Technical Report on the Miller Mine Graphite Property, Grenville Township, Quebec, Canada

(in accordance with National Instrument 43-101)

Submitted to

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PhD, P.Geo., OGQ member #290
and
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April 25, 2014
Signature Page and Qualification for the first Author

I, Rémi Charbonneau, P.Geo., Ph.D., do hereby certify that:

I reside at 7667 avenue De Chateaubriand, Montreal, Québec, Canada H2R 2M2 and I am currently Associate of Inlandsis Consultants s.e.n.c., located at the same address.


I received a B.Sc. in Geology from the Université de Montréal in 1986 and a PhD in Glacial Geology in 1995 from the same institution. I have been working as a contract geologist in mineral exploration since 1995. I am an active Professional Geologist and a registered member of the Ordre des Géologues du Québec (licence #290).

I have worked in the mineral exploration industry for over 15 years on projects for various metals and industrial minerals. Based on my experience and the exploration stage of the Miller Mine Project, I am allowed to act as the Qualified Person for the Project within the meaning of NI 43-101.

I have visited the Miller Mine Property on several occasions since the spring of 2013 while contributing to exploration work for the Issuer.

I am responsible for items 1 to 27 and most figures of the present Technical Report. I worked in close collaboration with co-author Steven Lauzier in the preparation of items 9 and 10.

I fulfill the requirements set out in section 1.5 of National Instrument 43-101 for an “independent qualified person” relative to the Issuer.

I have acted as a Qualified Person for the Issuer since 2013. I have had no prior involvement with the Miller Mine Graphite Property which is the subject of this technical report.

I have read and used National Instrument 43-101 and Form 43-101F1 (April 8, 2011 version) to make the present report compliant with its specifications and terminology.

As of the date of this technical report, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

April 25th, 2014

“Rémi Charbonneau”
Rémi Charbonneau
PhD, P.Geo., OGQ #290
Signature Page and Qualification for the second Author

I, Steven Lauzier, P.Geo. hereby certify that:
I reside at the 1395, 3rd Avenue Acton Vale, Québec, Canada J0H 1A0. I am the founder of SL Exploration Inc, located at 1380 rue Leblanc, Acton Vale, Québec, Canada J0H 1A0.


I received a B.Sc. in Geology from the Université du Québec à Montréal (Montreal, Quebec) in 2010. I have been working as a contract geologist in mineral exploration for 4 years since my graduation.

I am an active Professional Geologist and a registered member of the Ordre des Géologues du Québec (licence #1430). I am not a qualified person with respect to the Miller Mine Graphite Property.

My specialty in exploration has been graphite since 2012 following the personal acquisition of graphite properties and their subsequent exploration in the southern Quebec area.

I am co-author of items 9 and 10 (Exploration and Drilling) in the present Technical Report.

I do not fulfill the requirements set out in section 1.5 of the National Instrument 43-101 for an “independent qualified person” relative to the Issuer, having been involved in full-time contracting for the Issuer.

I acquired the initial 9 claims of the Miller Mine Property in 2011 as a prospector in association with 9228-6202 Québec Inc. who sold the claims to the Issuer. I personally retain a 7.5% interest in the property while 9228-6202 Québec Inc holds the balance. I currently own shares and stock options in the Issuer, along with a residual NSR pursuant to the transaction with the Issuer.

I have read and used National Instrument 43-101 and Form 43-101F1 (April 8, 2011 version) to make the present report compliant with its specifications and terminology.

As of the date of this technical report, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

April 25th, 2014

“Steven Lauzier”
Steven Lauzier
P.Geo., OGQ #1430
# Table of Contents

Signature Page and Qualification for the first Author .......................................................... 2  
Signature Page and Qualification for the second Author ......................................................... 3  
Table of Contents .................................................................................................................. 4  
List of Tables ....................................................................................................................... 6  
List of Figures ..................................................................................................................... 6  
List of Appendices ............................................................................................................... 7  
Item 1: Summary .................................................................................................................. 8  
Item 2: Introduction .............................................................................................................. 9  
Item 3: Reliance on Other Experts ....................................................................................... 10  
Item 4: Property Description and Location ......................................................................... 11  
  Item 4.1 Surface agreement ............................................................................................... 14  
  Item 4.2 Exploration Restrictions ...................................................................................... 15  
  Item 4.3 Bulk Sampling .................................................................................................... 16  
Item 5: Accessibility, Climate, Local Resources, Infrastructure and Physiography ............ 16  
Item 6: History .................................................................................................................... 17  
  Item 6.1 Miller Mine ......................................................................................................... 17  
Item 7: Geological Setting .................................................................................................. 18  
  Item 7.1: Local geology .................................................................................................... 18  
  Item 7.2: Mineralization .................................................................................................... 19  
    7.2.1 VN1 showing .......................................................................................................... 20  
    7.2.2 VN2 showing .......................................................................................................... 21  
    7.2.3 VN3 showing .......................................................................................................... 21  
    7.2.4 Other mineralization ............................................................................................. 21  
Item 8: Deposit Types .......................................................................................................... 23  
Item 9: Exploration .............................................................................................................. 24  
  9.1 Initial prospecting work ............................................................................................... 24  
  9.2 Initial geophysics phase .............................................................................................. 26  
  9.3 Anomaly follow-up .................................................................................................... 26  
    9.3.1 Old mine pit trenches ........................................................................................... 27  
    9.3.2 Main Trench area ................................................................................................. 28  
    9.3.3 Other trenches ..................................................................................................... 30  
  9.4 Airborne VTEM survey .............................................................................................. 31  
    9.4.1 Follow-up on airborne anomalies E1 and E2 ......................................................... 32
9.5 Second IMAGEM survey 33
9.6 Trenching on VN3 showing 34
9.7 PhiSpy Surveys 34
Item 10: Drilling 36
Item 10.1 First drilling campaign 36
10.2 Second drilling campaign 41
Item 10.3 Third drilling campaign 45
Item 11: Sample Preparation, Analyses and Security 47
Item 11.1 Prospecting sample protocol 47
Item 11.2 Channel sampling protocol 47
Item 11.3 Drill core sampling protocol 47
Item 12: Data Verification 48
Item 13: Mineral Processing and Metallurgical testing 48
13.1 Initial purity tests 48
13.2 Grinding and flotation tests 48
13.3 GDMS Analysis and Equivalent Boron Content 49
13.3.1 Equivalent Boron Content 49
13.4 Thermal Upgrading 50
13.5 Raman Spectroscopy 50
Item 14: Mineral Resource Estimates 52
Item 15: Mineral Reserve Estimates 53
Item 16: Mining Methods 54
Item 17: Recovery Methods 55
Item 18: Project Infrastructure 56
Item 19: Market Studies and Contracts 57
Item 20: Environmental Studies, Permitting and Social or Community 58
Item 21: Capital and Operating Costs 59
Item 22: Economic Analysis 60
Item 23: Adjacent Properties 61
Item 24: Other Relevant Data and Information 62
Item 25: Interpretation and Conclusions 63
Item 26: Recommendations and Budget 64
Item 26.1 Budget 64
Item 27: References 65
List of Tables

Table 1 Claim list of the Miller Property, held 100% by Carbon Canada .......................................................... 14
Table 2 Significant results from initial lithogeochemical sampling ................................................................. 25
Table 3 Structural measurements in the mine pit .............................................................................................. 25
Table 4 Results from the Trench #1 and Trench #2 sampling programs ......................................................... 27
Table 5 Significant results from the sampling program on the VN1 & AN2 showings. Trench #3 .................. 30
Table 6 Results of the follow up prospecting work on the VTEM anomaly .................................................... 33
Table 7 Technical details of the first drill program .............................................................................................. 37
Table 8 Significant results from the first drilling program .................................................................................. 38
Table 9 Technical details of the second drilling campaign .............................................................................. 42
Table 10 Significant results from the second drilling program ........................................................................... 43
Table 11 Technical details of the holes drilled in the third drilling campaign .............................................. 45
Table 12 Significant results from the third drilling campaign .......................................................................... 46

List of Figures

Figure 1 Location of the Miller graphite property ............................................................................................ 12
Figure 2 Claim map of the Miller Property and surrounding area ................................................................. 13
Figure 3 Exploration restrictions on the Property ............................................................................................ 15
Figure 4 Regional geology (Corriveau et al. 1998) .......................................................................................... 18
Figure 5 Local geology ........................................................................................................................................ 19
Figure 6 Detailed map of VN1 showing ............................................................................................................ 20
Figure 7 Detailed map of the VN2 showing ....................................................................................................... 21
Figure 8 Locations of samples collected from the sampling program at the Miller mine pit ..................... 26
Figure 9 Location of sampling from Trench #1 & #2 ....................................................................................... 28
Figure 10 Detailed map of Trench #3 (the "main trench") showing lithologies and the VN1 & VN2 showings ................................................................................................................. 29
Figure 11 Channel sample locations in Trench #3 (VN1 - VN2 showings) .................................................. 30
Figure 12 Locations of Trenches #4 & #5 ........................................................................................................... 31
Figure 13 Prospected areas over VTEM anomalies .......................................................................................... 33
Figure 14 Location of the VN3 showings .......................................................................................................... 34
Figure 15 Location of holes drilled during the first campaign ......................................................................... 37
Figure 16 Holes drilled during the second campaign in the VN1 - VN2 area .................................................. 42
Figure 17 Location of the holes drilled during the second and third drilling campaigns on the VN2 area .... 43
List of Appendices

Appendix 1. Bulk sample authorization
Appendix 2. VN1 photographs
Appendix 3. VN2 photographs
Appendix 4. VN3 photographs
Appendix 5. Raman report and SEM images
Appendix 6. Certificates of analysis
Appendix 7. Miller mine pit photographs
Appendix 8. Initial geophysics survey report
Appendix 9. Trench geology photographs
Appendix 10. Airborne survey report
Appendix 11. Second geophysics survey report
Appendix 12. Logs from the three drill campaigns
Appendix 13. Flotation testwork, chemical upgrading and two-stage hydrometallurgical test report
Appendix 14. GDMS and EBC tests report
Appendix 15. Thermal upgrading report
**Item 1: Summary**

This report describes the exploration work and the graphite potential related to the Miller Mine graphite property (the “Property”) held by Canada Carbon Inc. (“Canada Carbon” or the “Issuer”). The relevant data for the property were obtained from Canada Carbon and from the Quebec government’s public database and reports (historical data). The present Technical Report (the “Report”) is compliant with National Instrument 43-101 (“NI 43-101”) Standards of Disclosure for Mineral Projects and prepared in accordance with Form 43-101F1 for use in financing activities.

The Miller Mine Property includes 81 claims (47.38 km$^2$) registered to Canada Carbon, another eight (8) claims (4.8km$^2$) to be transferred from a company with an adjacent property, and 95 pending claims. The property is located in the Grenville, Grenville Augmentation and Harrington townships in the Outaouais Region of southern Quebec, about 80 km west of Montreal.

Since March 2013, Canada Carbon has discovered many occurrences of graphite mineralization over a small area in the vicinity of the past-producing Miller mine. The mineralization occurs as two main plurimetric graphite veins (VN2 and VN3), many graphite veins of smaller size, and numerous plurimetric graphite-wollastonite pods. The veins are mostly oriented N-S, similar to the trend of the former mine pit. The veins contain 40% to 80% Cg whereas the pods generally grade around 10-15% Cg. The main mineralization of interest on the Miller Property is categorized as granulite-hosted lump vein-style mineralization and is therefore particularly well suited for high-tech applications due to its high purity potential. Processing of the graphite vein material yielded an ultra-pure product, achieving results of up to 100% Cg. The possible use of the graphite in nuclear applications was also evaluated by verifying the Equivalent Boron Content of the impurities in a concentrate, which surpassed purity requirements. Raman spectroscopy studies demonstrated a high degree of crystallinity for vein graphite from the Miller mine. Given this background, the viability of a small-scale mining operation should be evaluated through testwork on a bulk sample. The demonstrated ability to produce a high purity graphite concentrate suggests the Miller occurrence has economically interesting grades.

Authorization was granted by the Ministry of Natural Resources of Quebec to extract a bulk sample of up to 480 tonnes (metric tons) of material from the surface showings and piles of blocks. The Issuer has excavated a series of trenches along a contact between marble and paragneiss. The contact zone is mineralized with graphite veins and graphite-wollastonite pods. Pegmatite intrusions are also present along the contact. The mineralized contact zone can be followed at surface for over 50 m from the southern end of the trench. It is folded towards the east; at depth, the mineralized contact (graphite-wollastonite) was encountered at a vertical distance of 39.3 m below the VN2 showing. An airborne VTEM survey detected many anomalies of significant size on both claim blocks belonging to the Issuer. Ground geophysics also detected large local anomalies associated with graphite vein systems.

To detect additional large conductors, the authors recommend systematic IP surveying over the known VTEM anomalies and local PhiSpy surveys over anomalous areas in order to generate high-quality targets for prospecting, trenching and drilling. An IP survey and trenching program should be carried out in the trench area to extend known mineralization laterally and at depth. Results of the bulk sampling program can be used to evaluate the potential for a small-scale operation. The total budget is estimated at $500,000.
Item 2: Introduction

Canada Carbon Inc. (“Canada Carbon” or the “Issuer”) is a Canadian mineral exploration company trading publicly on the TSX Venture Exchange (“TSXV”) under the symbol “CCB” and on the Frankfurt Stock Exchange (“FSE”) under the symbol “U7N1”. This company was formerly Bolero Resources Corp. and traded on the TSX Venture Exchange under the symbol “BRU” prior to October 5, 2012. The present report is prepared in compliance with National Instrument 43-101 (“NI 43-101”) policy guidelines for financing activities.

The exploration data presented in this report were obtained from Canada Carbon’s internal database whereas historical data were obtained from the EXAMINE database of the Ministry of Natural Resources of Quebec (“MNR”; Ministère des Ressources Naturelles), unless indicated otherwise.

Steven Lauzier first visited the property in the winter of 2013 to observe the graphite veins still remaining in the walls of the former Miller mine pit. The property was frequently visited by both authors in the following months during the exploration program carried out by the Issuer.
Item 3: Reliance on Other Experts

There is little historical information available regarding exploration and mining activities in the late 1800s and early 1900s, and such information consists mainly of general statements and cannot be directly verified. Land tenure information on mining claims was obtained from the GESTIM web site maintained by the MRN and accessed in March 2014. Metallurgical testwork and reports are also discussed and presented under Item 13. The tests were performed at accredited laboratories. External reports discussed herein are presented in the appendices. Venetia Bodycomb of Vee Geoservices provided the linguistic editing of a draft version of the Report.
Item 4: Property Description and Location

The Miller Graphite Property (the “Property”) is located in the Outaouais Region of southern Quebec, some 80 km west of Montreal (Figure 1). The property is located on NTS map sheets 31G/10 and 31G/15 (1:50,000 scale).

The initial acquisition (9 claims) included a 2% Net Production Return (NPR) royalty that was later reduced to 1.5% in exchange for 100,000 shares. This land package is where most of the exploration work has been carried out and it hosts the major discoveries. The property subsequently underwent significant expansion with the addition of 55 claims.

The Issuer has entered into agreements to acquire a 100% interest in five (5) claims from Nouveau-Monde Mining Enterprises Inc. (“Nouveau-Monde”) and eight (8) additional claims from Caribou King Resources Inc. (“Caribou King”). Two (2) Nouveau-Monde claims are currently pending due to exploration restrictions and will be transferred once the MNR allows it. The Issuer has also granted Nouveau-Monde a 2% Net Smelter Return (NSR) royalty which can be reduced at any time to 1% by paying $1,000,000 to Nouveau-Monde. Eight (8) claims (4.8 km²) belonging to Caribou King are still expected to be transferred. The latter claims are subject to an existing 2% Net of Processed Material Returns Royalty in favour of a third party, which can be reduced at any time to 1% by paying $1,000,000 to the royalty holder. The Issuer also entered into agreements with Marksman Geological Ltd. to purchase fourteen (14) other claims.

Table 1 lists 81 claims (47.38km²) in good standing and registered to Canada Carbon. These claims form two (2) blocks, as shown in Figure 2. Some of the land underlying certain claims is categorized for recreational land usage, and these claims are affected by exploration restriction and were still pending at the time of writing this report. Quebec’s mining law, the Mining Act, which was recently amended by Bill 70 (the “Act to amend the Mining Act”, assented on December 10, 2013), allows the MNR to decide whether it will modify the exploration restriction or to leave it as is. If the former decision is made, the MNR will remove the exploration restriction from the pending claims. A total of 95 claims are pending at the date of writing this report.

The work on the property was carried out on the existing active claims, except for the airborne survey which overlaps some of the pending claims for logistical purposes (e.g., flight line paths).

The historical pit and tailings of the former Miller Mine have not been restored and are naturally vegetated. No environmental liabilities are applicable to past claim holders or to Canada Carbon.

There are no other known significant factors or risks in addition to those noted in the Report that could affect access, title, or the right or ability to perform the recommended exploration program.
Figure 1 Location of the Miller graphite property
Figure 2 Claim map of the Miller Property and surrounding area.
Table 1 Claim list of the Miller Property, held 100% by Carbon Canada.

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**Item 4.1 Surface agreement**

In September 2013, Canada Carbon entered into a surface access agreement (the “Agreement”) with two landholders who are affiliated with each other. The agreement provides the Issuer with surface access for an initial period of five (5) years and allows the Issuer to carry out regular graphite prospecting and exploration programs including, but not limited to, conducting topographic, geological, geochemical and geophysical surveys, conducting underground or surface excavations, explorations and drillings, digging and trenching, and obtaining and testing geochemical or metallurgical samples. This agreement covers the area of interest on which Canada Carbon is working at this time.

The agreement grants the Issuer an exclusive and irrevocable option to acquire or lease from the landholder all or part of the property deemed reasonably necessary for the extraction of mineral substances. If the Issuer exercises this option, either by acquiring or leasing all or part of the property prior to the expiry of the five-year term, the term will be extended through the period of commercial production.

Pursuant to the Agreement, Canada Carbon has agreed to issue 40,000 common shares in the capital of the Company to the landholders for the first year of the term, and for each subsequent year of the term and until the Issuer begins operating the property as a mine (not including milling for the purposes of testing by a pilot plant), either 40,000 additional common shares or $5,000 payable in cash, at the option of the landholder. Should Canada Carbon begin commercial production during the term, the payments outlined above will cease and the Landholder will be entitled to a 2.5% NSR upon and subject to the terms of definitive royalty agreements.
**Item 4.2 Exploration Restrictions**

The Miller Property is located on private land and the surface right owners should be kept informed about upcoming exploration programs, and the Company should obtain their permission before initiating any exploration program.

Four categories of land status in the region impose certain restrictions on exploration activities, as depicted on Figure 3: (1) Large areas dedicated to resort and recreational activities (“territoire affecté à la villégiature’) that are not available for map staking: land affected by this restriction surrounds and limits the staking play. (2) Ecological reserves in which exploration is prohibited: two such projects occupy small areas on the west side of the Rouge River. (3) Wildlife habitats in which activities are forbidden (with exceptions) to any activities that can modify a biological, physical or chemical component associated with the habitat (only applicable to public land): a large area of white-tailed deer (*Odocoileus virginianus*) habitat overlaps the eastern part of the property but the restriction is not applicable because this particular area is on private land.

![Figure 3 Exploration restrictions on the Property.](image-url)
Item 4.3 Bulk Sampling

Canada Carbon has received permission in March 2013 to collect and ship up to 480 tonnes of graphite-bearing material from its Miller Mine graphite property in Quebec. According to the authorization granted by the MRN, the material may be extracted for mineralogical testing as well as for distribution to potential purchasers. The sample must be collected between March 15 and September 15, 2014, and the results of the treatment must be reported to the MRN by September 15, 2015. The objective of the bulk sample is to test the historically mined trench area of the property, along with multiple veins of graphite mineralization found over the area during field exploration by the Issuer. Stockpiles of graphitic material from historical production have been found in various areas around the former mine and can also be sent out for the purpose of bulk sampling. The removal of graphitic material exposed in the trench will also help the Issuer to understand the distribution of graphite pods and veins along the mineralized contact it has discovered.

The Issuer is currently in discussions with industry-leading graphite processors with respect to toll milling of the bulk sample material and anticipates shipping of graphite concentrate in the second quarter of 2014. Appendix 1 shows the bulk sample authorization received from the MRN.

Item 5: Accessibility, Climate, Local Resources, Infrastructure and Physiography

The property is well served by a network of public and private roads owing to its location in a well-developed area of southern Quebec. The site of the abandoned Miller mine is accessible from Scotch Road leading north from the village of Grenville-sur-la-Rouge. From this small and winding public access, a private road leads westward for about half a kilometre; the entrance to this road is restricted by a locked barrier and a copy of the key was borrowed so that exploration teams could access the site.

Southern Quebec is characterized by a continental climate. The land is usually free of snow from May to November. Vehicle access via the private road during the winter season would require contracting a snow removal service.

Local resources are available at the town of Grenville-sur-la-Rouge and at the nearby cities of Hawkesbury (Ontario) or Lachute, located respectively 10 km south and 20 km east of the Property. Transportation and housing are available nearby and the local work force should be able to support a mining operation. A power line crosses the southern part of the Property and a railroad passes through the Ottawa Valley near Grenville.

The property is characterized by steep topographic relief consisting of steep-sided hills with altitudes ranging from 100 to 240 metres above sea level. The drainage is dominated by the south-flowing Rouge River that runs through the Property, and by Du Calumet River that passes immediately north of the former Miller mine. Some small lakes are found within and in the neighbourhood of the property (e.g., Ogilvy Lake on Figure 2).
Item 6: History

Item 6.1 Miller Mine

A graphite occurrence on Lot 10 of Range V of the Grenville Township was described by Sir William Logan in 1845-1846, and mining operations were subsequently initiated by R.V. Harwood of Vaudreuil (Ells 1904; Cirkel 1907; Ells 1904). This initial period of exploitation may well have been the first graphite operation in Canada (Ells 1904; Spence 1920). Following a 25-year period of inactivity, the site was worked again for a short period of time around 1870 as the Miller mine (Cirkel 1907) and was taken over in 1889 by Messrs. Rae & Co. without extensive work (Spence 1920). The most important episode of mining apparently occurred from 1899 to 1900, as reported in Obalski 1900:

Keystone Graphite Co.-This company, composed of Americans, began last year to work on lot V, 10 of Grenville (county of Argenteuil) at a distance of 6 miles from Calumet station (C.P.R.). The deposit worked was formerly known under the name of the McVeity Mine. The graphite is found in a pretty pure state, in small veins or masses, in a crystalline rock. It is hand-picked on the spot and put in bags for shipment to the United States where it is treated and concentrated. The lots sent contain an average of from 35 to 55 per cent of pure graphite and it is paid for according to the grade. Since the company has been working, about 25 carloads have been shipped; from 16 to 22 men have been employed throughout the year. The work consists of a cutting about thirty feet deep joining the main deposit where, it is stated, a thickness of 2½ feet of solid graphite have been found at times. The work is done by hand without the aid of machinery. The same company has done some other prospecting on a small scale. (extract from Obalski 1900)

Later in his report, Obalski reported that a total of 388 short tons of raw graphite were produced in 1900 in Quebec, while other graphite companies were almost inactive (Obalski 1900, p. 15-16) suggesting that an important part of this total production was derived from the Miller operations.

A database search for “McVeity” yielded several mentions of a prospector actively exploring for iron and mica in the late 1800s in the Ottawa region. One former phosphate mine near Gatineau (Quebec) also bears that same name and it is thus possible that an episode of activity at Miller took place under the name “McVeity”. It is also reported that graphite was mined in 1900 on adjacent Lot 9 of the same range by the National Graphite Co. (Ells 1904) and further south, near the Pacific railroad station by the Calumet Graphite Co. (Obalsky 1900; Ells 1904).

The mine site area was claimed by Glen Blair (independent prospector) in late 1980s who performed limited ground geophysics and found a new occurrence of graphite on the SW corner of Lot 10 as well as some graphite boulders, about 100 m to the east (Blair 1988, 1989).
Item 7: Geological Setting

The Project occurs in the same locality where observations by Sir William Logan (1863) led to the recognition of the “Grenville Series”, which was later extended and redefined as a geological province. Today, the Grenville Province is recognized as a deeply exhumed Mesoproterozoic Himalayan-type collision orogenic belt that extends over thousands of kilometres and interpreted as a collage of gneissic terranes that were subjected to high-grade metamorphism (Martignole and Friedman 1998; Corriveau and van Breemen 2000; Corriveau et al. 2007). High-grade metamorphic terrane stacking occurred along deep-level ductile shear zones and resulted in the main crustal build-up. The study area is included in the south portion of the Morin Terrane, composed of supracrustal rocks, commonly at granulite facies, intruded by several bodies of granitic to anorthositic composition (1.14 Ga) grouped into the Morin AMCG Suite (Corriveau et al 1998), as depicted in Figure 4. To the west, the Morin Terrane is bounded to the Central Metasedimentary Belt along the Labelle deformation zone (Martignole et al. 2000).

![Figure 4 Regional geology (Corriveau et al. 1998).](image)

Item 7.1: Local geology

The southern part of the Grenville Township was mapped by Philpotts (1961) who detailed the folded sequence of quartzo-feldspathic gneiss, quartzite and crystalline limestone (marble); this sequence is characteristic of the Grenville Series of Logan (1863). The well-banded quartzo-feldspathic gneisses were divided into two groups on the basis of whether they contain biotite or pyroxene, which rarely occur together in the area. Philpotts determined that gneisses are not the dominant lithology, occurring as remnants between the various intrusive of the Morin Series, which includes gabbro, monzonite, mangerite, granite and syenite (Figure 5). Quartzite was documented as very massive, well jointed, white or pinkish rocks. Crystalline limestone appeared to be limited to two large beds. Microscope examination revealed
twinned calcite, sphene, zircon, diopside, serpentine (after olivine), graphite, quartz, microcline and grossularite. Wollastonite was only noted near igneous contacts. Various pegmatites were observed to be affected by scapolite alteration of feldspar where the pegmatites intrude crystalline limestone. Finally, Philpotts also noted younger diabase and lamprophyre dykes.

![Figure 5 Local geology](image)

**Figure 5 Local geology**

**Item 7.2: Mineralization**

Graphite has been found as disseminations in marble or sulphide-bearing paragneiss elsewhere on the Miller Mine Property (Philpotts 1976) but its presence as veins or pods represents the best potential for the more valued form of crystalline graphite. In known occurrences, graphite can be alone or in association with other minerals, including pyroxene, scapolite, titanite and wollastonite (Spence 1920). Through trenching, Canada Carbon has identified many examples of graphite vein mineralization associated with graphite-wollastonite pods. Smaller vein systems and graphite-wollastonite pods were also found all around the property.
7.2.1 VN1 showing

The VN1 showing is characterized by an irregular vein of semi-massive coarse graphite. The graphite vein is exposed along a strike length of 12.8 m, oriented NW-SE (148°) with a subvertical dip. From SE to NW, the vein ranges in width from 1 to 1.7 m over a distance of 7.9 m, and of that length, the vein maintains a width of 1.6 m over 2.5 m. Toward the NW, the vein is truncated where it encounters a 1.2-m zone of more competent host rocks. The width of the vein on the other side of the competent zone ranges from 10 cm to 1 m over a strike length of 3.7 m. Smaller graphite veins can be observed on both sides of the main vein, on available exposures. Finer grained graphite is locally present in the surrounding carbonate host rocks. The VN1 showing was covered by 1 to 3 m of glacial till.

Semi-massive coarse-grained graphite occurs within a pegmatitic skarn-mineral envelope, which includes large crystals of white feldspar, diopside and wollastonite. Local geology consists of a complex intermixing of banded paragneiss and medium-grained carbonate rock (historically referred to as a marble unit), where contorted fragments of gneiss appear to float within an equigranular carbonate matrix.

A detailed map of the VN1 showing is presented in Figure 6, and photographs of VN1 are provided in Appendix 2.

![Figure 6 Detailed map of VN1 showing.](image-url)
7.2.2 VN2 showing
The VN2 showing is characterized by a massive graphite vein up to 1.5 m thick that can be followed for more than 3 m at surface, several graphite pods, and multiple secondary graphite veins. The high-grade graphite veins and pods are aligned NE-SW and follow the contact between marble and paragneiss.

From the southern border of the trench, the contact can be followed at surface for more than 50 m and becomes folded toward the east. At depth, the mineralized contact was encountered 39.3 m below the VN2 showing.

A detailed map of the VN2 showing is presented in Figure 7 and photographs of VN2 are provided in Appendix 3.

![Detailed map of the VN2 showing](image)

7.2.3 VN3 showing
The VN3 showing is a massive graphite vein 2 m thick by 5 m long, hosted in unaltered marble. The VN3 discovery was investigated by six (6) shallow drill holes that targeted the vein at depth and along its projected strike and depth extensions.

Snow cover prevented extensive observation of this showing. Photographs of VN3 are provided in Appendix 4.

7.2.4 Other mineralization
Many graphite and wollastonite pods were exposed by the trenches. The pods are metre-scale and composed of calcite, diopside, feldspar, wollastonite and graphite. They display a pegmatitic texture and
are primarily located along the contact between marble and paragneiss. Graphite veins are found in many places on the property and in many different contexts. The veins vary in width from a few millimeters to 1.7 m.
**Item 8: Deposit Types**

Canada Carbon is actively exploring for metamorphic-hosted vein-type graphite deposits, long known to occur in the Outaouais region of southern Quebec (Cirkel 1907; Simandl and Kenan 1997). Other typical examples, mostly in granulitic terrain, are found in Sri-Lanka (Weis et al. 1981, Glassley 1982, Katz 1987, south India (Radhika et al. 1995, Baiju et al. 2005) and Spain (Rodas et al. 2000), among others. Vein graphite is characterized by coarse flakes with a high degree of crystallinity, which is required for new technological applications (Luque et al. 2013).

Deposits of vein graphite originate from the remobilization of carbon as carbon dioxide and methane in metamorphic fluids at the base of the crust or deeper within the mantle (Glassley 1982, Katz 1987, Skippen and Marshall 1991, Simandl and Kenan 1997). These are channelled upward along major fractures where deposition as graphite is triggered by chemical changes in the fluids in response to cooling and dewatering (Luque et al. 2013). Fluid transport and graphite deposition imply that structures played a major role in the location and shape of the resulting deposit. The precipitation of carbon in veins takes place at high temperatures, from 700°C to 800°C, which favor the formation of large and well crystallized graphite flakes, as revealed by the crystallite size, graphitization and Raman spectra of samples from south India (Baiju et al. 2005).

Within the Outauvais region of Quebec (Tremblay and Cummings 1987), and particularly at Miller (Ells 1904, Spence 1920), the mineralogical association of graphite and calcsilicates suggests a proximal source of carbon-rich fluids generated by silicification of nearby carbonate-rich rocks. Many studies have recognized that metasomatism, or more specifically skarnification, is an efficient way to produce carbon-rich fluids through the following reaction (Rodas et al. 2000, Pope 2004):

\[
\text{carbonate + silica} \rightarrow \text{calcsilicate + carbon dioxide}
\]

This also corresponds to a variety of the “decarbonation” of crustal rocks invoked by Luque et al. (2013). A description of this process is found in Ells (1904) who cites an older field investigation of the Miller Mine site presented by Professor Osann of Germany in 1899, which is included here because it is specific to the property and mentions the quartzite-like appearance of the altered marble:

> Along the contacts of the graphite veins, the neighbouring rocks have suffered alteration with scapolite, apatite, etc. and in places the granular limestone has been converted into a mixture of pyroxene, wollastonite and titanite [...] that minerals have been formed which are essentially the same as one is accustomed to observe in limestones which have undergone contact metamorphism. This portion of the limestone has been penetrated by gases and vapours from the neighbouring eruptive magmas, upon further cooling, perhaps also by solutions, and that in this way the materials foreign to the limestone, especially the silica, have been introduced. Sometimes the rock is so strongly impregnated with silica as to form a rock somewhat similar to quartzite.

The Miller Project represents a key example of the granulite-hosted graphite vein model by presenting the basal part of the metamorphic system where fluid generation takes place in close proximity to graphite deposition. In addition, the pegmatitic texture observed in some of the graphite occurrences displays particularly coarse crystals of the minerals associated with graphite generation (wollastonite, diopside), indicating that condensation was from pneumatolytic carbon-rich fluids. This process can generate large and well-ordered graphite crystals, such as those in the Miller samples submitted by Canada Carbon (confirmed by Raman spectroscopy; Appendix 5). Thus, the graphite from the Miller Mine Property is particularly well suited for high-tech applications as would be expected from a granulite-hosted vein-type occurrence.
Item 9: Exploration

Canada Carbon carried out initial prospecting to verify historical data and a later prospecting phase to verify ground (MaxMin, VLF, IP, ground TDEM) and airborne (TDEM) geophysical anomalies. The geophysical surveys were performed by different geophysics companies for the Issuer. Following the prospecting phase on the known anomalies, Canada Carbon proceeded to trench the ground anomalies and test some of them by performing two drilling campaigns. Trenching and drilling on a coincident IP – IMAGEM anomaly detected two graphite veins (named VN1 and VN2) along a contact zone. The main focus of the Issuer’s exploration work then became the investigation of these showings and the contact zone.

A local ground EM survey and follow-up drilling on the most interesting EM anomalies led to the discovery of the VN3 showing. Both holes of this second phase of drilling encountered two graphitic horizons that explained the anomalies. Additional ground EM surveying led to the identification of five (5) high-priority anomalies.

9.1 Initial prospecting work

After acquiring the Miller Mine Property in February 2013, Canada Carbon hired SL Exploration Inc. to perform prospecting work. The objective was to locate the old mine site and proceed with an initial assessment of property access and the historical mineralization. The field crew located the mine site approximately 150 m north of the position reported in the MNR database. Field observations in the old mine pit revealed that graphite veins occur in a marble unit near pegmatite and paragneiss. The larger graphite vein appears to have been mined in the past because its orientation corresponds to the mine pit’s north-south orientation. The field crew collected seven (7) grab samples.

Mineralization consists of two small but massive unnamed veins, 4 to 15 cm thick, in a graphitic marble unit. This zone is a few metres away from the contact between pegmatite and marble, which is consistent with historical data. Sample A41170 (49.4% Cg) is a grab sample that includes material from both veins and the mineralized marble host rock, whereas sample A41171 (32.4% Cg) is a grab sample of mineralized marble. The vein strikes N240° and dips steeply (80°) to the northwest.

A smaller 2 cm vein was discovered a few metres north of the mineralized zone with a NNW-SSE orientation and a vertical dip. Sample A41172 (10.7% Cg) is a grab sample of the vein material and its graphitic marble host. Other grab samples of paragneiss all around the pit yielded 0.22% Cg to 1.2% Cg. Certificates of assays are presented in Appendix 6. Results are summarized in Table 2.
Table 2 Significant results from initial lithogeochemical sampling.

<table>
<thead>
<tr>
<th>Graphite vein samples from the mine pit</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A43178</td>
<td>78.4</td>
</tr>
<tr>
<td>A43179</td>
<td>65.1</td>
</tr>
<tr>
<td>A43190</td>
<td>79.8</td>
</tr>
<tr>
<td>A43191</td>
<td>70.6</td>
</tr>
<tr>
<td>A43192</td>
<td>74.6</td>
</tr>
<tr>
<td>A43193</td>
<td>80.1</td>
</tr>
<tr>
<td>A43194</td>
<td>24.5</td>
</tr>
</tbody>
</table>

The objective of the follow-up prospecting work in March and April 2013 was to obtain samples from the graphite veins for metallurgical testing (See Item 13) and to better characterize the grade of the vein material. The melted snow cover allowed additional geological mapping in the mine pit and structural measurements were also taken. Veins exposed in the east part of the mine pit were sampled. Sample A41269, consisting of vein material with some pod material, was collected from the VN5 showing in the Miller mine pit and sent to SGS for the metallurgical tests as discussed in Item 13. Sample A41179, collected from the west part of the mine pit, was sent to Actlabs for testing but could not be used due to laboratory contamination. Structural measurements are presented in Table 3. Photographs of the mine pit are presented in Appendix 7. Certificates of analysis are presented in Appendix 6. Figure 8 provides a map of sample locations.

Table 3 Structural measurements in the mine pit.

<table>
<thead>
<tr>
<th>Name</th>
<th>Northing (UTM NAD 83 Z18) (mN)</th>
<th>Easting (UTM NAD 83 Z18) (mE)</th>
<th>Structure</th>
<th>Description</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN1</td>
<td>530 696</td>
<td>5 057 993</td>
<td>VN = N147/52, VN = N322/76</td>
<td>Two veins, 1 cm wide. Samples A41178 and A41179. 2 cm wide vein and 50 cm wide vein.</td>
<td>29.0 (A41178)</td>
</tr>
<tr>
<td>VN2</td>
<td>530 700</td>
<td>5 058 001</td>
<td>VN = N192/78</td>
<td>2 cm wide vein and 50 cm wide vein.</td>
<td>29.0 (A41178)</td>
</tr>
<tr>
<td>VN3</td>
<td>530 707</td>
<td>5 058 000</td>
<td>VN = N191/75, VN = N042/72</td>
<td>1 cm wide vein 2.5 cm wide vein and 40 cm wide vein.</td>
<td>13.5 (A41184)</td>
</tr>
<tr>
<td>VN4</td>
<td>530 740</td>
<td>5 057 995</td>
<td>VN = 266/82</td>
<td>1 cm wide vein 2.5 cm wide vein and 40 cm wide vein.</td>
<td>13.5 (A41184)</td>
</tr>
<tr>
<td>VN5</td>
<td>530 747</td>
<td>5 057 993</td>
<td>Intrusion = N160/82</td>
<td>Graphite pods next to pegmatite.</td>
<td>13.5 (A41184)</td>
</tr>
</tbody>
</table>
9.2 Initial geophysics phase

Géosig Inc. of Quebec City was contracted to perform a ground electromagnetic (EM) survey to test the immediate area of the historical mine pit using different methods, including Max-Min, IMAGEM, induced polarization (IP) and Beep Mat, to test their ability to detect graphite veins (Simoneau and Boivin 2013). The methods were tested over various parts of the 500 x 400 m grid consisting of eleven (11) east-west lines spaced 50 m apart, centered over the Miller pit. The various surveys were carried out during the last two weeks of May 2013 by various teams of 2 to 3 persons that included experienced geophysicists, one of whom was the creator of the IMAGEM detector. Details of the detector models used at Miller are included in Géosig’s Simoneau and Boivin 2013 report included herein as Appendix 8. This initial orientation study revealed several small anomalies, most of them overlapping two or more of the applied EM methods. In particular, the MaxMin returned only weak anomalies since this method typically targets deep-seated conductors. In contrast, the IMAGEM method detected near-surface anomalies where follow-up by Beep Mat allowed individual graphite veins to be pinpointed and exposed after removing the thin cover of glacial till. The most significant results from this initial EM survey are a series of anomalies located about 200 m west of the pit where subsequent mechanical trenching revealed new graphite occurrences (VN-1 and VN-2), as detailed under Item 9.3.2.

9.3 Anomaly follow-up

Based on the IP, IMAGEM and Max-Min results provided by the initial geophysics survey, the Issuer trenched the most easily accessible anomalies to expose the bedrock. Two trenches were excavated on IP anomalies 4 and 5 located near the former mine pit, and 4 trenches were excavated further west to test IP-1 to -3 along with a coincident IMAGEM anomaly on IP-1. One of the trenches investigating IP-1 was
expanded following the discovery of graphite mineralization. Trenching consisted of tree removal, mechanical stripping, and pressure washing of the bedrock; sampling consisted of grab samples or channel samples collected using a rock saw. Trenching occurred in several phases between June and October 2013.

### 9.3.1 Old mine pit trenches

Two trenches were dug over anomalies IP-4 and -5, close to the Miller mine pit. Many Beep-Mat signals had also been recorded in the area, along with EM anomalies. Further inspection revealed that many graphitic blocks were also present in the area. Overburden was 50 cm thick.

Trench #1 covered both geophysical targets in the mine pit area. The mineralized portion of the trench reveals several graphite veins 2.5-5 cm wide at the contact between marble and paragneiss. The marble unit also contains many approximately 30 cm-long pods of skarn with 10-20% graphite, along with graphite veining. Similar pods were observed in the mine pit and seem to be common throughout the marble unit.

Trench #2, a little further to the north, also covered both geophysical targets. This trench did not reveal the pod zone, but a 5-cm graphite vein could be followed for 8 m from the east end of the trench, initially striking westward and then southward toward an historically mined prospecting pit.

Table 4 presents the most significant results for the samples from both trenches, and Figure 9 displays the sample location map. Certificates of analysis are provided in Appendix 6.

**Table 4 Results from the Trench #1 and Trench #2 sampling programs.**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C17070</td>
<td>Trench #1: 50cm channel sample. Diopside, actinolite, calcite, biotite Skarn. 1-2%Gp 2-3mm + local clusters. Skarn float in the marble. Many 30-40cm floats in that area.</td>
<td>1.82</td>
</tr>
<tr>
<td>C17071</td>
<td>Trench#1: 50cm channel sample, similar to C17070, 0.5cm graphite vein</td>
<td>0.23</td>
</tr>
<tr>
<td>C17072</td>
<td>Trench#1: 1m channel sample. Same as C17070. 2-3%Gp. Vn coarse Gp 3-4cm.</td>
<td>2.27</td>
</tr>
<tr>
<td>C17073</td>
<td>Trench#1: 1m channel sample. Same as C17070. 10%Gp. Vn coarse Gp 1cm.</td>
<td>2.13</td>
</tr>
<tr>
<td>C17074</td>
<td>Trench#1: 1m channel sample. White marble, CC, Diopside, Bo, Gp. 1-2% mm graphite. 5m unit. Half of the trench.</td>
<td>1.27</td>
</tr>
<tr>
<td>C17076</td>
<td>Trench#2: 0.5m channel sample. Paragneiss. 1-2%Cg</td>
<td>1.58</td>
</tr>
<tr>
<td>C17077</td>
<td>Trench#2: Same as sample C17078</td>
<td>15.10</td>
</tr>
<tr>
<td>C17078</td>
<td>Trench#2: 15-20% Cg. 0.5m channel sample in a 10cm graphite vein.</td>
<td>24.60</td>
</tr>
</tbody>
</table>
9.3.2 Main Trench area

Trench #3 (the “main trench”) on the combined IMAGEM, Beep-Mat and IP-1 anomalies yielded the most interesting mineralization on the property. Graphite vein mineralization was exposed by mechanical stripping, revealing two high-grade showings (VN1 and VN2) located 200 m west of the Miller mine pit. Item 7.2 describes the mineralization in detail. One of the two smaller initial trenches was extended to reveal the bedrock between the VN2 and the VN1 showings. A total of 700 m² was exposed in the trench, for a total of 900 m³ of displaced overburden.

9.3.2.1 Geology

Trench #3 exposes the contact between marble and a paragneiss unit in the northeast part of the trench and between marble and a banded marble-paragneiss unit in the central and southeast parts. Pegmatites mark the contact and are spatially associated with mineralization: wide graphite veins and metre-scale graphite-wollastonite pods. The distinction between marble and skarn was based on diopside content. The marble displays variable degrees of silicification, increasing in intensity closer to the pegmatite, to the point where marble at the contact forms a zone of “quartzite”. In the banded marble-paragneiss unit, the marble is visibly altered whereas the paragneiss does not show signs of alteration at the macroscopic scale. The paragneiss unit at the northeast end of the trench also does not show visible signs of alteration.

A diabase dyke cuts across the other rock units. The diabase dyke is locally cut by graphite-filled faults. Pegmatite completely fills the contact zone in the northeast part. The contact zone in the southeast part displays intense alteration and could not be described in detail because it corresponds to a depression filled with soil and calcite grains resulting from surface weathering.

Other metre-scale pods were also found scattered in the marble unit away from any contact. Figure 10 shows a map of the general features of the trench. Close-ups of the geology of the VN1 and VN2 showings can be found in Item 7.2. Photographs of the lithologies encountered in the trench are presented in Appendix 9.
9.3.2.2 Structural geology

The pegmatite in the east area of the trench is cut by many faults trending N080. The main and secondary graphite veins trend N310 to N340. They occur at the contact between marble and paragneiss, and local folding often acts as a focus of mineralization. The paragneiss bands trend N030 to N040. Fractures oriented N080 were observed in the northeast part of the trench. The diabase dyke in the south part trends N070.

9.3.2.3 Sampling

Channel samples were collected to better characterize the graphite mineralization. The most significant results were obtained at the VN2 showing. Assays yielded 28.2% Cg over 1.3 m in a channel sample, including 49.7% Cg over 0.25 m. A graphite-wollastonite pod assayed 24.4% Cg over 0.5 m and 17.7% Cg over 0.5 m. The best assays were: 10.1% Cg over 0.6 m; 18.6% Cg over 1 m and 22.2% Cg over 1.3 m (VN1 showing); 42% Cg over 0.44 m; 24.4% over 0.5 m (pod near the VN2 showing); and 33% Cg over 0.5 m. Table 5 presents the most significant results from the sampling program in Trench #3 and Figure 11 shows the sample location map. The certificate of analysis is presented in Appendix 6.

Figure 10 Detailed map of Trench # 3 (the "main trench") showing lithologies and the VN1 & VN2 showings.
Table 5 Significant results from the sampling program on the VN1 & AN2 showings. Trench #3.

<table>
<thead>
<tr>
<th>Name</th>
<th>Sample#</th>
<th>Channel width (cm)</th>
<th>Channel length (m)</th>
<th>%Cg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pod #1</td>
<td>C18835</td>
<td>2.5</td>
<td>0.60</td>
<td>10.1</td>
</tr>
<tr>
<td>Pod VN1</td>
<td>C18836</td>
<td>2.5</td>
<td>1.00</td>
<td>18.6</td>
</tr>
<tr>
<td></td>
<td>C18837</td>
<td>2.5</td>
<td>1.30</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>C18838</td>
<td>2.5</td>
<td>0.58</td>
<td>6.6</td>
</tr>
<tr>
<td>Pod #2</td>
<td>C18839</td>
<td>2.5</td>
<td>0.44</td>
<td>42.0</td>
</tr>
<tr>
<td>VN2</td>
<td>C18841</td>
<td>2.5</td>
<td>1.30</td>
<td>28.2</td>
</tr>
<tr>
<td>Including</td>
<td>C18840</td>
<td>2.5</td>
<td>0.25</td>
<td>49.7</td>
</tr>
<tr>
<td>Pod #3 (VN2)</td>
<td>C18842</td>
<td>2.5</td>
<td>0.65</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>C18843</td>
<td>2.5</td>
<td>0.50</td>
<td>24.4</td>
</tr>
<tr>
<td></td>
<td>C18844</td>
<td>2.5</td>
<td>0.50</td>
<td>17.7</td>
</tr>
<tr>
<td>Pod #4</td>
<td>C18845</td>
<td>2.5</td>
<td>0.50</td>
<td>33.0</td>
</tr>
</tbody>
</table>

Figure 11 Channel sample locations in Trench #3 (VN1 - VN2 showings).

9.3.3 Other trenches

Trenches #4 and #5 tested anomalies IP-1 and IP-2. Both trenches revealed a marble unit in contact with paragneiss. Small graphite veins were found within the marble and inside a pegmatite body. Two folds were observed in Trench #5. The first fold had a vertical limb striking N080 and a subvertical limb oriented N340. A second series of tight folds was characterized by a hinge line plunging 50° toward N350 and limbs trending N340/80 and N160/80. Figure 12 show the location of the trenches. After making the above observations, the trenches were backfilled without further inspection.
9.4 Airborne VTEM survey

Geotech Ltd of Aurora, Ontario, was commissioned by the Issuer in the spring of 2013 to complete a helicopter-borne Versatile Time Domain Electromagnetic survey (VTEM Plus) and a Horizontal Magnetic Gradiometer (HGrad) geophysical survey over the two claim blocks of the Miller Mine Property (Figure 2). The survey was flown on June 13, 2013 over an area of 25 km², yielding a total of 336 line-km of geophysical data. Positioning was provided by a GPS navigation system and radar altimeter. The survey lines were oriented NE-SW and generally spaced 100 m apart, with a tighter spacing of 50 m in the central part of the East Block over the areas of historical mining and recent graphite discoveries. The survey lines were flown with an Astar 350 B3 helicopter at an elevation of 91 m above ground at an average speed of 80 km per hour, producing an average terrain clearance of 60 m for the EM bird and a magnetic sensor clearance of 67 m. Details of the detector models and measurement parameters are provided in the Geotech report (Vender and Orta 2013) provided in Appendix 10.

Geotech identified six (6) conductors (3 on the East Block and 3 on the West Block) based mainly on the Tau decay parameter evaluated from time domain EM data and vertical magnetic gradient contours (see Figure 7 of Vender and Orta 2013; Appendix 10) (see also Canada Carbon press releases of September 12 and October 8, 2013). All anomalies were later subjected to detailed modelling to determine the orientation and depth of the associated conductors (Han and Prikhodko 2013a, 2013b; Appendix 10) (see Canada Carbon press release of November 14, 2013).

The East Block contains three major anomalies, E1 to E3. Anomaly E1 is located 800 m north of the mine pit, with an approximate diameter of 400 m; E2 is 280 m southeast of the mine pit and 150 m south of Trench #3; E3 is located 545 m southeast of the Miller pit. Anomalies E1 and E3 and the north part of E2 are on land covered by Canada Carbon’s access agreement for exploration work. Based on the modelling work, anomalies E1 and E2 respectively occur at depths of 100 m and 80-100 m. Anomalies E1 and E2 occur in marble units that are known to contain graphite elsewhere on the property. Magnetic maps show...
that E1 is located at the contact of two magnetic anomalies which may correspond to the contact between two geological units, suggesting a potentially similar context to that of the Miller mineralization.

The West Block contains three major anomalies, W1 to W3. According to the modelling results, anomaly W1 is located in marble and is subvertical at a depth of 100 m, whereas W2 and W3 are near-surface anomalies and W2 is located at a contact zone between marble and intrusive rocks.

In addition to these six (6) main conductors, many clusters of smaller sized EM anomalies can be observed on time-constant images generated by Geotech for the two blocks of the property. The clusters correspond to one or more closely spaced EM anomalies or EM anomalies that show a relationship between their EM signals. The East Block contains 40 such clusters made of one or more EM anomaly. The average size of the clusters is approximately 100 m. Among the anomalies is a cluster found in the vicinity of the Miller mine pit. Southeast of the Miller mine pit, an anomaly is also present and its extent and pattern suggest continuity or near-continuity between the mine site anomaly and conductor E3. Many small historical trenches are found at surface and the Issuer’s geologists consider it very likely that graphite causes both of those anomalies. The West Block hosts 46 clusters with an average size of approximately 200 m; these clusters will be investigated by prospecting and Beep-Mat survey to better resolve their potential. This will also include detailed resistivity depth imaging and 3D Maxwell plate modelling. In conclusion, the VTEM survey identified many anomalies that are highly prospective for graphite. Some returned positive results during follow-up work (E2 and E3) whereas many others still need to be tested by prospecting, trenching or drilling, as required, particularly on the West Block.

9.4.1 Follow-up on airborne anomalies E1 and E2

Following the airborne VTEM survey, a field crew was sent in September and October to investigate some of the anomalies through prospecting, Beep-Mat surveying and hand digging. The objective of the program was to determine if any surface mineralization could explain the anomalies.

Although few outcrops are found on the property, numerous graphite veins were uncovered during this prospecting phase to the southeast of the mine pit, in the vicinity of the VN3 showing, and within the outline of the E3 anomaly. Numerous closely-spaced graphite veins ranging in width from several centimetres to tens of centimetres were discovered under 40 cm of overburden. Some veins occur at the marble-paragneiss contact, in an identical geological context to that of the Miller mine site and trench area. Several exploration pits were also located, with graphite-bearing blocks adjacent to them, apparently sourced from the pits.

Selected grab samples collected from these veins returned assays of 29.9% Cg, 23.4% Cg, 29.8% Cg, 29.9% Cg, 24.5% Cg and 33.3% Cg. The Issuer also found multiple stockpiles of graphite-bearing material, some of which were discovered near the historical Miller mine pit. The total piled material contains 640 tonnes of graphite-rich vein mineralization in marble, paragneiss and wollastonite, as well as five tonnes (5 t) of high-grade lump graphite. Wollastonite is present in the stockpiled material and occurs with graphite as acicular crystals up to tens of centimetres in size. Table 6 summarizes the results of the prospecting work. Figure 13 shows the locations of the prospected zones on the Property and the grab sample locations. Certificates of analysis are provided in Appendix 6.
Table 6 Results of the follow up prospecting work on the VTEM anomaly.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A41270</td>
<td>Graphitic paragneiss. 1m of overburden. Hematization+++</td>
<td>4.4</td>
</tr>
<tr>
<td>A41271</td>
<td>Close to a VTEM anomaly. Graphite veins in marbles.</td>
<td>4.0</td>
</tr>
<tr>
<td>A41272</td>
<td>Graphite veins in marble.</td>
<td>29.9</td>
</tr>
<tr>
<td>A41273</td>
<td>Graphite veins in marble. Strong Beep-Mat signal.</td>
<td>23.4</td>
</tr>
<tr>
<td>A41274</td>
<td>Graphite veins in marble. Strong Beep-Mat signal.</td>
<td>29.8</td>
</tr>
<tr>
<td>A41275</td>
<td>Graphite veins in marble. Strong Beep-Mat signal.</td>
<td>5.3</td>
</tr>
<tr>
<td>A41276</td>
<td>Graphite veins in marble.</td>
<td>29.9</td>
</tr>
<tr>
<td>A41277</td>
<td>Graphite veins in marble. Strong Beep-Mat signal.</td>
<td>14.7</td>
</tr>
<tr>
<td>C18575</td>
<td>Coarse-grained marble. 1-2% disseminated coarse graphite. 5x5cm clusters of</td>
<td>24.5</td>
</tr>
<tr>
<td>C18576</td>
<td>Medium-grained paragneiss. Traces of fine-grained to medium-grained Pyrite.</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>2% disseminated Gp + veins of medium- to coarse-grained Gp.</td>
<td></td>
</tr>
<tr>
<td>A41283</td>
<td>From a stockpile of material high-grade</td>
<td>44.9</td>
</tr>
<tr>
<td>A18811</td>
<td>From a stockpile of material high-grade</td>
<td>53.6</td>
</tr>
<tr>
<td>A41284</td>
<td>From a stockpile of low-grade material. ¼ of the stockpile is made of this.</td>
<td>10.8</td>
</tr>
<tr>
<td>A41285</td>
<td>From a stockpile of low-grade material. ¼ of the stockpile is made of this.</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Figure 13 Prospected areas over VTEM anomalies.

9.5 Second IMAGEM survey

In September 2013, Géosig was contracted to perform a second IMAGEM survey in the vicinity of Trench #3. The detailed mobile TDEM geophysical survey was completed from September 18 to 22, 2013, to investigate in greater detail the previously identified EM anomalies associated with graphite occurrences (Boivin 2013; Appendix 11). The survey operators could not follow the grid lines due to the presence of the trench, and instead followed a meandering path that was precisely recorded by a GPS unit integrated.
with the IMAGEM detector. This provided complete coverage of the planned area (300x150 m) with an irregular spacing of 50 to 200 m. This method increased the density of readings near positive responses, resulting in a better definition of the anomalies. A total of 9.55 line-km were completed with an average spacing of 20 readings per metre. The survey was successful in delineating well-defined anomalies over the known graphite occurrence and revealed new anomalies that will require further investigation. Although under development, the IMAGEM method appears very promising for the detection of near-surface conductors and seems particularly efficient for graphite vein mineralization.

9.6 Trenching on VN3 showing

A make-shift trench (Trench #6) was excavated at the VN3 showing in the southern area of the property, close to a targeted VTEM anomaly. The showing was discovered when a vein was exposed while moving the rig to the E3 drill site during the second drilling campaign (see Item 10.2). The bedrock was subsequently stripped to reveal a vein over 2 m wide that could be followed along strike for 5 m before pinching out. A channel sample (A18912) from the vein graded 45.35 over 1.46 m. Certificates of analysis are presented in Appendix 6. The location of the VN3 showing is shown on Figure 14 and photographs are presented in Appendix 4.

![Figure 14 Location of the VN3 showings.](image)

9.7 PhiSpy Surveys

After the second drilling campaign (see Item 10.2) and the trenching of the VN3 showing, a PhiSpy survey was performed in December 2013 and March 2014 over the vicinity of the VN3 showing, the E3 anomaly, the mine pit and the Trench #3 area.

The PhiSpy system is a versatile exploration tool similar to the IMAGEM method used in the past by Géosig. Contrary to large loop configurations requiring significant material and staff, the PhiSpy unit can be deployed rapidly and at low cost. It weighs about 40 kg and is operated by two people. Its small size
and its ability to record the location with a coupled GPS system makes it practical for use in sparse forests, without the absolute necessity of cut line. This is not the case with other TDEM systems or co-planar horizontal loop frequency EM systems (Max-Min). The large screen of the unit displays a map of the current location of the unit and other geoscientific information (such as targets from an airborne geophysical survey), thereby enabling easy navigation to, and proper coverage of, areas of interest. In addition, the large screen enables real-time display of TDEM profiles, providing on-the-spot anomaly detection. Shallow anomalies can then be dug out, investigated and sampled right away. Unlike small EM devices such as the Beep-Mat, which are usually limited to an investigation depth of about 1 m, PhiSpy can reach much deeper conductors and records full TDEM decay curves that can be post-processed and analyzed to retrieve information about the conductance and geometry of the conductors.

No report on the PhiSpy work has been produced. The Issuer will request a report once the current geophysics phase is complete. Since the PhiSpy equipment is similar to the Beep-mat, the authors are comfortable using the interpretation maps provided by the geophysicists without further interpretation from them, for the purposes of the present Report.

The PhiSpy survey performed between December 2013 and March 2014 revealed fourteen (14) anomalies of varying size. Beep-Mat prospecting was carried out on each anomaly. Five (5) anomalies of significant size were detected. Two of the anomalies are related to the VN1 and VN2 showings, while another corresponds to the target of the third drill program (Item 10.3) that revealed two graphitic horizons. Two bigger anomalies still require additional testing. The results of the survey on Trench #3 detected the southern and eastern extensions to the VN1 and VN2 showings.


**Item 10: Drilling**

Canada Carbon performed three drilling campaigns. The aim of the first campaign was to determine the depth extension of surface mineralization in the Trench #3 area (VN1 and VN2 showings). Drilling at this site extended the mineralized contact to a depth of at least 39 m below the VN2 showing. The aim of the second campaign was to extend the showings laterally and at depth. The drill holes extended the mineralized contact by finding another graphite pod along the depth extension of the contact. The second campaign also tested VTEM anomaly E2, which was explained by sulphide mineralization, and anomaly E3, although the latter could not be explained. The third campaign was a 2-hole survey intended to further test the E3 anomaly, this time encountering two conductive horizons consisting of graphitic marbles.

**Item 10.1 First drilling campaign**

Canada Carbon’s first drilling campaign of 12 holes for 594.9 m was carried out from late July to early August 2013. The objective was to test the depth and lateral extent of the various veins. Downing Drilling was contracted to drill the VN1 and VN2 showings in August 2013. The firm used a Boart Longyear LF70 with Interlock system. This rig was used for DDH13-01 to DDH13-08 and produced NQ diameter core. One hole was attempted using a small portable drill (VN1-01) but was stopped in the first metre of drilling due to the hardness of the pegmatite. A CME 850 on track drill was then used to perform the other 3 planned short holes (VN1-02; VN2-01; VN2-02).

The results of the drilling campaign demonstrate that the graphitic vein system extends to a depth of at least 39 m beneath the VN2 surface occurrences. Drilling intersected a graphite-wollastonite pod at 39.3 m (vertically) beneath the VN2 showing in hole DDH13-03, returning assays similar to the surface results, with 15.14% Cg over 0.9 m. Drill hole DDH13-04 laterally extended the graphite-wollastonite mineralization 14 m toward the east, and intersected 14.5% Cg over 0.5 m at 33.8 m (vertically) underground.

Some drill holes also tested the VN2 showing near surface. Drill hole VN02-01 encountered 32.45% Cg over 2m from 1 to 3 m downhole, including two veins respectively assaying 53.6% Cg over 0.3 m and 51.7% Cg over 0.9m.

Many lower grade intersections were also encountered. Some of the lower grade mineralization includes graphitic marble or paragneiss grading between 0.46% and 5.27% Cg. Many rock units were crosscut by thin veins (2-5cm).

Table 7 provides technical information on the holes drilled during the first campaign and Figure 15 shows the location of the holes. Highlights of the drilling results are presented in Table 8. Certificates of analysis are provided in Appendix 6. Detailed logs are found in Appendix 12.
Table 7 Technical details of the first drill program.

<table>
<thead>
<tr>
<th>Hole</th>
<th>Target</th>
<th>Location (UTM NAD83 Z18)</th>
<th>Azimuth</th>
<th>Dip</th>
<th>Length (m)</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDH13-01</td>
<td>VN1</td>
<td>Easting 530609 Northing 5058004</td>
<td>240</td>
<td>55</td>
<td>57.0</td>
<td>3</td>
</tr>
<tr>
<td>DDH13-02</td>
<td>VN1</td>
<td>Easting 530620 Northing 5057999</td>
<td>240</td>
<td>55</td>
<td>66.0</td>
<td>8</td>
</tr>
<tr>
<td>DDH13-03</td>
<td>VN1-VN2</td>
<td>Easting 530596 Northing 5057988</td>
<td>240</td>
<td>55</td>
<td>60.0</td>
<td>10</td>
</tr>
<tr>
<td>DDH13-04</td>
<td>VN2</td>
<td>Easting 530584 Northing 5057979</td>
<td>240</td>
<td>55</td>
<td>50.1</td>
<td>10</td>
</tr>
<tr>
<td>DDH13-05</td>
<td>VN2</td>
<td>Easting 530586 Northing 5057966</td>
<td>250</td>
<td>55</td>
<td>42.3</td>
<td>5</td>
</tr>
<tr>
<td>DDH13-06</td>
<td>VN2</td>
<td>Easting 530602 Northing 5057973</td>
<td>240</td>
<td>55</td>
<td>64.0</td>
<td>4</td>
</tr>
<tr>
<td>DDH13-07</td>
<td>VN2</td>
<td>Easting 530532 Northing 5057952</td>
<td>60</td>
<td>55</td>
<td>132.0</td>
<td>14</td>
</tr>
<tr>
<td>DDH13-08</td>
<td>VN2</td>
<td>Easting 530631 Northing 5057937</td>
<td>240</td>
<td>55</td>
<td>81.0</td>
<td>8</td>
</tr>
<tr>
<td>VN01-01</td>
<td>VN1</td>
<td>Easting 530584 Northing 5057996</td>
<td>-</td>
<td>90</td>
<td>2.0</td>
<td>0</td>
</tr>
<tr>
<td>VN01-02</td>
<td>VN1</td>
<td>Easting 530583 Northing 5057996</td>
<td>-</td>
<td>90</td>
<td>15.0</td>
<td>5</td>
</tr>
<tr>
<td>VN02-01</td>
<td>VN2</td>
<td>Easting 530571 Northing 5057974</td>
<td>-</td>
<td>90</td>
<td>15.0</td>
<td>13</td>
</tr>
<tr>
<td>VN02-02</td>
<td>VN2</td>
<td>Easting 530569 Northing 5057968</td>
<td>60</td>
<td>45</td>
<td>10.5</td>
<td>5</td>
</tr>
</tbody>
</table>

Figure 15 Location of holes drilled during the first campaign.
Table 8 Significant results from the first drilling program.

**VN1**

<table>
<thead>
<tr>
<th>Hole</th>
<th>Lithology</th>
<th>From (m)</th>
<th>To (m)</th>
<th>Interval (m)</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN01-01</td>
<td>0-1 m: graphite pod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VN01-02</td>
<td>0.2-1.8 m: graphite pod</td>
<td>0.00</td>
<td>1.35</td>
<td>1.35</td>
<td>7.22</td>
</tr>
<tr>
<td></td>
<td>1.8-15 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDH13-01</td>
<td>4.5-5.2 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.2-8.9 m: paragneiss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.9-37.7 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37.7-40.9 m: pegmatite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40.9-52.7 m: paragneiss and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pegmatite mix</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>52.7-57 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDH13-02</td>
<td>0.2-18.1 m: marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.1-28.9 m: mixed paragneiss and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28.9-51 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>51-63 m: pegmatite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>63-66 m: quartzite</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**VN2**

<table>
<thead>
<tr>
<th>Hole</th>
<th>Lithology</th>
<th>From (m)</th>
<th>To (m)</th>
<th>Interval (m)</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN02-01</td>
<td>0.8-2.70 m: graphite pod</td>
<td>1.00</td>
<td>3.00</td>
<td>2.00</td>
<td>32.45</td>
</tr>
<tr>
<td></td>
<td>2.70-3 m: wollastonite pod</td>
<td>Including</td>
<td>1.30</td>
<td>0.30</td>
<td>53.60</td>
</tr>
<tr>
<td></td>
<td>3-5 m: silicified marble</td>
<td>Including</td>
<td>2.60</td>
<td>0.90</td>
<td>51.70</td>
</tr>
<tr>
<td></td>
<td>5.5-6 m: pegmatite</td>
<td>0.00</td>
<td>4.00</td>
<td>4.00</td>
<td>2.32</td>
</tr>
<tr>
<td></td>
<td>5.6-15 m: silicified marble</td>
<td>Including</td>
<td>9.60</td>
<td>2.10</td>
<td>9.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VN02-02</td>
<td>0-1.7 m: paragneiss</td>
<td>0.00</td>
<td>4.00</td>
<td>4.00</td>
<td>2.32</td>
</tr>
<tr>
<td></td>
<td>1.7-5 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-10.5 m: quartzite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-9 m: paragneiss</td>
<td>0.00</td>
<td>2.00</td>
<td>2.00</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td>9-12.7 m: pegmatite</td>
<td>Including</td>
<td>1.10</td>
<td>0.30</td>
<td>6.33</td>
</tr>
<tr>
<td></td>
<td>12.7-17.7 m: paragneiss</td>
<td>46.70</td>
<td>48.70</td>
<td>2.00</td>
<td>6.14</td>
</tr>
<tr>
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<td>17.7-20.9 m: quartzite</td>
<td>Including</td>
<td>48.40</td>
<td>0.90</td>
<td>15.14</td>
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<td>20.9-22.5 m: pegmatite</td>
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<td></td>
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<tr>
<td>DDH13-03</td>
<td>22.5-28.3 m: quartzite</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>28.3-36.4 m: marble</td>
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<td></td>
<td>36.4-42 m: paragneiss</td>
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<td>42-47 m: silicified paragneiss</td>
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</tr>
<tr>
<td></td>
<td>47-51.5 m: pegmatite</td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td>51.5-60 m: silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.3-16.2 m: white marble</td>
<td>27.00</td>
<td>28.00</td>
<td>1.00</td>
<td>4.70</td>
</tr>
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<td></td>
<td>16.2-19.6 m: paragneiss</td>
<td>Including</td>
<td>27.75</td>
<td>0.15</td>
<td>11.90</td>
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<td></td>
<td>19.6-28.7 m: quartzite</td>
<td>39.50</td>
<td>42.00</td>
<td>2.50</td>
<td>8.12</td>
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<tr>
<td></td>
<td>28.7-38.6 m: diabase dykes</td>
<td>Including</td>
<td>41.80</td>
<td>0.50</td>
<td>14.50</td>
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<td>38.6-40.1 m: quartzite</td>
<td>48.00</td>
<td>49.50</td>
<td>1.50</td>
<td>4.20</td>
</tr>
<tr>
<td></td>
<td>40.1-41.8 m: wollastonite-graphite</td>
<td>Including</td>
<td>48.20</td>
<td>0.15</td>
<td>8.59</td>
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</tbody>
</table>

38
50.1-51.2 m: pegmatite

<table>
<thead>
<tr>
<th>DDH13-05</th>
<th>0-26 m: silicified marble and quartzite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26-32.7 m: white marble</td>
</tr>
<tr>
<td></td>
<td>32.7-40 m: alternating white marble</td>
</tr>
<tr>
<td></td>
<td>and chloritized pegmatite</td>
</tr>
<tr>
<td></td>
<td>40-42.3 m: pegmatite</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>DDH13-06</td>
<td>0.5-23.8 m: paragneiss</td>
</tr>
<tr>
<td></td>
<td>23.8-30.2 m: quartzite</td>
</tr>
<tr>
<td></td>
<td>30.2-42.5 m: paragneiss</td>
</tr>
<tr>
<td></td>
<td>42.5-48.6 m: serpentinized and chloritized paragneiss</td>
</tr>
<tr>
<td></td>
<td>48.6-59 m: silicified marble and white marble</td>
</tr>
<tr>
<td></td>
<td>59-64 m: quartzite</td>
</tr>
<tr>
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<td></td>
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<tr>
<td>DDH13-07</td>
<td>2.8-28.8 m: white marble</td>
</tr>
<tr>
<td></td>
<td>28.8-48 m: diabase and pegmatite</td>
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<td>intrusions</td>
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<td>48-69.1 m: mixed quartzite and</td>
</tr>
<tr>
<td></td>
<td>silicified marble</td>
</tr>
<tr>
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<td>69.1-74 m: diabase and chloritized</td>
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<tr>
<td></td>
<td>marble alternating</td>
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<tr>
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<td>74-80.5 m: silicified marble and</td>
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<tr>
<td></td>
<td>quartzite</td>
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<tr>
<td></td>
<td>80.5-84.5 m: pegmatite</td>
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<tr>
<td></td>
<td>84.5-94.8 m: silicified marble</td>
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<tr>
<td></td>
<td>94.8-103.4 m: quartzite</td>
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<tr>
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<td>103.4-118 m: marble and pegmatite</td>
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<td>alternating</td>
</tr>
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<td>118-132 m: marble and silicified</td>
</tr>
<tr>
<td></td>
<td>marble</td>
</tr>
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<td></td>
</tr>
<tr>
<td>DDH13-08</td>
<td>5.8-11.5 m: marble and silicified</td>
</tr>
<tr>
<td></td>
<td>marble</td>
</tr>
<tr>
<td></td>
<td>11.5-38.5 m: mixed silicified marble</td>
</tr>
<tr>
<td></td>
<td>and pegmatite</td>
</tr>
<tr>
<td></td>
<td>38.5-41.5 m: diabase dyke</td>
</tr>
<tr>
<td></td>
<td>41.5-63.7 m: white marble</td>
</tr>
<tr>
<td></td>
<td>63.7-66.5 m: paragneiss</td>
</tr>
<tr>
<td></td>
<td>66.5-69.3 m: quartzite</td>
</tr>
<tr>
<td></td>
<td>69.3-72.5 m: paragneiss</td>
</tr>
<tr>
<td></td>
<td>72.5-81 m: quartzite</td>
</tr>
</tbody>
</table>

Two holes, VN01-01 and VN01-02, were drilled vertically over the VN1 showing to test the depth of the vein. Hole VN01-01 was drilled using a small portable drill which was could not penetrate the pegmatite unit and so the hole ended at 2 m after drilling 1 m of graphite and wollastonite mineralization and 1 m of marble. Hole VN01-02 was drilled using a track drill and encountered 1.6 m of graphite and wollastonite pod followed by silicified marble down to 15 m. The cores show bedding of the marble at 20° to 35° to core axis. The contact between the marble and pegmatite veins and pods are at 30° to 45° to core axis and is therefore oblique to bedding. Surface observations show that the formations dip eastward.

Two holes tested the VN2 showing near surface. Drill hole VN02-01 yielded in 32.45% Cg over 2 m from 1 to 3 m downhole, including two veins assaying 53.6% Cg over 0.3 m and 51.7% Cg over 0.9 m. Drill hole VN02-02 started in paragneiss but missed the contact with marble at depth.
DDH13-01 targeted a SE extension to the VN1 showing and encountered highly altered marble carrying minor graphite on both sides of a pegmatite intrusion in paragneiss. Smaller pegmatite intrusions have a wollastonite content (visual estimate) varying between 30 and 40%. Those intrusions range from 10 to 50 cm wide. Contacts and bedding between sedimentary units are at 30° to 45° to core axis. The pegmatite cuts across the units at an angle of 15°, 30° or 60° to core axis and is therefore oblique to bedding.

DDH13-02 targeted a further SE extension to VN1 and met highly altered marble carrying minor graphite on both sides of a pegmatite intrusion in paragneiss. Serpentine veins were found on both sides of a pegmatite vein. Serpentine alteration in the form of diffuse patches was observed in the paragneiss close to the pegmatite vein. The paragneiss unit is located between 18.3 m and 20.6 m and displays variations in schistosity, with 15°, 30°, 70° or 80° to core axis across the interval. The overall core displays contacts dipping from 40° to 60° to core axis, which change to 20° to 25° after 26.6 m. The pegmatite horizons contain 45 to 52% wollastonite. Below the pegmatite horizon, the bedding in silicified marble presents an angle of 60° to core axis.

DDH13-03 targeted the VN2 surface showing as well as an extension to VN1. A graphite-wollastonite pod grading 15.14% Cg over 0.9 m was found at 47.40 m along the core, which corresponds to a vertical depth of 39.3 m below the VN2 showing. The mineralization occurs in a pegmatite along the contact between paragneiss and silicified marble.

DDH13-04 targeted the depth extension of the VN2 surface showing. The hole revealed two graphite veins, the largest 2cm thick with an orientation of 55° to core axis, and the second 1-2mm thick at the contact of white marble and paragneiss, oriented 25° to core axis. The hole encountered a wollastonite-graphite pod between 40.1 and 40.8 m grading 14.5% over 0.5 m. This mineralization laterally extends the mineralized contact toward the east by 14 m and corresponds to a vertical depth of 33.8 m. Most of the contacts and bedding planes are at 50° to core axis, but vary between 25 and 75°. The diabase is almost 9 m thick, with contacts at 90° (top) and 15° (bottom) to core axis.

DDH13-05 targeted the southeast extension to the VN2 showing and contact zone. The hole went through 10 cm of serpentinized breccia before entering a silicified body made of altered marble and quartzite, ending at 26 m downhole. The drilling then encountered white marble and pegmatite with chloritized contact zones. The white marble contains disseminated graphite and graphite veinlets. A 30 cm horizon in a silicified marble assayed 22.70% Cg. The hole ended with 2.3 m of wollastonite-rich pegmatite.

DDH13-06 further tested the southeast extension of the VN2 showing and contact zone. The hole encountered mainly paragneiss with local silica alteration and veins. This unit show a variation in schistosity from 3° to 40° at depth. At the bottom of the paragneiss, some contacts are intensely altered and the paragneiss is serpentinized over 1.6 m. Unaltered marble and silica-rich marble are also observed along core. Contacts and bedding in the silicified marble interval shows variable orientations between 30° and 70° to core axis. Disseminated graphite can be found along the drill hole.

DDH13-07 was drilled in the opposite direction compared to the other holes. The goal was to further test the VN2 showing at depth. The hole mostly encountered unaltered marble. Silicification locally altered the marble to silicified marble or quartzite. Some serpentinization and chloritization of the marble was also observed. The chloritized marble was found adjacent to a diabase dyke. Pegmatite intrusions and diabase dykes were also found along the core. The pegmatite contains between 25 and 60% wollastonite. In interval containing disseminated graphite associated with small graphite veinlets graded 8% over 0.9 m. The veins are oriented 20° to 30° or 65° to 75° to core axis.
DDH13-08 was collared 80 m southeast from the inferred extension of the contact to inspect the general geology of the area. This hole contained mostly marble intruded by pegmatite bodies and diabase dykes. Paragneiss is encountered near the bottom of the hole where it is intensely altered to quartzite. A graphite veinlet was found at the contact between altered marble and a pegmatite body. Most of the bedding planes are $20^\circ$ to core axis, although a few are at $40^\circ$ and $60^\circ$.

## 10.2 Second drilling campaign

The Issuer contracted George Downing Estate Drilling Ltd in mid-November 2013 (Grenville-sur-la-Rouge, Quebec) to complete a 10-hole (551 m) NQ-sized diamond drilling program. The firm used a Boart Longyear LF70 rig with Interlock system. The objective was to extend the VN2 graphite mineralization at depth and along strike, and to drill-test three (3) VTEM anomalies identified by the VTEM anomaly modelling. This hole would sample below the graphite veins and pods observed in the trench area since previous drilling had already tested the continuity of the graphite veins. The winter campaign encountered bad weather, which slowed down drilling production.

DDH13-09 explained the E2 VTEM anomaly when it encountered a sulphide-rich intersection with minor disseminated graphite. DDH13-10 targeted the E3 anomaly and encountered a wide intersection of minor and disseminated graphite in marble.

While moving the rig to the E3 drill site, a graphite-rich vein (VN3) was exposed over a width 2 m and a strike length of 5 m before pinching out. The VN3 discovery was drilled during the third campaign with six (6) shallow drill holes that targeted the projected strike and depth extensions of the vein (see next section for details).

The most significant results were from the new vein discovery VN3 with 48.60% C graphite (Cg) over 1.8 m in DDH13-15, including 63.20% Cg over 0.5 m. This intersection of graphite mineralization occurs 4.6 m (vertically) below the VN3 showing. In turn, DDH13-14 intersected a graphite vein grading 50.50% over 0.30 m within a 3.50 m interval grading 6.80% Cg between the surface and the DDH13-15 graphite mineralization. The VN3 showing remains open at depth.

The other hole of interest is DDH13-11, which targeted the depth extension of a wollastonite-graphite pod located 22.5 m southeast of the VN2 showing in the trench area. The hole encountered another pod, thereby extending the mineralized contact hosting the pods to a vertical depth of 8.19 m below the surface showing. The hole yielded grades similar to other wollastonite-graphite pods, specifically 8.10% Cg over 2.3 m including 11.00% Cg over 0.90 m. The pod southeast of the VN2 showing is suspected to be within the same mineralized contact that extends to at least 39.3 m (vertically) beneath the VN2 showing. The mineralized contact also remains open at depth.

Many lower grade intersections were also sampled during drilling. The best results were graphitic marble grading 2.00% over 10.50 m including 4.50 m at 3.50% Cg, and 1.00% over 13.00 m including 4.30 m at 1.6% Cg. Isolated values range between trace amounts of graphite and 4.00% Cg. No significant gold or base metal assays were obtained. The Issuer will use the lithogeochemistry data to establish alteration patterns and to better interpret the lithologies.

Table 9 provides technical information on the holes drilled during the campaign. Figure 16 shows the location of the holes in the VN1-VN2 area and Figure 17 shows the location of the holes in the VN3 area. Highlights of the drilling results are presented in Table 10. Certificates of analysis are provided in Appendix 6. Detailed logs are found in Appendix 12.
Table 9 Technical details of the second drilling campaign.

<table>
<thead>
<tr>
<th>Hole</th>
<th>Target</th>
<th>Location (UTM NAD83 Z18)</th>
<th>Azimuth</th>
<th>Dip</th>
<th>Length (m)</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDH13-09</td>
<td>VTEM E2</td>
<td>530546 5057969</td>
<td>225</td>
<td>60</td>
<td>182</td>
<td>62</td>
</tr>
<tr>
<td>DDH13-10</td>
<td>VTEM E3</td>
<td>531120 5057679</td>
<td>095</td>
<td>45</td>
<td>129</td>
<td>21</td>
</tr>
<tr>
<td>DDH13-11</td>
<td>VN2</td>
<td>530584 5057958</td>
<td>240</td>
<td>55</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>DDH13-12</td>
<td>VN2</td>
<td>530623 5058001</td>
<td>245</td>
<td>45</td>
<td>81</td>
<td>28</td>
</tr>
<tr>
<td>DDH13-13</td>
<td>VN3</td>
<td>531098 5057688</td>
<td>100</td>
<td>45</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>DDH13-14</td>
<td>VN3</td>
<td>531106 5057687</td>
<td>275</td>
<td>45</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>DDH13-15</td>
<td>VN3</td>
<td>531106 5057687</td>
<td>275</td>
<td>50</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>DDH13-16</td>
<td>VN3</td>
<td>531106 5057687</td>
<td>275</td>
<td>45</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>DDH13-17</td>
<td>VN3</td>
<td>531106 5057687</td>
<td>280</td>
<td>45</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>DDH13-18</td>
<td>VN3</td>
<td>531097 5057686</td>
<td>100</td>
<td>45</td>
<td>30</td>
<td>19</td>
</tr>
</tbody>
</table>

Figure 16 Holes drilled during the second campaign in the VN1 - VN2 area.
Figure 17 Location of the holes drilled during the second and third drilling campaigns on the VN2 area.

Table 10 Significant results from the second drilling program.

<table>
<thead>
<tr>
<th>VTEM anomalies</th>
<th>Hole</th>
<th>Lithology</th>
<th>From (m)</th>
<th>To (m)</th>
<th>Interval (m)</th>
<th>Cg (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DDH13-09</td>
<td>4.5-35.4 m: marble with diabase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>intrusions</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>35.4-49.2 m: silicified marble and quartzite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>49.2-52.4 m: alternating marble and paragneiss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>52.4-67.6 m: shear zone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>67.6-140 m: white marble and silicified marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>140-182 m: very silicified marble and quartzite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDH13-10</td>
<td>2.5-41 m: marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>41-48.3 m: marble with pegmatite intrusion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and silicified zone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48.3-53 m: opal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>53-69.2 m: marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>69.2-129 m: white marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VN2</td>
<td>0.4-10 m: paragneiss</td>
<td>10.00</td>
<td>12.30</td>
<td>2.3m</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-10.9 m: paragneiss with graphite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.9-13.3 m: silicified marble with</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>graphite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.3-17.6 m: silicified marble with a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>pegmatite intrusion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.6-36 m: white marble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DDH13-09 targeted the VTEM airborne geophysical anomaly E2. Most of the hole encountered marble or silicified marble. A 15 m thick shear zone was encountered, marked by quartz veining, silicification and potassic alteration. Traces of disseminated graphite are visible throughout the marble units. From 130 m to the end of the hole, the pyrrhotite and pyrite content of the rock is greater than in the rest of the core. The pyrrhotite content varies from trace amounts to 7% whereas pyrite is present in trace amounts to 1%. Graphite veinlets are observed in the same rock units. The sulphides are either disseminated or in veinlets. The sulphide-graphite mineralization is likely the source of the VTEM anomaly. The schistosity in the hole varies between 20° and 70° relative to core axis.

DDH13-10 is located close to the VN3 showing and targeted the VTEM anomaly E3. The entire hole passed through marble and pegmatite intrusions. Disseminated graphite occurs in trace amounts up to 3%. Wollastonite and graphite-rich zones are visible over small intervals. Most of the schistosity and bedding planes are between 30° and 90° core axis.
DDH13-11 was collared southeast of VN2 and targeted the depth extension of surface pods found 22.5 m south east of VN2. The hole passed through graphite mineralization in an altered marble unit at a downhole depth of 10 m. The mineralization consists of 0.9 m grading 11%, followed by a few mineralized zones resulting in a composite interval of 2.3 m grading 8.1%. This mineralization is 8.19 m (vertically) beneath the surface pod. The rest of the core is made of marble with few pegmatite bodies. Bands with the marble (“bedding”) are mostly about 40° to core axis and the schistosity is between 10° and 80° to core axis.

DDH13-12 targeted the VN2 showing at depth. This hole met marble with some paragneiss and pegmatite units. A quartzite unit is found at the end of the hole. Bedding and schistosity are oriented between 10° and 80° to core axis. This hole likely passed right next to the VN2 vein.

DDH13-13, DDH13-14, DDH13-15, DDH13-16, DDH13-17 and DDH13-18 targeted the VN3 showing with shallow holes. All holes passed through silicified marbles. Holes 16, 17 and 18 encountered some pegmatite and paragneiss units. Holes 14 and 15 encountered the graphite showings under VN3 at a vertical depth of 2.3 m in DDH13-14 with an intersection of 6.80% Cg over 3.5 m including 50.50% Cg over 0.3 m, and at a vertical depth of 4.6 m in DDH13-15 with an intersection grading 48.60% Cg over 1.8 m including 63.20% Cg over 0.5 m. The other holes did not test deeper, focusing instead on lateral extensions of the mineralization. Graphite concentrations observed along bands (“bedding”) in the paragneiss and marble are oriented between 25° and 55° to core axis. Disseminated graphite was encountered throughout the marble units and varies between trace amounts and 5%.

**Item 10.3 Third drilling campaign**

Drilling of the new target revealed by the PhiSpy survey and the Geotech E3 target was done using a small portable drill (Gopher drill) from Downing Drilling because the intended drill site occurs in a swampy area. Two (2) holes were drilled for a total of 64.5 m, targeting two anomalies provided by the PhiSpy survey. The anomalies are parallel, oriented north-south. The holes were drilled with a dip of 48° to the east. The core will be sampled at a later date to better characterize the grade of the graphitic horizons. Table 11 provides technical information on the holes drilled during the campaign. The location of the drill holes is shown in Figure 16. Highlights of the drilling results are presented below in Table 12. Detailed logs are found in Appendix 12.

**Table 11 Technical details of the holes drilled in the third drilling campaign.**

<table>
<thead>
<tr>
<th>Hole</th>
<th>Location (UTM NAD83 Z18)</th>
<th>Azimuth</th>
<th>Dip</th>
<th>Length (m)</th>
<th>Target</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDH14-19</td>
<td>531179 5057647</td>
<td>090</td>
<td>48</td>
<td>28.5</td>
<td>Ground E3</td>
<td>Ground E3</td>
</tr>
<tr>
<td>DDH14-20</td>
<td>531164 5057639</td>
<td>090</td>
<td>48</td>
<td>36</td>
<td>Ground E3</td>
<td>Ground E3</td>
</tr>
</tbody>
</table>
Table 12 Significant results from the third drilling campaign.

<table>
<thead>
<tr>
<th>E3 target</th>
<th>Hole</th>
<th>Lithology</th>
<th>Cg (%)</th>
<th>From (m)</th>
<th>To (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDH14-19</td>
<td>3-8 m:</td>
<td>marble and silicified marble</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-8.5 m:</td>
<td>bedded graphite inside the silicified marble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.5-20.3 m:</td>
<td>silicified marble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.3-28.5 m:</td>
<td>silicified marble with pegmatite and calcite pegmatitic intrusions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDH14-20</td>
<td>2.5-12.9 m:</td>
<td>silicified marble and small pegmatite intrusions</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.9-26.4 m:</td>
<td>white marble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26.4-28 m:</td>
<td>silicified marble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28-28.6 m:</td>
<td>bedded graphite in silicified marble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28.6-36 m:</td>
<td>silicified marble</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DDH14-19 targeted the eastern anomaly. Most of the hole passed through silicified marble. Graphite concentrations were observed along bands (“bedding”) in the marble between 7.9 m downhole (vertical depth of 8 to 8.5 m below the anomaly/surface), which likely explains the anomaly. Bedding is oriented 65° to core axis and schistosity in the marble varies between 55° and 70° to core axis.

DDH14-20 targeted the western anomaly as well as the first anomaly targeted by DDH14-19. Marble, altered marble and a few pegmatite intrusions were encountered in this hole. A 0.7 m interval of bedded and disseminated graphite mineralization was met at a downhole depth of 9.3 m and could explain the second geophysical anomaly. The graphite bedding observed in hole DDH14-19 was encountered between 27.8 and 28.6 m in DDH14-20, indicating very good depth continuity.

DDH14-20 initially encountered only silicified marble with a few pegmatite intrusions. In the middle of the hole, a 13.5 m zone of white marble was followed by silicified marble again that continues to the end of the hole. Minor graphite is observed from 9.3 to 10 m, which may explain the second anomaly. Bedding is oriented at 65° to core axis, similar to the schistosity of the marble that varies between 60 and 65° to core axis.
Item 11: Sample Preparation, Analyses and Security

Item 11.1 Prospecting sample protocol

The prospecting work followed a protocol determined by the Issuer’s technical team. To ensure samples and data are collected properly, a clear chain of custody of samples is established from the collection site to the laboratory. Samples weighing approximately 2 kg each were bagged onsite and placed into larger bags of 10 to 15 samples that were then shipped in batches by courier for analysis at the Actlabs facility in Ancaster, Ontario. Actlabs is an accredited laboratory meeting international standards ISO 9001:2000 with certification No. CERT-0032482 and the Canadian Association for Laboratory Accreditation Inc. Standard ISO/IFC170252005 accreditation No. A3200. At the laboratory, samples are prepared by drying, crushing (<7 kg) up to 90% passing 10 mesh, riffle splitting (250 g) and pulverizing (mild steel) to 95% passing 105µ. Graphitic carbon assaying was by multistage furnace treatment and infrared absorption. A suite of 49 elements were also analyzed for some of the samples by aqua regia digestion and Varian ICP analysis. The multi-element package comprised Ag, Cd, Cu, Mn, Mo, Ni, Pb, Zn, Al, As, B, Ba, Be, Bi, Ca, Co, Cr, Fe, Ga, Hg, K, La, Mg, Na, P, S, Sb, Sc, Sr, Ti, Te, Tl, U, V, W, Y and Zr. Duplicate analyses were performed at the laboratory for the purposes of quality assurance and quality control. No other quality assurance or quality control program was established.

Item 11.2 Channel sampling protocol

All channel samples were taken perpendicular to the orientation of the veins or pods. Channel samples were sent to Actlabs. Actlabs’ results are reported using protocol 5D-C in which the samples underwent drying, crushing with up to 90% passing through a #10 square-mesh screen, riffle splitting (250 gram) and pulverizing to 95% passing a 105 micron square-mesh screen. Graphitic carbon (Cg) was determined by multistage furnace treatment and infrared absorption, with a 0.05% detection limit.

Item 11.3 Drill core sampling protocol

Core samples were split in half on site and sent to Actlabs. Richer intersections were subdivided into vein and non-vein material. Quarter-splits of the non-vein material were sent to SGS Minerals Services Canada (“SGS”) in Lakefield, Ontario, for additional assaying and quarter-splits of the rest (vein material) were sent to Actlabs. Actlabs results are reported using protocol 5D-C in which the samples underwent drying, crushing with up to 90% passing through a #10 square-mesh screen, riffle splitting (250 gram) and pulverizing to 95% passing a 105 micron square-mesh screen. Graphitic carbon (Cg) was determined by multistage furnace treatment and infrared absorption, with a 0.05% detection limit. SGS Canada prepared the samples by crushing to 75% passing 2mm, splitting (250 gram) and pulverizing to 85% passing 75 micron square-mesh screen. Graphitic carbon was determined by calculating the difference from the carbon assay (after ashing) by tube furnace/coulometer minus the carbonate carbon (after ashing) by coulometry. The remainder of the core was tagged and stored on site.
Item 12: Data Verification

The exploration work discussed herein did not involve the systematic introduction of standard materials or duplicates in the sample series. Assay results recorded in the certificates of analysis were verified multiple times. Analytical results were compared to visual observations to provide a general assessment.

Item 13: Mineral Processing and Metallurgical testing

Graphite vein samples from the initial prospecting work (Item 9.1) were sent to SGS Minerals Services Canada (“SGS”) in Lakefield, Ontario, for preliminary metallurgical testing and to evaluate possible uses for the graphite vein material. The graphite-rich vein material was submitted to flotation tests for different size fractions, as well as purification tests, Boron Equivalent Content evaluation, and crystallinity determination by Raman spectroscopy, as described in the following subsections. The demonstrated ability to produce a high purity graphite concentrate suggests the Miller occurrence has economically interesting grades.

13.1 Initial purity tests

A 2 kg surface sample taken from an exposed vein with a grade of 61.2% Cg (65.1% C) was concentrated by grinding and flotation to 79.2% Cg (84.1% C). The +48 mesh size (jumbo size) fraction represented 34.3% of the flotation concentrate and was assayed at 93.5% Cg (94.4% C). This represents 40.5% of the graphitic carbon in the concentrate. The result was obtained in a single flotation test without process optimization.

The +48 mesh fraction of the concentrate was subjected to two (2) different hydrometallurgical purification processes. A traditional leach process yielded a concentrate that assayed 99.2% Cg (100 % C). A report on the testing is found in Appendix 13. A two-stage hydrometallurgical purification process treated the +48 mesh concentrate with an alkaline roast followed by a conventional acid leach. The alkaline roast stage increased the purity from 93.5% Cg (94.4% C) to 99.1% Cg (100% C). The acid leach stage resulted in an exceptional product grade of 100% Cg (100% C). A Loss on Ignition (LOI) test was also performed resulting in 100% loss. All carbon analyses were performed by SGS Canada Inc. (Lakefield) and are reported as total carbon (Ct) by LECO or graphitic carbon (Cg) employing a roast to burn off any organic carbon, followed by a leach to remove any carbonates and LECO assay of the leach residue. A report on the testing is provided in Appendix 13.

13.2 Grinding and flotation tests

Milling and flotation test work was conducted by SGS at the Lakefield facility. The objective of this test work was to determine the effects of repeated grind and flotation in order to achieve a higher graphitic carbon (‘Cg’) grade in the concentrate prior to purification. The modified protocol yielded a +48 mesh flotation concentrate of 99.1% Cg and 100% Total Carbon (“Ct”). The process subjected a -6 mesh sample to various grinding times and media, each one followed by three to four stages of cleaner flotation. The final cleaner concentrate represented 70.0% of the original feed and contained 93.2% Ct, which is a substantial improvement from the previous test at 84.1% Ct. The concentrate grade of the +200 mesh size fractions was exceptionally high at 98.1% Ct and increased further to 98.7% Ct in the +100 mesh size fractions. Further, the carbon recovery into the final flotation concentrate was increased from 73.4% to 97.2%. A particle size distribution was conducted on this final cleaner concentrate and sieve fractions assayed for Ct and Cg. All carbon analyses were performed by SGS at the Lakefield facility and are
reported as total carbon (Ct) by LECO or graphitic carbon (Cg) employing a roast to burn off any organic carbon, followed by a leach to remove any carbonates and LECO assay of the leach residue. The results of the testing are provided in Appendix 13.

13.3 GDMS Analysis and Equivalent Boron Content

The Issuer applied further testing to the graphite concentrate with the objective of quantifying the impurities present in the Miller graphite concentrate and to provide analytical results with lower relative errors than those achieved using conventional combustion infrared detection techniques.

A sample of graphite concentrate that had been purified by SGS at Lakefield was submitted for glow discharge mass spectrometer (GDMS) analysis by Evans Analytical in Liverpool, New York. The results of the GDMS analysis are presented in Appendix 14. The primary advantages of GDMS are its ability to quantify impurities at trace concentrations in high-purity inorganic solids, and to quantify concentrations of up to 73 contaminant chemical elements in a single analysis. The majority of the contaminant elements in the purified Miller graphite concentrate yielded concentrations that were below the analytical detection limit for each, typically at 0.5 ppm (0.5 g/t) or less. The sum of the concentrations of all elements yielded a concentration of less than 350 ppm (350 g/t), which by difference translates to an exceptional concentrate grade of 99.965% total carbon ("Ct").

Only 34% (116 ppm) of the total reported impurity content (approximately 350 ppm) arises from actual measured values. The concentrations of 56 elements were included in the total contaminant level calculation by using their limit of detection concentrations, as the measured value was less than the limit of detection, but could not be assumed to be zero. In this way, 200 ppm of the reported net contaminant level was contributed by just two elements with the highest detection limits, fluorine and tantalum, whose detection limits are 100 ppm each, but which may be present at much lower concentrations than their detection limits. The total contaminant level of 350 ppm therefore represents the estimated upper limit for the total contaminant concentration, and the true value may be less than 350 ppm.

13.3.1 Equivalent Boron Content

The impurity concentrations obtained by GDMS were used to calculate the Equivalent Boron Content (EBC) of the graphite, as defined in ASTM Method C1233-09, “Standard Practice for Determining Equivalent Boron Contents of Nuclear Materials”, in conjunction with ASTM Standard D7219-08, “Standard Specification for Isotropic and Near-isotropic Nuclear Graphites”, which lists the 16 elements of concern with respect to the EBC criterion. EBC is a means of estimating the potential for the impurities contained in the graphite to absorb neutrons when exposed to the controlled neutron flux within a nuclear reactor. Any impurities absorbing neutrons would adversely affect the rate and the control of the nuclear chain reaction.

EBC is calculated as the sum of the EBC of each impurity, such that EBC (impurity) = (EBC factor for impurity) (concentration of impurity (ppm)). Each EBC factor was obtained from Table 1 of ASTM Method C1233-09. A number of contaminants of concern were below the detection limit of the GDMS assay procedure, so the concentration associated with each respective detection limit was submitted for the calculation of the EBC of those contaminants, as discussed in paragraph 3.3 of the method. Desired maximum EBC levels are typically between 1 and 3 ppm, depending on the specifications of end-users. The calculated EBC for this graphite sample was 0.94 ppm, a value indicating higher purity than is required by the noted thresholds.
Indium is contained in the binder material that is required to mount the sample for GDMS analysis. Hence, the EBC calculation based on the GDMS assay must disregard this chemical element. Indium has a small EBC factor, and was not expected to be present in any significant amount in this graphite, so this departure from ASTM method C1233-09 is not considered to be significant. Reports of the testing are found in Appendix 14.

**13.4 Thermal Upgrading**

The objective of this additional chemical characterization was to measure the levels of impurities within the graphite much more sensitively than can be accomplished using conventional infrared techniques. The graphite concentrate was also subjected to rapid thermal treatment, an upgrading technique commonly employed in the commercial graphite industry, to determine the responsiveness of the Miller graphite to this process.

A sample of the Miller vein graphite was subjected to a two-stage caustic roast/acid leaching process by SGS Canada Ltd, which was then submitted to Evans Analytical Group (“EAG”) of Liverpool, New York, for full survey chemical analysis by GDMS. The sample was analyzed both as received, and also subsequent to rapid high temperature heat treatment in an inert atmosphere, to provide comparison of the total contaminants before and after heat treatment. Total measured elemental impurities before heat treatment were greater than 246 ppm by weight. Total measured impurities after heat treatment were less than 23 ppm. Thus, more than 90% of the contaminants were removed from this graphite by rapid thermal upgrading, yielding graphite of 99.9978% purity. It should be noted that industry standard assay methods used by graphite exploration companies are unable to determine graphite purity beyond 99.9%. The techniques used here make possible a much more precise measurement of overall purity.

Specific elements which were found in the pre-treated sample, but no longer detectable after thermal treatment include: chromium, copper, iron, lead, magnesium, manganese, phosphorus, strontium, titanium, yttrium, zinc, and zirconium. In addition, aluminum, boron, calcium, chlorine, silicon, sodium, and sulphur were also reduced significantly (decreased by 50% or more). Heat treatment conditions were: flowing helium atmosphere (100 mL/min); temperature 2000-2200 C.; duration 10 minutes.

The thermally upgraded graphite (99.9978% C₉) easily exceeds the overall purity threshold for nuclear grade graphite (99.97% C₉). Results of the testing are found in Appendix 15.

**13.5 Raman Spectroscopy**

EAG performed laboratory characterization tests on samples of Miller graphite provided by the Issuer. The crystallinity results were obtained using Raman spectroscopy, which definitively determines the degree of crystallinity of certain materials, including graphite.

Raman spectroscopy is the collection of light inelastically scattered by a material or compound. When a light of known wavelength strikes a material, the light is shifted according to the chemical functionalities of the material. The intensity of this shifted light depends on both molecular structure and macrostructure. As a result of these phenomena, the collection of the shifted light gives a Raman spectrum that can provide direct information regarding the molecular vibrations of the compound or material. We can then interpret this information to determine chemical structure, organization, and in some cases, non-covalent intermolecular interactions. The Raman spectrum of graphite is very well characterized, which permits clear interpretations of the Raman spectra of graphite test materials, based on the component peak intensities and positions of the spectral features.
A sample of the Miller high-purity graphite was submitted to a “LabRam” J-Y Spectrometer. An Ar+ ion laser (514.5 nm wavelength) with an 1800 gr/mm grating were used for the measurements. The Raman spectra were collected in the backscattering geometry (180°) under an Olympus BX40 microscope. The key spectral features collected were the G-band (1579 cm\(^{-1}\)) and D-band (1350 cm\(^{-1}\)), where the G-band is theoretically the only permitted band arising from a single crystal of graphite, and the D-band is a measure of the disorder within the crystal. The sharp, high-intensity, narrow-shooldered G-band peak strongly suggests that the sample is a single crystal of graphite. The proportionally very small D-band peak indicates extremely low disorder in that crystal, and may be due to minor mechanical damage experienced by the crystal during earlier processing. Reports of the testing and SEM pictures with comments are found in Appendix 5. Two pictures are of the same large (greater than 1mm) graphite crystal, at two different magnifications. The other five images are an edge-on view of one graphite crystal, under progressively increasing magnification.
Item 14: Mineral Resource Estimates

No mineral resource estimates has been carried out by the issuer.
Item 15: Mineral Reserve Estimates

No mineral reserve estimates has been carried out by the issuer.
Item 16: Mining Methods
No mining methods analysis has been carried out by the issuer.
**Item 17: Recovery Methods**

No recovery method tests have been carried out by the issuer. Historical recovery tests are discussed under item 6.
Item 18: Project Infrastructure

No project infrastructure has been planned by the issuer at this time. The Report discusses available infrastructures under items 4, 5, and 6.
Item 19: Market Studies and Contracts

No market studies and contracts have been carried out by the issuer.
Item 20: Environmental Studies, Permitting and Social or Community

No environmental studies, permitting and social or community impact studies have been carried out by the issuer.
**Item 21: Capital and Operating Costs**

No capital and operating cost estimates have been carried out by the issuer.
Item 22: Economic Analysis

No economic analysis has been carried out by the issuer.
Item 23: Adjacent Properties

Canada Carbon acquired all claims from adjacent properties with the exception to Marcy Kiesman’s claim and Durango Resources’ claim located east of the Property, some 3 km from the Miller mine pit (Figure 2). No work has been reported by those two claim holders.
Item 24: Other Relevant Data and Information

There is no other relevant data or information with respect to the Miller Mine Property at this time.
**Item 25: Interpretation and Conclusions**

The limited exploration performed to date at Miller, consisting of EM geophysics followed by trenching, was successful in discovering new graphite occurrences.

The mineralized contact in the trench area follows a marble/paragneiss contact, where pegmatite intruded into a low pressure zone and caused alteration of the marble by the addition of silica (silicification). This alteration released CO2 that was transported by pneumatolytic and/or hydrothermal fluids to precipitate graphite and wollastonite as pods along the mineralized contact. The drilling confirmed the presence of the mineralization at depth below the VN2 surface showing, supporting the assumption that pod and vein mineralization continues at depth.

The scattered nature of graphite-wollastonite-rich pockets along the contact render them difficult to target by drilling. IP surveys may help locate these graphite-rich pockets and graphite veins. Bulk sampling of surface mineralization will better define the quantity of graphite material and pods along the mineralized contact once the at-surface mineralization is removed. Statistical methods could be used to estimate the quantity of material in the contact zone.

The treatment of the graphite vein material achieved the highest purity standards. Obtaining such high purity levels using a non-optimized flotation and purification process further supports indications that graphite from the Miller deposit may be suitable for applications requiring ultra-pure grades, such as some core components of nuclear reactors. The Equivalent Boron Content also makes it suitable for nuclear-grade graphite. With this in mind, a small-scale mining operation may be economic and warrants further testing with additional treatment and metallurgical tests on a bulk sample.

The geophysical anomalies provided by the PhiSpy surveys should be individually inspected since they are more affected by the depth of the body than by its size. In fact, sizeable bodies buried at depth could generate a small anomaly. Thus although the new occurrences appear relatively small and sparsely distributed, they nonetheless present high-quality targets and further supports testing the viability of a small operation through bulk sampling, the authorization for which has already been granted. In addition, many areas of anomalous VTEM responses remain to be investigated on both claim blocks.
**Item 26: Recommendations and Budget**

Phase I should consist of ground IP surveys on the trench area and the large VTEM anomalies on both claim blocks. Following this, local PhiSpy surveys over the IP and VTEM anomalies could pinpoint exploration targets for prospecting, trenching and drilling. This systematic exploration method would maximize the obtained data and limit expenditures.

An IP survey in the trench area could help locate graphite pods at the contact of the marble and the paragneiss. This recommendation is not contingent upon the results of the other Phase I work. The trench area should also be extended by focusing on the contact between the marble and the paragneiss and where the previous ground TDEM surveys identified anomalies.

Again, not contingent on the results of other Phase I work, the Issuer should proceed with bulk sampling of graphite-rich material to better evaluate the economics of a small-scale operation for high-grade graphite production.

Phase II is contingent upon the results of Phase I and should consist of a drilling program over interesting targets identified during Phase I.

**Item 26.1 Budget**

**Phase 1**

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<td>Bulk sample</td>
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**Phase 2**

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<td>Drilling over selected anomalies and in trench #3</td>
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**Total: $500,000**
Item 27: References


Boivin, M., 2013, Detailed mobile TDEM survey on Miller-Graphite Property - East Block, Grenville Township, Quebec, Hawkesbury area, 31G/10; Geosig Inc for Canada Carbon Inc., internal report, 14 p. 2 maps.

Cirkel, Fritz, M. E., 1907, Graphite : its properties, occurrence, refining and uses; Department of Mines (Mines Branch), Ottawa, Canada, 307 p. 7 maps


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Han, Z. And Prikhodko, A., 2013b (September), The results of EMIT Maxwell Plate Modelling of selected VTEM anomaly from West Block, Grenville, Quebec; Geotech Ltd. for Canada Carbon Inc., internal report, 22 p.


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Maurice, O.D., 1973, Annotated list of occurrences of Industrial Minerals and Building Materials in Quebec; MRN, DP 184, 580 pages.


Obalski, J., 1900. Mining Operations in the Province of Quebec during the year 1900; Department of colonization and mines, 37 p. (http://sigeom.mrn.gouv.qc.ca/signet/classes/l1102_index : report number “OM 1900”).

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Appendix 1. Bulk sample authorization
Québec, le 13 février 2014

M. Bruce R. Duncan
Président-directeur général
Canada Carbon inc.
1166, rue Alberni, bureau 605
Vancouver (Colombie-Britannique) V6E 3Z3

Objet : Autorisation d'échantillonnage en vrac, propriété Miller Mine
Claim : CDC2299284

Monsieur le Président-directeur général,

Nous avons reçu votre demande d'autorisation pour extraire un échantillon de substances minérales en quantité supérieure à 50 tonnes métriques.

Conformément à l'article 69 de la Loi sur les mines (chapitre M-13.1) et en vertu des pouvoirs qui me sont délégués par l'arrêté ministériel 2009-006 en date du 20 février 2009, publié à la gazette officielle du Québec le 11 mars 2009, j'autorise la compagnie Canada Carbon inc. (n° interne 91295) à procéder aux travaux d'échantillonnage en vrac de substances minérales sur le claim CDC2299284, localisé dans le feuillet S.N.R.C. 31G/10.

Ces travaux pourront être entrepris et devront respecter les conditions suivantes :

1. Extraire du claim mentionné ci-dessus, un poids maximum de 480 tonnes métriques de substances minérales à des fins d'essais métallurgiques et de distribution d'échantillons auprès de manufacturiers;


3. Faire rapport au Ministère de la quantité de substances minérales extraite et du résultat des essais effectués avant le 15 septembre 2015;

4. Pendant la période d'échantillonnage, vous devrez vous assurer de la sécurisation des sites et empêcher l'accès à ceux-ci durant l'extraction de l'échantillon. Au besoin, disposer des clôtures pour limiter le passage de marcheurs ou d'animaux tel le cerf de Virginie;

5. Après les travaux d'échantillonnage, remblayer les fausses produites ou adoucir les pentes avec les surplus de roc dynamité et le sol déplacé. Remblayer les zones décapées.

Si vous désirez obtenir des précisions additionnelles sur votre dossier, nous vous prions de communiquer avec M. Laurent Ouellet, ingénieur, au numéro suivant : 1 800 363-7233, poste 5348.

Veuillez agréer, Monsieur le Président-directeur général, l’expression de mes sentiments les meilleurs.

Le directeur
des titres miniers et des systèmes,

[Signature]

Roch Gaudreau
Appendix 2. VN1 photographs
Appendix 3. VN2 photographs
Appendix 4. VN3 photographs
Appendix 5. Raman report and SEM images
RAMAN ANALYSIS REPORT
Jan 14, 2014

JOB NUMBER S0DKM997
PO NUMBER

for

Canada Carbon Inc.
1166 Alberni St. Suite 605
Vancouver, British Columbia V6E 3Z3
Canada

Prepared by:

____________________________
Vasil Pajcini, Ph.D.
Sr. Scientist, Raman Services
(Tel. 408-530-3852; vpajcini@eag.com)

Reviewed by:

____________________________
Angela Craig, Ph.D.
Manager, FTIR, Raman, GC-MS Services
(Tel. 408-530-3642; acraig@eag.com)
RAMAN ANALYSIS REPORT

Requester: Canada Carbon Inc.
Job Number: S0DKM997
Analysis Date: 14 Jan 2014

Purpose:

To acquire a Raman spectrum from flakes of high purity graphite sample.

Summary:

The Raman spectrum was that of a single crystal of graphite. The crystalline quality of the graphite was better than any other industrial graphite sample we at EAG have analyzed to date.

Experimental:

The measurements were performed using a “LabRam” J-Y Spectrometer. An Ar⁺ ion laser (514.5 nm wavelength) an 1800 gr/mm grating were used for the measurements. The Raman spectra were collected in the backscattering geometry (180°) under an Olympus BX40 microscope.

Results and Interpretations:

Spectrum 1 is the raw spectrum as acquired from a flake of the sample. Its baseline corrected spectrum is shown in Spectrum 2. Spectrum 2 also shows band-fitting of the major bands. The main peak in the spectrum is the G band (E\_2\_G\_2\_ symmetry) at 1579 cm\(^{-1}\), theoretically the only allowed Raman band of a single crystal of graphite.

The D band, which characterizes the disorder in a graphite sample was barely detected at 1350 cm\(^{-1}\). The intensity of the D band is a good indicator of the quality of graphite. A stronger D band indicates greater disorder in the sp\(^2\) bonded carbon compared to pure graphite. Spectrum 2 is overlaid with a reference spectrum of industrial graphite of high quality in Spectrum 3. It is important to note that the D band of the industrial graphite is very strong compared to the D band of this sample, which demonstrates that the quality of the graphite of this sample is superior of the other samples of industrial graphite we have measured. Another indicator is the width of the G band (at 1579 cm\(^{-1}\)), which is much smaller in the sample than in a typical industrial graphite sample (see Spectrum 3). The Raman spectrum clearly demonstrates that the graphite in this sample is very high quality single crystal graphite.

Note: The unsymmetrical band at 2700 cm\(^{-1}\) (which is shown decomposed as a doublet: 2682 & 2725 cm\(^{-1}\)) is the so-called G’ band (often called also 2D band, since its wavenumber is twice the D band wavenumber).

Raman spectroscopy is often used for the qualitative identification of functional groups or for the identification of entire organic compounds, typically with the aid of spectral databases.
Assignment of spectral features to functional groups or the identification of a compound can be made with relative certainty, in some instances. However in many cases the presence of spectral features and functional groups cannot be traced unambiguously to one specific compound, especially in the analysis of mixtures.

If any questions arise as you review the results of this analysis, principal analyst Vasil Pajcini or any other member of our technical staff will be available for consultation.

After reviewing this report, you may assess our services using an electronic service evaluation form. This can be done by clicking on the link below, or by pasting it into your internet browser. Your comments and suggestions allow us to determine how to better serve you in the future.
http://www.eaglabs.com/main-survey.html?job=S0DKM997Ra

This analysis report should not be reproduced except in full, without the written approval of EAG.
Appendix 1

Raman spectroscopy is the collection of light inelastically scattered by a material or compound. When a light of known wavelength strikes a material, the light is shifted according to the chemical functionalities of the material. The intensity of this shifted light depends on both molecular structure and macrostructure. As a result of these phenomena, the collection of the shifted light gives a Raman spectrum that can provide direct information regarding the molecular vibrations of the compound or material. We can then interpret this information to determine chemical structure, organization, and in some cases, non-covalent intermolecular interactions.
Canada Carbon Inc.

Spectrum 1
Spectrum 2

Wavenumber (cm⁻¹)

Intensity (a.u.)

0 500 1000 1500 2000 2500 3000 3500 4000

3246.09
2725.52
2682.05
2446.89
1578.97
1349.65
40000
30000
20000
10000
0

0 500 1000 1500 2000 2500 3000

1349.65
1578.97
2446.89
2682.05
2725.52
3246.09
Spectrum 3

Red – Sample

Blue – Industrial graphite
(200 X magnification) Same super-jumbo crystal seen at higher magnification.
(100 X magnification) Large, platy graphite crystals, up to 1mm size, or more (+16 mesh).
(350 X magnification) Edge view of a large graphite crystal.
(2500 X magnification) Magnified view of the same crystal, revealing highly ordered layering (left side of image), with minor mechanical damage (right side of image).
(10,000 X magnification) Higher magnification view of the same crystal, revealing sharp crystal edges.
(65,000 X magnification) Still higher magnification view of the same crystal
(150,000 X magnification) Even higher magnification view of the same crystal.
Appendix 6. Certificates of Analysis
CERTIFICATE OF ANALYSIS

ACTIVATION LABORATORIES LTD.

1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5
TELEPHONE +1.905.648.9611 or +1.888.228.5227    FAX +1.905.648.9613
E-MAIL Ancaster@actlabs.com     ACTLABS GROUP WEBSITE www.actlabs.com

President/General Manager:

Eric Hoffman  Ph.D.

CERTIFIED BY:

Paul Ogilvie

NOTES:

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our laboratory is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

REPORT A13-01622

The following analytical packages were requested:

- Code 1E3 Aqua Regia ICP
- Code 5D-C-Graphitic Carbon

8 Rock samples were submitted for analysis.

CERTIFICATE OF ANALYSIS

ATTN: Paul Ogilvie

Canada
83 Wilson Street
Oakville ON L6K 3G5
Canada Carbon

Your Reference:

Invoice Date: 18-Feb-13
Invoice No.: A13-01622
Date Submitted: 16-Feb-13

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CERTIFICATE OF ANALYSIS

Innovative Technologies Quality Analysis ...

Invoice No.:
Invoice Date:
Date Submitted:
Your Reference:

15-Mar-13
14-Mar-13
A13-02829

Canada Carbon
86 Wilson Street
Oakville ON
Canada

John Carter
ATTN:

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ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5   TELEPHONE +1.905.648.9611 or +1.888.228.5227    FAX +1.905.648.9613
E-MAIL Ancaster@actlabs.com     ACTLABS GROUP WEBSITE www.actlabs.com

Emmanuel Eseme, Ph.D.
CERTIFIED BY:

REPORT

A13-02829

The following analytical package was requested:
Code 5D-C-Graphitic Infrared

7 Rock samples were submitted for analysis.

CERTIFICATE OF ANALYSIS

ATTN: John Carter
Canada
Oakville ON
86 Wilson Street
Canada Carbon

Your Reference:
Invoice Date:
Invoice No.:
Date Submitted:

15-Mar-13
A13-02829
14-Mar-13

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Innovative Technologies
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**Unit Symbol:** %  
**Detection Limit:** 0.05  
**Analysis Method:** IR
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Innovative Technologies Quality Analysis...

Invoice No.: A13-05420
Invoice Date: 07-Jun-13
Date Submitted: 14-May-13
Your Reference: A13-05420

Emmanuel Eseme, Ph.D.

CERTIFIED BY:

Notes:

1 Pulp and Rock sample and 1 Rock sample were submitted for analysis.

The following analytical package was requested: Code 5D-C-Graphitic Infrared

CERTIFICATE OF ANALYSIS

ATTN: Metallurgy Manager, Jennifer Steyn

Canada Carbon
86 Wilson Street
Oakville ON
Canada Carbon

Quality Analyses...

Innovative Technologies
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Innovative Technologies Quality Analysis...

Innovative Technologies Quality Analysis...

Invoice No.: A13-10478
Invoice Date: 28-Aug-13
Date Submitted: 28-Aug-13
Your Reference: 13-Sep-13
Invoice No.: A13-10478
Date Submitted: 28-Aug-13

Canada Carbon
5213 Duric Road
Mississauga ON L5M 2C6
Canada

ATTN: Bruce Duncan

28 Rock samples were submitted for analysis.

The following analytical packages were requested:
Code 1E3 Aqua Regia ICP(ARANGEO)
Code 5D-C Graphitic Infrared
Code 1A2 Au - Fire Assay AA

REPORT A13-10478

If value exceeds upper limit we recommend reassay by the assay gravimetric-code 1A3.

Values which exceed the upper limit should be assayed for accurate numbers.

CERTIFIED BY:

Emmanuel Eseme, Ph.D.

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5
TELEPHONE +1.905.648.9611 or +1.888.228.5227
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E-MAIL Ancaster@actlabs.com
ACTLABS GROUP WEBSITE www.actlabs.com

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| Unit Symbol    | ppb| ppm| ppm| ppm| ppm| ppm| ppm| %  | ppm| ppm| %  | ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm|
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### GXR-1 Meas

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- 31.0 3.30 1110 852 18.0 41.0 730 760 3.52 427 15.0 750 1.22 1380 0.960 8.20 12.0 23.6 3.90 0.050 7.50 0.217

### GXR-1 Cert

- 27.0 1.3 970 754 12 25 633 653 0.41 362 < 10 145 0.8 1260 0.75 7 7 21.9 < 10 4 0.02 < 10 0.14
- 31.0 1110 852 18.0 41.0 730 760 3.52 427 15.0 750 1.22 1380 0.960 8.20 12.0 23.6 3.90 0.050 7.50 0.217

### DH-1a Meas

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- 4.00 0.860 6520 155 310 42.0 52.0 73.0 7.20 98.0 4.50 1640 1.90 19.0 1.01 14.6 64.0 3.09 20.0 0.110 4.01 64.5 1.66

### DH-1a Cert

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- 4.00 0.860 6520 155 310 42.0 52.0 73.0 7.20 98.0 4.50 1640 1.90 19.0 1.01 14.6 64.0 3.09 20.0 0.110 4.01 64.5 1.66

### Graphite Powder Meas

- Graphite Powder Meas
- Graphite Powder Cert
- Graphite Powder Meas
- Graphite Powder Cert
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- Graphite Powder Cert

### SAR-M (U.S.G.S.) Meas

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### SAR-M (U.S.G.S.) Cert

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### OxD108 Meas

- 420
- OxD108 Cert

### Graphite Powder Meas

- Graphite Powder Meas
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### OxD108 Meas

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### Graphite Powder Meas

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CERTIFICATE OF ANALYSIS

Innovative Technologies Quality Analysis...

Invoice No.:
Invoice Date:
Date Submitted:
Your Reference:
MILLER
25-Sep-13
A13-11616

Canada Carbon
86 Wilson Street
Oakville ON
Canada

ATTN: John Carter
Canada
Oakville ON
86 Wilson Street
Canada Carbon

Your Reference:
MILLER
Invoice Date:
A13-11616
Invoice No.: 25-Sep-13
Date Submitted:
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CERTIFICATE OF ANALYSIS

Innovative Technologies Qua lity Analysis ...

Invoice No.: A13-12889 (i)
Invoice Date: 24-Oct-13
Date Submitted: 07-Nov-13
Your Reference: MILLER

To: Bruce Duncan
ATTN:

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of the report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative of material submitted for analysis.

Emmanuel Eseme, Ph.D.

CERTIFIED BY:

Emmanuel Eseme, Ph.D.

Notes:

13 Rock samples were submitted for analysis.

Code 1A2 - Fire Assay AA
Code 4F-C - Graphitic Infrared

If value exceeds upper limit we recommend reassay by the assay of gravimetric-Code 1A3

REPORT:

A13-12889 (i)

The following analytical packages were requested: Code 1A2 - Fire Assay AA

13 Rock samples were submitted for analysis.

CERTIFICATE OF ANALYSES

Emmanuel Eseme, Ph.D.

ATTN: Bruce Duncan

Canada Carbon
Mississauga ON L5M 2C6
5213 Dunc Road
Canada Carbon

Your Reference: MILLER
Invoice Date: 07-Nov-13
Invoice No.: A13-12889 (i)
Date Submitted: 24-Oct-13
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Innovative Technologies Quality Analysis ...

[Signature]

CERTIFIED BY: Emmanuel Eseme, Ph.D.

ACTIVATION LABORATORIES LTD.

1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5

TELEPHONE +1.905.648.9611 or +1.888.228.5227

FAX +1.905.648.9613

E-MAIL Ancaster@actlabs.com

ACTLABS GROUP WEBSITE www.actlabs.com

ATTN: Bruce Duncan

Canada Carbon

5213 Dunc Road

Mississauga ON L5M 2C6

Canada Carbon

REPORT A13-13408

The following analytical package was requested:

Code 4F-C-Graphitic Infrared

4 Rock samples were submitted for analysis.

CERTIFICATE OF ANALYSIS

Your Reference: 08-NOV-13

Invoice Date: A13-13408

Invoice No.: 08-NOV-13

Date Submitted: 08-NOV-13

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CERTIFICATE OF ANALYSIS

1) If value exceeds upper limit we recommend reassay by the assay gravimetric - Code T3
2) Values which exceed the upper limit should be assayed for accurate number.

INNOVATIVE TECHNOLOGIES

Quality Control

Emmanuel Eseme, Ph.D.

CERTIFIED BY:

REPORT A13-14024

The following analytical packages were requested:

Code 1E3 Aqua Regia (ICP/AUGEO)
Code 1A2 Au - Fire Assay AA

The following analytical packages were requested:

Code 1A2-Au - Fire Assay AA

The following analytical packages were requested:

Code 1E3 Aqua Regia (ICP/AUGEO)
Code 4F-C-Graphitic Infrared

76 Rock samples were submitted for analysis.

 ATTN: John Carter

Canada Carbon
86 Wilson Street
Oakville ON
Canada Carbon

Invoice No.: A13-14024
Invoice Date: 06-Dec-13
Date Submitted: 21-Oct-13

NOTE:

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ACTIVATION LABORATORIES LTD.

1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5

TELEPHONE +1.905.648.9611 or

+1.888.228.5227    FAX +1.905.648.9613

E-MAIL Ancaster@actlabs.com     ACTLABS GROUP WEBSITE www.actlabs.com

INNOVATIVE TECHNOLOGIES
| Analyte Symbol | Au | Ag | Cd | Cu | Mn | Ni | Pb | Zn | Al | As | Ba | Bi | Ca | Co | Cr | Fe | Ga | Hg | K | La | Mg |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Unit Symbol    | ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm| ppm|
| Analysis Method| 41178 | 41184 |

18811 (Reac. 18911) 18701 (Reac. 17075)

< 5 0.2 < 0.5 23 83 10 6 6 0.51 < 10 2 8.72 2 10 2 2.87 2 2 0.08 10 0.12 10 0.01
### Activation Laboratories Ltd. Report: A13-14024

| Analyte Symbol | Au | Ag | Cd | Cu | Mn | Mo | Ni | Pb | Zn | Al | As | B | Ba | Bi | Ca | Co | Cr | Fe | Ga | Hg | K | La | Mg |
|----------------|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|
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| Analyte Symbol | Au | Ag | Cd | Cu | Mn | Mo | Ni | Pb | Zn | Al | As | B | Ba | Be | Bi | Ca | Co | Cr | Fe | Ga | Hg | K | La | Mg |
|----------------|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Unit Symbol    | ppb | ppm | ppm | ppm | ppm | ppm | ppm | %  | ppm | ppm | ppm | %  | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| Detection Limit| 5  | 0.2 | 0.5 | 1  | 5  | 1  | 1  | 2  | 2  | 0.01 | 2  | 1  | 0.5 | 2  | 0.01 | 1  | 1  | 0.01 | 10 | 1  | 0.01 | 10 | 1  | 0.01 | 10 | 0.01 |

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<p>| Analyte Symbol | Au | Ag | Cd | Cu | Mn | Mo | Ni | Pb | Zn | Al | As | B | Ba | Be | Bi | Ca | Co | Cr | Fe | Ga | Hg | K | La | Mg |
|----------------|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Unit Symbol    | ppb | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| Detection Limit| 5  | 0.2 | 0.5 | 1  | 5  | 1  | 1  | 2  | 2 | &lt; 0.01 | 2  | 10 | 10 | 9  | &lt; 0.01 | 1  | 1  | &lt; 0.01 | 10 | 1  | 10 | 1  | 0.01 | 10 | 0.01 |
| Method Blank   | &lt; 5 | &lt; 0.2 | &lt; 0.5 | &lt; 1 | &lt; 5 | &lt; 1 | &lt; 1 | &lt; 2 | &lt; 2 | &lt; 0.01 | &lt; 2 | &lt; 10 | &lt; 10 | &lt; 0.5 | &lt; 2 | &lt; 0.01 | &lt; 1 | &lt; 1 | &lt; 0.01 | &lt; 10 | &lt; 1 | &lt; 1 | &lt; 0.01 | &lt; 10 | &lt; 0.01 | &lt; 0.5 | &lt; 0.2 | &lt; 1 | &lt; 1 | &lt; 0.01 |
| Method Blank   | &lt; 0.2 | &lt; 0.5 | &lt; 1 | &lt; 5 | &lt; 1 | &lt; 1 | &lt; 2 | &lt; 2 | &lt; 0.01 | &lt; 2 | &lt; 10 | &lt; 10 | &lt; 0.5 | &lt; 2 | &lt; 0.01 | &lt; 1 | &lt; 1 | &lt; 0.01 | &lt; 10 | &lt; 1 | &lt; 1 | &lt; 0.01 | &lt; 10 | &lt; 0.01 | &lt; 0.5 | &lt; 0.2 | &lt; 1 | &lt; 1 | &lt; 0.01 |
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## Quality Control

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CERTIFICATE OF ANALYSIS

Innovative Technologies Quality Analysis...

Invoice No.:
Invoice Date:
Date Submitted:
Your Reference:
22-Jan-14
34047
10-Jan-14
A14-00193

A14-00193

63 Pulp samples were submitted for analysis.
Code 1A2 Au - Fire Assay AA
Code 1E3 Aqua Regia (ICP/AUGEO)
Code 4F-C-Graphitic Infrared
Code 8-Graphite-C-Graphitic Infrared

Values which exceed the upper limit should be assayed for accurate numbers.
If value exceeds upper limit we recommend re-assay by the assay gravimetric-Code 1A3.

Notes:

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of those analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY:

REPORT

CNQ

Emmanuel Eseme, Ph.D.

CERTIFIED OF ANALYSIS

ATTN: Andre Caouette
Caneda
Ste-Catherine-Boule Quebec J0G 1M0
184 Rue Principale

Your Reference:
Invoice Date:
Invoice No.:
Data Submitted:
34047
22-Jan-14
A14-00193
10-Jan-14

Quality Analyses...
| Analyte Symbol | Au | Ag | Cd | Cu | Mn | Mo | Ni | Pb | Zn | Al | As | B | Ba | Bi | Ca | Co | Cr | Fe | Ga | Hg | K | La | Mg |
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CDN-GS-1L Meas CDN-GS-1L Cert
CERTIFICATE OF ANALYSIS

Innovative Technologies Quality Analysis...

Invoice No.:
Invoice Date:
Date Submitted:
Your Reference:
24-Jan-14
MILLER
13-Jan-14
A14-00196

Canada Carbon
5213 Duric Road
Mississauga ON L5M 2C6
Canada

Bruce Duncan
ATTN: Elitsa Hrischeva, Ph.D.

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Elitsa Hrischeva, Ph.D.

CERTIFIED BY:

REPORT A14-00196

CODES
Code 1A2 - Au - Fire Assay AA
Code 1E3 - Aqua Regia (ICP/ICP-AUGEO)
Code 4F - Graphitic Infrared

The following analytical packages were requested:

18 Rock samples were submitted for analysis.

CERTIFICATE OF ANALYSIS

ATTN: Bruce Duncan
Canada Carbon
Mississauga ON L5M 2C6
5213 Duric Road
Canad...
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Certificate of Analysis
Work Order: LD130686A
[Report File No.: 0000002587]

To: Steven Lauzner
Canada Carbon Inc.
5213 Durie Road
Mississauga
ONTARIO L5M 2C5

Date: Nov 05, 2013

P.O. No. -
Project No. -
No. Of Samples: 18
Date Submitted: Nov 04, 2013
Report Comprises: Pages 1 to 9
(Inclusive of Cover Sheet)

Distribution of unused material:
Discard samples:

Certified By: 
Chris Bates
Operations Manager

SGS Canada Inc. is accredited by Standards Council of Canada (SCC) and conforms to the requirements of ISO/IEC 17025 for specific tests as indicated on the scope of accreditation to be found at http://www.scc.ca/en/programs/lab/mineral.shtml

Report Footer:
L.N.R. = Listed not received
I.S. = Insufficient Sample
n.s. = Not applicable
M = No result
INF = Composition of this sample makes detection impossible by this method
M after a result denotes ppb to ppm conversion, %= denotes ppm to % conversion
Elements marked with an asterisk (e.g. *Ni-A008v) were subcontracted
Methods marked with the @ symbol (e.g. @Cu) denote assays performed using accredited test methods

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*Rep 18574

WARNING: The samples to which the findings recorded herein (the "Findings") relate were (were) drawn and/or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness or of the goods and entities relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) were said to be extracted. The Findings report on the samples provided by the Client and are not intended for commercial or contractual settlement purposes. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the full extent of the law.
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SGS Canada Inc | Mineral Services | 185 Concession Street | Lakefield | ON | H-1 (705) 652-2000 | F-1 (705) 652-6365 | www.ca.sgs.com
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**WARNING:** The results (or the 'Findings') relate was (were) drawn and/or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of the goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) were said to be extracted. The findings represent the sample(s) provided by the client and are not intended for commercial or contractual settlement purposes. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
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<th>Element Method</th>
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Appendix 7. Miller mine pit photographs
Appendix 8. Initial geophysics survey report
CANADA CARBON INC.

HLEM-MaxMin, TDEM, Beep Mat and Induced Polarization Surveys on Miller-Graphite Property – East Block
Grenville Township, Québec
Hawkesbury area, 31G/10

REPORT

June 8th, 2013
Project 326.01

Marc Boivin, P.Geo.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>2. PROPERTY, LOCATION AND ACCESS</td>
<td>3</td>
</tr>
<tr>
<td>3. CLAIMS</td>
<td>4</td>
</tr>
<tr>
<td>4. PERSONNEL AND INSTRUMENTATION</td>
<td>5</td>
</tr>
<tr>
<td>5. PREVIOUS WORK</td>
<td>5</td>
</tr>
<tr>
<td>6. REGIONAL GEOLOGY</td>
<td>6</td>
</tr>
<tr>
<td>7. PROPERTY GEOLOGY (Extract from MRNW and ESIGEOM, 2012)</td>
<td>6</td>
</tr>
<tr>
<td>8. FIELD WORK AND PROCEDURE</td>
<td>7</td>
</tr>
<tr>
<td>9. HLEM MAXMIN SURVEY</td>
<td>8</td>
</tr>
<tr>
<td>9.1 Methodology</td>
<td>8</td>
</tr>
<tr>
<td>9.2 Presentation of the results</td>
<td>8</td>
</tr>
<tr>
<td>10. IMAGEM SURVEY</td>
<td>9</td>
</tr>
<tr>
<td>10.1 Methodology</td>
<td>9</td>
</tr>
<tr>
<td>10.2 Presentation of the results</td>
<td>10</td>
</tr>
<tr>
<td>10.3 Description of the IMAGEM results</td>
<td>10</td>
</tr>
<tr>
<td>10.3.1 Z coil—Secondary EM field</td>
<td>10</td>
</tr>
<tr>
<td>10.3.2 Description of the IMAGEM anomalies</td>
<td>11</td>
</tr>
<tr>
<td>11. BEEP MAT SURVEY</td>
<td>11</td>
</tr>
<tr>
<td>11.1 Methodology</td>
<td>11</td>
</tr>
<tr>
<td>11.2 Presentation of the results</td>
<td>11</td>
</tr>
<tr>
<td>11.3 Description of the Beep Mat results</td>
<td>11</td>
</tr>
<tr>
<td>12. INDUCED POLARIZATION SURVEY</td>
<td>13</td>
</tr>
<tr>
<td>12.1 Purpose of the IP survey</td>
<td>13</td>
</tr>
<tr>
<td>12.2 Usefulness of the Normalized Chargeability</td>
<td>13</td>
</tr>
<tr>
<td>12.3 Presentation of the results</td>
<td>14</td>
</tr>
<tr>
<td>12.4 Description of the I.P. results</td>
<td>14</td>
</tr>
<tr>
<td>12.4.1 Resistivity</td>
<td>14</td>
</tr>
<tr>
<td>12.4.2 Chargeability</td>
<td>15</td>
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<td>12.4.3 Normalized Chargeability</td>
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<td>12.4.4 Description of the I.P. anomalies</td>
<td>15</td>
</tr>
<tr>
<td>13. DISCUSSION OF THE RESULTS</td>
<td>15</td>
</tr>
<tr>
<td>14. CONCLUSIONS</td>
<td>18</td>
</tr>
<tr>
<td>15. RECOMMENDATIONS</td>
<td>18</td>
</tr>
</tbody>
</table>

- Figure 1. Localization of the Miller-Graphite Property .........................................................3
- Figure 2. Localization of the Miller-Graphite Property (East Block) ........................................4
- Figure 3. Claim map of the Miller-Graphite Property (East Block) ..........................................4
- Figure 4. Geology map of the Miller-Graphite Property ...........................................................6
- Figure 5. Imagem profiles over Line 3 ......................................................................................11
- Figure 6. Geophysical interpretation .......................................................................................17

## LIST OF MAPS

- DESCRIPTION TABLE OF IMAGEM ANOMALIES
- DESCRIPTION TABLE OF IP ANOMALIES
- PSEUDO SECTIONS
- MAPS

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GEOSIG Inc.
1. **INTRODUCTION**

At the request of Mr. Bruce Duncan, Executive Chairman & CEO for *Canada Carbon Inc.*, several geophysical surveys were completed on the Miller-Graphite property between May 17th and June 4th 2013. These surveys included MaxMin (HLEM), IMAGEM (mobile TDEM), Beep Mat and Induced Polarization (IP). The objective of the surveys was the characterization of graphite occurrences including the Miller graphite mine. This report presents the results of the geophysical surveys over the property and proposes a basic interpretation.

2. **PROPERTY, LOCATION AND ACCESS**

The Miller-Graphite Property is located about 80 km west of Montreal or 89 km east of Gatineau and 5 km north of Grenville, QC. The Highway 50 passes a few kilometres south of the property and the Scotch road (from Grenville) passes 800m east of the deposit. A bush road links to the deposit and across the property, which allows a very easy access. A power line also crosses the property 500m south of the deposit.

The property is on a hilly area. South of the old pit, the ground is relatively flat, toward a high plateau. The north area of the pit is going down toward a creek with a 20% to 40% slope. The creek is large and has lots of water.

![Figure 1. Localization of the Miller-Graphite Property](image)
3. CLAIMS

The Miller-Graphite Property East Block consists of 14 claims. The geophysical surveys covered a partial section of the property (2 claims). The portion of the claim map (coming from the Canada Carbon Inc. web site) which covers the Miller-Graphite Property is illustrated in Figure 3 on the next page.

The 2 claims covered are 2299284 2344488.
4. PERSONNEL AND INSTRUMENTATION

The MaxMin team was composed of:
- Pierre Simoneau, geophysicist, chief party of Géosig Inc.
- Murray Hutchins, technician for Geosig Inc.

The following instruments were used for the surveys:

MaxMin survey:
- Receiver: MaxMin II-5 made by Apex Parametrics (Toronto) n/s 808
- Transmitter: MaxMin II-5 made by Apex Parametrics (Toronto) n/s 809

The IMAGEM was carried out by Devbrio Geophysics. The IMAGEM crew was composed of:
- Jean-Christophe Ricard, EIT, conceptor of IMAGEM
- Jason Marcil, technician for Devbrio Geophysics
- Murray Hutchins, technician for Devbrio Geophysics

The instrument used was IMAGEM prototype #2

The Beep Mat survey was carried out by Frédéric Ladouceur and Jason Marcil from Devbrio Geophysique Inc. under the supervision of Pierre Simoneau.

The IP survey was carried out by Géosig Inc.

The IP team was composed of:
- Pierre Simoneau, chief party
- Patrick Boivin, technician
- Jean Jubinville Jr., technician
- Frédéric Ladouceur, technician

The following instruments were used for this IP survey:
- Receiver: ELREC-6 from IRIS (Terraplus, Toronto) n/s 126
- Transmitter: Tx-II 1800 W by GDD Instrumentation (Quebec) n/s 236

The report was written by Pierre Simoneau, P. Geo. M.Sc. and Marc Boivin P. Geo., consulting geophysicist.

The maps were finalized by Donald Saindon, geomatician.

5. PREVIOUS WORK

The beginning of the graphite extraction in the area started in 1845 and the Miller-Graphite Mine was probably the first graphite operation in Canada.

The other mining operation was in the Buckingham area (Mine Walker – 1876-1896, 1906) west of Grenville.

Around 1930, the extraction of graphite declined and was abandoned. The industry could not support the competition with the graphite from Madagascar and Ceylon (now Sri Lanka).

The only graphite mine in operation in Canada started in 1989, 25km south of Mont-Laurier. They are extracting crucible graphite in marble, like the Miller-Graphite deposit.

A 2013 sampling program was initiated on the property.
6. REGIONAL GEOLOGY

Mésoprotérozoïque (1600-1000 Ma*)

The Ottawa River territory extends in major part on the Grenville Province, a division of the Canadian Shield that was formed between 1300 and 1000 Ma at the side of a large continent, Laurentia. The Grenville orogeny with subduction of oceanic crust and continent collision created a large chain of hills that were eroded deep over time.

Mineralogically, the most interesting rocks belong to the Grenville Group. In the present area, the Central belt of metasediments is composed of marbles, paragneiss and quartzites, and amphibolites of volcanic origin. The marbles extend along the Gatineau valley up to the Baskatong Reservoir and up to Buckingham. East of that, there is still some marble but gneiss and quartzites are dominant.

Deposits of zinc-lead and Graphite are in relation with marbles.

7. PROPERTY GEOLOGY  (Extract from MRNW and ESIGEOM, 2012)

The mineralization at Miller-Graphite Mine consists of unknown quantity of graphite in five (5) graphite veins 10 to 60 cm wide. Such graphite veins usually consist of high grade mineralization, between 30 to 90% graphite. The size of the flake can vary between 0,5mm to many centimetres and would correspond to coarse flake size. Contact metamorphisms minerals are also present (Apatite, garnet, diopside, sphene, vesuvianite, wollastonite, a lithium mineral, and zircon). The graphite veins are hosted in a marble unit and a pegmatite, close to the contact of the two units. Their direction is unknown.
Note from the author: With the Beep Mat and the GPS, the main vein at the southeast corner of the pit was followed. It starts toward southeast but curves toward east to hit a brecciated area with several conductive veins.

The Miller-Graphite Mine is classified as a skarn deposit. The contact between a pegmatite intrusion and a marble unit has been mineralized by fluids coming out of the intrusive body.

8. FIELD WORK AND PROCEDURE

The geophysical work was contracted to GEOSIG INC. The IMAGEM survey was sub-contracted to Devbrio Geophysics.

The grid extends in a N-S direction with E-W lines from 1+50N to 6+00N with 50 metres between each lines from 2+00W to 2+50E.

The original grid was established by SL Exploration Inc. (Steven Lauzier) for the first MaxMin survey. The grid was flagged and chained with hand-GPS and chaining was more or less precise due to the bad reception of satellites in the bush. For the IP survey at 12.5m stations, the chaining must be precise and therefore, lines 4+00N, 3+50N, and 3+00N were rechained.

At first, a MaxMin survey was run over all the lines for a total of 4.3 km. The stations were read every 12.5m.
An IMAGEM survey totalling 2.5 km was completed in second. Continuous readings were recorded with an average spacing of 20 readings per meter. Grid lines covered by the survey were: 1+50N, 2+00N, 2+50N, 3+00N, 3+50N and 4+00N.

A third survey was run with a Beep Mat to follow-up IMAGEM anomalies and finally, an IP survey was completed over 3 lines around the Pit, L 4+00N, 3+50N and 3+00N. The IP stations were read at 12.5 m separation.

9. **HLEM MAXMIN SURVEY**

9.1 **Methodology**

A MaxMin II-5 portable unit was used in the maximum coupled mode (horizontal loop) with a 50-metre reference cable. The parameters (in phase and quadrature components of the secondary field) were read and recorded for three frequencies: 444, 1 777 and 3 555 Hz. All readings were automatically recorded with a MMC electronic notebook (serial no. 392) assuring an accuracy of more or less 0.1 %. Readings were taken every 12.5 metres on all the lines.

![MaxMin Receiver](image1.png) ![MaxMin Transmitter](image2.png)

9.2 **Presentation of the results**

All the results are presented on 1 map at a 1 : 1 250 scale. The map (no 9380) shows the profiles of the three frequencies with the interpretation of the MaxMin survey with the profiles of both components of the three frequencies (scale : 1 cm for 10 %). In phase profiles are in full lines while out of phase profiles are in dashed lines.

The MaxMin survey with a 50m cable was conducted to confirm the presence as well as the extension of graphite veins observed during the previous prospecting campaign.

No real MaxMin anomalies were revealed. There is only some sort of positive shoulder west of the pit (L 3+50N and L 4+00N). If the MaxMin did not react with
the known graphite veins it is because the veins are brecciated. Each fragments of graphite are separated from each other in the marble, cutting off the conductivity that the MaxMin need to react.

10. IMAGEM SURVEY

10.1 Methodology

IMAGEM is a new mobile Time Domain EM (TDEM) technology actually in development. It consists to a very small system similar to the helicopter-borne TDEM system. This survey is recommended to detect conductive materials, such as sulfides or graphite. Because of the sensibility and the high spatial resolution of the technique, the technique can detect very small amount of conductive materials or multiple sub-parallel features.

The equipment consists to a rectangular frame, used to transmitting and receiving. The configuration is a moving IN-LOOP geometry.

Transmitter and receiver is fully digital and can be configured to different needs. The system is taking continuous reading and is equipped of a GPS and inclinometer.

Transmitter is powered by a battery pack. Receiver records the full wave-form EM field along variable size receiving Z coils (3m², 6m², 9m² and 90m²).

Transmitter

- Effective surface : 4.41 m²
- Peak current: 700A
- Base frequency: 30 Hz
- Pulse width: 486 µs
- Wave form : Half-sine
- Magnetic moment: 3087 NIA
- Terrain clearance : 0.8 m

Receiver

- Main sensor : air coil
- Surface : 0.04 m²
- Number of turn : 298
- Effective surface :11.92 m²
The acquisition system records the full wave-form. Extracted data include 110 time channels (25 windows ON-TIME and 85 OFF-TIME windows). Table 1 show the time windows distribution.

10.2 Presentation of the results

The results of the IMAGEM survey are presented on the 1:1250 scale map no. 9379, on which we plotted OFF-TIME channels #10 to 33.

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<th>Canal</th>
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Table 1 : Location of the time windows

10.3 Description of the IMAGEM results

10.3.1 Z coil – Secondary EM field

TDEM responses measured over the survey lines generally show high resistive background. Strong anomalous peaks are visible on line 3+50N and 4+00N and weaker but well defined
anomalous peaks are visible on lines 2+00N, 2+50N and 3+00N. No anomaly was detected on line 1+50N. All the IMAGEM anomalies detected are relatively sharp and show shallow depth.

10.3.2 Description of the IMAGEM anomalies
Seventeen (17) anomalies have been detected. They are listed at the end of the report.
Some anomalous areas are characterized by 2 or 3 closely spaced anomalies. These are probably related to the same source as shown on figure 5.
Correlation line to line is possible for several IMAGEM anomalies. It generates a NW-SE conductive axis.

11. BEEP MAT SURVEY
11.1 Methodology
A Beep Mat unit was used to verify the source of the IMAGEM anomalies near or at the surface.

11.2 Presentation of the results
The traverses are presented on all maps at a 1 : 1 250 scale. The maps show the area where we followed some veins from Line 1+50N to L 4+00N. Essentially east of the main pit where Canada Carbon wanted us to look.

11.3 Description of the Beep Mat results
The veins southeast of the road are only beeping near the old trenches. Not between the trenches. Perhaps that the overburden is too thick and the veins too small to be detected.
Near line 3+00N, around 1+25 E, beside isolated spots and boulders, a small vein of 0.3m wide oriented west-northwest, starting from the roots of a tree and over the ground by a few centimeters could be followed over a 25 meters.
The main area where the Beep Mat found the most conductive veins is east of the pit, around the line 3+50N. The main vein starting from the SE corner was followed but the vein turned east toward a major brecciated area where the Beep Mat beeps almost everywhere. The zone might be beeping all over but not too strong on the IP survey, meaning that the veins might be small but numerous.

The Beep Mat can surely follow the veins. Some are easy to see. They show as a dyke coming out a few centimeter higher from the ground with a trace of boulders (Picture 2). Grey in color, with surrounding paragneiss that are so altered that the rock can fall apart with your hand.
The background graphite content of the paragneiss seems to show no results on the Beep Mat survey except near the pit and the paragneiss contact area that correspond to a graphite rich area, mainly brecciated.

A message mentioned that there could be pyrrhotite in the area. Despite the fact that the Beep Mat react negatively in some isolated areas, indicating something magnetic, we were not looking for sulphides. We pass the magnet over some blocks with mineralization and did not get anything magnetic. Pyrrhotite might not be associated with the graphite but that is just a comment. No sphalerite or galene or pyrrhotite were seen on the zones or boulders that were checked, only graphite. This was a very fast check up with the Beep Mat.

12. INDUCED POLARIZATION SURVEY

12.1 Purpose of the IP survey

An IP survey is usually done in order to detect conductive and/or polarizable materials, such as sulfides or graphite. Therefore, the survey consists in measuring the chargeability (M) and the apparent resistivity (R) along the lines studied.

Theoretically, the resistivity map should pinpoint conductive sulfides or graphite bodies. In reality, resistivity maps usually reflect variations in the conductivity and thickness of the overburden. The chargeability (M) measurements do allow the detection of sulfides or graphite bodies, either massive or disseminated, as the overburden seldom if ever shows any chargeability.

In areas of variable overburden conductivity, chargeability "anomalies", even over massive sulfide bodies, are subdued where the surface conductivities are high. Readings may be lower over sulfide bodies covered by clays (as low as 3 msec) than over non-mineralized but highly resistive volcanic outcrops (10 to 20 msec). To interpret an IP survey with such variations, both sets of measurements, chargeability and resistivity, must therefore be studied together. This is why we prepared normalized chargeability (NC) maps, as they reflect better the actual distribution of sulfides and other polarizable materials. Resistivity and raw chargeability maps are also drawn.

12.2 Usefulness of the Normalized Chargeability

An IP survey consists in measuring the primary voltage and chargeability between four electrodes, in order to predict the distribution of sulfides and other polarizable materials, such as graphite. From those two parameters, we calculate the apparent resistivity and the normalized chargeability (NC), using the formulas mentioned above. In areas of variable overburden conductivity, the application of the NC filter compensates for the high background chargeability observed in areas of high resistivity (outcrops or outcrops covered by very thin overburden) or the extremely low background chargeability observed in areas of swamps and conductive overburden.
The purpose of the exercise is to refine the NC, so that a given mass of sulfides is represented by an anomaly of, at least, very approximately the same amplitude, whatever the nature and depth of the surface overburden.

12.3 Presentation of the results

The results of the survey are presented on the 1:1 250 scale map no. 9381, on which we plotted the three profiles of the first separation at the following scales:

- **Chargeability (M)**: 20 msec/cm
- **Surface resistivity (R)**:
  - Logarithmic scale: 1 to 1 000 000 m, 2 decades per cm
  - 1000 Ω-meters centered on the line
- **Normalized chargeability (NC)**: 10 mhosec/cm

The localization of IP conductors is mostly based on the shape of the NC profiles which were calculated from M and R with the following formula:

\[
R = \pi a \cdot n (n+1) \cdot (n+2) \cdot V_p / I
\]

\[
NC = 9.58 \cdot M / \sqrt{R}
\]

where:
- NC = Normalized chargeability in mhosec
- R = Apparent resistivity in Ω-metres
- M = Chargeability in msec
- Vp = Primary voltage between receiver electrodes (mV)
- I = Current transmitted, in mA
- a = Electrode spacing, metres
- n = number of separations
- 9.58 = normalization factor

We gave the name of mhosec to the normalized chargeability as it is obtained by multiplying the conductivity (I/R) measured in mhos by the chargeability (milliseconds), or mhosec. By combining those two parameters, we created the new name, mhosec.

The resistivity, chargeability and the normalized chargeability, also at the first separation, have been contoured and they respectively appear on maps no. 9382 to 9384.

The six separations are also presented as colour contoured pseudo-sections at the 1:1 250 scale.

12.4 Description of the IP results

12.4.1 Resistivity

The apparent resistivity on this area varies from less than 126 Ω-m to almost 28 000 Ω-m on the first separation. Most of the time, the variation of the resistivity on an IP survey is associated to the thickness and the type of the overburden.
The polychrome contoured map of resistivity shows that almost all the high resistivity areas are representative of outcrops or outcrops covered by very thin overburden. On the property, the top of the hill (plateau) near line 3+00N has a high resistivity signature.

The high resistivity areas are surrounded by low resistivity ones, with resistivity lower than 1000 Ω-m, which usually is representative of areas of deeper overburden (ex: swamps, or valley, base of hills).

### 12.4.2 Chargeability

On this property, the background chargeability varies with the resistivity. It generally ranges between 4 and 6 milliseconds in area with no mineralization.

Most of the anomalies stand out of their respective background, but so do some of the areas of high resistivity.

### 12.4.3 Normalized Chargeability

The background NC value is generally near 1.5 mhossec in high resistivity areas and around 1.0 mhossec in low resistivity areas. The application of the normalized chargeability filter shows its utility here. Indeed, the NC filter compensates for the high background chargeability observed in areas of high resistivity (outcrops or outcrops covered by very thin overburden).

With the NC value, the increase of the chargeability across the property is softened and the anomalies observed on the chargeability weaken.

### 12.4.4 Description of the I.P. anomalies

Ten (10) anomalies have been detected and have been numbered IP-1 to IP-10. Some anomalies are related from one line to another but it might not be like that since the Beep Mat shows that some veins are curving and changing directions.

The west vein IP-1 could be correct but the others might be doubtful. If the anomaly IP-4 (from Line 3+50N) is following the pit going north, therefore, the anomaly IP-4 on line 4+00N is correct. But on the south side, IP-4 curves toward east and never reach line 3+00N. East of the pit, the anomalies don’t follow exactly the same vein but a brecciated contact, a mineralized zone that can be followed with the IMAGEM from line 2+00N to 4+00N and also with the Beep Mat from line 1+50N to 4+00N. That’s why the resistivity is higher and the chargeability can’t pinpoint a specific vein. But the high chargeability means that there is good graphite potential.

The individual anomalies are described in a table at the end of the report.

### 13. DISCUSSION OF THE RESULTS

The geophysical campaign covers a very limited area on the property. The target was mainly east of the old pit, a contact between the marble and the paragneiss. Half the grid is underlain by marble rocks (west) in contact with a paragneiss (east).
The MaxMin survey did not detect any evident conductive feature.

The IMAGEM survey has generated several discrete TDEM anomalies but cultural sources are possibly involved in these responses.

The Beep-Mat survey has detected several conductive sites. These sites match very well with IMAGEM anomalies and graphite occurrences has been linked with these responses.

The IP survey test has detected numerous anomalies. None of these IP anomalies are highly conductive. This confirms the lack of MaxMin anomalies.

The western anomaly IP-1 seems to follow the western contact of the marble where an IMAGEM anomaly was located. But the strongest IP anomaly (IP-3) didn’t give an IMAGEM anomaly. IP-3 is at the western end of the pit. The main zone that we were looking was east of the pit. IP-4, IP-5 and IP-6 are in the area of the main conductive area that we surveyed with the Beep Mat. IP-4 is strong near the pit but turns toward east and disappears in the brecciated zone. The anomaly IP-9 seems alone and is located at the end of line 3+50N, not on any of the other lines.

On some previous works (1989), a mineralized zone was found 100m east of the deposit and could correspond to the anomalies IP-7 and IP-8 that we have on Line 4+00N. The anomalies extend over 50m wide but do not show on line 3+50N.
Figure 6. Geophysical interpretation.
In a nutshell, graphite flakes are not “electrically” connected over a reasonable length to generate something detectable by the MaxMin or to generate highly conductive features on DC resistivity surveys. IMAGEM (TDEM) survey has probably detected limited extent graphite-rich conductive veins. Beep-Mat has confirmed the IMAGEM survey. Several anomalous IP axes have been traced. Some match with IMAGEM anomalies or axis.

14. CONCLUSIONS

The geophysical campaign gave interesting information about this property.

Indeed, 10 IP anomalies were identified across the grid and some TDEM trends have been drawn. There is good outcrop exposure. Some of the veins are visible on surface, meaning that the overburden is not deep. IMAGEM anomalies may reflect limited graphite-rich veins but IMAGEM axis has possibly point-out a trend of interest.

None conductive IP anomalies should reflect disseminated graphite environment.

IP-4/IP-5 and IP-1 anomalous axis match fairly well with IMAGEM axis. These axes should be prioritized to found graphite-rich veins.

15. RECOMMENDATIONS

Recommendations include backhoe trenching and sampling program in order to expose the recently discovered zones. Further geological mapping and prospecting is also required.

Covering the rest of the grid with an IP survey could help mapping the mineralized zone and see where the most concentrated areas are. The forest is open enough to run an IP survey without having to cut lines but the flagging-chaining must be precise.

Considering the deeper penetration of the IMAGEM, detailed IMAGEM lines should be completed to follow areas of interest.

Marc Boivin, Senior Geophysicist
# LIST OF MAPS

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HLEM-MaxMin Survey |
| 9381  | Profiles and Posting  
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Induced Polarization Survey |
| 9382  | Resistivity Contours  
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<td>5057919</td>
<td>Strong anomaly</td>
<td>Very weak amplitude</td>
</tr>
<tr>
<td>T6</td>
<td>530874</td>
<td>5057858</td>
<td>Weak anomaly</td>
<td>Weak amplitude</td>
</tr>
</tbody>
</table>
## DESCRIPTION OF INDUCED POLARIZATION ANOMALIES

**Project: Miller-Graphite – East Block**

<table>
<thead>
<tr>
<th>Anom No.</th>
<th>From Line Station</th>
<th>To Line Station</th>
<th>LENGTH (m)</th>
<th>MAIN TARGET ZONE</th>
<th>ASSOCIATION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP-1</td>
<td>L 3+00N 0+68W</td>
<td>L 4+00N 0+81W</td>
<td>&gt; 100</td>
<td>L 3+50N 0+93W</td>
<td>42.0</td>
<td>13.0</td>
</tr>
<tr>
<td>IP-2</td>
<td>L 3+50N 0+68W</td>
<td>L 3+50N 0+68W</td>
<td>-</td>
<td>L 3+50N 0+68W</td>
<td>37.0</td>
<td>8.5</td>
</tr>
<tr>
<td>IP-3</td>
<td>L 3+50N 0+06W</td>
<td>L 4+00N 0+25W</td>
<td>&gt; 50</td>
<td>L 3+50N 0+06W</td>
<td>55.0</td>
<td>14.0</td>
</tr>
<tr>
<td>IP-4</td>
<td>L 3+50N 0+62E</td>
<td>L 4+00N 0+56E</td>
<td>&gt; 50</td>
<td>L 3+50N 0+62E</td>
<td>35.0</td>
<td>7.4</td>
</tr>
<tr>
<td>IP-5</td>
<td>L 3+50N 1+06E</td>
<td>L 4+00N 1+00E</td>
<td>&gt; 50</td>
<td>L 3+50N 1+06E</td>
<td>30.0</td>
<td>6.3</td>
</tr>
<tr>
<td>IP-6</td>
<td>L 3+50N 1+31E</td>
<td>L 3+50N 1+31E</td>
<td>-</td>
<td>L 3+50N 1+31E</td>
<td>24.0</td>
<td>3.8</td>
</tr>
<tr>
<td>IP-7</td>
<td>L 4+00N 1+56E</td>
<td>L 4+00N 1+56E</td>
<td>-</td>
<td>L 4+00N 1+56E</td>
<td>24.0</td>
<td>4.0</td>
</tr>
<tr>
<td>IP-8</td>
<td>L 4+00N 1+81E</td>
<td>L 4+00N 1+81E</td>
<td>-</td>
<td>L 4+00N 1+56E</td>
<td>25.0</td>
<td>2.7</td>
</tr>
<tr>
<td>IP-9</td>
<td>L 3+50N 2+25E</td>
<td>L 3+50N 2+25E</td>
<td>-</td>
<td>L 3+50N 2+25E</td>
<td>21.0</td>
<td>7.4</td>
</tr>
<tr>
<td>IP-10</td>
<td>L 3+00N 0+93E</td>
<td>L 3+00N 0+93E</td>
<td>-</td>
<td>L 3+00N 0+93E</td>
<td>22.0</td>
<td>2.4</td>
</tr>
</tbody>
</table>

IP : chargeability  
NC : normalized chargeability  
Res: Resistivity  
\(\uparrow\downarrow\) : Increasing or lowering from the background.
Appendix 9. Trench geology photographs
18835 : NE graphitic pod ; 0.6m channel sample

10% fine grained Gp in pegmatitic wollastonite (calcite and diopside)

18836 : VN1 North ; 1m channel sample

5-10% fine grained Gp in pegmatite (feldspar, calcite, wollastonite and diopside)

18837 : VN1 South (1/2) ; 1.3m channel sample
15-20% fine grained Gp in pegmatitic wollastonite (calcite and diopside)

18838 : VN1 South (2/2) ; 0.58m channel sample

5-10% fine grained Gp in pegmatite (feldspar, calcite, wollastonite and diopside)

18839 : Pod between VN1 and VN2 ; 0.44m channel sample
60% coarse (some crystals >2cm) gp in marble in contact with 20% disseminated gp in marble.

18840 : VN2 Highgrade ; grab sample with rock saw

80% fine grained gp vein in marble.
18841 : VN2 ; 1.3m channel sample

40% medium grained gp, including the same vein as 18840. In a diopside marble.

18842 : Pod VN2 (1/3) North ; 0.65m channel sample

15%to 50% coarse to fine Gp in pegmatitic wollastonite.
18843: Pod VN2 (2/3) Central; 0.5m channel sample
20% coarse grained gp in pegmatitic wollastonite

18844: Pod VN2 (3/3) South; 0.5m channel sample
15% coarse grained gp in pegmatitic wollastonite and in marble
18845: Pod after VN2; 0.5m channel sample

30% coarse gp in marble. Trace sulfides, oxidation of the marble.
Appendix 10. Airborne survey report
REPORT ON A HELICOPTER-BORNE
VERSATILE TIME DOMAIN ELECTROMAGNETIC (VTEM\textsuperscript{plus}) AND
HORIZONTAL MAGNETIC GRADIOMETER GEOPHYSICAL SURVEY

East Block and West Block
Grenville, Quebec, Canada

For:
Canada Carbon Inc.

By:
Geotech Ltd.
245 Industrial Parkway North
Aurora, Ont., CANADA, L4G 4C4
Tel: 1.905.841.5004
Fax: 1.905.841.0611
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Survey flown during July 2013
Project GL130281
September 2013
TABLE OF CONTENTS

EXECUTIVE SUMMARY .................................................................................................................. ii

1. INTRODUCTION ................................................................................................................................. 1
  1.1 General Considerations .................................................................................................................. 1
  1.2 Survey and System Specifications ............................................................................................... 2
  1.3 Topographic Relief and Cultural Features .................................................................................... 4

2. DATA ACQUISITION ............................................................................................................................... 6
  2.1 Survey Area ................................................................................................................................... 6
  2.2 Survey Operations .......................................................................................................................... 6
  2.3 Flight Specifications ....................................................................................................................... 7
  2.4 Aircraft and Equipment ................................................................................................................ 7
      2.4.1 Survey Aircraft ....................................................................................................................... 7
      2.4.2 Electromagnetic System ......................................................................................................... 7
      2.4.3 Horizontal Magnetic Gradiometer ........................................................................................ 10
      2.4.4 Radar Altimeter ....................................................................................................................... 10
      2.4.5 GPS Navigation System ....................................................................................................... 10
      2.4.6 Digital Acquisition System .................................................................................................. 10
  2.5 Base Station ................................................................................................................................. 11

3. PERSONNEL ....................................................................................................................................... 12

4. DATA PROCESSING AND PRESENTATION ..................................................................................... 13
  4.1 Flight Path ..................................................................................................................................... 13
  4.2 Electromagnetic Data .................................................................................................................. 13
  4.3 Horizontal Magnetic Gradiometer Data ...................................................................................... 14

5. DELIVERABLES .................................................................................................................................. 15
  5.1 Survey Report ............................................................................................................................... 15
  5.2 Digital Data ................................................................................................................................... 15

6. CONCLUSIONS AND RECOMMENDATIONS ................................................................................. 19

LIST OF FIGURES

Figure 1: Property Location .................................................................................................................. 2
Figure 2: Survey area location on Google Earth .................................................................................. 3
Figure 3: East Block flight path over a Google Earth Image ................................................................. 4
Figure 4: West Block flight path over a Google Earth Image ............................................................... 5
Figure 5: VTEM Transmitter Current Waveform ............................................................................... 7
Figure 6: VTEMplus System Configuration ....................................................................................... 9
Figure 8 – Time Constant (Tau dBz/dt) image with Calculated Vertical Gradient (CVG) of TMI, highlighting flight path of selected RDIs in the East and West blocks .................................................. 19

LIST OF TABLES

Table 1: Survey Specifications .............................................................................................................. 6
Table 2: Survey schedule ...................................................................................................................... 6
Table 3: Off-Time Decay Sampling Scheme ......................................................................................... 8
Table 4: Acquisition Sampling Rates ................................................................................................... 10
Table 5: Geosoft GDB Data Format ..................................................................................................... 16
Table 6: Geosoft Resistivity Depth Image GDB Data Format ............................................................... 17

APPENDICES

A. Survey location maps .....................................................................................................................
B. Survey Block Coordinates .............................................................................................................
C. Geophysical Maps ..........................................................................................................................
D. Generalized Modelling Results of the VTEM System .................................................................
E. TAU Analysis .................................................................................................................................
F. TEM Resistivity Depth Imaging (RDI) ...........................................................................................
EXECUTIVE SUMMARY

On July 13th, 2013 Geotech Ltd. carried out a helicopter-borne geophysical survey over the East Block and West Block project areas situated near Grenville, Quebec, Canada.

Principal geophysical sensors included a versatile time domain electromagnetic (VTEMplus) system, and horizontal magnetic gradiometer. Ancillary equipment included a GPS navigation system and a radar altimeter. A total of 336 line-kilometres of geophysical data were acquired during the survey.

In-field data quality assurance and preliminary processing were carried out on a daily basis during the acquisition phase. Preliminary and final data processing, including generation of final digital data and map products were undertaken from the office of Geotech Ltd. in Aurora, Ontario.

The processed survey results are presented as the following maps:

- Electromagnetic stacked B-Field Z Component profiles
- Electromagnetic stacked dB/dt Z Component profiles
- B-Field Z Component Channel grid
- Total Magnetic Intensity (TMI)
- Magnetic Total Horizontal Gradient
- Magnetic Tilt-Angle Derivative
- dB/dt Calculated Time Constant (Tau) with contours of anomaly areas of the Calculated Vertical Derivative of TMI
- RDI sections of selected lines

Digital data includes all electromagnetic and magnetic products, plus ancillary data including the waveform.

The survey report describes the procedures for data acquisition, processing, final image presentation and the specifications for the digital data set.
1. INTRODUCTION

1.1 General Considerations

Geotech Ltd. performed a helicopter-borne geophysical survey over East Block and West Block project areas located near Grenville, Quebec, Canada (Figure 2).

Bruce Duncan represented Canada Carbon Inc. during the data acquisition and data processing phases of this project.

The geophysical surveys consisted of helicopter borne EM using the versatile time-domain electromagnetic (VTEM\textsuperscript{plus}) system with Z component measurements and horizontal magnetic gradiometer using two cesium magnetometers. A total of 336 line-km of geophysical data were acquired during the survey.

The crew was based out of Hawkesbury (Figure 2) in Ontario for the acquisition phase of the survey. Survey flying started on July 13\textsuperscript{th} and was completed on July 22\textsuperscript{nd}, 2013.
Data quality control and quality assurance, and preliminary data processing were carried out on a daily basis during the acquisition phase of the project. Final data processing followed immediately after the end of the survey. Final reporting, data presentation and archiving were completed from the Aurora office of Geotech Ltd. in September, 2013.

1.2 Survey and System Specifications

The survey area is located north of Grenville, Quebec, Canada (Figure 2).
The east block was flown in a northeast to southwest (N 45° E azimuth) direction with traverse line spacing of 50 and 100 metres as depicted in Figure 3. Tie lines were flown perpendicular to the traverse lines at a spacing of 1000 metres. The west block was flown in a northwest to southeast (N 135° E azimuth) direction with traverse line spacing of 100 metres as depicted in Figure 4. Tie lines were flown perpendicular to the traverse lines at a spacing of 1000 metres respectively. For more detailed information on the flight spacing and direction see Table 1.

Figure 2: Survey area location on Google Earth.
1.3 **Topographic Relief and Cultural Features**

**East Block**

Topographically, the block exhibits a shallow relief with an elevation ranging from 77 to 295 metres above mean sea level over an area of 13 square kilometres (Figure 3).

There are various rivers and streams running through the survey area which connect various lakes and wetlands. There are visible signs of culture such as roads, trails, power lines, buildings, and other structures which can be found throughout the survey area.

![East Block flight path over a Google Earth Image.](image)

*Figure 3: East Block flight path over a Google Earth Image.*

The survey area is covered by numerous mining claims which are plotted on all maps. The survey area is covered by NTS (National Topographic Survey) of Canada sheets 031G10.
West Block

Topographically, the block exhibits a shallow relief with an elevation ranging from 151 to 282 metres above mean sea level over an area of 13 square kilometres (Figure 4).

There are various rivers and streams running through the survey area which connect various lakes and wetlands. There are visible signs of culture such as roads, trails, and buildings which can be found throughout the survey area.

Figure 4: West Block flight path over a Google Earth Image.

The survey area is covered by numerous mining claims which are plotted on all maps. The survey area is covered by NTS (National Topographic Survey) of Canada sheets 031G10.
2. DATA ACQUISITION

2.1 Survey Area

The survey block (see Figure 3, Figure 4 and Appendix A) and general flight specifications are as follows:

Table 1: Survey Specifications

<table>
<thead>
<tr>
<th>Survey block</th>
<th>Traverse Line Spacing (m)</th>
<th>Area (Km²)</th>
<th>Planned¹ Line-km</th>
<th>Actual Line-km</th>
<th>Flight Direction</th>
<th>Line Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Block</td>
<td>Traverse: 50 &amp; 100</td>
<td>13</td>
<td>196</td>
<td>206</td>
<td>N 45° E / N 225° E</td>
<td>L1000-L1420</td>
</tr>
<tr>
<td></td>
<td>Tie: 100</td>
<td></td>
<td></td>
<td></td>
<td>N 135° E / N 315° E</td>
<td>T2000-T2020</td>
</tr>
<tr>
<td>West Block</td>
<td>Traverse: 100</td>
<td>13</td>
<td>140</td>
<td>147</td>
<td>N 135° E / N 315° E</td>
<td>L5000-L5410</td>
</tr>
<tr>
<td></td>
<td>Tie: 100</td>
<td></td>
<td></td>
<td></td>
<td>N 45° E / N 225° E</td>
<td>T6000-T6030</td>
</tr>
</tbody>
</table>

Survey block boundaries co-ordinates are provided in Appendix B.

2.2 Survey Operations

Survey operations were based out of Hawkesbury in Ontario on July 13th until July 22nd, 2013. The following table shows the timing of the flying.

Table 2: Survey schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Flight #</th>
<th>Flown km</th>
<th>Block</th>
<th>Crew location</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>Crew arrived</td>
</tr>
<tr>
<td>14-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>System assembly &amp; Logistics</td>
</tr>
<tr>
<td>15-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>System assembly</td>
</tr>
<tr>
<td>16-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>System assembly</td>
</tr>
<tr>
<td>17-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>Testing</td>
</tr>
<tr>
<td>18-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>Helicopter arrived</td>
</tr>
<tr>
<td>19-Jul-2013</td>
<td></td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>Testing limited due to weather</td>
</tr>
<tr>
<td>20-Jul-2013</td>
<td>1</td>
<td></td>
<td></td>
<td>Hawkesbury, ON</td>
<td>testing limited due to weather</td>
</tr>
<tr>
<td>21-Jul-2013</td>
<td>2,3</td>
<td>165</td>
<td>East / West</td>
<td>Hawkesbury, ON</td>
<td>165km flown</td>
</tr>
<tr>
<td>22-Jul-2013</td>
<td>4,5</td>
<td>171</td>
<td>East</td>
<td>Hawkesbury, ON</td>
<td>Remaining kms were flown</td>
</tr>
</tbody>
</table>

¹ Note: Actual Line kilometres represent the total line kilometres in the final database. These line-km normally exceed the planned line-km, as indicated in the survey NAV files.
2.3 Flight Specifications

During the survey the helicopter was maintained at a mean altitude of 91 metres above the ground with an average survey speed of 80 km/hour. This allowed for an actual average EM bird terrain clearance of 60 metres and a magnetic sensor clearance of 67 metres.

The on board operator was responsible for monitoring the system integrity. He also maintained a detailed flight log during the survey, tracking the times of the flight as well as any unusual geophysical or topographic features.

On return of the aircrew to the base camp the survey data was transferred from a compact flash card (PCMCIA) to the data processing computer. The data were then uploaded via ftp to the Geotech office in Aurora for daily quality assurance and quality control by qualified personnel.

2.4 Aircraft and Equipment

2.4.1 Survey Aircraft

The survey was flown using a Eurocopter Aerospatiale (Astar) 350 B3 helicopter, registration C-FKOI. The helicopter is owned and operated by Geotech Aviation. Installation of the geophysical and ancillary equipment was carried out by a Geotech Ltd crew.

2.4.2 Electromagnetic System

The electromagnetic system was a Geotech Time Domain EM (VTEMplus) system. VTEM with the Serial number 22 had been used for the survey. The configuration is as indicated in Figure 5.

The VTEM Receiver and transmitter coil were in concentric-coplanar and Z-direction oriented configuration. The EM bird was towed at a mean distance of 34 metres below the aircraft as shown in Figure 5. The VTEM transmitter current waveform is shown diagrammatically in Figure 4.

![Figure 5: VTEM Transmitter Current Waveform](image)
The VTEM decay sampling scheme is shown in Table 3 below. Thirty-two time measurement gates were used for the final data processing in the range from 0.096 to 7.036 msec. Zero time for off-time sampling scheme is equal to current pulse width and defined as the time near the end of the turn-off ramp where the dI/dt waveform falls to 1/2 of its peak value.

**Table 3: Off-Time Decay Sampling Scheme**

<table>
<thead>
<tr>
<th>Index</th>
<th>Middle Milliseconds</th>
<th>Start Milliseconds</th>
<th>End Milliseconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>0.096</td>
<td>0.090</td>
<td>0.103</td>
</tr>
<tr>
<td>15</td>
<td>0.110</td>
<td>0.103</td>
<td>0.118</td>
</tr>
<tr>
<td>16</td>
<td>0.126</td>
<td>0.118</td>
<td>0.136</td>
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<tr>
<td>17</td>
<td>0.145</td>
<td>0.136</td>
<td>0.156</td>
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<td>18</td>
<td>0.167</td>
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<td>0.179</td>
</tr>
<tr>
<td>19</td>
<td>0.192</td>
<td>0.179</td>
<td>0.206</td>
</tr>
<tr>
<td>20</td>
<td>0.220</td>
<td>0.206</td>
<td>0.236</td>
</tr>
<tr>
<td>21</td>
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<td>0.236</td>
<td>0.271</td>
</tr>
<tr>
<td>22</td>
<td>0.290</td>
<td>0.271</td>
<td>0.312</td>
</tr>
<tr>
<td>23</td>
<td>0.333</td>
<td>0.312</td>
<td>0.358</td>
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<td>0.440</td>
<td>0.411</td>
<td>0.472</td>
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<td>26</td>
<td>0.505</td>
<td>0.472</td>
<td>0.543</td>
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<td>27</td>
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<td>0.543</td>
<td>0.623</td>
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<td>0.667</td>
<td>0.623</td>
<td>0.716</td>
</tr>
<tr>
<td>29</td>
<td>0.766</td>
<td>0.716</td>
<td>0.823</td>
</tr>
<tr>
<td>30</td>
<td>0.880</td>
<td>0.823</td>
<td>0.945</td>
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<td>1.010</td>
<td>0.945</td>
<td>1.086</td>
</tr>
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<td>32</td>
<td>1.161</td>
<td>1.086</td>
<td>1.247</td>
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<td>1.333</td>
<td>1.247</td>
<td>1.432</td>
</tr>
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<td>34</td>
<td>1.531</td>
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<td>1.891</td>
<td>2.172</td>
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<td>2.323</td>
<td>2.172</td>
<td>2.495</td>
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<td>38</td>
<td>2.667</td>
<td>2.495</td>
<td>2.865</td>
</tr>
<tr>
<td>39</td>
<td>3.063</td>
<td>2.865</td>
<td>3.292</td>
</tr>
<tr>
<td>40</td>
<td>3.521</td>
<td>3.292</td>
<td>3.781</td>
</tr>
<tr>
<td>41</td>
<td>4.042</td>
<td>3.781</td>
<td>4.341</td>
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<tr>
<td>42</td>
<td>4.641</td>
<td>4.341</td>
<td>4.987</td>
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<td>43</td>
<td>5.333</td>
<td>4.987</td>
<td>5.729</td>
</tr>
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<td>44</td>
<td>6.125</td>
<td>5.729</td>
<td>6.581</td>
</tr>
<tr>
<td>45</td>
<td>7.036</td>
<td>6.581</td>
<td>7.560</td>
</tr>
</tbody>
</table>
VTEM system specifications:

**Transmitter**
- Transmitter loop diameter: 26 m
- Number of turns: 4
- Effective Transmitter loop area: 2123.7 m$^2$
- Transmitter base frequency: 30 Hz
- Peak current: 169 A
- Pulse width: 7.10 ms
- Wave form shape: Bi-polar trapezoid
- Peak dipole moment: 358,905 nI A
- Actual average EM Bird terrain clearance: 60 metres above the ground

**Receiver**
- Z-Coil diameter: 1.2 m
- Number of turns: 100
- Effective Z coil area: 113.04 m$^2$

![Figure 6: VTEM$^{\text{plus}}$ System Configuration.](image)
2.4.3 Horizontal Magnetic Gradiometer

The horizontal magnetic gradiometer consists of two Geometrics split-beam field magnetic sensors with a sampling interval of 0.1 seconds. These sensors are mounted 12.5 metres apart on a separate loop, 10 metres above the EM bird. A GPS antenna and Gyro Inclinometer is installed on the separate loop to accurately record the tilt and position of the magnetic gradiomag bird.

2.4.4 Radar Altimeter

A Terra TRA 3000/TRI 40 radar altimeter was used to record terrain clearance. The antenna was mounted beneath the bubble of the helicopter cockpit (Figure 6).

2.4.5 GPS Navigation System

The navigation system used was a Geotech PC104 based navigation system utilizing a NovAtel's WAAS (Wide Area Augmentation System) enabled GPS receiver, Geotech navigate software, a full screen display with controls in front of the pilot to direct the flight and a NovAtel GPS antenna mounted on the helicopter tail (Figure 6). As many as 11 GPS and two WAAS satellites may be monitored at any one time. The positional accuracy or circular error probability (CEP) is 1.8 m, with WAAS active, it is 1.0 m. The co-ordinates of the block were set-up prior to the survey and the information was fed into the airborne navigation system. The second GPS antenna is installed on the additional magnetic loop together with Gyro Inclinometer.

2.4.6 Digital Acquisition System

A Geotech data acquisition system recorded the digital survey data on an internal compact flash card. Data is displayed on an LCD screen as traces to allow the operator to monitor the integrity of the system. The data type and sampling interval as provided in Table 4.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDEM</td>
<td>0.1 sec</td>
</tr>
<tr>
<td>Magnetometer</td>
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</tr>
<tr>
<td>GPS Position</td>
<td>0.2 sec</td>
</tr>
<tr>
<td>Radar Altimeter</td>
<td>0.2 sec</td>
</tr>
<tr>
<td>Inclinometer</td>
<td>0.1 sec</td>
</tr>
</tbody>
</table>
2.5 Base Station

A combined magnetometer/GPS base station was utilized on this project. A Geometrics Cesium vapour magnetometer was used as a magnetic sensor with a sensitivity of 0.001 nT. The base station was recording the magnetic field together with the GPS time at 1 Hz on a base station computer.

The base station magnetometer sensor was installed (45° 34.9194′N, 74° 33.2483′W); away from electric transmission lines and moving ferrous objects such as motor vehicles. The base station data were backed-up to the data processing computer at the end of each survey day.
3. PERSONNEL

The following Geotech Ltd. personnel were involved in the project.

Field:

Project Manager: Scott Trew (Office)
Data QC: Rafael Coyoli (Office)
Crew chief: Jan Dabrowski
Operator: Ben Bruder

The survey pilot and the mechanical engineer were employed directly by the helicopter operator – Geotech Aviation.

Pilot: Andre Vandrier

Office:

Preliminary Data Processing: Rafael Coyoli
Nick Venter
Final Data Processing: Marta Orta
Final Data QA/QC: Alexander Prikhodko
Reporting/Mapping: Karl Monje

Data acquisition phase was carried out under the supervision of Andrei Bagrianski, P. Geo, Chief Operating Officer. The processing phase was carried out under the supervision of Alexander Prikhodko, P. Geo, Senior Geophysicist, VTEM Interpretation Supervisor. The customer relations were looked after by Blair Walker.
4. DATA PROCESSING AND PRESENTATION

Data compilation and processing were carried out by the application of Geosoft OASIS Montaj and programs proprietary to Geotech Ltd.

4.1 Flight Path

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the NAD83 Datum, UTM Zone 18 North coordinate system in Oasis Montaj.

The flight path was drawn using linear interpolation between x, y positions from the navigation system. Positions are updated every second and expressed as UTM easting's (x) and UTM northing's (y).

4.2 Electromagnetic Data

A three stage digital filtering process was used to reject major sferic events and to reduce noise levels. Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events.

The signal to noise ratio was further improved by the application of a low pass linear digital filter. This filter has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 1 second or 15 metres. This filter is a symmetrical 1 sec linear filter.

The results are presented as stacked profiles of EM voltages for the time gates, in linear - logarithmic scale for the B-field Z component and dB/dt responses in the Z components. B-field Z component time channel recorded at 0.505 milliseconds after the termination of the impulse is also presented as a colour image. Calculated Time Constant (TAU) with anomaly contours of Calculated Vertical Derivative of TMI is presented in Appendix C and E. Resistivity Depth Image (RDI) is also presented in Appendix E and F.

Z-axis coil is oriented parallel to the transmitter coil axis and are horizontal to the ground. This configuration provides information on the position, depth, dip and thickness of a conductor. Generalized modeling results of VTEM data, are shown in Appendix D.

In general Z component data produce double peak type anomalies for “thin” sub vertical targets and single peak for “thick” targets.

The limits and change-over of “thin-thick” depends on dimensions of a TEM system (Appendix D, Figure D-16).
4.3 Horizontal Magnetic Gradiometer Data

The horizontal gradients data from the VTEM\textsuperscript{plus} are measured by two magnetometers 12.5 m apart on an independent bird mounted 10 m above the VTEM loop. A GPS and a Gyro Inclinometer help to determine the positions and orientations of the magnetometers. The data from the two magnetometers are corrected for position and orientation variations, as well as for the diurnal variations using the base station data.

The position of the centre of the horizontal magnetic gradiometer bird is calculated from the GPS utilizing in-house processing tool in Geosoft. Following that total magnetic intensity is calculated at the center of the bird by calculating the mean values from both sensors. In addition to the total intensity advanced processing is done to calculate the in-line and cross-line (or lateral) horizontal gradient which enhance the understanding of magnetic targets. The in-line (longitudinal) horizontal gradient is calculated from the difference of two consecutive total magnetic field readings divided by the distance along the flight line direction, while the cross-line (lateral) horizontal magnetic gradient is calculated from the difference in the magnetic readings from both magnetic sensors divided by their horizontal separation.

Two advanced magnetic derivative products, the total horizontal derivative (THDR), and tilt angle derivative and are also created. The total horizontal derivative or gradient is also called the analytic signal, is defined as:

$$\text{THDR} = \sqrt{Hx^2 + Hy^2},$$

where $Hx$ and $Hy$ are cross-line and in-line horizontal gradients.

The tilt angle derivative (TDR) is defined as:

$$\text{TDR} = \arctan(Vz/\text{THDR}),$$

where $\text{THDR}$ is the total horizontal derivative, and $Vz$ is the vertical derivative.

Measured cross-line gradients can help to enhance cross-line linear features during gridding.
5. DELIVERABLES

5.1 Survey Report

The survey report describes the data acquisition, processing, and final presentation of the survey results. The survey report is provided in two paper copies and digitally in PDF format.

5.2 Digital Data

Two copies of the data and maps on DVD were prepared to accompany the report. Each DVD contains a digital file of the line data in GDB Geosoft Montaj format as well as the maps in Geosoft Montaj Map and PDF format.

- DVD structure.

  Data contains databases, grids and maps, as described below.
  Report contains a copy of the report and appendices in PDF format.

Databases in Geosoft GDB format, containing the channels listed in Table 5.
Table 5: Geosoft GDB Data Format

<table>
<thead>
<tr>
<th>Channel name</th>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X:</td>
<td>metres</td>
<td>UTM Easting NAD83 Zone 18 North</td>
</tr>
<tr>
<td>Y:</td>
<td>metres</td>
<td>UTM Northing NAD83 Zone 18 North</td>
</tr>
<tr>
<td>Longitude:</td>
<td>Decimal Degrees</td>
<td>WGS 84 Longitude data</td>
</tr>
<tr>
<td>Latitude:</td>
<td>Decimal Degrees</td>
<td>WGS 84 Latitude data</td>
</tr>
<tr>
<td>Z:</td>
<td>metres</td>
<td>GPS antenna elevation (above Geoid)</td>
</tr>
<tr>
<td>Radar:</td>
<td>metres</td>
<td>helicopter terrain clearance from radar altimeter</td>
</tr>
<tr>
<td>Radarb:</td>
<td>metres</td>
<td>Calculated EM bird terrain clearance from radar altimeter</td>
</tr>
<tr>
<td>DEM:</td>
<td>metres</td>
<td>Digital Elevation Model</td>
</tr>
<tr>
<td>Gtime:</td>
<td>Seconds of the day</td>
<td>GPS time</td>
</tr>
<tr>
<td>Mag1L:</td>
<td>nT</td>
<td>Measured Total Magnetic field data (left sensor)</td>
</tr>
<tr>
<td>Mag1R:</td>
<td>nT</td>
<td>Measured Total Magnetic field data (right sensor)</td>
</tr>
<tr>
<td>Basemag:</td>
<td>nT</td>
<td>Magnetic diurnal variation data</td>
</tr>
<tr>
<td>Mag2LZ</td>
<td>nT</td>
<td>Z corrected (w.r.t. loop center) and diurnal corrected magnetic field left mag</td>
</tr>
<tr>
<td>Mag2RZ</td>
<td>nT</td>
<td>Z corrected (w.r.t. loop center) and diurnal corrected magnetic field right mag</td>
</tr>
<tr>
<td>TMI2:</td>
<td>nT</td>
<td>Calculated from diurnal corrected total magnetic field intensity of the centre of the loop</td>
</tr>
<tr>
<td>TMI3:</td>
<td>nT</td>
<td>Microleveled total magnetic field intensity of the centre of the loop</td>
</tr>
<tr>
<td>Hgcxline</td>
<td></td>
<td>measured cross-line gradient</td>
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<tr>
<td>Hginline</td>
<td></td>
<td>Calculated in-line gradient</td>
</tr>
<tr>
<td>CVG</td>
<td>nT/m</td>
<td>Calculated Magnetic Vertical Gradient</td>
</tr>
<tr>
<td>SFz[14]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.096 millisecond time channel</td>
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<tr>
<td>SFz[15]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.110 millisecond time channel</td>
</tr>
<tr>
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<td>Z dB/dt 0.126 millisecond time channel</td>
</tr>
<tr>
<td>SFz[17]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.145 millisecond time channel</td>
</tr>
<tr>
<td>SFz[18]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.167 millisecond time channel</td>
</tr>
<tr>
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<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.192 millisecond time channel</td>
</tr>
<tr>
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<td>Z dB/dt 0.220 millisecond time channel</td>
</tr>
<tr>
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<td>Z dB/dt 0.253 millisecond time channel</td>
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<td>SFz[22]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.290 millisecond time channel</td>
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<tr>
<td>SFz[23]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.333 millisecond time channel</td>
</tr>
<tr>
<td>SFz[24]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.383 millisecond time channel</td>
</tr>
<tr>
<td>SFz[25]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.440 millisecond time channel</td>
</tr>
<tr>
<td>SFz[26]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.505 millisecond time channel</td>
</tr>
<tr>
<td>SFz[27]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.580 millisecond time channel</td>
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<td>SFz[28]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.667 millisecond time channel</td>
</tr>
<tr>
<td>SFz[29]:</td>
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<td>Z dB/dt 0.766 millisecond time channel</td>
</tr>
<tr>
<td>SFz[30]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 0.880 millisecond time channel</td>
</tr>
<tr>
<td>SFz[31]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 1.010 millisecond time channel</td>
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<tr>
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<td>Z dB/dt 1.161 millisecond time channel</td>
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<tr>
<td>SFz[33]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 1.333 millisecond time channel</td>
</tr>
<tr>
<td>SFz[34]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 1.531 millisecond time channel</td>
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<td>SFz[35]:</td>
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<tr>
<td>SFz[36]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 2.021 millisecond time channel</td>
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<tr>
<td>SFz[37]:</td>
<td>pV/(A*m^4)</td>
<td>Z dB/dt 2.323 millisecond time channel</td>
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</table>
### Channel name | Units | Description
--- | --- | ---
SFz[38]: | pV/(A*m^4) | Z dB/dt 2.667 millisecond time channel
SFz[39]: | pV/(A*m^4) | Z dB/dt 3.063 millisecond time channel
SFz[40]: | pV/(A*m^4) | Z dB/dt 3.521 millisecond time channel
SFz[41]: | pV/(A*m^4) | Z dB/dt 4.042 millisecond time channel
SFz[42]: | pV/(A*m^4) | Z dB/dt 4.641 millisecond time channel
SFz[43]: | pV/(A*m^4) | Z dB/dt 5.333 millisecond time channel
SFz[44]: | pV/(A*m^4) | Z dB/dt 6.125 millisecond time channel
SFz[45]: | pV/(A*m^4) | Z dB/dt 7.036 millisecond time channel
BFz | (pV*ms)/(A*m^4) | Z B-Field data for time channels 14 to 45

- Database of the Resistivity Depth Images in Geosoft GDB format, containing the following channels:

<table>
<thead>
<tr>
<th>Channel name</th>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
</table>
  Xg: | Metres | UTM Easting NAD83 Zone 18 North |
  Yg: | Metres | UTM Northing NAD83 Zone 18 North |
  Dist: | Meters | Distance from the beginning of the line |
  Depth: | Meters | array channel, depth from the surface |
  Z: | Meters | array channel, depth from sea level |
  AppRes: | Ohm-m | array channel, Apparent Resistivity |
  TR: | Meters | EM system height from sea level |
  Topo: | Meters | digital elevation model |
  Radarb: | Metres | Calculated EM bird terrain clearance from radar altimeter |
  CVG: | nT or nT/m | CVG data |
  SF: | pV/(A*m^4) | array channel, dB/dT |
  DOI: | Metres | Depth of Investigation; a measure of VTEM depth effectiveness |
  PLM: | | 60 Hz power line monitor |
  Mag: | | Total Magnetic Intensity |

- Database of the VTEM Waveform “GL130281_Waveform_Final.gdb” in Geosoft GDB format, containing the following channels:

  | Time: | Sampling rate interval, 5.2083 milliseconds |
  | Tx_Current: | Output current of the transmitter (Amp) |
  | Rx_Volt: | Output voltage of the receiver coil (Volt) |

- Grids in Geosoft GRD and GeoTIFF format, as follows:

  | BFz26: | B-Field Z Component Channel 26 (Time Gate 0.505 ms) |
CVG: Calculated Magnetic Vertical Gradient (nT/m)
DEM: Digital Elevation Model (metres)
PLM: Power Line Monitor
Hgcxlne: Measured Cross-Line Gradient (nT/m)
Hginline: Measured In-Line Gradient (nT/m)
SFz15: dB/dt Z Component Channel 15 (Time Gate 0.110 ms)
SFz25: dB/dt Z Component Channel 25 (Time Gate 0.440 ms)
SFz35: dB/dt Z Component Channel 35 (Time Gate 1.760 ms)
TauBF: B-Field Z Component, Calculated Time Constant (ms)
TMI: Total Magnetic Intensity (nT)
TotalHGrad: Magnetic Total Horizontal Gradient (nT/m)
TiltDrv: Magnetic Tilt derivative (radians)

A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information. A grid cell size of 25 metres was used.

- Final maps were produced at a scale of 1:10,000 for best representation of the survey size and line spacing. The coordinate/projection system used was NAD83 Datum, UTM Zone 18 North. All maps show the mining claims, flight path trace and topographic data; latitude and longitude are also noted on maps. Maps at 1:10,000 in Geosoft MAP format, as follows:

  GL130281_10k_BB_dBdt: dB/dt profiles Z Component, Time Gates 0.220 – 7.036 ms in linear – logarithmic scale.
  GL130281_10k_BB_BField: B-field profiles Z Component, Time Gates 0.220 – 7.036 ms in linear – logarithmic scale.
  GL130281_10k_BB_BFz26: B-field late time Z Component Channel 26, Time Gate 0.505 ms colour image.
  GL130281_10k_BB_TMI: Total magnetic intensity (TMI) colour image and contours.
  GL130281_10k_BB_TauSF: dB/dt Calculated Time Constant (Tau) with contours of anomaly areas of the Calculated Vertical Derivative of TMI
  GL130281_10k_BB_TotHGrad: Magnetic Total Horizontal Gradient colour image.
  GL130281_10k_BB_TiltDrv: Magnetic Tilt-Angle Derivative colour image.

BB represents block name (East and West block)
Maps are also presented in PDF format.

- 1:50,000 topographic vectors were taken from the NRCAN Geogratis database at; http://geogratis.gc.ca/geogratis/en/index.html.

- A Google Earth file GL130281_FP.kml showing the flight path of the block is included. Free versions of Google Earth software from: http://earth.google.com/download-earth.html
6. CONCLUSIONS AND RECOMMENDATIONS

A helicopter-borne versatile time domain electromagnetic (VTEMPlus) geophysical survey has been completed over the East and West blocks, located in southern Quebec, Canada.

The total area coverage is 25 km². Total survey line coverage is 336 line kilometers. Principal sensors included a Time Domain EM system and two magnetometers to measure horizontal gradient. Results have been presented as stacked profiles, and contour color images at a scale of 1:20,000. A formal interpretation is not included neither requested.

Based on the geophysical results obtained, a number of local TEM anomalies are identified in the two blocks. These conductors are highlighted in the Tau decay parameter image with calculated vertical magnetic gradient (CVG) contours, presented in Figure 7 below. Resistivity-depth images (RDIs are presented in Appendix C) of selected lines per block are also highlighted.

![Figure 7](image)

*Figure 7 – Time Constant (Tau dBz/dt) image with Calculated Vertical Gradient (CVG) of TMI, highlighting flight path of selected RDIs in the East and West blocks*

**East block**

A conductive zone (anomaly E1) is observed between lines L1195 to L1220. Highest values of Tau up to 1.2ms are observed on L1210, positioning 530,797m easting. Resistivity-depth image of L1210 (RDIs are presented in Appendix C) exhibits a vertically extended response beginning from around 100 m depth.
Between lines L1250 to L1270, a conductive zone (anomaly E2) is observed. Highest values of Tau are observed on line L1265 (Tau < 3.1 ms), positioning 530,602m easting. According to the RDI of L1265 top of the conductor at about 80-100m depth.

**West block**

A sub-vertical conductor (anomaly W1) is observed on line L5000 as well as T6000. As per geology (provided by the client), this conductor is located in marble rocks. Resistivity depth image (RDIs are presented in Appendix C) of L5000 shows top of the conductor at about 100m depth (positioning 521,730m easting).

A conductor is observed between lines L5080 to L5110 as well as tie-line T6010 (anomaly W2) is close to the powerline influence. The top of this conductor is close to the surface, as indicated in RDI of L5090. As per geology, this conductor is located in a contact with marble rocks.

A conductor is observed between lines L5360 to L5390 (anomaly W3), with association to magnetic anomalies. Highest response is observed on line L5370 (Tau < 2.1ms). According to RDI of L5370 the conductor is close to the surface.

Power line activity and local cultural components are detected in both survey blocks. Power line effect was removed from Tau images (see Figure 7 in previous page) to enhance the response from geology. Caution is recommended during further interpretation as cultural components might affect the geological response inherent in the data.

If the conductors correspond to the exploration model, it is recommended picking anomalies with conductance grading and center localization of the conductors, detail resistivity depth imaging, plate Maxwell modelling prior to ground follow up and drill testing. If magnetic anomalies are of interest, 3D inversion and/or modeling of magnetic field are recommended as well.

Respectfully submitted,

Nick Venter  
**Geotech Ltd.**

Marta Orta  
**Geotech Ltd.**

Jean M Legault, P.Geo., P.Eng. (OGQ#1147)  
**Geotech Ltd.**

September 2013

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2 Final data processing of the EM and magnetic data were carried out by Marta Orta, from the office of Geotech Ltd. in Aurora, Ontario, under the supervision of Alexander Prikhodko, P.Geo., PhD, Senior Geophysicist, VTEM Interpretation Supervisor.
APPENDIX A

SURVEY BLOCK LOCATION MAP

Survey Overview of the Survey Area
West Block Mining Claims
## APPENDIX B

### SURVEY EAST BLOCK COORDINATES
(WGS 84, UTM Zone 18 North)

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### SURVEY WEST BLOCK COORDINATES
(WGS 84, UTM Zone 18 North)

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</tbody>
</table>
APPENDIX C
GEOPHYSICAL MAPS

East Block – VTEM B-Field Z Component Profiles – Time Gates 0.220 – 7.036 ms – Over Total Magnetic Intensity Grid

¹ Full size geophysical maps are also available in PDF format on the final DVD
East Block – VTEM dB/dt Z Component Profiles – Time Gates 0.220 – 7.036 ms – Over Regional Geology Map
East Block – VTEM B-Field Z Component – Channel 26 – Time Gate 0.505 ms

East Block – dB/dt Calculated Time Constant (Tau) with contours of anomaly areas of the
Calculated Vertical Derivative of TMI
West Block – VTEM B-Field Z Component Profiles – Time Gates 0.220 – 7.036 ms – Over Total Magnetic Intensity Grid
West Block – VTEM dB/dt Z Component Profiles – Time Gates 0.220 – 7.036 ms – Over Regional Geology Map
West Block – Total Magnetic Intensity (TMI)
West Block – VTEM B-Field Z Component – Channel 26 – Time Gate 0.505 ms

West Block – dB/dt Calculated Time Constant (Tau) with contours of anomaly areas of the
Calculated Vertical Derivative of TMI
West Block – Magnetic Total Horizontal Gradient
RESISTIVITY DEPTH IMAGE (RDI) MAPS

Apparent Resistivity
East Block
(power line effect removed)

East Block – 3D Resistivity-Depth Image (RDI)
East Block – RDI Section L1265
West Block – 3D Resistivity-Depth Image (RDI)
West Block – RDI Section – L5000
West Block – RDI Section – L5090
West Block – RDI Section – L5370
APPENDIX D

GENERALIZED MODELING RESULTS OF THE VTEM SYSTEM

Introduction

The VTEM system is based on a concentric or central loop design, whereby, the receiver is positioned at the centre of a transmitter loop that produces a primary field. The wave form is a bi-polar, modified square wave with a turn-on and turn-off at each end.

During turn-on and turn-off, a time varying field is produced (dB/dt) and an electro-motive force (emf) is created as a finite impulse response. A current ring around the transmitter loop moves outward and downward as time progresses. When conductive rocks and mineralization are encountered, a secondary field is created by mutual induction and measured by the receiver at the centre of the transmitter loop.

Efficient modeling of the results can be carried out on regularly shaped geometries, thus yielding close approximations to the parameters of the measured targets. The following is a description of a series of common models made for the purpose of promoting a general understanding of the measured results.

A set of models has been produced for the Geotech VTEM® system dB/dT Z and X components (see models D1 to D15). The Maxwell™ modeling program (EMIT Technology Pty. Ltd. Midland, WA, AU) used to generate the following responses assumes a resistive half-space. The reader is encouraged to review these models, so as to get a general understanding of the responses as they apply to survey results. While these models do not begin to cover all possibilities, they give a general perspective on the simple and most commonly encountered anomalies.

As the plate dips and departs from the vertical position, the peaks become asymmetrical.

As the dip increases, the aspect ratio (Min/Max) decreases and this aspect ratio can be used as an empirical guide to dip angles from near 90° to about 30°. The method is not sensitive enough where dips are less than about 30°.
Figure D-1: vertical thin plate

Figure D-2: inclined thin plate

Figure D-3: inclined thin plate

Figure D-4: horizontal thin plate

Figure D-5: horizontal thick plate (linear scale of the response)

Figure D-6: horizontal thick plate (log scale of the response)
Figure D-7: vertical thick plate (linear scale of the response). 50 m depth

Figure D-8: vertical thick plate (log scale of the response). 50 m depth

Figure D-9: vertical thick plate (linear scale of the response). 100 m depth

Figure D-10: vertical thick plate (linear scale of the response). Depth/hor.thickness=2.5

Figure D-10: horizontal thick plate (linear scale of the response)

Figure D-11: horizontal thick plate (log scale of the response)
Figure D-12: inclined long thick plate

Figure D-13: two vertical thin plates

Figure D-14: two horizontal thin plates

Figure D-15: two vertical thick plates
The same type of target but with different thickness, for example, creates different form of the response:

![Figures D-16](https://example.com/fig-d-16.png)

Alexander Prikhodko, PhD, P.Geo

Geotech Ltd.

September 2010
APPENDIX E

EM TIME CONSTANT (TAU) ANALYSIS

Estimation of time constant parameter\(^1\) in transient electromagnetic method is one of the steps toward the extraction of the information about conductances beneath the surface from TEM measurements.

The most reliable method to discriminate or rank conductors from overburden, background or one and other is by calculating the EM field decay time constant (TAU parameter), which directly depends on conductance despite their depth and accordingly amplitude of the response.

Theory

As established in electromagnetic theory, the magnitude of the electro-motive force (emf) induced is proportional to the time rate of change of primary magnetic field at the conductor. This emf causes eddy currents to flow in the conductor with a characteristic transient decay, whose Time Constant (Tau) is a function of the conductance of the survey target or conductivity and geometry (including dimensions) of the target. The decaying currents generate a proportional secondary magnetic field, the time rate of change of which is measured by the receiver coil as induced voltage during the Off time.

The receiver coil output voltage \(e_0\) is proportional to the time rate of change of the secondary magnetic field and has the form,

\[
e_0 \propto \left(1 / \tau\right) e^{-\left(t / \tau\right)}
\]

Where,
\[
\tau = L/R \text{ is the characteristic time constant of the target (TAU)}
\]
\[
R = \text{resistance}
\]
\[
L = \text{inductance}
\]

From the expression, conductive targets that have small value of resistance and hence large value of \(\tau\) yield signals with small initial amplitude that decays relatively slowly with progress of time. Conversely, signals from poorly conducting targets that have large resistance value and small \(\tau\), have high initial amplitude but decay rapidly with time\(^1\) (Fig. E1).

\[\text{Figure E-1: Left – presence of good conductor, right – poor conductor.}\]

EM Time Constant (Tau) Calculation

The EM Time-Constant (TAU) is a general measure of the speed of decay of the electromagnetic response and indicates the presence of eddy currents in conductive sources as well as reflecting the “conductance quality” of a source. Although TAU can be calculated using either the measured dB/dt decay or the calculated B-field decay, dB/dt is commonly preferred due to better stability (S/N) relating to signal noise. Generally, TAU calculated on base of early time response reflects both near surface overburden and poor conductors whereas, in the late ranges of time, deep and more conductive sources, respectively. For example early time TAU distribution in an area that indicates conductive overburden is shown in Figure 2.

Figure E-2: Map of early time TAU. Area with overburden conductive layer and local sources.
Figure E-3: Map of full time range TAU with EM anomaly due to deep highly conductive target.

There are many advantages of TAU maps:

- TAU depends only on one parameter (conductance) in contrast to response magnitude;
- TAU is integral parameter, which covers time range and all conductive zones and targets are displayed independently of their depth and conductivity on a single map.
- Very good differential resolution in complex conductive places with many sources with different conductivity.
- Signs of the presence of good conductive targets are amplified and emphasized independently of their depth and level of response accordingly.

In the example shown in Figure 4 and 5, three local targets are defined, each of them with a different depth of burial, as indicated on the resistivity depth image (RDI). All are very good conductors but the deeper target (number 2) has a relatively weak dB/dt signal yet also features the strongest total TAU (Figure 4). This example highlights the benefit of TAU analysis in terms of an additional target discrimination tool.
The EM Time Constants for dB/dt and B-field were calculated using the “sliding Tau” in-house program developed at Geotech2. The principle of the calculation is based on using of time window (4 time channels) which is sliding along the curve decay and looking for latest time channels which have a response above the level of noise and decay. The EM decays are obtained from all available decay channels, starting at the latest channel. Time constants are taken from a least square fit of a straight-line (log/linear space) over the last 4 gates above a pre-set signal threshold level (Figure F6). Threshold settings are pointed in the “label” property of TAU database channels. The sliding Tau method determines that, as the amplitudes increase, the time-constant is taken at progressively later times in the EM decay. Conversely, as the amplitudes decrease, Tau is taken at progressively earlier times in the decay. If the maximum signal amplitude falls below the threshold, or becomes negative for any of the 4 time gates, then Tau is not calculated and is assigned a value of “dummy” by default.

![Figure E-6: Typical dB/dt decays of Vtem data](image)

Alexander Prikhodko, PhD, P.Geo
Geotech Ltd.

September 2010

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2 by A.Prikhodko
APPENDIX F

TEM RESISTIVITY DEPTH IMAGING (RDI)

Resistivity depth imaging (RDI) is a technique used to rapidly convert EM profile decay data into an equivalent resistivity versus depth cross-section, by deconvolving the measured TEM data. The used RDI algorithm of Resistivity-Depth transformation is based on the scheme of the apparent resistivity transform of Maxwell A. Meju (1998)¹ and TEM response from conductive half-space. The program is developed by Alexander Prikhodko and depth calibrated based on forward plate modeling for VTEM system configuration (Fig. 1-10).

RDI sections provide reasonable indications of conductor relative depth and vertical extent, as well as accurate 1D layered-earth apparent conductivity/resistivity structure across VTEM flight lines. Approximate depth of investigation of a TEM system, image of secondary field distribution in half space, effective resistivity, initial geometry and position of conductive targets is the information obtained on the basis of the RDI sections.

Maxwell forward modeling with RDI sections from the synthetic responses (VTEM system)

Figure F-1: Maxwell plate model and RDI from the calculated response for conductive “thin” plate (depth 50 m, dip 65 degree, depth extend 100 m).

Figure F-2: Maxwell plate model and RDI from the calculated response for “thick” plate 18 m thickness, depth 50 m, depth extend 200 m).

Figure F-3: Maxwell plate model and RDI from the calculated response for bulk ("thick") 100 m length, 40 m depth extend, 30 m thickness
**Figure F-4:** Maxwell plate model and RDI from the calculated response for “thick” vertical target (depth 100 m, depth extend 100 m). 19-44 chan.

**Figure F-5:** Maxwell plate model and RDI from the calculated response for horizontal thin plate (depth 50 m, dim 50x100 m). 15-44 chan.
**Figure F-6:** Maxwell plate model and RDI from the calculated response for horizontal thick (20m) plate – less conductive (on the top), more conductive (below)
**Figure F-7:** Maxwell plate model and RDI from the calculated response for inclined thick (50m) plate. Depth extends 150 m, depth to the target 50 m.

**Figure F-8:** Maxwell plate model and RDI from the calculated response for the long, wide and deep subhorizontal plate (depth 140 m, dim 25x500x800 m) with conductive overburden.
Figure F-9: Maxwell plate models and RDIs from the calculated response for “thick” dipping plates (35, 50, 75 m thickness), depth 50 m, conductivity 2.5 S/m.

Figure F-10: Maxwell plate models and RDIs from the calculated response for “thick” (35 m thickness) dipping plate on different depth (50, 100, 150 m), conductivity 2.5 S/m.

Figure F-11: RDI section for the real horizontal and slightly dipping conductive layers.
FORMS OF RDI PRESENTATION

Presentation of series of lines
3d presentation of RDIs
Apparent Resistivity Depth Slices plans:

0 m (surface)  -100 m  -200 m

3d views of apparent resistivity depth slices:
Real base metal targets in comparison with RDIs:

RDI section of the line over Caber deposit ("thin" subvertical plate target and conductive overburden).

3d RDI voxels with base metals ore bodies (Middle East):

discovered base metals ore body
Alexander Prikhodko, PhD, P.Geo
Geotech Ltd.
April 2011
The results of EMIT Maxwell® Plate Modeling of selected VTEM anomaly

From
East Block, Grenville, Quebec

for
Canada Carbon Inc.

VTEM survey 2013, Job GL130281
<table>
<thead>
<tr>
<th>Parameter</th>
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<td>Y</td>
<td>Meters</td>
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<td>Meters</td>
</tr>
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<td>Rotation</td>
<td>Degrees</td>
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<td>Length</td>
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<td>Siemens/Meter</td>
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<tr>
<td>Thickness</td>
<td>Meters</td>
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All X and Y Coordinates are projected using **NAD83 / UTM zone 18N**

(X, Y) refers to Center Top of the Plate projected to surface, i.e. point A.
Modeled survey lines and targets projected on TAU-CVG map. 8 lines over 3 targets were selected for modeling.
Two lines were modeled for target “E1”. The results show that the target is a 130*120 m² plate similar conductor dips to SW at 20 degrees angle, with depth to surface about 140 meters.

Middle time channels (CH23-33) used for modeling. Modeled response fits measured data very well.
### Target Plate Parameters

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<td>Siemens/Meter</td>
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<tr>
<td>Thickness</td>
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<td>Meters</td>
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x, y, z—coordinates of top-center point of the plate
Depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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<thead>
<tr>
<th>X (m)</th>
<th>Y (m)</th>
<th>Z (m)</th>
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Target Plate Parameters

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x,y,z—coordinates of top-center point of the plate
depth—depth from surface to top-center of the plate

Drill-hole Parameters Appropriate for the Model

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<thead>
<tr>
<th>X (m)</th>
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Four lines were modeled for target “E2”. The results show that the target strikes NW for about 250 m. The top surface of the conductor is near horizontal with 45-50 m wide in NE direction, and 90m depth to ground surface.

Middle time channels (CH24-34) used for modeling. Modeled response fits measured data well.
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x, y, z—coordinates of top-center point of the plate
Depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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Modeled plate

dB/dt z[30] grid

NAD83 / UTM zone 18N

E2_L1255
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x,y,z—coordinates of top-center point of the plate depth—depth from surface to top-center of the plate

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x,y,z—coordinates of top-center point of the plate
depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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![3D View of the plate and data](image)
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x, y, z—coordinates of top-center point of the plate  
Depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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</table>
Two lines were modeled for target “E3”. Based on the modeling results, it is a very conductive, steeply dipping conductor. The depth from ground surface to the top of the target is about 40 meters.

Middle time channels (CH24-34) used for modeling. Modeled response fits measured data well.
PLAN VIEW

Modeled plate

dB/dt z[30] grid

NAD83 / UTM zone 18N
### Target Plate Parameters

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- x,y,z—coordinates of top-center point of the plate
- depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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<tr>
<th>X (m)</th>
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<th>Z (m)</th>
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### Target Plate Parameters

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<td>Siemens/Meter</td>
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X, Y, Z—coordinates of top-center point of the plate
Depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

<table>
<thead>
<tr>
<th>X (m)</th>
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<th>Z (m)</th>
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Summary Table of All Recommended Drillholes

<table>
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<tr>
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<td>5057606.0</td>
<td>208</td>
<td>45</td>
<td>45</td>
<td>120</td>
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</tbody>
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Note:
1. Target E2 and E3 are situated in an area with strong EM noise, the data have high noise level. This affects the accuracy of the modeling results. Especially for target E3, the results are not very reliable.
2. If any additional geological information for the targets is available, the models can be revised or constrained, yield more accurate results.
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Tel: (905) 841 5004 (ext 106)
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Alexander.prikhodko@geotech.ca
www.geotech.ca
The results of EMIT Maxwell® Plate Modeling of selected VTEM anomaly

From

West Block, Grenville, Quebec

for

Canada Carbon Inc.

VTEM survey 2013, Job GL130281
**Target Plate Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
</tr>
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<tbody>
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</tr>
<tr>
<td>Thickness</td>
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(X, Y) refers to Center Top of the Plate projected to surface, i.e. point A.

All X and Y Coordinates are projected using **NAD83 / UTM zone 18N**
Modeled survey lines and targets projected on TAU-CVG map. 7 lines in 3 target areas were selected for modeling.
Two lines were modeled for target “W1”. According to the modeling results, it is a steep dipping, high conductive, shallow conductor. It is 200m long, 50~70m wide, about 10m thick.

Latest time channels (CH35-45) used for modeling. Modeled response fits measured data very well.
## Target Plate Parameters

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x, y, z—coordinates of top-center point of the plate

Depth—depth from surface to top-center of the plate

---

## Drill-hole Parameters Appropriate for the Model

<table>
<thead>
<tr>
<th>X (m)</th>
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<th>Z (m)</th>
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dB/dt z[36] grid

Modeled plate
Target Plate Parameters

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<td>Meters</td>
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x,y,z—coordinates of top-center point of the plate
depth—depth from surface to top-center of the plate

Drill-hole Parameters Appropriate for the Model

<table>
<thead>
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<th>X (m)</th>
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<th>Z (m)</th>
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<td>189</td>
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</table>
Two lines were modeled for target “W2”. The results show that the target is about 180m long, 10~35m wide, and dipping to azimuth 100° at 25~43° angle. It is a high conductive, shallow conductor.

Late time channels (CH33-43) used for modeling. Modeled response fits measured data well.
### Target Plate Parameters

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<tr>
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x, y, z — coordinates of top-center point of the plate  
Depth — depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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### Target Plate Parameters

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<td>Meters</td>
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x, y, z — coordinates of top-center point of the plate

Depth — depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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<tr>
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3D View of the plate and data
Three lines were modeled for area “W3”. Based on the modeling results, the source of the EM anomaly are two separate conductors, named “T1” and “T2”. T1 is about 260m long, 60m wide, dipping to azimuth 285° at 70~75° angle, with top depth to surface around 50m. T2 is smaller and shallower. Both T1 and T2 are steeply dipping, thin conductors.

Late time channels (CH30-40) used for modeling. Modeled response fits measured data very well.
Plan view

Modeled plate

dB/dt z[36] grid

W3_L5370
3D View of the plate and data

Target Plate Parameters

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<td>Meters</td>
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x, y, z—coordinates of top-center point of the plate
depth—depth from surface to top-center of the plate

Drill-hole Parameters Appropriate for the Model

<table>
<thead>
<tr>
<th>X (m)</th>
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<th>Z (m)</th>
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# Target Plate Parameters

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</tbody>
</table>

- x,y,z—coordinates of top-center point of the plate
- depth—depth from surface to top-center of the plate

# Drill-hole Parameters Appropriate for the Model

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<tr>
<th>X (m)</th>
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### Target Plate Parameters

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x,y,z—coordinates of top-center point of the plate
depth—depth from surface to top-center of the plate

### Drill-hole Parameters Appropriate for the Model

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<th>Line_Target</th>
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<th>Azimuth (deg)</th>
<th>Length (m)</th>
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## Summary Table of All Recommended Drillholes

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</table>

**Note:**
1. The modeled plate “W1” from the two lines have different dip directions, ground EM follow-up with dense lines and stations would define the conductor/conductors better.
2. There are many cultural sources in the survey area, field investigation is highly recommended to exclude the man made sources before any drilling test.
3. The modeling is based on the interpreter’s understanding of the data with no geological constrains. If any additional geological information for the targets is available, the models can be revised, yield more accurate results.
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Fax: (905) 841 0611  
Zihao.han@geotech.ca  
www.geotech.ca

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Manager of Data Interpretation  
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Jean M Legault, P.GEO., P.Eng.  
(OGQ#1147)
Appendix 11. Second geophysics survey report
CANADA CARBON INC.

Detailed mobile TDEM Survey on
Miller-Graphite Property – East Block

Grenville Township, Québec
Hawkesbury area, 31G/10

REPORT

September 26th, 2013

Marc Boivin,P.Geo.

Project 326.02
# TABLE OF CONTENTS

1. INTRODUCTION .............................................................................................................................  2  
2. PROPERTY, LOCATION AND ACCESS .......................................................................................  2  
3. CLAIMS ............................................................................................................................................ 3  
4. PERSONNEL AND INSTRUMENTATION ...................................................................................  3  
5. PREVIOUS WORK ..........................................................................................................................  3  
6. REGIONAL GEOLOGY .....................................................................................................................  3  
7. PROPERTY GEOLOGY ....................................................................................................................  3  
8. FIELD WORK AND PROCEDURE ................................................................................................  3  
9. IMAGEM SURVEY .........................................................................................................................  4  
   9.1 Methodology ..........................................................................................................................  4  
   9.2 Presentation of the results ...................................................................................................... 5  
10. IMAGEM RESULTS ......................................................................................................................  6  
   10.1 Description of the IMAGEM anomalies ................................................................................  6  
11. INTERPRETATION .......................................................................................................................  7  
12. CONCLUSION ...............................................................................................................................  7  

- LIST OF MAPS
1. INTRODUCTION

At the request of Mr. Bruce Duncan, Executive Chairman & CEO for Canada Carbon Inc., a detailed mobile TDEM geophysical survey was completed on the Miller-Graphite property between September 18th and September 22nd 2013. The system used was a new system called “IMAGEM” developed by Devbrio Geophysics. This survey was a follow-up of a previous IMAGEM survey carried out in May 2013. The objective of the survey was to detailed previous EM anomalies associated with graphite occurrences.

2. PROPERTY, LOCATION AND ACCESS

The Miller-Graphite Property is located about 80 km west of Montreal or 89 km East of Gatineau and 5 km north of Grenville, QC. The Highway 50 passes a few kilometres south of the property and the Scotch road (from Grenville) passes 800m east of the deposit. A bush road links to the deposit and across the property, which allows a very easy access. A power line also crosses the property 500m south of the deposit.

The property is on a hilly area. South of the old pit, the ground is relatively flat, toward a high plateau. The north area of the pit is going down toward a creek with a 20% to 40% slope. The creek is large and has lots of water.

Figure 1. Localization of the Miller-Graphite Property
3. CLAIMS

The Miller-Graphite Property East Block consists of 14 claims. The geophysical surveys covered a partial section of the property (4 claims). The portion of the claim map (coming from the Canada Carbon Inc. web site) which covers the Miller-Graphite Property is illustrated in Figure 3 on the next page.

The 4 claims covered are 2299284 2344488 2349742 2349744
4. PERSONNEL AND INSTRUMENTATION

The IMAGEM was carried out by Devbrio Geophysics. The IMAGEM crew was composed of:
- Andrew Hay, P.Geo.,
- Ian Jaffe, field assistant

The instrument used was IMAGEM prototype #2

The report was written by Marc Boivin P. Geo., consulting geophysicist.

The maps were finalized by Donald Saindon, geomatician.

5. PREVIOUS WORK

The beginning of the graphite extraction in the area started in 1845 and the Miller-Graphite Mine was probably the first graphite operation in Canada.
The other mining operation was in the Buckingham area (Mine Walker – 1876-1896, 1906) west of Grenville.

Around 1930, the extraction of graphite declined and was abandoned. The industry could not support the competition with the graphite from Madagascar and Ceylon (now Sri Lanka).

The only graphite mine in operation in Canada started in 1989, 25km south of Mont-Laurier. They are extracting crucible graphite in marble, like the Miller-Graphite deposit.

A 2013 sampling program was initiated on the property.

In May 2013, a combined HLEM (MaxMin), TDEM (Imagem), IP and Beep-Mat surveys were completed on the Miller-Graphite property. The IP and TDEM surveys have outlined shallow graphite occurrences.

6. REGIONAL GEOLOGY

Mésoprotérozoïque (1600-1000 Ma*)

The Ottawa River territory extends in major part on the Grenville Province, a division of the Canadian Shield that was formed between 1300 and 1000 Ma at the side of a large continent, Laurentia. The Grenville orogeny with subduction of oceanic crust and continent collision created a large chain of hills that were eroded deep over time.

Mineralogically, the most interesting rocks belong to the Grenville Group. In the present area, the Central belt of metasediments is composed of marbles, paragneiss and quartzites, and amphibolites of volcanic origin. The marbles extend along the Gatineau valley up to the Baskatong Reservoir and up to Buckingham. East of that, there is still some marble but gneiss and quartzites are dominant.

Deposits of zinc-lead and Graphite are in relation with marbles.

7. PROPERTY GEOLOGY (Extract from MRNW and ESIGEOM, 2012)

The mineralization at Miller-Graphite Mine consists of unknown quantity of graphite in five (5) graphite veins 10 to 60 cm wide. Such graphite veins usually consist of high grade mineralization, between 30 to 90% graphite. The size of the flake can vary between 0,5mm to many centimetres and would correspond to coarse flake size. Contact metamorphisms minerals are also present (Apatite, garnet, diopside, sphenite, vesuvianite, wollastonite, a lithium mineral, and zircon). The graphite veins are hosted in a marble unit and a pegmatite, close to the contact of the two units. Their direction is unknown.
Note from the author: With the Beep Mat and the GPS, the main vein at the southeast corner of the pit was followed. It starts toward southeast but curves toward east to hit a brecciated area with several conductive veins.

The Miller-Graphite Mine is classified as a skarn deposit. The contact between a pegmatite intrusion and a marble unit has been mineralized by fluids coming out of the intrusive body.
8. FIELD WORK AND PROCEDURE

The geophysical work was contracted to Géosig Inc.

The theoretical grid consisted by east-west 5 metres spaced lines over an area of 300 metres X 150 metres.

The real line path was recovered by the GPS unit integrated with the IMAGEM system. The presence of very recent exploration works (pits, fallen trees, ….) has significantly modified the original path. However, the planned surface was covered.

A total of 9.55km of mobile TDEM (IMAGEM) was completed. Continuous readings were recorded with an average spacing of 20 readings per meter.

9. IMAGEM SURVEY

9.1 Methodology

IMAGEM is a new mobile Time Domain EM (TDEM) technology actually in development. It consists to a very small system similar to the helicopter-borne TDEM system. This survey is recommended to detect conductive materials, such as sulfides or graphite. Because of the sensibility and the high spatial resolution
of the technique, the technique can detect very small amount of conductive materials or multiple sub-parallel features.

The equipment consists to a rectangular frame, used to transmitting and receiving. The configuration is a moving IN-LOOP geometry.

Transmitter and receiver is fully digital and can be configured to different needs. The system is taking continuous reading and is equipped of a GPS and inclinometer.

Transmitter is powered by a battery pack. Receiver records the full wave-form EM field along a 12m² receiving horizontal coil

Transmitter

- Effective surface: 4.41 m²
- Peak current: 700A
- Base frequency: 30 Hz
- Pulse width: 486 µs
- Wave form: Half-sine
- Magnetic moment: 3087 NIA
- Terrain clearance: 0.8 m

Receiver

- Sensor: air coil
- Surface: 0.04 m²
- Number of turn: 298
- Effective surface: 11.92 m²

The acquisition system records the full wave-form. Extracted data include 110 time channels (25 windows ON-TIME and 85 OFF-TIME windows). Table 1 show the time windows distribution.

9.2 Presentation of the results

The results of the IMAGEM survey are presented on the 1:500 scale map no. 9417, on which we plotted channels #33 to 54.
10. IMAGEM RESULTS

10.1 Description of the IMAGEM anomalies

Fifty-seven (57) anomalies have been detected. They are listed on table 2.

The anomalies are characterized by signal amplitude and geometrical parameters. Cultural sources were noticed by the IMAGEM crew but some anomalies can be possibly associated with cultural sources.

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<th>Impulsion</th>
<th>Canal</th>
<th>Début (ms)</th>
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The mobile TDEM survey permits to outline 4 anomalous zones (figure 6).

Zone A is sub-divided in 2 sub-areas but it matches with the anomalous zone highlighted by the previous geophysical survey.

Zone B is located along a trail, so cultural interferences are possible.

Zone C have a limited length and was not detected by the previous survey.
Zone D is located on the northern edge of the survey. It matches with a weak IMAGEM anomaly detected in May 2013.

12. CONCLUSION

The IMAGEM survey has defined several conductive zones. The survey reaches its goal by defining a previously detected conductive zone (zone A). Several smaller conductive zones were also detected. Ground prospecting is highly recommended to confirm presence of graphite.

Marc Boivin, Senior Geophysicist
# LIST OF MAPS

Scale: 1 : 500

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Appendix 12. Logs from the three drill campaigns
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**Notes:**
- No medium-vein contact
- Well carbon 45% contact 45° c.a.
- Beddings 10 cm.
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</tbody>
</table>

**Comments**

- Wellbore hi 30%
- Beddings 35° C, L

**KEY**:
- Fault, Breccia, Shear (present or absent)
- Vein (lit vein mineral)
- Alteration, Calc, CO2 (1=weak, 2=moderate, 3=strong)
- Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular)
### Structural and Mineralogical Data

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<td>Graphic</td>
<td>FRCO</td>
<td>Py %</td>
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**Comments:**
- Slightly altered: +5°C C.O.
- Wallisite 15%
- Diopside 30%

**Legend:**
- Fault, breccia, gouge (presence or absence)
- Vein (list vein minerals)
- Alteration: FeO, Fe2O3 (1=weak, 2=moderate, 3=strong)
- Graphic (measured relative to cone axis; 0° is parallel, 90° is perpendicular)
<table>
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<td></td>
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<td>Graphic</td>
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</table>

**Comments**

END

**NOTES:**
- **Assay:** Cu, Ni, Co, etc. (presence or absence of Cu in vein minerals)
- **Alteration:** Feh, CO2 (1-weak, 2-moderate, 3-strong)
- **Graphite:** measured relative to core axis; 'o' is parallel, '90' is perpendicular.
<table>
<thead>
<tr>
<th>Depth</th>
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**Comments**
- 4.5: No measurable contact
- 5.2: Quartzes replace B (7 to 8 mm) 120°
- 6: No measurable contact
- 8.0: Contact at 85°C

**KEY:**
- Fault, Breccia, Gouge (presence or absence)
- Vn (last mineral to form)
- Alteration: Fuch, Cus (4-week, 3-month, 6-month, 1-year, 2-years) orientation; 0° is parallel, 90° is perpendicular

**Signature:** [Signature]
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**Graphite Vein (<4 cm thick)**

Lithology: G - graphic, B - breccia, D - dike, A - aureole, V - vein, M - mineralization. Fe oxides: low, moderate, high. Graphic: measured relative to core axis; 0° is parallel, 90° is perpendicular.

**Comments**

Graphite Vein (<4 cm thick)
65° E. W.
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**KEY:** Fault, Breccia, Gouge (presence or absence). Vn (vein vein minerals). Alteration, FeOx, C02 (1-weak, 2-moderate, 3-strong). Graphic (measured relative to core axis; 0 is perfectly, 1/2 is partially, 1/2+ is petrocalcite)
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**Comments**

- Wollastonite 15%
- Gradual contact with Wollastonite 50%
- Gradual contact with Wollastonite 5%
- Contact 31° C. a.
- Pegmatite from 55.6 to 55.8 m.
- Wollastonite 50%.
- Pegmatite from 55 to 54.1 m.
- Wollastonite 50%.

**Notes:**
- Facies, Breccia, Gouge (presence or absence).
- Vein (flat vein mineral).
- Alteration: FeO, CaO, SiO2 (1 ust, 2 anorthite, 3 tremolite).
- Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular).
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**Remarks:** Disseminated graphite: 1%
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**Comments:**

- Alternating between beddings (20° E) of calcite, diopside, serpentine, with disseminated graphite 8%.
- Most of the beddings are made of calcite but they decrease and serpentine beddings increase.

**KEY:** fault, breccia, Goze (presence or absence). Vs (vesicle minerals). Alterations, FeOx, COx (1-weak, 2-moderate, 3-strong). Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular)

- Brecciation vein.
- Woollardite: 5.0%
- Serpentine vein.
- Serpentine: 50%
- Dioptase: 50%
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**Wollastonite 52%**

Contact: S up = 50°
- middle = 0°
- down = 30°

Wollastonite 45%
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</table>

**Comments**

- Graphite = 30%
- Biotite = 25%
- FeOx restricted to upper paragenesis
- Biotite = 1%
- Chlorite = 10%
- Pyrrhotite = 40%
- Discolored graphite = 3%

**Upper contact:**
- Wallrock = 60%
- Contact = 10%

**Wallrock:**
- Wollastonite = 10%
- Silica = 12%
- Pyrrhotite = 3%
- Titanite = 1%

**Paragenesis:**
- Pyrrhotite = 43%
- Biotite = 10%
- Chlorite = 5%

- Paragenesis 31% (Biotite 25% + Chlorite 5%)
- Wollastonite 10% + Titanite 1%

**KEY:**
- Fault, Breccia, Gouge (presence or absence)  
- Vein (location of mineralization)  
- Alteration: FeOx, Bi, Chl, Cr, H2O, Na, K
- Graphite (measured relative to core axis: 0° is parallel, 90° is perpendicular)
<table>
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**Notes:**
- Pegmatitic vein: 13.6 to 15.7 m
- Pegmatitic vein: 15.2 to 15.4 m
- Pegmatitic vein: 15.0 to 15.1 m
- Silica vein

**Comments:**
- Mix between the units: paragenesis 43% pegmatitic 23%
- Wolfsenite 40%

**Key:**
- Fault, Breccia, Gouge (presence or absence)
- Vein (not vein minerals)
- Alteration, FeOx, CO2 (1 = weak, 2 = moderate, 3 = strong)
- Graphite (measured relative to core axis: 0° is parallel, 90° is perpendicular)
<table>
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<tr>
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**Notes:**
- Disseminated graphite 2%
- Galena 70%
- Disseminated graphite 1%

**Abbreviations:**
- Fault, Breccia, Gouge (presence or absence)
- Va (trace van minerals)
- Alteration, FeOx, CO3 (1-week, 2-moderate, 3-strong)
- Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular)
Graphite veins, contact up to 15%. Interpreted as graphite veins (4 cm thick).

Abundant pyrrhotite.

Banding of silicified graphite from 168 to 228m.

Minerals to more greenish porphyry.
### Table

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**Comments:**
- wollastonite 10%
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*KEY: Fault, Breccia, Graphite (presence or absence). Vein (for vein minerals). Alterations: FeO, CSD (1=weak, 2=moderate, 3=strong). Graphite measured relative to core axis: 0° = parallel, 90° = perpendicular.*
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**Comments:**
- GOOD CONTACT
- WEDDLEITE 35%
- CONTACT 45° C.A.
- RARE VEIN, WEDDLEITE 35%
- FROM 23.6 to 25.3 m

**KEY:**
- Tank, Breccia, Gouge (presence or absence)
- Vn (for vein minerals)
- Alteration, FeOx, CuS (1 = none, 2 = moderate, 3 = strong)
- Graphic (measured relative to zone axis: 0° is parallel, 90° is perpendicular)
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**Comments**
- Serpentine 25%
- Gradual contact
- Serpentine 40%
- Gradual contact
- Serpentine 30%
- Chrysolite 15%

**KEY**: Rock, Freight, Sulfate (present or absent). Vn (for veined mineral). Alteration, Fossils, Sulfide (1=weak, 2=moderate, 3=strong). Graphic (measured relative to core axis; 0 is parallel, 90° is perpendicular).
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**Comments**
- Bedding 90° N.
- Contact 70° N.
- Wolframite 45%.
- Contact 60° E.
- Contact with graphite vein 75° E.
- Wolframite 80%.
- Contact 15° E.
- 4 pyrite veins oriented 35° E.
- Calcite veins 35° E.
- Pyrite veins 85° E.

**Key**
- Fm: Fm, Interbeds (presence or absence), Ve (wet veins absent).
- Alteration, FrCh, CO2 (1-weak, 2-moderate, 3-strong).
- Graphite measured relative to core axis: G° is parallel, 90° is perpendicular.

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**NOTE:** Fault, breccia, silicification (presence or absence). Veins (vein discontinuity, Alterations: Fatty, void, 0.5% (weak), 2 medium, 3 strong). Graphs (measured relative to core with D in parallel, 45° in perpendicular).
<table>
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KEY: Fault, Breccia, Goce (present or absent). Ve (vein mineral). Ab. (ablation). FeO (2=weak, 2=moderate, 2=strong). Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular).

Comments:
- Wallisite 15%
- Bedding 60° e.m.
- Contact 45° e.m.
- Wallisite 45%
- Contact 15° e.m.
- Contact 15° e.m.
- Wallisite 50%
- Contact 10° e.m.
- Contact 60° e.m.
- Wallisite 70%
- Contact 50° e.m.
- No measurable private Wallisite 50%
- No measurable private Wallisite 50%
- 1.5 cm. Veins 15° e.m.
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**Comments:**
- Contact 50° c.a.
- Wellstromite 65%
- Gradual Contact

Wellstromite 65%

Gradual Contact

Wellstromite 60° c.a.

Gradual Contact

Wellstromite 10%

Contact 85° c.a.

Microcrystalline dolomite
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- Bedding 30° at 71 m
- Bedding 60° at 72 m
- Contact 30° at 71 m
- Soft rock 20° at 73 m
- Bedding 20° at 72.4 m

**KEY:** 
- Fissures: Presence or absence. Va = (light mineral), Alteration, FeO₄, CO₂ (1 = weak, 2 = moderate, 3 = strong). Graphic: measured relative to core axis. 0° is parallel, 90° perpendicular.
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**Comments:**

$7$ from Yanin 25"
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</table>

- **Assay**: %Cu
- **Lithology**: Rock Type, Graphic

### Structure
- **Graphic**: Breccia
- **Geo**: Goethite, Sill
- **Decalc.**: Propylitic

### Alteration
- **Mineralogy**: Sulfides, Carbonite
- **Graphite**: 0%

### Comments
- *slightly altered* (marked)
- *mildly altered* (marked)
- *moderate alteration* (marked)
- *strong alteration* (marked)

**KEY**: Breccia, Goethite, Sulfide (presence or absence). *Yu* (bit with minerals). Alteration: Lo, 1 moderate, 2 strong. Graphic: measured relative to slope, 0° is parallel, 90° is perpendicular.
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**KEY:** Fault, Breccia, Gouge (presence or absence), Vein (I, II, III minerals). Alteration, (1-3) CG (1-weak, 2-moderate, 3-strong). Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular).
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**KEY:** Fault, breccia, gouge (presence or absence). Wt % (wt % minerals). Alteration, FeO, CO, SO (1=weak, 2=moderate, 3=strong). Graphic (measured relative to core axis: 0° is parallel, 90° is perpendicular).
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**Key:**
- Tuff
- Breccia
- Glype (presence or absence)
- Vein (lith with minerals)
- Alteration: FeCr, FeO (1-weak, 2-moderate, 3-strong)
- Graphite (measured relative to core axis: AP is parallel, AS is perpendicular)

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<table>
<thead>
<tr>
<th>Depth</th>
<th>Assay % Cu</th>
<th>Lithology</th>
<th>Structure</th>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>2.5</td>
<td>Marble</td>
<td>Graphite</td>
<td>5%</td>
<td>Sulfides</td>
<td>Carbon</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.00</td>
<td>3.5</td>
<td>Marble</td>
<td>Graphite</td>
<td>5%</td>
<td>Sulfides</td>
<td>Carbon</td>
<td></td>
</tr>
<tr>
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<td></td>
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<tr>
<td>4.00</td>
<td>4.5</td>
<td>Marble</td>
<td>Graphite</td>
<td>5%</td>
<td>Sulfides</td>
<td>Carbon</td>
<td></td>
</tr>
<tr>
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<td></td>
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<tr>
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<td>5.5</td>
<td>Marble</td>
<td>Graphite</td>
<td>5%</td>
<td>Sulfides</td>
<td>Carbon</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Graphite: 5% - 15%
- Sulfides: 5% - 15%
- Carbon: 5% - 15%

**KEY:** Fault, Brecia, Gouge (presence or absence). Vein (kit vein minerals). Alteration, FeOx, CO3 (1=weak, 2=moderate, 3=strong). Graphite (measured relative to core axis: 0° is parallel, 90° is perpendicular).
<table>
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<tr>
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</tr>
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<td></td>
<td></td>
<td>Crystalline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Muscovite</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quartz</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Feldspar</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>hornblende</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Chlorite</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Actinolite</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pyrite</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sulfide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Carbon</td>
</tr>
</tbody>
</table>

**Structure**

- Fault
- Breccia
- Un
- Gouge
- Silica
- Clay
- Detal
- Propylite
- Potassic

**Mineralogy**

- FeOx
- CO
- Py %
- Prr %
- Carbon %

**Comments**

- Dropshale at...
- 100% bedded grey-brown...
<table>
<thead>
<tr>
<th>Depth</th>
</tr>
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<tbody>
<tr>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
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</thead>
<tbody>
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</tr>
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<table>
<thead>
<tr>
<th>Structure</th>
<th>Alteration</th>
<th>Mineralogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Project</th>
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<tbody>
<tr>
<td>Ad.</td>
</tr>
<tr>
<td>Incl.</td>
</tr>
<tr>
<td>TD.</td>
</tr>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

KEY: Fault, Breccia, Gauged (presence or absence). Wt% (bit, else minerals). Alteration, Rmt, COG (1=weak, 2=moderate, 3=strong). Graphic (measured relative to core axis: 0°=parallel, 90°=perpendicular).
<table>
<thead>
<tr>
<th>Depth</th>
<th>Assay</th>
<th>Lithology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% CO2</td>
<td></td>
</tr>
</tbody>
</table>

**Structure**
- Graphic
- Fault
- Breccia
- Silt
- Clay
- Desiccated
- Propylitic
- Vein

**Alteration**
- Sulfide
- Pyrite
- Carbonate

**Mineralogy**
- Feldspar
- Plagioclase
- Amphibole

**Comments**
- No measurable contact
- Disseminated graphite 0.1%

**Notes:**
- Fault, breccia, gouge (presence or absence).
- VM (list with minerals).
- Alteration, FeCO3, CDI (breccia, propylitic, 3 stages).
- Graphic (measured relative to core axis: P is parallel, N is perpendicular).
<table>
<thead>
<tr>
<th>Depth</th>
<th>Assay % CO</th>
<th>Lithology Graphic</th>
<th>Structure Fault Breccia Vein Graphite Biotite Chlorite Decalcification Propylitic Fossils</th>
<th>Alteration FeOx Sulfides Cu % Pb % Zn % Carbon &amp;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>white possible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

*Disseminated possible to 1%*
<table>
<thead>
<tr>
<th>Depth</th>
<th>Assay (Co)</th>
<th>Lithology</th>
<th>Structure</th>
<th>Alteration</th>
<th>Mineralogy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td></td>
<td>Graphic</td>
<td>FeO</td>
<td>Sulfides</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FeO%</td>
<td>CO2%</td>
<td>P%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cl%</td>
<td>Na%</td>
<td>K%</td>
</tr>
</tbody>
</table>

**Comments**

- 'White, slightly gray'
- 'frothed, weathered'
- 'magnetite, thin chrome platination'
- 'alloyed, thin chrome on'
- 'frothed, weathered'
- 'frothed, weathered'
- 'frothed, weathered'

**NOTES:**
- Foul, Breccia, Sulfides [presence or absence]. Vitr (vitrine minerals).
- graphic, foliation, [lithologies], [contents, st-streng].
- Graphic (measured relative to core, sides). RP I parallel, WP I perpendicular.
<table>
<thead>
<tr>
<th>Depth</th>
<th>Assay % Cu</th>
<th>Lithology</th>
<th>Structure</th>
<th>Alteration</th>
<th>Mineralogy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Graphic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sulfides</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Precipitates</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fe Oxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Carbon</td>
<td></td>
<td></td>
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<tr>
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<td></td>
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</tr>
</tbody>
</table>

**Notes:**
- **F0** = Fine, **M0** = Medium, **L0** = Large
- **SA** = Sulfides, **PH** = Precipitates, **CO** = Carbonates
- **Fe Oxide**
- **Graphic**

**Project:**
- **Date:**
- **Easting:**
- **Northing:**

**Comments:**
- Handwritten notes included.

**Legend:**
- **F0**, **M0**, **L0** (presence of alteration).
- **SA**, **PH**, **CO** (degrees, ranges: 1 = weak, 2 = moderate, 3 = strong).
- **Graphic** (measured relative to true north; 0° is parallel, 90° is perpendicular.)
Appendix 13. Flotation testwork, chemical upgrading test report
An Investigation into

GRAPHITE UPGRADING AND PURIFICATION TESTWORK
ON THE MILLER DEPOSIT

CANADA CARBON

Project 14185-001/-002 Final Report
July 23, 2013

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Table of Contents

Introduction ............................................................................................................................................. 2
Testwork Summary ................................................................................................................................. 3
1. Sample Preparation and Head Characterization ............................................................................ 3
2. Metallurgical Testing ....................................................................................................................... 3
   2.1. Flotation Testwork ................................................................................................................. 3
   2.2. Results and Discussion ................................................................................................. 3
   2.3. Chemical Upgrading .............................................................................................................. 4
       2.3.1. Head Grade Characterization ..................................................................................... 4
       2.3.2. Hydrofluoric Acid Leaching ......................................................................................... 5
       2.3.3. Results and Discussion .............................................................................................. 5
   2.4. Two Stage Alkaline Roasting-Hydrofluoric Acid Leaching .................................................... 6
       2.4.1. Alkaline Roasting ........................................................................................................ 6
       2.4.2. Hydrofluoric Acid Leaching ......................................................................................... 6
       2.4.3. Results and Discussion .............................................................................................. 7
Conclusions and Recommendations ...................................................................................................... 8

Appendix A – Flotation Testwork ............................................................................................................ 9
Appendix B – Chemical Purification Testwork ...................................................................................... 11

List of Tables

Table 1: Head Grade Analysis ................................................................................................................ 3
Table 2: Flotation Test Results ............................................................................................................... 3
Table 3: Head Grade Analysis of the (+)48 Mesh Fraction ................................................................. 5
Table 4: Test Conditions- HF/H₂SO₄ Leaching ....................................................................................... 5
Table 5: HF/H₂SO₄ Leach Results ........................................................................................................ 5
Table 6: Test Conditions-(Caustic Bake, HF/H₂SO₄) .............................................................................. 6
Table 7: Tests Results ............................................................................................................................ 7
Introduction

This report summarizes initial scoping work examining methods to upgrade graphite by flotation followed by chemical upgrading. The objective of the chemical purification was to upgrade the +48 mesh fraction of the concentrate produced in a flotation test to a grade of >99.9% total carbon. The flotation test work was completed under project 14185-001 and the hydrometallurgical test work was completed under project 14185-001/-002. The results from this test program were reported to Mr. Bruce Duncan of Canada Carbon as they became available.

The test work included:

- Sample preparation and characterization;
- Crushing, blending and splitting;
- Flotation testing;
- Chemical upgrading.
Testwork Summary

1. Sample Preparation and Head Characterization

The graphite feed from the Miller deposit received on June 4, 2013 and assigned the SGS receipt number 0023Jun13. The sample was crushed to -6 mesh. A 1-kg sample was removed and submitted for batch flotation test work. A head sample was submitted for the full carbon suite of assays. The assay results are presented in Table 1.

Table 1: Head Grade Analysis

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>C(t)</th>
<th>C(g)</th>
<th>TOC leco pulp</th>
<th>CO2</th>
<th>S</th>
<th>LOI @ 1000°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Head Grade</td>
<td>65.1</td>
<td>61.2</td>
<td>&lt;0.05</td>
<td>61.2</td>
<td>0.04</td>
<td>72.3</td>
</tr>
</tbody>
</table>

The head graphite sample assayed at 65.1% total carbon, and 61.2% graphitic carbon. The head sample is also characterized by its low sulphur content (0.04%) and low total organic carbon (<0.05%).

2. Metallurgical Testing

2.1. Flotation Test work

A single flotation test was performed on 1 kg of material to upgrade the graphite prior to leaching. The test results are summarized Table 2, and test details are provided in the Appendix A.

Table 2: Flotation Test Results

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight g</th>
<th>%</th>
<th>Assays, %</th>
<th>% Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>C (t)</td>
<td>C (gr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th Cleaner Conc +48 mesh</td>
<td>202.5</td>
<td>20.2</td>
<td>94.4</td>
<td>93.5</td>
</tr>
<tr>
<td>4th Cleaner Conc -48 mesh</td>
<td>387.4</td>
<td>38.6</td>
<td>78.7</td>
<td>71.7</td>
</tr>
<tr>
<td>4th Clr Conc (Combined)</td>
<td>589.9</td>
<td>58.7</td>
<td>84.1</td>
<td>79.2</td>
</tr>
<tr>
<td>3rd Clr Conc</td>
<td>673.3</td>
<td>67.0</td>
<td>81.7</td>
<td>76.6</td>
</tr>
<tr>
<td>2nd Clr Conc</td>
<td>690.2</td>
<td>68.7</td>
<td>81.7</td>
<td>75.2</td>
</tr>
<tr>
<td>1st Clr Conc</td>
<td>732.3</td>
<td>72.9</td>
<td>79.0</td>
<td>72.5</td>
</tr>
<tr>
<td>1st Cl Conc + Scav Conc</td>
<td>786.0</td>
<td>78.2</td>
<td>78.9</td>
<td>72.3</td>
</tr>
<tr>
<td>1st Cl Tail</td>
<td>124.2</td>
<td>12.4</td>
<td>37.5</td>
<td>31.3</td>
</tr>
<tr>
<td>Ro Conc</td>
<td>654.0</td>
<td>65.1</td>
<td>66.4</td>
<td>58.2</td>
</tr>
<tr>
<td>Ro Tail</td>
<td>148.0</td>
<td>14.7</td>
<td>34.4</td>
<td>29.3</td>
</tr>
<tr>
<td>Head ( calc. )</td>
<td>1004.5</td>
<td>100.0</td>
<td>67.3</td>
<td>61.1</td>
</tr>
</tbody>
</table>

SGS Minerals Services
2.2. Results and Discussion

The feed sample was ground for 1 minute in a rod mill grind to liberate the large flaked graphite. A “flash flotation” stage was performed on this coarsely ground material. This recovered the coarse flakes generated in the primary grind.

The tailings from the flash float was reground in the same rod mill as a secondary grind, where further graphite was liberated and recovered in the rougher flotation stage.

The flash and rougher concentrate were combined and reground in a ceramic mill with 1/2” ceramic media. The ceramic media provides a gentle abrasion-type grind that prevents breakage of the graphite flakes compared to using the traditional steel grinding media which would be too harsh for the graphite flakes.

The reground product was then refloated in a cleaning stage to upgrade the graphite. The cleaner concentrate was upgraded three more times in three cleaner stages.

Fuel oil and methyl isobutyl carbonal (MIBC) were used as the collector and frother, respectively throughout the flowsheet as flotation reagents.

The 4th cleaner concentrate was then screened on a 48 mesh screen producing a plus and minus product that was assayed along with the various products produced in the test. The +48 mesh fraction was then leached.

The 4th cleaner concentrate recovered 73% of the C(t) at a grade of 84.1% C(t). When the 4th cleaner concentrate was screened at 48 mesh the C(t) grade of the +48 mesh fraction was 94% at almost 30% recovery. The C(t) grade of the -48 mesh fraction was almost 80%. To upgrade the -48 mesh fraction, additional regrinding (similar to flash and rougher concentrate regrinding) and several cleaning stages will probably be required to upgrade the graphite to greater than 95%, while achieving higher overall recoveries.

The C(t) grade of the rougher tailing was 34% representing roughly 7.5% of the total C(t) in the feed. The losses in the 1st cleaner scavenger tails were minimal giving a combined tailing C(t) loss of 8.3%. The test details are included in Appendix A.

2.3. Chemical Upgrading

2.3.1. Head Grade Characterization

The +48 mesh fraction of the graphite flotation concentrate was subjected to chemical upgrading. A representative head sample of approximately 10 grams was submitted for chemical analysis. The head
assay data are presented in Table 3. The concentrate assayed at 94.4% total carbon and 93.5% graphitic carbon. Key impurities include Fe, Al, Ca, Si and Mg.

### Table 3: Head Grade Analysis of the +48 Mesh Fraction

| Sample ID | C(t) % | C(g) % | LOI % | Si % | S % | Al g/t | Mg g/t | Fe g/t | Ca g/t | Mn g/t | Mo g/t | Na g/t | Ni g/t | Pb g/t | Sb g/t | Se g/t | Sn g/t | Bi g/t | Cd g/t | Co g/t | Cr g/t | Cu g/t | Be g/t | K g/t | Li g/t | Ba g/t | Sr g/t | Ti g/t | Tl g/t | U g/t | V g/t | Y g/t | Zn g/t | Ag g/t | As g/t |
|-----------|-------|-------|-------|------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| F1 +48 M  | 94.4  | 93.5  | 95    | 1.18 | 0.03| 2230  | 2060  | 4010  | 66.5  | < 200 | 116   | < 20  | < 30  | < 10  | < 30  | < 10  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  | < 20  |< 20  |
|           |       |       |       |      |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

#### 2.3.2. Hydrofluoric Acid Leaching

The objective of the hydrofluoric acid (HF) leach is to remove Si and other impurities from the graphite concentrate, and in doing so produce a high purity graphite product.

The HF leach was conducted in a Teflon beaker equipped with a magnetic stir bar and temperature probe. The reactor was placed on top of a stirring hot plate. The test was conducted in two stages. The first stage involved mixing the feed sample with a set amount of concentrated sulphuric acid (96% H₂SO₄) and water. The resulting mixture had the consistency of wet sand. Concentrated HF (48%) was added to the mixture. The resulting slurry was heated to 90°C. After 300 minutes water was added to the reaction slurry. The slurry was stirred at 90°C for an additional hour. After the reaction period, the slurry was filtered and the residue was thoroughly washed to recover the graphite. The test details and data are included in Appendix B.

#### 2.3.3. Results and Discussion

The test conditions and results are presented in Table 4 and Table 5.

### Table 4: Test Conditions- HF/H₂SO₄ Leaching

<table>
<thead>
<tr>
<th>Test:</th>
<th>Graphite Mass, g</th>
<th>Particle Size, mesh</th>
<th>HF, kg/t Feed</th>
<th>H₂SO₄, kg/t Feed</th>
<th>Time, min</th>
<th>Temp, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC-T1</td>
<td>20</td>
<td>+48</td>
<td>334</td>
<td>864</td>
<td>360</td>
<td>90</td>
</tr>
</tbody>
</table>
Table 5: HF/H$_2$SO$_4$ Leach Results

<table>
<thead>
<tr>
<th>Initial Graphite Grade</th>
<th>Final Graphite Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(t), %</td>
<td>C(g), %</td>
</tr>
<tr>
<td>94.4</td>
<td>93.5</td>
</tr>
</tbody>
</table>

The results show (Table 5) that the graphite was upgraded to 99.2% graphitic carbon and 100% total carbon.

2.4. Two Stage Alkaline Roasting-Hydrofluoric Acid Leaching

2.4.1. Alkaline Roasting

The alkaline roasting process is based on the ability of sodium hydroxide to react with the impurities in the graphite concentrate at high temperatures, especially Si, S, Fe and Ca, rendering such impurities soluble in water.

The alkaline roasting procedure consists of a caustic bake, water wash, and dilute acid leach. The caustic-graphite slurry was mixed manually for about 15 minute in a crucible. First excess water was boiled off, and then the crucible was placed into a muffle furnace at a temperature of 400°C. The reaction time was measured from the moment the sample reached the target temperature. At the conclusion of the reaction time, the crucible was removed from the furnace and the solids quenched with deionised (DI) water. The resulting slurry was heated to 80°C, while agitating for about 30 minutes and then the slurry was vacuum filtered. The resulting residue was subjected to a series of repulp-filtration steps using warm DI water until the filtrate reached a neutral pH. The washed residue was then slurried in 10% H$_2$SO$_4$ and leached for about 30 minutes at 80°C. The resulting slurry was vacuum filtered. The filter cake was repulped with DI water to remove any trace of acid. The test details and data are included in Appendix B and Table 6.

2.4.2. Hydrofluoric Acid Leaching

The washed and dried residue from the alkaline roasting stage (Section 2.4.1) was further leached with HF/H$_2$SO$_4$ mixture using the same conditions as in Section 2.3.2. The purpose of this stage is to leach the remaining and the most obstinate impurities into soluble components. The test details and data are included in Appendix B and Table 6.
2.4.3. Results and Discussion

The results (Table 7) show that the graphite was upgraded to 99.1% graphitic carbon as the result of the alkaline roasting stage. The graphite residue from this stage was further upgraded in the HF/H₂SO₄ leaching stage to approximately 100% graphitic carbon. The graphite reached 100% total carbon in both stages.

Table 7: Tests Results-(Alkaline Roast, HF/H₂SO₄)

<table>
<thead>
<tr>
<th>Test:</th>
<th>Graphite Mass, g</th>
<th>Particule Size, mesh</th>
<th>HF, kg/t Feed</th>
<th>H₂SO₄, kg/t Feed</th>
<th>NaOH, kg/t Feed</th>
<th>Time, min</th>
<th>Temp, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Roast</td>
<td>30</td>
<td>+48</td>
<td>833</td>
<td>60</td>
<td></td>
<td>833</td>
<td>60</td>
</tr>
<tr>
<td>HF/H₂SO₄ Leach</td>
<td>18</td>
<td>+48</td>
<td>370.7</td>
<td>960</td>
<td></td>
<td>360</td>
<td>90</td>
</tr>
</tbody>
</table>

Table 6: Test Conditions-(Alkaline Roast, HF/H₂SO₄)

<table>
<thead>
<tr>
<th>Test:</th>
<th>Graphite Mass, g</th>
<th>Particule Size, mesh</th>
<th>HF, kg/t Feed</th>
<th>H₂SO₄, kg/t Feed</th>
<th>NaOH, kg/t Feed</th>
<th>Time, min</th>
<th>Temp, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Roast</td>
<td>30</td>
<td>+48</td>
<td>833</td>
<td>60</td>
<td></td>
<td>833</td>
<td>60</td>
</tr>
<tr>
<td>HF/H₂SO₄ Leach</td>
<td>18</td>
<td>+48</td>
<td>370.7</td>
<td>960</td>
<td></td>
<td>360</td>
<td>90</td>
</tr>
</tbody>
</table>

Conclusions and Recommendations

Based on the results and observations from the tests detailed in this report, the following conclusions and recommendations are made:

**Flotation Tests:**

- The 4th cleaner concentrate recovered 73% of the C(t) at a grade of 84.1% C(t). When the 4th cleaner concentrate was screened at 48 mesh the C(t) grade of the +48 mesh fraction was 94% at almost 30% recovery. The C(t) grade of the -48 mesh fraction was almost 80%. To upgrade the -48 mesh fraction, addition regrinding (similar to flash and rougher concentrate regrinding) and several cleaning stages will probably be required to upgrade the graphite to greater than 95%, while achieving higher recoveries;

- The C(t) grade of the rougher tailing was 34% which represents roughly 7.5% of the total C(t) in the feed. The losses in the 1st cleaner scavenger tails were minimal giving a combined tailing C(t) losses were 8.3%;

- It is recommended that further flotation test work is performed to optimize the graphite recovery and grades while preserving the integrity of the large flakes.

**Hydrometallurgical Test work:**

- The HF/H₂SO₄ acid combination was efficient in removing most impurities. The resulting purified graphite solids were upgraded to 100% total carbon and 99.2% graphitic carbon;

- The caustic baking followed by HF/H₂SO₄ acid leach was efficient in upgrading the graphite to approximately 100% graphitic carbon and to 100% total carbon;

- According to SGS, the caustic baking process followed by hydrofluoric leaching test results were very encouraging. After being optimized on batch/bench, larger scale continuous testing of the Alkaline roasting process is recommended.
Appendix A – Flotation Testwork
Purpose: Exploratory test on Canada Carbon Sample, upgrading graphite concentrate for leach tests.

Procedure: As described below.

Feed: 1 kg of -6 mesh of the Canadian Carbon sample.

Primary Grind: 1 min/2kg @ 65 % solids in rod mill #3.

Secondary Grind: 5 min @ 65% solids in SS rod mill #3, K80 = 689 um.

Polishing Grind: Ro & Flash Conc 15 minutes Ceramic mill with 1/2" ceramic media, K80 = 330 um.

Conditions:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Reagents, g/t</th>
<th>Time, minutes</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fuel Oil</td>
<td>MIBC</td>
<td>Grind</td>
</tr>
<tr>
<td>Primary Grind</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Flotation 1</td>
<td>5</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Flash Flotation 2</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Secondary Grind</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rougher 1</td>
<td>5</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Rougher 2</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Combine Flash Conc &amp; Ro Conc</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regrind PM (ceramic media)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1st Cleaner</td>
<td>10</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>1st Cleaner Scavenger</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Cleaner</td>
<td>5.0</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>3rd Cleaner</td>
<td>5.0</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>4th Cleaner</td>
<td>5.0</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

4th cleaner concentrate screened at 48 mesh - fractions sent for assay.

Total: 50 80 0 21 9 22

Metallurgical Balance

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight</th>
<th>C (%)</th>
<th>C(gr)</th>
<th>LOI</th>
<th>% Distribution</th>
<th>C (%)</th>
<th>C(gr)</th>
<th>LOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Cleaner Conc +48 mesh</td>
<td>202.5</td>
<td>20.2</td>
<td>94.4</td>
<td>93.5</td>
<td>95.0</td>
<td>28.3</td>
<td>30.9</td>
<td>26.5</td>
</tr>
<tr>
<td>4th Cleaner Conc -48 mesh</td>
<td>387.4</td>
<td>38.6</td>
<td>78.7</td>
<td>71.7</td>
<td>82.1</td>
<td>45.1</td>
<td>45.3</td>
<td>43.8</td>
</tr>
<tr>
<td>4th Cleaner Tails</td>
<td>83.4</td>
<td>8.30</td>
<td>76.5</td>
<td>58.5</td>
<td>80.1</td>
<td>9.44</td>
<td>7.95</td>
<td>9.19</td>
</tr>
<tr>
<td>3rd Cleaner Tails</td>
<td>16.9</td>
<td>1.68</td>
<td>23.6</td>
<td>17.8</td>
<td>37.2</td>
<td>0.59</td>
<td>0.49</td>
<td>0.86</td>
</tr>
<tr>
<td>2nd Cleaner Tails</td>
<td>42.1</td>
<td>4.19</td>
<td>35.2</td>
<td>29.4</td>
<td>48.6</td>
<td>2.19</td>
<td>2.02</td>
<td>2.81</td>
</tr>
<tr>
<td>1st Cleaner Scavenger Conc</td>
<td>53.7</td>
<td>5.35</td>
<td>76.7</td>
<td>68.3</td>
<td>79.9</td>
<td>6.09</td>
<td>5.96</td>
<td>5.90</td>
</tr>
<tr>
<td>1st Cleaner Scavenger Tails</td>
<td>70.5</td>
<td>7.02</td>
<td>7.72</td>
<td>3.2</td>
<td>22.5</td>
<td>0.80</td>
<td>0.37</td>
<td>2.18</td>
</tr>
<tr>
<td>Ro Tail</td>
<td>148.0</td>
<td>14.7</td>
<td>34.4</td>
<td>29.3</td>
<td>43.4</td>
<td>7.53</td>
<td>7.07</td>
<td>8.84</td>
</tr>
<tr>
<td>Head ( calc. )</td>
<td>1004.5</td>
<td>100.0</td>
<td>67.3</td>
<td>61.1</td>
<td>72.4</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product</th>
<th>Weight</th>
<th>C (%)</th>
<th>C(gr)</th>
<th>LOI</th>
<th>% Distribution</th>
<th>C (%)</th>
<th>C(gr)</th>
<th>LOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Clr Conc</td>
<td>589.9</td>
<td>58.7</td>
<td>84.1</td>
<td>79.2</td>
<td>86.5</td>
<td>73.4</td>
<td>76.1</td>
<td>70.2</td>
</tr>
<tr>
<td>3rd Clr Conc</td>
<td>673.3</td>
<td>67.0</td>
<td>83.1</td>
<td>76.6</td>
<td>85.7</td>
<td>82.8</td>
<td>84.1</td>
<td>79.4</td>
</tr>
<tr>
<td>2nd Clr Conc</td>
<td>690.2</td>
<td>68.7</td>
<td>81.7</td>
<td>75.2</td>
<td>84.5</td>
<td>83.4</td>
<td>84.6</td>
<td>80.3</td>
</tr>
<tr>
<td>1st Clr Conc</td>
<td>732.3</td>
<td>72.9</td>
<td>79.0</td>
<td>72.5</td>
<td>82.5</td>
<td>85.6</td>
<td>86.6</td>
<td>83.1</td>
</tr>
<tr>
<td>1st Cl Conc + Scav Conc</td>
<td>786.0</td>
<td>78.2</td>
<td>78.9</td>
<td>72.3</td>
<td>82.3</td>
<td>91.7</td>
<td>92.6</td>
<td>89.0</td>
</tr>
<tr>
<td>1st Cl Tail</td>
<td>124.2</td>
<td>12.4</td>
<td>37.5</td>
<td>31.3</td>
<td>47.3</td>
<td>6.90</td>
<td>6.3</td>
<td>8.08</td>
</tr>
<tr>
<td>Ro Conc</td>
<td>654.0</td>
<td>65.1</td>
<td>66.4</td>
<td>58.2</td>
<td>71.9</td>
<td>64.2</td>
<td>62.1</td>
<td>64.7</td>
</tr>
<tr>
<td>Ro Tail</td>
<td>148.0</td>
<td>14.7</td>
<td>34.4</td>
<td>29.3</td>
<td>43.4</td>
<td>7.53</td>
<td>7.1</td>
<td>8.84</td>
</tr>
</tbody>
</table>
Appendix B – Chemical Purification Testwork
Purpose: To evaluate an HF/H2SO4 leach on a graphite sample by removing the impurities

Grind: (+)48 mesh fraction of the flotation testwork

Sample: F1 (+46mesh) Test

**Leach Conditions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Weight (g)</td>
<td>20.0</td>
</tr>
<tr>
<td>Target Leach Weight Total (g)</td>
<td>83.9</td>
</tr>
<tr>
<td>Weight of H2SO4 Addition (g)</td>
<td>18.00</td>
</tr>
<tr>
<td>Weight of HF(48%) Addition (g)</td>
<td>13.9</td>
</tr>
<tr>
<td>Weight of H2O Addition (g)</td>
<td>50.0</td>
</tr>
<tr>
<td>Pulp Density (% Solids w/w)</td>
<td>23.8</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>90.0</td>
</tr>
</tbody>
</table>

**Procedure:**

HF/H2SO4
18g of conc H2SO4 and 50g of DI water was added to a 1000ml teflon beaker. While mixing 20g of graphite was slowly added, then 13.9g of 48% HF was slowly added.

The beaker was covered with a Teflon watch glass and placed on a hot plate. The pulp was mixed with a magnetic stir bar and heated slowly to a boil (~90 °C). After 5 hour, 100ml of hot DI water was added. The pulp was then boiled for 1 more hour. After 1 hour, the beaker was removed from the hot plate and cooled.

The graphite slurry was filtered through low ash PVC membrane (5 µm). The residue was repulped three times with hot DI water and 3 times displacement washed.

**Analytical Requirements:**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample ID(s)</th>
<th>Analysis</th>
<th>LIMS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtrate</td>
<td>CC-T1 FIL</td>
<td>ICP-Scan, Si</td>
<td>CA02849-JUN13</td>
</tr>
<tr>
<td>Wash</td>
<td>CC-T1 WSH</td>
<td>ICP-Scan, Si</td>
<td>CA02849-JUN13</td>
</tr>
<tr>
<td>Residue</td>
<td>CC-T1 RES</td>
<td>C(t),LOI @ 500C and 1000C</td>
<td>CA02890-JUN13</td>
</tr>
</tbody>
</table>
### Test: CC-T1

**Date:** 17-Jun-13  
**Technologist:** H. Moussaid

#### Leach Data:

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Temp (°C)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>35.5</td>
<td>All feed in, started heat and mixing</td>
</tr>
<tr>
<td>15</td>
<td>78.0</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>240</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>90.0</td>
<td>Added 100 ml of DI water</td>
</tr>
<tr>
<td>360</td>
<td>90.0</td>
<td>End of Reaction</td>
</tr>
</tbody>
</table>

#### Sample Data:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Solution</th>
<th>Solid</th>
<th>Gross Mass, g</th>
<th>Net Mass, g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mass, g</td>
<td>Soln Den., g/mL</td>
<td>Vol, mL</td>
<td>Tare</td>
</tr>
<tr>
<td>CC-T1 FIL</td>
<td>166.9</td>
<td>1.9902</td>
<td>153.1</td>
<td>13.1</td>
</tr>
<tr>
<td>CC-T1 WSH</td>
<td>409.4</td>
<td>1.9076</td>
<td>406.2</td>
<td>230</td>
</tr>
<tr>
<td>CC-T1 RES</td>
<td>206.5</td>
<td>230</td>
<td>225.00</td>
<td>23.50</td>
</tr>
</tbody>
</table>

**% Wet Loss:** 7.50
## Mass Balance Of Selected Elements

<table>
<thead>
<tr>
<th>mass or vol, g or mL</th>
<th>Al</th>
<th>Ca</th>
<th>Fe</th>
<th>Mg</th>
<th>Na</th>
<th>Ti</th>
<th>Si</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphite Feed</td>
<td>20.0</td>
<td>0.223</td>
<td>0.96</td>
<td>0.401</td>
<td>0.206</td>
<td>0.0116</td>
<td>0.00199</td>
</tr>
<tr>
<td>FIL</td>
<td>153.1</td>
<td>19</td>
<td>427</td>
<td>499</td>
<td>144</td>
<td>1.58</td>
<td>1.7</td>
</tr>
<tr>
<td>WSH</td>
<td>406.2</td>
<td>32</td>
<td>63</td>
<td>19</td>
<td>17.3</td>
<td>0.14</td>
<td>&lt;0.2</td>
</tr>
<tr>
<td>RES</td>
<td>18.5</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
</tr>
</tbody>
</table>

**IN - Elemental Masses, g**

<table>
<thead>
<tr>
<th>Graphite Feed</th>
<th>0.045</th>
<th>0.192</th>
<th>0.1</th>
<th>0.041</th>
<th>0.002</th>
<th>0.0004</th>
<th>0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIL</td>
<td>0.003</td>
<td>0.065</td>
<td>0.076</td>
<td>0.022</td>
<td>0.000</td>
<td>0.000</td>
<td>0.231</td>
</tr>
<tr>
<td>WSH</td>
<td>0.013</td>
<td>0.026</td>
<td>0.008</td>
<td>0.007</td>
<td>0.000</td>
<td>0.000</td>
<td>0.012</td>
</tr>
<tr>
<td>RES</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a</td>
</tr>
</tbody>
</table>

**OUT - Elemental Masses, g**

<table>
<thead>
<tr>
<th>Graphite Feed</th>
<th>0.02</th>
<th>0.0910</th>
<th>0.08</th>
<th>0.03</th>
<th>0.0003</th>
<th>0.0003</th>
<th>0.243</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIL</td>
<td>35.7</td>
<td>47.4</td>
<td>104.9</td>
<td>70.6</td>
<td>12.9</td>
<td>85.8</td>
<td>102.9</td>
</tr>
<tr>
<td>WSH</td>
<td>35.7</td>
<td>47.4</td>
<td>104.9</td>
<td>70.6</td>
<td>12.9</td>
<td>85.8</td>
<td>102.9</td>
</tr>
</tbody>
</table>

**% Extraction, %**

<table>
<thead>
<tr>
<th>Graphite Feed</th>
<th>35.7</th>
<th>47.4</th>
<th>104.9</th>
<th>70.6</th>
<th>12.9</th>
<th>85.8</th>
<th>102.9</th>
</tr>
</thead>
</table>

| Solids Mass Reduction, % | 7.5 |

*** this mass balance is performed using only the graphite feed and the assays of the filtrate and the washes.
Purpose: 25% NaOH baking of graphite @ 400°C to remove impurities followed by water and acid leach

Sample: (+)48 mesh graphite from flotation test: F1

Grade: 94.4C(T)

HSE: Review MSDS for concentrated hot sodium hydroxide, NaOH. Work under ventilation, use adequate personal protective equipment.

Input data and Calculations:

<table>
<thead>
<tr>
<th>Test temperature</th>
<th>400 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to heat</td>
<td>60 min</td>
</tr>
<tr>
<td>Wet Weight</td>
<td>30.00 g</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>0.00 %</td>
</tr>
<tr>
<td>Leach caustic:Graphite Ratio</td>
<td>2.00 :1</td>
</tr>
<tr>
<td>Dry Weight</td>
<td>30.00 g</td>
</tr>
</tbody>
</table>

Procedure:
1. Review MSDS for NaOH; work under fumehood; wear applicable PPE
2. Measure and weigh the desired amount of graphite and Caustic sample; place in crucible
3. Place crucible in spill tray and put into muffle furnace
4. Set muffle furnace temperature to 400 °C for 1 hour.
5. At time t = 0, record data and observations and continue for the duration of the reaction
6. When test is complete, turn off furnace and remove crucible; place in fume hood
7. Quench sample with enough DI water to allow for repulping of residue
8. Filter the quenched sample; weigh the pregnant solution and measure SG, remove a sample for analysis
9. Wash 3 times with 125 mL water.
10. The filtered residue was slurried in 10% H2SO4 with the L/S ratio at 4/1 (w/w) at 80°C for 30 min.
11. The acidic slurry was filtered and thoroughly washed with DI water.
12. Combine washes into single container
13. Store solution in a sealed and marked container for possible further testwork/analysis
14. Weigh the wet cake (residue) and determine moisture content by drying to constant weight at 120°C
15. Submit the two analytical solution
16. Submit the dried filter cake residues for analysis
17. Ensure all data are recorded, verify balance (if applicable), and summarize results

Analytical Requirements:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample ID(s)</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtrate</td>
<td>CB-1 FIL</td>
<td>N.A</td>
</tr>
<tr>
<td>Wash</td>
<td>CB-1 WSH</td>
<td>N.A</td>
</tr>
<tr>
<td>Residue</td>
<td>CB-1 RES</td>
<td>C(t), LOI @ 1000°C</td>
</tr>
<tr>
<td>Head solids</td>
<td>CB-1 Head</td>
<td>C(t), LOI @ 1000°C</td>
</tr>
</tbody>
</table>
Test: CB-1  
Technologist: H. Moussaid  
Date: 08-Jul-13

Measurements/Observations:

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Temp (°C)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>400</td>
<td>mixed 30g of graphite with 25% NaOH (60g) in Crucible and placed in a furnace @ 400°C</td>
</tr>
<tr>
<td>30</td>
<td>400</td>
<td>End of Test</td>
</tr>
<tr>
<td>60</td>
<td>400</td>
<td>The baked graphite was mixed with DI water and water leached for 4 hours. The slurry was filtered and the residue was repulped 4 times with hot DI WATER.</td>
</tr>
</tbody>
</table>

The residue was slurried in 10% H2SO4.

Sample Data:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Solution</th>
<th>Gross Mass, g</th>
<th>Net Mass, g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mass, g</td>
<td>Soln Den., g/ml</td>
</tr>
<tr>
<td>CB-1</td>
<td>FIL NaOH Wash</td>
<td>823.4</td>
<td>1.029</td>
</tr>
<tr>
<td>CB-1</td>
<td>WSH H2SO4+Wash</td>
<td>786.9</td>
<td>1.028</td>
</tr>
<tr>
<td>CB-1</td>
<td>RES</td>
<td>202.6</td>
<td>243.6</td>
</tr>
<tr>
<td>% Wet Loss:</td>
<td></td>
<td>18.67</td>
<td></td>
</tr>
</tbody>
</table>
Purpose: To evaluate an HF/H2SO4 leach on a graphite sample by removing the impurities
Grind: (+)48 mesh
Sample: Residue from Test: CB-1

Leach Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Weight (g) (Dry)</td>
<td>18.0</td>
</tr>
<tr>
<td>Target Leach Weight Total (g)</td>
<td>81.9</td>
</tr>
<tr>
<td>Weight of H2SO4 Addition (g)</td>
<td>16.00</td>
</tr>
<tr>
<td>Weight of HF (48%) Addition (g)</td>
<td>13.9</td>
</tr>
<tr>
<td>Weight of H2O Addition (g)</td>
<td>50.0</td>
</tr>
<tr>
<td>Pulp Density (% Solids w/w)</td>
<td>22.0</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>90.0</td>
</tr>
</tbody>
</table>

Procedure:

HF/H2SO4

18g of conc H2SO4 and 50g of DI water was added to a 1000ml teflon beaker.
13.9g of 48% HF was added very slowly while mixing.
The beaker was covered with a Teflon watch glass and placed on a hot plate.
The pulp was mixed with a magnetic stir bar and heated slowly to a boil (~90 °C).
After 5 hours, 100ml of hot DI water was added.
The pulp was then boiled for 1 more hour.
After 1 hour, the beaker was removed from the hot plate and cooled.
The graphite slurry was filtered through low ash PVC membrane (5 µm).
The residue was repulped three times with hot DI water and 3 times displacement washed.

Analytical Requirements:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample ID(s)</th>
<th>Analysis</th>
<th>LIMS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtrate</td>
<td>CC-T2 FIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash</td>
<td>CC-T2 WSH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residue</td>
<td>CC-T2 RES</td>
<td>(C), LOI @ 500°C and 1000°C</td>
<td></td>
</tr>
</tbody>
</table>
**Leach Data:**

<table>
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<tr>
<th>Time (min)</th>
<th>Temp (°C)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>35.5</td>
<td>All feed in, started heat and mixing</td>
</tr>
<tr>
<td>15</td>
<td>78.0</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>240</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>90.0</td>
<td>Added 100 ml of DI water</td>
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<tr>
<td>360</td>
<td>90.0</td>
<td>End of Reaction</td>
</tr>
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</table>

**Sample Data:**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mass, g</th>
<th>Soln Den., g/mL</th>
<th>Vol, mL</th>
<th>Tare</th>
<th>Wet</th>
<th>Dry</th>
<th>Wet</th>
<th>Dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC-T2 FIL</td>
<td>150.2</td>
<td>1.0902</td>
<td>137.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CC-T2 WSH</td>
<td>350.1</td>
<td>1.0078</td>
<td>347.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC-T2 RES</td>
<td></td>
<td></td>
<td></td>
<td>21.2</td>
<td>45.2</td>
<td>38.90</td>
<td>24.00</td>
<td>17.70</td>
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%Wet Loss: 1.67
Sample: 10th Clnr Conc  
Test No.: F2  
SFA

<table>
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<tr>
<th>Mesh</th>
<th>µm</th>
<th>Weight grams</th>
<th>% Retained Individual</th>
<th>% Retained Cumulative</th>
<th>% Passing Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>425</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>48</td>
<td>300</td>
<td>11.4</td>
<td>11.0</td>
<td>11.0</td>
<td>89.0</td>
</tr>
<tr>
<td>65</td>
<td>212</td>
<td>10.4</td>
<td>10.1</td>
<td>21.1</td>
<td>78.9</td>
</tr>
<tr>
<td>80</td>
<td>180</td>
<td>6.5</td>
<td>6.3</td>
<td>27.4</td>
<td>72.6</td>
</tr>
<tr>
<td>100</td>
<td>150</td>
<td>7.7</td>
<td>7.5</td>
<td>34.9</td>
<td>65.1</td>
</tr>
<tr>
<td>150</td>
<td>106</td>
<td>14.1</td>
<td>13.7</td>
<td>48.5</td>
<td>51.5</td>
</tr>
<tr>
<td>200</td>
<td>75</td>
<td>13.1</td>
<td>12.7</td>
<td>61.2</td>
<td>38.8</td>
</tr>
<tr>
<td>Pan</td>
<td>-75</td>
<td>40.0</td>
<td>38.8</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>103.2</td>
<td>100.0</td>
<td>-</td>
<td>-</td>
</tr>
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</table>

**K80 = 221 µm**

---

**LIMS CA03367-JUL.13**

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>C(t) %</th>
<th>C(g) High %</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2 10th Clnr Conc +48mesh</td>
<td>100.1</td>
<td>99.09</td>
</tr>
<tr>
<td>F2 10th Clnr Conc +65mesh</td>
<td>99.9</td>
<td>99.02</td>
</tr>
<tr>
<td>F2 10th Clnr Conc +80mesh</td>
<td>98.6</td>
<td>99.05</td>
</tr>
<tr>
<td>F2 10th Clnr Conc +100mesh</td>
<td>97.3</td>
<td>97.2</td>
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<td>F2 10th Clnr Conc +150mesh</td>
<td>98</td>
<td>93.43</td>
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<td>F2 10th Clnr Conc +200mesh</td>
<td>97.2</td>
<td>96.69</td>
</tr>
<tr>
<td>F2 10th Clnr Conc -200mesh</td>
<td>84.4</td>
<td>84.06</td>
</tr>
</tbody>
</table>

---

Kevin Stewart  
Metallurgist, Mineral Processing  
Minerals Services  
SGS Canada Inc.  
185 Concession St.,  
Lakefield, ON K0L 2H0  
Canada
Appendix 14. GDMS and EBC tests report
### Element Concentration [ppm wt]

<table>
<thead>
<tr>
<th>Element</th>
<th>Concentration [ppm wt]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Be</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>B</td>
<td>0.12</td>
</tr>
<tr>
<td>C</td>
<td>Matrix</td>
</tr>
<tr>
<td>F</td>
<td>=&lt; 100</td>
</tr>
<tr>
<td>Na</td>
<td>39</td>
</tr>
<tr>
<td>Mg</td>
<td>5.7</td>
</tr>
<tr>
<td>Al</td>
<td>3.7</td>
</tr>
<tr>
<td>Si</td>
<td>24</td>
</tr>
<tr>
<td>P</td>
<td>0.85</td>
</tr>
<tr>
<td>S</td>
<td>14</td>
</tr>
<tr>
<td>Cl</td>
<td>0.81</td>
</tr>
<tr>
<td>K</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Ca</td>
<td>3.5</td>
</tr>
<tr>
<td>Sc</td>
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</tr>
<tr>
<td>Ti</td>
<td>0.11</td>
</tr>
<tr>
<td>V</td>
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</tr>
<tr>
<td>Cr</td>
<td>11</td>
</tr>
<tr>
<td>Mn</td>
<td>&lt; 0.05</td>
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<tr>
<td>Fe</td>
<td>12</td>
</tr>
<tr>
<td>Co</td>
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<tr>
<td>Ni</td>
<td>0.26</td>
</tr>
<tr>
<td>Cu</td>
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</tr>
<tr>
<td>Zn</td>
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<tr>
<td>Ga</td>
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</tr>
<tr>
<td>Ge</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>As</td>
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</tr>
<tr>
<td>Se</td>
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</tr>
<tr>
<td>Br</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Rb</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Sr</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Y</td>
<td>0.12</td>
</tr>
<tr>
<td>Zr</td>
<td>0.25</td>
</tr>
<tr>
<td>Nb</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>Mo</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Ru</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>Rh</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Pd</td>
<td>&lt; 0.5</td>
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</tbody>
</table>

### Element Concentration [ppm wt]

<table>
<thead>
<tr>
<th>Element</th>
<th>Concentration [ppm wt]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Cd</td>
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</tr>
<tr>
<td>In</td>
<td>Binder</td>
</tr>
<tr>
<td>Sn</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Sb</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Te</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>I</td>
<td>&lt;= 5</td>
</tr>
<tr>
<td>Cs</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Ba</td>
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</tr>
<tr>
<td>La</td>
<td>&lt;= 0.5</td>
</tr>
<tr>
<td>Ce</td>
<td>&lt;= 0.5</td>
</tr>
<tr>
<td>Pr</td>
<td>&lt;= 0.5</td>
</tr>
<tr>
<td>Nd</td>
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</tr>
<tr>
<td>Sm</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Eu</td>
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</tr>
<tr>
<td>Gd</td>
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</tr>
<tr>
<td>Tb</td>
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</tr>
<tr>
<td>Dy</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Ho</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Er</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Tm</td>
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</tr>
<tr>
<td>Yb</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Lu</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Hf</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Ta</td>
<td>&lt; 100</td>
</tr>
<tr>
<td>W</td>
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<tr>
<td>Re</td>
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</tr>
<tr>
<td>Os</td>
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</tr>
<tr>
<td>Ir</td>
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</tr>
<tr>
<td>Pt</td>
<td>&lt; 0.5</td>
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<tr>
<td>Au</td>
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</tr>
<tr>
<td>Hg</td>
<td>&lt; 0.5</td>
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<tr>
<td>Tl</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Pb</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Bi</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Th</td>
<td>0.01</td>
</tr>
<tr>
<td>U</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

**Customer:** SGS Minerals Services  
**P.O. #** 123543  
**Date:** 3-Oct-2013  
**Customer ID:** Graphite Flake  
**Job #** S0DKJ261  
**Sample ID:** S131002051  

**ISO 17025**  
**Testing Cert. #2797.03**  

---

**Reviewed by**

Precision and bias typical of GDMS measurements are discussed under ASTM F1593.  
This shall not be reproduced except in full without written approval of the laboratory.
<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>SYMBOL</th>
<th>CONC. PPM</th>
<th>EQUIV. FACTOR</th>
<th>BORON EQ. PPM</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0,12</td>
<td>1</td>
<td>0,12</td>
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<td>Chlorine</td>
<td>Cl</td>
<td>0,81</td>
<td>0,0134</td>
<td>0,010854</td>
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<tr>
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<td>Ti</td>
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<tr>
<td>Iron</td>
<td>Fe</td>
<td>12</td>
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<tr>
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<td>Ni</td>
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<td>0,00108</td>
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</table>

TOTAL BORON EQUIV. PPM
Measured values only
Appendix 15. Thermal upgrading results
<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>SYMBOL</th>
<th>INITIAL CONC. ppm</th>
<th>MEASURED ppm</th>
<th>PURIFIED CONC. ppm</th>
<th>MEASURED ppm</th>
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<tbody>
<tr>
<td>Lithium</td>
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<td>0,05</td>
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<td>0,05</td>
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<td>0,15</td>
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<td></td>
</tr>
<tr>
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<td>10</td>
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<td></td>
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<tr>
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<td>11</td>
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<td>Potassium</td>
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<td>0,8</td>
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<td>3</td>
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<td>Ti</td>
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<td>0,2</td>
<td>0,05</td>
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<td>V</td>
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<td>0,05</td>
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</tr>
<tr>
<td>Chromium</td>
<td>Cr</td>
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