Canada Carbon Achieves 99.9978% Purity by Rapid Thermal Upgrading of Miller Vein Graphite

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VANCOUVER, BRITISH COLUMBIA--(Marketwired - Dec 12, 2013) - **Canada Carbon Inc. (the "Company") (TSX VENTURE:CCB)** is pleased to announce the following results from additional chemical characterization of the purified graphite concentrate from its 100% owned Miller hydrothermal lump/vein graphite property. 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. This is important information, because very pure graphite currently sells for much higher prices than less pure graphite material. Moreover, the specific contaminants present can influence the high-technology applications for which the graphite is suitable.

A sample of the Miller vein graphite was subjected to a two stage caustic roast/acid leaching process, by SGS Canada Ltd., as previously reported, which was then submitted to Evans Analytical Group, of Liverpool, New York (EAG-NY) for full survey chemical analysis by glow discharge mass spectrometry (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% Cg) easily exceeds the overall purity threshold for nuclear grade graphite (99.97% Cg). Another nuclear grade purity criterion is the Boron Equivalent Content (BEC), a measure of the neutron capture potential of the elemental contaminants in the graphite. Based on only the three detected elements (boron, chlorine, and nickel) among the list of sixteen elements typically considered for the calculation of the Boron Equivalent Concentration, the BEC of this graphite sample was 0.164 ppm. When the detection limits for the other 13 elements were included (as per ASTM methods), the BEC was not more than 0.966 ppm, well below the strictest standard (2 ppm BEC) typically applied to nuclear graphite purity specifications.

TABLE 1: ELEMENTAL CONTAMINANTS DETECTED AFTER THERMAL TREATMENT

ELEMENT	SYMBOL	CONCENTRATION (ppm by weight)	% REDUCTION BY THERMAL TREATMENT
Boron	B	0.15	50
Sodium	Na	3.4	77
Aluminum	Al	0.2	>99
Silicon	Si	1.5	95
Sulphur	S	11	56
Chlorine	Cl	1	50
Potassium	K	0.8	20

Calcium	Ca	3	97
Nickel	Ni	0.7	0
Tungsten	W	0.7	30

R. Bruce Duncan, CEO and Director of Canada Carbon, remarked, "The Miller vein graphite continues to exceed our most optimistic expectations with respect to not only the high purity achievable for it, but also the ease with which those results are obtained. Here, we report 90% loss of contaminants in just 10 minutes of thermal treatment. Despite the great success that we have achieved so far in upgrading our Miller graphite, these results are still preliminary. The Company is planning a systematic laboratory investigation to determine an optimized metallurgical process for this graphite, which we believe could provide results exceeding those achieved via these initial investigations. The Company will also submit samples of the Miller graphite for characterization tests, to further investigate some of its unique physical properties. Those results will be reported as soon as they are received."

Dr. Karol Putyera, Vice President for GDMS Services at EAG-NY stated that, "The high temperature heat treatment experiment clearly points towards unique physical characteristics of this Miller vein material. In all my years of analyzing graphite this behavior is unprecedented"

Sample Processing, Assay Procedures, and Technical Information

A surface sample of Miller vein graphite (62% Cg) was submitted to SGS Canada (Lakefield), where it was crushed, concentrated by single-stage flotation (dense media separation), and sorted by particle size. The +48 mesh fraction graded 93.5% Cg (please refer to press release dated July 18, 2013). This concentrate was upgraded via sequential caustic roast and leaching in H_2SO_4/HF, then thoroughly washed, resulting in graphite of >99% purity, as determined by the Leco furnace method (please refer to press release dated July 23, 2013).

A sample of this high-purity material was submitted to EAG-NY, where it was prepared for chemical survey analysis by GDMS. In this method, the sample (graphite) is mounted as the cathode in the glow discharge cell and analyzed directly. Argon is generally used as the discharge (plasma) gas, which atomizes the sample. Atomized species diffuse into the discharge plasma, where they are ionized. Carbon ions together with analyte ions are then extracted from the cell and accelerated into the mass analyzer for detection. The plasma atomization process continues until a sufficient mass of the sample has been atomized, to ensure that the acquired results are representative of the analyzed sample. The mass spectrometer determines the ion beam ratios of analyte ions versus carbon ions, thereby identifying the elements present in the sample, and their mass fractions. Reference sample analysis is used to determine the relative sensitivity factors for each element, which then determines the limits of detection for each element.

Previously, a purified Miller graphite sample was submitted to EAG-NY, where it was submitted for GDMS survey analysis, using a protocol in which the graphite was first pressed into a high purity indium metal, to serve as a binder. This resulted in higher limits of detection for the analyte elements, as the plasma intensity was limited by the low melting point of indium. For the assay results reported here, a larger sample was submitted so that the assay protocol could be optimized for fast flow GDMS measurements, resulting in higher instrumental sensitivity. An approximately 5g sample of Miller graphite was pressed into a self-supporting wafer without a binder. This sample was then assayed by FF-GDMS "as received", and also after heat treatment. Thermal treatment conditions were the following: flowing helium atmosphere (100 mL/min); temperature 2000-2200 C.; duration 10 minutes. The equipment used was supplied by Thermo Fisher Scientific, Model Element GD.

The impurity concentrations obtained by FF-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 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 FF-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.

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recognized leader in the development and delivery of international voluntary consensus standards. Today, some 12,000 ASTM standards are used around the world to improve product quality, enhance safety, facilitate market access and trade, and build consumer confidence.

About Dr. Karol Putyera, Vice President, GDMS Analytical Services, New York

Dr. Putyera started to work for Shiva Technologies, Inc. (later purchased by Evans Analytical Group) in 1992 as a part-time GDMS analyst while being a Research Associate in the L.C. Smith College of Chemical Engineering and Materials Science at Syracuse University NY, from 1992-1995. After completing his JSPS fellowship at Chiba University in Japan Dr. Putyera joined Shiva full-time as technical manager and subsequently held positions in the company as Director of Advanced Technology Group, General Manager Shiva West, Laboratory Director, Vice President for Business and Technology Development and most recently President of Shiva Technologies, Inc. and Shiva Technologies Europe.

Dr. Putyera completed his BS and M.S. degrees in Physical Chemistry at Charles University, Prague, Czech Republic in 1983 and 1985, respectively. He received his Ph.D. degree in Inorganic Chemistry in 1991 at the Institute of Inorganic Chemistry, Slovak Academy of Sciences, Slovak Republic.

Rémi Charbonneau, Ph.D., P. Geo #290 (an Associate of Inlandsis Consultants s.e.n.c.) is an Independent Qualified Person under National Instrument 43-101, and has reviewed and approved the technical information provided in this news release.
On Behalf of the Board of Directors

CANADA CARBON INC.

R. Bruce Duncan, Interim CEO and Director

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