0	99.00			
1478693	Pulp	71.17	4.89	2.24	0.50	3.45	0.20	1.18	0.22	0.21	<0.01	0.014	7060	235	339	55	44	6	7	14.3	99.22			
1478694	Pulp	74.10	4.71	2.02	0.44	1.44	0.18	1.11	0.21	0.25	<0.01	0.035	6625	253	214	57	50	<5	6	13.9	99.23			
1478696	Pulp	76.10	4.22	1.87	0.46	1.23	0.17	1.01	0.19	0.27	<0.01	0.034	6437	224	167	51	49	<5	6	13.1	99.42			
1478697	Pulp	72.42	4.41	2.49	0.49	2.78	0.16	1.06	0.20	0.32	<0.01	0.032	6801	242	365	54	48	<5	7	14.1	99.31			
1478698	Pulp	75.62	4.55	1.78	0.48	1.05	0.15	1.05	0.20	0.12	<0.01	0.022	5821	245	129	55	46	<5	6	13.2	98.99			
1478699	Pulp	75.85	4.46	1.73	0.42	1.71	0.15	1.05	0.20	0.14	<0.01	0.018	6234	233	209	53	35	<5	6	12.4	98.93			
1478700	Pulp	73.23	5.08	2.00	0.47	2.08	0.17	1.20	0.23	0.35	<0.01	0.018	7259	258	265	60	35	<5	7	13.2	98.92			
1478701	Pulp	73.63	4.72	1.81	0.45	2.34	0.17	1.12	0.22	0.42	<0.01	0.022	7073	219	303	56	36	<5	6	13.3	99.06			
1478702	Pulp	71.35	4.93	1.78	0.64	2.70	0.16	1.17	0.23	0.38	<0.01	0.023	7326	226	315	61	37	<5	6	14.8	99.07			
1478703	Pulp	66.61	5.15	1.96	1.09	5.87	0.14	1.26	0.23	1.22	0.01	0.027	11290	179	628	70	42	<5	6	14.7	99.62			
1478704	Pulp	62.30	6.08	2.25	1.31	6.85	0.14	1.49	0.28	1.29	0.02	0.025	14920	183	756	74	37	6	7	15.9	99.70			
1478705	Pulp	61.92	5.66	2.10	2.04	7.14	0.16	1.40	0.27	1.36	0.02	0.023	14016	165	804	75	39	<5	7	15.9	99.71			
1478706	Pulp	62.41	6.66	2.46	1.75	6.05	0.17	1.65	0.32	1.35	0.02	0.030	16092	168	629	79	38	<5	7	15.0	99.72			
1478707	Pulp	60.71	5.60	2.04	2.47	8.06	0.17	1.37	0.28	1.72	0.02	0.027	13705	159	802	68	38	7	6	15.6	99.73			
1478708	Pulp	55.77	6.13	2.36	3.23	10.09	0.19	1.52	0.30	1.39	0.02	0.025	17616	145	936	81	32	7	7	16.6	99.72			
1478710	Pulp	60.91	6.91	2.89	2.66	6.21	0.22	1.71	0.33	1.03	0.02	0.028	16233	161	671	83	34	7	8	14.9	99.70			
1478711	Pulp	58.14	7.49	2.56	2.89	6.45	0.23	1.85	0.37	0.31	0.02	0.022	14704	201	465	93	37	7	8	17.4	99.44			
1478712	Pulp	57.90	7.81	3.13	2.87	5.85	0.26	1.89	0.39	0.30	0.02	0.019	14954	224	374	99	40	9	9	17.1	99.34			
1478713	Pulp	51.63	7.25	2.65	2.68	11.04	0.24	1.79	0.37	0.34	0.02	0.018	13268	231	752	93	40	8	10	19.7	99.35			
1478714	Pulp	56.09	7.44	2.48	2.98	6.40	0.27	1.85	0.38	0.29	0.02	0.024	12490	246	358	100	43	<5	9	19.6	99.33			
1478715	Pulp	60.59	6.38	2.38	1.89	5.85	0.24	1.56	0.32	0.35	0.01	0.026	9142	230	476	87	42	6	7	18.6	99.34			
1478716	Pulp	58.15	6.20	2.29	2.37	7.66	0.23	1.55	0.31	0.60	0.02	0.030	10191	217	700	86	43	5	8	18.8	99.48			
1478717	Pulp	58.50	6.34	2.56	2.34	6.34	0.24	1.57	0.32	0.33	0.01	0.034	9743	240	446	88	47	5	8	19.6	99.42			
1478718	Pulp	60.14	6.93	2.48	1.82	5.72	0.24	1.70	0.34	0.33	0.01	0.029	11654	237	428	94	43	6	8	18.3	99.40			
1478719	Pulp	58.60	6.60	2.33	2.18	6.58	0.22	1.64	0.32	1.19	0.01	0.038	13114	222	629	90	38	<5	7	18.4	99.66			
1478720	Pulp	57.76	6.18	2.31	3.01	7.38	0.24	1.57	0.31	1.87	0.02	0.034	13186	189	693	83	31	5	7	17.5	99.74			
1478721	Pulp	52.34	5.95	2.39	3.90	10.49	0.23	1.54	0.28	1.65	0.02	0.031	15288	170	1107	83	31	<5	7	19.1	99.77			
1478722	Pulp	57.50	7.14	3.05	3.13	6.30	0.33	1.81	0.34	1.24	0.02	0.033	14418	202	521	90	38	7	8	17.2	99.77			



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**Client: Breakaway Expl. Mgmt. Inc.**

3081 Third Ave.

Whitehorse Yukon Y1A 4Z7 Canada

Project: DV

Report Date: September 23, 2020

Page: 7 of 8

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478691	Pulp	8.23 1.60
1478692	Pulp	9.38 1.79
1478693	Pulp	8.39 2.09
1478694	Pulp	9.06 1.83
1478696	Pulp	8.81 1.82
1478697	Pulp	8.67 2.27
1478698	Pulp	8.84 1.84
1478699	Pulp	8.09 1.72
1478700	Pulp	8.32 2.00
1478701	Pulp	8.69 1.81
1478702	Pulp	9.36 1.77
1478703	Pulp	8.53 1.74
1478704	Pulp	8.62 1.92
1478705	Pulp	8.80 1.89
1478706	Pulp	7.89 2.14
1478707	Pulp	8.49 1.82
1478708	Pulp	8.02 2.03
1478710	Pulp	7.14 2.42
1478711	Pulp	8.63 2.20
1478712	Pulp	8.35 2.67
1478713	Pulp	9.62 2.31
1478714	Pulp	10.42 2.27
1478715	Pulp	10.34 2.15
1478716	Pulp	10.32 2.04
1478717	Pulp	10.88 2.32
1478718	Pulp	10.41 2.27
1478719	Pulp	11.08 2.08
1478720	Pulp	10.03 2.04
1478721	Pulp	10.12 2.08
1478722	Pulp	9.23 2.56



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Project: DV

Report Date: September 23, 2020

Page: 8 of 8

Part: 1 of 2

# CERTIFICATE OF ANALYSIS

# WHI20000198.1

	Method Analyte Unit MDL	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	
		SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum		
		%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	
		0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01	
1478724	Pulp	62.16	7.94	3.33	1.98	3.19	0.39	2.01	0.37	0.66	0.01	0.042	14280	253	425	101	43	<5	8	16.0	99.75		
1478725	Pulp	51.76	7.09	2.46	2.01	8.04	0.23	1.80	0.33	0.89	0.01	0.043	12718	297	760	107	50	7	9	23.3	99.53		
1478726	Pulp	47.11	5.77	2.08	4.09	10.96	0.18	1.47	0.27	0.11	0.02	0.018	8520	313	522	101	45	9	6	26.1	99.25		
1478727	Pulp	51.77	5.15	2.00	3.40	10.48	0.18	1.34	0.25	0.10	0.02	0.011	7843	267	553	91	37	8	6	23.8	99.53		
1478728	Pulp	53.65	5.72	2.38	2.63	8.95	0.19	1.48	0.27	0.16	0.01	0.012	9067	307	485	100	42	7	6	23.0	99.55		
1478729	Pulp	53.77	5.89	2.27	2.59	8.63	0.19	1.49	0.27	0.20	0.01	0.015	9393	301	490	103	46	8	7	22.9	99.43		
1478730	Pulp	53.30	5.57	1.95	2.89	9.55	0.19	1.41	0.28	0.08	0.01	0.015	8435	305	501	101	45	8	6	23.1	99.44		
1478732	Pulp	51.41	5.27	1.94	3.38	11.19	0.18	1.37	0.27	0.07	0.02	0.012	9413	295	592	95	39	8	6	23.3	99.59		
1478733	Pulp	43.97	4.47	1.92	6.00	14.30	0.14	1.16	0.22	0.14	0.02	0.009	9731	202	865	77	31	8	5	26.1	99.64		
1478734	Pulp	52.76	5.27	2.03	3.03	10.43	0.18	1.31	0.26	0.08	0.01	0.010	10035	251	586	87	34	7	6	23.0	99.63		
1478735	Pulp	54.31	5.08	1.86	2.64	10.52	0.18	1.29	0.26	0.04	0.01	0.011	9350	258	581	92	35	7	6	22.3	99.65		
1478736	Pulp	47.68	5.06	1.92	4.62	13.14	0.16	1.27	0.25	0.21	0.02	0.011	12302	235	882	104	39	18	5	23.7	99.56		
1478737	Pulp	53.99	5.15	2.43	2.52	11.00	0.17	1.31	0.27	0.11	0.01	0.010	9771	247	659	89	35	9	6	21.5	99.64		
1478738	Pulp	55.67	4.83	1.85	2.29	10.76	0.17	1.22	0.25	0.09	0.01	0.011	9039	238	652	80	33	7	5	21.3	99.59		
1478739	Pulp	59.07	4.75	1.79	2.00	8.94	0.16	1.19	0.25	0.09	0.01	0.011	9226	242	545	78	32	8	5	20.2	99.62		
1478741	Pulp	60.52	4.54	1.55	1.86	8.39	0.17	1.14	0.24	0.06	0.01	0.012	7479	249	502	74	32	7	5	20.1	99.56		
1478742	Pulp	61.43	4.30	1.51	1.92	8.34	0.14	1.04	0.22	0.07	0.01	0.011	7485	234	517	71	32	<5	5	19.6	99.54		
1478743	Pulp	52.17	3.95	1.69	4.00	12.49	0.12	0.98	0.20	0.05	0.02	0.010	8594	216	846	74	31	6	4	22.7	99.53		
1478744	Pulp	57.83	4.86	1.64	1.83	9.73	0.15	1.19	0.25	0.07	0.01	0.013	10909	273	675	88	40	7	6	20.5	99.42		
1478745	Pulp	61.41	4.27	1.74	1.66	9.16	0.14	1.05	0.21	0.06	0.01	0.012	9138	261	628	74	36	<5	5	18.6	99.47		



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Project: DV

Report Date: September 23, 2020

Page: 8 of 8

Part: 2 of 2

# CERTIFICATE OF ANALYSIS

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478724	Pulp	9.11 2.87
1478725	Pulp	14.36 2.37
1478726	Pulp	14.57 2.14
1478727	Pulp	13.45 1.92
1478728	Pulp	13.49 2.32
1478729	Pulp	13.53 2.24
1478730	Pulp	14.29 1.98
1478732	Pulp	13.81 1.89
1478733	Pulp	12.17 1.77
1478734	Pulp	12.00 1.92
1478735	Pulp	11.80 1.74
1478736	Pulp	12.06 1.79
1478737	Pulp	11.37 2.21
1478738	Pulp	11.90 1.79
1478739	Pulp	11.40 1.76
1478741	Pulp	11.49 1.56
1478742	Pulp	10.97 1.58
1478743	Pulp	11.68 1.64
1478744	Pulp	12.03 1.70
1478745	Pulp	11.62 1.72



QUALITY CONTROL REPORT

WHI20000198.1

Table with columns: Method, Analyte, Unit, MDL, and various chemical elements (SiO2, Al2O3, Fe2O3, MgO, CaO, Na2O, K2O, TiO2, P2O5, MnO, Cr2O3, Ba, Ni, Sr, Zr, Y, Nb, Sc, LOI, Sum) with numerical values.





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Project: DV  
Report Date: September 23, 2020

Page: 1 of 3

Part: 2 of 2

# QUALITY CONTROL REPORT

WHI20000198.1

Method	TC000	TC000
Analyte	TOT/C	TOT/S
Unit	%	%
MDL	0.02	0.02
1478527	Pulp	9.14 3.18
1478549	Pulp	5.79 0.96
1478591	Pulp	6.70 1.05
1478632	Pulp	7.27 1.10
1478673	Pulp	9.02 1.91
1478741	Pulp	11.49 1.56
Pulp Duplicates		
1478537	Pulp	5.17 2.18
REP 1478537	QC	
1478558	Pulp	5.39 1.85
REP 1478558	QC	5.43 1.84
1478576	Pulp	5.65 1.52
REP 1478576	QC	
1478597	Pulp	5.69 1.04
REP 1478597	QC	5.81 1.09
1478615	Pulp	7.71 1.45
REP 1478615	QC	
1478636	Pulp	8.19 1.45
REP 1478636	QC	8.25 1.46
1478655	Pulp	5.77 1.16
REP 1478655	QC	
1478675	Pulp	8.02 1.75
REP 1478675	QC	8.15 1.79
1478694	Pulp	9.06 1.83
REP 1478694	QC	
1478715	Pulp	10.34 2.15
REP 1478715	QC	10.59 2.23
1478728	Pulp	13.49 2.32
REP 1478728	QC	



# QUALITY CONTROL REPORT

WHI20000198.1

		LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
		SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum
		%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
		0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01
1478742	Pulp	61.43	4.30	1.51	1.92	8.34	0.14	1.04	0.22	0.07	0.01	0.011	7485	234	517	71	32	<5	5	19.6	99.54
REP 1478742	QC																				
Reference Materials																					
STD GS311-1	Standard																				
STD GS311-1	Standard																				
STD GS311-1	Standard																				
STD GS311-1	Standard																				
STD GS311-1	Standard																				
STD GS311-1	Standard																				
STD GS910-4	Standard																				
STD GS910-4	Standard																				
STD GS910-4	Standard																				
STD GS910-4	Standard																				
STD GS910-4	Standard																				
STD SO-19	Standard	60.50	13.90	7.51	2.92	5.97	4.03	1.29	0.71	0.32	0.13	0.494	472	472	318	113	35	72	26	1.9	99.89
STD SO-19	Standard	60.59	13.92	7.46	2.88	5.91	4.05	1.30	0.70	0.32	0.13	0.499	476	473	318	114	35	73	27	1.9	99.88
STD SO-19	Standard	60.49	14.02	7.46	2.93	5.97	3.96	1.27	0.70	0.32	0.13	0.497	471	473	318	113	35	67	26	1.9	99.88
STD SO-19	Standard	60.74	13.94	7.37	2.90	5.90	3.99	1.28	0.70	0.32	0.13	0.500	466	470	315	114	34	71	26	1.9	99.88
STD SO-19	Standard	59.89	14.19	7.56	2.98	6.03	4.11	1.32	0.71	0.32	0.13	0.500	480	477	324	118	35	68	27	1.9	99.87
STD SO-19	Standard	60.15	14.06	7.50	2.94	6.06	4.08	1.31	0.71	0.32	0.13	0.496	477	475	319	117	35	70	27	1.9	99.89
STD SO-19	Standard	60.56	13.95	7.47	2.90	5.93	4.01	1.29	0.70	0.32	0.13	0.497	472	470	316	116	35	75	26	1.9	99.87
STD SO-19	Standard	60.57	13.94	7.49	2.91	5.91	4.00	1.29	0.70	0.32	0.13	0.491	469	467	314	106	34	72	26	1.9	99.87
STD SO-19	Standard	60.47	13.91	7.48	2.90	5.93	4.09	1.30	0.70	0.32	0.13	0.503	477	468	315	114	35	70	27	1.9	99.86
STD SO-19	Standard	60.17	14.18	7.46	2.94	6.01	4.04	1.30	0.71	0.32	0.13	0.505	472	466	319	117	35	72	27	1.9	99.87
STD SO-19	Standard	60.27	14.00	7.51	2.92	5.94	4.11	1.31	0.71	0.32	0.13	0.502	472	475	319	117	35	70	27	1.9	99.87
STD SO-19	Standard	60.60	13.89	7.44	2.89	5.94	4.03	1.30	0.70	0.31	0.13	0.499	472	477	316	114	34	70	26	1.9	99.87
STD SO-19	Standard	60.48	13.91	7.47	2.90	5.96	4.06	1.31	0.70	0.32	0.13	0.503	469	476	313	114	35	73	26	1.9	99.87
STD SO-19	Standard	60.83	13.79	7.36	2.88	5.95	4.01	1.29	0.70	0.31	0.13	0.494	462	469	311	112	34	71	26	1.9	99.86



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Project: DV  
Report Date: September 23, 2020

Page: 2 of 3

Part: 2 of 2

# QUALITY CONTROL REPORT

WHI20000198.1

		TC000 TOT/C %	TC000 TOT/S %
1478742	Pulp	10.97	1.58
REP 1478742	QC	10.87	1.52
Reference Materials			
STD GS311-1	Standard	0.99	2.41
STD GS311-1	Standard	1.01	2.26
STD GS311-1	Standard	0.97	2.43
STD GS311-1	Standard	1.01	2.22
STD GS311-1	Standard	1.00	2.35
STD GS311-1	Standard	1.00	2.34
STD GS910-4	Standard	2.66	8.56
STD GS910-4	Standard	2.66	8.35
STD GS910-4	Standard	2.61	8.45
STD GS910-4	Standard	2.66	8.79
STD GS910-4	Standard	2.62	8.56
STD GS910-4	Standard	2.65	8.21
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
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STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		
STD SO-19	Standard		



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Page: 3 of 3

Part: 1 of 2

# QUALITY CONTROL REPORT

WHI20000198.1

		LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300	LF300
		SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ba	Ni	Sr	Zr	Y	Nb	Sc	LOI	Sum
		%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
		0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	5	20	2	5	3	5	1	-5.1	0.01
STD GS311-1 Expected																					
STD GS910-4 Expected																					
STD SO-19 Expected		61.13	13.95	7.47	2.88	6	4.11	1.29	0.69	0.32	0.13	0.5	486	470	317.1	112	35.5	68.5	27		
BLK	Blank																				
BLK	Blank																				
BLK	Blank																				
BLK	Blank																				
BLK	Blank																				
BLK	Blank																				
BLK	Blank	0.03	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	2	<5	<3	<5	<1	0.0	0.03
BLK	Blank	0.03	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	3	<5	<3	<5	<1	0.0	0.03
BLK	Blank	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	2	<5	<3	<5	<1	0.0	<0.01
BLK	Blank	0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	3	<5	<3	<5	<1	0.0	0.01
BLK	Blank	0.04	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	<2	<5	<3	<5	<1	0.0	0.02
BLK	Blank	0.02	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	<2	<5	<3	<5	<1	0.0	0.02
BLK	Blank	0.02	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<5	<20	<2	<5	<3	<5	<1	0.0	0.04
Prep Wash																					
ROCK-WHI	Prep Blank	70.26	14.25	3.29	0.99	2.62	4.38	2.07	0.39	0.10	0.08	0.003	864	<20	219	134	18	10	7	1.4	99.98
ROCK-WHI	Prep Blank	70.83	14.32	3.10	0.87	2.44	4.50	2.09	0.37	0.09	0.08	<0.002	865	<20	222	141	17	7	7	1.2	99.99



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Report Date: September 23, 2020

Page: 3 of 3

Part: 2 of 2

# QUALITY CONTROL REPORT

WHI20000198.1

		TC000	TC000
		TOT/C	TOT/S
		%	%
		0.02	0.02
STD GS311-1 Expected		1.02	2.35
STD GS910-4 Expected		2.65	8.27
STD SO-19 Expected			
BLK	Blank	<0.02	<0.02
BLK	Blank	<0.02	<0.02
BLK	Blank	<0.02	<0.02
BLK	Blank	<0.02	<0.02
BLK	Blank	<0.02	<0.02
BLK	Blank	<0.02	<0.02
BLK	Blank		
BLK	Blank		
BLK	Blank		
BLK	Blank		
BLK	Blank		
BLK	Blank		
BLK	Blank		
Prep Wash			
ROCK-WHI	Prep Blank	0.08	<0.02
ROCK-WHI	Prep Blank	0.06	<0.02

**Appendix C: McGill Study**

## McGill University Study

### Methods

#### *Total organic carbon*

A sufficient amount (50 to 100 mg) of the crushed pulp material is placed in glass beakers. Hydrochloric acid (1N) was added to the sample and left for 48 hours to ensure the complete removal of carbonate minerals. Samples were washed with nanopure water until a neutral pH was attained and were left to dry. A small amount (~10mg) of sample material was weighed in tin cups and placed in a 96-sample holder. High-temperature catalytic combustion of samples was performed with a Carlo Erba NC2500 connected by gas chromatography to a thermal conductivity detector.

To calculate the weight percentage of inorganic carbon (assumed to be calcite), the following formula was used, modified from H elie (2009).

$$CaCO_3(\text{wt}\%) = 100 * \left\{ \frac{(R_2 - R_1)}{(0.6 * R_2) - 0.12} \right\}$$

Where  $R_1$  is the result of total carbon analysis of untreated samples ( $\div 100$ ), and  $R_2$  is the result of acid-treated samples ( $\div 100$ ). The 0.6 and 0.12 coefficients represent the volatilized components of inorganic carbonates ( $CO_2 + H_2O$ ) and the carbon fraction in calcite, respectively. Organic carbon is then calculated as the difference between total carbon and inorganic carbon. Total carbon values were analyzed by Bureau Veritas using a Leco Carbon Analyzer. Several samples ( $n=7$ ) yielded negative inorganic carbon calculations (average =  $-0.26 \text{ wt}\% \text{ C}$ ), indicating no inorganic carbon sources in these samples. To confirm no inorganic carbon, these 7 samples were also analyzed for total carbon using a Carlo Erba NC2500, and differences are better than 1 %.

#### *Organic carbon isotopes*

Sample material was weighed in tin cups to obtain the same amount of  $CO_2$  for all samples and reference materials. Analysis was performed using Isoprime 100 isotope mass spectrometer coupled to an Elementar Vario Microcube elemental analyzer in continuous flow mode. Two internal standards were used for calibration ( $\delta^{13}C = -28.73 \pm 0.06\text{‰}$  &  $-11.85 \pm 0.04\text{‰}$ ) and cross-checked using a third standard ( $\delta^{13}C = -17.04 \pm 0.11\text{‰}$ ). Results are given in delta units vs VPDB with an overall analytical uncertainty of better than  $\pm 0.1\text{‰}$  (1s).

Seven of the 200 samples analyzed for  $\delta^{13}C_{org}$  isotopes returned anomalous heavy values ( $> -20\text{‰}$ ). These samples are being acidified and analyzed for TOC and  $\delta^{13}C_{org}$  as they potentially contain carbonate material not removed in the acidification step.

### Results

#### *TOC and $\delta^{13}C_{org}$*

The TOC content of the formations is generally similar among the Imperial Formation ( $5.6 \pm 1.09 \text{ wt}\%$ ), Canol Formation ( $6.07 \pm 1.2 \text{ wt}\%$ ), RCTZ ( $6 \pm 0.9$ ) and the Road River Group ( $7.3 \pm 1.9 \text{ wt}\%$ ). The  $\delta^{13}C_{org}$  results also show limited range among the Imperial Formation ( $-30.74 \pm 0.11\text{‰}$ ), Canol Formation ( $-31.93 \pm 0.86\text{‰}$ ), RCTZ ( $-31.0 \pm 0.11\text{‰}$ ) and the Road River Group ( $-30.77 \pm 0.15\text{‰}$ ). The downhole plots of the  $\delta^{13}C_{org}$  are shown in Figure 1. Depth is plotted as the midpoint of the interval sampled. The upper Canol

Formation (DV-07-05) shows a general increase in  $\delta^{13}\text{C}_{\text{org}}$  from  $\sim -31.5\text{‰}$  to  $-30.7\text{‰}$  at the contact with the Imperial Formation. The Imperial Formation shows steady  $\delta^{13}\text{C}_{\text{org}}$  in the studied section. The upper portion of the Road River Group (DV07-06) shows a general decline in isotope values from  $\sim -30.7\text{‰}$  to  $-31.1\text{‰}$  at the contact with the RCTZ. The lower Canol Formation is steady at  $\sim -31.2\text{‰}$  until  $\sim 73$  meters with a marked increase in  $\delta^{13}\text{C}_{\text{org}}$  values to  $-30.8\text{‰}$  at  $65.5$  m. A steady decline is observed between  $65.5$  m and  $27.8$  m to  $\sim -31.1\text{‰}$ .

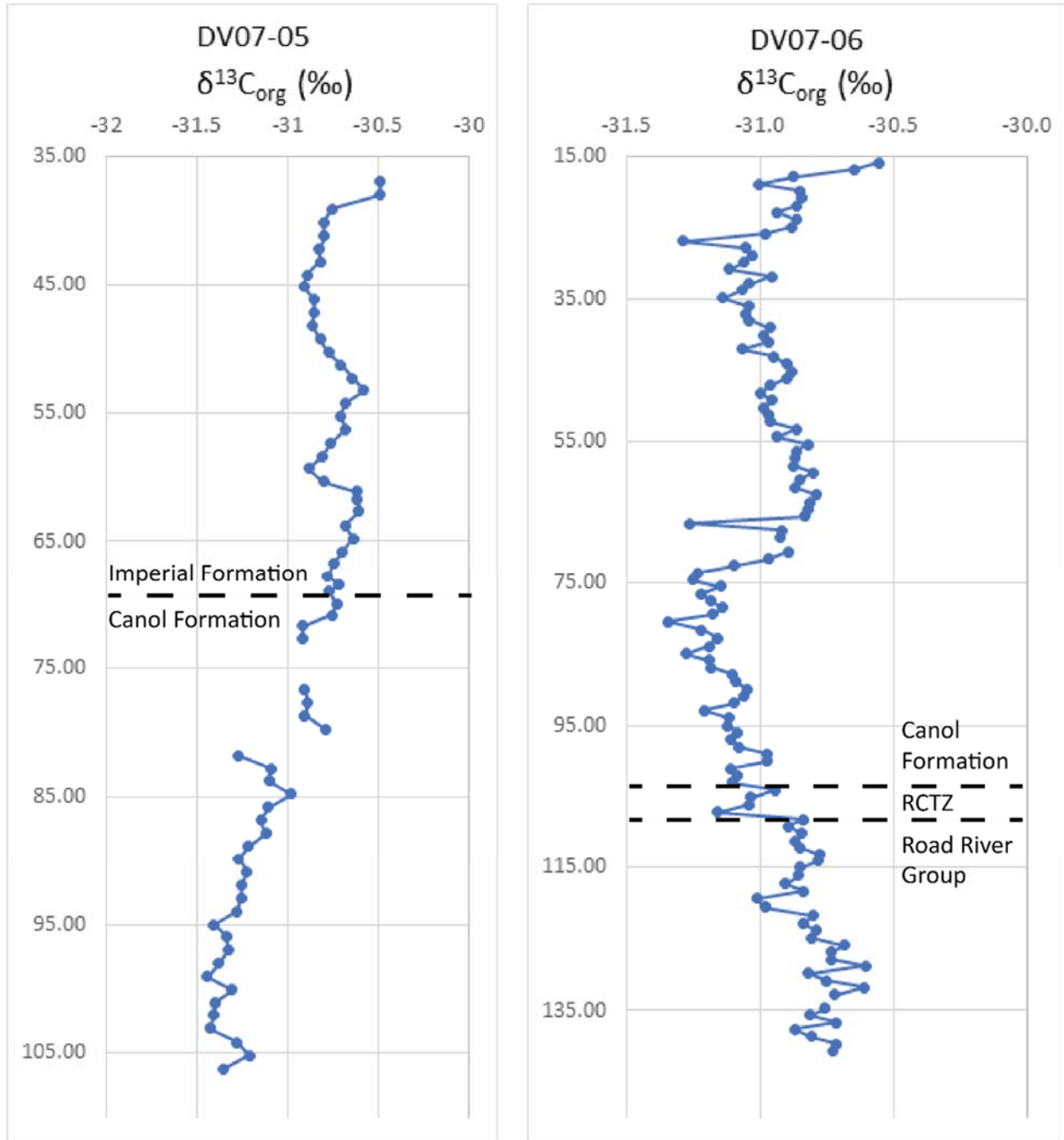


Figure 1.  $\delta^{13}\text{C}_{\text{org}}$  isotope downhole plots for DV07-05 (left) and DV-07-06 (right). Formation boundaries are marked.



## Whole-rock Geochemistry

The 200 samples sent for additional analysis encompass the lower 34 m of the Imperial Formation (n = 35), Canol Formation (n = 127), RCTZ (Road River Canol Transition Zone; n = 6) and the upper portion of the Road River Group (n = 32). High Zn and V concentrations are found in the Canol Formation (2628 ± 855 ppm and 2073 ± 455 ppm, respectively), compared to the Imperial Formation (347 ± 383 ppm and 1401 ± 509 ppm, respectively), RCTZ (663 ± 69 ppm and 809 ± 96, respectively) and Road River Group (911 ± 539 ppm and 1179 ± 512 ppm, respectively).

Within the Canol Formation, Zn and V display different interelement relationships. Zinc correlates strongly with Cd (0.92) and moderately with Cu (0.5) and V (0.42). In contrast, V only weakly correlates with Cd (0.4), Cu (0.35) and Ba (0.37) but moderately correlates S (0.65), TOC (0.64), Mo (0.66) and Ni (0.57) (Table 1). Spearman ranked correlation coefficients display limited significant relationships between TOC and other elements in the Road River Group and Imperial Formations. Correlations were not calculated for the RCTZ given the small sample set (n = 6).

	Zn	V	Ba	Ni	TOC	S	Mo	Cu	Cd
Zn		1.02E-06	3.07E-01	4.42E-02	1.02E-02	6.86E-01	5.33E-01	3.04E-09	1.09E-51
V	<b>0.42</b>		1.52E-05	1.62E-12	7.80E-16	1.69E-09	2.80E-17	6.94E-05	1.81E-06
Ba	-0.09	0.37		1.35E-04	1.86E-06	1.42E-16	2.64E-03	9.62E-03	6.18E-01
Ni	0.18	0.57	<b>0.33</b>		2.53E-09	4.54E-18	4.03E-14	7.73E-03	2.67E-01
TOC	0.23	<b>0.64</b>	0.41	<b>0.50</b>		4.16E-11	6.87E-05	4.89E-10	8.24E-04
S	0.04	<b>0.50</b>	<b>0.65</b>	<b>0.67</b>	<b>0.54</b>		2.70E-06	5.47E-02	6.68E-01
Mo	0.06	<b>0.66</b>	0.26	<b>0.61</b>	0.35	0.40		8.06E-01	2.65E-01
Cu	<b>0.50</b>	0.35	0.23	0.24	<b>0.52</b>	0.17	0.02		2.46E-12
Cd	<b>0.92</b>	0.41	0.04	0.10	0.29	0.04	-0.10	<b>0.57</b>	

Table 1. Spearman ranked correlation table for the Canol Formation showing the rho statistic (lower triangle) and the associated P-value (upper triangle). Moderate significant relationships are in bold.

## Thin sections

Several samples of the Imperial Formation, Canol Formation, RCTZ and Road River Group were obtained from the Yukon Geology Survey and sent directly to McGill University for thin section analysis. This is still on-going work, so only a summary of the Canol Formation is provided.

Mineralogy of the Canol Formation includes quartz, aluminosilicates, sulphides, and organic matter. Quartz is primarily microcrystalline interspersed with aluminosilicates and forms the bulk of the shale matrix. Feldspar minerals include K-bearing and Ba-bearing phases. Small detrital grains (~15-25 µm) of K-feldspar commonly have overgrowths of authigenic feldspar with Ba-altered rims. Larger authigenic Ba-feldspars appear to infill the quartz matrix and have inclusions of organic matter. Sulphides include pyrite and sphalerite. Pyrites in the Canol Formation consist of small framboids (< 15 µm) composed of minute pyrite crystals. Sphalerite is often secondary, seen to infill the pore spaces and is commonly associated with authigenic clay. The clay mineral phase has two forms, large detrital grains (25-50 µm) or smaller (10-25 µm) secondary phases. Preliminary energy-dispersive x-ray spectroscopy (EDS) analysis indicates that secondary clay contains minor V (~1-3 wt%). The detrital grains are devoid of V. Compositional EDS analysis suggests the clay phase is dominantly illite.

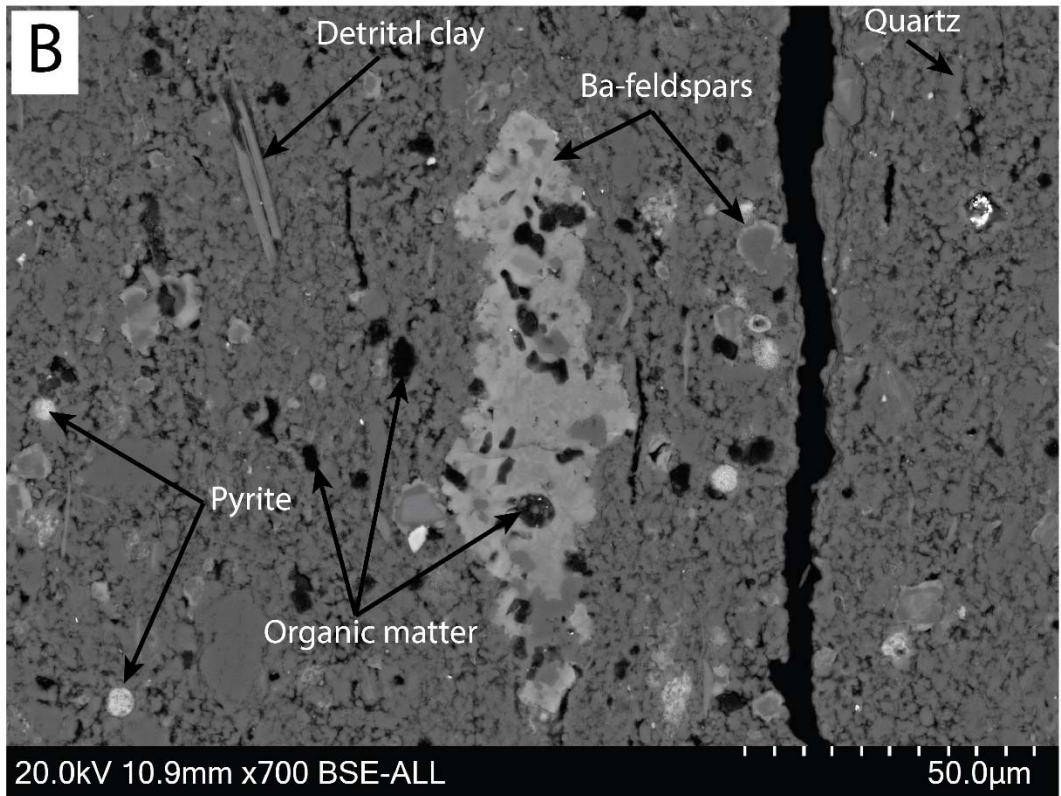
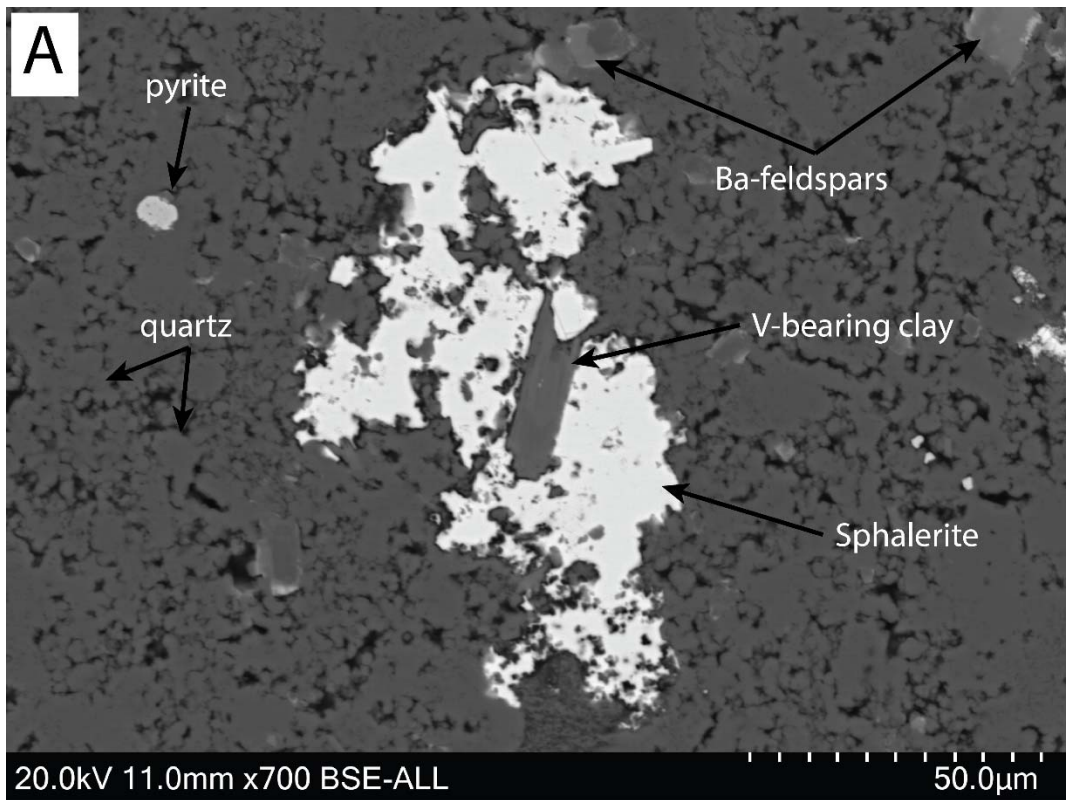


Figure 2. Scanning electron microscope images of the Canol Formation. (A) Sphalerite infilling pore spaces in microcrystalline matrix, with authigenic illite. (B) Ba-feldspars in quartz matrix with clots of organic matter interspersed throughout.

## Discussion

This research is being performed by Ph.D. Candidate Kyle Henderson at McGill University. It is a component of a broader study into the genesis of hyper-enriched black shales within the Richardson Trough.

There are three primary pathways for trace-metal enrichment in black shales: 1) detrital contribution, 2) organic detritus and 3) authigenic enrichment driven by redox processes at or near the sediment-water interface. Both V and Zn are relatively abundant trace-metals in the upper continental crust, with reported concentrations of 107 ppm and 71 ppm, respectively (McLennan, 2001). As a result, the 'average' shale typically contains elevated concentrations of V (130 ppm) and Zn (95 ppm) (Wedepohl, 2004). In seawater, both elements can be delivered to the sediment by accumulating organic detritus due to both the trace-element content of organic matter and adsorption processes. For example, estimates on marine plankton's metal content indicate V and Zn concentrations of 110 ppm and 3 ppm, respectively (Piper, 1994). Both V and Zn may adsorb to the surfaces of inorganic or organic debris within the water column. These elements have average concentrations of 2 ppb and 350 ppt, respectively (Nozaki, 1997).

Several recent studies have investigated the origin of V enrichment in black shales, including the Late Devonian Bakken Formation in North Dakota Williston Basin (Scott et al., 2017), Cambrian shales of South China (Lu et al., 2021) and a comprehensive study including several formations performed by Kunert et al. (2020). These studies suggest that V accumulation's key processes include adsorption to metal oxides, organic-clay composites, and highly reducing redox conditions. Fewer studies have been dedicated to substantial Zn accumulation. Still, they include the Late Devonian Bakken Formation (Scott et al., 2017), metalliferous shales in the Brooks Range, Alaska (Slack et al., 2015), and hyper-enriched black shales found in South China and Yukon, Canada (Han et al., 2015; Lehmann et al., 2016). Additional research into the origin of hyper-enriched black shales in Yukon is currently being undertaken at McGill University by Ph.D. candidate Kyle Henderson. Studies that have focused on Zn enrichment purport highly reducing conditions and hydrothermal fluids as being critical processes.

The interelement correlations within the Canol Formation suggest organic matter and redox conditions are vital processes responsible for V and Zn enrichment. The strong correlation with Zn and Cd combined with the moderate interelement relationship between Zn-Cu-Cd is commonly observed in modern-day upwelling regions (Böning et al., 2004; Böning et al., 2009). This element group (Zn-Cu-Cd) extends to V, albeit with weaker correlations (Table 1). This interelement relationship suggests that organic matter productivity is likely essential for Zn and V's enrichment within the Canol Formation.

Preliminary microscopy has shown that sphalerite is present within the Canol Formation as anhedral masses that infill pore-networks created by microcrystalline quartz (Fig 2a). Sphalerite shows a spatial relationship to secondary, authigenic V-bearing illite (1-3 wt% V), strengthening the hypothesis that these elements' enrichment is causally linked. This analysis was achieved via scanning electron microscopy, and the presence of V is indicated by EDS (energy dispersive X-Rays), which is semi-quantitative. Future work will be performed to establish quantified mineral chemistry.

Barium-bearing feldspars are known in other black shale formations but are relatively uncommon minerals as an authigenic phase. Within the Richardson Trough, Ba-feldspars have been found in the hyper-enriched black shales (Henderson et al., 2019; Orberger et al., 2005). Additionally, Ba-feldspars have been observed in the hyper-enriched black shales in South China (Pašava et al., 2008) and the high

V Cambrian black shales in South China (Liu et al., 2019). Barium-feldspars are typically related to exhalative hydrothermal fluids or associated with low to medium-grade metamorphism. They are commonly identified in sedimentary exhalative type Pb-Zn or Ba-Zn deposits. However, recent studies have suggested a diagenetic origin for Ba-feldspar without the need for an external hydrothermal fluid (Fernandes et al., 2017; Magnall et al., 2020).

The  $\delta^{13}\text{C}_{\text{Org}}$  data shows minimal variability, although subtle trends can be observed in the Road River Group and Canol Formation (Fig. 1). The limited variation compared to the Trail River Section is likely due to the larger sampling interval conducted in this study (1m) compared to point samples in Fraser and Hutchison (2017). This data will be used to correlate between the Dempster and Trail River areas.

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