

2019 NI 43-101 Mineral Resource Update for Graphite Creek, Seward Peninsula, Alaska, USA



Photo: High-grade graphite interval from 18GC021

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Glossary of Terms

Elements/Assays

C, %C	carbon, weight, percent carbon
Cg, %Cg	graphitic carbon, weight percent carbon
CO	carbon monoxide
CO ₂	carbon dioxide
Li	lithium
Li+	lithium ion
K	potassium
Ar	argon
40K/40Ar	potassium 40/argon 40 dating methodology

Mass, Length, Area, Volume

wt%	weight percent
kg	kilogram(s)
lbs	pounds
t	metric tonne(s)
t-conc	metric tonnes graphite concentrate
\$US per t	US dollars per metric tonne
tpa	metric tonnes per annum
tpd	metric tonnes per day
tpy	metric tonnes per year
g/cm ³	grams per cubic centimeter
kg/m ³	kilograms per cubic meter
sg	specific gravity
m ² /g	square meters per gram
m ²	square meter
km	kilometer(s)
m	meter(s)
mm	millimeter(s)
µm	microns/micrometer(s)
nm	nanometer(s)
D50	50% passing particle size

Financial/Tax Initialisms

EBDIT	earnings before depreciation, interest, & taxes
IRR	internal rate of return
NPV	net present value
\$	US dollars
ACIT	State of Alaska Corporate Income Tax
AMLT	Alaska Mining License Tax
APR	Alaska Production Royalty
B&O	Washington State Business & Occupation Tax
DAPD	Domestic Activities Production Deduction
EIC	Exploration Incentive Credit
NSR	Net Smelter Return

Time, Rate

s	second(s)
h	hour(s)
pa	per annum

Initialisms

BET	Brunauer-Emmet-Teller
CIM	Canadian Institute of Mining, Metallurgy, & Petroleum
EV	electric vehicle
FOB	free on board
FS	feasibility study
GPS	global positioning system
HMS	heavy media separation
IGL	independent graphite laboratory
IMPL	independent mineral processing laboratory
LNG	liquefied natural gas
LOI	loss-on-ignition
PFS	prefeasibility study
QA	quality assurance
QC	quality control
QP	qualified person
ROM	run of mine
TPF	Thermal Processing Facility

Symbols

>	greater than
<	less than

Power/Energy/Temperature

kW	kilowatt(s)
kWh	kilowatt hour(s)
MW	megawatt(s)
MWh	megawatt hour(s)
MWh-y	megawatt hours per year
GWh	gigawatt hour(s)
Ah/kg	Ampere hour per kilogram
V	Volt(s)
°C	degrees Celsius

Graphite Products

MG	milled graphite
NMG	non-milled graphite
NM-P-SG	non-milled purified spherical graphite
M-P-SG	milled purified spherical graphite
CSG	coated spherical graphite
M-P-CSG	milled purified coated spherical graphite



1 Summary

1.1 Project Overview

The Graphite Creek Property (the “Property”) is located in the Kigluaik Mountains on the Seward Peninsula approximately 60 km north of Nome, Alaska. The Property consists of 176 ¼ section state claims after the recent transfer of 24 federal mining claims to State of Alaska mining claims.

Graphite One Inc. recently completed its fifth season of exploration and fourth season of drilling on the Graphite Creek Property on the Seward Peninsula, Alaska, USA. The Graphite Creek Property continues to show potential to be a significant domestic source of critical graphite materials based on its high-grade, percentage of large-flake graphite, and near-surface mineralization. Graphite One Inc. first acquired claims over the Graphite Creek Property in 2011 and did mapping and sampling over the Property. In 2012, Graphite One initiated the first drill program on the Property and flew helicopter-borne electromagnetics. A resource estimate with indicated resources was calculated in 2014 using drilling from 2014 drilling on 50m centers.

Graphite One contracted TRU Group in 2016 to complete a preliminary economic assessment (PEA) on the Graphite Creek deposit. In June 2017 the PEA was finalized with an updated resource containing 10.32 million tonnes of indicated resources at 7.2% Cg and 744,000 tonnes graphite. Inferred resources were 71.24 million tonnes at 7.0% Cg and 4,969,000 tonnes graphite. Cut-off grade was at 6% Cg.

With the infill drilling results from 2018 and a more detailed block model, Graphite Creek now has a measured resource totaling 1.69 million tonnes at 8.0% Cg and 135,000 tonnes of contained graphite with a 5% cut-off grade. Total measured and indicated resources are 10.95 million tonnes at 7.8% Cg with 850,000 tonnes of contained graphite at a 5% cut-off grade. This represents a 6% increase in tonnage, an 8% improvement in grade and a 14% increase in contained graphite when compared to the 2017 PEA indicated resource results.

1.2 Geological Setting and Mineralization

The Graphite Creek deposit is made up of the Kigluaik Group which consists of amphibolite and granulite facies metamorphic rocks which is divided into two sub-groups, an upper and lower assemblage. Amphibolite grade upper Kigluaik Group schist is exposed on the southern flanks of the Kigluaik Mountains. The basal Kigluaik Group contains granulite grade schist and gneiss and is exposed on north flank of the mountains. The lower Kigluaik Group comprises coarse marble, quartzo-feldspathic gneiss, schist and gneiss of mafic and ultramafic composition, graphite-rich schist, and garnet lherzolite.

The metamorphic rocks of the Kigluaik Group are composed of continental crustal material of Proterozoic to middle Paleozoic age that were subjected to crustal imbrication and thickening in middle Mesozoic time and widespread plutonic activity in mid-Cretaceous to late Cretaceous time (Sainsbury, 1972, 1975; Bunker et al., 1979; Miller, 1994; Till and Dumoulin, 1994; Armstrong et al., 1986; Amato and Wright, 1998; Till et al., 2011). However, some authors have proposed that at least part, and perhaps a significant part, of high-grade metasedimentary and metaigneous rocks of the Kigluaik Group (unit PzPh on Figure 3) was originally blueschist-facies rocks of the Nome Complex subsequent to a high-grade metamorphic overprinting (Hannula and McWilliams, 1995; Till et al., 2011).



All of the formations of the Kigluaik Group are cut by intrusive rocks, the most common of which is granite. These intrusions are more abundant in the lower part of the group. Besides granite intrusions, dykes and sills of diorite, diabase and pegmatite are present.

Peak metamorphic grade in the area is thought to have occurred in the Cretaceous (91 Ma), immediately preceding or coincident with the intrusion of the Kigluaik Pluton (Amato and Wright, 1998). Other dating methods have yielded younger ages. ⁴⁰K/⁴⁰Ar and ⁴⁰Ar/³⁹Ar dating have yielded ages of ~95-81 Ma. The younger ages likely date the onset of high-grade regional metamorphism of the Kigluaik Group (Adler and Bundtzen, 2011).

There are two distinctive graphite-bearing schist intervals at Graphite Creek. The first is quartz-biotite-garnet-sillimanite schist that contains coarse, semi-massive and massive graphite segregations (Figure 4). The other interval unit is quartz-biotite schist that typically contains disseminated graphite. The quartz-biotite-garnet-sillimanite schist is the principal host to higher grade graphite and makes up two distinctive layers in the metasedimentary sequence along the north flank of the Kigluaik Mountains. A third potential horizon is defined by 'pods' of quartz-biotite-garnet-sillimanite schist. The position of these layers is most likely structurally controlled; that is a folded unit with the third pod-like layer forming in this style as uppermost erosional features (T. Hudson, personal communication, 2012). Hence, shallow-dipping erosional remnants of the southern-most third layer makes up a few discontinuous perched masses at higher elevations. The quartz-biotite-garnet-sillimanite schist layers strike obliquely to the mountain front and dip northwards at 40° to 80°.

1.3 Drilling

The primary goals of the 2018 drill program were to increase indicated resources to measured and to gather sufficient material for metallurgical tests. To accomplish this, drill holes were planned within the core area of the resource at 50m-spaced down-dip step-outs. Larger diameter HQ core (6.35 cm) was drilled in the 2018 program. A total of 800.87 m of drilling in 6 drill holes was completed.

All 6 drill holes encountered graphite mineralization where expected down-dip of known mineralization. Results from the drilling is presented in the Interpretation and Conclusions section of this report.

The 2018 drilling continued to show that the upper zone of graphite mineralization is fairly consistent. The lower zone of mineralization is more variable in grade and thickness of higher grade graphite mineralization.

1.4 Resources

The Graphite Creek Resource estimate has been classified as 'Measured,' 'Indicated' and 'Inferred' according to the CIM definition standards. The classification was based on geological confidence, data quality and grade continuity. The most relevant factors used in the classification process were:

- Drill hole spacing density;
- Level of confidence in the geological interpretation where the observed stratigraphic horizons are easily identifiable along strike and across the deposit, which provides confidence in the geological and mineralization continuity; and
- Estimation parameters (i.e., continuity of mineralization).



The 2019 resource update has calculated the following resources with a 5% cut-off grade:

- Measured: 1.69 million tonnes containing 135,000 tonnes of graphite grading 8.0%
- Indicated: 9.26 million tonnes containing 715,000 tonnes of graphite grading 7.7%
- Inferred: 91.89 million tonnes containing 7,343,000 tonnes of graphite grading 8.0%

It should be noted the dip and location of the Kigluaik Fault that trends parallel and is adjacent to the mineralization of the deposit is a controlling factor of the graphite resource. The updated fault surface in the area of new 2018 drill results indicated a potential dip to the NW and a location 20-100 meters to the south-east of the previous interpretation of the fault. Outside of the new 2018 drilling, the fault has been interpreted as being vertical. The vertical surface and new location of the fault results in a truncation in the down dip extension of mineralization in places. However, the observed stratigraphic horizons show remarkable consistency along strike with little deviation along strike which provides confidence in the geological and mineralization continuity.

1.5 Environmental, Permitting, Social Impact

Graphite One continued to conduct environmental baseline studies on the Graphite Creek project to examine the potential impact of the Project on the environment and on the land water use by Alaska Native communities. In 2018, this work continued with hydrology and water quality sampling at the same sampling sites surveyed in past years (2014, 2015, and 2016). An aerial salmon stream survey was also undertaken and identified 16 anadromous streams. The salmon survey noted adult salmon distribution on the streams adjacent to Imuruk Bay being limited to the lower reaches of the streams. Pink salmon were the dominant species observed, with few observations of chum as a single or paired individuals, and one group of small Dolly Varden.

Graphite One also continued community outreach activities so the closest Alaska Native villages are informed about the project. Prior to the 2018 field season, Graphite One was invited to the villages of Teller and Brevig Mission to provide a project update, to review plans for the field season and employment opportunities. During the 2018 field season, Graphite One provided site tours of the Property to members from surrounding villages as part of the Subsistence Advisory Committee (SAC). Three separate tours were given with community members from Teller, Brevig Mission, Mary's Igloo, and Nome. The tour gave an opportunity for these local members to hear an update on the Graphite Creek project, see the current state of the project site, provide knowledge and insight to Graphite One personnel as to the regional subsistence resources and their importance to the surrounding communities, and voice comments and concerns, both positive and negative, on effects the project could have on their way of life. After the field season, a follow-up facilitated meeting was convened in Nome to provide an opportunity to all SAC members to compare notes, ask questions, discuss concerns and provide feedback to the company for future planning and design considerations. The company plans for the SAC tours and meeting to be held annually.

1.6 Recommendations

Follow-up drilling is needed to bring more indicated resources up to measured resources in the core area of the Graphite Creek deposit. An estimated 30-50 drill holes averaging 150 m in depth are needed at 50m spacing. Exploration drilling along strike of the deposit which is also open for kilometers on either side of the indicated resource area is also recommended but may not be necessary in the near term.



Drilling in 2018 encountered a large fault that appears to not have been intersected previously. This fault is likely a part of the Kigluaik fault system, which is a basin-bounding fault system separating the entire Kigluaik Mountains from the Imuruk Basin. This fault bounds the down-dip extent of the graphite mineralization. Further drilling targeting to intersect this fault will give better definition to the extent of the graphite resource. Understanding the nature of this structural zone will also be important in the mine planning process.

Oriented core should be included in future drilling programs. Oriented core will provide structural information which will aid in understanding the geologic controls on mineralization (folding, foliation, faulting, etc.) and also provide geotechnical information on joints, fractures, faults, etc. which will be important for mine design.

Geotechnical drilling should also be implemented to begin studies for excavation stability analyses, optimal pit slope angles, and pit architecture for mine design purposes.

Metallurgical studies should continue with the material collected in 2018 and 2014.

Environmental baseline studies and community outreach should be ongoing.

2 Introduction

The United States Department of Defense recently identified graphite as a “critical mineral” based on the high demand of graphite needed for national security/defense applications and the current 100% dependency the U.S. has on imports for graphite, mostly from China (United States Department of Defense, 2018). This directive highlights the importance and support for finding a domestic source to fulfil the U.S.’s graphite demand, such as what could be fulfilled with the Graphite Creek Deposit.

Graphite One Inc. recently completed its fifth season of exploration and fourth season of drilling on the Graphite Creek Property on the Seward Peninsula, Alaska, United States. The Graphite Creek Property is a world-class graphite deposit based on its high-grade, percentage of large-flake graphite, and near-surface mineralization which is subparallel to topography.

The 2018 drill program focused on elevating indicated resources to measured resources and collecting mineralized material for metallurgical analyses. A total of 800.87 m of drilling in 6 drill holes was completed between August 2nd and October 3rd, 2018.

Work on an updated resource for Graphite Creek was started in January 2019. With the infill drilling results from 2018 and a more detailed block model, Graphite Creek now has a measured resource totaling 1.69 million tonnes at 8.0% graphitic carbon (Cg) and 0.14 million tonnes of contained graphite. Total measured and indicated resources are 10.95 million tonnes at 7.8% Cg with 0.85 million tonnes of contained graphite. This represents a 6% increase in tonnage, an 8% improvement in grade and a 14% increase in contained graphite when compared to the 2017 PEA indicated resource results.



3 Reliance on Other Experts

Information in sections 13, 16, 17, 18, 19, most of 20, 21, 22, and 24 were taken from the 2017 PEA report by the TRU Group. Section 14 was completed by Chris Valorose, M.Sc., MAusIMM of Valorose Consulting, Inc. All other sections were compiled by Natalie King, M.Sc., of Alaska Earth Sciences, Inc. and project manager in 2018 of the Graphite Creek Project.

All information in this report has been reviewed and approved by William T. Ellis, P. Geo with Alaska Earth Sciences, Inc. Mr. Ellis provided oversight to the 2018 drilling and sampling program and updated resource estimate and is a “Qualified Person” under NI 43-101 guidelines. Mr. Ellis conducted a site visit on September 19-20, 2018 to Graphite One’s prep lab facilities in Nome, Tisuk camp, and Graphite Creek project site.

4 Property Description and Location

The Graphite Creek Property (the “Property”) is located in the Kigluaik Mountains on the Seward Peninsula approximately 60 km north of Nome, Alaska (Figure 1). The Kigluaik Mountains are a 70-km long east-west mountain range bounding the south edge of the Imuruk Basin. The Kigluaik Mountains go from near sea level up to around 1000 m in elevation with the highest peak, Mount Osborn reaching 1437 m. The mountains are quite rugged with glacially carved U-shaped valleys and hanging valleys. The Property is at about 300 m in elevation on the northern flank of the Kigluaik Mountains, above the Imuruk Basin.

The graphite outcrops at about 300 m and strikes roughly subparallel with the flank of the Kigluaik Mountains. Creek drainages out of the mountains cross-cut the graphite perpendicular providing good exposure of bedrock. Graphite Creek, Ruby Creek, and Christopherson Creek are notable drainages with good graphite exposure.

The Property consists of 176 ¼ section state claims after the recent transfer of 24 federal mining claims to State of Alaska mining claims in March 2018. The 28,160-acre Property is now 100% on State of Alaska land.

A seasonal exploration camp was re-established at mile 49 on the Nome-Teller Highway near the Tisuk River.



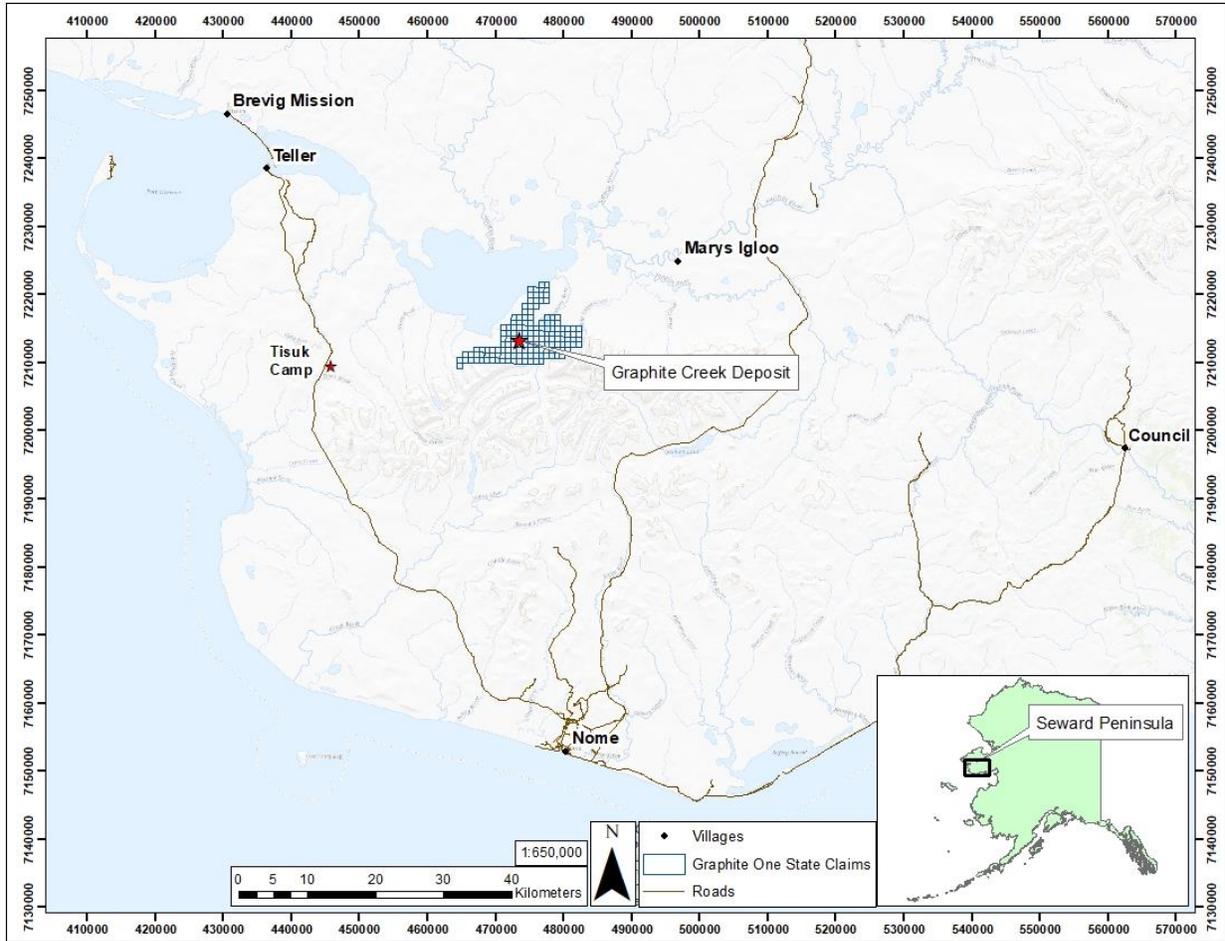


Figure 1: Location of Graphite One Resources Inc.'s state claims on the Seward Peninsula, Alaska.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The Graphite Creek Property is in the middle of the Seward Peninsula 60 km north of the city of Nome which has a year-round population of approximately 3,000 to 4,000 people. The Property is 45 km to the south east from the village of Teller with a population of around 200 people. Currently the property is only accessible by helicopter. The closest road access is either 23 km to the south east through Mosquito Pass to the Kougarok Road (Nome-Taylor Highway) or 30 km west along the north flank of the Kigluaik Mountains to the Nome-Teller Highway.

The Property lies within the subarctic climate with long, cold winters and short, mild summers. Average high temperatures in Nome range from 4 to 16 °C May to September and -12 to 0 °C from October to April. The wettest months are from July to September with an average of 2.5-8 cm of precipitation. The Property site is 5 km from Windy Cove on the Imuruk Basin which is well known by locals as an area of high winds particularly in the late fall through the winter. Water spouts are known to form in Windy Cove during these high wind events.

Much of the vegetation around the Property is typical of subarctic climates with abundant shrubs, tundra, moss, and lichen (Figure 2). There are no trees on or near the Property. The steeper Kigluaik Mountains are covered mostly in talus and bedrock. In the lower elevations, such as near the deposit, rocky surfaces have more lichen cover and thin veneers of moss. Discontinuous permafrost is also present throughout the region.



Figure 2: Photos of Property at drill site 18GC023 showing abundance of tundra and shrubs. Photo on the left is looking northwest towards Windy Cove in the Imuruk Basin. Photo on the right is looking east at the drill site at the break in slope at the base of the Kigluaik Mountains.

6 History

Graphitic bedrock was first documented on the north side of the Kigluaik Mountains in the early twentieth century (Moffit, 1913). The graphite showings are known to outcrop in incised creek valleys on the north side of the Kigluaik Mountains and it is from these exposures that the graphite showings have been described by various authors (e.g., Mertie, 1918; Coats, 1944; Cobb, 1972; Cobb and Sainsbury, 1972; Sainsbury, 1972; Weiss, 1973; Cobb, 1975; Hudson and Plafker, 1978; Hudson, 1981, 1998; Swainbank et al., 1995; Adler and Bundtzen, 2011; Nelson, 2011). From west to east these creek exposures include Christophosen Creek, Hot Springs Creek, Trail Creek, Glacier Canyon Creek, Ruby Creek and Graphite Creek. A general historical overview of each of the historical graphite showings is described in Duplessis et al. (2013).

6.1 Historical Mining

During the early 1900s, at least two companies mined in the area. The first known claims were staked in 1900 by Uncle Sam Alaska Mining Syndicate (“USAMS”) in Graphite Bay, now known as Windy Cove (Harrington, 1919). In 1912, USAMS shipped 120 tonnes of graphite to Seattle and the San Francisco Bay area, and by 1916 had stockpiled another 275 tonnes (Mertie, 1918). The Alaska Graphite Mining Co. staked claims in 1905 and added additional claims in 1915 and 1916 (Mertie, 1918; Harrington, 1919). A total of 32 tonnes of graphite was mined from talus in 1907 (Coats, 1944). Employing about seven people, 90 tonnes of graphite was mined in 1916 (Mertie, 1918). This production was hauled a short distance overland to Windy Cove, from there to Teller by boat, and then shipped to Seattle and San Francisco (Harrington, 1919).

6.2 Early Exploration

After initial early 1900s production, the Graphite Creek Property lay dormant until 1943 when USGS geologist Robert Coats visited the area. His field crew sampled material from several sorted piles of previously mined graphite, and from several high grade graphitic lenses on the Property (Coats, 1944). Three specific areas underwent surface excavation work and were named by Coats as Christophosen Creek, Ruby Creek, and Graphite Creek. Coats (1944) reported that exposed high-grade lenses in these three areas varied from a few centimeters to a meter in thickness with lengths that are ten to fifteen times their width and contained up to 60% graphite.

The last known exploration interest in the area was in 1981 when a brief field examination of the showings was conducted by the Anaconda Copper Company when several samples were taken for analysis during a one-day visit (Hudson, 1981; Wolgemuth, 1982).

6.3 Graphite One Exploration

Exploration work performed by Graphite One during 2011 to 2014 consisted of a variety of programs, the details of which are reported in Duplessis et al. (2013), Eccles and Nicolls (2014), and Eccles et al. (2015). Those programs are summarized in this report in the Exploration section.

7 Geological Setting and Mineralization

The following geologic sections were taken from Eccles et al., 2015.

7.1 Regional Geology

The Kigluaik Group consists of amphibolite and granulite facies metamorphic rocks and is therefore divided into two sub-groups, an upper and lower assemblage. Amphibolite grade upper Kigluaik Group schist is exposed on the southern flanks of the Kigluaik Mountains. Pelitic gneiss samples from the upper section of the Kigluaik group have been dated using Rb/Sr to ~735 Ma (Bunker et al., 1979). The basal Kigluaik Group contains granulite grade schist and gneiss and is exposed on north flank of the mountains (Figure 3). These rocks have no direct counterparts in the adjacent mountain ranges and are believed to represent the deepest crustal rocks exposed in northwestern Alaska (Miller, 1994). The lower Kigluaik Group comprises coarse marble, quartzo-feldspathic gneiss, schist and gneiss of mafic and ultramafic composition, graphite-rich schist, and garnet lherzolite.



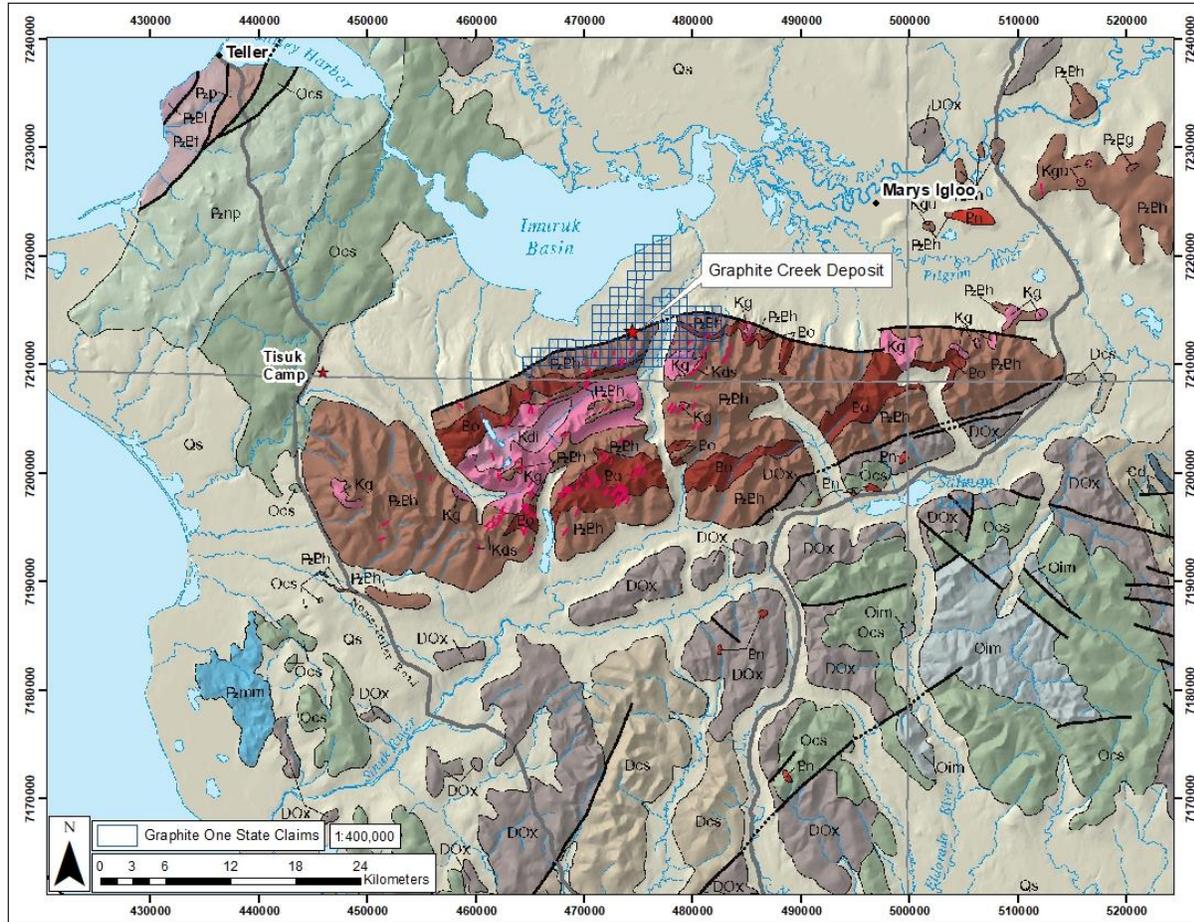
The metamorphic rocks of the Kigluaik Group are composed of continental crustal material of Proterozoic to middle Paleozoic age that were subjected to crustal imbrication and thickening in middle Mesozoic time and widespread plutonic activity in mid-Cretaceous to late Cretaceous time (Sainsbury, 1972, 1975; Bunker et al., 1979; Miller, 1994; Till and Dumoulin, 1994; Armstrong et al., 1986; Amato and Wright, 1998; Till et al., 2011). However, some authors have proposed that at least part, and perhaps a significant part, of high-grade metasedimentary and metaigneous rocks of the Kigluaik Group (unit PzPh on Figure 3) was originally blueschist-facies rocks of the Nome Complex subsequent to a high-grade metamorphic overprinting (Hannula and McWilliams, 1995; Till et al., 2011).

All of the formations of the Kigluaik Group are cut by intrusive rocks, the most common of which is granite. These intrusions are more abundant in the lower part of the group. Besides granite intrusions, dykes and sills of diorite, diabase and pegmatite are present.

Peak metamorphic grade in the area is thought to have occurred in the Cretaceous (91 Ma), immediately preceding or coincident with the intrusion of the Kigluaik Pluton (Amato and Wright, 1998). Other dating methods have yielded younger ages. $^{40}\text{K}/^{40}\text{Ar}$ and $^{40}\text{Ar}/^{39}\text{Ar}$ dating have yielded ages of ~95-81 Ma. The younger ages likely date the onset of high-grade regional metamorphism of the Kigluaik Group (Adler and Bundtzen, 2011).

Bedrock is either exposed or covered minimally by surficial overburden material throughout most of the Property area, particularly in the incised creek valleys and/or relatively steep slopes adjacent to the Kigluaik Fault. Surficial Quaternary deposits dominate the area to the north of the Graphite One Property. The surficial deposits include: glacially deposited sand, gravel, and boulders; fluvial gravel and sand; marine and fluvial terrace deposits; and wetlands (Till et al., 2011).





LIST OF MAP UNITS

[See Description of Map Units (in pamphlet) for complete unit descriptions. Some unit exposures on the map are too small to distinguish the color for unit identification. These units are labeled where possible, and unlabeled units are attributed in the database.]

SURFICIAL DEPOSITS

- Qs Surficial deposits, undivided (Quaternary)
- MESOZOIC AND CENOZOIC IGNEOUS ROCKS**
- LJm Lost Jim Basalt (Holocene)
- QTV Weathered volcanic rocks, undivided (Quaternary and Tertiary)
- TKv Felsic volcanic rocks (Tertiary and Cretaceous)
- Khp Tin-bearing granitic stocks (Late Cretaceous)
- Kds Dikes and stocks (Cretaceous)
- Pp Pargon pluton (Cretaceous)
- Kgd Kiglaik diorite (Cretaceous)
- Kg Kiglaik granite (Cretaceous)
- Kgs Stocks, undifferentiated (Cretaceous)
- Klu Kugruk pluton (Cretaceous)
- Kwc Windy Creek pluton (Cretaceous)
- Kd Darby pluton (Cretaceous)
- Kdi Diorite (Cretaceous)
- Kgr Granodiorite (Cretaceous)
- Kma Monzonite-syenite (Cretaceous)
- Kgm Gaeisic monzonite (Cretaceous)
- Kbk Bendleben and Kuzlirra plutons (Cretaceous)
- Kdc Dry Canyon stock (Early Cretaceous)
- Kgr Granite and granodiorite (Early Cretaceous)
- Ksy Syenite, monzonite, and nepheline syenite (Early Cretaceous)
- Kv Andesite and basalt flows and volcanoclastic rocks (Early Cretaceous)
- Kgr Granitic rocks, undifferentiated (Cretaceous)

YORK TERRANE

YORK MOUNTAINS SUCCESSION

- DSl Limestone (Devonian and (or) Silurian)
- SOsl Dark limestone (Silurian and Upper Ordovician)
- SOul Limestone and dolostone, undifferentiated (Silurian and Ordovician)
- Os Limestone and shale (Ordovician)
- Oi Limestone (Ordovician)
- Oal Argillaceous limestone and limestone (Ordovician)

UNITS WITH UNCERTAIN AFFINITIES

- Bl Limestone (Paleozoic)
- Ml Limestone, dolomitic limestone, and marble (Mississippian)
- PuP Metagabbro (Paleozoic)
- OEl Limestone and dolomitic limestone (Ordovician to Proterozoic)
- OEt Sandstone, siltstone, and limestone (Ordovician to Proterozoic)
- Olp Phyllite (Ordovician to Proterozoic)

GRANTLEY HARBOR FAULT ZONE

- Rp Phyllite and argillite (Paleozoic)
- PEl Metalimestone (Paleozoic and Proterozoic?)
- PEr Metalimestone and phyllite (Paleozoic and Proterozoic?)

NOME COMPLEX

- Pmp Metagabbro and metasediments (Paleozoic?)
- Ds Pelitic schist (Devonian?)
- Dca Pelitic, calcareous, and graphitic schist (Devonian)
- DOx Mixed marble, graphitic metasiliceous rock, and schist (Devonian to Ordovician)—Overlay pattern indicates area of a distinctive belt of dolostone and marble of Silurian-Devonian age
- Dg Granitic orthogneiss (Devonian)
- Df Felsic schist (Devonian)
- Dca Casadepaga Schist (Ordovician)

Impure chlorite marble (Ordovician)

Metagranitic rocks (Late Proterozoic)

SCATTERED METACARBONATE ROCKS

- Pm Marble, undivided (Paleozoic)
- Pd Dolostone, undivided (Paleozoic)
- Pmm Marble of the Moon Mountains (Paleozoic)
- Ddm Dolostone, metalimestone, and marble (Devonian)
- Sd Dolostone (Silurian)
- Od Dolostone (Ordovician)
- cd Dolostone (Cambrian)

METATURBIDITES

- DCbm Black marble (Devonian to Cambrian)
- DCcs Calcareous schist of Kwinik Mountain (Devonian to Cambrian)
- DCbm Black metalimestone and marble (Devonian to Ordovician)

HIGH-GRADE METAMORPHIC AND ASSOCIATED IGNEOUS ROCKS

- PEh High-grade metasedimentary and metaigneous rocks (Paleozoic and Proterozoic)
- Pm Marble (Paleozoic and Proterozoic?)
- PEg Gneiss and orthogneiss (Paleozoic? and Proterozoic?)
- Bo Orthogneiss (Proterozoic)
- PEv Metavolcanic rocks (Proterozoic)

KUGRUK FAULT ZONE

- TKs Carbonate-rich conglomerate and sandstone; mudstone, siltstone and coal (Tertiary and Cretaceous)
- Jt Spruce Creek tonalite (Jurassic)
- Mm Metamorphosed mafic rocks and serpentinite (Mesozoic and Paleozoic?)

- 1:250,000-scale quadrangle boundary
- Contact—Depositional, intrusive, or metamorphic
- Fault—Dotted where concealed
- Road

Figure 3: Geologic map of the Seward Peninsula by Till et al., 2011.



7.2 Property Geology

The Graphite Creek graphite deposit is located on the north side of the Kigluaik Mountains at about 300 m elevation. More specifically, the graphitic schist occurs on the upslope and footwall surface trace of the reactivated Kigluaik normal fault. The Kigluaik Fault generally strikes at approximately azimuth 250° and dips 75° to the north over a distance of approximately 35 km. Contemporary movement on this fault has uplifted the rugged and youthful Kigluaik Mountains to the south and down thrown the lowlands of the Imuruk Basin to the north (Hudson and Plafker, 1978).

Graphite occurs as high-grade massive to semi-massive segregations and disseminations within amphibolite facies metasedimentary rocks, primarily quartz-biotite schist with zones of quartz-biotite-garnet-sillimanite schist (Sainsbury, 1972). Based on their apparent association with the Kigluaik Fault, the graphite-bearing schist strike subparallel to the mountain front and dips north between 40° and 75°.

The 2012 geological mapping program confirmed historical observations of distinct geological layers comprising high-grade massive to semi-massive segregated and disseminated graphite in quartz-biotite-garnet-sillimanite schist and disseminated graphite in quartz-biotite schist (\pm garnet). Based on strike/dip measurements, the layers consistently dip northwards such that these layers appear to represent continuous geological units and are not overly distorted by complex regional or large-scale fold belts. Small localized folding does exist on the <1 m scale, but is more or less confined within the high-grade graphite schist layers.

7.3 Mineralization

There are two distinctive graphite-bearing schist intervals at Graphite Creek. The first is quartz-biotite-garnet-sillimanite schist that contains coarse, semi-massive and massive graphite segregations (Figure 4). The other interval unit is quartz-biotite schist that typically contains disseminated graphite. The quartz-biotite-garnet-sillimanite schist is the principal host to higher grade graphite and makes up two distinctive layers in the metasedimentary sequence along the north flank of the Kigluaik Mountains. A third potential horizon is defined by 'pods' of quartz-biotite-garnet-sillimanite schist. The position of these layers is most likely structurally controlled; that is, a folded unit with the third pod-like layer forming in this style as uppermost erosional features (T. Hudson, personal communication, 2012). Hence, shallow-dipping erosional remnants of the southern-most third layer makes up a few discontinuous perched masses at higher elevations. The quartz-biotite-garnet-sillimanite schist layers strike obliquely to the mountain front and dip northwards at 40° to 80°.



Figure 4: Examples of graphite mineralization in different schists. Photo on left is semi-massive graphite, center photo is quartz-biotite-garnet-sillimanite schist, far right photo is quartz-biotite schist.

The quartz-biotite-garnet-sillimanite schist typically is fine to coarse grained, weathers grey, has a wavy and crenulated schistosity, garnet porphyroblasts (up to 2 cm across), and augen-shaped quartz grains. Discontinuous segregations (lenses and streaks) of coarse high-grade graphite, from centimeters to a few meters thick, are common. These high-grade graphite lenses in the quartz-biotite-garnet-sillimanite schist have up to 60% coarse, crystalline graphite and were likely the sources of hand-sorted graphite produced in the early 1900's. Disseminated flakes of graphite, up to 1 mm or more across, make up several percent of the rock.

The quartz-biotite schist is fine-grained, weathers a rusty ochre color and has regular layering with individual layers commonly 3 to 10 cm thick. Graphite occurs as disseminated flakes up to about 1 mm across and can make up several percent of the rock. Higher grade graphite-rich layers, varying from 3 to 25 cm in width are present, but are not as common as in the quartz-biotite-garnet-sillimanite schist.

8 Deposit Types

The following description of graphite deposits is taken from Eccles et al., 2015:

Graphite deposits of commercial interest occur widely in regionally or thermally metamorphosed sedimentary rocks, and in hydrothermal and metasomatic deposits. Harben and Kuřvart (1996) identified five deposit types:

- 1) Deposits formed by concentration and crystallization of carbon (from coal or carbonaceous sedimentary rocks) during regional or contact metamorphism (Cameron and Weiss, 1960; Graffin, 1975; Krauss et al., 1988; Sutphin et al., 1991; Weiss, 1973; Weiss and Salas, 1978);
- 2) Vein deposits, where graphite is thought to form epigenetically from carbon-rich hydrothermal or pneumatolytic solutions as interlocking aggregates of coarse graphite crystals in veins containing 75-100% carbon (Cameron and Weiss, 1960; Harben and Bates, 1984; Krauss et al., 1988; Rumble et al., 1986; Sutphin et al., 1991; Weiss, 1973);
- 3) Contact metasomatic (skarn) deposits resulting from a concentration of pre-existing carbon in sediments (Bugge, 1978) that could include calc-silicate hornfelses or reaction skarns (Evans, 1993);
- 4) Residual deposits that may be concentrated in deposits formed through weathering/leaching of graphitic gneiss and schist because of the unreactive nature of graphite (Dill, 2009; Murdoch, 1967; Fogg and Boyle, 1987); and
- 5) Early magmatic deposits (rare) such as peraluminous dacite and gabbro (Tsuchiya et al., 1991; Kanaris-Sotiriou, 1997), and alkaline pegmatite (Jaszczak et al., 2007; Satish-Kumar and Santosh, 1998).

Most economic deposits of graphite occur as flake graphite in high-grade metamorphic rock (i.e., granulite facies) forming under pressures of 1 GPa and 750° C. Disseminated flake graphite deposits develop syngenetically from carbonaceous material in sedimentary rocks that have been subjected to garnet grade or higher regional metamorphism (Cameron and Weiss, 1960; Harben and Bates, 1984; Krauss et al., 1988; Sutphin et al., 1991). Since graphite is a form of carbon, and all carbon oxidizes at



high temperature, graphite must have a reducing environment in order to be stable at high temperature.

Flake graphite deposits may be any age but are commonly Archean to late Proterozoic in age. Host rocks typically consist of metasedimentary rocks such as quartz-mica schist, gneiss, micaceous quartzite, micaceous-feldspathic quartzite and marble. Associated rocks are pegmatite, aplite, and granite intrusives. Gangue mineralogy may include quartz, calcite, biotite, muscovite, feldspars, garnet, and sometimes amphibole, pyrrhotite, pyrite and magnetite. A typical rock type where flake graphite may be found is sulfidic biotite-quartz-feldspar gneiss; such is the rock type of the Mesoproterozoic graphite deposits in the Highlands region of New Jersey, USA (Volkert et al., 2000).

Deposits are usually stratabound and consist of individual beds or lenses in gneiss, schist, and marble that are richer in graphite than associated beds. Deposits are typically up to 35 m thick and several kilometers or more, long. Concurrent, intense large-scale folding of the metasedimentary sequences is common and graphite deposits commonly occur on the limbs of such folds. Deposits tend to occur in metamorphosed continental margin or intercratonic basinal sediments. Regional depositional environments include regional metamorphism and large-scale deformation of carbon-rich sedimentary sequences. Rarely, graphite veins may be associated with disseminated flake graphite deposits.

Most of the world's production of flake graphite comes from deposits of disseminated graphite in areas characterized by regionally metamorphosed rocks. Large deposits of flake graphite are known and/or have been mined in the United States, Central America, South America, Canada, Africa, India, Germany, Ukraine, Russia, Madagascar and China. Small, localized deposits of flake or flake-like graphite are known from literally hundreds of other localities. Mined flake graphite deposits commonly have grades of 10% to 12% graphite. Mexico and South Korea are significant sources of amorphous, or microcrystalline, graphite. Sri Lanka is home to the largest known deposits of crystalline vein graphite. Contact metasomatic or hydrothermal graphite deposits were mined in Canada and the United States, but these deposits are generally small and of relatively low grade.

9 Exploration

The exploration work completed by Graphite One on the Graphite Creek Property is summarized below.

9.1 2011 Program

In 2011, a helicopter-supported mapping and sampling program was completed. Graphite-bearing meta-sediments were identified, and their distribution mapped along the north-central slope of the Kigluaik Mountains (Nelson, 2011). Graphite-rich host rocks were reported across a continuous strike length in excess of five kilometers.

Three 15-kilogram composite samples were collected from outcrop (Hudson, 2011). The samples were characterized as high grade, mixed grade and mixed/disseminated grade. The samples were submitted for petrographic and laboratory screen analysis. The high-grade, mixed-grade and disseminated graphite samples contained 56.9%, 14.5%, and 8.2% graphite, respectively. Screening analyses of the samples were crushed to -10 mesh and it was determined that they contained 84.3%, 93.6% and 76.5% large flake graphite (large flake being defined as flake size greater than 80 mesh in one dimension)



(Hudson, 2011). Graphite flakes varied between a few microns to about 1.5 mm in its longest direction with averages between 150-250 microns. The graphite was described as consisting of lath-shaped particles with deformed or foliated texture, liberated crystals and intergrowths with other constituents.

9.2 2012 Program

The 2012 program consisted of an airborne geophysical survey, detailed 1:5,000 scale mapping and sampling, bulk pit sampling, and a diamond drilling program consisting of 4,248 meters in 18 holes. The results of the helicopter-borne time domain electromagnetic (EM) survey are shown in Figure 5. Interpretation of the geophysical survey results coupled with the mapping and sampling program indicates the potential for graphite mineralization along an 18 km corridor of metasediments on the north flank of the Kigluaik Mountains.

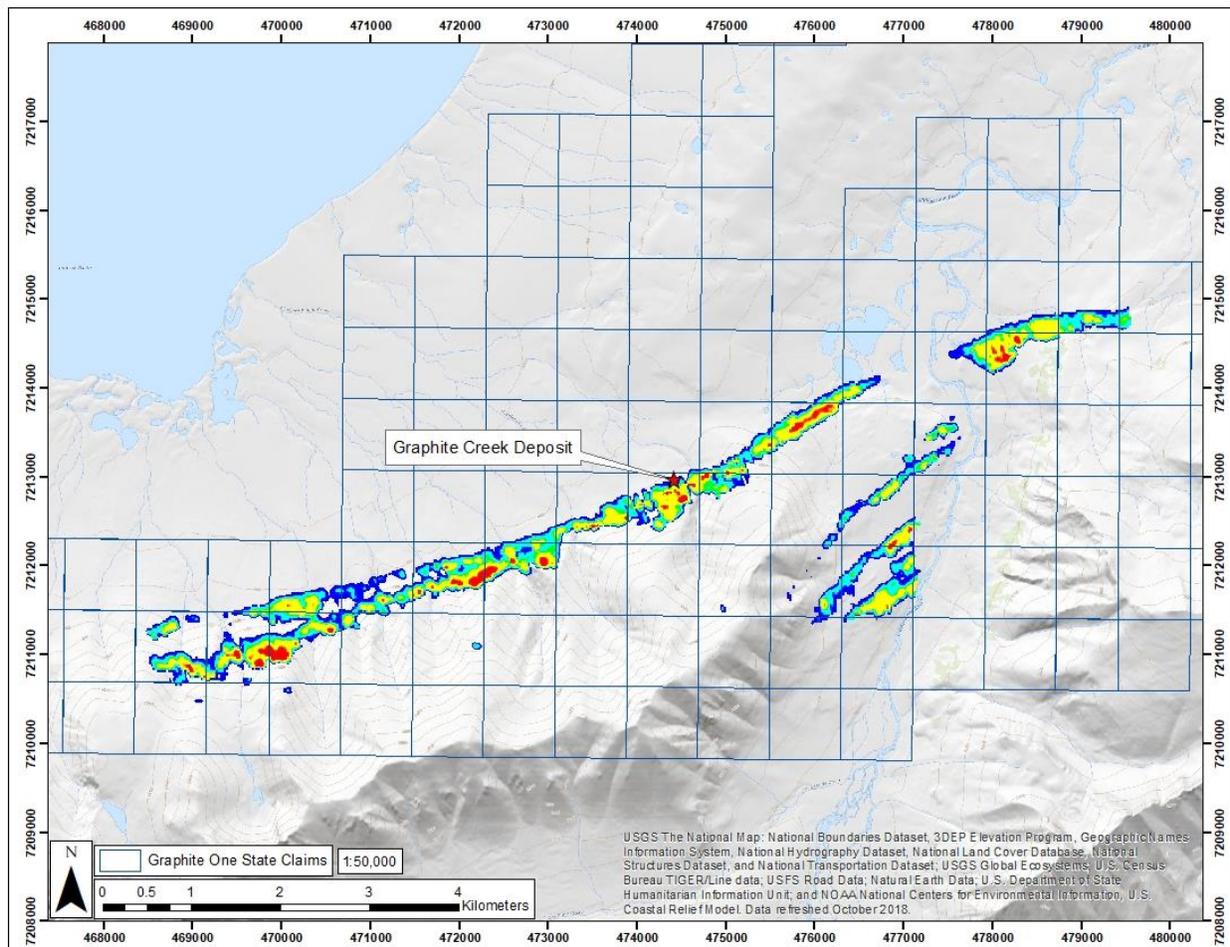


Figure 5: Heli-borne electromagnetic geophysical survey highlighting corridor with potential graphite mineralization.

A total of 591 rock samples were collected by Graphite One's consultants APEX Geoscience Ltd. across the Property (Figure 6). Graphite mineralization grading between 0.05% and 51% graphitic carbon (Cg) was found to occur within quartz-biotite schist and quartz-biotite-garnet-sillimanite schist units. The quartz-biotite-garnet-sillimanite schist is typically high-grade due to graphite concentrated as massive to semi-massive segregations that contain up to 80.9% Cg.

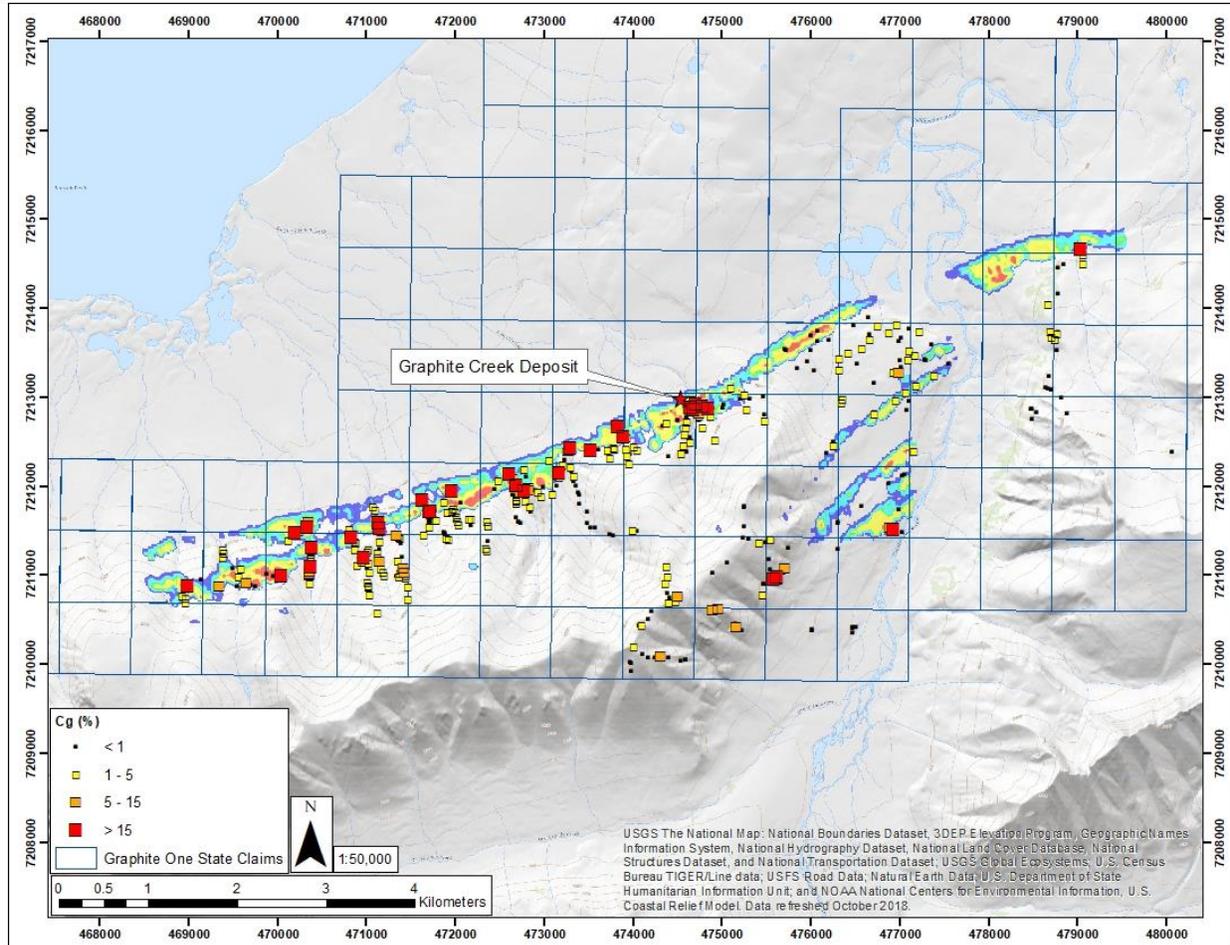


Figure 6: Rock samples collected on Graphite One's Property highlighting graphite mineralization (Cg).

Fifteen bulk samples of between 558 kg and 739 kg totaling 9,916 kg were collected from three different areas including the Graphite Creek, Christophosen Creek and Child Creek.

The initial drill hole spacing was approximately 200 m between holes along strike, but later in the program infill drilling was carried out with hole spacings as close as 50 m (Figure 7). Graphite mineralization was encountered in all drill holes, including the last hole, 12GCH008 which was collared approximately 2.3 km to the west along strike to test the lateral extent of the mineralization.

Based on the 2012 drilling and exploration results, APEX reported an inferred mineral resource of 107.2 million tonnes of graphite mineralization grading 5.78% Cg at a cut-off grade of 3.0% (Duplessis et al., 2013).

9.3 2013 Program

The 2013 exploration program consisted of a small diamond drilling program, calculation of a new resource estimate, and a bench-scale beneficiation test. The diamond drilling program consisted of 1,024 m of drilling in ten drill holes (Figure 7). Again, graphite mineralization was encountered in all of the drill holes. The holes were drilled with a collar spacing of approximately 250 m and increased the

mineral resource to a zone approximately five kilometers in length, and at depths from surface or near surface to depths of 147 m below surface.

A new resource estimate was calculated based on the cumulative drill data from the 2012 and 2013 drill programs. The APEX geologists calculated that the deposit contained approximately 186.9 million tonnes of graphite-bearing mineralization at a grade of 5.5% Cg, using a cut-off grade of 3.0% Cg (Eccles and Nicholls, 2014).

9.4 2014 Program

The 2014 program consisted of diamond drilling, collection of metallurgical samples, and the calculation of a new resource estimate. That program is described in detail in a technical report issued by Graphite One Resources in March, 2015 (Eccles et al., 2015).

The drill program was designed to both increase the confidence level and the extent of the resource. The program consisted of 20 holes totaling approximately 2,221 m logged and assayed, and 2 holes totaling 91.6 m used for metallurgical testing. The 2014 drill holes were collared on sections approximately 50 m apart and at least two holes were drilled on each section, in an effort to confirm continuity of the mineralization, both vertically and laterally (Figure 7).

The increased drill density in the central region of the deposit, combined with the demonstrated continuity of the mineralization allowed the resource in this section to be classified as Indicated. The Indicated Mineral Resource area is spatially constrained by the boundary of the 2014 drill program and defines an area measuring: approximately 730 m along the northeast-striking trend of the graphitic schist; approximately 185 m across the strike of the schist; and to a depth of approximately 200 m below surface. Using a base cut-off of 3% Cg, the Indicated Mineral Resource estimation contains 17.95 million tonnes of mineralized graphite schist at a grade of 6.3% Cg. Based on this tonnage, grade and 3% Cg cut-off, the in situ graphite contained within the Indicated Mineral Resource area is estimated to be 1.13 million tonnes.

The Inferred Mineral Resource area is constrained by the drilled portions of the graphitic conductor that are not included within the Indicated Resource area. Accordingly, the Inferred Resource area is: approximately 5.0 km along the northeast- striking trend of the graphitic schist (minus the 730 m portion of the Indicated Resource); approximately 200 m across the strike of the graphitic schist; and to a depth of approximately 320 m below surface. Using a base cut-off of 3% Cg, the Inferred Mineral Resource estimates that 154.36 million tonnes of mineralized graphite schist at a graphite grade of 5.7% Cg are present at the Graphite Creek deposit. Based on this tonnage, grade and 3% Cg cut-off, the in-situ graphite of the Inferred Mineral Resource is 8.76 million tonnes.



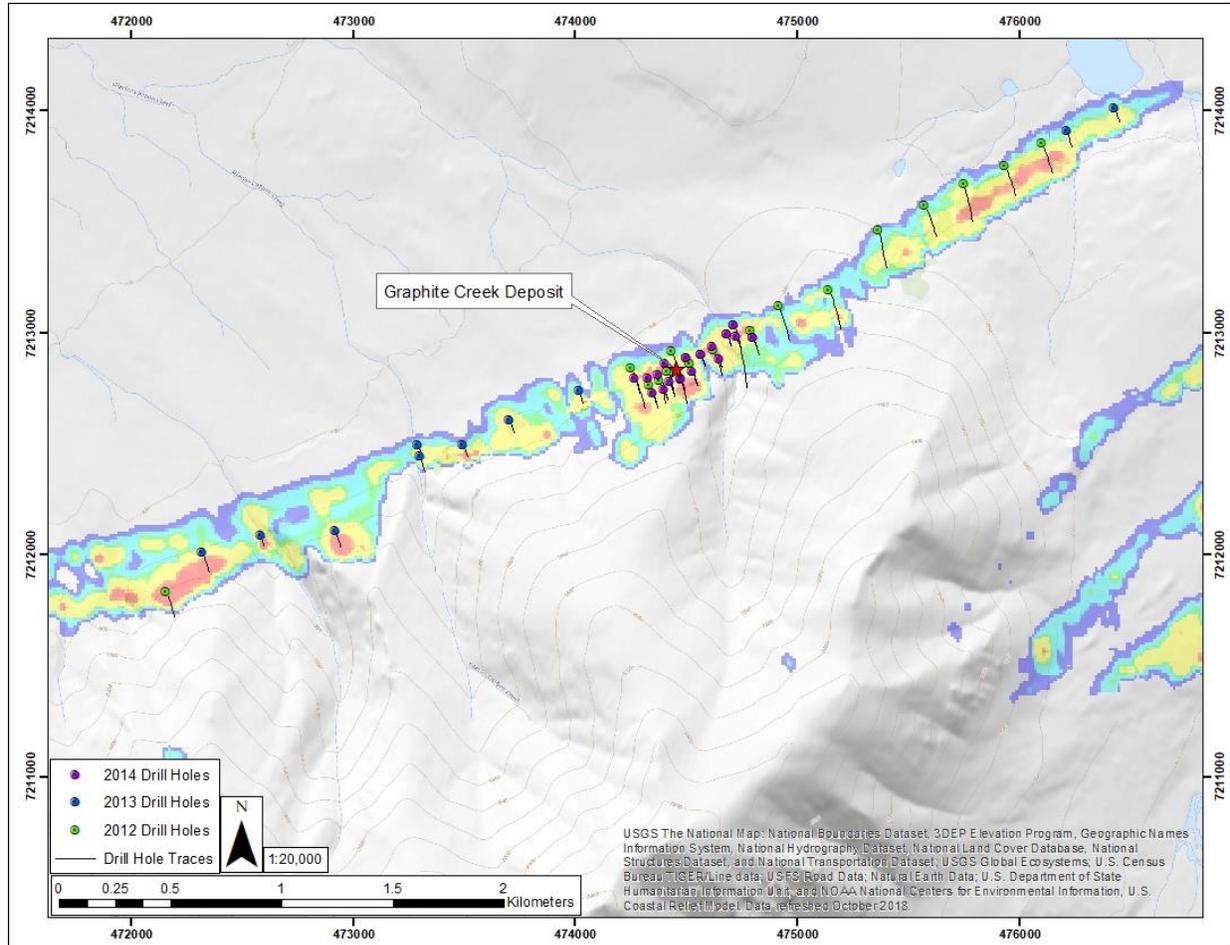


Figure 7: Drill holes completed by Graphite One from 2012 to 2014.

10 Drilling

10.1 2018 Program

The primary goals of the 2018 drill program were to elevate indicated resources to measured, and to gather sufficient material for metallurgical tests. To accomplish this, drill holes were planned within the core area of the resource at 50m-spaced down-dip step-outs (Table 1, Figure 8). The plan was for all drilling to be completed using HQ-sized diameter core in order to gather sufficient material for metallurgical testing, however one drill hole did use BTW-sized core.

Six drill holes totaling 800.87m were completed between August 2nd and October 5th. All 6 drill holes encountered graphite mineralization where expected down-dip of known mineralization. Results from the drilling are presented in the Interpretation and Conclusions section of this report.

Hole ID	Easting	Northing	Elevation (m)	Coordinate System	Depth (m)	Azimuth	Dip	Hole Status	Drill Co.	Core Size
18GC021	474438.1	7212911	216.8	NAD83 Zone 3	67.06	160	-49	Abandoned	Yukuskokon	HQ3
18GC022	474351.3	7212853	219.23	NAD83 Zone 3	156.97	160	-62	Complete	Yukuskokon	BTW
18GC023	474421.5	7212960	210.41	NAD83 Zone 3	198.73	160	-58	Complete	Boart Longyear	HQ
18GC024	474394	7212900	211.46	NAD83 Zone 3	144.78	160	-59	Complete	Boart Longyear	HQ
18GC025	474482.6	7212941	213.92	NAD83 Zone 3	169.32	160	-66	Complete	Boart Longyear	HQ
18GC026	474523	7212961	214.66	NAD83 Zone 3	64.01	160	-52	Complete	Boart Longyear	HQ

Table 1: Drill hole collars for 2018 drilling.

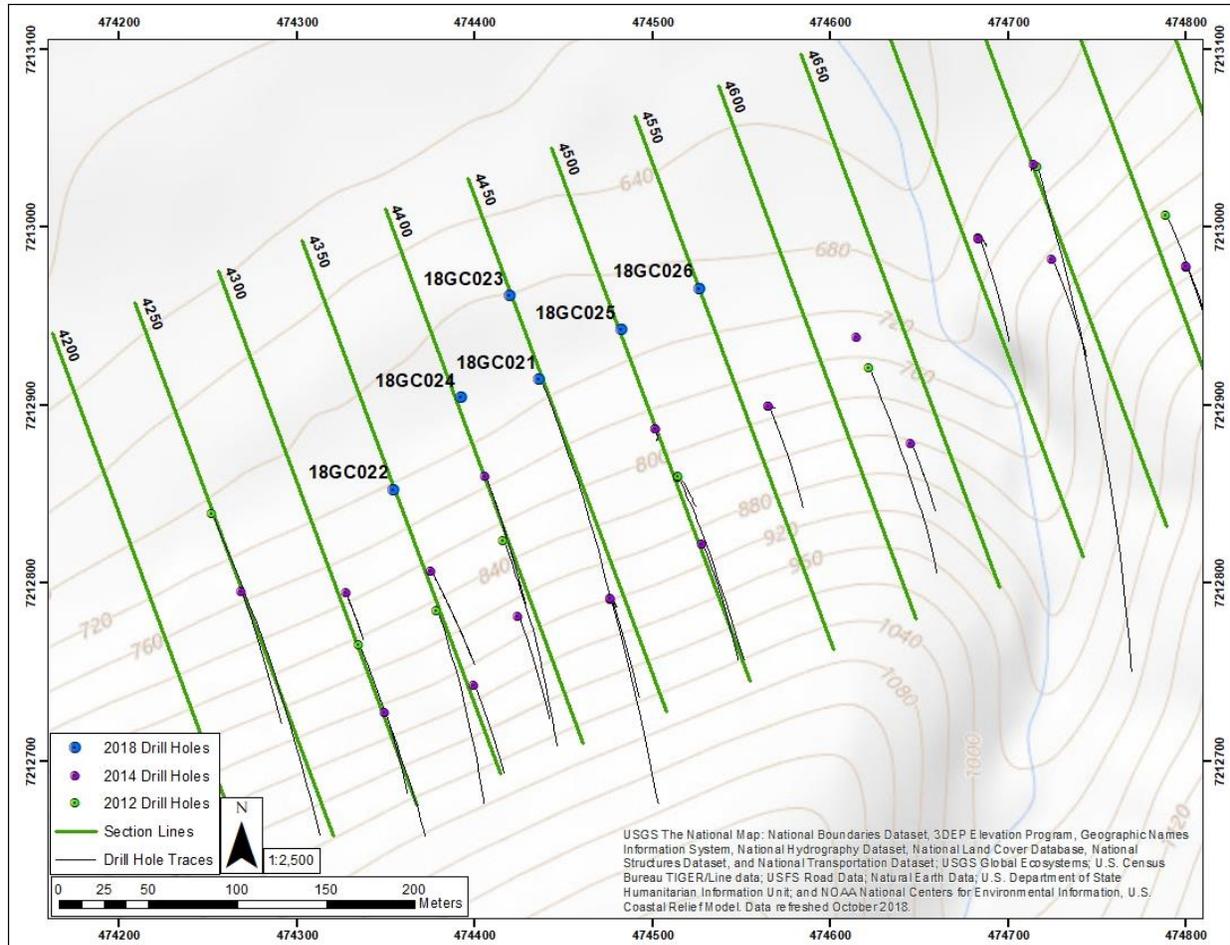


Figure 8: 2018 drill hole plan map.

11 Sample Preparation, Analyses and Security

11.1 Sample Preparation

Core samples were marked out by the geologist and sample tags stapled to the core boxes at the start of each sample interval. Samples were mostly 1 m in length except for where there was a change in lithology or massive graphite mineralization. Massive graphite intervals were broken out to their own sample if the length was 30 cm or longer.

After the sample intervals were marked, all the core boxes were photographed.

After the samples were split in half using a core saw, half the sample was bagged in a polyurethane bag, the corresponding sample tag placed in the bag, and the bag was zip-tied shut. Multiple sample bags were placed in rice bags which were labeled with the sample shipment, samples in the bag, and company name. A shipment consisted of either samples from an entire drill hole or part of a drill hole. No shipments contained samples from multiple drill holes.

Once a shipment was cut and bagged, samples were driven by Graphite One personnel from the Tisuk Camp to Graphite One's prep lab in Nome, AK. At the prep lab, an Activation Lab technician dried and crushed each sample. The pulps were then packaged to be sent via FedEx from Nome, AK to the Activation Lab in Ancaster, ON for analysis.

11.2 Analyses

Graphitic carbon was the only element analyzed in the drill core samples shipped to Activation Lab in Ancaster, ON. The analytical package used was 5D-C Graphitic.

11.3 Security

Samples were stored securely in Tisuk Camp by Graphite One personnel until a shipment was ready. A chain of custody form tracked the handling of samples from Tisuk Camp, transportation by Graphite One personnel to Nome prep lab, and hand off to Activation Lab personnel at the Nome prep lab. Samples in the prep lab were stored securely until a shipment was complete and ready to be sent to the assay lab. Sample pulps were tracked via FedEx tracking numbers from Nome to the Activation Lab in Ancaster, ON.

12 Data Verification

An alternating standard or field blank was inserted every 10th sample in sequence. A field blank was also inserted after a semi-massive to massive graphite sample. The three graphite standards used were GR1, GR3, and GR4 from CDN Laboratory. Field blank material was composed of a metagranite from a quarry east of Nome. This is the same field blank material used in all of Graphite One's drill programs.

Assay results were plotted to see if values fell within the accepted limits. All of the field blanks values except one were below detection limit for graphitic carbon (Figure 9). All the standard sample assay values fell within the accepted two standard limits of deviation (Figure 10, 11, 12).

One field blank had a value of 0.51% Cg and was a blank placed after a semi-massive graphite interval. This sample may represent some contamination from inadequate lab cleaning. Since this was the only sample with a higher value, there were no significant concerns about the quality of assay data at this time.

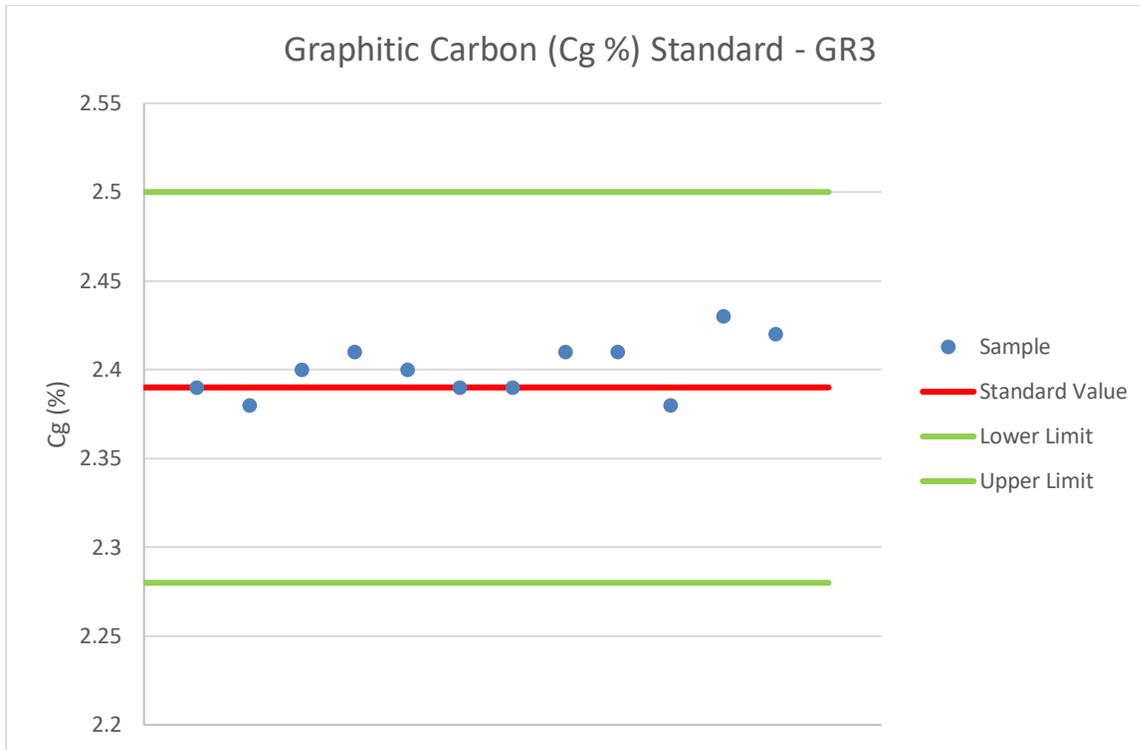


Figure 11: 2018 assay results for standard GR3. All results were within accepted upper and lower limits.

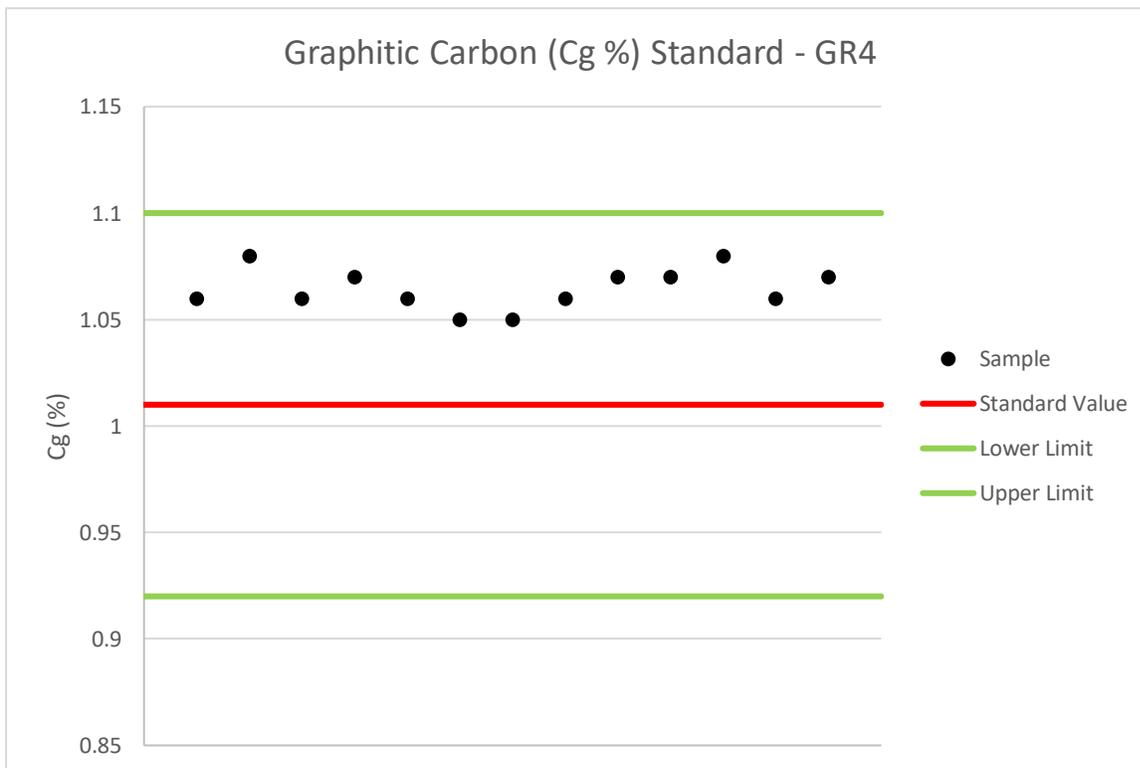


Figure 12: 2018 assay results for standard GR4. All results were within accepted upper and lower limits.

13 Mineral Processing and Metallurgical Testing

The following information is taken from Graphite One's PEA prepared by TRU Group dated June 30, 2017.

13.1 Hazen Research Inc.

13.1.1 Analysis of Graphite Mineral Samples from Alaska (Hazen 2011)

Hazen Research, Inc. carried out an analysis on three mineral samples varying from low to high grade graphite mineralization, referred to in order of increasing graphite grade as Disseminated (8.2% Cg), Mixed (14.5% Cg) and High (56.9% Cg). The purpose of the study was to quantify the graphite content by chemical analyses (carbon assays), determine the size distribution by screen analysis, and determine the textural characteristics by optical microscopy of three graphite mineral samples.

As-received samples were stage-crushed to minus ½ inch with split samples for screen analysis further crushed to minus 10 mesh. Samples intended for chemical and x-ray fluorescence analysis were pulverized to minus 200 mesh. All size fractions from the screen analysis were subjected to moisture determination, loss on ignition (LOI) at 850°C for 2 hours and CO₂ assay evolution for carbonates. The graphite content was then calculated from the LOI determination after subtraction of moisture and CO₂ from carbonates.

Optical examination of polished sections of Disseminated graphite samples showed siliceous gangue (mostly quartz) with minor amounts of micas, magnetite, ilmenite, and titanium oxides. Graphite was very abundant, consisted of lath-shaped particles with sometimes deformed or foliated texture, occurred as liberated crystals, and also intergrown with the other constituents, Figure 13. The size of the graphite varied between a few microns up to about 1.5 mm in the long dimension and averaged about 150–250 µm.

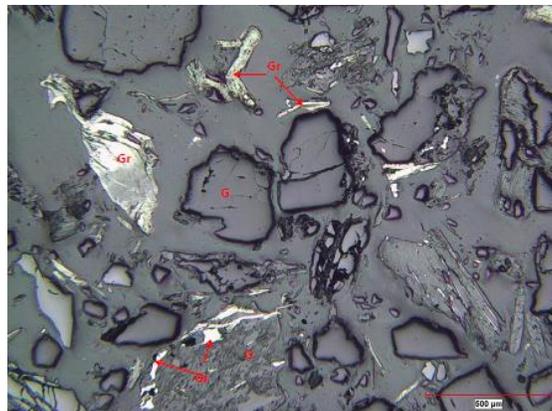


Figure 13: Micrograph showing coarse and fine graphite (Gr) crystals forming intergrowths with gangue (G) and liberated crystals.

Selected results of wet screening at 10, 40, 80 and 100 mesh and the carbon assay by size fraction appear in Table 2. In all three samples, the 10 by 40 mesh fraction holds bulk majority of the distributed sample mass and of the distributed graphite followed by the 40 by 80 size class. The two size fractions in generally accounted for over three-quarters of the mass and graphite in each sample.

Sample ID	Mass Distribution %	Graphite Assay % Cg	Graphite Distribution %
High Grade			
10 by 40	57.5	55.9	56.7
40 by 80	18.0	61.5	19.5
Disseminated			
10 by 40	71.1	7.5	64.3
40 by 80	7.7	11.5	10.7
Mixed			
10 by 40	66.0	15	62.8
40 by 80	16.6	19.3	20.3

Table 2: Selected results of screen analysis and graphite assay by size fraction for different graphite mineralization samples

13.1.2 Upgrading of Coarse High Grade Graphite Mineral Samples (2012)

The 40 by 80 mesh fraction from the High Grade graphite mineralization was subsequently examined by Hazen for upgrading to 95% Cg by way of gravity separation coupled with heavy media separation (HMS) and also by conventional flotation coupled with HMS.

Previously crushed material was wet screened at 40 and 80 mesh and then fed to an eighth-size Wilfley table to separate heavier gangue from the lighter graphite concentrate. Initial HMS of the gravity concentrate effected at 2.6 sg produced a float concentrate grading 90.7% Cg. Secondary (cleaner) stage HMS performed at 2.45 sg slightly increased the float concentrate grade to 91.7% Cg. TRU calculated the overall graphite recovery at 46.6% for the initial HMS and 45.7% following second stage HMS. Cleaning of the initial HMS float concentrate was also attempted by conventional flotation but did not much improve concentrate grade, which assayed at 92, 91.2, and 91.7% graphite (Cg) in triplicate analyses.

Optical microscopy on polished sections of the float concentrates from both HMS stages revealed the presence of liberated particles of graphite and gangue along with graphite particles inter-grown with gangue in the initial concentrate while only liberated graphite and fewer graphite-gangue inter-grown particles were present in the second stage concentrate. The relative low graphite assay of the second HMS float concentrate and absence of discrete gangue particles implied that unliberated gangue was trapped between graphite flakes.

Rougher flotation of the 40 by 80 mesh fraction followed by three stages of cleaner flotation yielded concentrate grading 76% Cg at a graphite recovery calculated by TRU to be approximately 73%. Further cleaning of this concentrate by HMS at 2.45 sg produced a float concentrate assaying at 86.8, 87, and 87.3% Cg, which was not an improvement on the grade compared to the previous method using gravity separation with HMS.

Hazen concluded that upgrading to 92% graphite was the limit for the 40- by 80-mesh fraction due to the intimate occurrence of impurities with the graphite.

13.1.3 Analysis of Graphite Core Samples from Alaska (2012)

Hazen also conducted screen analyses at 10, 40, 80 and 100 mesh and assay by size fraction on four drill core graphite mineralization samples identified as 12GPHFL001 (8.7 % Cg), 12GPHFL002 (13.7% Cg),



12GPHFL003 (14.9% Cg) and 12GPHFL005 (8.0 %Cg). XRD analysis was performed to determine of major constituents of the samples along with optical examination of polished sample cross sections of the different screening size fractions.

Selected results of wet screening and the carbon assay for each fraction appear in Table 3. In all three samples, the 10 by 40 mesh fraction had the highest distribution of sample mass and graphite followed by the 40 by 80 fraction. Optical examination of the different size fractions again identified discrete particles of liberated graphite along with graphite intergrown with gangue. XRD patterns for all drill cores showed that all samples consist of major quartz, minor muscovite, sillimanite, chlorite, and minor to trace amounts of kaolinite.

Sample ID	Mass Distribution %	Graphite Assay % Cg	Graphite Distribution %
12GPHFL001			
10 by 40	51.5	7.3	42.2
40 by 80	19.2	9.6	20.7
12GPHFL002			
10 by 40	54.4	12.7	48.7
40 by 80	19.9	15.2	21.3
12GPHFL003			
10 by 40	43.7	13	38.9
40 by 80	24.3	15.0	25.0
12GPHFL005			
10 by 40	43.2	6.7	35.8
40 by 80	21.0	9.1	23.5

Table 3: Selected results of screen analysis and graphite assay by size fraction on drill core samples

13.2 SGS Lakefield Beneficiation Tests (2013)

13.2.1 Scoping Level Evaluation of Graphite Creek Mineralization

SGS Lakefield conducted a scoping flotation study on one composite sample of low grading graphite mineralization (5.41% C, 5.3% Cg) from the Graphite Creek property. Eight open circuit flotation tests were carried out with the objective of producing a concentrate grading 94%C. Investigated process variables included flowsheet configuration, polishing grind times, and grinding media size.

Flowsheet FT6 seen in Figure 14 yielded the best results, which did not achieve the target concentrate grade. Initial flash flotation tails were subjected to a regrind and rougher flotation. Rougher concentrate was combined with the recovered flash concentrate and subjected to a polishing grind followed by four stages of cleaning. The fourth stage cleaner concentrate was screened at 80 mesh to divide the concentrate into two fractions that were further processed: +80 Mesh (coarse) oversize was subjected to a polishing grind and three stages of cleaning and produced a concentrate grade of 91.7%C; -80 Mesh (fine) undersize was subjected to a polishing grind and four stages of cleaning and produced a concentrate grade of 89%C. The combined concentrate grade was 89.7% at a total carbon recovery of 86.9%.



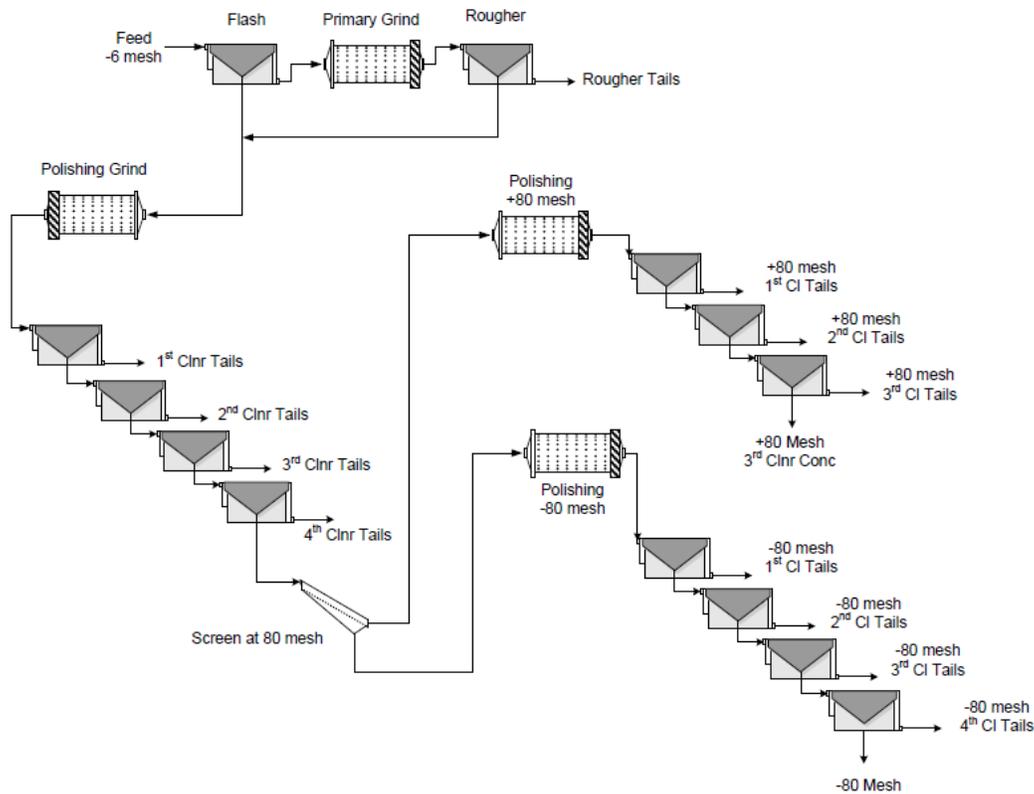


Figure 14: SGS Conceptual Graphite Creek Flowsheet for the production of coarse (+80 Mesh) concentrate and fine concentrate (-80 Mesh).

Screen analysis and assay by size fraction of the combined concentrates revealed the graphite grade was the highest in the coarse fraction of +48 mesh (300 microns) at 93.6% C and gradually decreased to 89.6% C as flake size decrease although in the smallest size fraction of -325 mesh (44 microns) the grade increased to 91.7% C. Additionally, 18.6% of the concentrate mass reported to the +80 mesh (180 microns) size fractions and 35.8% to the -80/+200 mesh products. The remaining concentrate mass of 45.6% consisted of graphite flakes smaller than 200 mesh (75 microns).

SGS attributed the inability of flotation to reach the grade target of 94% C to: the rapid flotation kinetics which resulted in the entrainment liberated gangue material with the floated graphite; impurities that attached to the surface of the graphite flakes or entered into crevices or pores on the graphite and were not removed; and complex associations of graphite and impurities possibly trapped between graphite layers.

13.3 IGL STAX Graphite Characterization

TRU mandated an Independent Graphite Laboratory (referred to as “IGL”) to characterize the basic physical properties of graphite recovered from selected mineralized drill core samples from Graphite One’s Graphite Creek property. The investigation provided an early assessment of the recovered graphite’s potential suitability for value-added products and end uses. Table 4 lists the drill hole core segments selected for characterization and gross sample masses received by IGL. All the samples were selected from the upper Quartz-Granite-Biotite-Sillimanite-Schist (QGBSS) layer associated with high graphite mineralization.

Drill Hole ID	Drill Core Interval Measured from Surface		Interval Length (m)	Sample Mass (kg)
	From (m)	To (m)		
13GCH012	37	46	9	7.0
12GCH002	10	19	9	8.2
12GCH003	3.9	20.1	16.1	10.6
12GCH004	6.2	21.3	15.1	5.2
12GC007	60	71	11	12.4
12GC009	94.3	102.8	8.5	11.8

Table 4: Origin and mass of mineralized samples

The graphite mineralization samples were subjected to modest crushing followed by a wet classification technique to extract rudimentary concentrates for characterization. The main physicochemical properties of the extracted graphite concentrate samples were elucidated from the analytical methods listed in Table 5.

CHARACTERIZATION METHOD	OUTCOME
Screening Analysis	Sizing of graphite mineralization samples and graphite concentrate
Laser Light Scattering	Statistical particle size distribution
Scanning Electron Microscopy (SEM)	Morphological and topological information
Optical Microscopy	Morphological and topological information
Loss on Ignition (LOI)	Characterization of carbon content
Surface Area by BET	Surface area
Density Measurements	Tap Density Apparent (bulk) Density by Scott Volume method True Density by Helium Pycnometry
Inductively Coupled Plasma	Spectroscopic method to characterize ash impurity contents
Fourier Transform Infrared Spectroscopy	Spectroscopy analysis that probes carbon-carbon bonds

Table 5: Graphite Characterization Techniques Employed by IGL

13.3.1 Graphite Concentrate Extraction by Wet Classification

A composite mineralized sample from each drill holes was moderately crushed and then floated by a proprietary wet classification technique to extract a graphite concentrate with a representative cross section of the graphite particle size fractions. The method facilitates separation of particles by weight under gravity; heavy particles, typically rock, sink while the light particles, graphite, that float. Addition of surfactant allows separation of both phases.

CARBON CONTENT ON LOSS ON IGNITION

All mineral samples and graphite concentrate samples featured in this study were assayed for carbon by Loss on Ignition (LOI) analytical technique as per ASTM C561 Standard Test Method for Ash in a Graphite Sample, Table 6. Noteworthy was that the lowest grading mineralization sample produced the highest grade concentrate with the highest concentration factor which indicative of the high degree of liberation from gangue.

Sample ID	Graphite Mineralization (%C)	Floated Concentrate (%C)	Concentration Factor
13GCH012	14.1	67.4	4.8
12GCH002	9.0	85.0	9.4
12GCH003	29.7	79.4	2.7
12GCH004	12.1	67.3	5.6
12GC007	14.1	65.3	4.6
12GC009	11.3	69.5	6.2

Table 6: Assays of graphite mineralization samples and floated concentrate

SCREEN ANALYSIS

Screening analysis results of all drill hole concentrates are shown in Figure 15. All concentrates contained a variable but sizeable fraction of the +20 mesh (850 µm) particles indicating the presence of coarse graphite. Sample 12GCH002 has the finest particle distribution and also attained the highest grade graphite concentrate after one pass of wet classification. The particle size distribution of 12GCH002 concentrate may be considered the most representative of the native graphite at the Graphite Creek Property as the graphite was the most easily liberated from the gangue and produced the highest grade concentrate. Conversely the size data for the other drill core concentrates could have been influenced by the presence of a greater proportion retained gangue. This particular subject is complex as there were competing considerations in the extraction of graphite concentrate from the mineralized samples; achieving higher grade in the concentrate with more intensive processing or extracting a better representation of the graphite particles in a lower grade concentrate. The latter was deemed more important for this characterization study whose scope and objectives did not include maximizing graphite recovery or process development and optimization.

In a later section, laser light scattering particle size analysis of coarse size fractions that were sonicated (subjected to high intensity sound waves) showed a demonstrable shift towards a finer particle size distribution. This occurrence was attributed to de-aggregation or disintegration of some of the unique morphologies identified in the graphite concentrates discussed below.

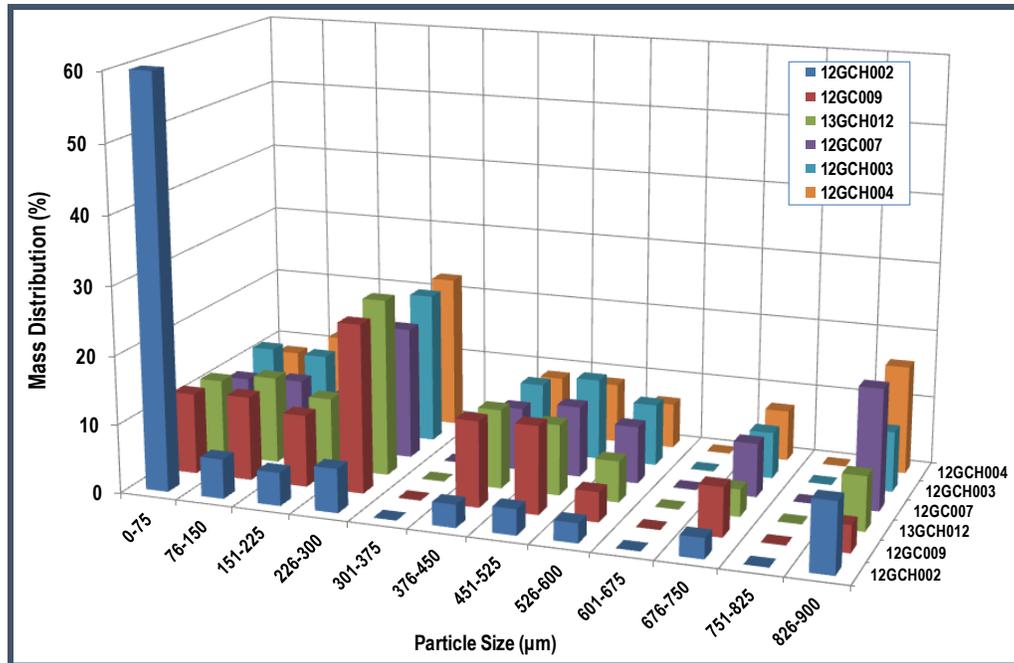


Figure 15: Particle size distribution histograms based on screen analysis test.

OPTICAL MICROSCOPE EXAMINATION OF THE COARSE PARTICLE FRACTIONS

Differences in +25 mesh graphite particle features were evident between different drill hole concentrates: 12GC009 had a bulky morphology; 12GCH003 particles were three-dimensional structures reminiscent of vein graphite; while 12GCH004 graphite was a lot flakier. Flake type as a function of excavation location was not determined but merits further investigation.

MORPHOLOGICAL UNIQUENESS OF GRAPHITE CREEK GRAPHITE

Analysis of the overall distribution of graphite revealed unusual morphologies in the samples –

- I. High-aspect ratio, elongated thin flakes;
- II. Ultra-thin, self-scrolling large sheets;
- III. Pebble-shaped particles (naturally spherical graphite);
- IV. Naturally expanded structures
- V. Three-dimensional aggregates of ultra-fine flakes (so-called pressed flake);
- VI. Classical natural flake graphite (so-called integral flake).

All morphologies are seen concurrently in Figure 16. High resolution SEM images of the specific morphologies are seen in the sequence of Figure 17 to Figure 20. These unique morphologies may well turn out to be by far the major competitive advantage of Graphite One. A high-resolution SEM image of a pebble shaped particle from 13GCH012 concentrate is shown in Figure 20. The aggregate nature of this particle can be clearly observed. It should be emphasized that spherical/pebble shaped particles were found in the concentrates for each drill core examined by the IGL. The actual proportion of the

different morphologies and differentiation between aggregate and integral properties has not been quantified.

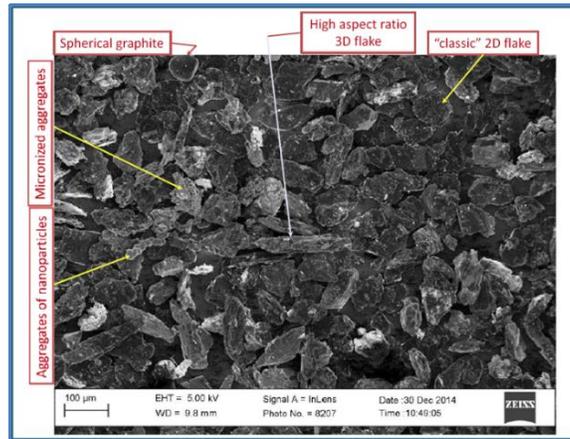


Figure 16: Various Morphologies from the +100 mesh cut in 12GCH002 graphite

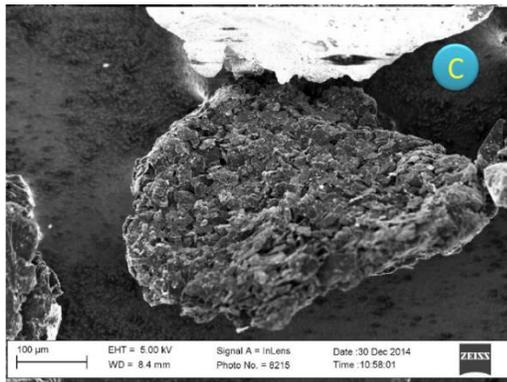


Figure 17: Close up of an Aggregate of "Pressed Flake" from the +50 mesh fraction of 12GCH002 (C)

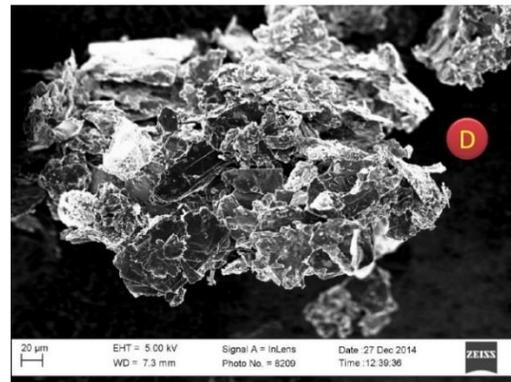


Figure 19: Graphite Unique Morphology in 12GCH003 showing a natural expanded graphite structure

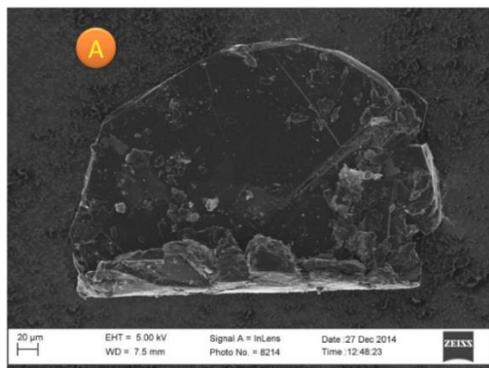


Figure 18: Classic Coarse "Integral Flake" from 12GC009

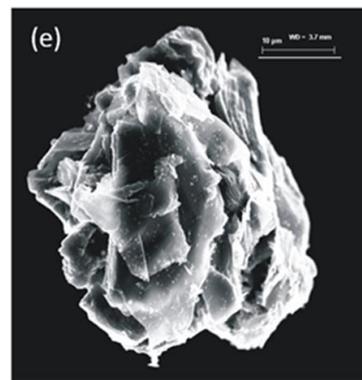


Figure 20: High resolution SEM image of a pebble-shaped particle from 13GCH012 concentrate

NATURAL SPHERICAL MORPHOLOGY OF GRAPHITE CREEK GRAPHITE

Optical examination of the various size classes for each of the drill hole composite concentrates revealed the presence of naturally occurring pebble/spheroidal shaped graphite. Visible progression of increasing

(natural) sphericity and proportion to other morphologies with decreasing particle size class can be observed in the optical micrographs of 12GCH002 concentrate from +53 μm (+270 mesh) and +25 μm (+500 mesh).

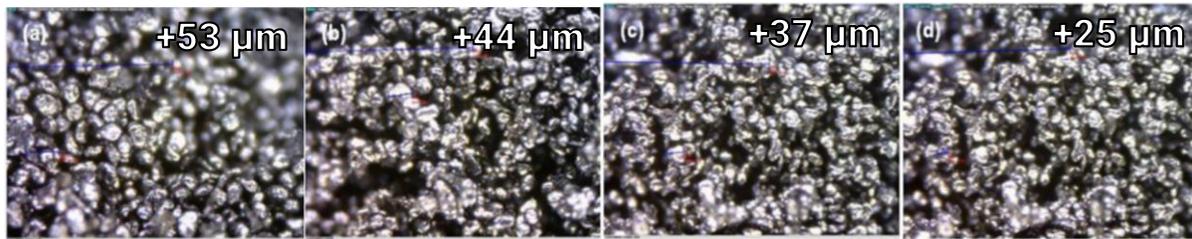


Figure 21: Optical micrographs showing progressive increased sphericity with decreasing particle size cut.

LASER LIGHT SCATTERING OF MATERIAL TAKEN FROM CYLINDER TEST

Laser light scattering was used to obtain particle size distributions, to fill in the missing size fraction from screening as well as to measure the stability/friability of the graphite. All samples examined were recovered from a graduated cylinder settling/float test. The limitation of the graduate cylinder settling test is that it can only extract “classic” flaky particles when it comes to graphite which is coarser than +30 mesh (600 μm) (i.e. ultra-coarse grades).

Analysis of the data indicated that all the drill hole concentrates have bimodal particle size distributions with sizeable fraction of coarse particles. Example distributions are shown in Figure 22 for 12GCH002 and 12GCH003 concentrates where it is evident that coarser particles dominate the distribution for 12GCH002 whereas in 12GCH003 there is a greater proportion of 40 μm particles.

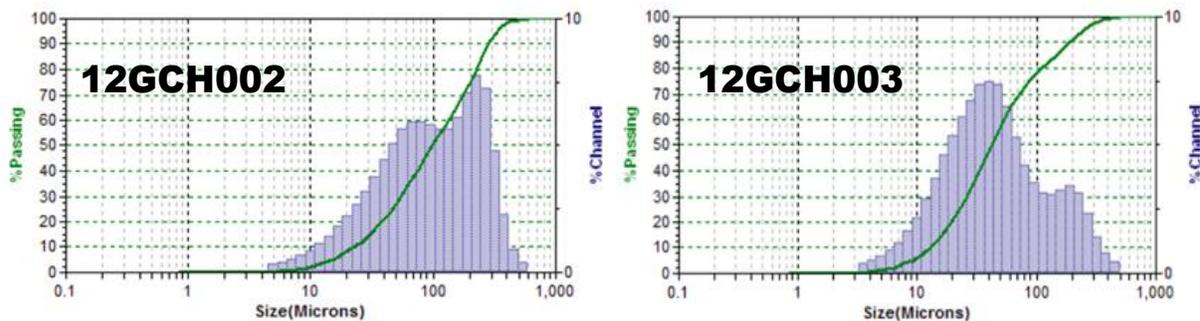


Figure 22: Bimodal particle size distribution in concentrates 12GCH002 and 12GCH003

The stability of the graphite particles was also of interest due to the apparent morphologies of the flakes which included aggregate flakes, pebbles or other 3D shapes and ultra-thin integral flakes that could lead to friability. Friability here refers to the ability of the graphite solids to reduce to smaller particles under the application of external stresses. Friability was examined by comparing the shift in particle D50 before and after heavy sonication in all screened size cuts from graphite concentrate 12GCH002. Non-sonicated and sonicated 12GCH002 +20 mesh and +50 mesh concentrate size fractions are respectively compared in Figure 23 and Figure 24. The +20 mesh fraction is seen to highly friable; the coarse flake fraction is gone after sonication and the remaining particles are < 100 μm . Conversely, the sonicated +50 mesh size fraction retained a coarse fraction over a wider particle size distribution.

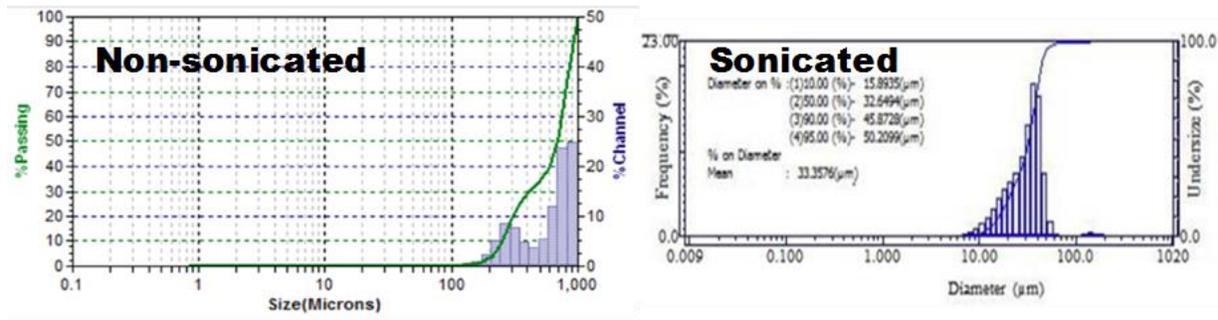


Figure 23: 12GCH002 +20 Mesh particle size distribution before & after sonication

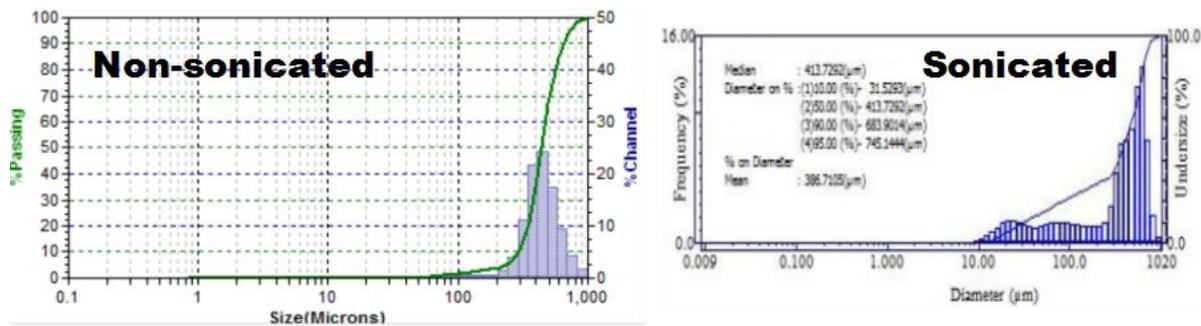


Figure 24: 12GCH002 +50 Mesh particle size distribution before & after sonication

Detailed analysis of the various size fractions from 12GCH002 concentrate indicated that:

- +20 and +40 mesh size cuts are highly friable;
- +25 and +30 mesh have low friability and could survive downstream processing;
- +50 mesh cut is highly stable with negligible friability. This cut contained three dimensional shapes which are mostly aggregates and rather unusual elongated flakes reminiscent of vein graphite;
- -60/+70 mesh cut has limited friability and contains classic flake like particles;
- +230 to +500 mesh cuts range is dominated by spherical and pebble type particles. In particular, the +325 mesh fraction has low friability.
- -635 mesh fraction is composed mainly of flaky, mostly non-spherical particles.

No link between particle morphology and friability could be established since the proportions of each morphology in each of the mesh cuts was unknown combined with the fact that light scattering provides an average diameter measurement for all particle types.

ICP ANALYSES OF LOI ASH

ICP analysis was performed on LOI ash samples to determine concentrations of those impurities in graphite which are known to cause problems in electrochemical applications. Advanced battery systems have stringent purity requirements setting a minimum purity on the graphite precursor at 99.95 wt% C while the content of the remaining 0.05 wt% ash must respect a threshold concentration limit on certain “critical” impurities, which for some are limited to singular digit values in ppm (parts per million). These critical elements include –

- As (arsenic)
- Cr (chromium)
- Fe (iron)
- Mo (molybdenum)
- Sb (antimony)
- Sn (tin)
- Ca (calcium)
- Al (aluminum)
- Pb (lead) and others

Table 7 summarizes the ash composition of the Graphite Creek concentrates. Immediately apparent is that As, Sb, Pb are at low levels. Sn, Pb and Al are relatively low melting point metals that can be easily removed by thermal purification. Refractory metals such as molybdenum could be problematic for thermal purification if its concentration exceeds 20 to 30 ppm as removal to tolerable threshold limits might prove challenging. 12GCH002 concentrate assayed 60.52 ppm for molybdenum. However, other graphite concentrates samples assayed one to two orders of magnitude lower than 12GCH002 in the range of 0.52 to 4.4 ppm, which is lower than typical occurrences in Chinese flake graphite. Blending with low-molybdenum mineralized samples could lower the overall molybdenum content and concentration. Improved mineral beneficiation could see partial removal of various impurities from the graphite structure.

Graphite source	12GCH-002-1	12GCH-003	12GCH-007	12GCH-009	13GCH-012
Element	Concentration of impurities, ppm				
Al	1428	708.2	546.5	3912	3781
As	<0.1	<0.1	<0.1	<0.1	<0.1
Ca	157.5	230.9	207.1	368.1	505.3
Co	<0.1	ND	<0.1	<0.1	<0.1
Cr	10.74	27.84	10.92	43.01	5.845
Cu	28.01	1.974	2.646	36.65	5.653
Fe	833.2	700.3	397	6107	1518
Mo	60.52	4.303	2.164	4.402	0.521
Ni	3.53	1.265	0.885	28.67	3.127
Pb	3.454	<0.1	2.177	0.545	1.642
Sb	<0.1	<0.1	<0.1	<0.1	<0.1
Si	171.3	144.5	41.57	312.7	100.8
Sn	193.8	149	78.19	1584	359.1
V	22.15	9.38	11.41	35.37	7.286

Table 7: Elemental impurities by ICP in select Graphite Creek graphite concentrate

Although all six drill core samples were treated under the same process conditions the resultant grade of the concentrate samples were different as was the color of ash and the shape of the unburned particulates, Figure 25, which are indicative of inhomogeneity between the drill core samples.



Figure 25: Homogeneity / consistency by ash color - poor (naturally occurring)

PRELIMINARY IDENTIFICATION OF COMPONENTS IN GRAPHITE'S GANGUE

Golden colored particulates as seen in Figure 26 appeared in a number of crucibles with LOI/ash from burnt concentrate. Analysis of the 12GCH004 ash revealed the presence of precious metal and other valuable impurities such as titanium, chromium, platinum (and iron). More golden particles were found in the ash of oversized mineral sample that had not passed primary crushing to (-16 mesh). It is conceivable that these values could be recovered ahead of graphite recovery. More work is needed to confirm preliminary findings.

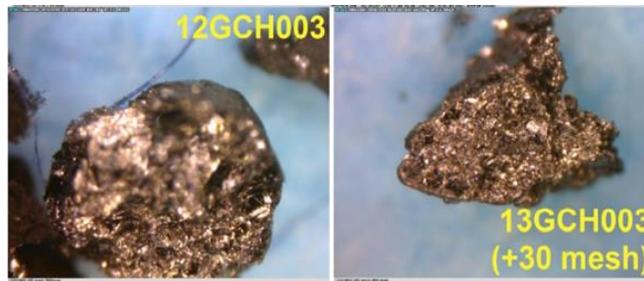


Figure 26: Coarse "golden" particles in the ash of graphite 12GCH004

DENSITY MEASUREMENTS

Measured density values for concentrate samples 12GCH002 (82.8% C) and 12GCH003 (79.4% C) are shown in Table 8 and compared to reference values. Tap and bulk density tests were run at the conclusion of the characterization effort; therefore, measurements.

Density Parameter	12GCH002 82.8wt% C (g/cm ³)	12GCH003 79.4wt% C (g/cm ³)	Reference Chinese flake K0598 98 wt%C (g/cm ³)	Theoretical Value at 293K for pure Mono-crystalline Graphite (g/cm ³)	Commercial, Poly-crystalline Graphite (g/cm ³)
True Density	2.174	-	2.258	2.266	< 2.039
Tap Density	0.604	0.658	0.663	-	-
Scott Volume	-	0.63	0.49	-	-

Table 8: Measured density of select Graphite Creek concentrates vs reference values

The main conclusions drawn from the density measurements are:

- True density values for 12GCH002 at 82.8 wt%C and the Chinese reference at 98%C are sufficiently close to the theoretical value to be considered fully graphitic

- Both concentrates have similar Tap Density values which occupy the range from 0.604 to 0.663 g/cm³. Lower values are indicative of finer particle size distributions

CONFIRMING FLAKE GRAPHITE PROPERTIES BY FTIR SPECTROSCOPY

Graphite powder was subjected to infra-red (IR) photons over broad spectrum of frequencies. “Classic” flake graphite has a characteristic transmission signature under infrared scan. It manifests itself as a sloping, near straight line dependence of percent transmission as a function of wavelengths in the infrared region of electromagnetic spectra that also has a characteristic triplet peak in the range of wavelengths from 2,300 to 1,900 cm⁻¹. From Figure 27 it was concluded that the FTIR signature of 12GCH002 is typical of natural crystalline flake graphite.

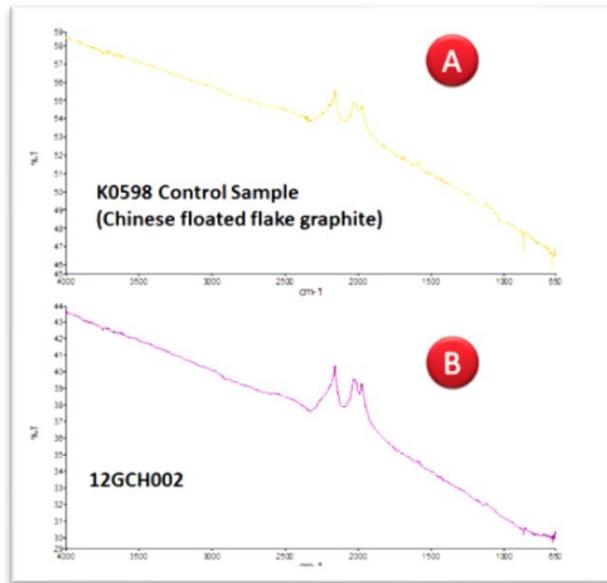


Figure 27: FTIR patterns of (A) control +50 mesh flake graphite K0598 and (B) 12GCH002

SURFACE AREA BY BET

Specific surface area is an important property of carbon material for batteries. Generally, the higher the value of surface area, the finer the material, and the more breaks and crevices on the surface. High surface area is generally a positive feature for applications of graphite in alkaline batteries. In contrast, lithium-ion battery applications require a surface area of grades as low as possible, albeit exceptions apply. Surface area reduction in lithium-ion batteries is one of the ways for ensuring low irreversible capacity loss on the anodes and enhanced battery safety.

The surface area of the graphite powders was measured by a Quantachrome Instruments NOVA 2200e surface analyzer. The instrument utilizes a modified Brunauer–Emmett–Teller (BET) theory equation to quantify the physical adsorption of gas molecules on a solid, porous surface of carbon powder and relate it to surface area.

Average surface area measurements for the drill hole concentrates appear in Table 9. The values range from low to moderate; the lowest measured BET value was 2.71 m²/g in 12GC009 while the highest was 4.29 m²/g in 13GCH012.

Concentrate Sample ID	BET Surface Area (m ² /g)
13GCH012	4.29
12GCH002	3.36
12GCH003	3.60
12GCH004	3.94
12GC007	4.00
12GC009	2.71

Table 9: BET surface area measurements

IGL COMMENTARY RELATED TO GRAPHITE CREEK SAMPLES UNIQUENESS

The Graphite Creek formation hosts some of the most uniquely shaped graphite particles which IGL has encountered in its many years of experience with the industrial graphite and carbon industries. This deposit contains some the following graphites –

- Naturally occurring spheroidal (pebble-shaped) graphite in the size range from +200 to +635 mesh;
- +20 mesh ultra-thin self-scrolling sheets;
- +50 mesh graphite aggregates whose primary particles are 20-30 µm in diameter;
- Up to +20 mesh three-dimensional bulky and needle-shaped graphite (12GCH003);
- Elongated high aspect ratio flakes of +200 to +100 mesh size;
- Nanosized flake graphite material whose one dimension is naturally as thin as 100 nm (12GC009);
- Naturally occurring flake graphite whose particle architecture closely matches that of expanded graphite without any intercalation, expansion and delamination done to it.

13.3.2 Characterization Test Work Key Conclusions

IGL CORE FINDINGS

The following conclusions can be drawn from the characterization work –

- **Characterization points to natural crystalline flake:** FTIR spectroscopy results along with Bulk, Tap and True densities, BET surface area confirmed crystalline flake graphite.
- **Spherical/pebble shaped particles:** Remarkably, natural spherical morphology was seen in all the Graphite Creek drill hole concentrate samples; first noted at below 100 mesh, the proportion increased relative to other shapes with decreasing size classes until +500 mesh.
- **The graphite deposit is further unique:** Observed morphologies ranged from flakes, and three dimensional expanded shapes to spherical and pebble shaped particles. Proportions varied by mesh size cut within each drill hole concentrate.
- **Mineralization in-homogeneity:** Graphite Creek mineralization of the selected drill holes displayed non-homogeneity as evidenced by the variability of the graphite grade, impurity content and ash appearance between drill hole concentrates. Mineralization blending could be used to mitigate such variations.
- **Impurities:** Drill hole concentrates impurity concentrations were largely within the treatment capabilities of thermal purification to achieve tolerances for battery applications; only 12GCH002 concentrate had a high molybdenum concentration. Mineralization blending and

improved mineral beneficiation could reduce the concentration of molybdenum and other problem impurities to accepted threshold limits. Value impurities such as titanium and platinum, the latter detected in 12GCH002 LOI ash at 0.43 wt% could be investigated for recovery ahead of graphite extraction.

- **Contains significant coarse flake proportion:** Screening analysis and optical microscopy demonstrate that Graphite Creek’s deposit possesses sizeable proportions of the coarse flake but further examination is required to assess the relative amount of integral versus aggregate flake and whether flake fragility will affect recovery.

TRU INSIGHT ON THE CHARACTERIZATION RESULTS

Advantages of uniqueness of the Graphite Creek graphite mineralization relate –

- Naturally occurring graphite in the shape of pebbles or spheres are close to the size ranges of interest for lithium ion battery grade graphite;
 - There is a possibility of increasing the yield of spherical graphite from the normal industry yield of 30%-40% to a yield as high as 70% (proven in Section 13.4 Exploratory Product Development – Spherical Graphite).
 - Time in the spheronizing mill could be reduced, thus resulting in lower intensity milling (proven in Section 13.4) and lower operating and capital costs for this step
- The inherent high aspect ratio and high friability of certain size ranges of particles could render them more amenable to milling and realize a 50% reduction in operating costs for the micronizing milling step in the Products Manufacturing Plant;

This uniqueness also requires extraordinary future research and development to –

- Determine whether there is a relationship between drill core interval depth and mineral grade with observed variation in particle morphology and particle size distribution.
- Discern whether 12GCH002 which showed high liberation from gangue during extraction is representative of the Graphite Creek mineralization in the upper QGBSS layer, is an outlier or is representative of a particular sector of graphite mineralization.
- Assess possible separation of integral from pressed flake;
- Identify particle types and morphologies that will survive the purification steps;
- Examine friable fractions that are more amenable to milling and assess the suitability of large aspect ratio / pressed flakes for making foil and sheet production¹⁸;
- Confirm ease of spheronizing and recovery rates in commercial equipment

“STAX GRAPHITE” BRAND OF THE UNIQUE GRAPHITE CREEK MINERALIZATION

TRU recommends that Graphite One brand the unique aspects of the Graphite Creek mineralization to distinguish it from other commercially mined graphite. TRU selected brand name “STAX Graphite” highlight the main descriptive morphological aspects of the graphite–

- ***“S” as in Spheroidal***
- ***“T” as in Thin***
- ***“A” as in Aggregate***
- ***“X” as in Expanded***



- **STAX Graphite is unique and commercially important:** The importance was demonstrated exploratory product development test work which achieved high conversion yield to spherical graphite which also achieved high performance during electrochemical testing. STAX graphite (subject to study in further extraordinary product development R&D) is projected as being uniquely amenable for use in several applications, including lithium-ion, alkaline batteries, greases and lubricants, friction, motor brushes, crucibles, etc.

13.4 Exploratory Product Development – Spherical Graphite

An exploratory product development program was performed at USA-based IGL under the management of TRU Group with the following objectives:

- 1) Develop experience and a knowledge base on the mechanical processing of STAX graphite; and
- 2) Produce a preliminary spherical graphite product suitable for lithium ion batteries for EV applications and characterize the physical and electrochemical properties in CR2016 coin cells.

Historical surface samples collected from the Graphite Creek Property were sent to IGL in November 2015 as the raw feed to execute the test work. Graphite concentrate was extracted from the mineral samples in two-stage flotation with only prior pre-crushing of the mineralized material. The resulting concentrate was thermally purified to exceed the minimum threshold of 99.95% C required of graphite for lithium ion battery applications. Following thermal purification, the graphite was spheronized and classified into different size classes. The physical properties of each recovered size class were characterized; those fractions identified as suitable for anode material in lithium ion battery applications were electrochemically assessed in both non-coated and coated spherical graphite forms.

13.4.1 Preparation of Graphite Concentrate

Received mineral samples which were collected from the surface outcrop bulk sampling program of 2012 were sorted by IGL into three lots on the basis of macroscopic mineralogy. Following the analysis of the three rock types, the lot which appeared as Gray Marble was selected for beneficiation and graphite extraction as they were determined to be have similar mineralogy to the Quartz-Garnet-Biotite-Sillimanite Schist which is mineral zone of interest for crushed to -18 mesh. LOI 950 °C analysis of the rock yielded an assay of 48.2% C. Two stages of non-optimized flotation produced approximately 3.3 kg of bulk graphite concentrate assaying 79.6 %C by LOI 950°C.

13.4.2 Thermal Purification of Graphite Concentrate

Concentrate was thermally purified at USA-based Thermal Processing Facility (TPF) external to IGL at high temperature and under a halogen atmosphere to achieve minimum target purity of 99.95% C and threshold limits on certain individual impurities. The concentrate grade at 79.6%C grade was low by TPF processing standards and therefore a sample cut of 288 g was air-jet milled in advance by IGL and then submitted for trial purification. The increased surface area milled concentrate was intended to assist thermal purification. During this exercise, IGL observed that only 30-35 psi of the energy input was required to mill the Graphite Creek graphite as opposed to 100-120 psi that is typical for “conventional” China flake. Following successful treatment of the trial sample, most (2733.4 g) of the remaining bulk concentrate was also air-jet milled ahead of thermal purification. A third concentrate sample cut of 299.4 g was thermally treated without any prior air-jet milling. Analysis of the concentrate samples by LOI 950°C and recorded mass losses in Table 10 show that the target purity of 99.95% C was exceeded.



Mass loss was attributed to impurity volatilization and thermal decomposition of other minerals. Separate analyses for impurity content were also within threshold limits.

Sample ID	Initial Mass (g)	Final Mass (g)	Mass Loss (%)	LOI Assay (%C)
MG-Trial	288	202	30%	99.990
MG-Bulk	2733.4	2041.2	25%	99.987
NMG	299.4	198.4	34%	99.992

Table 10: Carbon assay and recorded mass loss of milled (MG) and non-milled (NMG) purified graphite samples

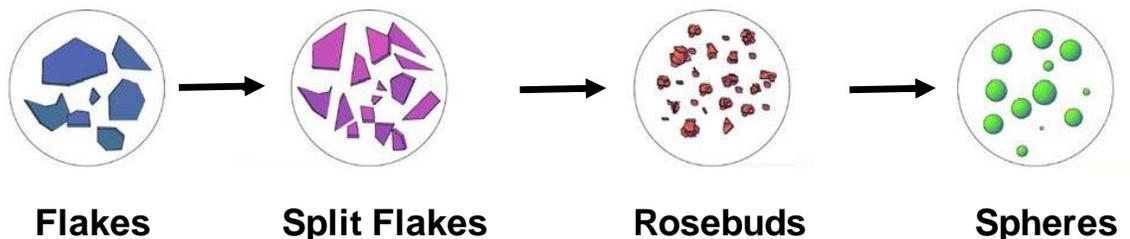
13.4.3 Spherical Graphite Preparation

Purified milled (MG) and non-milled (NMG) graphite samples were converted into spherical graphite in a single, non-optimized trial. Purified MG material was processed by normal production protocols with –

- 1) (Additional) air-jet milling of the MG bulk concentrate to ensure the mean particle size (D50) was between 25 and 35 microns (µm) to improve conversion yield
- 2) Mechano-chemical (spheronization) processing of the air-jet milled graphite to achieve the desired particle (spheroidal/potato) shape

The NMG sample cut was directly fed to the spheronization mill without any prior air-jet milling as an investigative exercise on the potential outcome.

Mechano-chemical processing or “spheronization” progressively transformed pre-cursor (air-jet milled) flakes into spheroidal or potato shapes in the sequence depicted below.



13.4.4 Spherical Graphite Physical Characterization

After spheronization, the recovered spherical graphite (SG) product was classified into different size fractions and characterized. Both the non-milled purified and spheronized graphite (NM-PSG) cut and the bulk milled purified and spheronized (M-P-SG) graphite were physically characterized. A carbon-coated counterpart (M-P-CSG) of the latter was also physically characterized. There was insufficient quantity of non-milled graphite sample to manufacture a coated product.

PRINCIPAL CHARACTERIZATION METHODS

The techniques to characterize the physical properties above-mentioned purified, spherical graphite samples were similar to those used to characterize the graphite mineral samples from drill core segments which are summarized in Table 5, Section 13.3.

CHARACTERIZATION OF NON-MILLED PURIFIED SPHERONIZED GRAPHITE (NM-P-SG)

Non-milled graphite samples that were purified and directly spheronized (NM-P-SG) without any prior size reduction were classified into eight size fractions. Results of physical characterization and particle size analysis are presented in Table 11. Most significant was the high conversion yield at 74.6 wt% to spheroidal size cuts potentially suited for advanced lithium-ion battery applications – highlighted samples PNM-SG-0 and PNM-SG-1. This result was achieved without any prior jet milling, i.e., direct spheronization, of the purified graphite, used the entire size distribution of the graphite feed, and required half the residence time with one third of the energy input to the spheronizing mill compared to conventional Chinese flake graphite.

Sample ID	Mass (g)	Mass Distribution (%)	Tap Density (g/cm ³)	Scott Volume (g/cm ³)	BET (m ² /g)	Sonicated Particle Size Analysis			
						D ₁₀ (µm)	D ₅₀ (µm)	D ₉₀ (µm)	Mean (µm)
NM-P-SG-0	49.5	41.6%	1.17	0.76	11.9015	11.02	22.5	30.63	21.73
NM-P-SG-1	39.4	33.1%	0.88	--	10.1715	7.08	13.46	19.77	13.63
NM-P-SG-2	18.1	15.2%	--	--	11.4095	--	--	--	--
NM-P-SG-3	2.4	2.0%	0.859	--	16.66	4.26	8.04	13.18	8.5
NM-P-SG-4	2.3	1.9%	0.87	--	9.3	3.85	7.57	13.01	8.19
NM-P-SG-5	2.4	2.0%	--	--	9.34025	4.77	8.26	13.94	8.97
NM-P-SG-6	2.6	2.2%	--	--	10.491	5.7	7.93	10.37	7.99
NM-P-SG-7	2.4	2.0%	0.708	--		3.03	5.72	9.91	6.22
NM-P-SG-Mix-0-1	10		1.063			6.7	16.68	39.9	21.44

Table 11: Physical characterization of directly spheronized graphite by size cut

Of the two size cuts, NM-P-SG-0 featured a verified Scott Volume of 0.76 g/cm³ with a Tap Density of 1.17 g/cm³. In the IGL team’s many years of tangible experience with graphite for batteries, this is the highest packing density of all graphites seen. The remarkable packing density is achieved as a result of form factor and size of the resultant particles. Scanning electron microscopy (SEM) micrographs of NM-P-SG-0 particles in Figures 28-29 show, dense spheroidal matter, very uniform, and aligned with expectations of graphite for applications in the advanced lithium-ion battery systems. Particles of “-1” cut range from spheroidal to the rounded edge three-dimensional shapes. Comparison between the unmilled “-0” and “-1” size cuts reveals that the former has a higher degree of sphericity. This manifests itself in a greater packing density for the “-0” cut. NM-P-SG-0 and NM-P-SG-1 size cuts were mixed in amounts proportional to their yield for testing in uncoated form in CR2016 coin cell batteries. The resultant tap density of 1.063 g/cm³ is a sign of superior material for application in lithium-ion battery anodes. Sample cuts NM-P-SG-5 and NM-P-SG-6 are very fine and spheroidal in nature. Their packing density is in line with values of the NM-P-SG-1 cut, at 45% of the particle size. With particle D50 values between 8 and 9 µm, these spheroids could be suitable candidates for ultra-high-rate military lithium-ion and plug-in hybrid electric vehicle batteries. Future studies should focus on yield optimization.

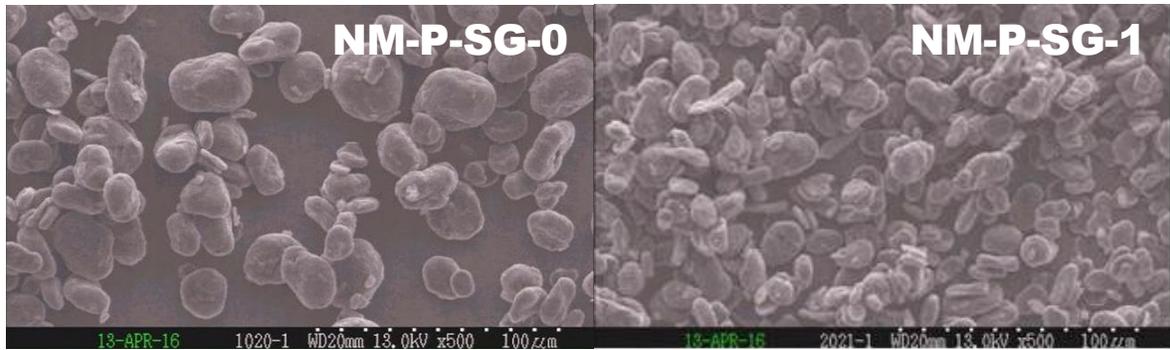


Figure 28: SEM micrographs of spherical graphite from size cuts NM-P-SG-0 and NM-P-SG-1

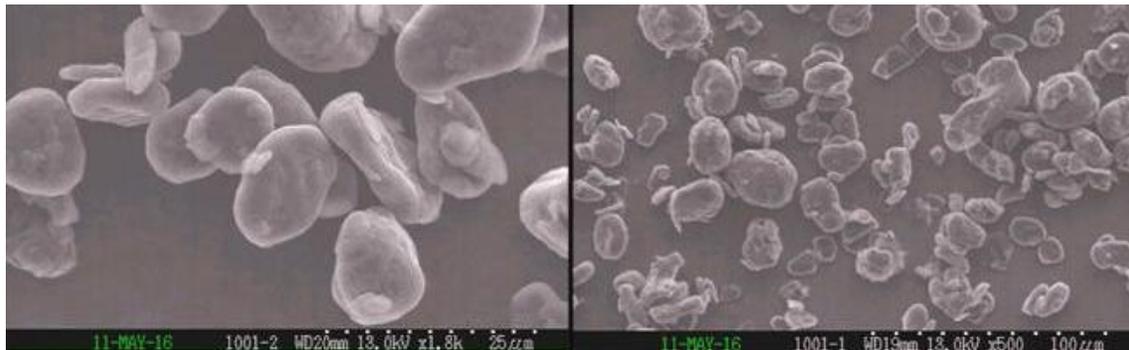


Figure 29: SEM micrographs of proportionally mixed fractions of NM-P-SG-0 and NM-P-SG-1

CHARACTERIZATION OF MILLED PURIFIED SPHERONIZED GRAPHITE (MG-P-SG)

Density measurements (Tap, Scott Volume and BET) and particle size analysis of MG that was purified and spheronized (M-P-SG) are presented in Table 12. Top size cuts by particle size and tap density are: M-P-SG-0, MP-SG-1 and MP-SG-2 which represent 49% of the converted feed. Relative to the graphite that was directly spheronized, the conversion yield was lower and the degree of spheronization qualitatively less.

Sample ID	Mass (g)	Mass Distb'n (%)	True Density (g/cm ³)	Tap Density (g/cm ³)	Scott Volume (g/cm ³)	BET (m ² /g)	Sonicated Particle Size Analysis			
							D ₁₀ (µm)	D ₅₀ (µm)	D ₉₀ (µm)	Mean (µm)
M-P-SG-0	190.9	13%	--	0.93	0.529	4.394	9.77	18.31	27.43	18.56
M-P-SG-1	325.5	22%	2.2341	0.91	0.492	4.472	8.26	18.06	31.92	19.49
M-P-SG-2	207.71	14%	--	0.863	0.37	--	6.63	14.36	24.16	15.07
M-P-SG-3	177.2	12%	--	0.76	0.328	--	5.97	12.2	20.41	12.85
M-P-SG-4	114.38	8%	--	0.672	0.316	5.692	6.4	11.79	18.29	12.16
M-P-SG-5	77.7	5%	--	0.683	--	6.8805	4.99	10.74	19.35	11.8
M-P-SG-6	69.2	5%	--	0.616	--	5.116	4.98	10	16.67	10.54
M-P-SG-7	321.1	22%	--	0.75	0.279	7.362	4.28	8.34	14.92	9.13
M-P-SG-Mix-0-2-5	31.6			0.8938	0.589					

Table 12: Physical characterization of milled spheronized graphite by size cut

CHARACTERIZATION OF MILLED PURIFIED COATED SPHERONIZED GRAPHITE (MG-P-CSG)

Non-coated spherical graphite will attain a higher first discharge capacity but at higher (double digit percentage) irreversible capacity loss compared to coated material. However, lithium ion battery applications require spherical graphite be coated with nano-sized particles to reduce BET surface area to improve (reduce) irreversible capacity loss and battery safety. Table 13 summarizes the physical properties of coated spherical graphite blended from size cuts of milled spheronized graphite above. As anticipated, the carbon coating resulted in lower True Density (due to the lower density of the coating); higher Tap Density and Scott Volume; and lower BET.

Sample ID	Mass (g)	True Density (g/cm ³)	Tap Density (g/cm ³)	Scott Volume (g/cm ³)	BET (m ² /g)	Sonicated Particle Size Analysis			
						D ₁₀ (µm)	D ₅₀ (µm)	D ₉₀ (µm)	Mean (µm)
M-P-CSG 325	220.2	1.911	0.8766	0.5954	0.938	17.08	65.56	193.2	87.78
M-P-CSG -325/+400	61.7	--	0.942	0.5639	0.868	10.71	21.78	28.72	20.48
M-P-CSG -400/+450	429.1	--	0.917	0.5841	--	11.05	17.83	24.2	17.76
M-P-CSG -450/+500	7	--	0.902	0.588	0.867	10.2	14.8	19.6	14.86
M-P-CSG-Mix-0-2-5	80.5	--	0.85	0.5179	1.04	10.54	19.47	28.67	19.58
M-P-CSG-Mix-4-7-6	291.6	--	0.802	0.4287	0.998	8.23	14.7	22.96	15.24

Table 13: Physical characterization of coated spherical graphite samples

13.4.5 Spherical Graphite Electrochemical Characterization

Baseline electrochemical characterization was performed with uncoated and coated spherical graphite samples identified with physical characteristics suitable for use in lithium-ion batteries. Three spherical graphite samples tested in CR2016 coin cells assembled by IGL included:

1. Non-milled purified spheronized graphite blended mixture (NM-P-SG-Mix-0-1) that were:
 - a. Not carbon coated
2. Milled purified spheronized graphite blended mixtures that were:
 - a. Not carbon coated (M-P-SG-Mix-0-2-5)
 - b. Carbon coated and heat treated (M-P-CSG-Mix-0-2-5)

Initial electrochemical performance of lithium-ion battery grade active materials (uncoated and coated spherical graphite) was assessed in standard CR2016 coin cells. The cells were assembled into the “half-cell” design which, in this context assumes testing the graphite anode vs the Li/Li⁺ counter electrode. Cycling was performed at the following typical rates: C/20 (3 cycles), followed by C/10 – 3 cycles; C/5 – 1 cycle; C/2 – 20+ cycles from 1.1V to either 1.8 or 2.0 V vs. Li/Li⁺ for graphite materials of interest.

ELECTROCHEMICAL CHARACTERIZATION OF SPHERONIZED GRAPHITE

Electrochemical performance of non-carbon coated spheronized graphite was examined in two types of tests in order to provide a comparative baseline for coated spherical graphite:

1. Initial galvanostatic cycling at C/20 rate to record and assess the first discharge capacity and irreversible (first cycle) capacity loss on coin cells manufactured with M-P-SG samples and NM-P-SG samples followed by repeat charge-discharge cycle(s) to examine performance stability
2. Short-duration continuous galvanostatic cycling at C/3 rate on one sample to examine cycling stability on one cell manufactured with NM-P-SG samples

Summary galvanostatic test results for uncoated spherical graphite are shown in Table 14. Selected galvanostatic curves from coin cells 1203, 1207 and 1211 appear in Figure 30 to Figure 33, respectively.

Coin Cell ID	Spherical Graphite Product	First Charge Capacity	First (Reversible) Discharge Capacity at 1.8 V vs Li/Li+	First (Irreversible) Cycle Loss
		(Ah/kg)	(Ah/kg)	(%)
1203	M-P-SG-0-2-5	421.6	372.0	11.8
1207	M-P-SG-0-2-5	395.5	370.9	6.2
1208	M-P-SG-0-2-5	415.6	369.2	11.2
1209	NM-P-SG-0-1	442.7	367.4	17.0
1211	NM-P-SG-0-1	427.4	360.7	15.6

Table 14: Galvanostatic test results for coin cells made with M-P-SG-0-2-5 blend and NM-P-SG-0-1 blend

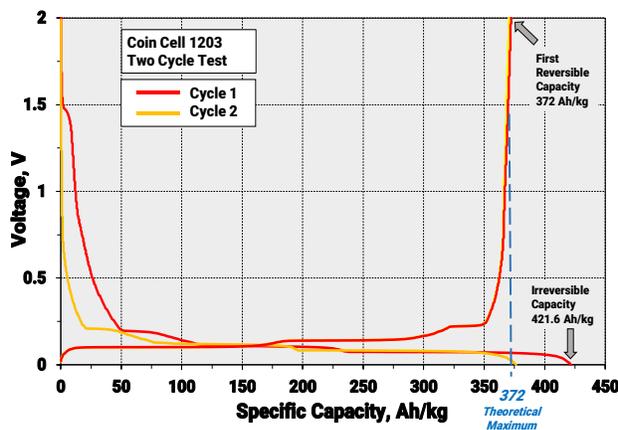


Figure 30: Initial galvanostatic cycling of CR2016 coin cell 1203 vs. Li/Li+ counter electrode at C/20 rate (limited electrolyte)

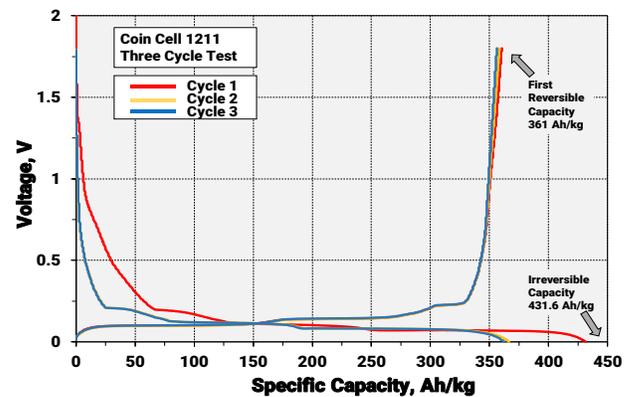


Figure 32: Initial galvanostatic cycling of CR2016 coin cell 1211 vs. Li/Li+ counter electrode at C/20 rate

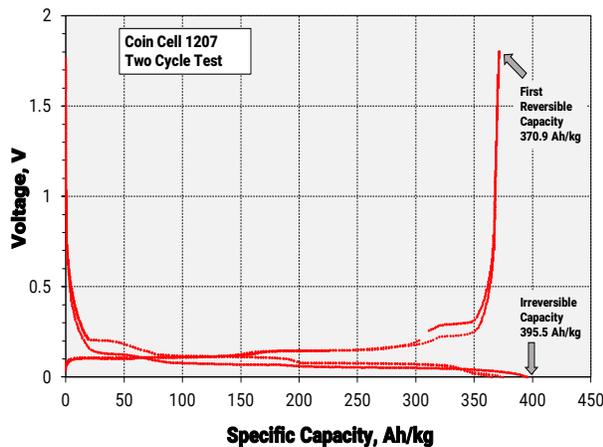


Figure 31: Initial galvanostatic cycling of CR2016 coin cell 1207 vs. Li/Li+ counter electrode at C/20 rate

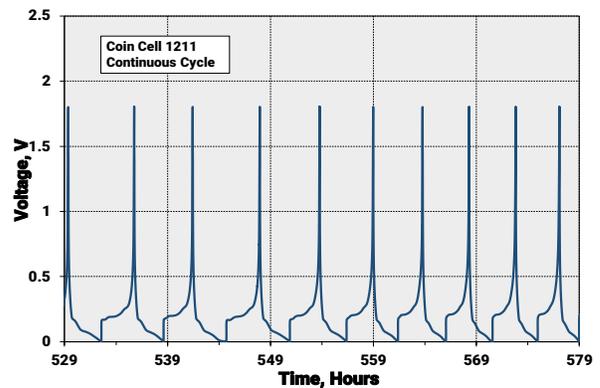


Figure 33: Continuous galvanostatic cycling of CR 2016 coin cell

IGL asserted that most of the galvanostatic curves are excellent as per:

- The reversible capacity of the uncoated spheronized graphite from Graphite Creek achieved at or near the theoretical reversible capacity of 372 Ah/kg for graphite; coin cell 1203 attained 372.0 Ah/kg while coin cell 1207 reached 370.9 Ah/kg.
- The above performance was realised at an active material loading level of near 11 mg/cm², which is used in commercial batteries.
- Repeatability of graphite performance was observed with consecutive cycling. Most cells consistent performance over multiple cycles (2-3 cycles)
- Even though IGL did not build cells with a specific design that would survive continuous cycling, coin cell 1211 shows good stability in short duration continuous recharge as seen in Figure 32 for cycles #16 through #26 (50 hours).

ELECTROCHEMICAL CHARACTERIZATION OF COATED SPHERONIZED GRAPHITE

Summary galvanostatic test results for three CR2016 coin cells manufactured with M-P-CSG- 0-2-5 blend are seen in Table 15. All three coin cells experienced single digit irreversible capacity loss consistent with expectations relative to coin cells made with non-coated spherical graphite. Of the three, coin cell 1220 performed best with respect to all parameters and also showed stability and reproducibility over three charge-discharge cycles, Figure 34; first discharge capacity was near theoretical at 370.1 Ah/kg for an irreversible capacity loss of 6.3%.

Coin Cell ID	Spherical Graphite Product	First charge capacity (Ah/kg)	First (Reversible) Discharge Capacity at 1.8 V vs Li/Li+ (Ah/kg)	First (Irreversible) Cycle Loss (%)
1220	M-P-CSG-0-2-5	395.2	370.1	6.3
1221	M-P-CSG-0-2-5	401.1	364.1	9.2
1228	M-P-CSG-0-2-5	398.8	367.9	7.8

Table 15: Galvanostatic test results for coin cells made with M-P-CSG-O-2-5 blend

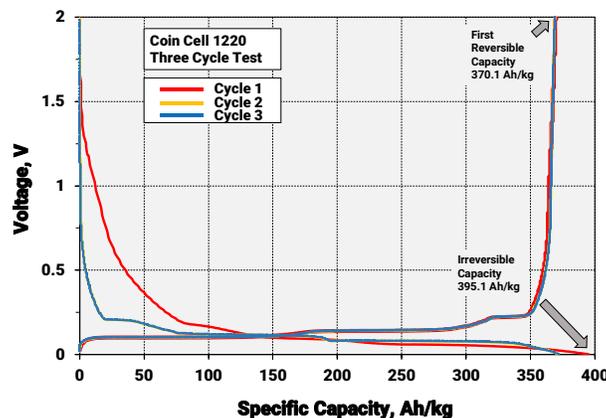


Figure 34: Initial galvanostatic cycling of coated SG in CR2016 coin cell 1220 vs. Li/Li+ counter electrode at C/20 rate

13.4.6 Summary

- Direct spheronization of non-milled, purified graphite achieved approximately 74.6 wt% yield of usable spherical product.

- A record Tap Density value at 1.17 g/cm³ was measured with the non-milled spheroidal flake – higher Tap Density translates to more particle insertion (higher energy density) in the electrode assembly.
- Carbon coating on to the spherical flake resulted in a low BET surface area product.
- Uncoated and coated spheronized graphite tested for their initial electrochemical properties in CR2016 coin cells both delivered near theoretical performance, which is promising for application in advanced lithium-ion battery systems.
- More work is needed in order to verify the stated levels of performance with graphite recovered and spheronized from subterranean formations at the Graphite Creek and to assess carbon coating performance in commercial equipment

13.5 TRU Group Beneficiation Test Work

Mineral processing test work under the management of TRU Group was conducted at another independent USA-based mineral processing laboratory (IMPL). Two series of flotation tests were carried with the first series using graphite mineralization from drill core segments grading 15-17 %C while the second series used graphite mineralization from drill core segments representative of the preliminary mine plan and grading 5-7% C High grade mineral pockets exist on the Graphite Creek property and mechanical concentration of such material provides data on feed variability recoveries.

13.5.1 Mechanical Concentration of Graphite Mineralization 15-17%C

The test work investigated the potential recovery of a coarse graphite concentrate (+80 mesh) and fine graphite concentrate (-80 mesh) from drill core segments with graphite mineralization grading at 15-17 %C. One flowsheet examined in this series of tests appears in Figure 35. The objective was to produce two concentrates grading near or above 95% Cg.

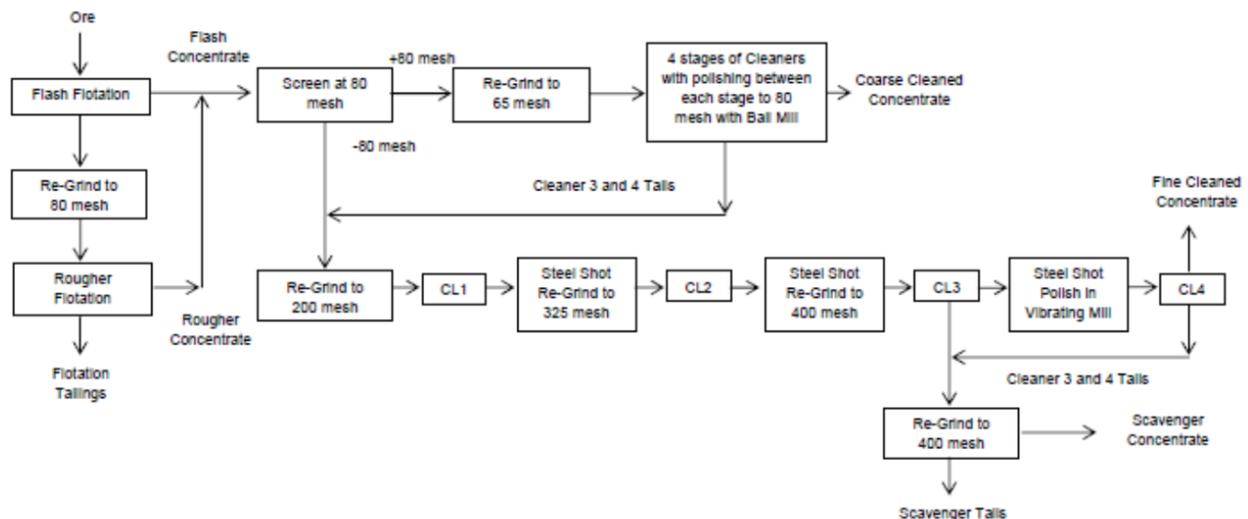


Figure 35: Flowsheet to produce minimum 95% Cg grade in coarse and fine concentrates

Feed ground to 16 mesh was subjected to flash and rougher flotation. The rougher and flash concentrates were combined and screened at 80 mesh. The oversize (coarse) and undersize (fine) were each subjected to four sequences of regrind/polishing coupled with cleaner flotation. The recovered

coarse concentrate was screened at 80 mesh; the amount of oversize (+80 mesh) was negligible and could not be analyzed. This finding does not pre-suppose that the fraction of true (integral) coarse particles was non-existent in the feed but may rather indicate that the intensity of processing was too high to preserve the original flakes that were either integral or aggregate structures. As per the characterization test work in Section 13.3, actual quantification of integral vs aggregate graphite flake in the mineralized sample is complex and detailed study will be required in a future investigation.

13.5.2 TRU Proposed Mineral Processing Flowsheet

Subsequent mineral processing test work investigated a simplified flowsheet proposed by TRU Group to produce a single concentrate from lower grade graphite mineralization samples consistent with and representative of the targeted exploitation zone discussed in Section 14. Table 16 summarizes the drill core segments used in this study identified by drill hole, drilling interval and assay for the interval according to drill core logs. The proposed simplified flowsheet, Figure 36, is the basis for the recovery methods appearing in Section 19 and is integrated to the requirements of spherical graphite product manufacturing. It requires less equipment for mineral processing with the consequent benefit of lowering capital costs and operating costs for the Graphite Creek Project. In addition, a higher proportion of value-added manufacturing is directed to spherical graphite product which has the highest projected growth of all graphite end-use segments and the highest unit selling price.

Drill Hole ID	Interval		Mass (kg)	Assay %Cg
	From (m)	To (m)		
12GC004	25	47	60.7	6.78
12GC007	65	75	27.6	7.05
12GC007	114	124	27.6	7.05
12GC009	57	77.06	55.3	7.81
13GCH010	72	82	19.0	7.17

Table 16: Drill core segments used in performance baseline test and rougher flotation

The design was supported by prior flotation test findings, which showed low recovery of actual coarse graphite while exploratory product development test work demonstrated high (75%) conversion of feed with a broad particle size distribution to spherical graphite.

Flash flotation is excluded since there is no separate recovery of coarse graphite fractions. TRU attributes prior unsuccessful attempts to upgrade graphite mineralization from Graphite Creek to 95% Cg to insufficient mechanical liberation of the graphite largely due to the choice of grinding regimen, mill type and grinding media. Crushed mill feed material is fed to rod mill for primary grinding to a P80 of 150 mesh. Rod mill slurry is conditioned with reagents and subjected to rougher flotation followed by cleaner flotation. The initial cleaner pulp is then re-ground in a ball mill and subjected to further cleaner flotation. The three tailings streams from rougher, initial cleaning and secondary cleaning are not processed further for graphite recovery. At the laboratory scale, three additional sequences of polishing grinding in vibratory mills coupled with cleaner flotation produce the final graphite concentrate. The tailings from these cleaner stages are sent for scavenger flotation; scavenger concentrate is recirculated to the first polishing grind while scavenger tails are not processed any further.

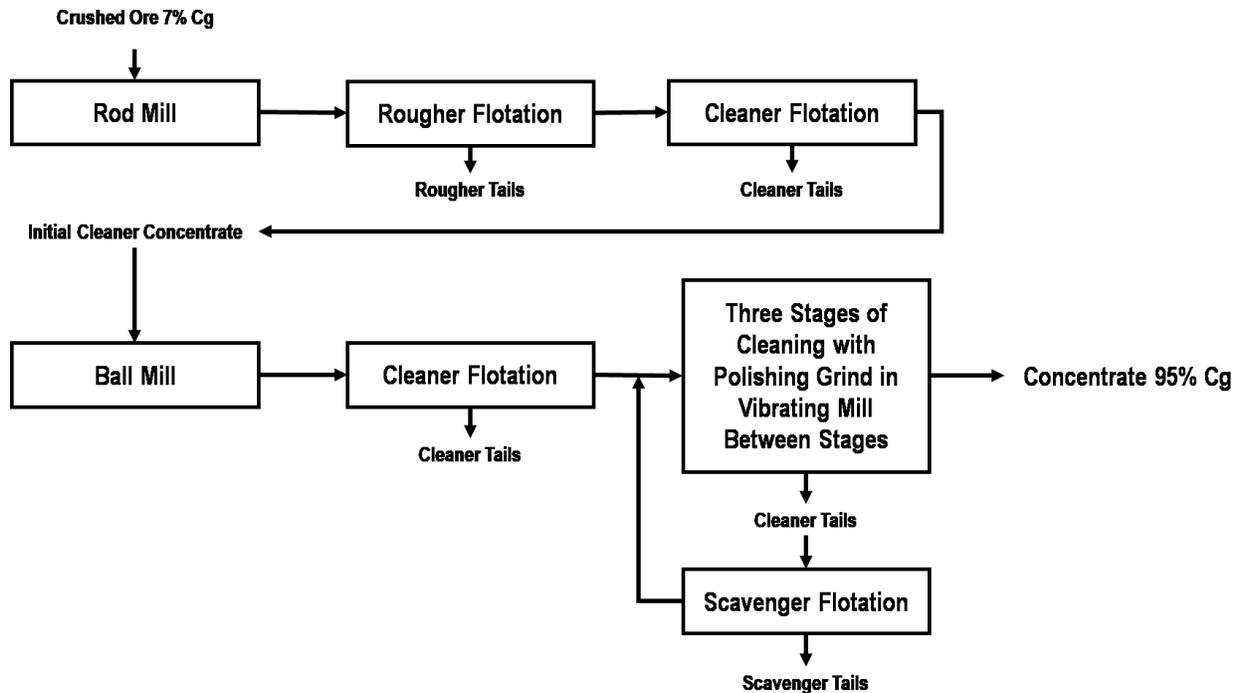


Figure 36: TRU Proposed flowsheet to produce 95% Cg concentrate

TRU projected performance of the flowsheet at the Graphite Creek Mineral Processing Plant based on composite test results is 80% graphite recovery in a concentrate grading 95% Cg. As the head grade of the graphite mineral samples was similar to that used in the SGS test work, a baseline performance test was conducted to confirm the reproducibility of SGS flotation test FT6 and establish cleaner performance. The results of the baseline performance test, Table 17, showed good agreement with SGS FT6 and established the high performance of cleaner flotation stages. Subsequent tests assessed the performance of rougher flotation with only prior grinding of the feed to P80 325 mesh, which resulted in a carbon recovery of 99% in a concentrate grade of 33-34%C at a mass pull of 17.4%. Increasing the P80 size of rod mill grind to 150 mesh, employing flotation columns for the latter four cleaning stages, and using specialized mills for polishing grinds will, in TRU opinion, deliver the projected performance targets. Ongoing test work will validate the entire flowsheet, which will also generate concentrate for the further product development test work.

Product	Overall Recovery % Wt		Overall Recovery % C		Individual Cleaner Recovery % C		Concentrate Grade % C	
	IMPL	SGS	IMPL	SGS	IMPL	SGS	IMPL	SGS
+80 CL3 Conc +80	0.5	1.5	8.5	22.0	Combined CL1-3		96.2	91.7
+80 CL3 Conc -80	0.4		6.1		97.4	97.3	94.6	
-80 CL4 Conc	4.7	4.7	76.7	64.9	Combined CL1-4		94.3	89.0
					96.4	93.8		
CL4 Conc	6.2	7.0	94.5	91.9	Combined CL2-4		88.1	84.4
					96.7	96.7		
CL1 Conc	8.1	8.6	97.7	94.9	99.0	99.2	69.4	71.6
Flash/Rougher Conc	19.5	16.5	98.7	95.7	-----		32.1	37.5

Table 17: Comparison of baseline performance test results with SGS test FT6

14 Mineral Resource Estimates

14.1 Introduction

Modelling, resource estimation and statistics was performed by Christopher Valorose under the supervision of William Ellis. The Measured, Indicated and Inferred Graphite Creek Resource estimate is reported in accordance with the Canadian Securities Administrators National Instrument 43-101 and has been estimated using the CIM “Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines” dated November 23rd, 2003 and CIM “Definition Standards for Mineral Resources and Mineral Reserves” dated November 27th, 2010. Mineral resources are not mineral reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the mineral resource will be converted into a mineral reserve.

A ‘Measured Mineral Resource’ is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.

An ‘Indicated Mineral Resource’ is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

An ‘Inferred Mineral Resource’ is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited



sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

The project area is based in the Universal Transverse Mercator (“UTM”) coordinate system, North American Datum (“NAD”) 1983 and UTM Zone 3. Multiple drill programs have been completed in 2012, 2013, 2014 and 2018. The 2018 drill season provides the entirety of new data in the resource model. The drill data was provided in multiple Microsoft ACCESS databases with original drill logs and assay certificates. A total of 56 drill holes are included in the drill databases with 54 having assay data available (two holes were metallurgical holes with no associated assay results). All collar coordinates, downhole surveys, assays, and geologic data were compared to original logs and assay certificates and no significant discrepancies were found.

Results from previous resource estimations and geologic modeling were provided and used as basis for future modeling. Updates to lithologic units, overburden, and faulting using the new 2018 data were also provided. Mineral resource modelling, estimation and statistics was carried out using commercial mine planning software Vulcan (version 11.1).

14.2 Data

14.2.1 Drill Hole Database Validation

Drilling data was provided in the form of multiple Microsoft Access databases, primarily split between the main drilling seasons of 2012-2014 and 2018. Original logs in Microsoft Excel format for the 2012-2014 drill holes were also provided, as were all assay certificates for all drill holes. A full comparison of the drill hole databases to the original logs and assay certificates was completed.

The 2012, 2013 and 2014 drill holes were surveyed using a Topcon static GPS system. Drill hole elevations were determined using a differential GPS and then cross-checked with the recently acquired IfSAR bare-earth DEM (DTM) data, which has a 5 m cell size resolution. Due to the vast topographic relief in places at Graphite Creek differences between the differential GPS and the IfSAR bare-earth DEM (DTM) data is to be expected. No major concerns were identified. (Robinson et al., 2017)

The 2018 drill collars were surveyed using Topcon and Javad high precision GPS equipment using typical RTK surveying methods to accurately locate 2018 collars in the same coordinate system used in previous exploration campaigns.

When compared to original logs, minor differences were found in the 2012-2014 collar coordinates within the database provided. One 2012 hole (12GCH008) had a 2 meter difference in the Y coordinate and all 2014 drill holes had minor X and Y coordinates discrepancies of less than 0.72 meters. Difference in elevation up to 5.4 meters were also seen, primarily in 2012 drilling, with more minor difference seen in 2014 drilling. In all cases, the discrepancies are considered insignificant and coordinates provided in the drill hole database were used in resource estimation as the database had been verified and used in previous estimates.

Of the 50 drill holes completed during 2012-2014, 42 drill holes were drilled at an azimuth of approximately 160°, with the holes being drilled from the northwest to the southeast. The drill hole inclination of these holes varied from -49° to -78° with 40 drill holes (80%) having inclinations of between -49° to -65°. The remaining 8 drill holes were drilled vertically (-90°). Regular down hole easy



shot surveys were routinely collected every 30 m down the drill hole while the drilling was in progress, after which a follow up multi-shot survey was completed for each hole at regular 1 to 10 m intervals. The exception to this was drill holes: 12GC001; 12GC004; 12GCH006; 13GCH009; 13GCH010 13GCH012; 13GCH013; 14GCH003; 14GCH010; 14GCH012; 14GCH013; 14GCH017 to 14GCH020, where only 5 to 30 m interval easy shot surveys were completed. All spurious surveys were removed.

The down hole surveys for the 2018 drill holes used the Reflex EZ-Trac multi-shot survey collecting a reading every 30m coming out of the hole. Survey results were evaluated for validity and results that were deemed not good were not imported into the drilling database. Drill holes 18GC021 and 18GC022 did not have downhole surveys completed due to complications with tooling in the hole. The survey for 18GC025 was not good due to a rock stuck in the drill bit preventing the survey tool from going out into the open hole for good readings.

All EZ Shot downhole surveys were compared with original logs and one discrepancy in hole 13GCH013 was found and corrected. Remaining multi-short surveys were reviewed visually when loaded in Vulcan and no significant issues were seen. The 2012-2014 survey results all used a standard declination correction of 12.016777. Due to the location of the project, declination can vary significantly year-to-year and thus it was determined to use new correction factors for 2012, 2013, and 2014 data. The declination was determined for each year using the magnetic field calculator on the National Oceanic and Atmospheric Administration website and can be seen in Table 18. The maximum difference in sample location (the bottom sample in all holes) when using the new declination correction factor was less than 1.7 meters in all holes, and the average maximum distance is approximately 0.7 meters.



HOLE ID	Max Difference	HOLE ID	Max Difference
12GC001	1.612	13GCH014B	0.761
12GC002	1.364	13GCH015	0.791
12GC003	0.965	13GCH016	0.572
12GC004	0.962	13GCH017	1.065
12GC005	0.895	14GC014	0.016
12GC006	1.020	14GC018	0.060
12GC007	1.002	14GCH001	0.959
12GC008	0.840	14GCH002	0.452
12GC009	0.798	14GCH003	0.755
12GC010	0.816	14GCH004	0.925
12GCH001	0.658	14GCH005	0.833
12GCH002	0.618	14GCH006	1.207
12GCH003	0.631	14GCH007	0.954
12GCH004	0.602	14GCH008	0.918
12GCH005	0.109	14GCH009	0.094
12GCH006	0.669	14GCH010	0.110
12GCH007	0.640	14GCH011	1.097
12GCH008	0.674	14GCH012	0.052
13GCH009	0.809	14GCH013	0.935
13GCH010	0.779	14GCH015	0.642
13GCH011	0.664	14GCH016	0.099
13GCH012	0.681	14GCH017	0.948
13GCH013	0.617	14GCH019	0.899
13GCH014A	0.319	14GCH020	0.769
AVERAGE	0.722		

Table 18: Maximum difference in sample location using updated declination in downhole surveys

Logged lithology in the drill database was compared to the original logs with no errors or omissions found.

All assay results for Cg (%) were compared to original certificates and 100% of the assay results in the provided database were verifiable with no errors or omissions found.

Density data was also provided but no comparisons back to original logs or certificates was undertaken. Rather a visual and statistical validation was undertaken with no significant errors discovered.

After validation of the provided data, a Vulcan database was created for further modeling, statistics and resource estimation. No overlapping samples or geologic intervals were found. The Vulcan database used in resource modeling and estimation is considered reliable for mineral resource estimation purposes.

14.2.2 Data Summary

The final database is composed of 56 drill holes. Two holes are metallurgical holes with no assay data available leaving 54 drill holes with assay data available for resource estimation. A summary of the final assay data available is provided in Table 19.

	ALL Graphite Samples
Count	7893
Mean	3.17
Standard deviation	4.73
Maximum	59.10
Upper quartile	3.90
Median	1.90
Lower quartile	0.44
Minimum	0.02
Coeff. Of Variation	1.49
Variance	22.35
Percentile 10	0.10
Percentile 20	0.30
Percentile 90	7.17
Percentile 99	25.01

Table 19: Summary statistics for unconstrained graphite samples

The Graphite Creek Resource estimate has been calculated utilizing the graphitic carbon (Cg) percent assay grade. Graphite is the only commodity at this stage that demonstrates potential for economic concentrations. Previous resource modeling interpreted nine mineralized lodes using an approximate 3% Cg cutoff. The interpretation was updated with the new 2018 drill results and new downhole survey correction factors. All mineralized wireframes/solids were snapped directly to drilling to provide distinct contacts between mineralized and unmineralized zones (see Section 14.3.2, Lode Models). It should be noted that the more densely drilled lodes with abundant samples have an excellent single population and Log normal bell curve (Lodes 01 to 03); whereas when the number of drill holes intersecting the respective lode decrease, the number of samples within that lode are less and as such the data populations are more erratic (albeit still exhibiting single populations). Because the Graphite Creek samples exhibit a single population, linear estimation techniques were applied. Summary statistics, histograms, and log normal curves for each lode are provided in Figures 37-46.

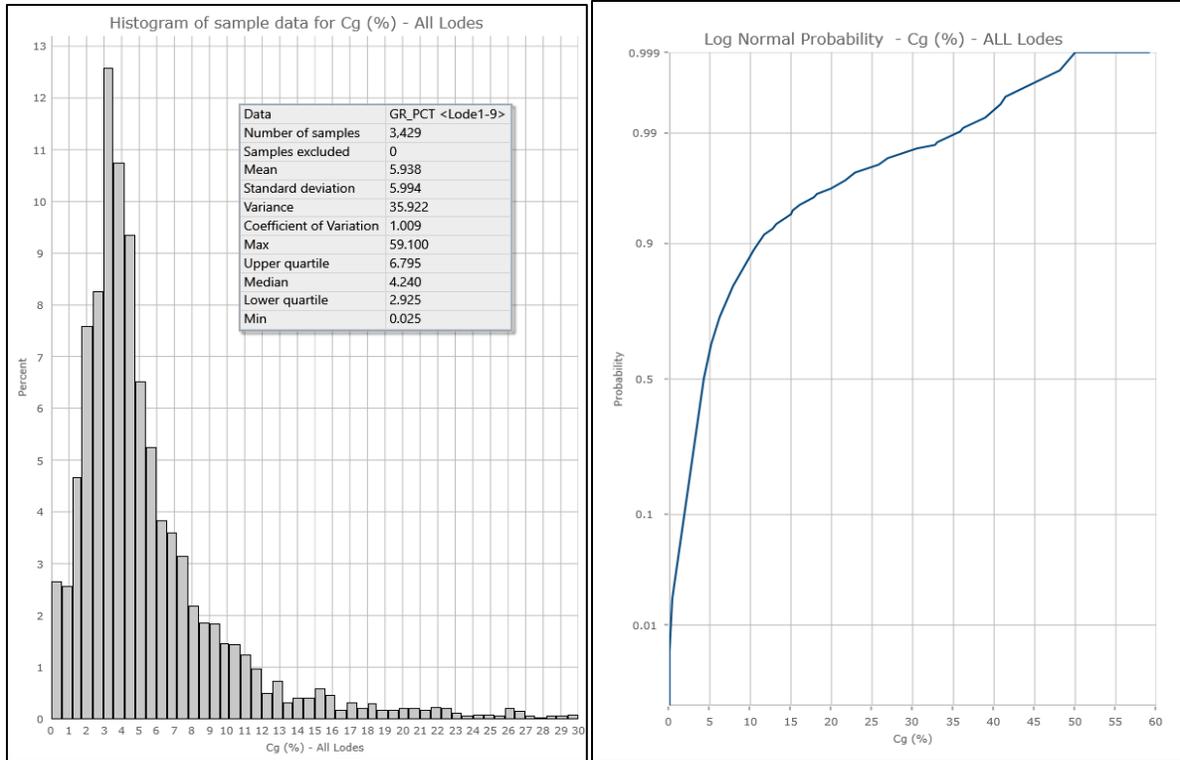


Figure 37: Histogram and probability plot of Cg (%) sample data in all lodges.

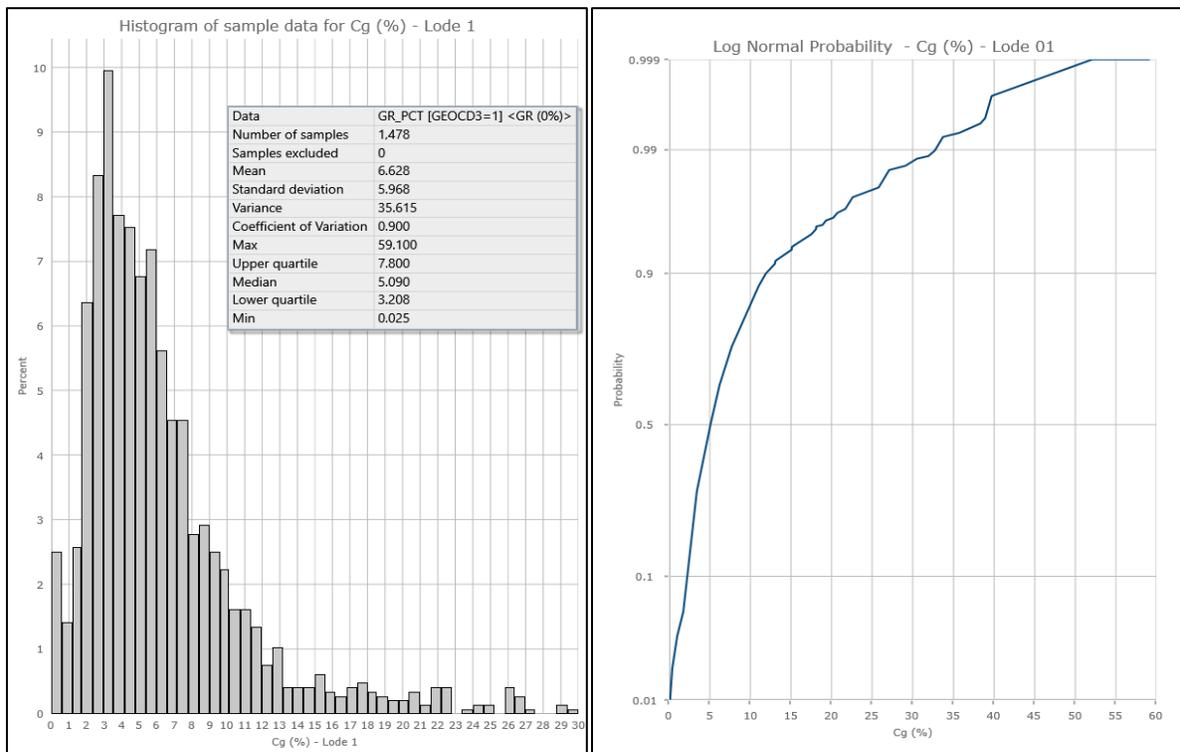


Figure 38: Histogram and probability plot of Cg (%) sample data in Lode 1.

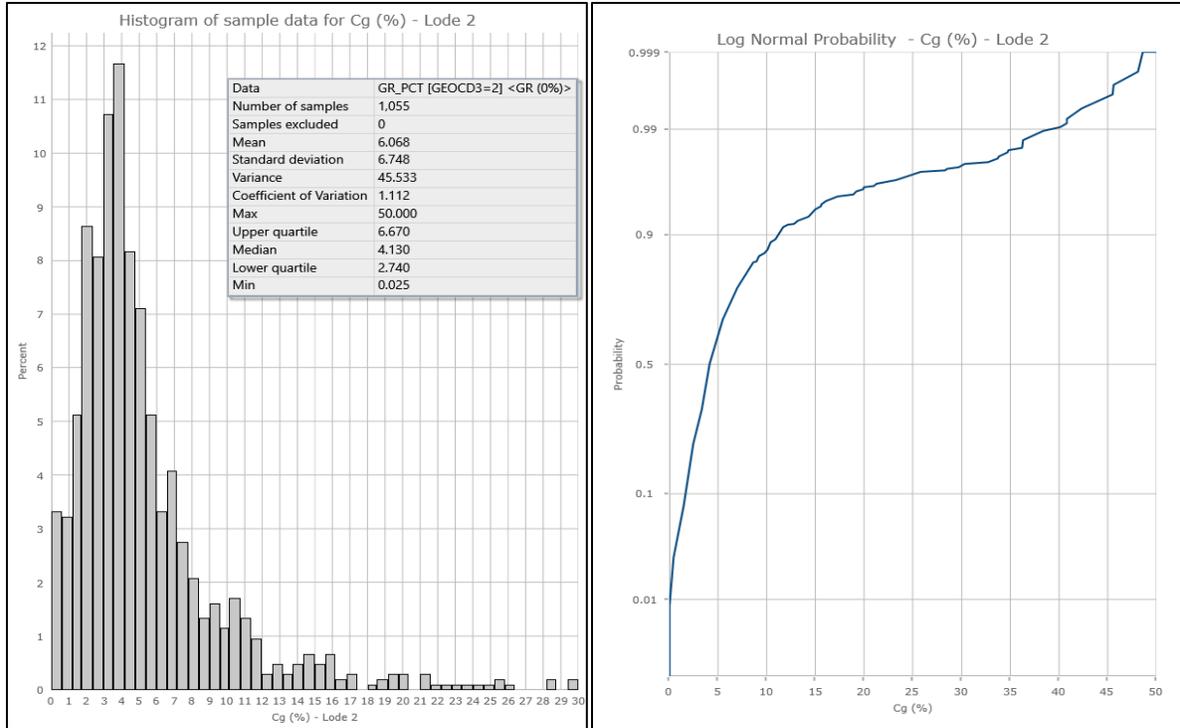


Figure 39: Histogram and probability plot of Cg (%) sample data in Lode 2.

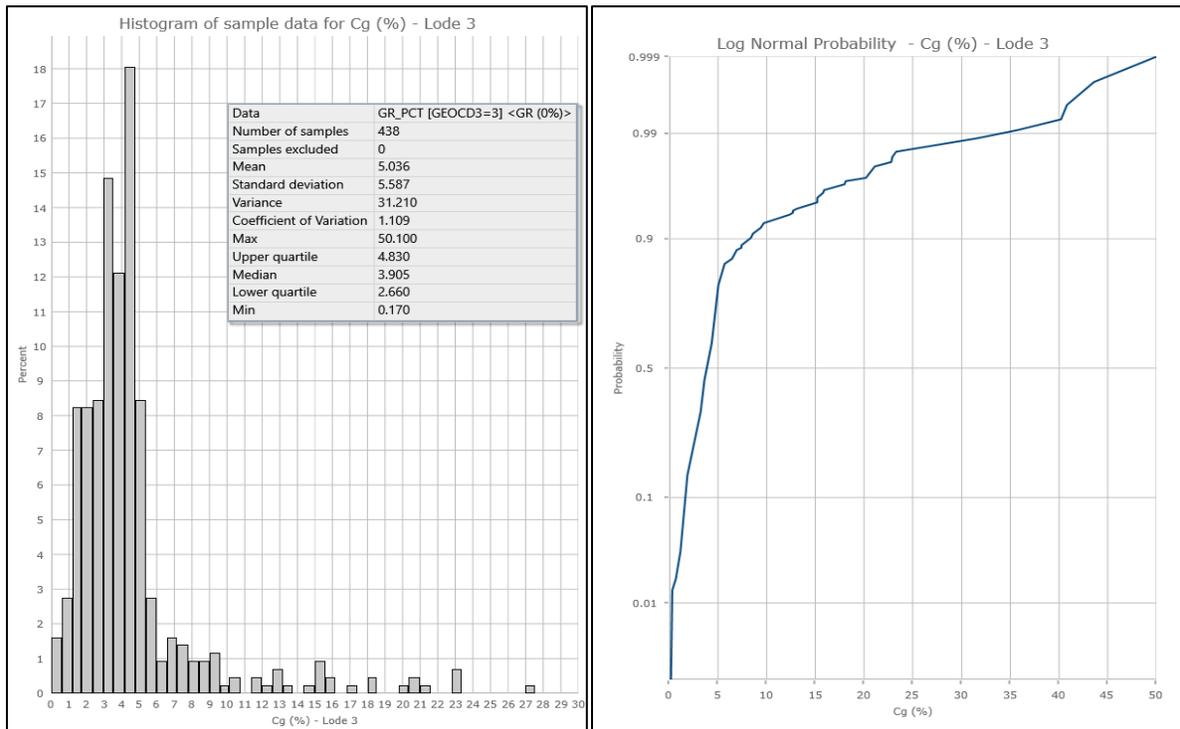


Figure 40: Histogram and probability plot of Cg (%) sample data in Lode 3.

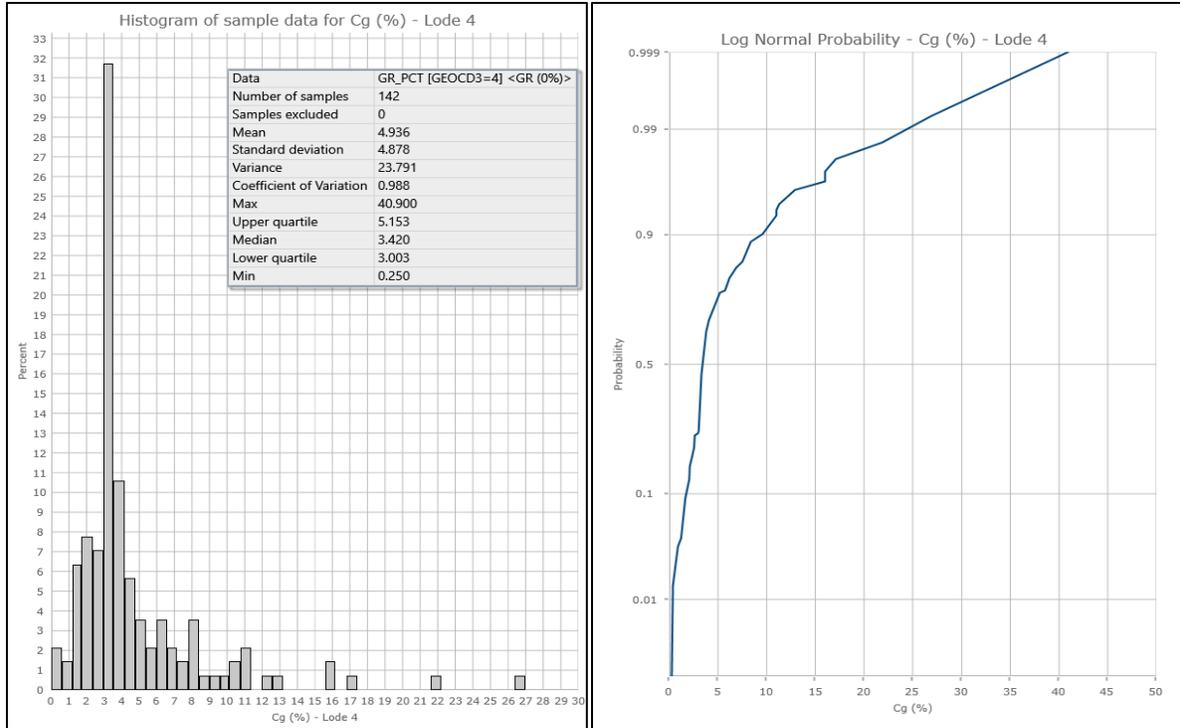


Figure 41: Histogram and probability plot of Cg (%) sample data in Lode 4.

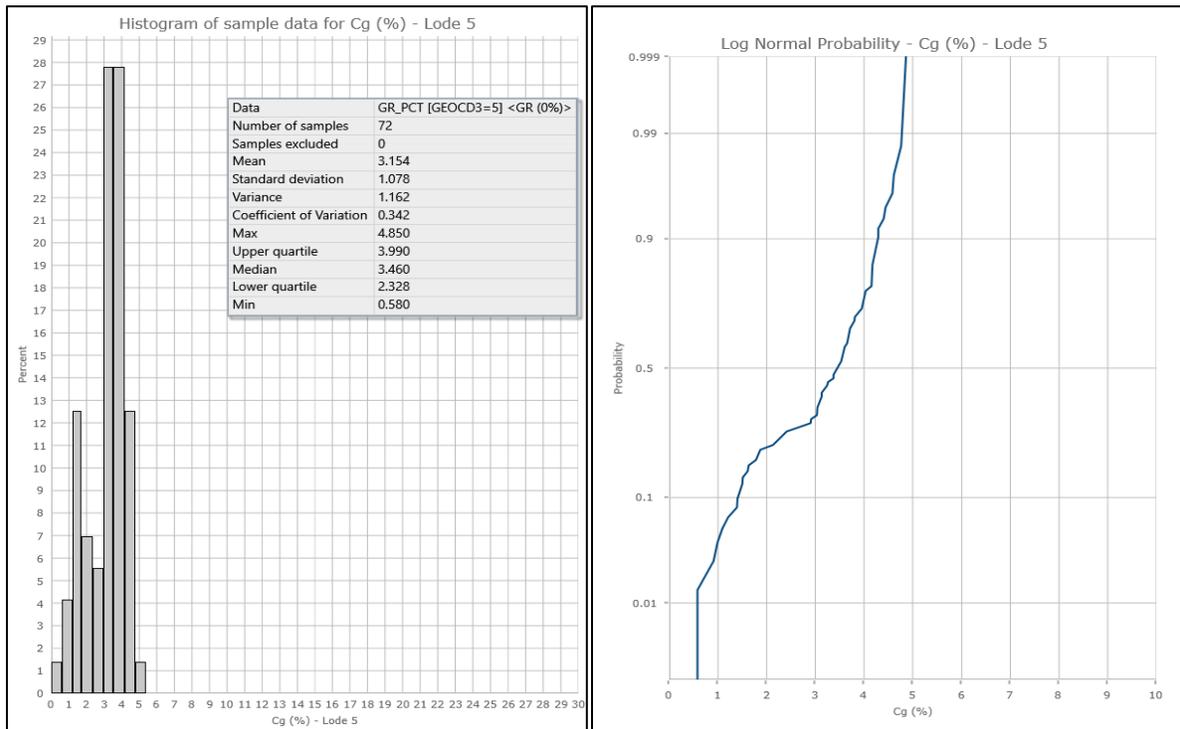


Figure 42: Histogram and probability plot of Cg (%) sample data in Lode 5.

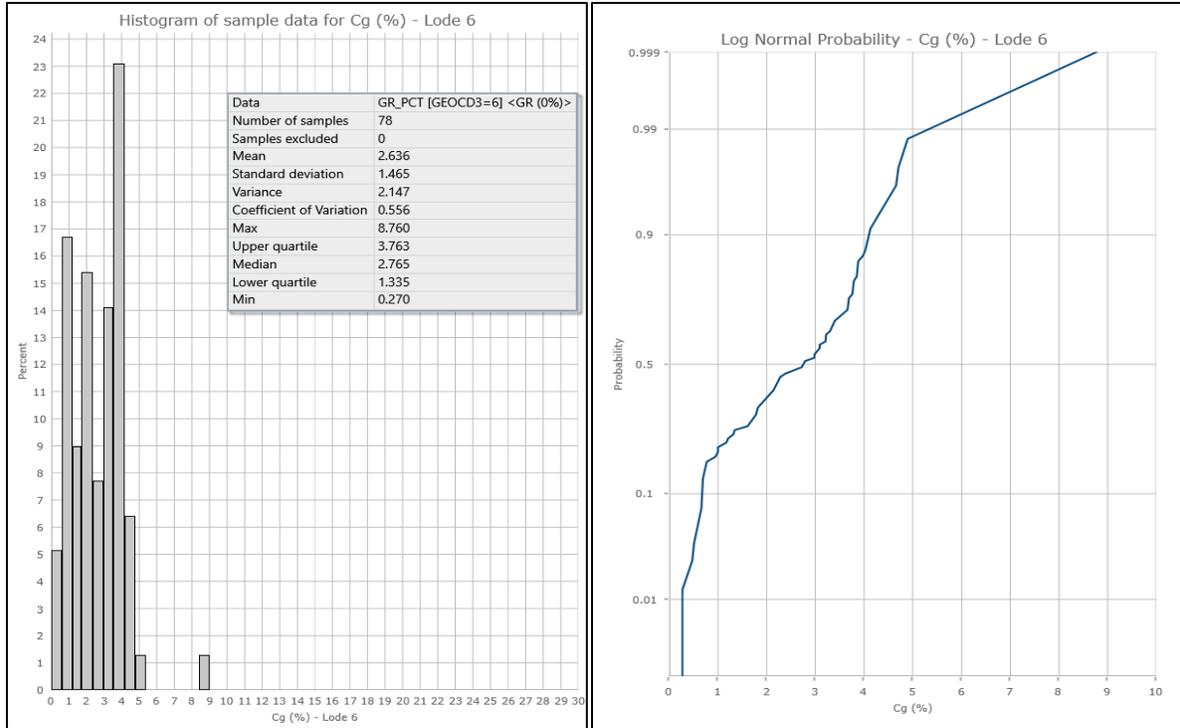


Figure 43: Histogram and probability plot of Cg (%) sample data in Lode 6.

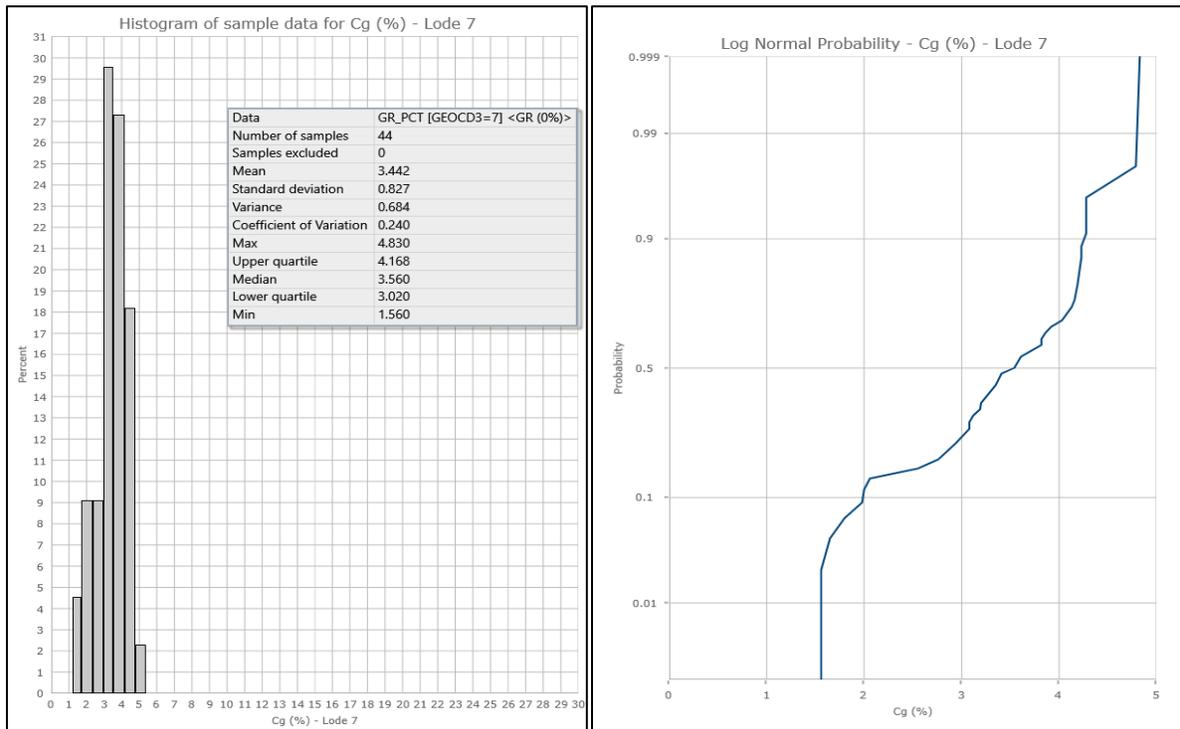


Figure 44: Histogram and probability plot of Cg (%) sample data in Lode 7.

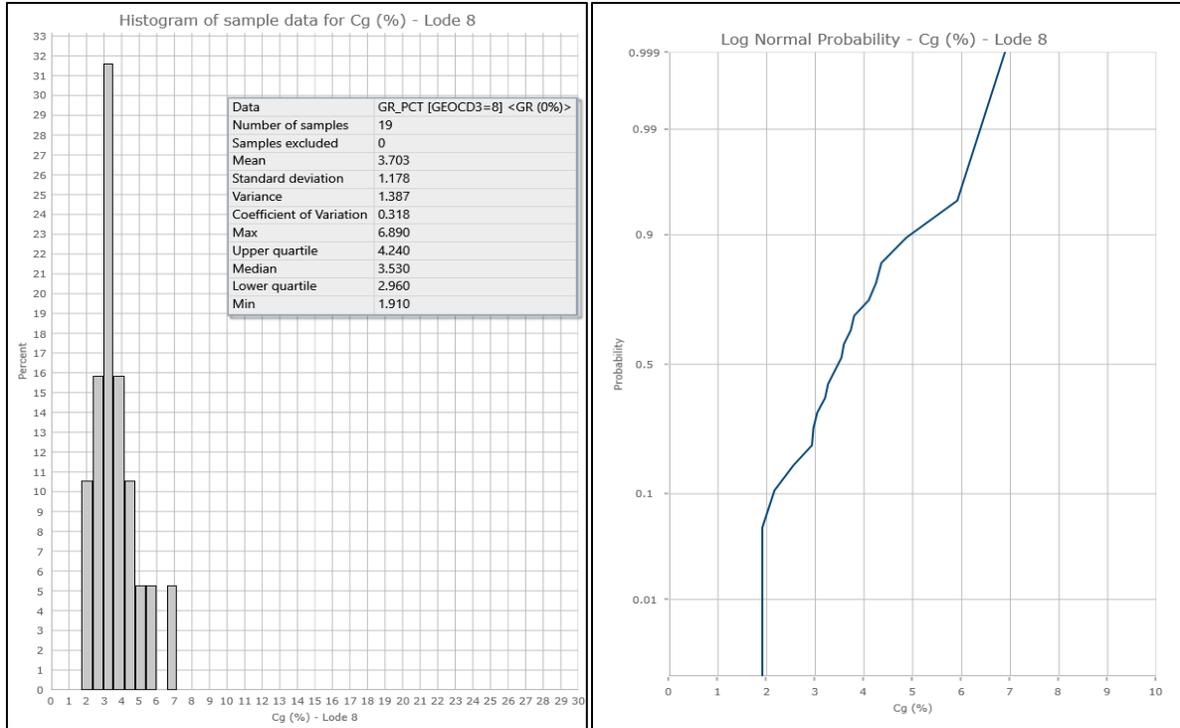


Figure 45: Histogram and probability plot of Cg (%) sample data in Lode 8.

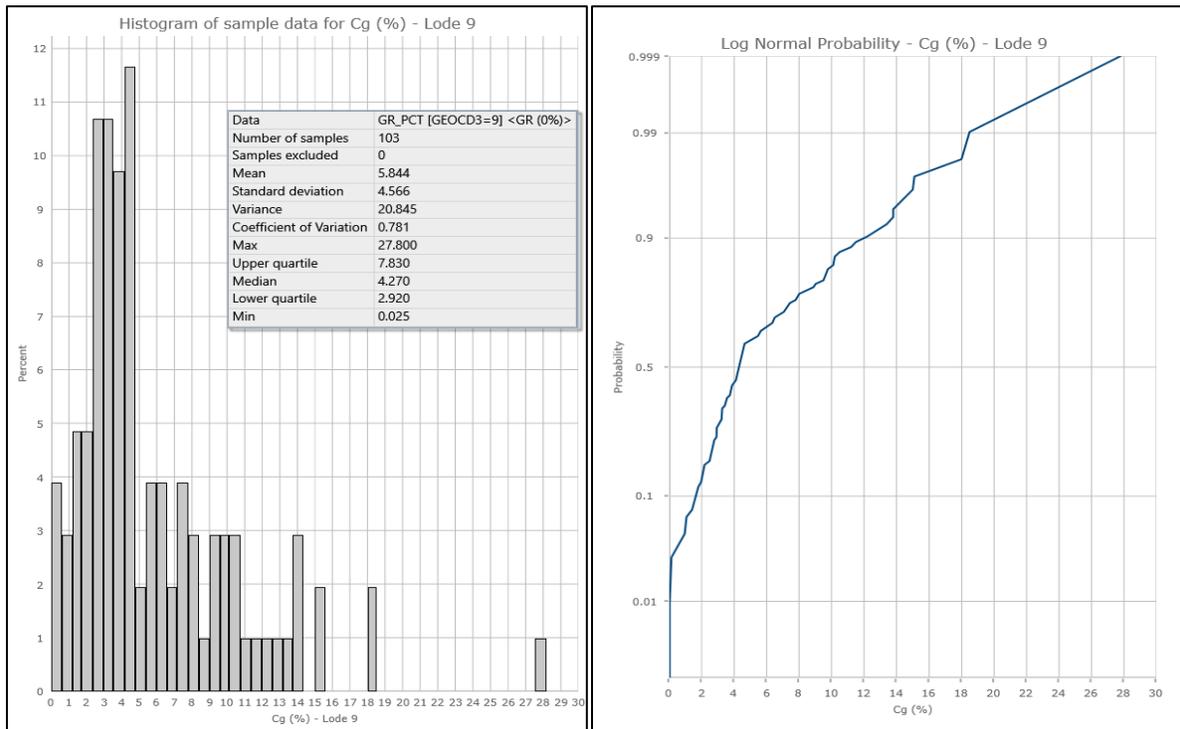


Figure 46: Histogram and probability plot of Cg (%) sample data in Lode 9.

14.3 Geological Models

14.3.1 Topography

During the 2018 season, LiDAR was flown over the project area along with the two proposed access corridors. The full LiDAR dataset was provided, in addition to 2 meter contour lines. The 2 meter contour lines were used to create a 3-D wireframe surface over the resource area. All topographical references for resource estimation are in relation to this surface.

14.3.2 Lode Models

Nine different mineralized lodes have previously been recognized in the project area. Previous estimations have used a 3.0% Cg lower cutoff for lode interpretation and this practice was continued with allowances of lower grade to allow for continuity of individual lodes. The mineralized lodes were updated using the following process:

- Wireframe solids of the previous estimation lodes were provided.
- The wireframe points were extracted and relevant points were snapped to drill holes at sample locations accounting for a 3% Cg lower cutoff.
- A hanging wall surface and footwall surface for each Lode was created. The standard smoothing and filtering process in Vulcan were used to create a smoother, more geologically reasonable interpretation. Care was taken to honor all drill hole snapping.
- The resulting hanging wall and footwall surfaces were combined into a 3-D wireframe solid. All Lodes were extended beyond overburden, topography, Graphite Creek Fault, and the Kigluaik Fault.

From previous reports, the mineralization was extrapolated down dip approximately 150 m from the drill hole and extrapolated up dip to surface. Rock chip samples collected during the 2012 field season confirmed mineralization at surface. The lodes were extrapolated half way to the next drill section or 90 to 120 m along strike from the last drill hole.

The top of the lodes were either cut by one of the overburden surfaces (see section 14.3.3) or the topographic surface described (see section 14.3.1). The down dip mineralization was either extended 150 m down dip from the nearest drill hole, or was cut in instances where the extension of mineralization intersected one of the two interpreted Kigluaik Fault (see Section 14.3.5). Lodes 1-5 intersected the Graphite Creek Fault and are cut into an East and West Lode.

14.3.3 Lithological Models

The quartz-biotite-garnet-sillimanite schist was modelled snapping to the tops and bottoms of intervals in the drill holes. Two main horizons were modelled. All of the high-grade graphite mineralization is found within this unit. Lower grade zones (1-3% Cg) were occasionally found outside the modelled lithology in the quartz-biotite schist. The two horizons were fairly linear across the deposit with no major folding and only one major offset (less than 100m) at the Graphite Creek fault. The quartz diorite sill was also modelled which lies mostly in the western part of the deposit above the upper quartz-biotite-garnet-sillimanite schist.

The lithology models were not used during resource estimation.



14.3.4 Overburden Model

Two overburden models were created. Within the area of new 2018 drilling and the previously recognized Indicated Resource an overburden model was created in a similar detailed manner as the lithology models described in section 14.3.2. Outside of the area, the overburden model used in the previous resource models was updated in the following manner:

- The polylines/strings used in previous models were updated and points snapped to the current drill data. Only the bottom surface of the strings was retained (footwall) as the upper surface is above topography.
- A 3-D wireframe surface was created from the resulting strings using an approximate 25 meter grid-spacing.
- The smoothing and filtering options in Vulcan were used to create a smoother surface. Care was taken to keep the wireframe snapped to drilling.

All samples above the wireframe surfaces were flagged and not included in the resource estimation.

14.3.5 Fault Models

Three major faults are present in the project area:

- The Graphite Creek Fault is a NW-SE trending fault and is a bounding surface for the mineralized lodes. The lodes that intersect the fault are split at the fault surface into an East and West Lode.
- The Kigluaik Fault is a major range-bounding fault trending NE-SW throughout the resource area. North of the fault is deep overburden.
- The West Fault is N-S trending slightly west of the most recent 2018 drilling. The West Fault is not considered a bounding surface.

The Graphite Creek Fault and the West Fault were not updated with new drilling. Within the area of new 2018 drilling and the previously recognized Indicated Resource, the Kigluaik Fault was modeled as part of the modeling of Lithology described in section 14.3.2. The updated Kigluaik Fault is 20-100 meters further south-east of the previous model. The previous model of the Kigluaik Fault was not updated outside of the new 2018 drilling and previously recognized Indicated Resource.

It should be noted that if further drilling confirms the 20-100 meter offset location of the Kigluaik throughout the resource area it could truncate the remaining resource.

14.4 Drill Hole Flagging and Compositing

Drill hole samples situated within the mineralized lodes were selected and flagged with the wireframe name/code. The flagged samples were checked visually next to the drill hole to check that the automatic flagging process worked correctly and that wireframes were snapped to drill holes correctly. All samples were correctly flagged and there was no need to manually flag or remove any samples.

The drill hole sample width analysis showed a variable sample length from 0.1 m to 5.13 m with a dominant sample length population at 1.0 m (Table 20 and Figure 47). Previous estimations selected a composite size of 3.0 meters. The current estimation selected a composite size of 2.0 meters because it



portrays a more realistic interval equivalent to the anticipated mining unit, provides more detail within mineralized lodes, and compares well with potential mining equipment size. The majority of samples are a nominal 1.0 meter. Within the mineralized lodes, only 12 samples are above 2.0 meters in length, (0.35%).

	Outside										
	ALL	Lode	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	7893	4464	1478	1055	438	142	72	78	44	19	103
Mean	0.96	0.96	0.96	0.94	0.96	0.93	0.99	1.00	1.07	1.00	0.95
Standard deviation	0.22	0.19	0.31	0.19	0.14	0.18	0.12	0.05	0.45	0.00	0.17
Maximum	5.13	3.05	5.13	2.20	1.28	1.28	1.00	1.31	4.00	1.00	1.19
Upper quartile	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Median	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lower quartile	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Minimum	0.00	0.00	0.10	0.13	0.23	0.35	0.00	0.69	1.00	1.00	0.34
Coeff. Of Variation	0.23	0.20	0.33	0.20	0.14	0.19	0.12	0.05	0.42	0.00	0.18
Variance	0.05	0.04	0.10	0.04	0.02	0.03	0.01	0.00	0.20	0.00	0.03
Percentile 10	0.70	0.71	0.65	0.64	0.84	0.61	1.00	1.00	1.00	1.00	0.71
Percentile 20	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00
Percentile 90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percentile 99	1.32	1.34	1.50	1.28	1.17	1.25	1.00	1.07	2.74	1.00	1.16

Table 20: General statistics for sample length

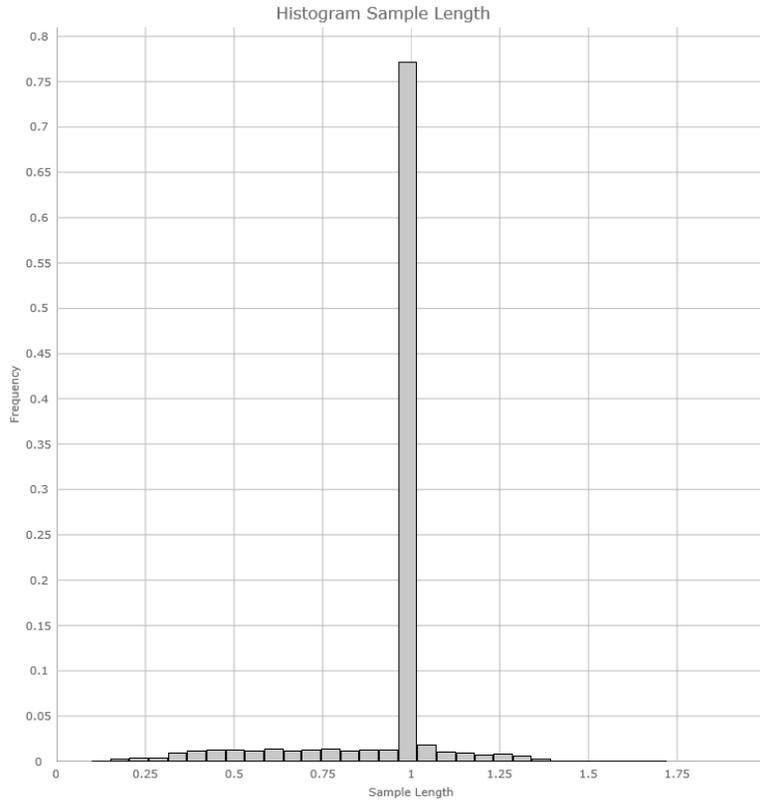


Figure 47: Histogram of sample lengths for drill core assay data

Length weighted composites were calculated for all of the graphite assay samples. The compositing process starts from the first point of intersection between the drill hole and the mineralized wireframe and is stopped upon the end of the mineralized wireframe. Un-assayed intervals were ignored in the composite process.

Upon completion of the 2.0 m compositing process, the composites were examined to determine if there was any noticeable bias applied to the grades during the compositing process. There was little to no change in the grade for the Graphite Creek sample file. Orphan composites (less than 2.0 meter length) were created at the end of the mineralized wireframes and it was determined to keep all orphaned composites. Grade estimation weighted composite by sample length, and the number of orphan composites (less than 7.6%) is limited. The composited samples were used for sample statistics, capping, estimation input file and validation comparisons.

14.5 Grade Capping/Outlier Restrictions

Composites within the nine lodes were examined for capping analysis. Log probability plots and histograms of the composites for each of the nine lodes are seen in Figures 48-57. The figures show the graphite values (% Cg) belong to a consistent population within each lode and do not require capping of the data. There is an appearance of a higher grade population seen as the tailing end of the histograms above approximately 10%. However, this shows a continuity of the grade, is not seen as anomalous or outlier data, and such high grade is supported by field visits and observations in the core during all drill seasons. Due to the low co-efficient of variation and lack of clear high grade outliers, it was decided not to apply any capping to the estimation.

It should be noted that a graphite value of 25% is the approximate 99th percentile and capping composites would only affect 14 composites, indicating the lack of capping would likely have limited effect on the estimation.

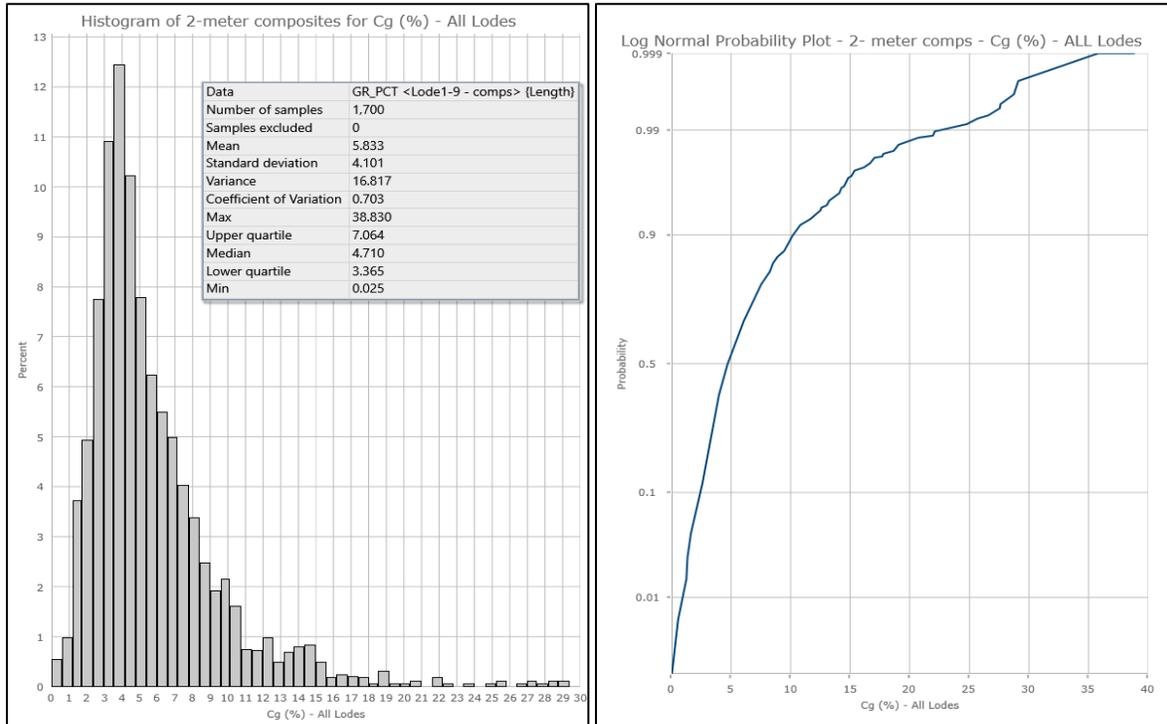


Figure 48: Histogram and probability plot of 2-meter composites for all lodes.

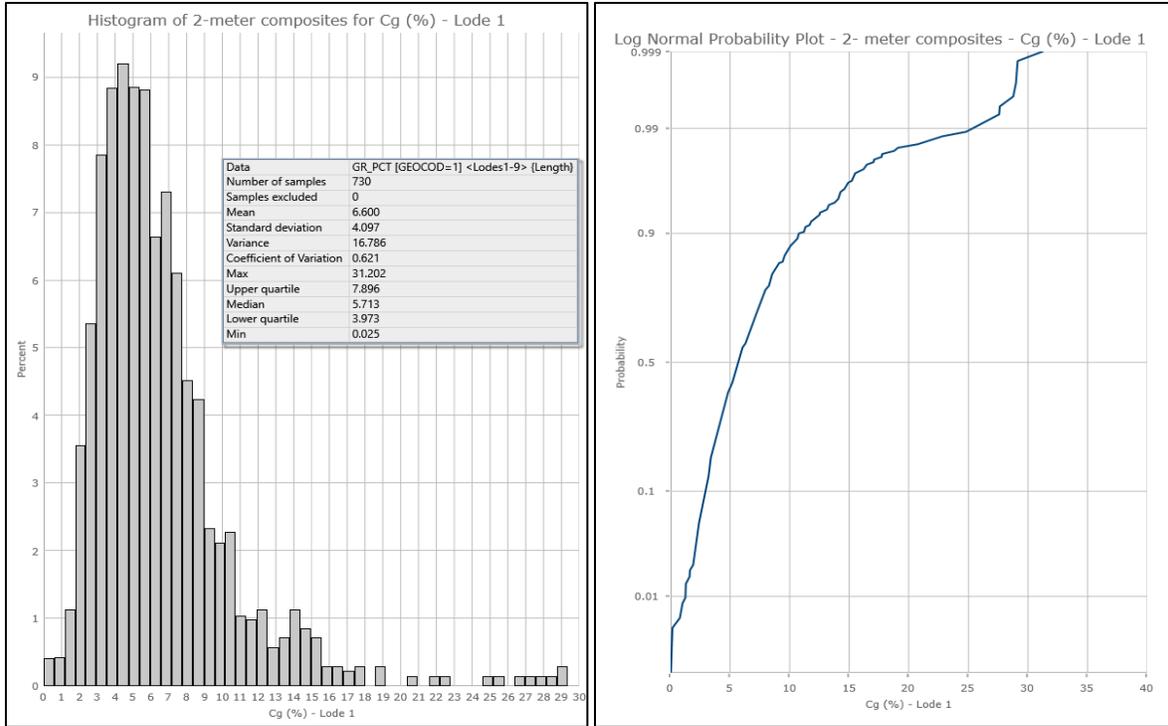


Figure 49: Histogram and probability plot of 2-meter composites for Lode 1.

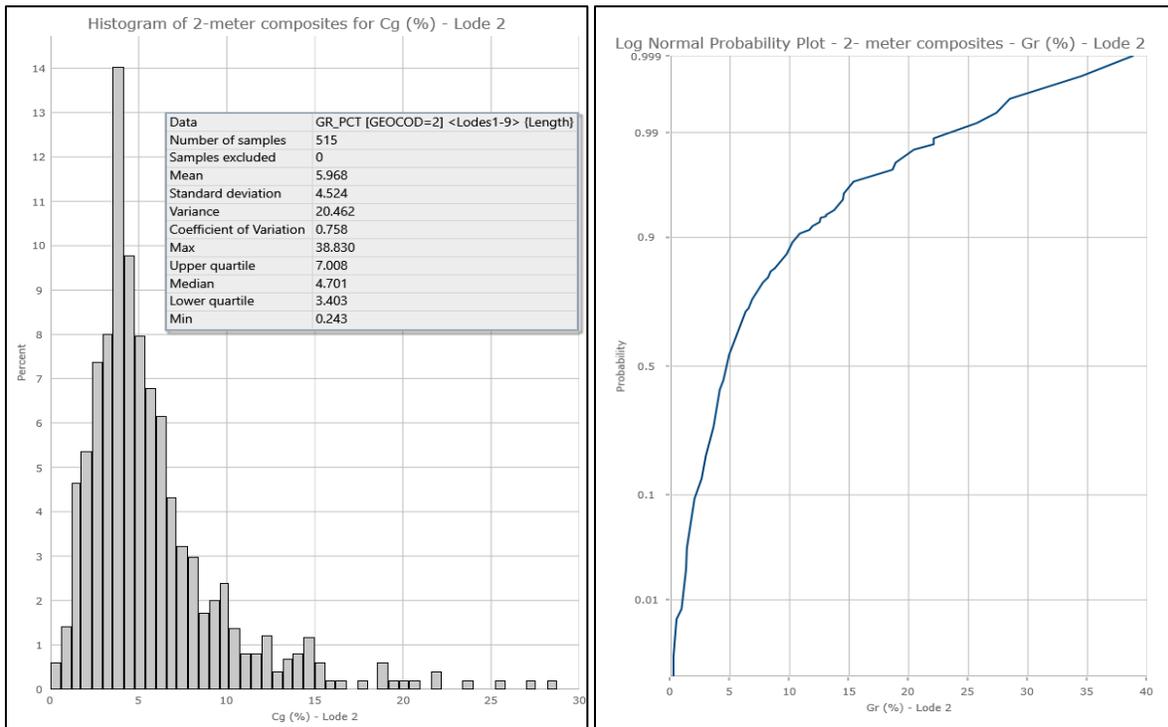


Figure 50: Histogram and probability plot of 2-meter composites for Lode 2.

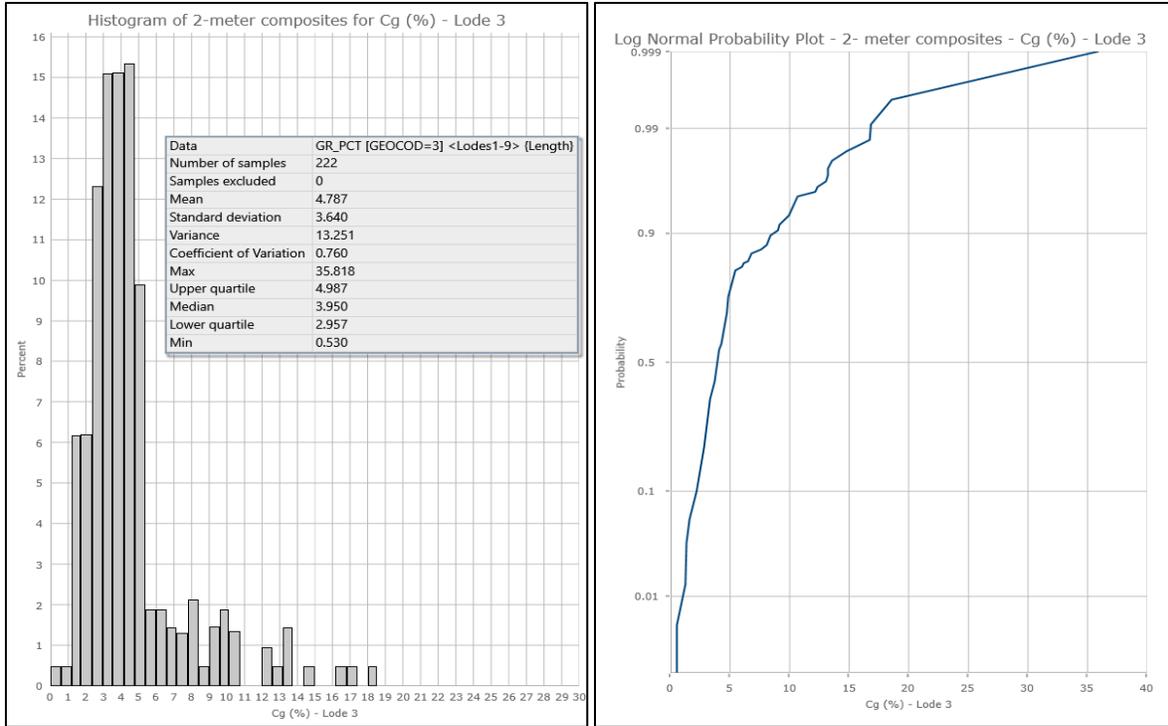


Figure 51: Histogram and probability plot of 2-meter composites for Lode 3.

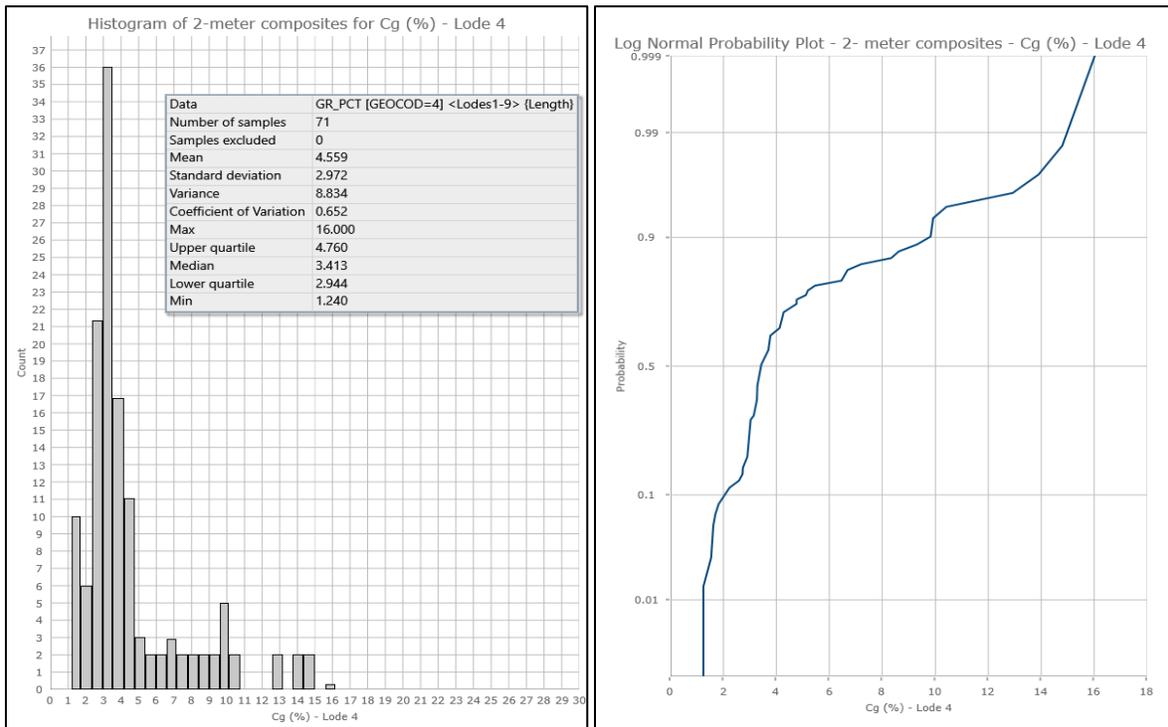


Figure 52: Histogram and probability plot of 2-meter composites for Lode 4.

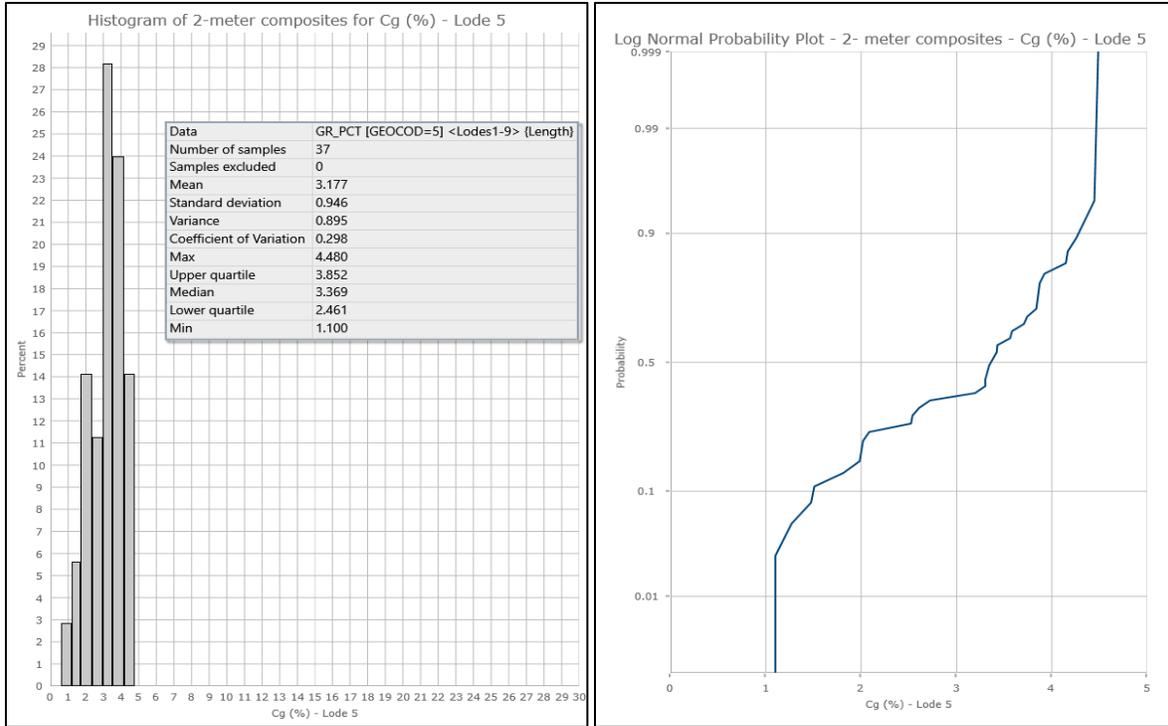


Figure 53: Histogram and probability plot of 2-meter composites for Lode 5.

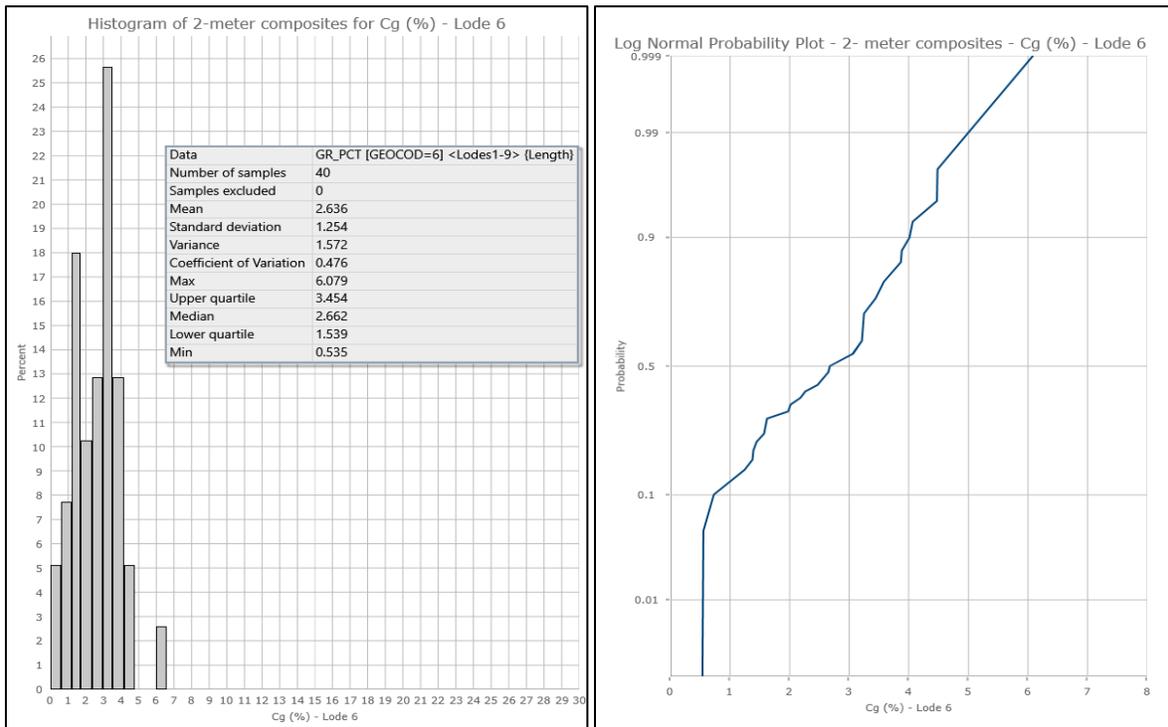


Figure 54: Histogram and probability plot of 2-meter composites for Lode 6.

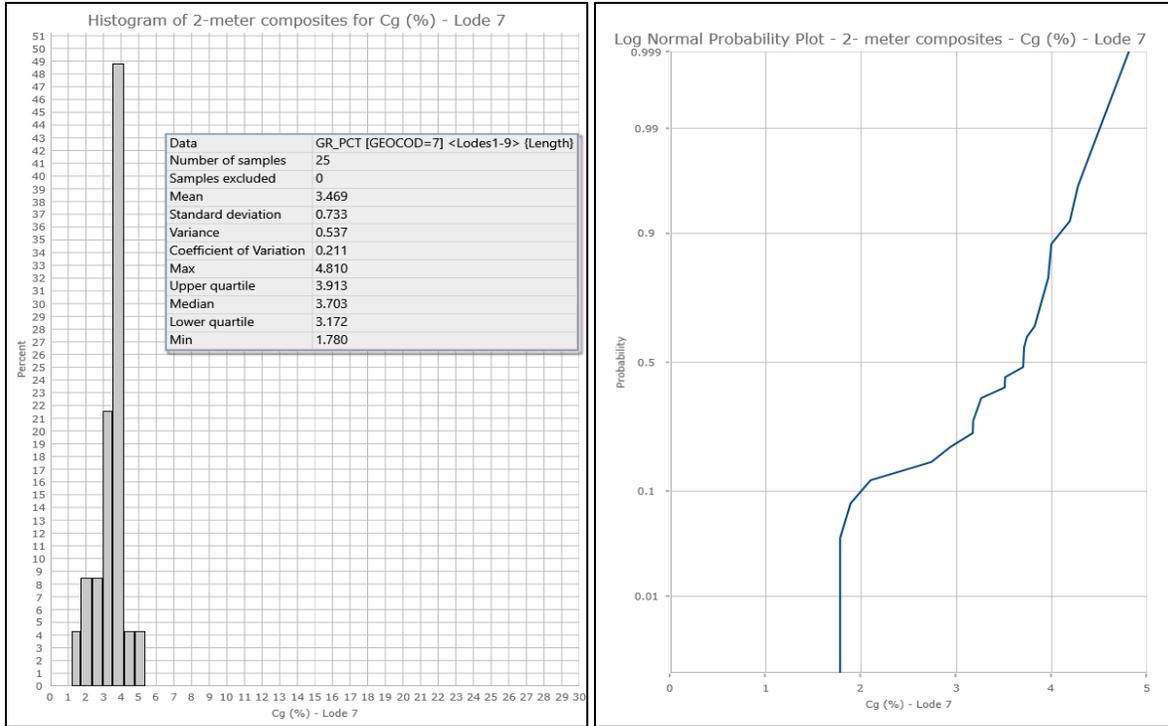


Figure 55: Histogram and probability plot of 2-meter composites for Lode 7.

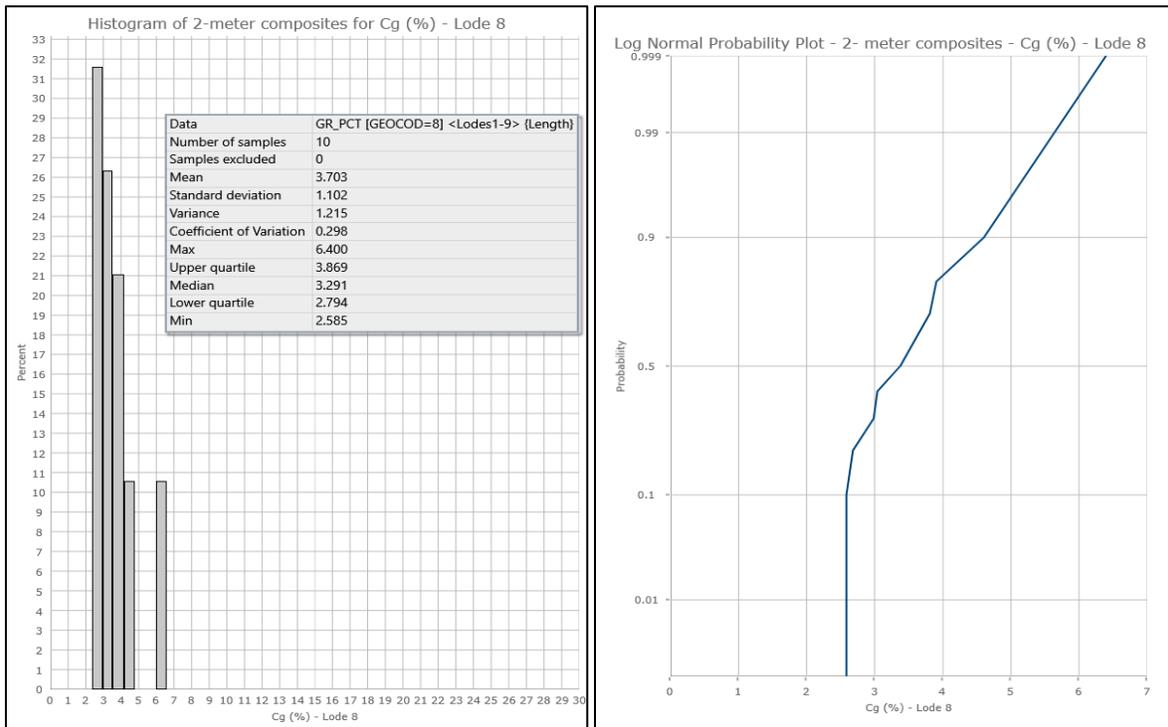


Figure 56: Histogram and probability plot of 2-meter composites for Lode 8.

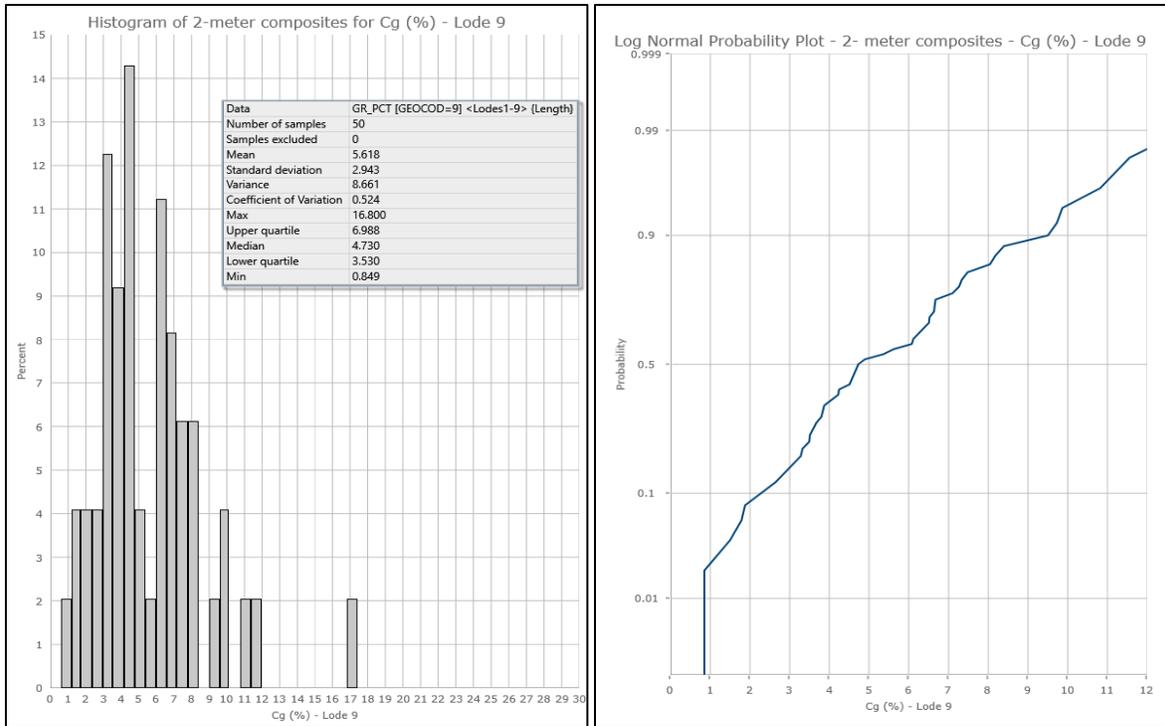


Figure 57: Histogram and probability plot of 2-meter composites for Lode 9.

14.6 Grade Continuity

Variography on the composited data was used to produce spherical correlograms. As all nine lodes have similar orientations and grade characteristics, it was deemed appropriate to treat them all as one domain. The variograms were created along a 060° strike orientation, similar to the previous variography and similar to the strike of graphite mineralization. Orthogonal variograms were created to determine appropriate ranges for estimation along the major, semi-major, and minor directions.

The maximum range of the variogram in the major direction axis was approximately 300 meters, and approximately 100 meters in the semi-major direction, which is comparable to previous estimations.

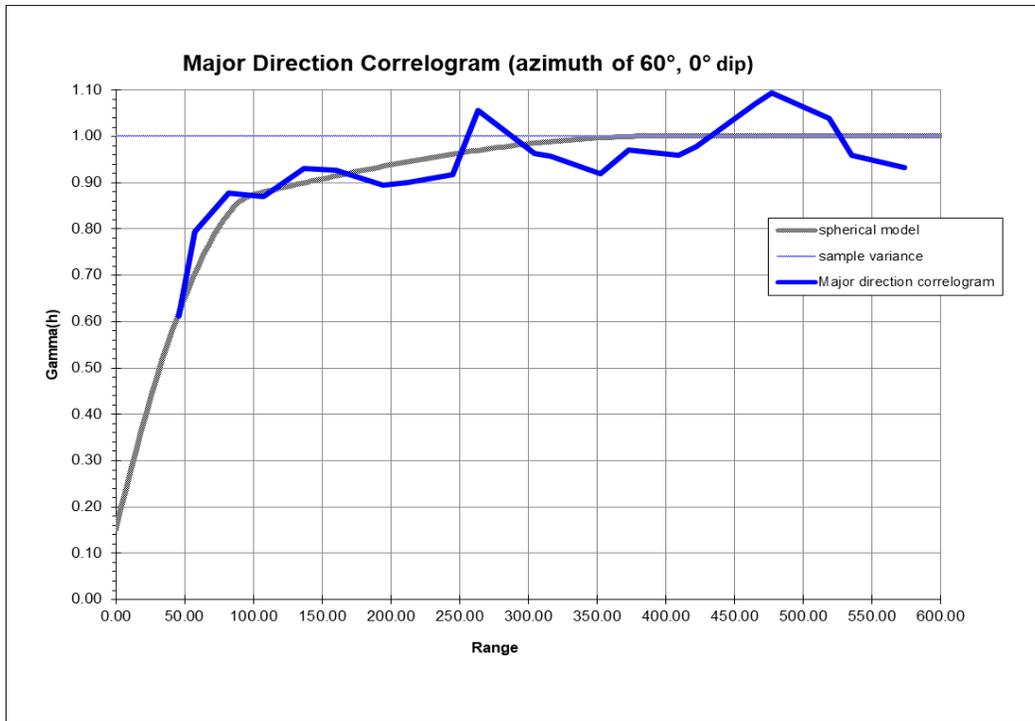


Figure 58: Major direction correlogram

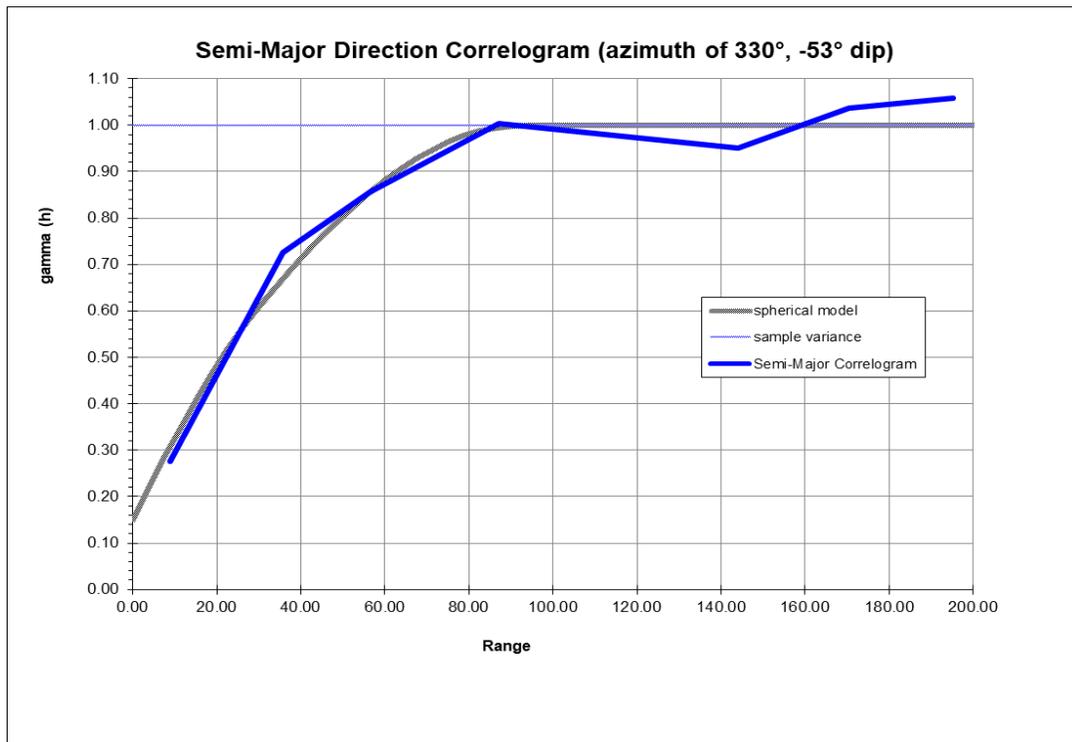


Figure 59: Semi-major direction correlogram

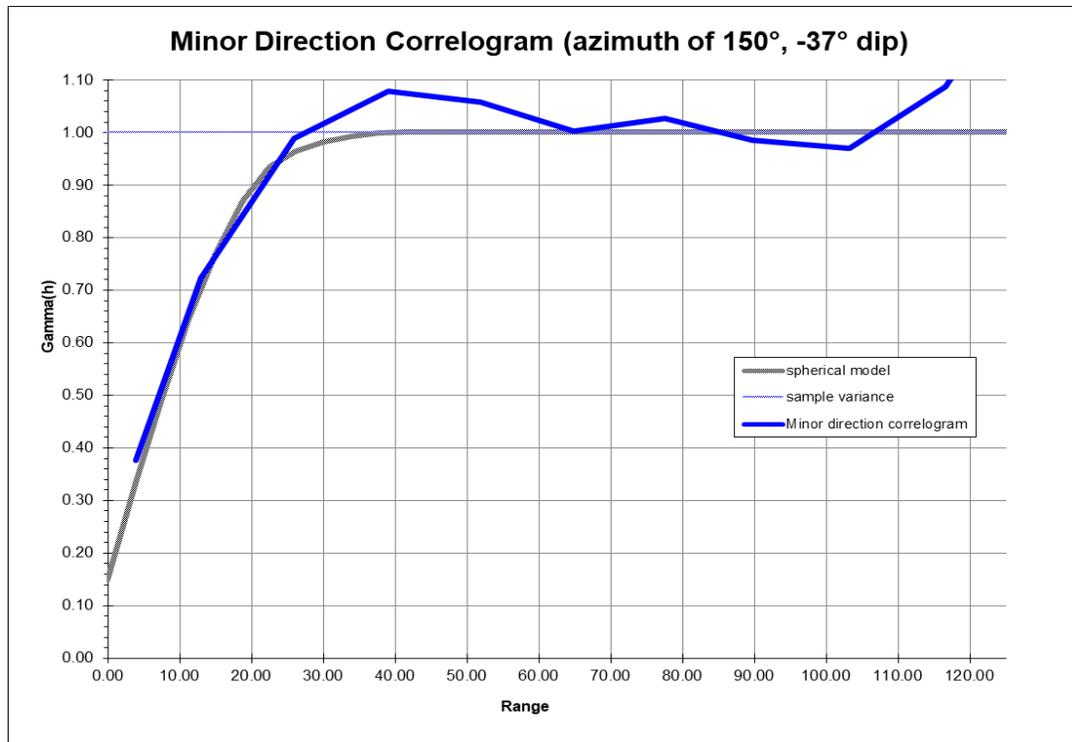


Figure 60: Minor direction correlogram

14.7 Block Model Extents and Block Size

A parent block size of 2 m (X) x 2 m (Y) x 2 m (Z) was chosen for the resource estimate. This differs from previous estimate and was chosen to provide more detail of mineralized lodes and represent equipment size in future mining scenarios. The block model was rotated to an absolute bearing of 067 to be parallel to the strike of graphite mineralization. The block model extents were extended past mineralized wireframes to encompass potential for grade.

Table 21 presents the coordinate ranges and block size dimensions that were used to build the 3D block models from the mineralization wireframes. A comparison of wireframe volume versus block model volume was performed to ensure there was no overstating of tonnages. Each block was coded with the lode number to ensure the mineralized lodes were treated as hard boundaries.

	Easting	Northing	Elevation
Minimum	472160	7211350	-170
Offset	5100	850	620
Cell Size	2	2	2
Rotation (Absolute Bearing)	067	067	067

Table 21: Block model extents and offset. Offset are distance from origin.

14.8 Grade Estimation

14.8.1 Estimation Methods

The resource estimation of graphite (% Cg) was calculated using inverse-distance squared for each of the nine lodes. A block discretization of 4 x 4 x 4 was applied to all blocks during estimation. Each lode was estimated as a hard boundary which means that only composites located within that lode were used to estimate the grade of the blocks within that lode. Blocks not within a mineralized lode were not estimated with graphite and assigned a graphite value of 0. After estimation, blocks above the topography surface, above the overburden surface, and north of the Kigluaik Fault were assigned a graphite value of 0.

14.8.2 Sample Selection

A multi-pass approach was used in grade estimation with variable sample selection criteria depending on the estimation pass (Table 22). Identical selection criteria were used for each mineralized lode. Prior to estimation of each individual lode, a single block search for all mineralized lodes was completed to allow any block pierced by a drill hole to be estimated. For each of the nine mineralized lodes, a total of seven passes were completed. Passes 1,2,3, and 5 required at least 2 drill holes. Passes 4 and 6 are considered 'donut hole' passes and require only one drill hole at smaller distances in order to fill in blocks that may have been missed in previous passes. Pass 7 was a final estimation requiring only one drill hole and closely followed the previous estimations final pass in order to fill in all remaining blocks within mineralized lodes.

Pass	Note	Approximate factor of max. sill variance range	Minimum # of Samples	Maximum # of Samples	Max. # per Drillhole	Ellipse Range			Corresponding Category
						Major	Semi-Major	Minor	
BOX	Box search	N/A	1	99	1	1	1	1	Measured
1		50%	2	5	1	45	22	8	Measured
2		80%	2	5	1	100	50	20	Indicated
3		90%	2	5	1	160	65	22	Inferred
4	"donut hole"		1	5	1	80	32	11	Inferred
5		100%	2	5	1	250	100	40	Inferred
6	"donut hole"		1	5	1	125	50	20	Inferred
7	fill remaining blocks	300%	1	5	1	1500	500	500	Inferred

Table 22: Summary table of estimation criteria for Graphite estimation.

14.8.3 Search Ellipsoid

The directions of the search ellipse were defined in previous estimations and the same directions were used in the current estimation (Table 23).

Lode	Search Ellipsoid	Strike (°)	Dip (°)	Plunge (°)
Lode 01	Lode 01 E	60	53	0
	Lode 01 W	68	39	0
Lode 02	Lode 02 E	61	53	0
	Lode 02 W	70	44	0
Lode 03	Lode 03 E	61	57	0
	Lode 03 W	71	51	0
Lode 04	Lode 04 E	58	61	0
	Lode 04 W	67	55	0
Lode 05	Lode 05 E	60	62	0
	Lode 05 W	72	55	0
Lode 06	Lode 06	61	61	0
Lode 07	Lode 07	64	51	0
Lode 08	Lode 08	66	55	0
Lode 09	Lode 09	59	51	0

Table 23: Search ellipsoid orientation for the graphite estimation

The multi-pass approach used increasing sizes of search ellipsoids based on the variogram ranges in each direction (see Section 14.6). The ranges and passes were also used in defining the classification of resources (see Section 14.11). After the initial box search, the search ellipsoid ranges were approximated to be equal to variable factors of the maximum sill variance range. Pass 1, 2, 3, 5, and 7 used approximately 50%, 80%, 90%, 100%, and 300% of the maximum sill variance range, respectively. Passes 4 and 6, with their less selective sample searches, used ranges equal to half of passes 5 and 7, respectively.

After reviewing the ranges and comparing to previous estimate, adjustments were made to the ranges to provide continuity with previous estimates. The ranges in the major direction of passes 1,2, and 3 were increased from 35, 75, and 130 meters to 45, 100, and 160 meters, respectively. The major direction is along strike of the graphite mineralization and its continuity is observed in the field and thus the increase in range is considered acceptable.

14.9 Bulk Density (Specific Gravity)

A total of 403 bulk density measurements were collected from the 2012, 2013, 2014, and 2018 drill core within the resource area. These were collected at regular intervals, averaging 1.0 m, down each of the 54 drill holes (excluding the two metallurgical drill holes). The density measurements were calculated on site by Activation Laboratories Ltd. staff in 2012-2014 and by Graphite One staff in 2018 using the weight in air/weight in water methodology. Of the 7,403 bulk density samples collected only 3,132 bulk density samples were situated within the mineralized wireframes. A histogram and summary statistics of the density samples is shown in Figure 61 and Table 24.

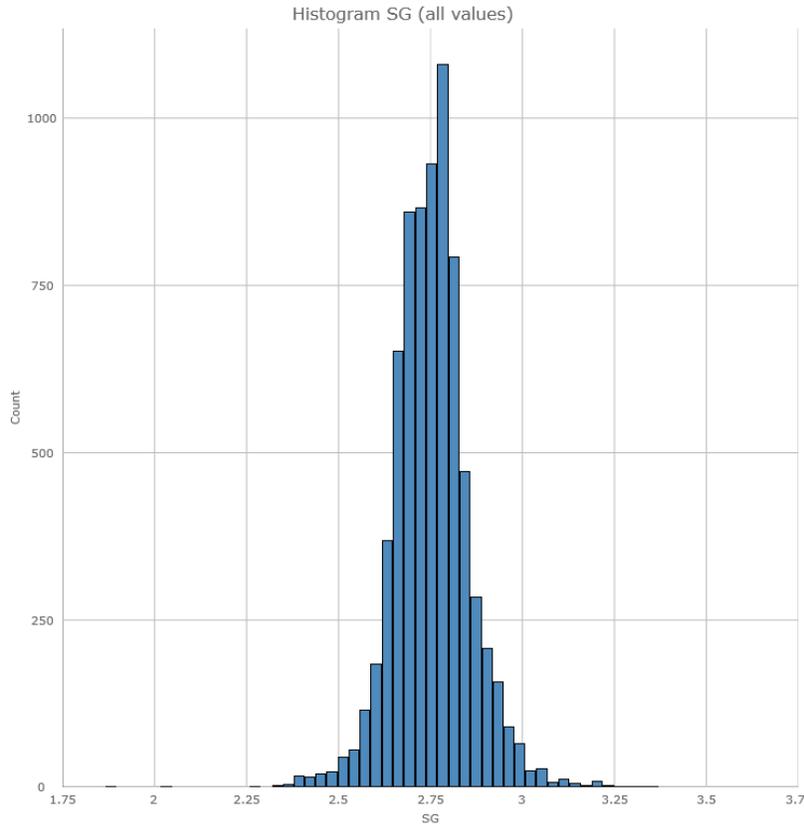


Figure 61: Histogram of bulk density (specific gravity) data

	Outside Lodes	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	4271	1296	999	379	142	72	78	44	19	103
Mean	2.78	2.74	2.75	2.74	2.73	2.71	2.71	2.66	2.87	2.70
Standard deviation	0.28	0.17	0.11	0.10	0.09	0.07	0.07	0.07	0.61	0.10
Maximum	17.90	6.58	3.22	3.19	3.06	2.96	2.91	2.91	5.44	2.91
Upper quartile	2.81	2.81	2.81	2.79	2.77	2.75	2.74	2.69	2.81	2.76
Median	2.77	2.74	2.75	2.72	2.71	2.68	2.69	2.67	2.71	2.71
Lower quartile	2.71	2.68	2.69	2.68	2.67	2.66	2.67	2.62	2.67	2.65
Minimum	1.90	2.36	2.33	2.40	2.53	2.63	2.58	2.52	2.63	2.45
Coeff. Of Variation	0.08	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.37	0.01
Variance	0.10	0.06	0.04	0.04	0.03	0.03	0.03	0.03	0.21	0.04
Percentile 10	2.66	2.61	2.64	2.65	2.64	2.64	2.62	2.57	2.66	2.55
Percentile 20	2.69	2.66	2.67	2.67	2.66	2.65	2.66	2.60	2.67	2.62
Percentile 90	2.88	2.88	2.87	2.87	2.84	2.80	2.80	2.71	2.84	2.81
Percentile 99	3.05	3.02	3.05	2.98	2.97	2.93	2.90	2.86	4.95	2.86

Table 24: General statistics of bulk density data.

The 2012 Maiden Inferred Resource estimate of the Graphite Creek Property used a conservative density value of 2.7 kg/m³ (Duplessis et al., 2013). In 2013, the Expanded Graphite Creek Inferred resource estimate for Graphite Creek estimated the density value for each block using the density dataset collected (Eccles and Nicholls, 2014). The high level of detailed density collection (i.e., one density measurement per every meter and in every drill hole) has been maintained during 2014 and 2018 drill seasons, and accordingly, it was decided to estimate the value of density for each individual block within the block model (as was done for graphite assay data).

The estimation technique used to calculate the density value for each block was inverse-distance squared. Unlike previous estimations of bulk density, the entire resource area was estimated as one unit rather than using the mineralized lodes with hard boundaries. It was thought this would provide detailed and accurate density measurements for area outside of mineralization for future use in mine planning.

A separate set of 2 meter composites was created for the bulk density measurements using an identical method as for the graphite composites. During estimation, only composites between 1.5 and 3.2 were selected as this was considered a valid range, effectively providing a top cut of 3.2 and removing 9 composites from estimation. Search ellipsoids were oriented along the average orientation of mineralization with a bearing of 064° and dip of 54° to the NW. A multi-pass approach was used to estimate the bulk density with identical sample selection criteria and search ellipsoid ranges as the graphite estimation. Blocks above topography were assigned a density value of 0. Blocks above the overburden surface and north of the Kigluak Fault were assigned a density value of 2.6 as were any remaining blocks without an estimation.

It should be noted the use of soft boundaries and the overall lower density of graphite compared to the host rock likely resulted in slightly higher density measurements in the mineralized lodes due to composites outside of the graphite mineralization being used within mineralized lodes. A comparison of estimated density to 2 meter composite density can be seen in Table 25. In the primary lodes (Lodes 1-3), the difference is less than 1%, and the maximum difference in all Lodes is 2.6%. Thus, the effect for overestimation of density in the mineralized lodes is considered minimal.

	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Raw	2.74	2.75	2.74	2.73	2.71	2.71	2.66	2.73	2.70
2m Composites	2.74	2.75	2.74	2.73	2.71	2.71	2.66	2.73	2.70
Blocks - ALL	2.75	2.76	2.77	2.76	2.74	2.76	2.73	2.73	2.71
Blocks - M+I	2.74	2.76	2.74	2.77	2.74	2.76	2.64	2.74	2.69
% Diff ALL vs 2m	0.44%	0.36%	0.99%	1.36%	1.44%	2.18%	2.60%	0.11%	0.30%
% Diff M+I vs 2m	0.18%	0.33%	-0.04%	1.43%	1.15%	2.18%	-0.53%	0.59%	-0.33%

Table 25: Comparison of mean specific gravity values between raw samples, 2-meter composites, and estimated blocks by Lode. There is a slight overestimation of specific gravity due to soft boundaries but is more pronounced in less-sample Lodes, and less pronounced in Measured and Indicated blocks and thus considered immaterial.

14.10 Model Variation
 14.10.1 Visual Validation

The blocks were visually validated on cross sections and plan view comparing block grades versus the composite sample grades for all sections and drill holes (Figures 62-64). The estimated graphite showed good correlation to the composite values. Reasonable variation and orientation of the grade was also observed.

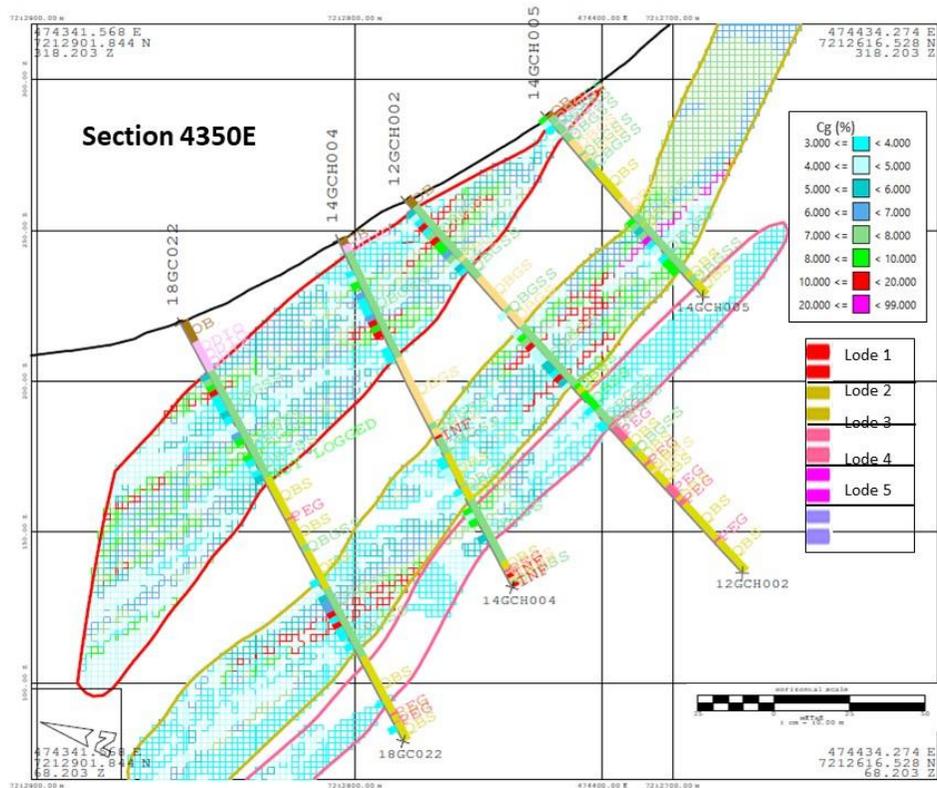


Figure 62:Section 4350E showing block model Cg (%) grades within mineralized lodes.



Figure 63: Section 4400E showing block model Cg (%) grades within mineralized lodges.

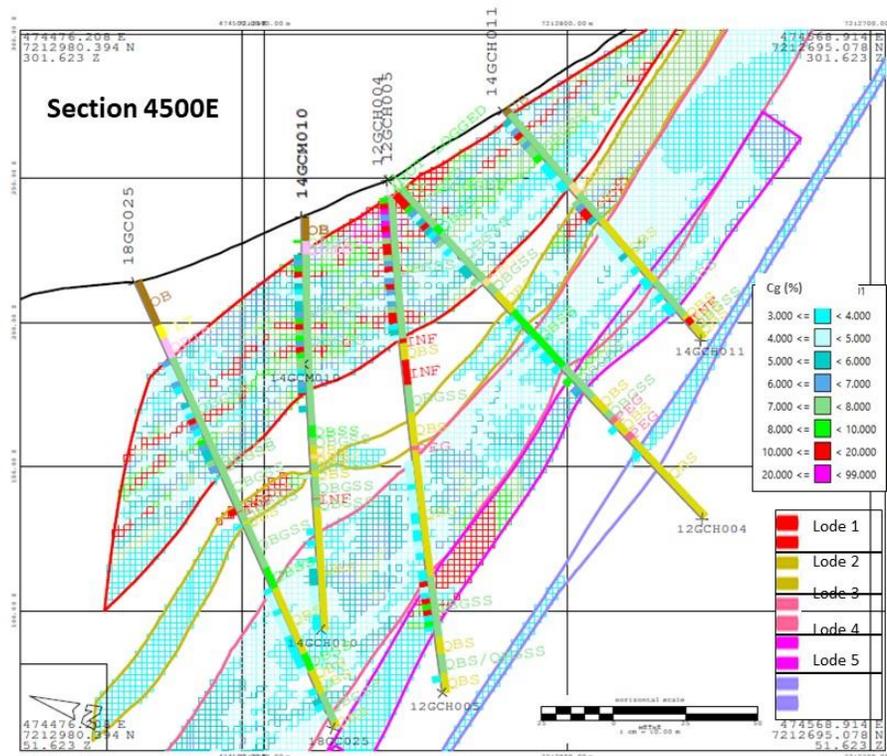


Figure 64: Section 4500E showing block model Cg (%) grades within mineralized lodges.

14.10.2 Statistical Validation

A statistical comparison of the raw data, 2 meter composite data, and the resulting block data for each mineralized lode is provide in Table 26. The block data is also broken down into the Measured and Indicated category (see Section 14.11). The comparison shows good statistical comparison between the estimated blocks and the 2 meter composite within the closer spaced areas of the resource (i.e. the Measured and Indicated resource). The comparison of all estimated blocks, including the wider spaced areas with less data show more variation in the average grade including instance of higher average grade in specific lodges. This would be expected and can be attributed to the lack of data to further define the estimation and is not considered unreasonable.

	Raw (uncomposited) Statistics by Lode - Cg (%)								
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	1478	1055	438	142	72	78	44	19	103
Mean	6.63	6.07	5.04	4.94	3.15	2.64	3.44	3.70	5.84
Standard deviation	5.97	6.75	5.59	4.88	1.08	1.47	0.83	1.18	4.57
Maximum	59.10	50.00	50.10	40.90	4.85	8.76	4.83	6.89	27.80
Upper quartile	7.80	6.67	4.83	5.15	3.99	3.76	4.17	4.24	7.83
Median	5.09	4.13	3.91	3.42	3.46	2.77	3.56	3.53	4.27
Lower quartile	3.21	2.74	2.66	3.00	2.33	1.34	3.02	2.96	2.92
Minimum	0.03	0.03	0.17	0.25	0.58	0.27	1.56	1.91	0.03
Coeff. Of Variation	0.90	1.11	1.11	0.99	0.34	0.56	0.24	0.32	0.78
Variance	35.62	45.53	31.21	23.79	1.16	2.15	0.68	1.39	20.85
Percentile 10	2.18	1.63	1.56	1.77	1.41	0.67	1.99	2.14	1.64
Percentile 20	2.89	2.38	2.35	2.52	1.85	1.00	2.83	2.85	2.59
Percentile 90	11.94	11.10	8.25	9.44	4.27	4.09	4.26	4.97	11.99
Percentile 99	32.74	39.17	34.17	24.70	4.78	5.73	4.81	6.70	18.49
	2- Meter Length-weighted Composite Statistics by Lode - Cg (%)								
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	730	515	222	71	37	40	25	10	50
Mean	6.60	5.97	4.79	4.56	3.18	2.64	3.47	3.70	5.62
Standard deviation	4.10	4.52	3.64	2.97	0.95	1.25	0.73	1.10	2.94
Maximum	31.20	38.83	35.82	16.00	4.48	6.08	4.81	6.40	16.80
Upper quartile	7.90	7.01	4.99	4.76	3.85	3.45	3.91	3.87	6.99
Median	5.71	4.70	3.95	3.41	3.37	2.66	3.70	3.29	4.73
Lower quartile	3.97	3.40	2.96	2.94	2.46	1.54	3.17	2.79	3.53
Minimum	0.03	0.24	0.53	1.24	1.10	0.54	1.78	2.59	0.85
Coeff. Of Variation	0.62	0.76	0.76	0.65	0.30	0.48	0.21	0.30	0.52
Variance	16.79	20.46	13.25	8.83	0.90	1.57	0.54	1.22	8.66
Percentile 10	2.89	2.09	2.16	1.95	1.68	0.72	1.97	2.59	2.26
Percentile 20	3.66	3.07	2.78	2.91	2.03	1.39	2.88	2.67	3.32
Percentile 90	10.93	10.75	8.59	9.30	4.29	4.01	4.05	4.70	9.52
Percentile 99	25.36	23.82	16.82	14.30	4.47	5.45	4.68	6.23	14.23



Measured and Indicated estimated block Statistics by Lode - Cg (%)									
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	449775	295177	140492	15363	10811	276	8	4	30
Mean	6.46	5.96	4.47	5.63	3.05	4.04	3.70	3.02	5.91
Standard deviation	3.06	3.50	1.86	2.58	0.64	0.62	0.45	0.25	3.19
Maximum	30.90	38.83	18.49	14.93	4.48	6.08	4.19	3.38	16.80
Upper quartile	7.60	7.04	5.17	7.34	3.61	4.24	3.99	3.29	7.37
Median	5.92	5.01	4.11	5.12	3.32	4.23	3.86	3.01	5.85
Lower quartile	4.58	3.81	3.28	3.78	2.57	4.22	3.35	2.76	3.46
Minimum	0.00	0.21	0.53	1.20	1.10	0.55	2.74	2.68	1.50
Coeff. Of Variation	0.47	0.59	0.42	0.46	0.21	0.15	0.12	0.08	0.54
Variance	9.36	12.28	3.45	6.66	0.42	0.38	0.20	0.06	10.20
Percentile 10	3.62	3.01	2.68	3.10	2.07	3.55	2.74	2.68	1.88
Percentile 20	4.27	3.62	3.08	3.57	2.41	4.21	3.03	2.68	3.28
Percentile 90	18.50	19.01	11.55	12.50	4.01	4.26	4.17	3.36	15.23
Percentile 99	30.90	38.83	18.49	14.93	4.48	6.08	4.19	3.38	16.80

ALL estimated block Statistics by Lode - Cg (%)									
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	1839325	4048795	1003310	625255	305337	772325	267803	228615	651595
Mean	6.04	6.24	6.98	4.50	3.28	3.35	3.52	3.22	5.54
Standard deviation	2.76	3.41	4.88	1.75	0.54	0.70	0.70	0.61	2.37
Maximum	30.90	38.83	35.82	16.00	4.48	6.08	4.81	6.40	16.80
Upper quartile	6.82	7.78	7.77	4.77	3.61	3.71	3.81	3.44	6.52
Median	5.69	5.53	5.37	4.14	3.32	3.42	3.69	3.13	5.33
Lower quartile	4.61	4.04	3.96	3.51	3.07	3.11	3.44	3.03	4.23
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coeff. Of Variation	0.46	0.55	0.70	0.39	0.16	0.21	0.20	0.19	0.43
Variance	7.64	11.61	23.82	3.07	0.29	0.49	0.49	0.37	5.61
Percentile 10	3.53	2.63	3.06	3.16	2.77	2.73	2.87	2.80	3.21
Percentile 20	4.28	3.70	3.75	3.33	3.05	3.04	3.31	2.96	3.89
Percentile 90	8.69	10.55	15.27	6.57	3.75	4.01	4.00	3.82	8.04
Percentile 99	16.60	17.85	23.65	10.76	4.34	4.68	4.81	4.61	14.75

Table 26: Representative statistics of estimated Cg (%) by mineralized Lode.

Similar statistical comparisons of the density (specific gravity) estimation are provided in Table 27.

Raw (uncomposited) Statistics by Lode - Specific Gravity									
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	1289	997	379	142	72	78	44	18	103
Mean	2.74	2.75	2.74	2.73	2.71	2.71	2.66	2.73	2.70
Standard deviation	0.11	0.11	0.10	0.09	0.07	0.07	0.07	0.07	0.10
Max	3.13	3.19	3.19	3.06	2.96	2.91	2.91	2.88	2.91
Upper quartile	2.81	2.81	2.79	2.77	2.75	2.74	2.69	2.77	2.76
Median	2.74	2.75	2.72	2.71	2.68	2.69	2.67	2.70	2.71
Lower quartile	2.67	2.69	2.68	2.67	2.66	2.67	2.62	2.67	2.65
Min	2.36	2.33	2.40	2.53	2.63	2.58	2.52	2.63	2.45
Coeff. Of Variation	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04
Variance	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Percentile 10	2.60	2.64	2.65	2.64	2.64	2.62	2.57	2.65	2.55
Percentile 20	2.66	2.67	2.67	2.66	2.65	2.66	2.60	2.67	2.62
Percentile 90	2.87	2.87	2.87	2.84	2.80	2.80	2.71	2.83	2.81
Percentile 99	3.00	3.03	2.98	2.97	2.93	2.90	2.86	2.87	2.86
2- Meter Length-weighted Composite Statistics by Lode -Specific Gravity									
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	678	500	199	71	37	40	25	9	50
Mean	2.74	2.75	2.74	2.73	2.71	2.71	2.66	2.73	2.70
Standard deviation	0.09	0.08	0.07	0.07	0.05	0.06	0.06	0.05	0.08
Max	3.09	3.12	2.97	2.97	2.85	2.89	2.81	2.79	2.86
Upper quartile	2.79	2.80	2.78	2.75	2.72	2.72	2.69	2.78	2.76
Median	2.74	2.75	2.73	2.71	2.68	2.69	2.66	2.71	2.71
Lower quartile	2.69	2.70	2.68	2.68	2.66	2.67	2.61	2.68	2.67
Min	2.40	2.44	2.55	2.60	2.64	2.61	2.55	2.65	2.53
Coeff. Of Variation	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03
Variance	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
Percentile 10	2.63	2.66	2.66	2.66	2.65	2.64	2.57	2.65	2.60
Percentile 20	2.68	2.69	2.68	2.67	2.66	2.67	2.59	2.67	2.62
Percentile 90	2.84	2.84	2.83	2.82	2.78	2.77	2.73	2.79	2.79
Percentile 99	2.94	2.94	2.94	2.89	2.84	2.87	2.79	2.79	2.85

Measured and Indicated estimated block Statistics by Lode - Specific Gravity									
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	449775	295177	140492	15363	10811	276	8	4	30
Mean	2.74	2.76	2.74	2.77	2.74	2.76	2.64	2.74	2.69
Standard deviation	0.06	0.06	0.05	0.05	0.05	0.03	0.05	0.06	0.08
Max	3.06	3.12	3.01	3.04	2.92	2.81	2.71	2.79	2.86
Upper quartile	2.78	2.79	2.77	2.79	2.77	2.78	2.68	2.79	2.75
Median	2.75	2.76	2.73	2.76	2.73	2.77	2.66	2.77	2.69
Lower quartile	2.71	2.72	2.70	2.73	2.69	2.76	2.59	2.68	2.66
Min	2.40	2.44	2.53	2.60	2.61	2.63	2.55	2.65	2.53
Coeff. Of Variation	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.03
Variance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Percentile 10	2.67	2.69	2.68	2.71	2.67	2.72	2.55	2.65	2.57
Percentile 20	2.70	2.71	2.70	2.73	2.69	2.75	2.57	2.65	2.62
Percentile 90	2.82	2.83	2.81	2.83	2.81	2.80	2.69	2.79	2.77
Percentile 99	2.89	2.92	2.89	2.89	2.87	2.80	2.71	2.79	2.85

ALL estimated block Statistics by Lode - Specific Gravity									
	Lode 1	Lode 2	Lode 3	Lode 4	Lode 5	Lode 6	Lode 7	Lode 8	Lode 9
Count	1839325	4048795	1003310	625255	305337	772325	267803	228615	651595
Mean	2.75	2.76	2.77	2.76	2.74	2.76	2.73	2.73	2.71
Standard deviation	0.06	0.06	0.06	0.06	0.05	0.05	0.06	0.05	0.06
Max	3.09	3.12	3.17	3.08	2.99	2.96	2.95	2.89	2.91
Upper quartile	2.79	2.79	2.80	2.80	2.78	2.79	2.77	2.77	2.75
Median	2.75	2.76	2.76	2.76	2.75	2.77	2.73	2.73	2.71
Lower quartile	2.72	2.73	2.73	2.73	2.71	2.73	2.69	2.69	2.68
Min	2.40	2.36	2.51	2.58	2.60	2.59	2.52	2.36	2.53
Coeff. Of Variation	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Variance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percentile 10	2.68	2.69	2.70	2.70	2.68	2.70	2.65	2.67	2.63
Percentile 20	2.71	2.72	2.72	2.72	2.70	2.72	2.68	2.69	2.67
Percentile 90	2.82	2.83	2.84	2.83	2.81	2.82	2.80	2.80	2.78
Percentile 99	2.91	2.92	2.95	2.94	2.87	2.90	2.87	2.85	2.86

Table 27: Representative statistics of estimated density (specific gravity) by mineralized Lode.

14.10.3 Swath Plots

During each pass in the graphite estimation process, a nearest neighbor value was calculated into the block model. Swath plots along the Easting, Northing and Elevation were created comparing the estimated graphite and the nearest neighbor value (Figures 65-67) . The swath plots were created in 10 meter wide sections along each orientation and with a 3% (Cg) cutoff. The resulting swath plots showed limited over and under estimation, especially within the Measured and Indicated blocks. When comparing all estimated blocks, the variation is larger, particularly when the number of blocks is small. This is expected with the lack of data in certain areas.



Similar swath plots were created for the density estimation (Figures 68-70).

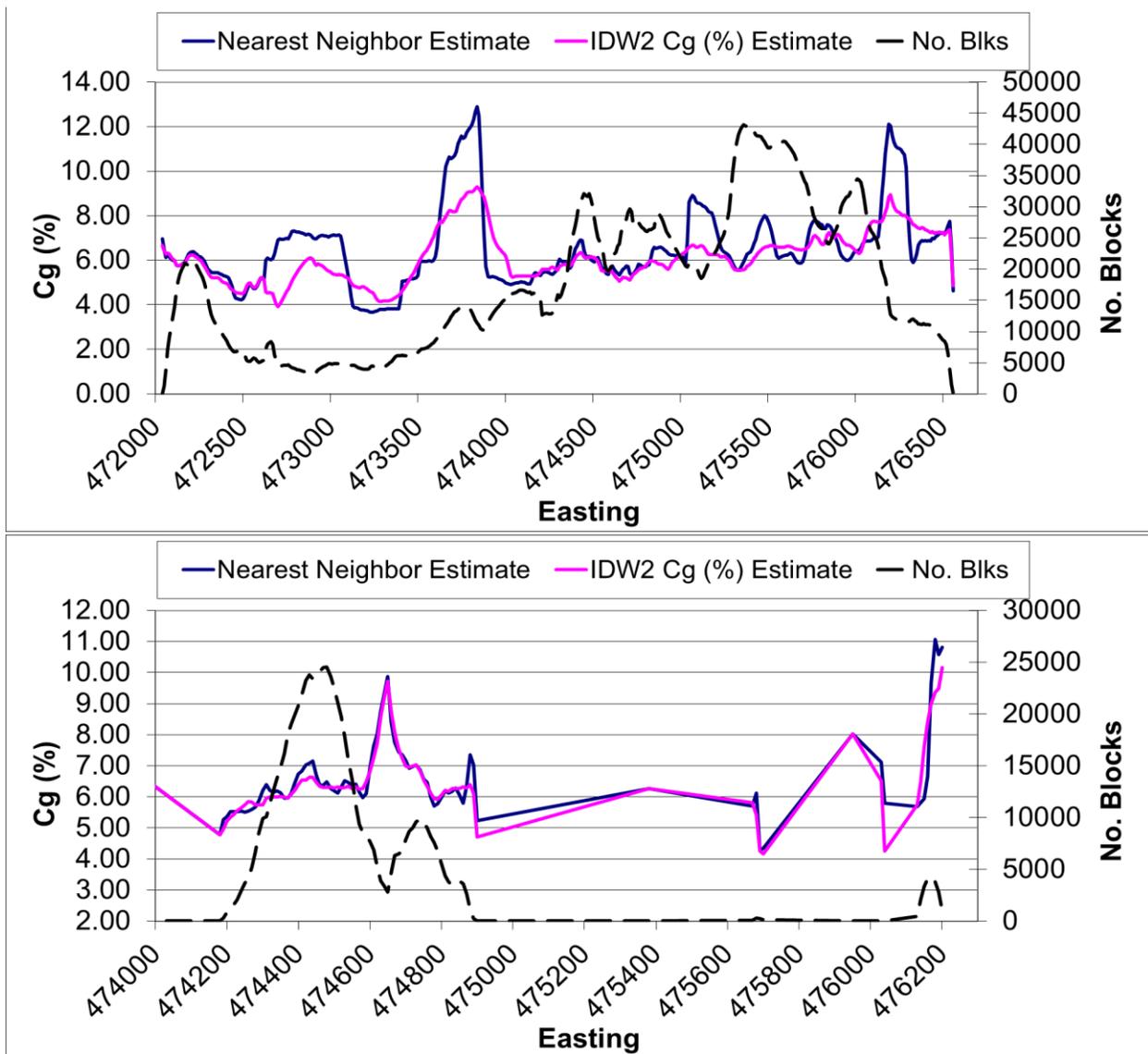


Figure 65: Easting swath plot of nearest neighbor Cg (%) vs. IDW2 estimate using 3% cutoff and 10-meter increments. All estimated blocks on top graph, Measured and Indicated blocks on bottom graph.

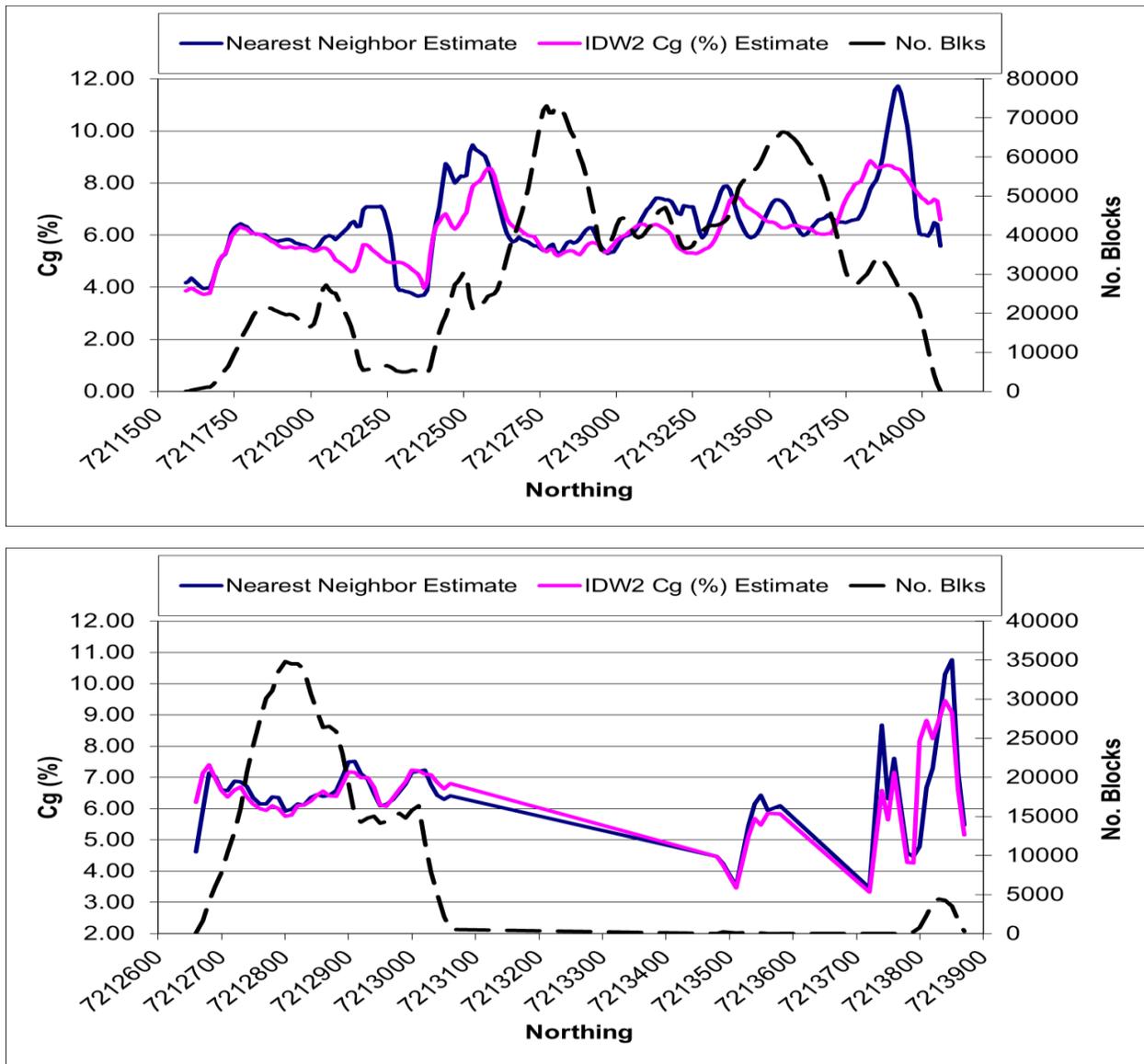


Figure 66: Northing swath plot of nearest neighbor Cg vs. IDW2 estimate using 3% cutoff and 10-meter increments. All estimated blocks on top graph, Measured and Indicated blocks on bottom graph.

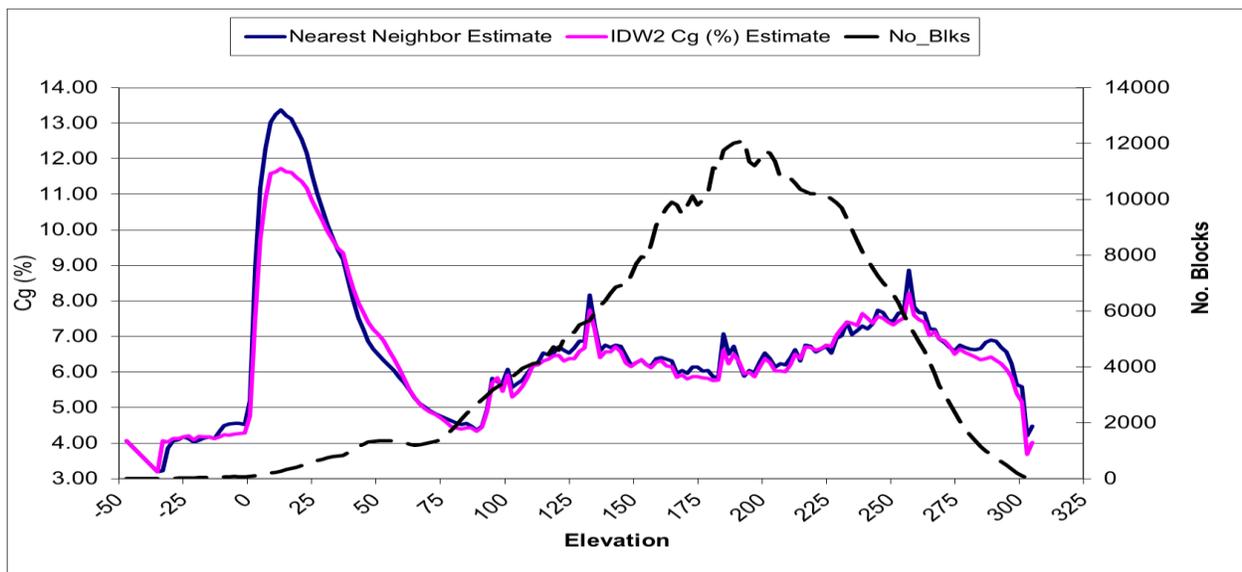
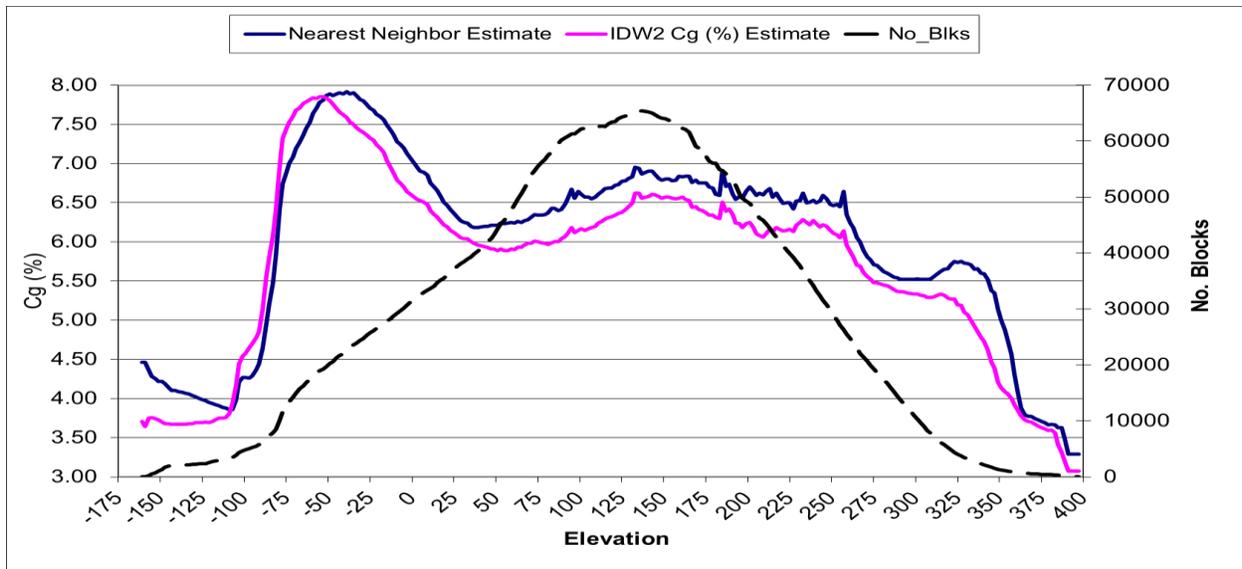


Figure 67: Elevation swath plot of nearest neighbor Cg vs. IDW2 estimate using 3% cutoff and 10-meter increments. All estimated blocks on top graph, Measured and Indicated blocks on bottom graph.

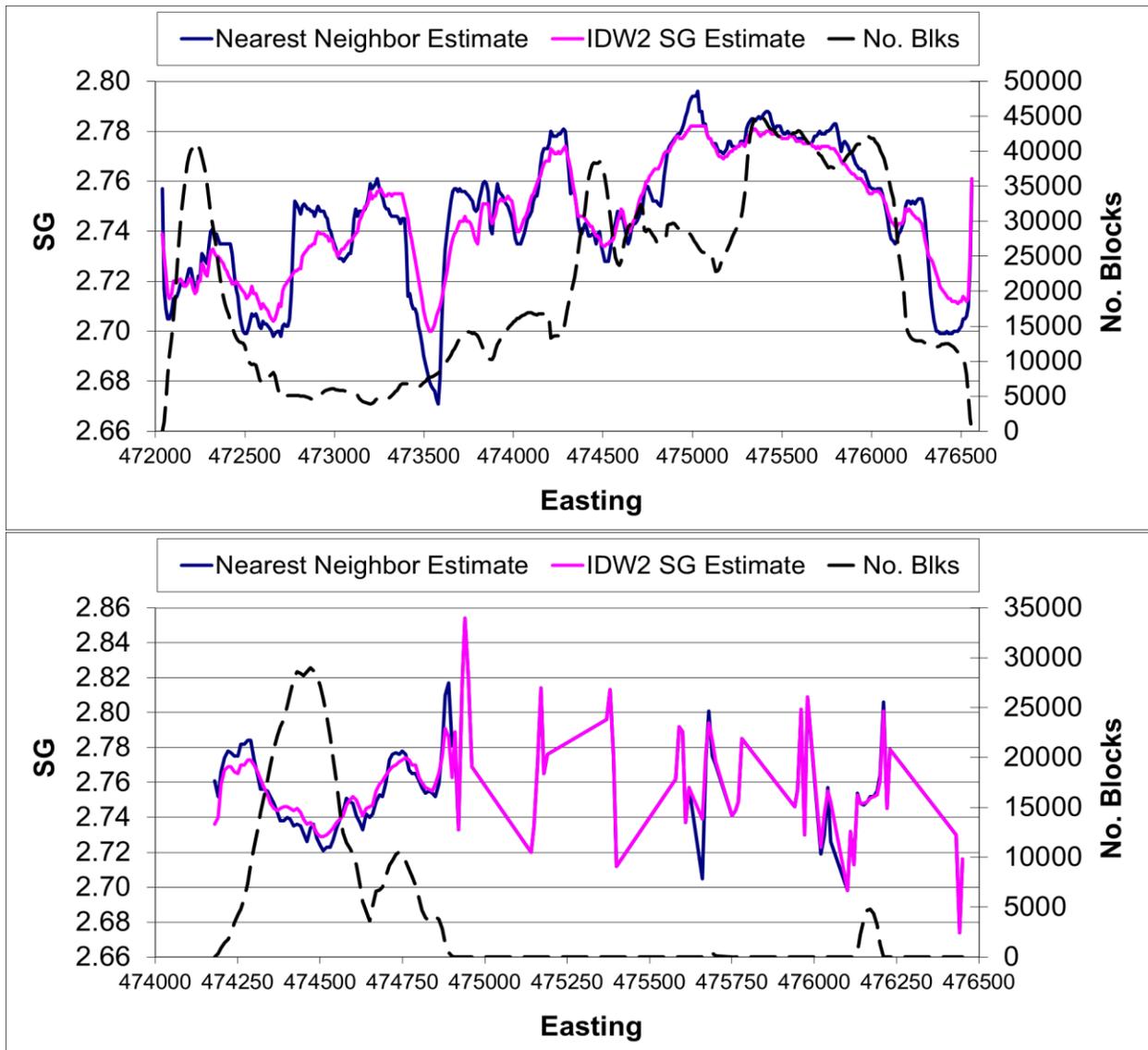


Figure 68: Easting swath plot of nearest neighbor SG vs. IDW2 estimate using only blocks with a Cg estimate and 10-meter increments. All estimated blocks on top, Measured and Indicated blocks on bottom.

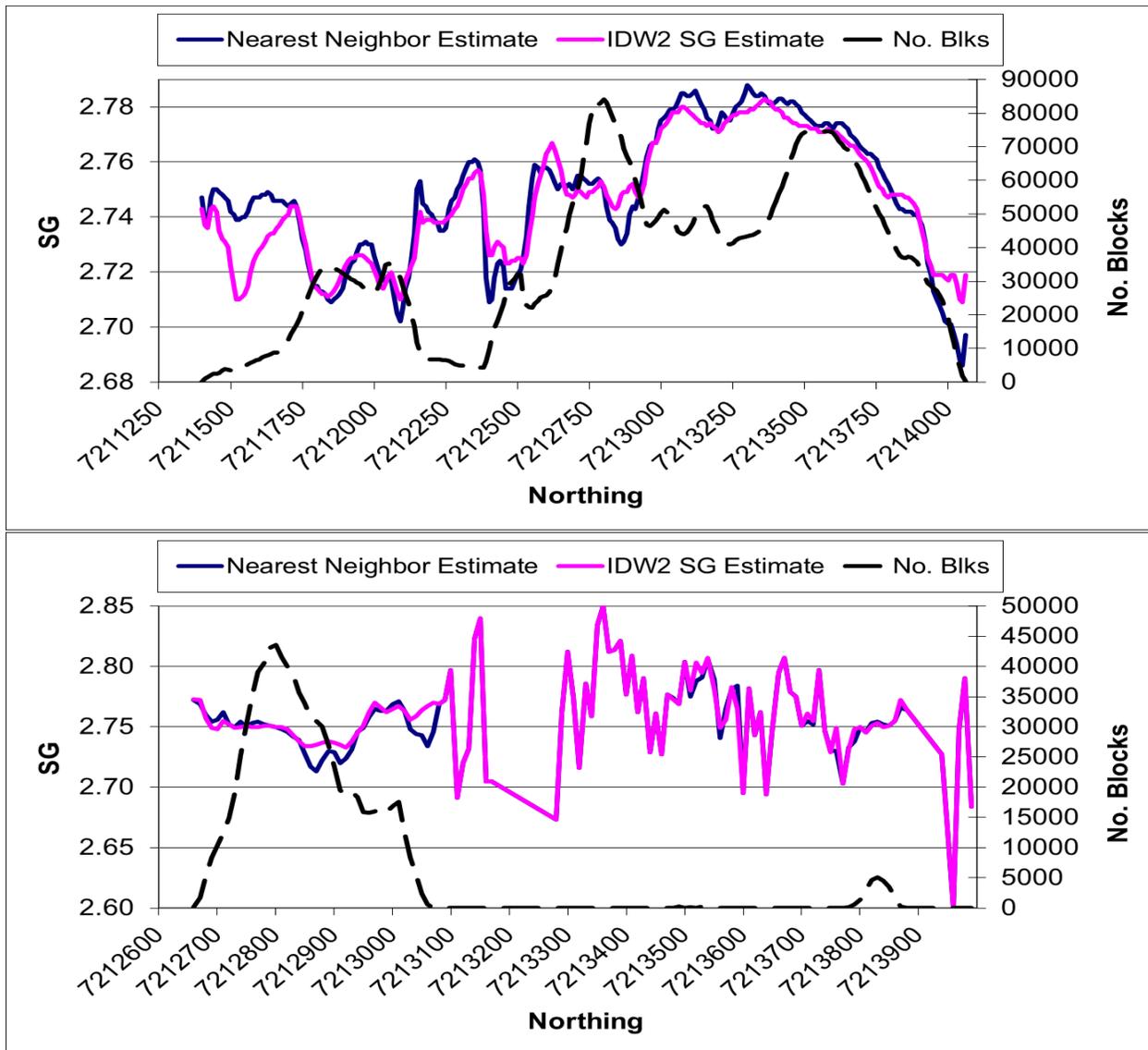


Figure 69: Northing swath plot of nearest neighbor SG vs. IDW2 estimate using blocks with a Cg estimate and 10-meter increments. All estimated blocks on top, Measured and Indicated blocks on bottom.

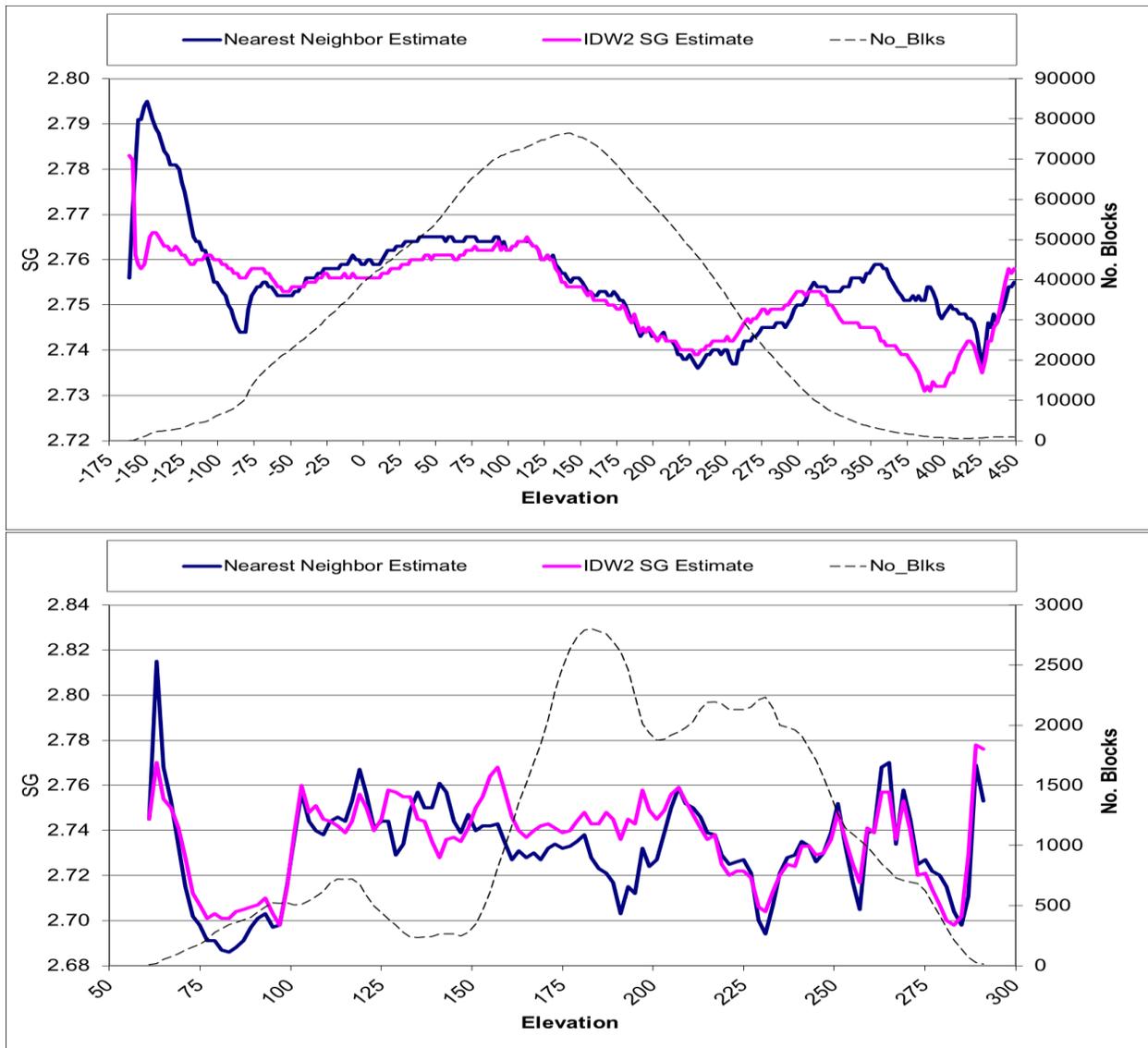


Figure 70: Elevation swath plot of nearest neighbor SG vs. IDW2 estimate using only blocks with a Cg estimate and 10-meter increments. All estimated blocks on top, Measured and Indicated blocks on bottom.

14.11 Resource Classification

The Graphite Creek Resource estimate has been classified in accordance with guidelines established by the CIM “Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines” dated November 23rd, 2003 and CIM “Definition Standards for Mineral Resources and Mineral Reserves” dated November 27th, 2010.

The Graphite Creek Resource estimate has been classified as ‘Indicated’ and ‘Inferred’ according to the CIM definition standards. The classification was based on geological confidence, data quality and grade continuity. The most relevant factors used in the classification process were:

- Drill hole spacing density;
- Level of confidence in the geological interpretation where the observed stratigraphic horizons are easily identifiable along strike and across the deposit, which provides confidence in the geological and mineralization continuity; and
- Estimation parameters (i.e., continuity of mineralization).

The parameters of each estimation pass were determined by the factors listed above and thus the classification of resources was guided by the estimation pass (Table 28). The single box search pass and pass 1 are considered to have a high level of confidence unlikely to be drilled again and thus blocks estimated during these passes are considered to be in the ‘Measured’ category. Pass 2 used a range within 80% of the maximum sill variance with at least two drill hole and thus considered high confidence. All blocks estimated during pass 2 are considered to be in the ‘Indicated’ category. All remaining blocks estimated are considered to be in the ‘Inferred’ category and includes blocks estimated in passes 3-7. The updated Graphite Creek resource numbers for inferred, indicated and measured resources are summarized in Table 29.

	Pass	Nominal search distance	Min. number of composites	Min. # of drill holes
Measured	BOX	1 x 1 x 1	1	1
	1	45 x 22 x 8	2	2
Indicated	2	100 x 50 x 20	2	2
Inferred	3	160 x 65 x 22	2	2
	4	80 x 32 x 11	1	1
	5	250 x 100 x 40	2	2
	6	125 x 50 x 20	1	1
	7	1500 x 500 x 500	1	1

Table 28: Classification criteria

Graphite Creek Resource Estimate Update: March 2019				
MINERAL RESOURCE CLASSIFICATION	CUT-OFF GRADE (% Cg)	TONNAGE (MILLION TONNES)	GRAPHITE GRADE (% Cg)	CONTAINED GRAPHITE (TONNES)
INFERRED	4.0	125.48	7.1%	8,850,296
	5.0	91.89	8.0%	7,342,883
	6.0	65.94	9.0%	5,922,778
	7.0	44.01	10.2%	4,504,835
	8.0	29.77	11.6%	3,440,831
INDICATED	4.0	12.57	6.9%	864,110
	5.0	9.26	7.7%	715,363
	6.0	6.45	8.7%	561,470
	7.0	4.32	9.8%	423,790
	8.0	2.8	11.1%	309,862
MEASURED	4.0	2.19	7.2%	157,634
	5.0	1.69	8.0%	135,171
	6.0	1.22	9.0%	109,456
	7.0	0.84	10.1%	84,904
	8.0	0.57	11.3%	64,825
MEASURED + INDICATED	4.0	14.76	6.9%	1,021,744
	5.0	10.95	7.8%	850,534
	6.0	7.67	8.8%	670,926
	7.0	5.16	9.9%	508,694
	8.0	3.37	11.1%	374,687

Table 29: March 2019 Graphite Creek updated resource with inferred, indicated, and measured resources

It should be noted the dip and location of the Kigluaik Fault that trends parallel and is adjacent to the mineralization of the deposit is a controlling factor of the graphite resource. The updated fault surface in the area of new 2018 drill results indicated a potential dip to the NW and a location 20-100 meters to the south-east of the previous interpretation of the fault. Outside of the new 2018 drilling, the fault has been interpreted as being vertical. The vertical surface and new location of the fault results in a truncation in the down dip extension of mineralization in places. However, the observed stratigraphic horizons show remarkable consistency along strike with little deviation along strike which provides confidence in the geological and mineralization continuity.

Mineral resources are not mineral reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the mineral resource will be converted into a mineral reserve. The collective work to date from the Graphite Creek Property indicate that while the project is in early stages of exploration/resource work that indications of the size and grade of the graphite give suggestions that they are of high enough concentration to be of economic interest.

15 Mineral Reserve Estimates

There are currently no mineral reserves defined for the Graphite Creek deposit as a feasibility study has not been carried out. There is no guarantee that any or all of the reported mineral resources will be upgraded to mineral reserves.

16 Mining Methods

The following information is taken from Graphite One's PEA prepared by TRU Group dated June 30, 2017.

16.1 Introduction

The Graphite Creek deposit outcrops at the surface, along a significant length of outcrop and maintains a relatively shallow dip below the land surface. The most cost-effective mining methods to be utilized for this project would be a surface mining technique. Mining capital cost allocations are discussed in Section 21 Capital Costs and Operating Costs, but a brief summary of production rates and equipment requirements is included here for clarity. It is currently presumed that mining is performed year-round to optimize the use of capital and equipment and as with all other aspects of the project, would be owner operated. This is preferable due to the economic and security advantages provided by vertical integration of the project from mine to finished product.

A summary of the equipment required to operate an open pit mine as envisioned in this study is included in Section 16.4 Mine Equipment, Facilities & Personnel.

16.1.1 Mine Operator

Graphite One could contract the mining operations should the Company find it beneficial to do so. The decision would most likely be based upon the client's ability to effectively manage the overall mining operations, the cost of acquiring the necessary capital to build the mine, and the increase to the per tonne mining cost that would be required to allow the contract miner to make an effective profit. Regardless of whether the client operates the mine or if it is contracted out, the methodology and approximate base-line costs generated in this report still apply.

16.1.2 Operating Season

Seasonal mining is a possible future operating scenario. However, it has been presumed that a year-round operation would provide a much more effective use of the mining equipment, afford the use of smaller-scale equipment, and would not be seriously affected by winter weather. Many mines operate in a similar environment without significant decrease in efficiency or increase in operating costs. A few examples include; Teck Red Dog and Kinross Fort Knox in Alaska, the Diavik, Ekati and Gahcho Kue diamond mines in Canada's Northwest Territories, the Meadowbank gold mine in Nunavut, also in Canada, as well as numerous mines across Scandinavia and Russia. The success of these operations demonstrates the feasibility of mining year-round in the North.

Should Graphite One wish to operate on a seasonal basis, it would likely increase costs based upon the necessity to utilize larger equipment to move more overburden and mill feed in a shorter time frame. It would add additional costs for maintaining a large stockpile and the associated re-handle costs for moving the extracted graphite mineralization from the stockpile to the mill. While this type of operation



could be feasible in the future, for this analysis, it was simpler to presume a year-round operation to minimize the mining costs.

16.1.3 Geotechnical Assessments

Insufficient technical assessments specifically suitable for explicit definition of the geotechnical parameters for the Graphite One Graphite Creek mineralization are currently available. All drill core recovered by the company has undergone geotechnical logging along with geological, structural and mineralization characterization. The data obtained through analysis of the core will be utilized in the proposed geotechnical evaluations. This will include additional core drilling and further slope stability studies.

16.1.4 Hydrological/Hydrogeological Assessments

Insufficient technical assessments specifically suitable for explicit definition of the hydrogeologic parameters for the Graphite One mineralization are currently available. Graphite One has completed four seasons of surface groundwater volume and flow measurements on the creeks in the project footprint and Cobblestone River as part of the baseline sampling program. Groundwater depth locations in the exploration core holes completed during the three seasons of drilling were recorded in the driller's logs and geologists field notes. The assessment of the groundwater hydrology of the site will require drilling of monitoring wells and more detailed hydrological investigations.

16.1.5 Seismic Monitoring and Assessment

Seismicity issues were not considered in conceptual design at this point in the project planning. The seismicity must be assessed and considered in subsequent and more advanced engineering stages of the project.

16.2 Open Pit Mining

The area which has been modeled in greater detail and selected for the earliest phases of mining is located along a relatively continuous 1500-meter outcrop of mineralized material between approximately 474,000 E and 475,500 E (see Figure 71). This zone has been modeled as being segregated into three separate zones of graphite mineralization, termed Lodes 1, 2 and 3. Based on surface mapping and diamond drilling, it was determined that the barren rock zone between Lodes 2 and 3 are highly variable, with thicknesses ranging from zero to as much as 5 meters (Figure 72). The three Lodes dip gently at approximately 45° down slope to the north under an increasing amount of overburden.

It has been assumed that the open pit mining will likely be designed to first remove the non-resource bearing overburden, then mine the resource defined as Lode 1. Subsequent to this removal, the resource-barren interburden between the base of Lode 1 and the top of Lode 2 will be removed and discarded. Since the resource-barren interburden between Lode 2 and Lode 3 is rather small and inconsistent in thickness, it has been assumed that Lode 2 and Lode 3 will be mined as a single unit, with the extraction of the non-resource bearing material done as a sub-stage of the mining process.



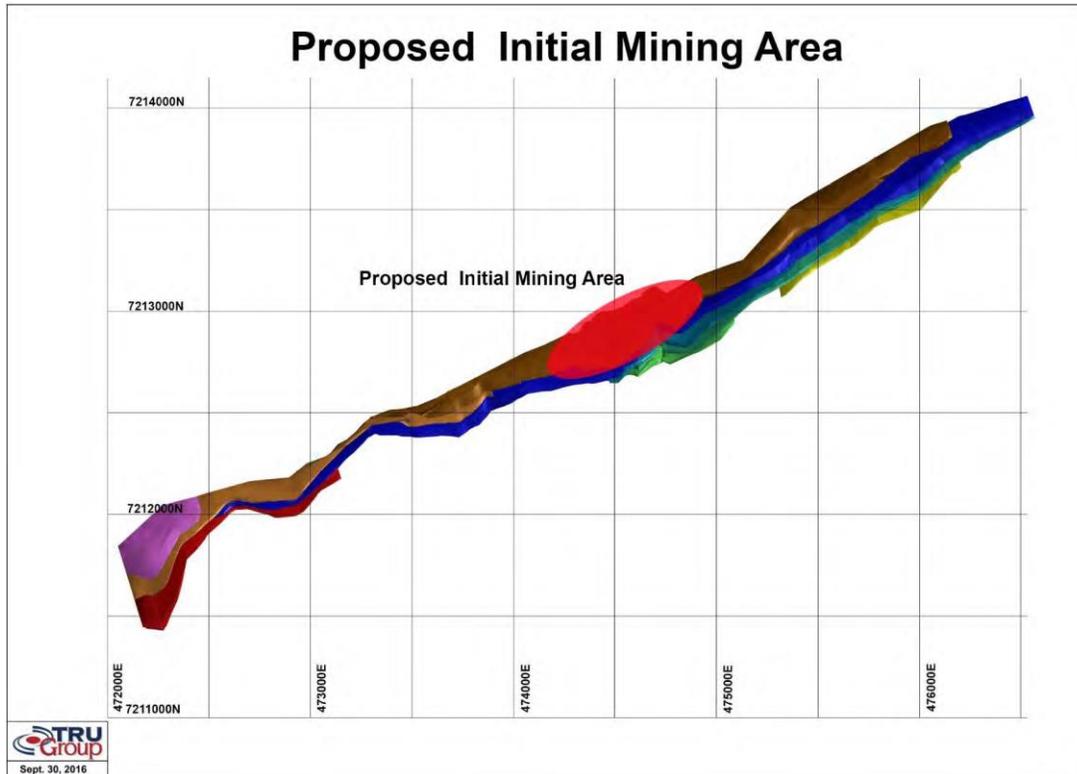


Figure 71: Proposed open pit mining area encircled in red.

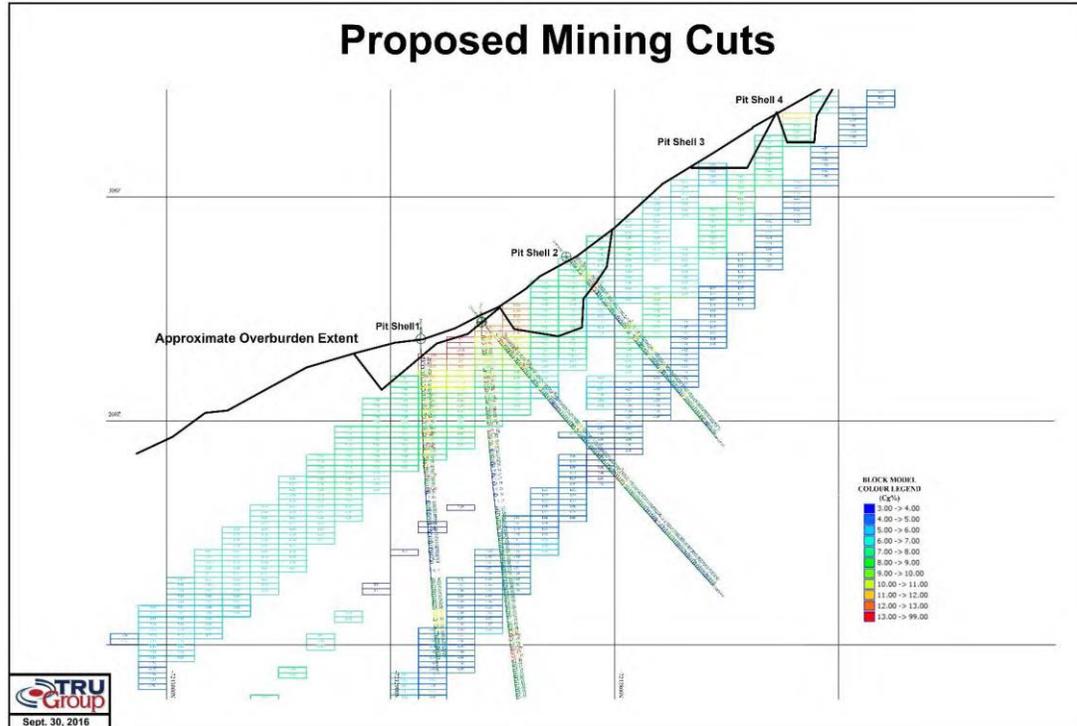


Figure 72: Idealized cross-section through middle of pit area showing relative positions of the four bench areas

The mining methodology is planned as a truck and shovel operation mining along several contiguous, en-echelon, pits starting at the outcrop and progressing in the down dip direction. This method of mining allows the maximum flexibility as the equipment is highly mobile and can be moved between the active mining pits to offer the most economic extraction of the material and allow the mining engineers a high degree of flexibility in mining the resource-bearing material in a manner which allows the delivery of a consistent grade to the processing plant.

The mine has been designed to operate on a 24-hour per day schedule (assuming two 12-hour shifts per day) on a year-round basis. Numerous mines operating in similar climates were evaluated and it was determined that the continuous operation model offers the most cost effective type operation. The factors leading to this cost-effectiveness stem primarily from the use of smaller equipment over a longer time frame. This significantly reduces the initial capital expense of purchasing smaller sized equipment as well as offering the reduction in the day-to-day operations and maintenance costs of operating smaller equipment. Additionally, the smaller equipment offered by this plan is much more flexible and mobile and offers significant cost savings in operating the mine in the most cost effective manner by keeping the equipment operational for longer periods of time.

16.2.1 Mine Design

The mining operation would be conducted along 4 active benches: Bench 1 – Overburden extraction, Bench 2 – Mining of Lode 1, Bench 3 – Extraction of Inter-burden, and Bench 4 – Mining of Lode 2/3. As mining progresses with time, the benches will proceed along the outcrop surface and will also continue to mine to depth in the down dip direction.

Bench 1: This initial bench (see Figure 73) will remove the non-graphite bearing material from the surface down to the top of the graphite-bearing Lode 1. The mining involved with this bench will remove the non-graphite bearing material situated from the topographic surface down to the top of the graphite-bearing Lode 1. As this bench will initiate at the outcrop, the initial bench will be thin, but will increase in volume as the land surface rises and the natural dip of the graphite mineralization progresses to greater depths. It is noted that the topsoil extracted from this zone will be saved for later cover of the reclaimed mine area.

Initially the material extracted from Bench 1 will be stockpiled near or adjacent to Bench 1 at a site defined as suitable by geotechnical testing. Generally, this stockpile is located as close to the initial cut as possible to minimize trucking costs. It is noted that as the initial phases of Bench 1 are in an area with a relatively thin layer of overburden, this stockpile will be of minimal size. As mining progresses, the material extracted below the topsoil and above Lode 1 will be trucked to the previously mined area below Bench 4 and the material dumped back into the existing open cut.

Bench 2: This bench entails the mining of the graphite material identified within Lode 1. Over the course of mining the thickness of the bench will vary within the vertical dimensions of the graphite mineralization body, but will not increase or decrease in any progressive pattern. As such, the truck and shovel methodology proposed offers the optimal mining process to effectively extract the material without including significant dilution from the non-graphite bearing overburden or interburden. The material extracted from Bench 2 will be trucked to the mineral processing area for further treatment.



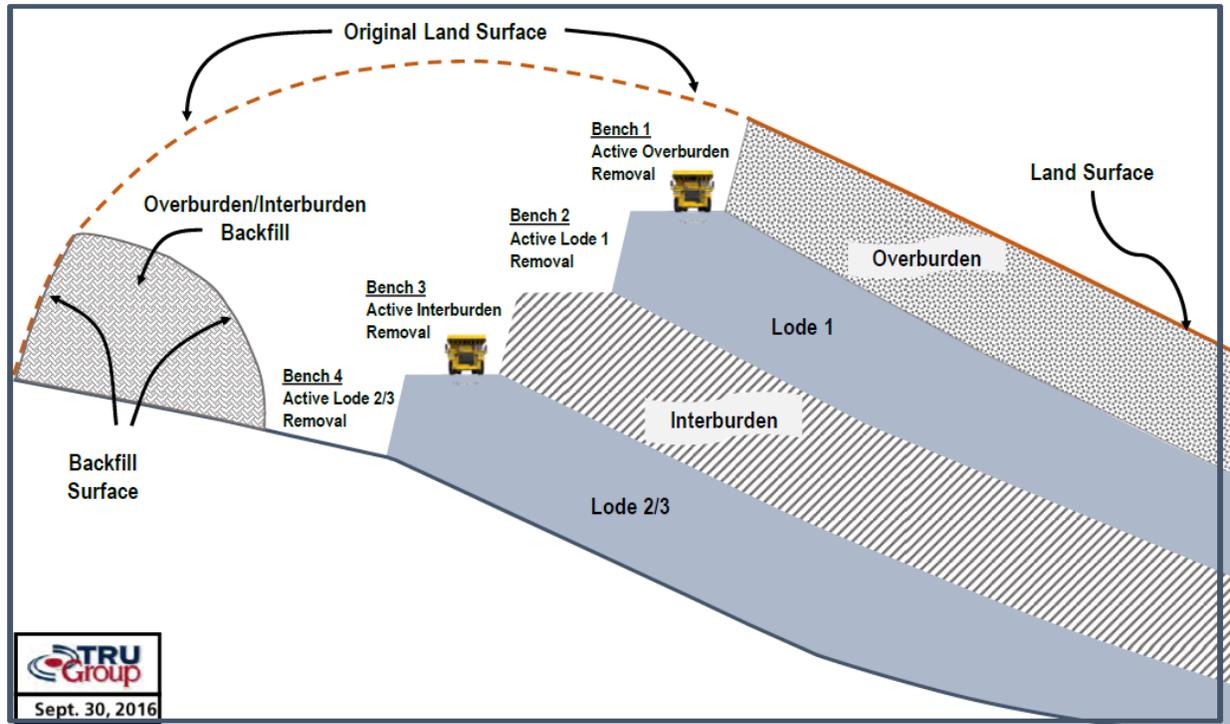


Figure 73: Schematic cross-section of conceptual mine plan near center of indicated resource identified in Figure 71.

Bench 3: This bench will entail the extraction of the non-graphite bearing interburden between the bottom of Lode 1 and the top of Lode 2. The thickness of this interburden zone is variable. As a result, the boundary between the bottom of Lode 1 and the top of Lode 2 will need to be carefully defined by the mine staff and care must be taken to assure that the extraction of the barren interburden material does not include significant extraction of the graphite bearing material from the top of Lode 2. Material from this bench will be trucked to a previously mined area below Bench 4 and the material dumped back into the existing open cut.

Bench 4: This bench (See Figure 73) entails the mining of Lodes 2 and 3 as a single unit. As noted before, the non-graphite bearing inter-burden between these two lodes is quite small and variable and, as such, does not lend itself to a dedicated mining horizon. During the mining of Bench 4 it is expected that the mine staff will identify larger zones of non-graphite bearing rock within the bench cut and extract this material for disposal rather than including it in the mill feed extracted from the bench. The non-graphite bearing material will be trucked to a previously mined area below Bench 4 and the material dumped back into the existing open cut (see Figure 73). The graphite-bearing material extracted from Bench 4 will be trucked to the mineral processing area for further treatment.

16.2.2 Mining Methodology

To effectively follow the mine plan outlined above, the optimal method of surface mining will be to conduct what is termed a “truck and shovel” type operation. This method of mining is characterized by its flexibility in mining mineralized bodies of variable thickness and its ability to operate in a multi-pit situation. The material to be moved (whether mill feed material or waste rock) is first blasted to loosen and break up the material. The loosened material is then scooped up by large volume shovels and

deposited in large trucks, which transport the material to the mill feed treatment area or to the waste rock dump area.

Planning and production estimates are based on simultaneous production from the four benches described above. Grades of graphite mineralization would be closely monitored during production drilling, and production rates in the individual benches would be adjusted to meet operational and mill-feed requirements. The basic mine concept presumes that each of the four benches outlined above will have a large shovel and at least two trucks available for material haulage.

One of the benefits of the truck and shovel operation is that all the equipment can be moved between benches to facilitate timely and cost-effective material handling depending upon the needs of any particular area. As noted above, Bench 1 will require only minimal hauling in the early portions of the mine process, but will require the movement of significantly larger volumes of material as mining progresses in the down dip (down slope) direction. It is quite feasible for the machines operating in a pit requiring less material movement, i.e. Bench 3, to move to Bench 1 for extended periods of time. Effective mine planning will allow the optimal utilization of the existing equipment without the cost of purchasing machines that will not be fully utilized.

Pit optimizations do not include individual benches or ramp design. For the pit size, production requirements, and recommended equipment fleet, TRU considers mining of 10 to 12 m benches in two cuts and development of an 18 m wide ramp, including ditches and safety berm, to be appropriate for the open pit operations. The ramp should be designed with a maximum 10% gradient with the exit appropriately located to minimize transport distances to the mill and the waste rock dumps. Industry average pit slope angles are assumed at this stage of planning.

16.2.3 Mining Waste to Mineralization Strip Ratio

The mining strip ratio is a number which relates the volume of the non-graphite bearing material (waste) moved during the mining process to the volume of the graphite mineralization (mill feed) and is generally expressed as a 3:1, 8:1 or 12:1 value, with the non-bearing material volume noted first and the mineralized volume noted second. It is noted that the “overburden” number includes the material located above the mineralized body (overburden), non-graphite bearing material between the mineralized Lodes (interburden), and non-graphite bearing material within the mineralization.

A comprehensive engineering study quantifying the overburden ratio for the proposed mine was not carried out for the preparation of this report. An estimate of the overburden ratio was generated by analyzing the cross sections generated during the modelling process, and estimating the final pit slope angle. Based upon these assessments it is estimated that the overburden ratio for this project ranges between 2:1 and 4:1. For all subsequent discussion, a value for the overburden ratio was selected to be a conservative 3:1.

16.2.4 Production Output and Schedule

The graphite mineralization is calculated to include in excess of 40 million tonnes of inferred resources. The mining plan outlined above proposes mining of graphite mineralized material at an ultimate rate of 3,090 tpd (1,018,00 tpy), as summarized in Table 29 and illustrated in Figure 74.



UNIT PRODUCTION INPUT-OUTPUT	PLANNED CAPACITY tpy						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Years 7+
Mineral Processing Plant							
Plant Feed Input	305,400	407,200	509,000	814,400	916,200	1,018,000	1,018,000
Graphite Concentrate Output	18,000	24,000	30,000	48,000	54,000	60,000	60,000
Tailings Output	287,400	383,200	479,000	766,400	862,200	958,000	958,000

Sources & notes -
 TRU Estimates

Table 30: Planned Production Unit Capacities by Period in tonnes per year

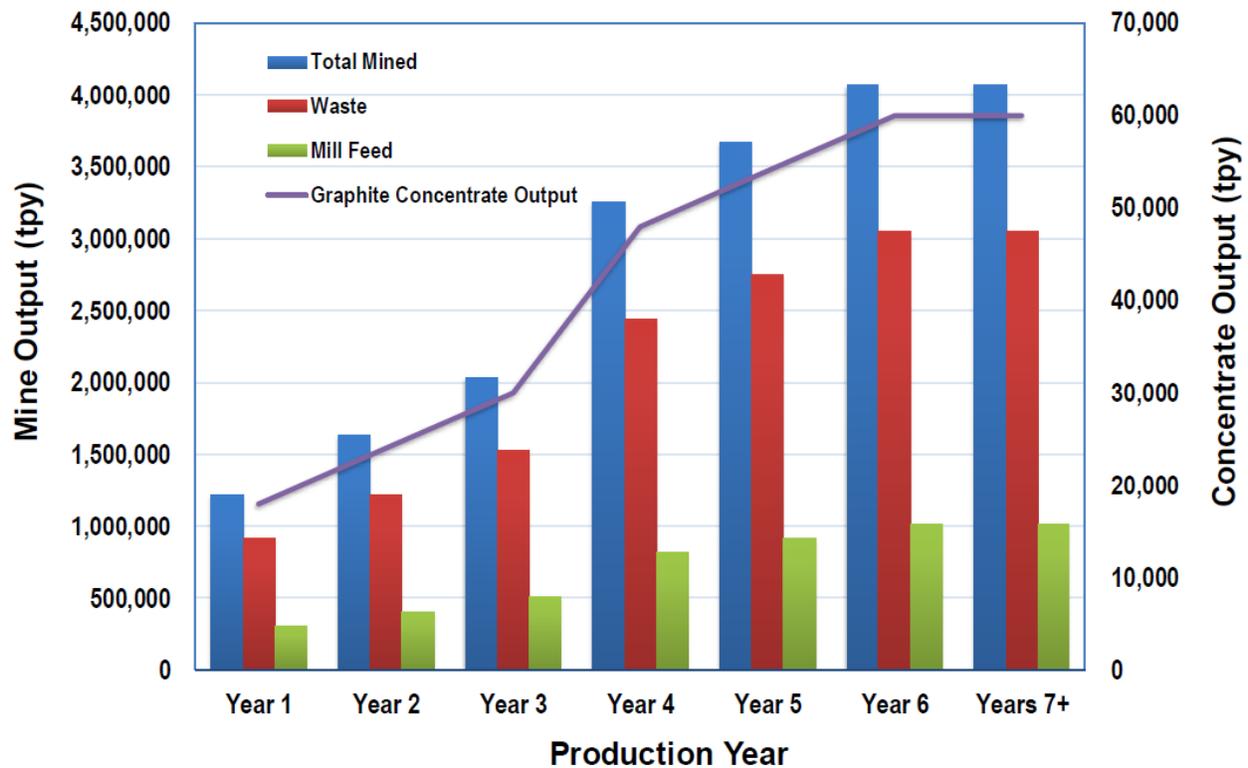


Figure 74: Planned production unit capacities in tonnes per year

Based on the modelled portion of the graphite mineralization at 7% Cg, the inferred resources could conceivably sustain the proposed mining rate for 20 years and up to 40 years. Additional graphite material has also been identified outside the modelled area indicating that mining could possibly be conducted at a higher rate or longer period. This would be dependent upon additional assessments of the graphite mineralization outside the modelled area. Conclusive determinations on the extended lifespan of the project can only be made with additional infill drilling to upgrade the classification of inferred and projected resources (outside the exploration area) and further evaluation of pertinent economic criteria.

16.3 Facilities Location

The location of the mine itself will correspond to the outcrop of the graphite-bearing rock formation defined previously and will overlay the area defined within the resource estimation performed in Section 14.8 Mineral Resource Estimates. The actual size and final footprint of the mine will be greatly dependent upon the extraction rates (tpy) and the number of years that the mine operates. It has been previously noted that there exists the excellent potential for additional resources outside the defined resource estimation area, which would be dependent upon future delineation and definition drilling.

The location of the support facilities and material processing mill will be largely determined by future geotechnical studies, which will define those areas best suited for safe construction. While no specific location for these facilities is provided here, there are several factors which will be combined with the geotechnical data to determine the optimal facility location.

One of the more critical factors in placement of the mill will be to locate the processing facility as close to the mine as possible. A proximal location will reduce the travel time for the haulage trucks, which saves on operational costs as well as maintenance. Additionally, a proximal location allows the use of smaller trucks which will cycle faster thus again reducing operational costs as well as initial capital expenditures. Finally, while it is necessary to place the facility where the geotechnical testing dictates, if the mill can be located at a nearby location that is topographically lower than the mine, this will also reduce truck operations costs by having the loaded trucks moving downhill and the empty trucks moving uphill.

The location of the mine support facility should likewise be located as proximal to the mine as is feasible. While a close location of the facility is not as critical as the mill, there are definite operational advantages to reducing the distance between the mine and the support facility. Among these advantages is the nearby location of the maintenance shop and refueling depot. The reduction of travel time for the equipment between these facilities will serve to minimize the mine costs. Additionally, having a proximate location from which to stage the equipment and mine operations will serve to make the mine run more efficiently.

The infrastructure that is being currently proposed for the Graphite Creek Mine site includes:

- Process plant
- Access and site roads
- Power generation
 - Substation
 - Distribution to various parts of the site
- Mining/processing water distribution/storage facility
- Tailings pond
- Water treatment facility
- Camp with admin offices
- Sewage treatment facilities
- Communications towers/equipment
- Storage facilities



16.4 Mine Equipment, Facilities & Personnel

To conduct the mining operations described above, the following equipment and personnel would be necessary:

Equipment Estimates

Hydraulic Shove 2m ³	4	Front End Loader 5m ³	4
Rear Dump Truck 50 t	8	Rotary Drills	4
Bulldozer D9	6	Road Grader	3
Water Tanker	3	Service/Tire Truck	5
Light Plants	16	Water Pumps	5
Pickup Truck	10		

Mine Service Buildings

Office	Maintenance Shop
Dry Storage	Warehouse
Worker Barrack	Worker Rec/Dining Facility

Hourly Personnel per Shift

Category	Day Shift	Night Shift
Driller/Blasters	8	-
Truck Drivers	8	4
Mechanics	6	6
Excavator Operator	8	4
Equipment Operator	8	4
Laborer/Maintenance	16	8

Salaried Personnel

Manager	1	Foreman	4
Superintendent	1	Supervisor	4
Geologist	1	Clerk/Secretary	2
Engineer	1		



16.4.1 Mining Capital and Operating Costs

A summary of projected capital expenditures for mining-related facilities is provided in Table 31 below. Operating costs related to mining operations are summarized in Table 32. These costs are examined in Section 21 Capital Costs and Operating Costs. Total capital cost for mining operations is estimated at \$43.1 million. Operating costs for mining are estimated at \$27.25 per tonne of delivered plant feed.

CAPITAL COST CATEGORY & ITEM	COST \$ million
Mining Equipment & Facilities Costs:	\$40.0
<i>Mining Equipment</i>	26.5
<i>Mine Services Buildings</i>	4.9
<i>Site Roads and Preliminary Earthwork</i>	6.9
<i>Pre-production Stripping</i>	1.7
Indirect Costs	\$3.1
<i>Engineering</i>	3.1
TOTAL CAPITAL COST - MINING	\$43.1

Sources & notes -
TRU Estimates

Table 31: Mining Capital Cost Estimate by Category and Item (US\$ millions)

MAJOR OPERATING COST ITEM	Mining OPEX	
	\$/year	\$/t Plant Feed
Salaried Labour	\$1,730,600	\$1.70
Hourly Labour	\$20,156,400	\$19.80
Equipment Operation	\$2,799,500	\$2.75
Supplies/Materials	\$1,781,500	\$1.75
Miscellaneous	\$1,272,500	\$1.25
Total Operating Cost	\$27,740,500	\$27.25

Sources & notes -
TRU Estimates

Table 32: Mining Operating Cost Estimate at full capacity - US\$



16.4.2 Other Mine Infrastructure

This sub-section refers to infrastructure directly designed and installed to support mining operations. Other, non-mining related infrastructure is discussed in Section 18.

DEWATERING

Dewatering wells will be drilled peripheral to the ultimate open pit footprint. Locations of the dewatering wells will be determined after further hydrogeological studies have been completed. Water from the dewatering wells as well as runoff water pumped from the pit will probably need to be processed in the water treatment plant before being released into the environment. The nature of the well water and pumped runoff water will need to be studied and characterized before a final determination of water handling procedures may be determined.

The current proposed pit outline straddles the Graphite Creek watercourse, a seasonal stream flowing northwest across the property into the Imuruk Basin. This water will need to be diverted away from the pit area. Further environmental and engineering studies will be required to determine the most economical and least environmentally disruptive method of accomplishing this.

EXPLOSIVES & DETONATORS

Detonators and explosives will be stored in approved explosives magazines. They will be located at a safe distance from the mining operations. The explosives and detonators magazines will be located away from the open pit, far enough from buildings and working areas to meet safety standards. Suppliers will deliver explosives and detonators directly into dedicated magazines for storage until use.

17 Recovery Methods

The following information is taken from Graphite One's PEA prepared by TRU Group dated June 30, 2017.

The Graphite One project has been conceived as the vertically-integrated manufacturing of high grade coated spherical graphite. The concept is illustrated in the following Figure 75. It is framed as an American interstate project with

1. Mining and mineral processing at the Graphite Creek property in Alaska
2. Purification and value-added graphite processing performed at the Product Manufacturing Plant at developed brownfield site in the proximity of a port.

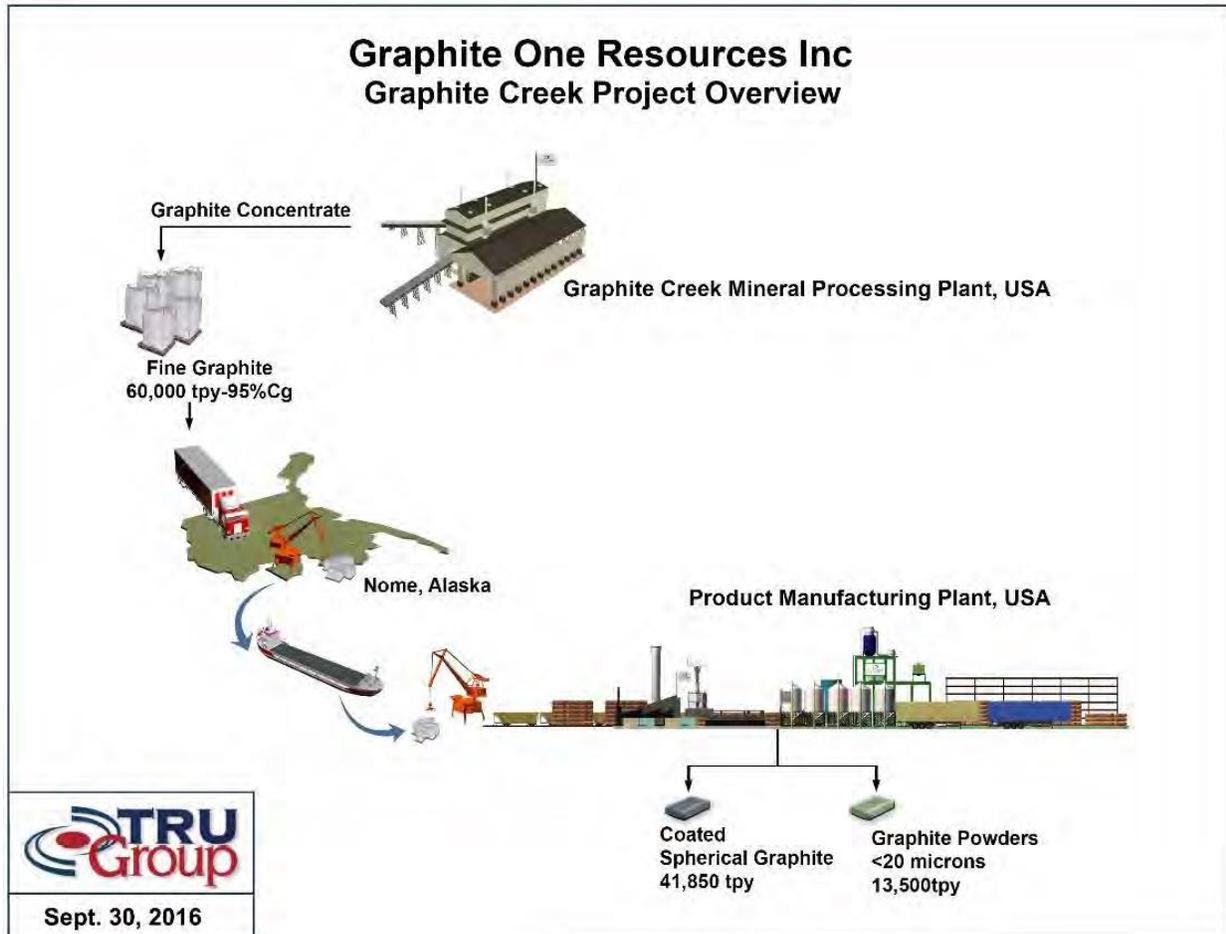


Figure 75: Concept for Graphite One Project at full production

Key considerations for this choice are -

- Minimizing the amount of material requiring transport out of Alaska with consequent reduction in expenditures for costly barge transport
- The proposed location for the Product Manufacturing Plant has the low-cost hydroelectric power needed for the energy-intensive purification processing and products manufacturing and is a good strategic geographic location for marketing finished products.

When the Project reaches full production capacity, open pit mining will deliver 1,018,000 tpy of graphite mineralization to the Mineral Processing Plant for the extraction and recovery of graphite into 60,000 tpy concentrate grading 95% graphite (Cg). The single concentrate is transported to the port of Nome from where it is shipped to a coastal location in proximity to Product Manufacturing Plant. The sequence of processing at the Product Manufacturing Plant includes: thermal purification of the concentrate to 99.95%+ Cg; mechano-chemical processing (spheronization) of the refined product and classification processed material into spherical graphite and reject fractions; coating the spherical graphite; and heat treatment of the 'green' surface coated spherical graphite. The plant is designed to deliver 41,850 tpy of high-grade coated spherical graphite for lithium-ion battery applications along with 13,500 tpy of refined, sub 20-micron graphite powder for various end-uses, Figure 76.

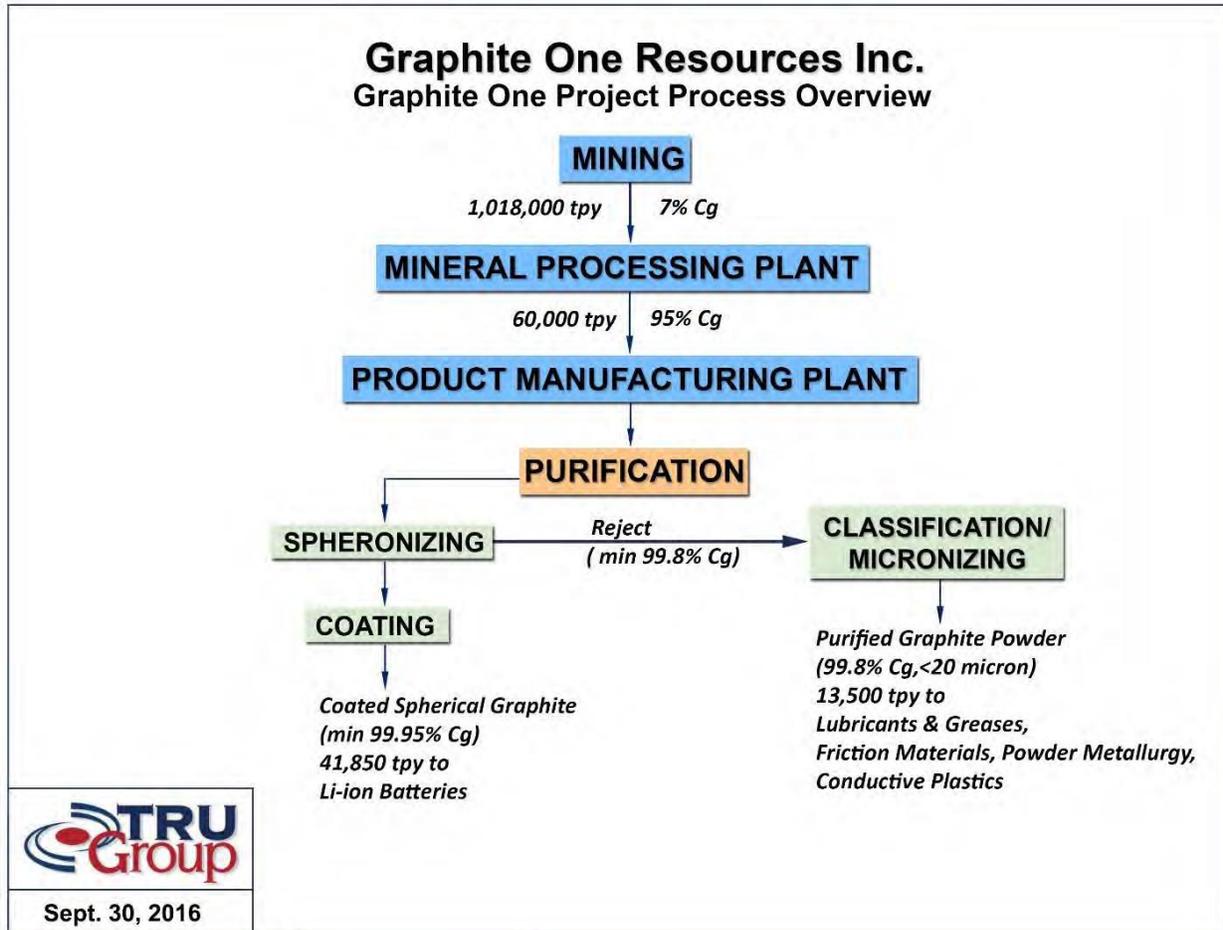


Figure 76: Process outline of the integrated Graphite One Project

17.1 Alaska Mineral Processing Plant

TRU's summary outline of the proposed processing of graphite mineralization at the Mineral Processing Plant at the Graphite Creek property is seen in Figure 77.

It is assumed that the delivered STAX Graphite mineralization has been mined at a nominal grade of 7% Cg, is crushed and beneficiated in close proximity to the mine.

Once received at the Mineral Processing Plant, the graphite mineralization is processed through the following unit operations:

- Two stages of crushing
- Initial grinding followed by conventional cell rougher flotation and cleaner flotation
- Multiple sequences of grinding/polishing with column flotation to progressively upgrade the concentrate to 95% Cg that is pressure filtered and pneumatically dried

At full project design capacity, the Plant feed is 1,018,000 tpy of mined mill feed material that yields 60,000 tpy of graphite concentrate. The concentrate is packaged in one tonne super sacks and placed in 20 t shipping containers in preparation for overland truck transport to the Port of Nome, Alaska. The

containers are loaded onto barges during the seasonal shipping window and delivered to the Products Manufacturing Plant.

Mineral processing testwork indicated that the apparent coarse fraction of graphite was either low or sufficiently fragile to disintegrate or dissociate under mechanical stress. Exploratory product development testwork demonstrated that purification and mechano-chemical processing of the entire size distribution of a non-classified graphite concentrate (coarse and fine flake) resulted in recovery of spherical graphite of which nearly 75% was suitable for EV lithium-ion batteries. This supports the design decision to produce one concentrate stream for integrated processing to spherical graphite.

The Mineral Processing Plant is designed to run on a year-round (12 month) schedule. Consideration of a six-month schedule to roughly coincide with the Alaska-Washington shipping window was dropped due to the higher capital expenditures and operating costs incurred with running at a higher processing intensity and which negatively impacted the project economics.

Road clearance during winter months will ensure year-round access to the mill for labour rotations, resupply of operations and transport of concentrate to a storage area near the port of Nome, which will begin at the end of the winter season. A contracted truck transport fleet will move concentrate from the mill and will also be used to deliver fuel to the Graphite Creek Project site on the return trip. A habitation unit with living quarters and communal facilities will be established for the on-site work force.

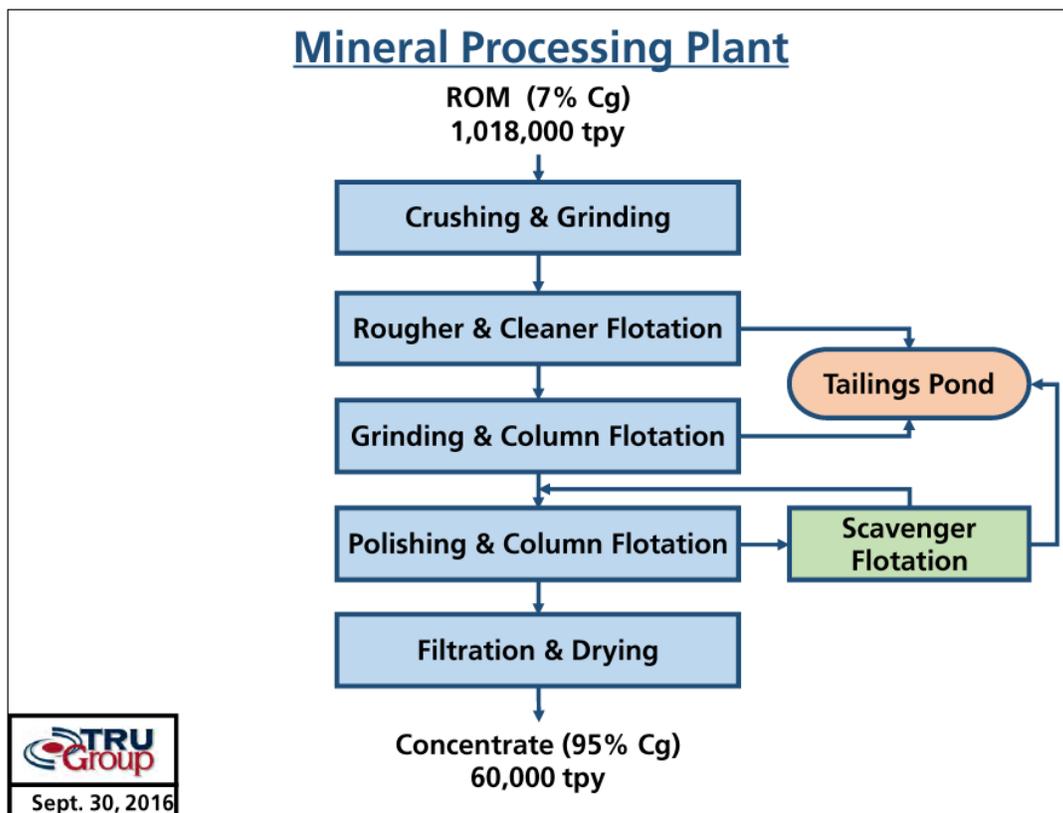


Figure 77: Graphite Creek Mineral Processing Plant process outline

17.1.1 Design Basis

The Mineral Processing Plant has been designed on the basis of producing 60,000 tpy graphite concentrate grading 95% Cg (graphite content). The annual feed rate of run-of-mine material grading 7% Cg to the Plant is 1,018,000 tpy. Recovery of graphite during mineral processing is assumed under optimized conditions to reach 80%. The Plant is designed to operate 330 days per year.

AK Mineral Processing Plant Parameter	Value
Feed Rate	1,018,000 tonnes per year
Feed Grade	7 %Cg
Graphite Recovery	80 %
Concentrate Grade	95 %Cg
Operation	330 days per year
Concentrate Output	60,000 tonnes per year

Table 33: Mineral Processing Plant design basis

TRU has also opted for a design that uses five parallel circuits (at full design capacity) of smaller-scaled equipment rather than incorporating one or two larger-scale equivalents in a single series for mineral beneficiation. This design will allow for better flexibility on production and improve graphite recovery. The rendered flowsheet, appearing in Figure 78, is one line of the entire circuit. The plant reaches full capacity (60,000 tpy concentrates) in the sixth year of operation.

17.1.2 Crushing and Grinding

Run of Mine (ROM) mineralized rock grading 7% Cg is delivered by truck to the mill where the load is deposited into dump hoppers positioned above grizzly feeders for removal of plus 500 mm material. The undersize falls through the grizzly and is fed to the primary jaw crusher to reduce the particle size from 400 mm to less than 100 mm (4 inch). Vibrating screening of the jaw crusher discharge ensures that oversize is recirculated to the jaw crusher while the undersize fraction proceeds to secondary crushing where hammer mill crushers comminute the material to 20 mm (¾ inch). Screening of hammer crusher discharges ensures that oversize is recycled while the undersize proceeds to storage bins as feed inventory to primary grinding. There will be three crushing circuits operating in parallel when the Alaska Mineral Processing Plant is at full capacity.

Crushed material from the storage bins is conveyed to the primary grinding circuit which at full capacity will consist of five rod mills operating in parallel. The rod mill is in closed circuit with cyclones where the oversize, the cyclone underflow is returned to the mill. The cyclone overflow at a particle size P80 of 150 mesh (100 microns) flows by gravity to the rougher flotation feed conditioning tank where flotation reagents are added to the pulp in preparation for flotation. Each grinding circuit will be coupled to a flotation circuit; at full plant capacity there will also be five flotation circuits in parallel.

17.1.3 Rougher and Cleaner Flotation

Conditioned pulp is sent to the rougher cell bank consisting of four conventional impeller-agitated flotation cells, each of twelve cubic meter volume and arranged in series. The rougher flotation concentrate proceeds to a cleaner cell bank consisting of four conventional impeller-agitated flotation

cells, each of five cubic meter volume and arranged in series. Graphite recovery of 95% is expected in an initial cleaner concentrate grading 45%C to 50%C in about 20% mass pull. This concentrate is directed to the column flotation circuit for further upgrading while tailings from both rougher and initial cleaner stages are pumped to tailings impoundment.

17.1.4 Column Flotation

Upgrading of the initial cleaner concentrate is carried out in four stages of column flotation. Each cleaning stage is preceded by grinding/polishing of the feed pulp.

Initial cleaner concentrate pulp is directed to the first regrind ball mill for incremental size reduction with steel balls and then fed to the first flotation column for upgrading. Successive column cleaner stages use different mills and grinding media to ready the feed; cleaner column two is preceded by attrition milling of the pulp; cleaner columns three and four are preceded by friction milling of the pulp with high density media.



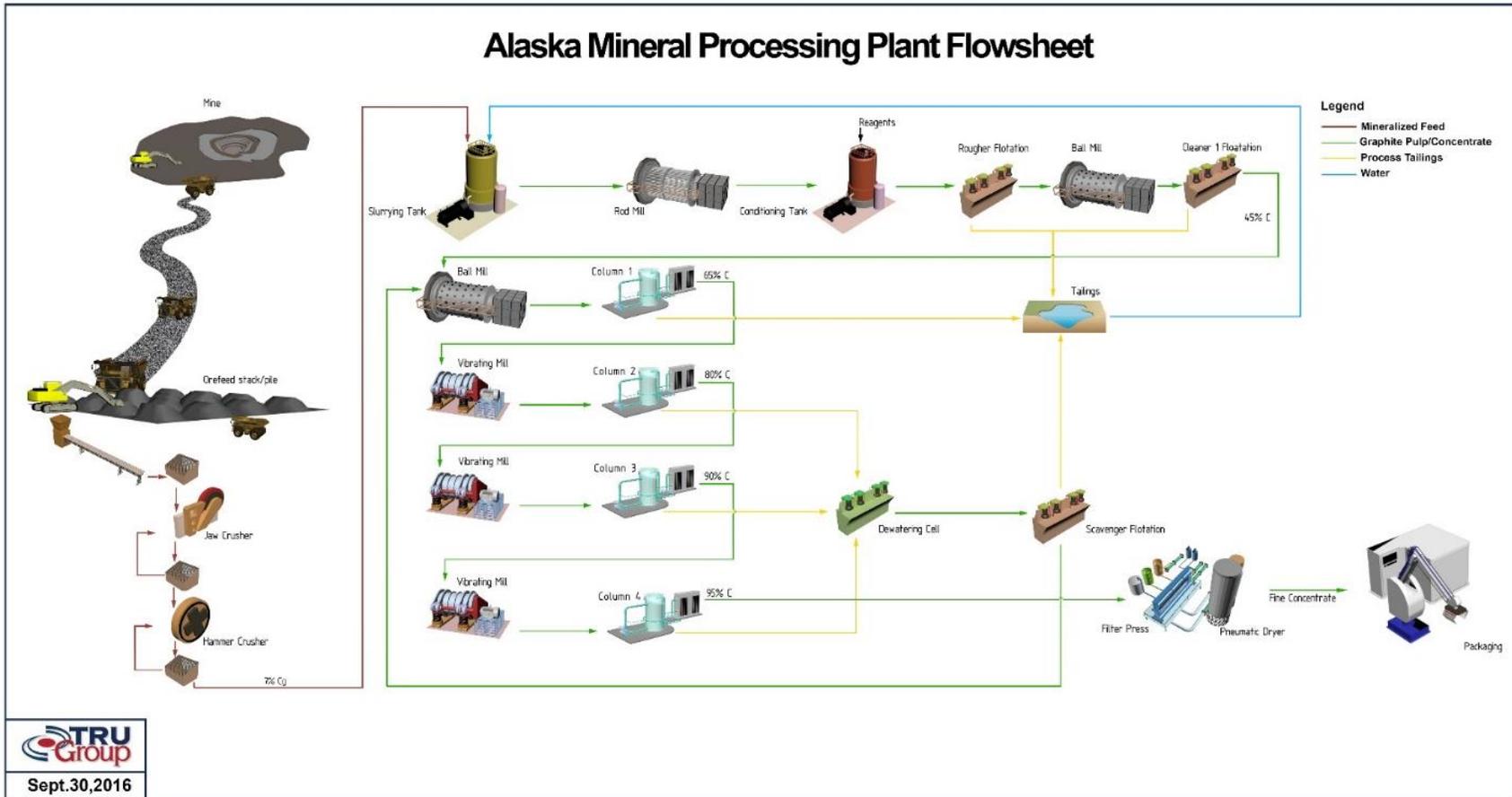


Figure 78: TRU Group rendering of the Graphite Creek Mineral Processing Plant conceptual flowsheet.

The progressive upgrading of the initial cleaner concentrate at 45% C during successive column cleaning is: 75% C in cleaner column one; 85% C in column cleaner two; 93% C column cleaner three to the final column cleaner four which produces concentrate at a grade of 95% C at an overall recovery of 80%. Tailings from cleaner column one are pumped with the rougher tails to impoundment while the underflow from cleaner columns two, three and four is directed to dewatering cells ahead of scavenger flotation for additional graphite recovery. The dewatered pulp is processed in four conventional impeller-agitated flotation cells, each of five cubic meter volume and arranged in series. Scavenger concentrate is recirculated to the attrition mill preceding cleaner column two; scavenger tailings are sent to tailings impoundment.

17.1.5 Drying and Packaging

The final concentrate overflow from cleaner column four is dewatered in plate and frame filter presses. The filter cake is then conveyed to pneumatic dryers to remove remaining moisture. The final product is pneumatically conveyed to bulk bag fillers where it is bagged in one tonne super sacks.

17.1.6 Tailings

Tailings from rougher flotation, initial cleaner flotation, column one cleaner and the scavenger circuit will be pumped to a tailings pond on the Graphite Creek Project site where there will be natural settling of rejected gangue. Process water will be pumped from the tailings pond and recycled as process water. Detailed study of the tailings will be investigated in the future. In the event that neutralization is required, there are large outcrop of limestone and marble at the site.

17.1.7 Reagents

Process reagents required at the Mineral Processing Plant for flotation are namely Flotanol and kerosene. It has not been determined if pH modifiers will be needed for conditioning the slurry ahead of rougher flotation or for the flotation tailings slurry that will be impounded.

17.1.8 Utilities Consumption

Most electric power in northwestern Alaska is produced by community cooperatives operating diesel fueled generators. These plants are sized to the community needs and there is little if any excess electrical power generation that could benefit the Mineral Processing Plant. In addition, the remote location of the Graphite Creek Project site and distance to any established electrical infrastructure would make it impractical or costly to install additional capacity at an existing plant and run high voltage cables back to the site. Therefore, the electricity will be generated by an on-site diesel power plant to satisfy operational requirements for the mine, Plant and those of ancillary and support facilities.

A six-megawatt power plant (three two-MW diesel generators) operating at 80% of nominal capacity will generate the annual requirement of 37 MWh of electricity. Annual diesel fuel consumption is estimated at 9,000 m³ when production at the Mineral Processing Plant reaches full capacity of 60,000 tpy-concentrate. Diesel fuel is imported from Washington State and stored at leased facilities; a three-month inventory of fuel is maintained at the Plant site.

Annual process water requirements are similarly estimated at 500,000 m³. Pending the results of water sampling and flow measurements on the major streams and Cobblestone River, it is assumed that process water will be drawn from on-site resources although recovered water from the tailings pond will be recirculated to minimize fresh water additions.



17.1.9 Equipment List

Major equipment items at the Mineral Processing Plan are summarized below:

MAJOR EQUIPMENT ITEM	NUMBER OF UNITS
<i>Crushing and Grinding Circuit</i>	
Feed Grizzly	3
Jaw Crusher	3
Primary Vibrating Screen	3
Hammer Crusher	3
Secondary Vibrating Screen	3
Rod mill	5
<i>Flotation Circuit</i>	
Conditioning Tank	5
Ball Mill	5
Rougher Flotation Cell Bank	5
Cleaner Flotation Cell Bank	5
Cleaner Column One Ball Mill	5
1st Cleaner Flotation Column	5
Cleaner Column 2 Friction Mill	5
2nd Cleaner Flotation Column	5
Cleaner Column 3 Friction Mill	5
3 rd Cleaner Flotation Column	5
Cleaner Column 4 Friction Mill	5
4 th Cleaner Flotation Column	5
Dewatering Cell	3
Scavenger Flotation Cell Bank	3
<i>Drying and Packaging</i>	
Plate Filter-presses	30
Pneumatic Dryer	4
Bulk Bag Packaging Station	1

17.2 Product Manufacturing Plant

The process outline for the Product Manufacturing Plant appears in Figure 79. The Plant receives 60,000 tpy of concentrate grading 95% Cg from the Graphite Creek Mineral Processing Plant in 20-foot shipping



containers. All received concentrate is thermally purified. State-of-the-art (electric-powered) thermal purification has been selected over acid chemical purification to position Graphite One to increase throughput and minimize or eliminate acid effluents. Purification is performed at extremely high temperature under an inert atmosphere. The fine graphite concentrate received contains STAX morphology which is highly amenable for the efficient production of the coated spherical graphite (CSG) product.

Purifying all the concentrate will yield higher quality product offerings in line with the core Graphite One strategy to produce only up-market high quality products –

- CSG, 41,850 tpy for lithium-ion battery end-use applications
- Purified sub-20 micron powders, 13,500 tpy for varied end-use applications including lubricants, friction products, conductive polymers, specialty powder and metallurgical additives

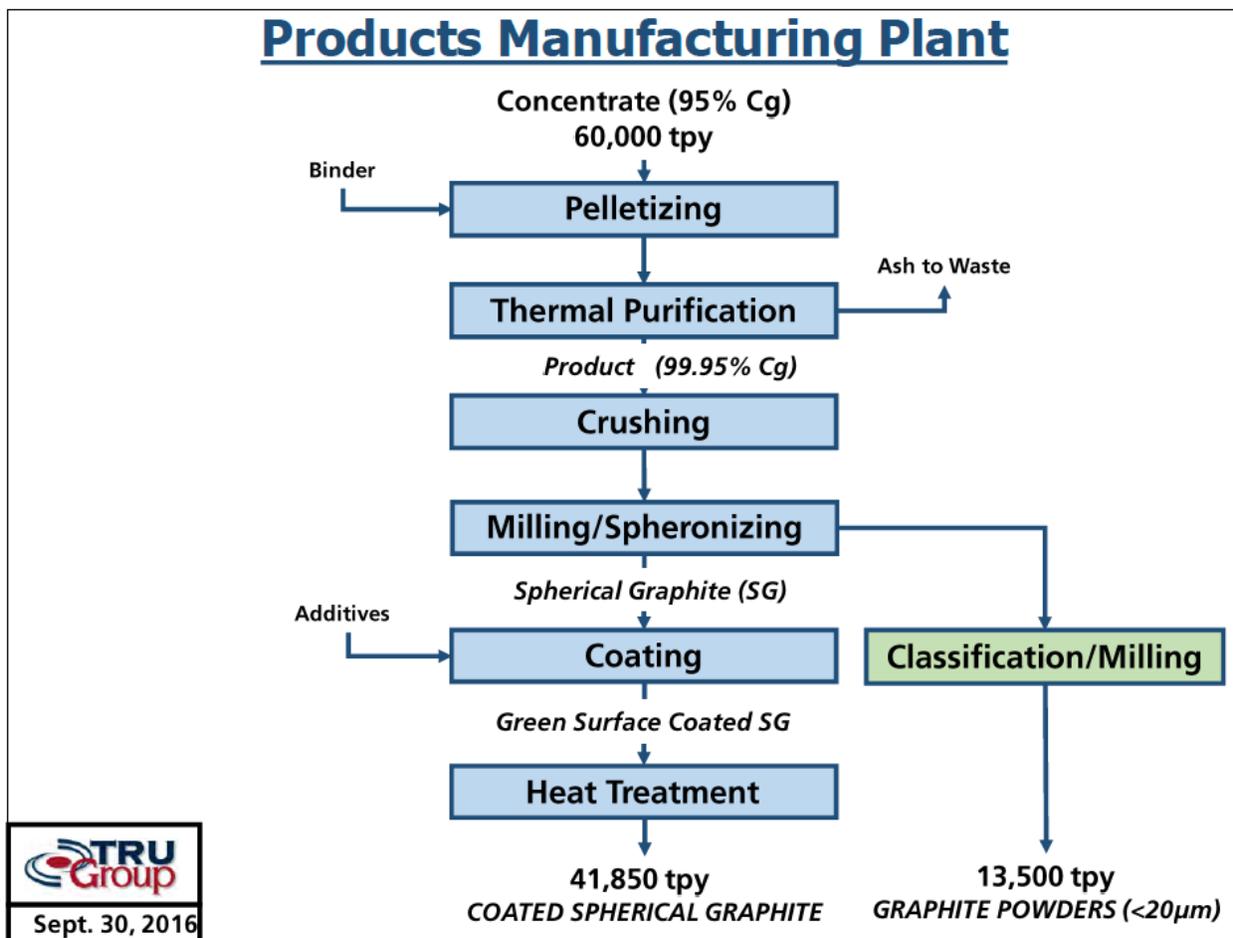


Figure 79: Product Manufacturing Plant process online

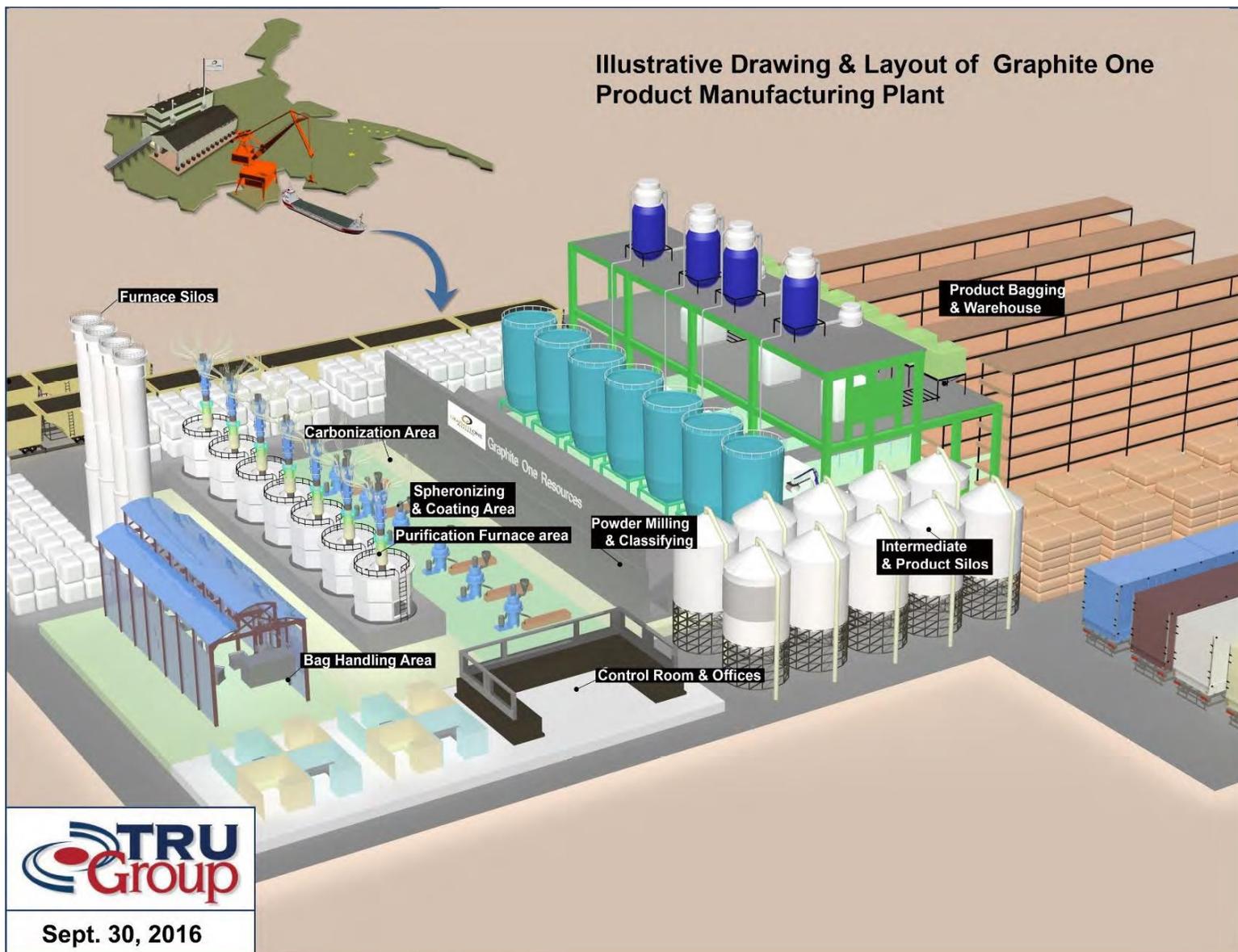


Figure 80: Illustration depicting the Product Manufacturing Plant

17.2.1 Raw Material Handling and Storage

Graphite concentrate packaged in one-tonne super sacks and stacked in 20-foot shipping containers are deposited at the unloading station of at the Products Manufacturing Plant. The super sacks are removed by forklift and loaded onto bulk bag discharging systems fitted with containment devices to minimize dusting while emptying their contents. The graphite is conveyed to storage silos (4) each of 125 m³ capacity that are fitted with 70-degree inverted cones. Each cone is equipped with a gyrating live bottom bin activator, slide valve, air slides, and pneumatic/screw discharge conveyors. The graphite concentrate grading 95% Cg will be fed to the graphite purification furnaces feed pelletizers.

17.2.2 Graphite Purification

Final upgrading of the graphite concentrate produced at the Mineral Processing Plant is proposed to be performed at the Product Manufacturing Plant. Minimum purity requirements of the graphite feedstock for spherical graphite production is 99.95% C, which is also constrained by threshold limits on certain metallic impurities that would otherwise be problematic for EV lithium-ion battery end use.

Thermal purification of static samples at high temperature under a halogen atmosphere successfully achieved and surpassed target graphite purity while also achieving a lowering of problematic metallic impurities to below threshold limits. Despite this success, the process operates in batch mode and requires lengthy retention times. High volume purification of graphite concentrate for spherical graphite manufacturing is performed in electrically-heated furnaces operating under dynamic fluidizing conditions with an inert atmosphere at high temperature. The purification furnaces are designed as high throughput, low residence time units that achieve high rate purification by exposure of individual flakes to high temperature under turbulent fluid mixing conditions.

Fine material is pelletized in drum pelletizers to meet the furnace operating specifications for minimum particle size then fed into the furnace feed hopper elevated above the furnace. and the pellets are top fed to the multi-story cylindrical furnace. The graphite pellets descend and circulate through a heat affected zone eventually settling in a chilled zone at the furnace bottom where the purified graphite is also discharged. The furnace operates as a fluidized bed with bottom-feeding of the inert gas. The heat to maintain the furnace at high temperatures (2,500 to 3,000 °C) is created by an electrical arc between the graphite electrode and the graphite lined walls of the furnace. Due to the operating and maintenance schedule, nine furnaces are dedicated to treating the concentrate at a daily rate of 238 tpd. Each furnace draws about 1 MW of electrical power. The purified material discharges from the furnace cooling system and is passed through rolls crushers to break up the pellets, then transferred to storage silos to be further processed to coated spherical graphite and graphite powder.

Exposure of the graphite to high temperature volatilizes impurities, which exit from the top of the furnace where they are condensed and collected for disposal. The cooled, purified graphite flakes are conveyed to the furnace discharge storage silos ahead of spheronization.

At full scale production, eleven (11) purification furnaces are required, ten operating at a throughput of one tonne graphite per hour and one unit on standby.

17.2.3 Graphite Spheronization and Coating

Natural graphite flake with specific properties suitable for lithium ion battery anode applications is jet milled to specific particle size (about 20 microns). The graphite flake may need to be pre-milled to feed the jet mill; this depends on the feed particle distribution and requirement of the jet mill. Once ground,



the graphite undergoes further shaping and classification processes to produce potato (spheroidal) shaped particles known as spherical graphite. Current industry standard product yields are 30-40% spherical graphite from the process. The balance is considered reject and is used for other products. Exploratory product development tests indicated that almost 75% of spheronized product was acceptable for EV battery applications. This result was achieved without any prior jet milling, i.e., direct spheronization, of the purified graphite, used the entire size distribution of the graphite feed, and required half the residence time with one third of the energy input to the spheronizing mill compared to conventional Chinese flake graphite.

Other size fractions suitable for other (non-EV) lithium-ion batteries end-use increases the recovery to 91%. This is an acceptable assumption at the conceptual level. Pilot scale equipment is available from vendors, which will be necessary to define the yield and number of circuits required for the Graphite Creek concentrates. Those size fractions (8% by weight) that fall outside the acceptable range for lithium-ion battery applications are directed to the fine powders circuit for further micronization and/or classification by end-use application. This fraction is fed to jet mills with internal classifiers to produce different graphite powders in the size range of about 1 to 20 μm .

Spheronizing and coating is carried out on a batch basis. Purified graphite powder is first spheronized and classified into various size fractions. Spherical graphite size fractions suitable for lithium-ion batteries are combined with coating precursor and recycled to the spheronizing mill. The 'green' surface coated graphite product is collected and heat treated at about 1000°C for a specified time in kiln type furnaces to remove volatiles and harden the coating. The coated spherical graphite product discharge from the furnace through a cooler then transferred to product storage.

All products are automatically bagged, robotically palletized and stored in a warehouse on site.

When the Plant reaches full scale production, eleven (11) spheronizing-coating systems and four carbonization furnaces are required. Future investigations on optimizing the spheronization process and customizing the surface coating process may alter the final number of installed units.

17.2.4 Ancillary

Specialty gas is required for both graphite powder purification and spherical graphite coating graphitization. A nitrogen plant is installed at the site of the Products Manufacturing Plant to produce the required quantities of high purity inert gas. Modular expansion of the nitrogen plant takes place in year 6 of operations ahead of the Plant moving to full scale production.

17.2.5 Utilities Consumption

Electric power is assumed to be sourced from the existing grid. The major consumer of electricity are the electric-powered purification furnaces that have an electrical rating of 1 MW. Annual power consumption of the full capacity plant is estimated at 54.4 GWh.

17.2.6 Consumables

The main consumables in the operation of the Products Manufacturing Plant are:

1. Graphite replacement electrodes used for heating the purification furnaces.
2. Petroleum pitch that is pre-cursor source of carbon that is applied to spherical graphite size fractions recovered for lithium-ion battery end-use. The pitch was assumed to be sourced from a Europe-based manufacturer and supplier.



17.2.7 Equipment List

Major equipment items that form the basis of the capital cost estimates for the Product Manufacturing Plant are summarized below.

MAJOR EQUIPMENT ITEM	NUMBER OF UNITS
Thermal Purification	
Bag (1t) Unloading Station	4
Furnace Feed Storage Silos	4
Thermal Purification Furnace	11
Specialty Gas Plant	2
Manufacturing	
Purified Graphite Storage Silos	4
Hybrid Spheronizing/Coating System	11
Carbonization Furnace	4
Powder Mills and Classifier System	4
Product Handling	
Product Storage Silos	12
Automated Bagging System and Robotic Palletizer	2

The manufacturing arrangements on the factory floor will be designed and engineered to optimize productivity. The following Figure 81 below is an illustrative floorplan layout (based on the plant overview earlier depicted in Figure 80 above) –

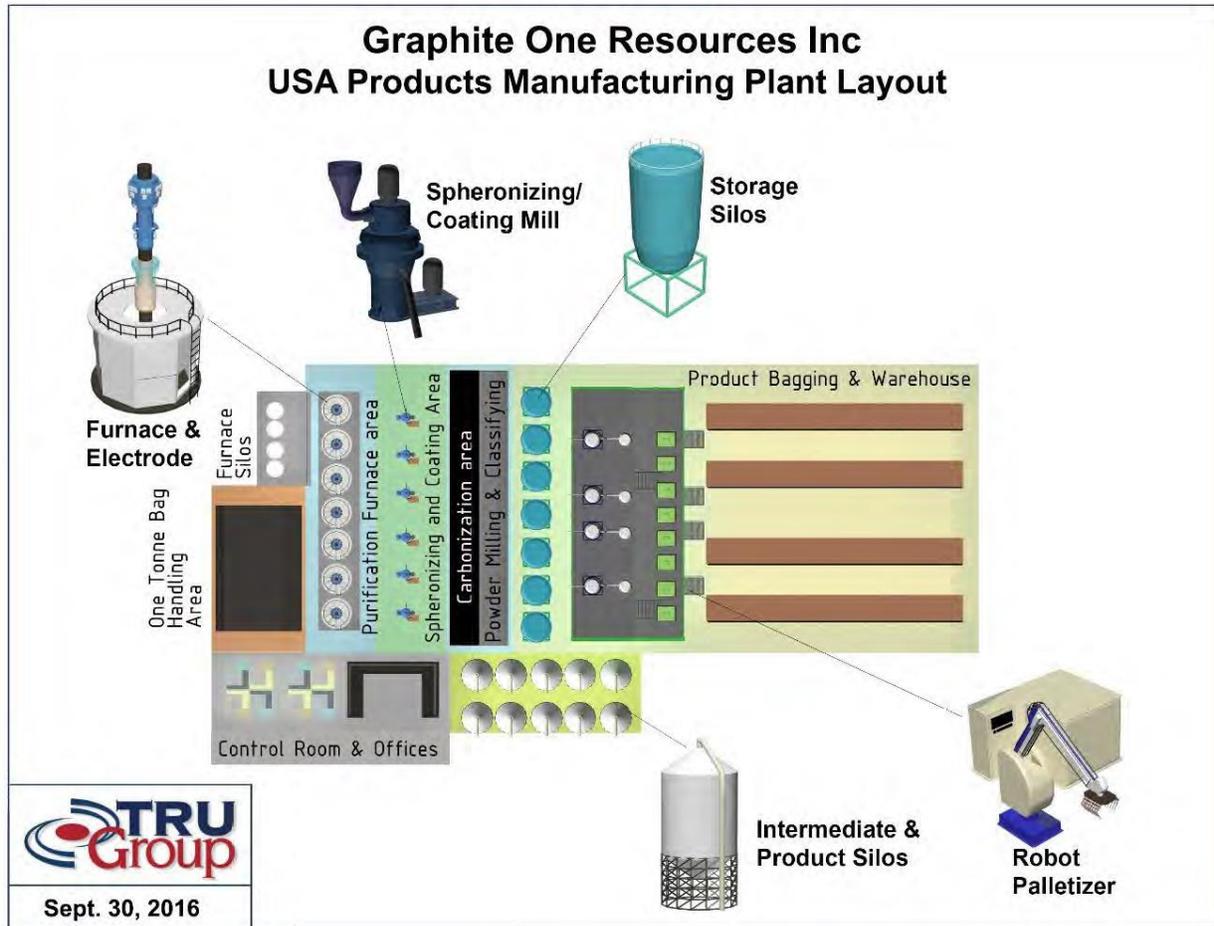


Figure 81: Illustrative floorplan of the Product Manufacturing Plant

Several operational parameters (manpower, energy, etc.) for both the Mineral Processing Plant and Product Manufacturing Plant are detailed in Section 21 CAPITAL INVESTMENT AND OPERATING COSTS.

18 Project Infrastructure

The following information is taken from Graphite One’s PEA prepared by TRU Group dated June 30, 2017. Section 18.1.3 has been updated with work completed in 2018.

18.1 Infrastructure – Mine & Mineral Processing Plant

There are no permanent structures on the Graphite Creek Property. Some historical features that are still discernable, such as some trails/roads from the early 20th century, are present but have been largely reclaimed by the environment. There are two minor archaeological sites, found at the State Historic Preservation Site (SHIPO), and these will be undisturbed by the mine activity.

18.1.1 Site Layout

The infrastructure that is being currently proposed for the Graphite Creek site includes:

- Process plant

- Access and site roads
- Power generation
 - Substation
 - Distribution to various parts of the site
- Mining/processing water distribution/storage facility
- Tailings pond
- Year-round site access via 36 km connecting road to Nome-Teller Highway
- Water treatment facility
- Camp with admin offices
- Sewage treatment facilities
- Communications towers/equipment
- Storage facilities
- On-site assay laboratory

18.1.2 Process Plant

The proposed mineral processing plant at Graphite Creek includes the following operations and their requisite space, power, water, and equipment:

- Crushing
- Milling and flotation
- Classification
- Filtration
- Drying

There will be a further area of the plant or at the camp proper, where some quantitative analyses and quality system work can be performed.

18.1.3 Site Access and Site Roads

RECON LLC (RECON) was contracted in 2018 to assess access routes to connect existing roads to the Graphite Creek site. Two access corridors were identified: a west access corridor with two routing options with a tie-in at Mile 49 of the Nome-Teller Highway and a south access corridor with two routing options with a tie-in at Mile 30 and Mile 28 of the Kougarok Road (Figure 82). The Nome-Teller highway access routes would require roughly 42-45 km of new road to be built while the Kougarok Road access routes would require 27-31 km of new road to be built.

Advantages and disadvantages for all routes will be assessed and a preferred route will be determined by Graphite One at a later date.



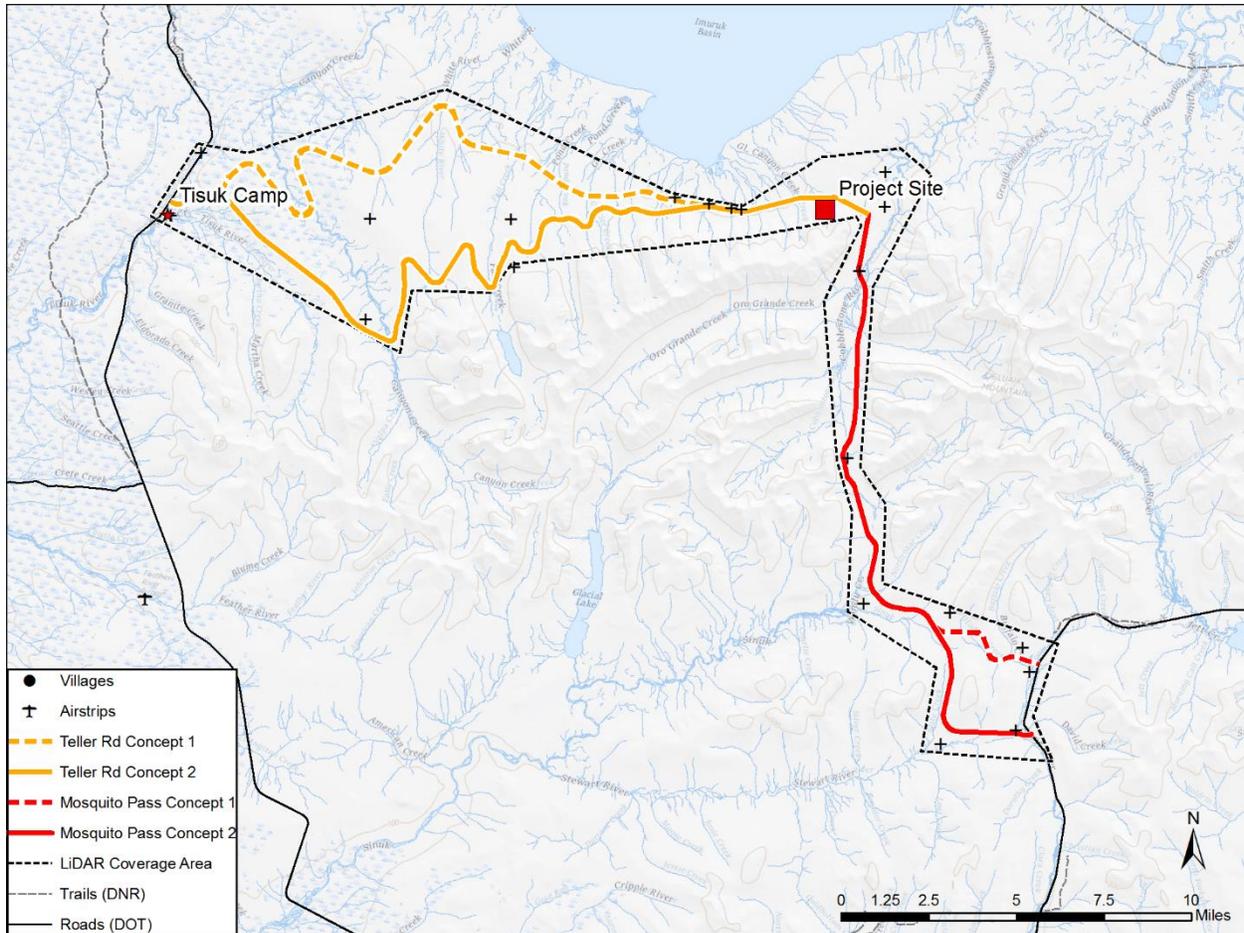


Figure 82: Conceptual road route: Graphite Creek Mine site to Nome-Teller Highway

18.1.4 Power Generation

Power options include diesel, LNG, wind, and tidal/basin discharge channel hydroelectric turbines. The current thinking is that power will be diesel generated and will be eventually supplemented/supplanted by renewables if and when the technology of choice offers an economic argument for adoption.

The power requirement for the Graphite Creek Project is anticipated to be 4MW initially, and ramping to 6MW after five years of operation, based on the preliminary equipment list that has been generated. The power is supplied, at least at the start of the venture, by 2 diesel generators at 2MW each, with a third added to scale up at the five-year point.

18.1.5 Fuel Storage

Fuel storage and handling facilities have been accounted for in the CAPEX discussion (see Section 21 of this Assessment). This is anticipated to include tanks with sufficient capacity to operate the power generation equipment for three months, as mitigation of any supply risk.

18.1.6 Buildings

It is expected that at the Alaska site, there will be habitable buildings for personnel living quarters, as well as various smaller semi-permanent buildings to house equipment and to provide storage. The larger industrial buildings include:

- A 14,000 m² building to house:
 - Crushing
 - Grinding
 - Flotation
 - Filtration
 - Drying and bagging
 - Administration offices, maintenance areas, and control room(s)
- A storage area/platform for the product awaiting shipment to the Product Manufacturing Plant

18.1.7 Tailings and Waste Rock Management

At the assumed strip ratio (3:1), between 3 and 4 million tonnes of waste rock per year will be moved to the waste rock storage area. A number of locations have been identified as potentially suitable for waste rock storage, though no firm decisions in this regard have been made.

18.1.8 Sewage and Refuse Management

Sewage disposal consists of a portable sewage treatment plant. The waste product can be incinerated, or de-watered and composted, depending on the nature and technology of the plant. It is expected that the camp waste other than sewage will be incinerated in accordance with best practice.

18.1.9 Communication

Intra-site communications at the Alaska site will include VHS radio, a voice-over-internet protocol (VOIP) telephone system. Off-site communications will be necessarily satellite-based, as will the television system service provided for in the accommodations.

18.1.10 Process/Potable Water

Potable water is expected to be supplied via well. A purification (UV and filtration system, or chlorination system) will also be provided if deemed necessary.

18.2 Infrastructure – Product Manufacturing Plant

The Product Manufacturing Plant is assumed to be situated at a brownfield industrial site that is serviced by public utilities with developed road and rail infrastructure. Criteria relevant to deciding the location of such facilities include power cost and supply, availability of industrial zoned land, proximity to tidewater and port facilities, and infrastructure that supports both the workforce and delivery logistics for input materials, services and finished products.

18.2.1 Buildings

The main building at the manufacturing site is a processing plant with a plot area of 70 m x 65 m in size. The following unit operations/activities are located in the plant:

- Bag handling
- Pelletizing
- Spheronizing
- Carbonization
- Powder milling and classifying
- Bagging and warehousing
- Administration and control

Further, the following storage structures are included:

- Several silos for incoming, intermediary, and finished products
- A 70 m x 70 m structure to warehouse the finished product awaiting transport to customer facilities.

18.2.2 Power Supply and Distribution

Power will be negotiated with and supplied by the municipality.

18.2.3 Communications

Communications will be selected according to best cost/benefit based upon services available at the site.

18.2.4 Process/Potable Water

It is assumed that the water will be drawn from municipal sources.

18.2.5 Solid Waste Management

Waste management will be performed in accordance with best practice within the municipality.

18.2.6 Sewage and Refuse Management

Sewage and waste management will be done in accordance with the bylaws and practices laid out by the municipality.

19 Market Studies and Contracts

The following information is taken from Graphite One's PEA prepared by TRU Group dated June 30, 2017.

This section provides an overview of the graphite market sufficient in detail to provide the reader with an understanding of the market factors that have shaped the conceptual marketing and competitive strategies that have been developed thus far for the Graphite Creek Project. This section considers materials from various sources as noted in the text, especially to construct an historic perspective. This section is an update of, and extraction from, the mid-2015 TRU internal study for Graphite One. The current summary market situation and projection through 2021 is essentially a current independent assessment by TRU using the data sources noted in the text, although much of the original material is excluded as proprietary. The Graphite One plan to focus primarily on the sale of coated spherical graphite for lithium-ion battery anodes falls out of the previous work reviewing the market, and this strategy is reflected once again in this update of the graphite market. Over ninety per cent of output from the planned Product Manufacturing Plant will be in this form and the remainder as purified graphite powders sub-20 microns (a byproduct of spheronizing reject).

19.1 Graphite Market Overview

19.1.1 Market Environment

GLOBAL DEMAND MEDIUM TERM OUTLOOK BY END-USE

Global demand for all types of graphite (natural and synthetic) was about 2.4 million t in 2011 and expected to grow at a modest 4% per annum to reach 2.8 million t in 2016. Table 34 provides data on



global markets for graphite demand by end-use application segment for 2011, 2016 and TRU’s five-year illustrative forecast through 2021 when total consumption will reach 3.4 million t.

The natural graphite market is quite mature with overall growth of around 3-4% per annum. Some segments are expected to trend higher than the average: Notably the use of graphite in lithium-ion (Li-ion) batteries as electric vehicle (EV) adoption accelerates. Our estimate of the global demand for natural graphite concentrate for 2021 is 1.5 million t-conc with refractories use continuing to very much determine the overall trend.

In addition, it is expected that advances in natural graphite technology, and increased Western supply, to provide the natural graphite market with an opportunity to gain share in EV battery anodes and other synthetic graphite segments in some applications.

Target Application	2011	% total	2016	% total	2021	% total	Growth % pa	
							2011-16	2016-21
Graphite One Segments	368,000	15%	500,000	18%	800,000	33%	6%	10%
batteries - all types	85,000	4%	160,000	6%	400,000	12%	13%	20%
lubricants / friction	186,000	8%	220,000	8%	260,000	8%	3%	3%
other natural specialty	97,000	4%	120,000	4%	140,000	4%	4%	3%
All Other Uses	2,042,000	85%	2,320,000	82%	2,630,000	77%	3%	3%
TOTAL ALL USES	2,410,000	100%	2,820,000	100%	3,430,000	100%	3%	4%
<i>Natural Graphite in t-conc:</i>	<i>930,000</i>	<i>39%</i>	<i>1,200,000</i>	<i>43%</i>	<i>1,581,400</i>	<i>46%</i>	<i>5%</i>	<i>6%</i>
<i>Synthetic Graphite in t:</i>	<i>1,480,000</i>	<i>61%</i>	<i>1,620,000</i>	<i>57%</i>	<i>1,848,600</i>	<i>54%</i>	<i>2%</i>	<i>3%</i>

Sources and notes -

September 6, 2016

1 Roskill data 2011 with 2016 from various sources and estimates by TRU

2 Forecasts are illustrative TRU estimates subject to detailed study

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Table 34: Global graphite demand outlook by end-use application 2011-2021 in t-concentrate

CHINA AND UNITED STATES POSITION IN THE MARKET

The following is quoted from the US Geologic Survey (USGS), 2016: “During 2015, China produced 66% of the world’s graphite and consumed 35%. North America produced 5% of the world’s graphite supply, with production only in Canada and Mexico.” USGS tabulation of natural graphite production statistics by country appears in Table 35.

China continues to be a major exporting force in the global graphite market through 2015, its major geographic markets being Japan (25% in 2015), Korea (16%), United States and Germany (each 8%) as shown in Figure 83.



Country	Mine Production		Reserves million t
	2014	2015	
United States	0	0	0
Brazil	80000	80000	72
Canada	30000	30000	incl*
China	780000	780000	55
India	170000	170000	8
Korea, North	30000	30000	incl*
Madagascar	5000	5000	0.9
Mexico	22000	22000	3
Norway	8000	8000	incl*
Russia	15000	15000	incl*
Sri Lanka	4000	4000	incl*
Turkey	29000	32000	90
Ukraine	5000	5000	incl*
Zimbabwe	7000	7000	incl*
Other countries	1000	1000	incl*
World total	1,186,000	1,189,000	230

incl* is included in total

Table 35: Global graphite mine production by country in t

China Exports of Natural Graphite Flakes & Powder by Destination

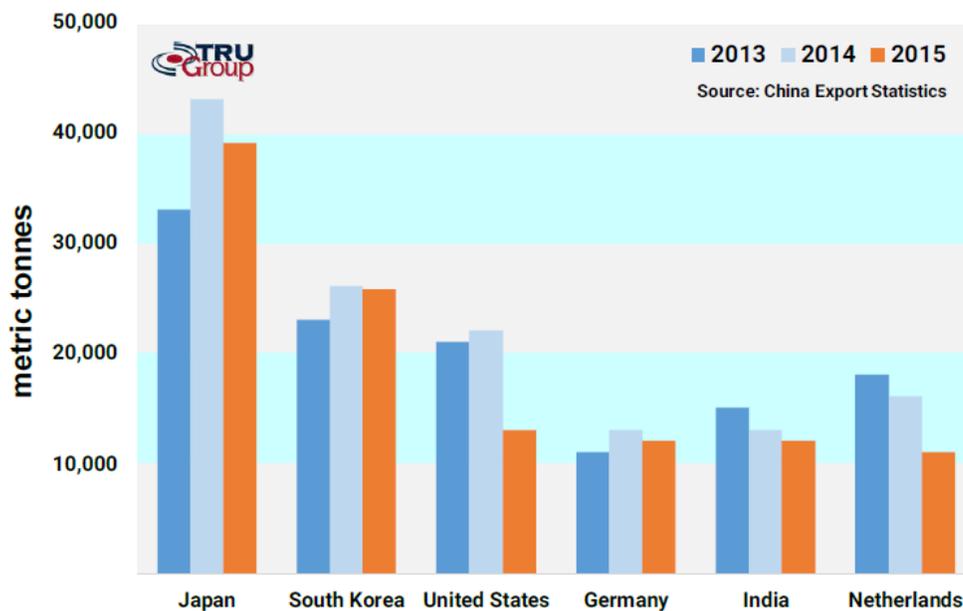


Figure 83: China exports of natural graphite flakes and powder by destination

USGS GRAPHITE ANNUAL REPORT

According to the USGS: Although natural graphite was not produced in the United States in 2015, approximately 90 U.S. firms, primarily in the Northeastern and Great Lakes regions, consumed 54,400



tonnes valued at \$50.7 million. The major uses of natural graphite in 2015 were brake linings, foundry operations, lubricants, refractory applications, and steelmaking. During 2015, U.S. natural graphite imports were 65,900 tons, which were 65% flake and high purity, 34% amorphous graphite, and 1% lump and chip”. The USGS data for the natural graphite industry for the United States is presented in Table 36.

Natural Graphite Parameter		Year					
		2010	2011	2012	2013	2014	2015
Production, mine	t	0	0	0	0	0	0
Imports for consumption	t	65000	72000	57000	61000	64000	66000
Exports	t	6000	6000	6000	9000	12000	12000
Apparent Consumption	t	59,000	66,000	51,000	52,000	53,000	54,000
Price, imports (average dollars per t at foreign ports):							
	Flake \$ per t	\$720	\$1,180	\$1,370	\$1,330	\$1,270	\$1,240
	Lump and chip (Sri Lankan) \$ per t	\$1,700	\$1,820	\$1,960	\$1,720	\$1,870	\$1,890
	Amorphous \$ per t	\$257	\$301	\$339	\$375	\$360	\$370

Sources & notes -

US Geological Survey, Mineral Commodity Summaries, Jan 2016. Graphite (Natural)
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Table 36: USGS reported salient data for the USA natural graphite

Principal import sources of natural graphite were, in descending order of tonnage, China, Mexico, Canada, Brazil, and Madagascar, which combined, accounted for 97% of the tonnage and 91% of the value of total imports. Mexico provided all of the amorphous graphite, and Sri Lanka provided all of the lump and chippy dust variety. China, Canada, and Madagascar were, in descending order of tonnage, the major suppliers of crystalline flake and flake dust graphite.

Although no production of natural graphite was reported in the United States, two companies were exploring for and developing graphite projects in the United States. Alabama Graphite Corp. is developing the Coosa Graphite Project in Alabama, and Graphite One Resources Inc. is developing the Graphite Creek Project in Alaska. Advances in thermal technology and acid leaching techniques that enable the production of higher purity graphite powders are likely to lead to development of new applications for graphite in high-technology fields.

THE TESLA MOTORS FACTOR

Tesla Motors, Inc of Palo Alto, CA is building a large plant to manufacture lithium-ion electric vehicle batteries. Industrial Minerals data provided a perspective of the requirement in its December 2014 presentation at the Berlin graphite conference²⁶ and summarized in Table 36:



Demand from Tesla Plant*	126,000 tpa
Spherical Graphite Demand	50,000 tpa
Total Flake Graphite Supply 2013:	375,000 tonnes
%Increase on Today's Graphite Demand	152%
%Increase on Today's Total Flake Graphite Demand	34%
*Tesla will be purchasing battery grade graphite not flake graphite	

Table 37: Industrial Minerals data presented in December 2014

Benchmark Mineral Intelligence states that “If Tesla is able to reach a production total 300,000 vehicles a year all with batteries ranging from 60kWh to 90kWh in capacity, its annual demand for spherical graphite in vehicles in 2021 will be over 26,000 tonnes a year”.

US COMPETITOR SITUATION

The USGS states in their January 2016 Mineral Commodities Summary “Although no production of natural graphite was reported in the United States, two companies were exploring for and developing graphite projects in the United States. Alabama Graphite Corp. was developing the Coosa Graphite Project in Alabama, and Graphite One Resources Inc. was developing the Graphite Creek Project in Alaska.”

Graphite One would of course be manufacturing graphite end-use products from a resource located in the United States, and it is expected that this would represent a significant marketing advantage in the battery arena. There are four main existing well-established producers (some of which have interests in resources outside of the USA) are referenced below.

ASBURY CARBONS, ASBURY, NJ (asbury.com)

“Asbury Carbons is a manufacturer and trader of graphite and carbon products including granular and powdered natural and synthetic graphite, petroleum and metallurgical cokes, anthracite coal and carbon black. It operates no mines in the USA and relies solely on imported material; in 1972, it became the first company in the USA to import natural graphite from China. Asbury Carbons sells domestically and also exports its products.

The company operates seven processing plants in the USA and Canada through its subsidiaries which carry out milling, screening and blending; they have a combined capacity of over 300,000 tpy.

The company’s graphite and carbon products are used in friction materials, lubricants, fuel cells, cast metals, drilling paints, coatings and backfill. The company also provides admixed graphite and carbon powders to the powdered metal industry”.

GRAFTECH INTERNATIONAL HOLDINGS INC., PARMA, OH (graftech.com)

“GrafTech International has been producing carbon and graphite products for over 120 years. It produces natural graphite products, synthetic graphite products and carbon electrodes, as well as other carbon-based products. The company imports 100% of its natural graphite needs for processing”.

According to the company website its “products, which include graphite electrodes, advanced carbon and graphite materials, and flexible graphite, are manufactured on four continents and sold to

customers in over 70 countries”. The company has thirteen manufacturing locations in the United States of which three are stated to be processing natural (flexible and super fine grain) graphite products.

POCO GRAPHITE INC., DECATUR, TX (poco.com)

“Poco Graphite has been producing graphite products for over 40 years, specialising in coatings and treatments that help to reduce wear. It manufactures graphite and silicon carbide products for use in electrical discharge machining (EDM), glass-making, semiconductors, crucibles and biomedical applications. It also produces carbon-graphite foam. Poco Graphite is based in Texas, with branches in Limonest, France and Shanghai, China. Poco Graphite was acquired by Entegris of the USA in August 2008”.

According to their website “Poco materials are used in many diverse applications and industries. Poco products are produced for the following major markets: Semiconductor and general industrial products, biomedical, glass industry products and electrical discharge machining”.

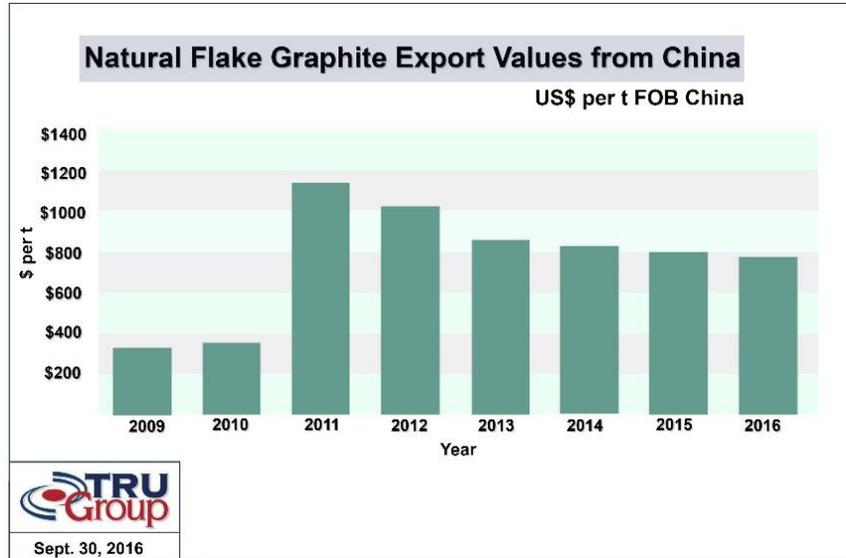
SUPERIOR GRAPHITE, CHICAGO, IL (superiorgraphite.com)

“Founded in 1917, Superior Graphite operates graphite processing and manufacturing facilities at three locations in the USA, as well as others offshore. Its main products are synthetic graphite electrodes and synthetic graphite powders, but it also produces a range of natural graphite products, including amorphous graphite (60-85% C), flake graphite (80-99% C), vein graphite (90-99% C), purified flake and purified vein graphite (99.7-99.9% C), and expandable graphite (99.0% C minimum). Superior Graphite also produces lubricants, silicon carbide and ceramic products, and speciality carbon and graphite shapes”.

The company website classifies product offerings as Graphite Electrodes, Graphite & Carbon Powders, Lubricants, Silicon Carbide & Ceramic Armor Tile, Specialty Carbon & Graphite Shapes.

GRAPHITE CONCENTRATE PRICE HISTORY

Figure 84 and Figure 85 provide respective 2016 first quarter updates of pricing for natural flake graphite and spherical graphite based on the US\$ value of China export data. Also illustrated in these charts are the trends in the annual price since 2009. Data is in US\$ per t average FOB (free on board) world exports for Natural Flake and Spherical Graphite –

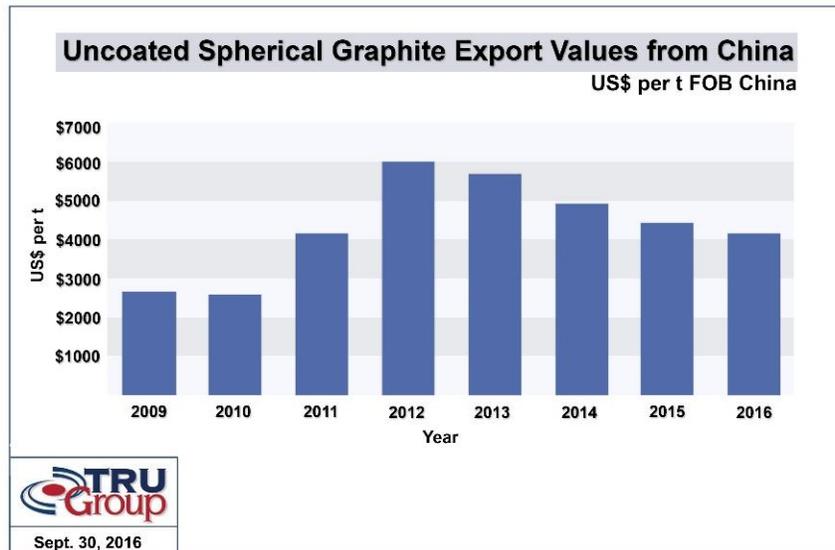


Sources & notes –

1. Value \$791 per t for 2016 estimate is based on first quarter 2016
2. Commodity “Natural graphite in flakes” trade code 25041010
3. Global Trade Atlas

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Figure 84: Natural flake graphite export prices from China FOB in US\$ per t



Sources & notes –

1. Value \$4,150 per t for 2016 estimate is based on year-to-date May 2016
2. Commodity “Spherical Graphite” trade code 25041091
3. Global Trade Atlas

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Figure 85: Spherical (uncoated) graphite export prices from China FOB in US\$ per t

The prices negotiated between buyer and seller are based on a number of factors including carbon content, presence of ash, level / type of impurities, flake (particle) size, as well as quantity purchased. This would explain some of the value per t variations by country of destination of China exports shown for 2016 in Table 38.

Harmonized HS Code	GRAPHITE EXPORT PRODUCT	Destination FOB China US\$ per t				
		World	USA	Germany	Japan	Korea
25041010	Natural graphite in flakes	\$791	\$750	\$1,010	\$930	\$810
25041091	Spherical graphite	\$4,150	\$1,700	\$2,200	\$3,310	\$5,110
25041099	Other natural graphite, in powder or in flakes	\$420	\$400	\$550	\$390	\$720
25049000	Other natural graphite, not in flakes / powder	\$220	-	\$680	\$290	\$180
38011000	Artificial graphite	\$880	\$830	\$630	\$1,050	\$990

Sources & notes:

Exports to the US year-to-date 2016 was only 75 t and not a good reflection of prices
China trade statistics

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Table 38: Graphite export value US\$ per t FOB China year-to-date May 2016

The average dollar value for China exports to all countries year-to-date May 2016 was \$794 per t for natural graphite flake and \$4150 per t for spherical graphite.

Export values from China to the United States were \$750 and \$1700 per t respectively for flake and uncoated spherical graphite. However, only 75 t of uncoated spherical graphite was shipped to the United States and the export value therefore would not be a suitable indicator of the market price for uncoated spherical graphite in the USA due to the insignificant volume.

For the domestic US market, the average dollar value per t for US imports of natural flake at foreign ports was \$1,240 for year 2015. US latest year-to-date April 2016 data import statistics provide further insight on the current US domestic graphite price environment, Table 39.

Harmonized HS Code	GRAPHITE IMPORT PRODUCT	Source USA US\$ per t CV				
		World	Canada	China	Brazil	Mexico
2504101000	Natural Graphite Crystalline Flake Excpt Flake Dust	\$1,300	\$1,240	\$1,250	\$2,310	-
2504105000	Natural Graphite In Powder Or Flakes, Nesoi	\$1,290	\$1,580	\$2,090	\$2,014	\$380
2504900000	Natural Graphite Except Powder Or Flakes	\$790	-	\$2,910	-	\$330
38011000	Artificial graphite	\$1,660	\$1,250	\$810	\$7,340	\$1,350

Sources & notes:

CV = Custom Import Value, price actually paid excluding import duties, freight, insurance, and other charges.
Global Trade Statistics

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Table 39: US graphite custom import values US\$ per t year-to-date April 2016

19.1.2 Graphite One's Market & Competitive Positioning

This section expands on the market analysis in the segments Graphite One will be targeting, and which will competitively position the project for the future. It is proposed that Graphite One's underlying strategy should take optimal advantage of the unique STAX Graphite focusing on growth upscale segments where it could be the lead supplier.



TARGET PRODUCT/MARKET SCOPE

At full capacity, the Product Manufacturing Plant will deliver 55,350 tpy of graphite finished products for sale. Approximately three quarters of sales or 41,850 t is Coated Spherical Graphite (CSG) suitable for li-ion batteries, Table 40.

PRODUCTION SEGMENTATION By Graphite Material	Target End-Use			TOTALS	
	Li-ion Battery ¹	Lubes Other	Frict High ²	tpy	%
Coated Spherical Graphite	99.9%	41,850	0	41,850	76%
Graphite Powders <20 microns	99.8%	0	13,500	13,500	24%
TOTALS BY END-USE		41,850	13,500	55,350	100%
<i>% of total</i>		76%	24%	100%	

Sources & notes -

- 1 Other uses for spherical graphite include as an additive in specialty plastics & lubricants
- 2 Other high grade target uses include conductive plastics and powder metallurgy

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Table 40: Graphite One projected sales volume by material segmentation and end-use tpy at full capacity

Note that all of the CSG is expected to be of purity aiming at meeting or exceeding the requirements for EV battery anodes. However, variations of this product may be quite suitable for all li-ion batteries (for electronics, power tools etc.) and other non-battery uses such as an additive in specialty plastics and lubricants. These end-use segments may prove profitable as target markets for Graphite One.

About 13,500 t per year of the reject material, the by-product of spheronizing, is sold as purified graphite powders of less than 20 microns for lubricants, friction products, high-end conductive plastics and specialty powder metallurgy additives.

COATED SPHERICAL GRAPHITE

Coated Spherical Graphite Specifications & Description

This section focuses on the specifications for graphite suitable for electric vehicles. This is a “superior grade” graphite: variations of this grade could also be used in li-ion batteries designed for a wide range of uses (such as power storage, power tools, consumer electronics etc.).

Metal contaminants are particularly deleterious for electro-chemical applications such as li-ion batteries. Inductively coupled plasma atomic emission spectroscopy can provide a quantitative breakdown of the trace there is likely to be a progressive transition from synthetics to natural graphites.

TRU has defined a target product specification for Graphite One EV Grade CSG as described in Table 41.

PROPERTY (Units)	Value
D ₁₀ (µm)	> 7
D ₅₀ (µm)	< 25
D ₉₀ (µm)	< 40
D _{max} (µm)	≤ 50
d ₀₀₂ (nm)	< 0.336
g-index	> 0.93
Moisture (wt %)	< 0.1
Fixed Carbon (wt %)	> 99.95
Bulk density (g/cc)	> 0.45
Tap Density (g/cc)	> 0.75
True Density (g/cc)	2.2
Scott Density (g/cc)	0.8
BET Surface Area (m ² /g)	< 1.85
First Cycle Efficiency FCE (%)	≥94
Specific Capacity (mAh/g)	≥365
Ash Content (wt %)	< 0.05
Each Contaminant in Ash (ppm)	Minimized¹
CONFIDENTIAL	

Sources & notes -

1 Deliterious metal contaminants particulary minimized

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Table 41: TRU target EV battery natural graphite specifications

Coated Spherical Graphite Market Positioning for Graphite One

In the earlier market review, global demand for all graphite use in batteries was estimated at 160,000 t-conc for 2016 growing at a rate of 20% through 2021 to about 400,000 t-conc. Not all of this was spherical graphite. China, the largest current producer, exported 28,600 t of uncoated spherical graphite in 2015 to five top countries as shown in Figure 86.

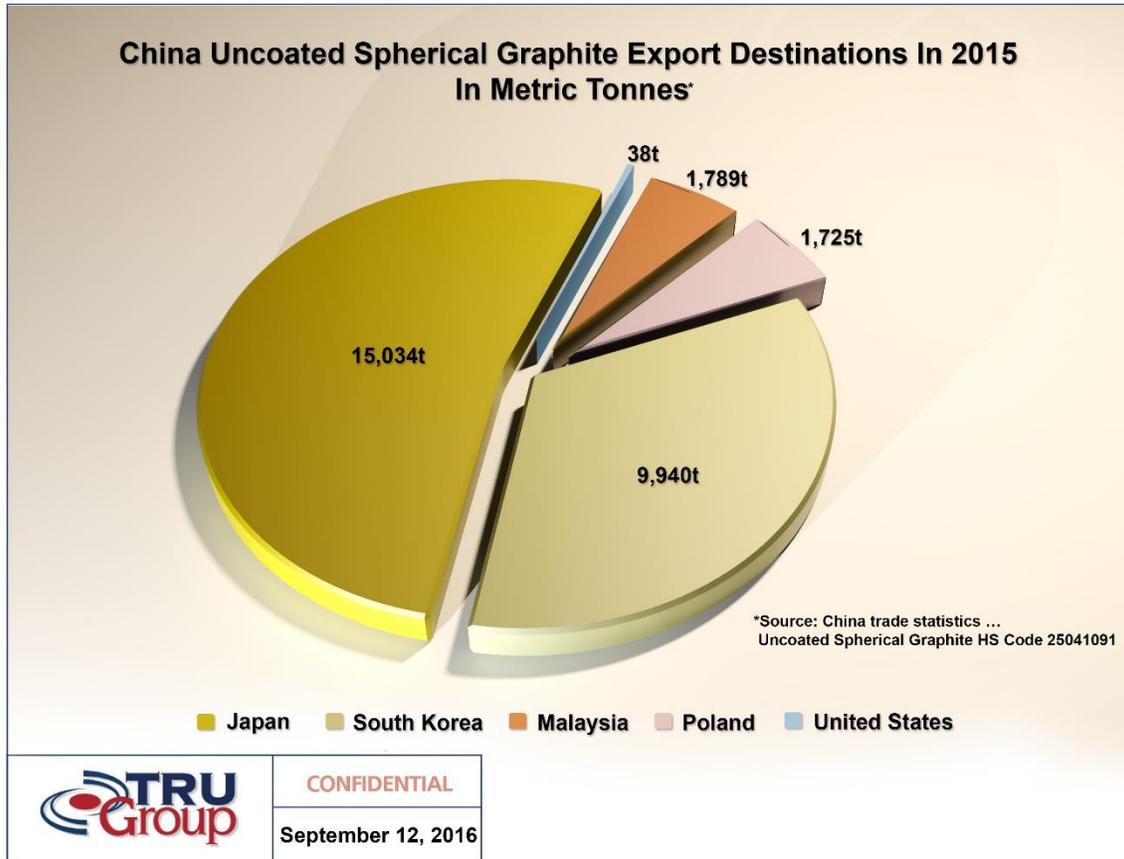


Figure 86: China uncoated spherical graphite export destinations 2015

Typically, a high-grade battery manufacturer, such as in Japan or Korea, would apply their own coating onto imported spherical graphite product. These two countries reportedly still monopolize the global coated spherical graphite market in 2016.

“Benchmark Mineral Intelligence forecasts the anode market – which is nearly exclusively served by naturally sourced spherical graphite and synthetically produced graphite – to increase from 80,000 t in 2015 to at least 250,000 t by the end of 2020 while the market could be as large as 400,000 tpy in the most bullish of cases with no supply restrictions. Benchmark estimates that over 360,000 tonnes of medium flake graphite will be needed as a feedstock source for the spherical material by 2020. This is nearly a doubling of the flake concentrate market in 2015 should the natural-to- synthetic demand proportions remain the same in 2020”.

TRU have not been able to find a reliable source of data on the coated spherical graphite market as it exists today nor a well-constructed forecast of demand for the product. This PEA assumes that demand for coated spherical (natural) graphite to reach over 200,000 t by 2021; however, this number has a high error and is subject to revision based on a detailed market study of this use. Indeed, a comprehensive study of all market parameters is considered essential as current market data is totally inadequate considering the important strategic decisions at play.

Graphite One’s strategy is to first focus on markets in the United States and then Japan and Korea. In 2016, demand for spherical graphite in the United States is currently limited but expectations for market

growth are high – much of it based on the Tesla Motors plan to complete its Li-ion battery plant in Nevada. Other developments in the field of power storage also expected to contribute to demand growth. With respect to the latter, Alevo Group of Switzerland announced in October 2014 that it will deploy and commission production lines in Concord NC, USA for the manufacture of its innovative battery technology and GridBanks (banks of batteries that can be attached to the power grid). When the manufacturing facility is at full capacity it has the potential to produce 16 GWh of Alevo batteries per annum. According to the company, it “currently has one production line that is fairly well automated and capable of producing 600h MW and 300 MWh annually for both the utility-scale projects as well as smaller commercial and industrial customer installations”.

The United States is already home to 8,925 MWh per year or 20% of global EV Li-ion battery capacity and will have about one-third of the total in the short term, Table 42.

Country	OPERATING			% of Total	PLANNED	
	Fully	Partially	Total		Begun	Announced
United States	8,925	8,750	17,675	32%	26,250	150
Foreign Countries	34,735	3,038	37,773	68%	16,244	120
<i>China</i>	<i>11,152</i>	<i>3,038</i>	<i>14,190</i>	<i>26%</i>	<i>16244</i>	<i>0</i>
<i>Japan</i>	<i>13,623</i>	<i>0</i>	<i>13,623</i>	<i>25%</i>	<i>0</i>	<i>0</i>
<i>Korea</i>	<i>6,570</i>	<i>0</i>	<i>6,570</i>	<i>12%</i>	<i>0</i>	<i>0</i>
<i>European Union</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0%</i>	<i>0</i>	<i>0</i>
<i>Rest of World</i>	<i>3,390</i>	<i>0</i>	<i>3,390</i>	<i>6%</i>	<i>0</i>	<i>120</i>
Global Capacity in MWh-y	43,660	11,788	55,448	100%	42,494	270

Sources & notes -

¹ Clean Energy Manufacturing Analysis Centre, April 2016 "Automotive Lithium-ion Cell Manufacturing: Regional Cost Structures and Supply Chain Considerations"

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Table 42: Global automotive lithium-ion battery manufacturing capacity by stage (MWh per Year)

Over 26,000 MWh per year of new capacity is currently under construction in the United States. While there is current over capacity of EV batteries, if such large battery US plants do in fact reach their design capacities, it will be a positive development for domestic Li-ion battery commercialization. Assuming adoption of an accelerated development program, Graphite One could be producing an estimated 16,600 t of CSG or around 8% of global demand in this segment by 2021. Potentially, a significant proportion could be sold domestically but strategically Japan and Korea would be considered accessible markets given the advantageous location of the Graphite One Product Manufacturing Plant. Within this time frame Graphite One could potentially become the dominant, if not the only American producer, of high grade CSG that is integrated with a domestic graphite resource.

GRAPHITE POWDERS LESS THAN 20 MICRONS

Graphite Powder Specifications & Description

The Graphite One spheronizing reject by-product material is expected to find application in a range of end uses. Table 43 shows TRU target specifications for four applications that would fit the strategy of focusing sales in high-end market segments.

CATEGORY \ End-Use SPECIFICATION PROPERTY	Additive in Lubricants & Greases	Friction Materials & Powder Metallurgy		Conductive Additives
	Colloidal Graphite Suspension	Sintered Metal Brake Linings	High-end Powder Metallurgy	Plastics & Rubbers
Flake Size (µm)	1-3	5-20	4-20	4-20
Purity (%)	99.5-99.9	> 99.0	99.7-99.9	99.9
Ash (%)	0.1-0.5	1	0.1-0.3	0.1
Surface Area (m ² /g)	10-25 [†]	-	-	≥ 9 [†]
Density-Scott (g/cm ³)	0.04-0.13 [†]	-	-	0.05-0.08 [†]
Electrical Resistivity (Ω cm)	-	-	-	0.04-0.08

Sources and notes -

† Based on TIMCAL TIMREX PP10 and LSG 10 Natural flake

* Based on Micrograf (HC30, 99507 UJ) from Nacional de Grafite

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Table 43: Graphite powders specifications by category

Larger flakes are best used for making high-value converted products while finer powder is best applied as additives. Since thermal material purification up to 99.9% will be done prior to spheronizing the reject byproduct will be immediately applicable to, and will compete with synthetics for, lubricants, conductive polymers and powder metallurgy end uses. This may require milling and micronization to an appropriate particle size distribution.

Graphite Powders Market Positioning for Graphite One

Production of about 13,500 t per year of the reject material, the by-product from spheronizing, is a significant volume; however, it has potentially a wide range of uses such as in lubricants, friction products, high-end conductive plastics and specialty powder metallurgy additives. This opinion is subject to further testwork on the Graphite One material and a more detailed market study.

In concentrate terms, the global natural graphite demand projected for these uses in 2021 is about the same volume for that projected for batteries in 2021 – 400,000 t-conc. In the markets where natural graphite is well established – lubricants and friction products – the projected demand represents two-thirds of this. For powder metallurgy, “high-purity” graphite of around 96-99% Cg is preferred, with a particle size of around 5µm³⁴ and thus the Graphite One material would be particularly well suited. However, the powder metallurgy segment requires further assessment once more technical data is known about the Graphite One by-product material.

19.1.3 Graphite One Product Pricing Sales Revenue

PROJECT AT FULL CAPACITY OF 55,350 TPY-PRODUCT

The average price of the Graphite One manufactured output products is projected to be around \$5054 per t ex plant on a 2016 constant US dollar basis. The average reflects TRU estimates for the likely achievable price for the individual products after examining various sources of data and China export value per t data. The price estimates are shown in Table 44.

Graphite Product Segment	Volume ¹ tpy	Price ² US\$ per t	SALES	
			US\$million	%
Coated Spherical Graphite ³	41,850	\$6,200	\$259	93%
Purified Graphite Powders <20 microns	13,500	\$1,500	\$20	7%
- standard powders	6,750	\$1,000	\$6.8	
- niche-segment powders	6,750	\$2,000	\$13.5	
TOTAL SALES	55,350	\$5,054	\$280	100%

Sources & notes -

1 Volume segmentation TRU estimates for plant at full capacity

2 Prices are TRU estimates in 2016 US\$ per t ex plant subject to detailed market study

3 Coated spherical graphite price based on China export value for uncoated plus coating charge

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Table 44: Graphite One sales segmentation by product - volume t & value 2016 \$US ex-plant at full capacity

Graphite One aims to achieve market price leadership given that several potential competitors have announced plans to build such a facility in the United States. Alabama Graphite Corp is the only US based graphite junior saying it plans to produce coated spherical graphite from graphite sourced in the US.

TRU price estimates are reasonable considering the state of development of the market and the size of the proposed large volume operation. The CSG price of \$6,200 per t ex plant is based on China export value for uncoated plus a coating charge: the coating charge considers the cost-of-coating variations & risks, margin targets and the competitive environment as it exists in 2016. On the latter consideration, it is noted that Graphite One must be competitive with captive coaters. TRU judgement is that the error in the US\$6,200 estimate is about ±30% (between \$4,340 and \$8,060). Using the China export value per tonne FOB (free on board China port) at this stage as the foundation of the target price for the Product Manufacturing Plant's primary production provides some assurance of Graphite One's potential for price competitiveness in both domestic and Asian regional markets.

Benchmark Mineral Intelligence, UK has estimated a price range for coated spherical graphite in the range of \$7,000 - \$12,000 per t although without any explicit basis. Graphite One pricing assumptions for CSG are not a deliberate undercutting strategy but rather a more realistic projection of the attainable selling point inside a contained and controlled market.

Project economics is most sensitive to product selling prices than any other variable analyzed in Section 22.3 Sensitivity Analysis of this report. That analysis shows that a price assumption for coated spherical

graphite of \$8,060 per t rather than the \$6,200 base case would result in an IRR of 35 % compared to the projected 27 %.

ANNUAL GRAPHITE SALES PROJECTION

TRU expects sales revenue to reach US\$280 million at full capacity with CSG dominating output accounting for 93% or US\$259.5 million, of the total. Purified Graphite Powders account for the balance with sales of \$20 million. Fast-paced capacity expansion is aimed at quickly gaining a dominating share of the global market by the sixth year of production, Table 45.

GRAPHITE ONE STRATEGIC POSTURE & COMPETITIVE STRATEGY

By far the most important competitive advantage to be relied upon will be Graphite One’s anticipated ability to manufacture very high quality spherical coated graphite with comparative ease with a favourable (low) level of powder by-product production. In the laboratory setting the STAX graphite spheronizes much more efficiently (compared to industry norms), coats well and exhibits outstanding electrical properties. Trials on commercial equipment are planned to determine whether these advantages transfer to the plant environment. It is realized also that a significant R&D and product development effort is required due to the uniqueness of the Graphite Creek (STAX) graphite to be processed.

Graphite One Sales Projection based on Capacity
 Start-up and Expansions 2016-US\$millions

Year	Volume t	Revenue US\$million	Expansion Rate % pa
1	16,605	\$84	-
2	22,140	\$112	33%
3	27,675	\$140	25%
4	44,280	\$224	60%
5	49,815	\$252	13%
6	55,350	\$280	11%
7	55,350	\$280	0%
8	55,350	\$280	0%
9	55,350	\$280	0%
10	55,350	\$280	0%

Sources & notes -

1 Ave price per t 2016 constant US\$ ex plant \$5,054

Table 45: Graphite One ten-year sales projection 2016 US\$ millions

Graphite One could be a globally prominent producer of premier CSG for use in EV Li-ion battery anodes within the planned production horizon targeting markets in the United States, Japan, Korea and Europe.

The coated spherical market is in a developing stage with rapid changes occurring. Graphite One strategy remains flexible and would consider options such as selling uncoated spherical graphite, toll

and customized coating, as well as making Li-ion anodes in-house to lock-in a portion of the coated output.

19.1.4 Contracts Required for Property Development

Distribution of the manufactured output products is expected to be largely direct to anode and Li-ion battery manufacturers. Graphite One Resources is in conversation with such potential customers and is arranging in due course to send product samples to some for their evaluation.

20 Environmental Studies, Permitting and Social or Community Impact

Most of the following information is taken from Graphite One's PEA prepared by TRU Group dated June 30, 2017. Information from 2018 has been added to this report.

20.1 Environmental Studies

This section characterizes the existing environmental baseline data that has been collected for the PEA and makes further suggestions for additional studies that would be beneficial for Graphite Creek Project planning, design, and future permitting efforts. Furthermore, a summary is presented of anticipated permits that may be required, and describes social and community engagement to date.

20.1.1 Baseline Studies Completed and Ongoing

Graphite One is conducting and planning to conduct a number of baseline studies to examine the potential impact of the Project on the environment and on land and water use by Alaska Native communities. These studies and their status are summarized in Table 46 and are discussed below. To the knowledge of the QP, there are no outstanding environmental liabilities to which any portion of the Project is subject.



BASELINE ENVIRONMENTAL STUDY	STATUS
Hydrology and Water Quality	Sampling of streams on Graphite Creek Property 2014, 2015, 2016 & 2018. Additional surface water studies planned.
Wetlands	Initial desktop studies completed in 2014. Additional desktop studies and field surveys planned.
Aquatic Life and Fisheries	Initial desktop and field surveys completed in 2014. Initial aerial reconnaissance for anadromous species completed in 2018. Identified anadromous species in 16 streams. Additional aquatic life and fisheries studies planned.
Metal Leaching and Acid Base Accounting	ARD potential of mineralized and waste rock types planned.
Archeology/Cultural Resources	Planned
Hydrogeology	Planned
Meteorology/Air Quality	Planned
Noise and Visual Impacts	Planned
Wildlife	Planned
Land Use	A desktop Study identifying existing land uses and changes due to the project is planned.
Subsistence	A study of subsistence use within the general area of the project is planned.
Socioeconomics	A desktop study of social and economic conditions within the nearby surrounding communities is planned.

Table 46: Graphite One baseline environment studies and current execution status

HYDROLOGY AND WATER QUALITY

The Graphite Creek Deposit lies on the north side of the Kigluaik Mountains in a watershed that drains to the north via several small creeks that flow into Imuruk Basin. A larger watershed is located to the east that drains via the Cobblestone River, an anadromous waterway which also drains into the Imuruk Basin.

Hydrology and surface water quality sampling efforts began in 2014 with the establishment of nine sample stations including the Cobblestone River, Graphite Creek, Ptarmigan Creek, Ruby Creek, Trail Creek and Christophosen Creek. The 2014 sampling effort was conducted in three sampling periods; early June, late July, and mid-September in an effort to capture three runoff regimes; high flow post breakup, summer base flow, and mid to high fall storm discharge. Several stations in the upper reaches of the drainages were unable to be sampled in June due to high amounts snow and frozen site conditions. Discharge was taken at each station using the incremental velocity-area method (Buchanan and Somers, 1969).

Hydrology and water quality sampling continued in 2015 with nine sites being sampled in mid- October. Freeze up had not yet occurred, but varying amounts of ice was present in all of the creeks including large ice bergs in the Cobblestone River.

There were two sample events in 2016 with the first sample event occurring in late May. As in 2014, the upper stations were covered in deep snow and several of the original upper sample stations were



inaccessible. Alternate sample stations were established further down the valley where liquid water was observed and sampled for both hydrology and water quality. Summer base flows were also collected in August and the number of sample stations were expanded from nine to 16 including stations on Canyon Creek, Falls Creek, Hotsprings Creek, White Creek, and Pond Creek.

Hydrology and water quality sampling continued in August 2018 at all of the sampling sites used in 2016 except for one, which was inaccessible due extensive thick brush surrounding the site.

Water quality analysis includes common field parameters such as water temperature, electrical conductivity, pH, dissolved oxygen, and turbidity. Samples are collected and sent to a lab for chemical analysis including total and dissolved metals, total and dissolved organic carbon, total suspended solids, hardness, acidity, ammonia, and nitrates.

WETLANDS

A desktop wetlands analysis was prepared in 2014 by HDR Inc., using guidelines set forth by the U.S. Army Corps of Engineers. The survey included regional familiarity with plant species, high resolution 1-meter satellite imagery, topographic information, U.S. Fish and Wildlife Service National Wetland Inventory, U.S. Geologic Survey National Hydrology Dataset, and LANDFIRE vegetation mapping. A total of 53,000 acres were delineated using two scales of detail. The areas including mineral claims, potential transportation corridors, and the Tisuk Camp were mapped at of 1:3,000, while the rest of the delineation was done at a scale of 1:12,000. Areas were classified as “uplands”, “high-value wetlands”, and “low-value wetlands”. Of the 53,000 acres delineated, approximately 23,000 were classified as uplands, 23,000 acres were low value wetlands, and 7,000 acres were high-value wetlands (HDR, 2015). The results of the delineation will be used in Graphite Creek Project planning for the siting of facilities and transportation. In addition to the already completed desktop wetlands mapping, we plan to add desktop mapping for an alternative access route. This mapping will be completed in 2019. A ground survey will be required for permitting purposes.

AQUATIC LIFE

Aquatic resources surveys were first was conducted in 2014. The 2014 survey consisted of an initial desktop survey of known aquatic resources, as well as a field survey conducted in late July. The desktop survey determined that there are documented anadromous species including sockeye salmon, pink salmon, chum salmon, Dolly Varden char, and an unspecified whitefish (ADF&G, 2006, 2008) in the Cobblestone River. No fish species are documented in Graphite Creek, Ptarmigan Creek, Ruby Creek, Trail Creek, and an unnamed tributary near the Graphite Creek Project area. To the west of the Graphite Creek Project area, Canyon Creek supports pink salmon, chum salmon, and Dolly Varden char (ADF&G, 2004, 2006). Imuruk Basin, a brackish shallow waterbody to which all creeks and rivers in the Graphite Creek Project area drain, is known to contain at various times of the year; sockeye salmon, chum salmon, pink salmon, grayling, northern pike, whitefish, herring, flounder, Dolly Varden char, and burbot (Raymond-Yakoubian, 2013).

The field survey did not sample Canyon Creek, or the Cobblestone River, however salmon were observed while conducting water sampling in the Cobblestone later that fall. The survey did include placing traps in Graphite Creek, Ptarmigan Creek, Glacier Canyon Creek, Trail Creek, and two unnamed creeks. No fish were captured in 541 total hours of the traps being set in the various creeks (TetraTech, 2014a).



In 2018 an aerial stream survey for anadromous fish was completed by Owl Ridge Natural Resource Consultants, Inc. The survey looked at 25 streams in the Graphite Creek project area and along potential access routes. Six of the streams were previously identified as anadromous streams. The survey identified ten new anadromous streams, for a total of 16 anadromous streams. Adult salmon distribution on the streams adjacent to Imuruk Bay was limited to the lower reaches of the streams. Pink salmon were the dominant species observed, with few observations of chum as a single or paired individuals, and one group of small Dolly Varden.

ADDITIONAL BASELINE STUDY RECOMMENDATIONS

DISCIPLINE	RECOMMENDED STUDIES
Metal Leaching and Acid Base Accounting	Static test work of lithogeochemical domains within and adjacent to the proposed pit as well as eventual kinetic test work including humidity cells and onsite leaching barrels.
Archaeology	Assessment of known cultural sites and on the ground fieldwork to investigate potential additional sites.
Aquatic Life	Expanded aquatic life surveys of the waterbodies in and adjacent to the Graphite Creek Project area including spawning, presence/absence, macroinvertebrates, and habitat.
Fisheries	Analysis of the known fisheries and potential impacts due to mining.
Hydrogeology	Expanded water quality sampling and hydrologic studies are needed to support development of a Graphite Creek Project plan and eventual permitting.
Meteorology	Installation of one or several meteorological stations and modeling of the data to ADEC standards. Background air pollution data collection and modeling should also be done if required by ADEC.
Noise and Visual Impacts	A noise and visual impacts survey of background conditions should be conducted in support of permitting activities.
Wildlife	Avian, large mammal, subsistence, and threatened and endangered species surveys should be conducted for the Graphite Creek Project area and adjacent migratory locations.

20.2 Permitting

20.2.1 Exploration Permits

Graphite One Resources conducts mineral exploration under the State of Alaska Annual Hardrock Exploration (AHEA) Permit #2299. The AHEA covers drilling activities, water usage, temporary camps and small land disturbances. In addition, Graphite One participates in the BLM and State reclamation bonding pools.

20.2.2 Mining Permits

Many state and federal permits will be required to conduct mining operations at the Graphite Creek Project area. A full list will not be determined until after a feasibility study has been conducted and a plan of operations has been developed. Graphite One has provisionally identified the following federal and state permits/certificates that could be required to undertake mining on the Graphite Creek Property.



AGENCY	AUTHORIZATION
FEDERAL	
Environmental Protection Agency (EPA)	Spill Prevention and Contingency (SPCC) Plan
U. S. Army Corps of Engineers (USACE)	Rivers and Harbors Act (RHA) Section 10 (Structures in navigable waters)
	RHA Section 9 (dams and dykes in navigable waters-interstate commerce)
	Clean Water Act Section 404 Wetlands Fill Permit
U.S. Coast Guard	RHA Section 9 Construction Permit (bridge across navigable waters).
Bureau of Alcohol, Tobacco, and Firearms	License to Transport Explosives
	Permit and License for Use of Explosives
Federal Aviation Administration	Notice of Landing Area Proposal (existing airstrip)
	Notice of Controlled Firing Area for Blasting
U.S. Department of Transportation	Hazardous Materials Registration
U.S. Fish and Wildlife Service	Section 7 of the Endangered Species Act consultation requiring a Biological Assessment or Biological Opinion
STATE	
Department of Natural Resources (DNR), Division of Mining, Land and Water	Plan of Operations
	Reclamation Plan Approval
	Mining License
	Land Use Permits and Leases
	Rights-of-Way, Easements, Material Sites, etc.
	Certificate of Approval to Construct a Dam
	Certificate of Approval to Operate a Dam
	Temporary Water Use Permit
DNR State Historic Preservation Office	Section 106 Historical and Cultural Protection Act clearance
Department of Fish and Game, Habitat Division	Fish Habitat or Fish passage permit
Department of Environmental Conservation (DEC), Division of Water	Section 401 Water Quality Certification (CWA 402 Permit)
	Wastewater Disposal Permits
	Non-Domestic Wastewater Disposal Permit
	Storm Water Discharge Pollution Prevention Plan
	Domestic Wastewater Disposal Permit
	Approval to construct and Operate a Public Water Supply System
DEC Division of Environmental Health	Solid Waste Disposal Permit
	Food Sanitation Permit
	Class III Municipal Solid Waste Landfill Permit
DEC Division of Air Quality	Air Quality Construction Permit (first 12 months)
	Air Quality PSD Title V Operating Permit (after 12 months)
	Air Quality Permit to Open Burn



Work towards the completion of preliminary feasibility study will commence in 2019 followed by a feasibility study, wherein more detail regarding plans for mining and processing will be developed and presented. This will lead to a plan of operations to be developed for submission so that the National Environmental Policy Act (NEPA) review process can begin. Many of the permits above, and additional minor permits not included in the above table, will be part of the NEPA process.

20.3 Social/Community Impact

The objective of Graphite One's Community Relations Program is to foster relations with the local population through regular, open dialogue and information sharing to ensure that all stakeholders have a voice in the Project's planning, exploration and development phases.

To date, the program has focused on building the company's relationship with the Inupiaq communities closest to the Property (Teller, Brevig Mission and Mary's Igloo) as well as the City of Nome. There is a high level of interest in the Project and the possibility that it could bring economic and employment benefits to the region. There are also concerns that the project might disrupt the region's subsistence way of life.

Graphite One has held numerous meetings with residents of the communities of Teller, Brevig Mission, Mary's Igloo and the City of Nome. Each governing entity within these communities has been included in these meetings. In addition, meetings have been regularly held with regional organizations and governing bodies such as Kawerak, Inc. and Bering Straits Native Corporation. Prior to the 2018 field season, Graphite One was invited to the villages of Teller and Brevig Mission to provide a project update, to review plans for the field season and employment opportunities.

In meetings held to date, Graphite One has described the exploration program, generally introduced the Project and answered questions from the participants. The company has assisted the Inupiaq communities in establishing a Subsistence Advisory Council to, among other things, advise the Project on matters related to the Alaska Natives hunting and gathering patterns and concerns.

Uqaqti Consulting, LLC from Fairbanks, AK assists Graphite One in coordinating its Community Relations Program. Uqaqti's principal consultant is an Alaska Native who has lived in remote villages for fifteen years and has a comprehensive understanding of Alaska native social, economic, political and cultural issues.

20.3.1 Subsistence Advisory Committee

During the 2018 field season, Graphite One provided site tours of the Property to members from surrounding villages as part of the Subsistence Advisory Council (SAC). Three separate tours were given with representatives from Teller, Brevig Mission, Mary's Igloo, and Nome. The tour gave an opportunity for these local members to hear an update on the Graphite Creek project, see the current state of the project site, provide knowledge and insight to Graphite One personnel as to the regional subsistence resources and their importance to the surrounding communities, and voice comments and concerns, both positive and negative, on effects the project could have on their way of life (Figure 87). After the field season, a follow-up facilitated meeting was convened in Nome to provide an opportunity to all SAC members to compare notes, ask questions, discuss concerns and provide feedback to the company for



future planning and design considerations. The company plans for the SAC tours and meeting to be held annually.



Figure 87: Photos from Subsistence Advisory Committee site tour. a) Members from Nome, Teller, and Mary's Igloo with project staff at Tisuk Camp, b) Members pointing out areas near the property site with Stan Foo, COO, c) Members from Brevig Mission examining 2018 drill core, d) Brevig Mission members out at project site with drillers.

21 Capital and Operating Costs

The following information is taken from Graphite One's PEA prepared by TRU Group dated June 30, 2017.

21.1 Project Summary

21.1.1 Graphite One Project Capital Investment Summary

The order-of-magnitude capital cost estimates presented herein for the mining at the Graphite Creek property, the Mineral Processing Plant and the Graphite Products Manufacturing Plant were developed from the equipment lists for major equipment based on the designs described in Sections 16, 17, and 18, Mining Methods, Recovery Methods and Project Infrastructure, respectively. Quotations for certain project-specific items, higher-cost equipment, as well as TRU in-house data were employed in the generation of the estimates. The plant capital expenditures were spread over three years and ramp up to full production at 60,000 tonnes per year (tpy) of graphite concentrate at the Mineral Processing

Plant is six years. The Product Manufacturing Plant design has the plant reaching full capacity at 55,350 tpy of graphite products in Year 6.

The order-of-magnitude capital cost (CAPEX) for mining operations, the Mineral Processing Plant and the Product Manufacturing Plant and infrastructure was estimated at \$363 million. No contingency is included for the two Plants. Indirect costs for the two Plants were assumed to be 33% of the direct costs: 20% for EPCM (engineering, procurement, construction & management), 10% for freight and capital spare parts, and 3% for commissioning and start-up costs. A summary of the CAPEX estimates is shown in Table 47.

Summary of Capital Cost Estimate

OPERATIONS CATEGORY	CAPITAL COST US\$ millions
Graphite Creek Mine & Mineral Processing	\$233
<i>Mining</i>	\$43
<i>Mineral Processing</i>	\$158
<i>Infrastructure</i>	\$32
Product Manufacturing Plant	\$130
TOTAL ALL OPERATIONS	\$363

Table 47: Mining and Plant capital cost summary 2016 US\$ million

21.1.2 Graphite One Project Operating Costs Summary

The order-of-magnitude operating cost (OPEX) for the entire project at full capacity inclusive of Graphite Creek mining, Alaska Mineral Processing Plant and Infrastructure, and the Product Manufacturing Plant is estimated at \$98 million per year. On a plant input/output basis, the total project OPEX translates to US\$96/t-Mineral Processing Plant Feed or \$1,774 per t of Product Manufacturing Plant graphite product. The OPEX estimates are shown in Table 48.

Operating Cost Estimates, Mine and Plants at full capacity -US\$

MAJOR OPERATING COST ITEM	Graphite Creek		Product Manufacturing	Graphite One Integrated Project
	Mining	Mineral Processing		
	\$	\$		
Labour	\$21,887,000	\$12,170,000	\$7,270,000	\$41,327,000
Energy (Power and Diesel) ¹		\$9,900,000	\$14,900,000	\$24,800,000
Equipment Operation	\$2,799,500			\$2,799,500
Consumables		\$3,300,000	\$7,100,000	\$10,400,000
Maintenance & Supplies	\$1,781,500	\$2,700,000	\$3,600,000	\$8,081,500
Miscellaneous	\$1,272,500			\$1,272,500
Concentrate Shipping		\$1,800,000	\$7,698,000	\$9,498,000
Total Operating Cost	\$27,740,500	\$29,870,000	\$40,568,000	\$98,178,500
Operating Cost/t Mineral Processing Plant feed	\$27	\$29	\$40	\$96
Operating Cost/t Concentrate	\$462	\$498	\$676	\$1,636
Operating Cost/t Graphite Product	\$501	\$540	\$733	\$1,774

Sources & notes -

¹ The mining energy cost is included in Alaska Plant cost
TRU Estimates

Table 48: Mine and Plants operating cost summary 2016\$

21.2 Basis of Estimates

The mining/milling/manufacturing process for the proposed graphite products was developed by TRU based on the set of assumptions illustrated in Sections 16,17 and 18. The operating and capital costs were developed by TRU for:

- the Graphite Creek mine in Alaska;
- the Mineral Processing Plant located at the mine site;
- the Mineral Processing Plant Infrastructure; and
- the Products Manufacturing Plant located at brownfield site with developed infrastructure and access to low cost electric power.

Production is based on a resource of 44 million tonnes at 7% Cg and a project life of 40 years.

21.2.1 Mining at Full Capacity

The estimated costs for development of the mine have been based upon certain technical assumptions and approximations. A more refined capital cost (CAPEX) will be developed once many of these assumptions are resolved for site-specific factors.

The proposed mine plan is for a “truck and shovel” open-pit operation mining four (4) en echelon benches, initiating along the physical outcrop of the graphite bearing zone. These pits will mine, in succession, the overburden above Lode 1 (Bench 1), the graphite-bearing Lode 1 (Bench 2), the non-graphite bearing inter-burden below Lode 1 (Bench 3), and the graphite bearing Lodes 2 and 3 as a single unit (Bench 4). It is noted that there will be non-graphite mineralization bearing waste rock mined from Benches 2 and 4, which will be identified by the mine management team prior to blasting, which will be hauled away to the overburden waste area.



Electrical power for the mine operation will be generated by the on-site power plant, which is included in the Infrastructure costs.

Table 49 below summarizes the assumed design factors utilized in the mining CAPEX/OPEX development.

Mining Design Criteria

DESIGN FACTOR	ASSUMPTION
Mine type	Surface mine
Strip ratio	3:1
Plant feed production, tpd	3,090
Waste production, tpd	9,270
Haul distance to Plant, km	1.5
Haul distance to Waste rock storage, km	1.5
Operating days/year	360
Hours/shift	12
Shifts/day	2
Number of shift crews	4
Shift schedule	14 days on/14 off
Operating benches	4

Sources & notes -
 TRU Estimates

Table 49: Mine design criteria

21.2.2 Plant Production at Full Capacity

The Project CAPEX/OPEX estimates and financial analysis were based on the initial rate of production and phased expansion of both the Mineral Processing Plant and the Product Manufacturing Plant as tabulated in Table 50. The phased rate of capacity expansion is based on market conditions with a projected uptick in graphite demand. The Mineral Processing Plant is designed to initially produce 18,000 tpy-concentrate and increase to full Plant production capacity of 60,000 tpy-concentrate by Year 6. The Product Manufacturing Plant is designed to initially produce 16,600 tpy-product and reach full capacity of 55,350 tpy-product by end of Year 6. It is assumed that the annual concentrate production can be shipped to the Product Manufacturing Plant during the 5-month operating window for barge transport.

Planned Production Unit Capacities by Period in tpy

UNIT PRODUCTION INPUT-OUTPUT	PLANNED CAPACITY						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Years 7+
Mineral Processing Plant							
Plant Feed	305,400	407,200	509,000	814,400	916,200	1,018,000	1,018,000
Graphite Concentrate Output	18,000	24,000	30,000	48,000	54,000	60,000	60,000
Products Manufacturing Plant							
Concentrate Feed from Alaska Mineral Processing	18,000	24,000	30,000	48,000	54,000	60,000	60,000
Graphite Manufactured Products Output	16,605	22,140	27,675	44,280	49,815	55,350	55,350

Sources & notes -
 TRU Estimates

Table 50: Plants production schedule capacities assumptions

21.2.3 General Financial Assumptions

The following are some of the general financial assumptions applied in the TRU analysis –

- All units are in metric
- Currency – **\$2016** constant dollars
- Sales Prices – market price FOB Product Manufacturing Plant
- Input costs – market prices adjusted for location delivered
- Chemical prices- published ICIS Prices provided benchmark USA prices for input chemicals
- Equipment costs are based on TRU files and experience on similar facilities and confidential budget quotations from major equipment vendors
- Projections are for 40 years but this is not a reflection of the mine or plant operations life and no terminal value is applied
- Exploration and feasibility study costs are not included; rather, all costs once production begins are included
- As a Conceptual-level Study all capital and main line operating cost estimates are at an accuracy of $\pm 45\%$, and the display of more detailed data is not intended to suggest a margin of accuracy other than the $\pm 45\%$
- Profitability is assessed on a Project Total Capital Cost only, and no estimation of possible financing structure has been made
- This financial analysis, given in Section 22, is subject to caution. Due to the elevated risk a higher discounting rate of 10% has been assumed in the Net Present Value (NPV) evaluation.

21.2.4 Exclusions to Capital Cost Estimates

Exclusions to the capital cost estimates include the following -

- Exploration drilling
- Metallurgical testwork
- Environmental impact studies
- Rock mechanics study
- Hydrogeology investigations
- Geotechnical investigations



- Pre-feasibility and Feasibility studies
- Land acquisition, leases, rights of way and water rights
- Port facilities at Nome
- Permits, fees and process royalties
- Project application and approval expenses
- Import duties and custom fees
- Project financing and interest charges
- Taxes
- Escalation of pricing

21.3 Capital Costs (CAPEX) Estimates

21.3.1 Open Pit Mining

The mining capital cost is estimated at \$43.2 million and is based on the Mineral Processing Plant operating at full capacity with the mine delivering 1,018,000 tpy (3,090 tpd) of feed to the plant. The mining strip ratio was estimated at 3:1 based on TRU assessment of available geological data. The indirect costs of \$3.1 million include Engineering (10% of the direct cost of the equipment and buildings). The capital cost breakdown is shown below in Table 51.

Mining Capital Cost Estimate by Category and Item US\$ millions

CAPITAL COST CATEGORY & ITEM	COST \$ million
Mining Equipment & Facilities Costs:	\$40.0
<i>Mining Equipment</i>	26.5
<i>Mine Services Buildings</i>	4.9
<i>Site Roads and Preliminary Earthwork</i>	6.9
<i>Pre-production Stripping</i>	1.7
Indirect Costs	\$3.1
<i>Engineering</i>	3.1
TOTAL CAPITAL COST - MINING	\$43.1

Sources & notes -
 TRU Estimates

Table 51: Graphite Creek mining capital cost estimate 2016 \$million

MINING EQUIPMENT

The capital cost for the mining equipment is based on the equipment items listed in Table 52. Equipment pricing was based upon average available pricing from various vendors. The number of each equipment type was developed based on the design criteria listed in Table 49.



Mining Equipment

EQUIPMENT ITEM	NUMBER OF UNITS
Shovel - 2 cubic meter excavator	4
Front End Loader - 5 cubic meter	4
Rear Dump Truck - 50 tonne	8
Rotary Drill	4
Bulldozer -Caterpillar D9	6
Road Grader	3
Water Tanker	3
Service/Tire Truck	5
Light Plants	16
Water Pumps	5
Pickup Truck	10



Sources & notes -
 TRU Estimates

Table 52: Graphite Creek mining equipment list at plant full capacity

MINE SERVICE BUILDINGS

The mine service buildings listed in Table 53 were included in the capital cost estimate. A cost of \$1500 per square-meter was used.

Mine Services Buildings

BUILDING	AREA m²
Mine Office	100
Maintenance	2500
Storage/Warehouse	200
Worker Barrack/Rec/Dining Facility	700



Sources & notes -
 TRU Estimates

Table 53: Graphite Creek mining service buildings list

SITE ROADS AND PRELIMINARY EARTHWORKS

Haul route distances of 1.5 km for each the plant feed and for the waste rock was used in the estimate.

PRE-PRODUCTION STRIPPING

Pre-production stripping would be minimal, as the graphite mineralization body outcrops at the surface. Removal of the overburden is incorporated in the first pit.

21.3.2 Mineral Processing Plant

The order-of-magnitude capital cost for the Mineral Processing Plant is estimated to be \$158 million without added contingency. Indirect costs were assumed as 33% of the plant direct costs; 20% for EPCM (engineering, procurement, construction & management), 10% for freight and capital spare parts, and 3% for commissioning and start-up costs. Further details of the capital cost estimate are shown in Table 54.

Mineral Processing Plant Capital Cost	
CAPITAL COST CATEGORY & ITEM	COST \$million
Equipment & Facilities Costs:	\$129
<i>Mineral Processing</i>	89.6
<i>Tailings Dam</i>	14.5
<i>Process Building</i>	22.0
<i>Concentrate Storage</i>	2.5
Indirect and Start-up Costs	\$30
<i>Freight & Insurance & Capital Spare Parts</i>	9.0
<i>Basic & EPCM</i>	17.9
<i>Commissioning & Startup</i>	2.7
<i>Owner's Cost</i>	0.0
TOTAL PLANT	\$158

Sources & notes -
 TRU Estimates

Table 54: Mineral Processing Plant capital cost estimate 2016 \$ million

MINERAL PROCESSING PLANT

The capital cost estimate for the Mineral Processing Plant was based on the major equipment list compiled for the design of the Plant described in Section 17, Recovery Methods. Estimates for high-cost equipment items were based on vendor quotations while other equipment costs were sourced from TRU in-house data. Equipment installation costs for civils and structural, piping, electrical, instrumentation and miscellaneous mechanical were developed by applying factors to the equipment cost.

TAILINGS DAM

The cost of the tailings placement in a dam was estimated to be \$2 per t-tails. By the time full production has been reached, the capital outlay is estimated to be \$7 million. An additional \$8 million was included for an added 4 years of storage for a total of 10 years of operation. The financial model



includes working capital for tailings pond expansion after 10 years. Table 55 shows the estimated tailings output from the Mineral Processing Plant.

Planned Production Unit Capacities with Tailings Output in tpy

UNIT PRODUCTION INPUT-OUTPUT	PLANNED CAPACITY						
	tpy						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Years 7+
Mineral Processing Plant							
Plant Feed Input	305,400	407,200	509,000	814,400	916,200	1,018,000	1,018,000
Graphite Concentrate Output	18,000	24,000	30,000	48,000	54,000	60,000	60,000
Tailings Output	287,400	383,200	479,000	766,400	862,200	958,000	958,000

Sources & notes -
 TRU Estimates

Table 55: Tailings output by year

MINERAL PROCESSING PLANT BUILDING

The Mineral Processing Plant building size was estimated to be approximately 14,000 square meters based on a preliminary plot plan for the major processing equipment, reagents storage, utilities, product packaging, control room and offices. The estimated capital cost of the plant at \$22 million was based on a northern industrial building cost from TRU in-house data (\$1600/m²).

CONCENTRATE STORAGE BUILDING

The Concentrate Storage building size was calculated based on storing six months of concentrate production (30,000 t) stored in one tonne bags. The capital cost was estimated to be \$2.5 million based on storing the bags concentrate in purchased 20-foot shipping containers, each holding about 18 tonnes. Approximately half of the containers would be stacked at site and the other half at the Port of Nome.

21.3.3 Mine and Plant Infrastructure

The capital cost estimate for the Graphite Creek site infrastructure was developed based on the major plant and mine requirements outlined in Section 18, Project Infrastructure. The capital cost for the Alaska site infrastructure was estimated to be \$32 million without added contingency. Further details of the capital cost estimate are shown in Table 56.

Capital Cost Estimate Infrastructure Alaska US\$ millions

CAPITAL COST CATEGORY & ITEM	Alaska Infrastructure
<i>Site Access Road</i>	10
<i>Power Plant</i>	12
<i>Infrastructure (Camp, Port Storage)</i>	10
TOTAL INFRASTRUCTURE \$millions	\$32

Sources & notes -
 TRU Estimates

Table 56: Graphite Creek infrastructure capital cost estimate 2016 \$million

SITE ACCESS ROAD

The length of the site access road to the Graphite Creek Property was estimated to be about 35km from the highway. Road construction costs of \$275,000 per km (Total capital cost: \$10 million) were based on the average cost of road construction from preliminary quotations provided to Graphite One.

POWER PLANT

The electrical power requirement for the Mine, Plant and the Staff Accommodation facilities was estimated to be 6 MW once the operations are at full working capacity. The diesel power plant capital cost of \$12 million was based on TRU in-house data and includes fuel storage and handling facilities.

INFRASTRUCTURE (CAMP, PORT STORAGE)

This category includes miscellaneous items outside the scope of the Mine and Plant and is a capital cost allowance. On site roads, a habitation unit with living quarters and communal facilities for the on-site work force, and concentrate storage at the Port of Nome is included.

21.3.4 Product Manufacturing Plant

The order-of-magnitude capital cost for the Product Manufacturing Plant was estimated to be \$130 million without added contingency. Indirect costs were assumed to be 33% of the direct costs; 20% for EPCM (engineering, procurement, construction & management), 10% for freight, insurance, and capital spare parts, and 3% for commissioning and start-up costs. Further details of the CAPEX estimate are shown in Table 57.

Product Manufacturing Plant Capital Cost Estimate

CAPITAL COST CATEGORY & ITEM	COST \$million
Equipment & Facilities Costs:	\$100
<i>Product Manufacturing</i>	90.1
<i>Ash Storage</i>	1.8
<i>Manufacturing Building</i>	6.0
<i>Concentrate Storage</i>	2.5
Indirect and Start-up Costs	\$30
<i>Freight & Insurance & Capital Spare Parts</i>	9.0
<i>Basic & EPCM</i>	18.0
<i>Commissioning & Startup</i>	2.7
<i>Owner's Cost</i>	0.0
TOTAL PLANT COST	\$130

Sources & notes -
 TRU Estimates

Table 57: Product Manufacturing Plant capital cost estimate 2016 \$million

PRODUCT MANUFACTURING

The capital cost estimate for the Graphite Products Manufacturing Plant was developed from an equipment list for major equipment based on the design described in Section 17, Recovery Methods. Estimates for high cost items were based on vendor quotations while other equipment costs were sourced from TRU in-house data. Equipment installation costs for civils and structural, piping, electrical, instrumentation and miscellaneous mechanical were developed by applying factors to the equipment cost.

ASH STORAGE

Ash is generated during thermal purification of the concentrate. The cost to store the ash was estimated to be \$40 per t-ash. Further study of the ash characteristics will determine whether it could be used for remediation efforts. By the time full production has been reached by the end of year 6, the capital outlay is estimated to be \$0.9 million. An additional \$0.9 million was included for an added 4 years of storage for a total of 10 years of operation. The financial model includes working capital for ash storage expansion after 10 years. Table 58 shows the estimated ash output from the Plant.

Planned Production Unit Capacities with Furnace Ash Output in tpy

Unit Production Input-Output	Planned Capacity tpy						
	year 1	year 2	year 3	year 4	year 5	year 6	years 7.5+
Washington Product Manufacturing Plant							
Plant Feed Input	18,000	24,000	30,000	48,000	54,000	60,000	60,000
Furnace Ash Output	1,800	2,400	3,000	4,800	5,400	6,000	6,000

Sources & notes -
 TRU Estimates
 TRU Group Inc

Table 58: Product Manufacturing Plant furnace feed input and ash output

MANUFACTURING BUILDING

The Product Manufacturing Plant building size is estimated to be approximately 5,600 square meters based on a preliminary plot plan for the major processing equipment, reagents storage, utilities, product packaging, control room and offices. The estimated capital cost of the Plant at \$5.6 million was based on \$ per square meter (\$/m²) construction costs of \$1000.

CONCENTRATE STORAGE

The Concentrate Storage building size is estimated on the basis of storing 6 months of concentrate production (30,000 t) packaged in 1-tonne bags. The capital cost was estimated to be \$2.5 million based on storing the bags concentrate in purchased 20-foot shipping containers, each holding about 18 tonnes. The containers would be stacked at the Product Manufacturing Plant.

21.3.5 Product Manufacturing Plant Infrastructure

It is assumed that the Product Manufacturing Plant site will be situated in an industrial area at a coastal location with developed infrastructure, serviced by road and rail and has access to low cost electrical power.

21.4 Operating Costs

21.4.1 Open Pit Mining

The Graphite Creek mining cost is estimated to be \$27.7 million per year or on a plant input basis, \$27.25 per t-plant feed. The cost includes delivery to the Mineral Processing Plant. Table 59 shows the breakdown of the operating costs.

Mining Operating Cost Estimate at Full Capacity

MAJOR OPERATING COST ITEM	Mining OPEX	
	\$/year	\$/t Plant Feed
Salaried Labour	\$1,730,600	\$1.70
Hourly Labour	\$20,156,400	\$19.80
Equipment Operation	\$2,799,500	\$2.75
Supplies/Materials	\$1,781,500	\$1.75
Miscellaneous	\$1,272,500	\$1.25
Total Operating Cost	\$27,740,500	\$27.25

Sources & notes -
 TRU Estimates

Table 59: Mining operating cost estimate 2016 US\$

These costs are based upon the best available factors known at the present time and account for year-round, multi-pit exploitation with careful control on graphite mineralization grade. The costs are conservative and include provisions for unknown geotechnical factors. Future planned studies will provide the requisite geotechnical information to remove uncertainty factors and allow for a detailed mine plan study with refined mining costs.

LABOUR

The cost of labour, salaried and hourly, was based on the labour loading shown below in Table 60. This labour loading was developed based on a plant feedrate of 3,090 tpd at a 3:1 mine strip ratio, operating 360 days/per year, two 12 hour shifts/day. The average labour cost for salaried and hourly personnel, based on the Alaska Department of Labor rates in remote areas and fully loaded (including living expenses while on site), is \$126,000 per annum.

EQUIPMENT OPERATION

The equipment operation cost of \$2.75 per t-plant feed is based on a 360 day per year operation for similar mining operations. This cost item includes the cost of diesel, tires, equipment repairs.

SUPPLIES AND MATERIALS

Supplies and materials cost of \$1.75 per t-plant feed is based on similar mining operations. This includes such consumable items as drilling and blasting supplies, as well as consumables necessary to support the work crew.

MISCELLANEOUS

A cost of \$1.25 per t-plant feed is an allowance for miscellaneous costs.

Mine Labour Loading

LABOUR CATEGORY	PERSONNEL
Management	14
Mine Manager	1
Mining Engineer	1
Geologist	1
Superintendent	1
Foreman	4
Supervisors	4
Administrative Assistants	2
Mine Labour	160
Drillers/Blasters	16
Truck Drivers	24
Mechanics	24
Excavator Operator	24
Equipment Operator	24
Laborer/Maintenance	48
Total	174

Sources & notes -
TRU Estimates

Table 60: Salaried and hourly mine labour loading

21.4.2 Alaska Mineral Processing Plant

The Mineral Processing Plant operating cost is estimated at \$29.9 million per year, which translates to specific costs of \$29 per t-plant feed and \$498 per t-concentrate produced. The cost is based on mining and plant operations having reached full respective production capacities of 1,018,000 tpy feed and 60,000 tpy graphite concentrate. Table 61 shows the breakdown of the operating costs.

Operating Cost - Mineral Processing Plant at full capacity

MAJOR OPERATING COST ITEM	COST
	\$
Plant Labour	\$12,170,000
Energy (Diesel for Power)	\$9,900,000
Consumables	\$3,300,000
Maintenance & Supplies	\$2,700,000
Concentrate Trucking	\$1,800,000
Total Operating Cost	\$29,870,000
Operating Cost/t feed	\$29
Operating Cost/t Concentrate	\$498

Sources & notes -
TRU Estimates

Table 61: Mineral Processing Plant operating cost estimate 2016\$



LABOUR

The labour requirements are based on operating 365 days per year, 24 hours per day with two 12-hour shifts using four operating crews. Support staff is scheduled on a 5-day week on an 8- hour shift. The estimated plant people requirements are summarized below in Table 62.

Total workforce requirements at the Alaska-Mineral Processing Plant is estimated at 95 people. Head office and administration personnel are not estimated at this stage.

The average labour cost for salaried and hourly personnel, based on TRU in-house data and the Alaska Department of Labour rates in remote areas and fully loaded (including living expenses while on site), is \$128,000 per annum.

ENERGY

The power for the Alaska Mineral Processing Plant is provided by three (3) 2 MW diesel generators giving a total power capacity of 6 MW. The diesel fuel is transported to Nome from Seattle by barge in 20 t isotainers. The isotainers are transferred to the Mineral Processing Plant by the returning concentrate transport trucks. The fuel provision scenario that has been assumed requires advance bulk fuel purchases which are stored at leased facilities under a long-term contract. In this scenario, the overall delivered cost of ULS-1 diesel fuel has been estimated at \$1.10 per liter (\$4.17 per gallon).

Mineral Processing Plant Labour Loading

LABOUR CATEGORY	PERSONNEL
Management	15
Plant Manager	1
Department Managers	6
Process Engineer	2
Day Supervisors	2
Shift Supervisors	4
Plant Labor	80
Plant Operators	24
Plant Helpers	24
Control Room Operators	4
Instrument Technicians	4
Laboratory	8
Mechanics	8
Warehouse	8
Total	95

Sources & notes -
 TRU Estimates

Table 62: Mineral Processing Plant labour loading

CONSUMABLES

The estimated input costs for consumables to the operating cost for the Mineral Processing Plant is summarized in Table 63. Input prices are market prices adjusted for delivered location, published ICIS Prices provided benchmark USA prices, in-house data or budget quotations. Reagent consumptions



were calculated based on the mass balance and respective requirements. Grinding media consumption and mill liner replacement were based on in-house data. The diesel consumption was calculated based on estimated plant site operating power of 40,000 MWh per year (includes mining and infrastructure).

MAINTENANCE AND SUPPLIES

The maintenance and supplies category annual cost is based on 3% of the process plant direct capital cost of \$90 million.

Mineral Processing Plant - Consumable Input Costs

INPUT ITEM	Units	Unit costs US\$
<i>Main Process Consumables</i>		
Grinding and Flotation	t-feed	\$3.00
<i>Energy & Utilities</i>		
Diesel Fuel	L	\$1.10
Sources & notes - TRU Estimates		

Table 63: Input costs for consumables - Mineral Processing Plant 2016\$

CONCENTRATE TRUCKING

The graphite concentrate from Mineral Processing Plant is packaged into one tonne supersacks, loaded into containers and transported by trucks approximately 102 km to the port at Nome, Alaska. TRU estimated the transport cost at \$30 per t-concentrate. A port facility proposed by Bering Straits Native Corporation at Port Clarence could be an alternative to the Port of Nome during the life of the Project and reduce the overland transportation distance from the mine site.

21.4.3 Product Manufacturing Plant Operations

The Product Manufacturing Plant operating cost is estimated at \$40.6 million per year or on an input/output basis \$676 per t-plant feed (concentrate) and \$733 per t-graphite product. The cost is based on the Graphite Creek Project operating at full production capacity with 60,000 tpy feed concentrate arriving from Alaska and being converted to 55,350 tpy of purified graphite product. Table 64 shows the breakdown of the operating costs.

Operating Cost Product Manufacturing Plant at full capacity

MAJOR OPERATING COST ITEM	COST
	\$
Plant Labour	\$7,270,000
Energy (Power)	\$14,900,000
Consumables	\$7,100,000
Maintenance & Supplies	\$3,600,000
Concentrate Shipping	\$7,698,000
Total Operating Cost	\$40,568,000
Operating Cost/t feed (Conc.)	\$676
Operating Cost/t Product	\$733

Sources & notes -
 TRU Estimates

Table 64: Product Manufacturing Plant operating cost estimate 206 US\$

LABOUR

The labour requirements are estimated for a plant operating basis of 365 days per year, 24 hours per day with three 8-hour shifts using up to four operating crews. Support staff is scheduled on a 5-day week on an 8-hour shift. Labour workforce requirements are summarized in Table 65.

Total workforce requirements at the Product Manufacturing Plant is estimated at 102 people. Head office and administration personnel are not estimated at this stage. The average fully-loaded labour cost for salaried and hourly personnel based on Washington State statistics plus 30% fringe, is estimated at \$71,000 per annum.

Product Manufacturing Plant Labour Loading

LABOUR CATEGORY	PERSONNEL
Management	14
Plant Manager	1
Department Managers	3
Process Engineer	2
Day Supervisors	4
Shift Supervisors	4
Plant Labor	88
Plant Operators	24
Plant Helpers	32
Control Room Operators	8
Instrument Technicians	4
Laboratory	8
Mechanics	8
Warehouse	4
Total	102

Sources & notes -
 TRU Estimates

Table 65: Product Manufacturing Plant labour loading



ENERGY

The electrical energy has been projected to be provided from the grid at a cost of US\$ 0.04 per kWh, which was provided by published data for Washington State. The energy consumption was calculated based on the equipment list and appropriate power draw per motor based on equipment type. Specialty gas for the thermal purification furnaces is supplied by an on-site plant. The electrical requirement for the specialty gas plant is also included in the cost.

CONSUMABLES

The estimated input costs for consumables to the operating cost for the Product Manufacturing Plant is summarized in Table 66. Input prices are market prices adjusted for location delivered, published ICIS Prices provided benchmark USA prices, in-house data or budget quotations. Consumptions were calculated based on the mass balance and respective requirements and in-house data.

Product Manufacturing Plant - Consumable Input Costs		
INPUT ITEM	Units	Unit costs US\$
Main Process Consumables		
Coating Pre-cursor additive	t	\$2,100
Graphite (furnace electrode)	t-conc	\$42
Energy & Utilities		
Electricity grid	MWh	\$40

Sources & notes -
 TRU Estimates

Table 66: Input costs for consumables - Product Manufacturing 2016\$

MAINTENANCE AND SUPPLIES

The maintenance and supplies category annual cost is based on 4% of the process plant direct capital cost of \$90 million.

CONCENTRATE SHIPPING

The cost of concentrate shipping from Nome AK to the Product Manufacturing Plant was included in the Product Manufacturing Plant operating cost. Concentrate will be stored in an enclosed shed until winter's end and the reopening of shipping lanes in northwestern Alaska. The containers are loaded onto barges and transported to the Product Manufacturing Plant located at or near a coastal site. A quotation of \$128.30 per t concentrate was provided to TRU and used in the model.

21.5 General & Administration, Research & Development

The General and Administration costs was estimated to be about \$3 per t-Alaska plant feed, \$3 million per year at full capacity and R&D, \$1 million/year. These categories are entered separately in the economic analysis as the cost includes both plant sites. These costs include head office management salaries, administration, and expenses for trips to the plant sites.

22 Economic Analysis

The following information is taken from Graphite One’s PEA prepared by TRU Group dated June 30, 2017.

The Company cautions that this PEA is preliminary in nature and is based on technical and economic assumptions that will be further investigated and established with greater confidence in future studies. The PEA is based on the current resource model (November 2016), which includes estimates of indicated and inferred resources. The current information is insufficient to convert mineral resources to mineral reserves; mineral resources that are not mineral reserves do not have demonstrated economic viability. As such, there is no certainty that PEA will be realized.

22.1 Financial Analysis Basis

The financial analysis was based on-

- An Indicated and Inferred resource of 44 million t at 7% Cg, 80% Cg recovery, and a project life of 40 years.
- Operating and capital costs developed in accordance with the conceptual designs for the Graphite Creek Mine and Mineral Processing Plant in Alaska and the Product Manufacturing Plant located a developed brownfield site with access to low cost electrical power.
- Ramping to a full capacity of 60,000 tpy graphite concentrate and 55,350 tpy graphite products by end Year 6. The analysis assumed that the total annual concentrate production was transported within the shipping windows to the Products plant and processed.
- Graphite product distribution at full capacity would be 41,850 tpy of CSG selling at US\$6,200 per t and 13,500 tpy purified graphite powders <20 micron selling at an average price of \$1500 per t.

The order-of-magnitude capital cost for the mine and both plants was estimated to be \$363 million without added contingency. The distributions of the capital cost between the mine and two plants are given in following Table 67. The operations at Graphite Creek account for 64% of the total capital outlay.

Capital Cost Structure by Operation

CAPEX by CATEGORY	GRAPHITE CREEK			INTEGRATED OPERATIONS TOTAL
	Mining	Mineral Processing	Product Manufacturing	
Total Capital Cost 2016-US\$ millions	\$43	\$190	\$130	\$363
Percent of Total	12%	52%	36%	100%

Sources & notes -
TRU Estimates

Table 67: Capital cost structure by operation 2016 \$millions

Order-of-magnitude annual production costs for the first 10 years of the Project appear in following Table 68. These operating costs were used in determining the profitability of the Project. When at full capacity by end of year six, the cost to produce 55,350 tpy of graphite products is estimated at \$98 million or \$1,774 per t-product.

Graphite One Integrated Operations Annual Costs Plant Type and Item

US\$ 2016 Constant

DIRECT CASH COST BY ITEM	\$ Unit Cost	Units	Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
Mineralization delivered to Mill			0	305,400	407,200	509,000	814,400	916,200	1,018,000	1,018,000	1,018,000	1,018,000	1,018,000
Mining Cost & Mineralization delivered to Mill	\$27.25	t	\$0	\$8,322,150	\$11,096,200	\$13,870,250	\$22,192,400	\$24,966,450	\$27,740,500	\$27,740,500	\$27,740,500	\$27,740,500	\$27,740,500
Graphite Creek Graphite Concentrate Output		t	0	18,000	24,000	30,000	48,000	54,000	60,000	60,000	60,000	60,000	60,000
Concentrate Trucking to Nome	\$30	per t		\$540,000	\$720,000	\$900,000	\$1,440,000	\$1,620,000	\$1,800,000	\$1,800,000	\$1,800,000	\$1,800,000	\$1,800,000
Concentrate Barge Shipping	\$128	per t	\$-	\$2,309,400	\$3,079,200	\$3,849,000	\$6,158,400	\$6,928,200	\$7,698,000	\$7,698,000	\$7,698,000	\$7,698,000	\$7,698,000
Product Manufacturing Plant Output		t	0	16,605	22,140	27,675	44,280	49,815	55,350	55,350	55,350	55,350	55,350
Labor Costs:													
Direct Labor - Mineral Processing			\$2,434,000	\$6,693,500	\$6,693,500	\$6,693,500	\$12,170,000	\$12,170,000	\$12,170,000	\$12,170,000	\$12,170,000	\$12,170,000	\$12,170,000
Direct Labor - Product Manufacturing			\$1,454,000	\$4,725,500	\$4,725,500	\$4,725,500	\$7,270,000	\$7,270,000	\$7,270,000	\$7,270,000	\$7,270,000	\$7,270,000	\$7,270,000
Equipment Repairs/Maintenance - Mineral Processing													
Equipment Repairs/Maintenance - Mineral Processing			\$0	\$810,000	\$1,080,000	\$1,350,000	\$2,160,000	\$2,430,000	\$2,700,000	\$2,700,000	\$2,700,000	\$2,700,000	\$2,700,000
Equipment Repairs/Maintenance - Product Manufacturing													
Equipment Repairs/Maintenance - Product Manufacturing			\$0	\$1,080,000	\$1,440,000	\$1,800,000	\$2,880,000	\$3,240,000	\$3,600,000	\$3,600,000	\$3,600,000	\$3,600,000	\$3,600,000
Other Operating costs - Mining & Mineral Processing													
Diesel (Power)	\$1,100	m3		\$2,970,000	\$3,960,000	\$4,950,000	\$7,920,000	\$8,910,000	\$9,900,000	\$9,900,000	\$9,900,000	\$9,900,000	\$9,900,000
Other Operating costs - Product Manufacturing													
Power	\$40	MWh	\$0	\$4,470,000	\$5,960,000	\$7,450,000	\$11,920,000	\$13,410,000	\$14,900,000	\$14,900,000	\$14,900,000	\$14,900,000	\$14,900,000
Process Reagents - Mineral Processing													
Grinding media/ liners/reagents			\$0	\$990,000	\$1,320,000	\$1,650,000	\$2,640,000	\$2,970,000	\$3,300,000	\$3,300,000	\$3,300,000	\$3,300,000	\$3,300,000
Process Reagents - Product Manufacturing													
Coating Pre-cursor	\$2,100	t	\$0	\$1,380,000	\$1,840,000	\$2,300,000	\$3,680,000	\$4,140,000	\$4,600,000	\$4,600,000	\$4,600,000	\$4,600,000	\$4,600,000
Graphite (furnace electrode)			\$0	\$750,000	\$1,000,000	\$1,250,000	\$2,000,000	\$2,250,000	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000
TOTAL INTEGRATED PRODUCTION COSTS			\$3,888,000	\$35,040,550	\$42,914,400	\$50,788,250	\$82,430,800	\$90,304,650	\$98,178,500	\$98,178,500	\$98,178,500	\$98,178,500	\$98,178,500
<i>Mining</i>			\$0	\$8,322,150	\$11,096,200	\$13,870,250	\$22,192,400	\$24,966,450	\$27,740,500	\$27,740,500	\$27,740,500	\$27,740,500	\$27,740,500
<i>Mineral Processing Plant*</i>			\$2,434,000	\$12,003,500	\$13,773,500	\$15,543,500	\$26,330,000	\$28,100,000	\$29,870,000	\$29,870,000	\$29,870,000	\$29,870,000	\$29,870,000
<i>Products Manufacturing Plant**</i>			\$1,454,000	\$14,714,900	\$18,044,700	\$21,374,500	\$33,908,400	\$37,238,200	\$40,568,000	\$40,568,000	\$40,568,000	\$40,568,000	\$40,568,000
<i>Cost per unit t of Graphite Product Out \$ per t</i>				\$2,110	\$1,938	\$1,835	\$1,862	\$1,813	\$1,774	\$1,774	\$1,774	\$1,774	\$1,774

* Mineral Processing cost includes cost of concentrate shipments to Nome from Mill.

**Product Manufacturing cost includes cost of concentrate shipments from Nome to Product Manufacturing Plant
TRU Estimates

Table 68: Graphite One Plants cash operating costs by item



The summary distribution of operating costs, Table 69, shows that power (25%) and labour (42%) are the major contributors to the total costs of the integrated operation. The cost of electrical power at the Alaska Plant generated by a diesel power plant accounts for 33% of the plant operating costs. Electrical power for the Product Manufacturing Plant provided from the grid is 37% of the plant operating cost. Concentrate shipping from Nome, Alaska to the Product Manufacturing Plant is also a large cost item accounting for 19% of the latter's operating cost. Diesel supply, alternative power generation options and concentrate shipping require further investigation in future studies.

MAJOR OPERATING COST ITEM	GRAPHITE CREEK OPERATIONS				PRODUCT MANUFACTURING		INTEGRATED PLANTS TOTAL	
	MINING		MINERAL PROCESSING		\$	%	\$	%
	\$	%	\$	%				
Labour	\$21,887,000	79%	\$12,170,000	41%	\$7,270,000	18%	\$41,327,000	42%
Energy (Power and Diesel) ¹			\$9,900,000	33%	\$14,900,000	37%	\$24,800,000	25%
Equipment Operation	\$2,799,500	10%					\$2,799,500	3%
Consumables			\$3,300,000	11%	\$7,100,000	18%	\$10,400,000	11%
Maintenance & Supplies	\$1,781,500	6%	\$2,700,000	9%	\$3,600,000	9%	\$8,081,500	8%
Miscellaneous	\$1,272,500	5%					\$1,272,500	1%
Concentrate Shipping			\$1,800,000	6%	\$7,698,000	19%	\$9,498,000	10%
Total Operating Cost	\$27,740,500	100%	\$29,870,000	100%	\$40,568,000	100%	\$98,178,500	100%
- % of total :	28%		30%		41%		100%	

Sources & notes -

¹ Mining energy cost included in Alaska Plant cost
TRU Estimates

Table 69: Summary operating cost structure by operation at full capacity 2016\$

The average price of the Graphite One manufactured output products at full design capacity of 55,350 tpy-product is projected to be \$3,920 per t, on a 2016 constant US dollar ex-plant basis. The average reflects TRU estimates for the likely achievable price for the individual products after examining various sources of data and China export value data on per t basis. The price estimates are shown in Section 19, Table 19-7 Graphite One projected sales volume by material segmentation and end-use.

22.2 Project Profitability

The Graphite One business model generates cash earnings of \$182 million per year on sales of \$280 million at full capacity with a consolidated operating margin (EBDIT) of 63% on sales. CSG dominates the output accounting for 93% or US\$259.5 million, of the total. Purified Graphite Powders account for the balance with sales of \$20 million. Sales figures are summarized in Table 32 Graphite One sales segmentation by product – volume t & value 2016\$US.

The required project total capital cash outlay over ten years is estimated at \$368 million, which includes working capital. The resultant Net Present Value (NPV) is \$1,037 million using a 10% discount rate and mine life of 40 years. The Internal Rate of Return (IRR) is 27% with payback in Year-4 from the start-up of production. The consolidated summary is given in following Table 70.



Graphite One Projected Consolidated Financial Estimates $\pm 45\%$ ³

US\$ millions Constant 2016

LINE ITEM	Year(-1)	Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
TOTAL SALES REVENUE		\$0	\$84	\$112	\$140	\$224	\$252	\$280	\$280	\$280	\$280	\$280
Less Plant Operating Costs:		\$4	\$35	\$43	\$51	\$82	\$90	\$98	\$98	\$98	\$98	\$98
Plant Operating Profit		-\$4	\$49	\$69	\$89	\$141	\$161	\$182	\$182	\$182	\$182	\$182
- operating margin %			58%	62%	64%	63%	64%	65%	65%	65%	65%	65%
Less Company Overhead Costs:		\$2	\$5	\$5	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4
Corporate and SG&A:			\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3
Product Development R&D:		\$2	\$2	\$2	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
EARNINGS - EBDIT		-\$6	\$44	\$64	\$85	\$137	\$157	\$178	\$178	\$178	\$178	\$178
ANNUAL CAPITAL OUTLAY	\$164	\$164	\$38	\$2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plant and Equipment Cost:	\$164	\$164	\$36	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Working Capital:			\$2	\$2								
ANNUAL NET CASH FLOW	-\$164	-\$169	\$6	\$62	\$85	\$137	\$157	\$178	\$178	\$178	\$178	\$178
Cumulative Cash Flow:	-\$164	-\$333	-\$327	-\$265	-\$180	-\$43	\$114	\$292	\$469	\$647	\$825	\$1,002
PROFITABILITY ANALYSIS:												
EBDIT as % of Revenue			52%	57%	61%	61%	63%	63%	63%	63%	63%	63%
Net Present Value [NPV] at	\$1,037											
discounting rate 10%												
Internal Rate of Return [IRR]	27%											
Payback in Production Year	4											

Sources & notes:

- 1 EBDIT = earnings before depreciation, interest and taxes
- 2 NPV rate adjusted for elevated risk calculated for forty years operation with no terminal value
- 3 TRU estimates subject to error caution stated in the text of the report

Table 70: Graphite One Project consolidated financial estimates 2016 \$million

22.3 Post-Tax Financial Analysis

22.3.1 Assumptions

For purposes of this analysis, it is assumed that the vertically-integrated Graphite One Project is controlled and owned by a US-based entity and financed by 100% equity. The relevant tax jurisdictions for the purposes of this analysis are the United States federal government, the State of Alaska, and the State of Washington. The post-tax analysis includes consideration of the current US Federal Income Tax, State of Alaska Corporate Income Tax and Mining License Tax (including the production royalty on state lands that is calculated in the same manner), and State of Washington Business and Occupation Tax. The analysis assumes that taxes are paid in the year incurred.

Not considered in the analysis but which may apply are state or local sales, excise, use, and property taxes. Also not considered are tax incentives offered by the State of Washington, which may reduce the overall effective Business and Occupation tax rate, and any potential incentives or assistance extended by the State of Alaska. As development decisions are made in the future, Graphite One will seek expert



accountancy and legal counsel to develop a corporate structure that optimizes the after-tax financial outlook for the project.

US FEDERAL INCOME TAX

General Rate

The top marginal US federal corporate income tax rate currently is 35%. US federal income tax is imposed on gross income less allowable deductions, which generally include depreciation and amortization of capital investments, operating costs, depletion allowance, state and local taxes, royalties paid to third parties, and other deductible expenditures.

Depreciation Allowance

Straight line depreciation of all mining and mineral processing equipment against gross income has been assumed over the first seven years of production.

Straight line depreciation of all mining and mineral processing equipment against gross income has been assumed over the first seven years of production. Future assessments may choose a more tax advantageous depreciation methodology if one is available at the time.

Depletion Allowance

An owner of an economic interest in a mine is allowed a depletion deduction in computing taxable income for US federal income tax purposes. The amount of the depletion allowance for any taxable year is the greater of cost depletion, which is based on the cost of the minerals in place, and percentage depletion, which is calculated as a percentage of gross income from mining. Percentage depletion allowance is applicable to hard rock mineral bodies under certain circumstances. When applicable, percentage depletion is applied against gross income at varying rates according to the mineral or metal classification. Pursuant to 26 U.S.C. § 613, the percentage depletion rate for graphite from deposits in the United States is 22% of gross income. It is subject to various limitations, including a limit of 50% of mining taxable income, and possible application of the Alternative Minimum Tax. A percentage depletion rate of 22% per year has been applied in the Post-Tax Analysis of the Graphite One Project.

DOMESTIC ACTIVITIES PRODUCTION DEDUCTION (DAPD)

The DAPD is a deduction provided to businesses that produce certain goods in the United States. It went into effect in 2005 and applies to both small and large businesses. The deduction is limited to up to half the amount of wages paid to workers engaged in domestic production during the taxable year and it cannot exceed the corporation's taxable income for the year. The applicable deduction is 9% of gross receipts from qualified production activities minus the cost of goods sold that are allocable to such receipts and other expenses, losses, and deductions that are properly allocable to such receipts. DAPD has been applied to Federal corporate taxable income. Alaska State corporate taxable income is based on Federal taxable income with certain adjustments, and the DAPD has been adopted by reference.

STATE OF ALASKA CORPORATE INCOME TAX (ACIT)

Alaska levies a corporate income tax on taxable income, which is based on federal taxable income with certain Alaska adjustments. The tax rates are graduated from 0% to 9.4%; the 9.4% rate applies to taxable income in excess of \$222,000. If taxable income exceeds \$222,000, the tax due would be \$10,830 plus 9.4% of the taxable income over \$222,000.



Alaska Mining License Tax (AMLT)

The AMLT is calculated on a sliding scale based on net income from mining in Alaska.

Mining Net Income	Rate
\$0 - \$40,000	No Tax
\$40,001 - \$50,000	\$1,200 plus 3% over \$40,000
\$50,001 - \$100,000	\$1,500 plus 5% over \$50,000
Over \$100,000	\$4,000 plus 7% over \$100,000

An exemption from the AMLT is provided to new mining operations for a period of three and a half years (3.5 years) from the start of production.

In the calculation of the AMLT, both (i) payments made to other holders of economic interests in the involved property (e.g., royalty interests) and (ii) other tax payments (including the ACIT and sales, excise, use, and property taxes) are deductible.

The applicable rate for the Graphite One Project after 3.5 years of production is \$4,000 plus 7% of net income over \$100,000. As discussed below, exploration incentive tax credits can be applied against up to 50% of tax liabilities for up to 15 years.

Alaska Production Royalty (APR)

The APR is payable on mineral production from state lands. It is anticipated and thus assumed that all of Graphite One’s production will come from state lands. The APR is equal to three percent (3%) of net income as determined under the Alaska Mining License Tax Law (AS 43.65) and regulations (15 AAC 65). The 3.5-year exemption from the AMLT does not apply to the APR, thus the APR is payable from the commencement of production.

Private Royalty Agreements

Several of the Graphite Creek properties have outstanding royalty agreements. In simplified terms, Graphite One has the option of buying out or buying down these royalties, such that the maximum royalty due on any property will be a 3% net smelter returns (NSR) royalty. It is assumed that Graphite One will exercise these options on the applicable mining claims in the target exploration area with payments of US\$4.5 million and CAD\$1 million.

For purposes of this analysis, annual royalties payable to third parties on Graphite One’s properties thus will be assumed to be a maximum of three percent (3%) of the NSR, with NSR based on the arm’s length sales price of flake graphite concentrate delivered to the manufacturing plant less all freight, warehouse, insurance, and other costs of transportation, storage, and shipping. TRU assumes an Alaska to Washington concentrate transfer price equal to the China export value 2016 for “Natural Graphite in Flakes” Commodity code 25041010 = US\$740 per t FOB China.

Further refinement of royalty payments will be made in future assessments once the proportion of production of the affected mining claims are calculated with greater accuracy from a detailed mining plan.

Exploration Incentive Credit (EIC)

The EIC Program is authorized under AS 27.30.010-27.30.099 and provides credits for certain approved expenditures related to mineral exploration activities. Subject to certain limitations, these credits can be applied against tax liabilities arising under the AMLT and the ACIT, and against royalty obligations arising under the APR. The credit is limited to \$20 million and may be applied against 50% of tax liabilities over a 15-year period. Only expenditures that are incurred prior to the mine construction commencement date are eligible. The mine construction commencement date is the date most mining permits and other required permits have been issued and remaining permits are forthcoming.

WASHINGTON STATE BUSINESS AND OCCUPATION (B&O) TAX

The State of Washington does not have personal or corporate income tax. Rather a Business and Occupation tax is imposed upon the privilege of engaging in business and levied against gross receipts. This means there are no deductions from the B&O tax for labor, materials, taxes, or other costs of doing business. The B&O tax is measured by the application of rates against value of products, gross proceeds of sales, or gross income of the business. The B&O tax rate varies by business activity. The applicable B&O tax rate for manufacturing is 0.484% of the value of the products manufactured in Washington. The wholesaling tax rate is 0.484% of the gross proceeds of sales in Washington, with a credit for any manufacturing tax paid.

In future assessments, the Project will consider whether a sale of concentrate to the plant owner or a tolling arrangement with the plant owner is the most tax advantageous arrangement.

WASHINGTON STATE TAX INCENTIVES

The State of Washington provides tax incentive on R&D expenditures and on new employment depending on location. Applicable incentives will be examined in future assessments following selection of the site for the Product Manufacturing Plant.

22.3.2 Post-Tax Economic Summary

The post-tax Graphite One Project financial highlights are summarized below in Table 71.

Parameter	Value
Earnings Post-Tax (Year-8 +)	\$118 million per year
NPV at 10% Discounting Rate	\$616 million
IRR	22 %
Payback	Production Year 4

Table 71: Graphite One Project post-tax financial highlights

The post-tax consolidated financial statement for the Graphite One integrated project appears in Table 72. Following the expansion of spherical graphite production to full capacity in Production Year 7.5 and the concurrent expiration of depreciation allowances and EIC credits, the Earnings Post-Tax stabilize at \$118 million per year with an operating margin of 42% in Production Year 8. The project NPV at a 10% discounting rate is calculated at \$616 million. Project IRR is 22% with payback achieved during Production Year 4.

Graphite One Financial Projections in Constant 2016 US\$ million **POST TAX**

Graphite One Projected Consolidated Financial Estimates $\pm 45\%$ ²

US\$ millions Constant 2016

LINE ITEM	Year(-1)	Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
TOTAL SALES REVENUE		\$0	\$84	\$112	\$140	\$224	\$252	\$280	\$280	\$280	\$280	\$280
Less Plant Operating Costs:		\$4	\$35	\$43	\$51	\$82	\$90	\$98	\$98	\$98	\$98	\$98
Plant Operating Profit		-\$4	\$49	\$69	\$89	\$141	\$161	\$182	\$182	\$182	\$182	\$182
- operating margin %			58%	62%	64%	63%	64%	65%	65%	65%	65%	65%
Less Company Overhead Costs:		\$2	\$5	\$5	\$4	\$4	\$4	\$4	\$4	\$4	\$4	\$4
Corporate and SG&A:			\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3
Product Development R&D:		\$2	\$2	\$2	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
TAXES, ROYALTIES												
Combined Federal, Alaska & Washington Taxes & Royalties		-\$0.1	\$5.0	\$6.8	\$16.8	\$31.7	\$39.8	\$45.8	\$47.8	\$59.4	\$59.4	\$59.4
Federal Tax			\$3.3	\$3.7	\$11.3	\$21.3	\$25.2	\$29.1	\$29.1	\$34.3	\$34.3	\$34.3
Alaska State Tax			\$0.6	\$1.3	\$2.0	\$3.7	\$4.4	\$5.1	\$7.1	\$11.8	\$11.8	\$11.8
Washington B&O Tax			\$0.4	\$0.5	\$0.7	\$1.1	\$1.2	\$1.4	\$1.4	\$1.4	\$1.4	\$1.4
Production Royalties			\$0.3	\$0.8	\$1.1	\$2.4	\$2.8	\$3.2	\$3.2	\$3.8	\$3.8	\$3.8
NSR Royalties			\$0.4	\$0.5	\$0.7	\$1.1	\$1.2	\$1.3	\$1.3	\$1.3	\$1.3	\$1.3
Mining License Tax			\$0.0	\$0.0	\$1.1	\$2.1	\$5.0	\$5.7	\$5.7	\$6.8	\$6.8	\$6.8
EARNINGS - Post Tax		-\$6	\$39	\$57	\$68	\$106	\$118	\$132	\$130	\$118	\$118	\$118
ANNUAL CAPITAL OUTLAY		\$164	\$169	\$38	\$2	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plant and Equipment Cost:		\$184	\$184	\$38	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Working Capital:				\$2	\$2							
NSR Buyout/Buydown			\$5									
ANNUAL NET CASH FLOW		-\$184	-\$175	\$1	\$55	\$68	\$106	\$118	\$132	\$130	\$118	\$118
Cumulative Cash Flow:		-\$164	-\$338	-\$338	-\$282	-\$214	-\$108	\$9	\$141	\$271	\$389	\$507
PROFITABILITY ANALYSIS:												
Earnings Post-Tax as % of Revenue			46%	51%	49%	47%	47%	47%	46%	42%	42%	42%
1 Net Present Value [NPV] at discounting rate 10%		\$616										
Internal Rate of Return [IRR]		22%										
Payback in Production Year		4										

Sources & notes:

- 1 NPV rate adjusted for elevated risk calculated for forty years operation with no terminal value
- 2 TRU estimates subject to error caution stated in the text of the report

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Table 72: Graphite One Project post-tax financial estimates 2016 \$million

22.4 Sensitivity Analysis

A sensitivity analysis of the pre-tax (EBDIT) consolidated financials was carried out to determine the effect of the following parameters on the NPV (at a 10% discount rate) and IRR.

- CSG product selling price
- Capital cost
- Operating cost
- Graphite (Cg) head grade, and
- Graphite (Cg) recovery

The following are the summary findings of the sensitivity analysis, also tabulated in Table 73:



The product selling price had the greatest impact on the NPV and IRR. A 10% change in the selling price resulted in a change of about \$210 million in the NPV and 2.9% in the IRR.

- A 10% change in the operating cost resulted in an NPV and IRR change of \$80 million and 1.2%, respectively.
- A 10% change in the recovery resulted in an NPV and IRR change of about \$60 million and 1.4%, respectively.
- A 10% change in the head grade resulted in an NPV and IRR change of about \$50 million and 1.3%, respectively.
- A 10% change in the capital cost resulted in an NPV and IRR change of \$35 million and 1.8%, respectively.

VARIABLE PARAMETER (10%)	NPV IMPACT	IRR IMPACT
CSG Selling Price	\$210 million	2.9%
Operating Cost	\$80 million	1.2%
Recovery	\$60 million	1.4%
Head Grade	\$50 million	1.3%
Capital Cost	\$35 million	1.8%

Table 73: Impact of 10% variation in selected parameters on Graphite Creek Project NPV and IRR

The analysis was based on varying each parameter by reasonable plus and minus factors and running the economic analysis using the base case spreadsheet. The NPV at 10% discount rate and IRR results are shown below in Figure 88 and Figure 89 and Table 74, Table 75, and Table 76. The base case parameters and results are highlighted in the tables.

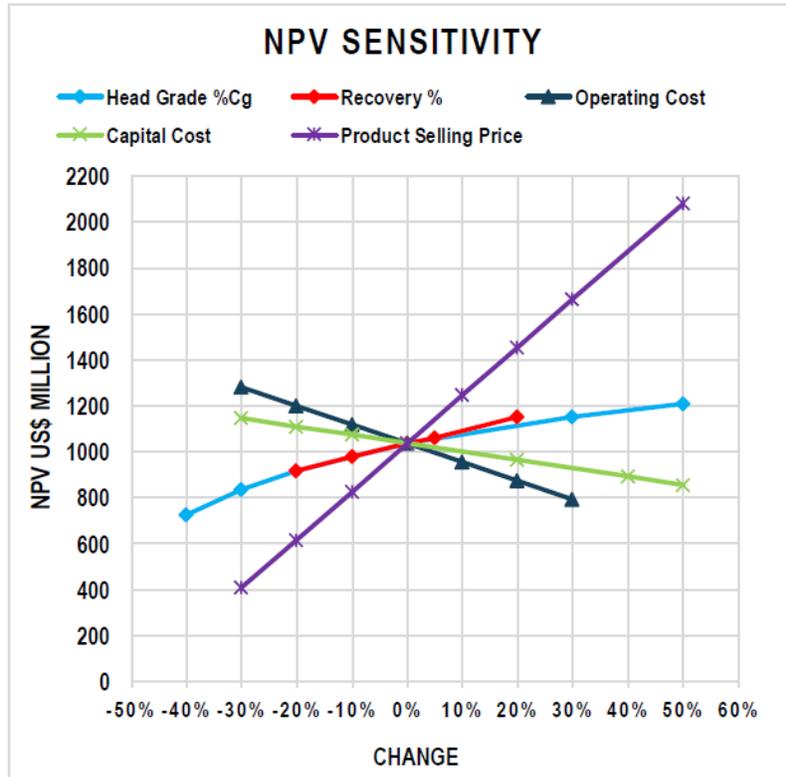


Figure 88: NPV Sensitivity Graph (before tax)

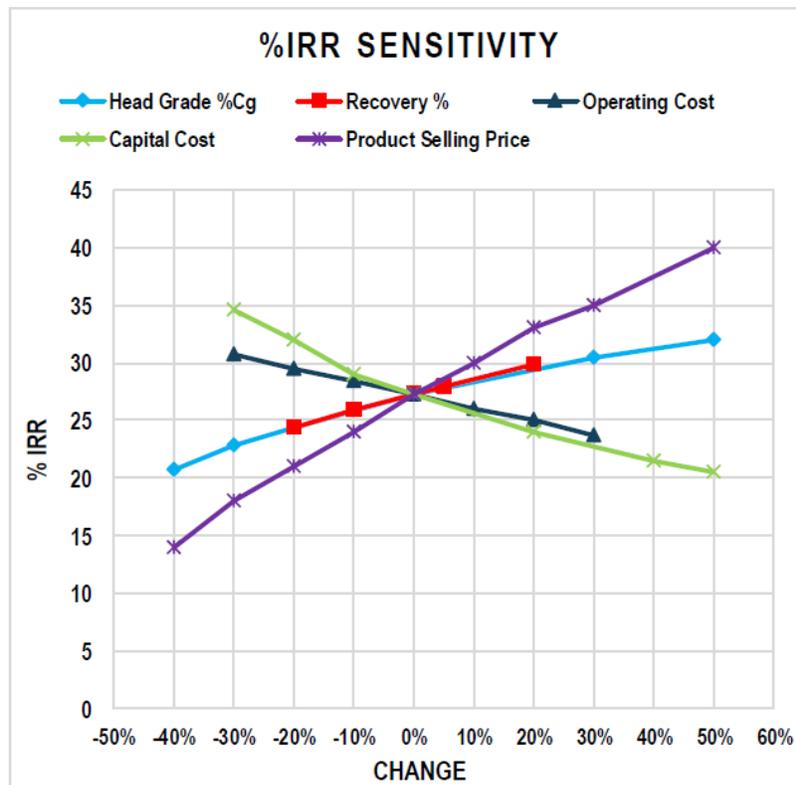


Figure 89: IRR Sensitivity Graph (before tax)



COATED SPHERICAL GRAPHITE PRODUCT SELLING PRICE					
	PRICE	CHANGE	NPV	IRR	PAYBACK
	\$/t	%	\$million	%	Production Year
	3720	-40%	199	14	7
	4340	-30%	408	18	6
	4960	-20%	616	21	5
	5580	-10%	827	24	4
Base Case	6200	0%	1037	27	4
	6820	10%	1246	30	3
	7440	20%	1456	33	3
	8060	30%	1665	35	3
	9300	50%	2084	40	3

Sources & notes -
TRU Estimates
TRU Group Inc

Table 74: NPV and IRR Results for CSG product selling price variations

	CAPITAL COST				OPERATING COST			
	COST	CHANGE	NPV	IRR	COST	CHANGE	NPV	IRR
	\$million	%	\$million	%	\$/t-Product	%	\$million	%
	254	-30%	1145	35	1242	-30%	1280	31
	291	-20%	1109	32	1419	-20%	1199	30
	327	-10%	1073	29	1596	-10%	1118	28
Base Case	363.5	0%	1037	27	1774	0%	1037	27
	436	20%	965	24	1951	10%	956	26
	509	40%	893	22	2129	20%	875	25
	545	50%	857	21	2306	30%	794	24

Sources & notes -
TRU Estimates
TRU Group Inc

Table 75: NPV and IRR results for factored capital cost and operating cost

	Cg HEAD GRADE				Cg RECOVERY			
	Cg	CHANGE	NPV	IRR	RECOVERY	CHANGE	NPV	IRR
	%	%	\$million	%	%	%	\$million	%
	4.2	40%	727	20.7				
	4.9	30%	836	22.8	64	-20%	915	24
	5.6	20%	915	24.4	72	-10%	981	26
Base Case	7	0%	1037	27.3	80	0%	1037	27
	9.1	-30%	1151	30.4	84	5%	1060	28
	10.5	-50%	1208	32	96	20%	1150	30

Sources & notes -
TRU Estimates
TRU Group Inc

Table 76: NPV and IRR results for factored head grade and recovery



The financial model was also run to determine the sensitivity of the NPV and IRR to the length of the mine operation. The results are shown in Table 77.

MINE LIFE			
YEARS	CHANGE %	NPV \$million	IRR %
10	-75%	397	23.7
15	-63%	654	26.4
20	-50%	814	27.0
28	-30%	953	27.2
Base Case	40	1037	27.3

Sources & notes -
TRU Estimates
TRU Group Inc

Table 77: NPV and IRR results for a reduced mine life

23 Adjacent Properties

There are no adjacent properties to Graphite One’s Graphite Creek property. The Graphite Creek property is the only property currently focused on graphite in the region.

24 Other Relevant Data and Information

The following information is taken from Graphite One’s PEA prepared by TRU Group dated June 30, 2017.

24.1 Project Timing and Schedule

A preliminary project schedule is presented in Figure 90. The following are key time sensitive dependencies to meet the proposed schedule:

- Development of the Alaska site is dependent on the construction of the 35km site access road which will start the spring of 2018 on completion of feasibility studies and permitting.
- Long-lead process equipment must be identified at the beginning of the feasibility study stage (grinding mills, purification furnaces, specialty processing equipment).
- Outdoor construction will be minimized during the coldest part of the year so the site preparation and concrete work must be started in spring of 2019 at the respective sites of the Mineral Processing Plant and Product Manufacturing Plant.

The schedule assumes that Graphite One Resources Inc has financing in place to initiate the feasibility and other baseline studies in Q1 2017.

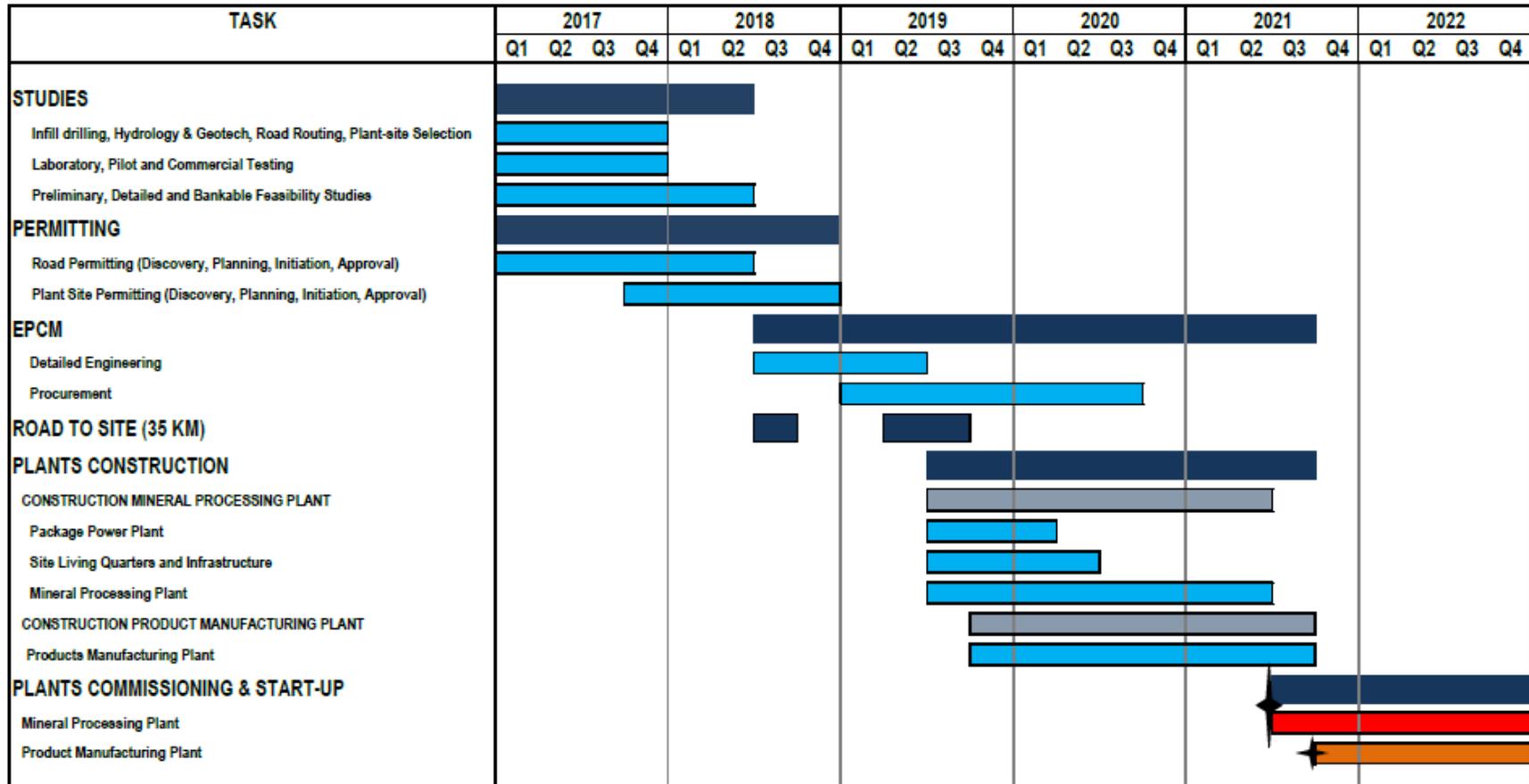


Figure 90: Preliminary schedule for Graphite One Project

24.2 Risks and Opportunities

The following risks and opportunities have been identified as particularly impactful to the Graphite One Project.

24.2.1 Risks

The Alaska mining and mineral processing aspects of the Project are subject to common risks set as confronting other non-commodity mineral extraction-based operations, including:

- Accurate characterization of the deposit through modelling and drilling
- Access to sufficient resources and infrastructure to effectively and efficiently extract the resource from the ground
- Acceptance and cooperation from the local population, Alaska Natives groups, and municipal, state and federal governments
- Assurance that the Project will not harm the local and wider environment, and that remediation of the land after Project fulfillment is practicable

From the perspective of spherical graphite product manufacturing

- Market acceptance of a novel graphite material
- Market penetration and competitiveness in the face of China dominance in graphite primary production
- Research and development into value-added processing of graphite concentrate into spherical graphite by lithium-ion battery end-use segment to maximize use and revenue

These and other risks have been mitigated and resolved to various degrees thus far in the project life, and will continue to be addressed, as described elsewhere in this assessment.

It is prudent to note risk associated with the reliance of the Project on the CSG product for electric vehicle batteries. This is the risk that there will not be sufficient market for the graphite volume produced by this project and its competitors. Also, there is a technology risk in that other battery technologies may be developed over time that replace lithium-ion chemistry. It would certainly seem that this risk is currently low as the technology has gained acceptance and share in both the consumer mind and in the automotive manufacturers' plans.

24.2.2 Opportunities

This project is responding to the opportunity created by the adoption of the li-ion battery for electric vehicle batteries but in addition the shift in battery production from offshore to the United States. As noted elsewhere in this report, over 26,000 MWh per year of new capacity is currently under construction in the United States. This is three times that existing in 2016 and will serve to further solidify its strong position as a producer of electric vehicle batteries.

There are other opportunities that have not been fully explored as yet, including market potential for the by-product graphite powders, which will be very pure, micronized powders with very small variability in sizing and composition. There may be some very lucrative application markets for these products, which will greatly enhance the economics of the Project. Further study is required.



25 Interpretation and Conclusions

25.2 Drilling

Assay results from the 2018 drilling extended graphite mineralization down-dip 50 m to the northwest. Highlights from the assays are given in Table 78 below. Full assay results can be found in Appendix 28.2.

No Cutoff						6% Cutoff					
Hole ID	Section	From (m)	To (m)	Length (m)	Cg (%)	Hole ID	Section	From (m)	To (m)	Length (m)	Cg (%)
18GC021	4450	26.65	63	36.35	5.99	18GC021	4450	26.65	31	4.35	7.02
								44.3	45.65	1.35	16.04
18GC022	4350	19	28.5	9.5	7.56	18GC022	4350	20	25	5	7.75
		34	52	14.95*	5.6			25.7	27.74	2.04	11.13
		101.5	113.45	11.95	9.48			49.07	51	1.93	9.06
		*3.05m not sampled due to poor recovery						105	107	2	7.72
								108.78	109.4	0.62	30.13
								112.79	113.45	0.66	22.97
18GC023	4450	42	45.94	3.94	5.44	18GC023	4450	58	60	2	12.31
		53.75	79	25.25	7.88			65	67	2	8.42
		85	96.19	11.19	7.13			69	71	2	10.26
		158	171	13	6.07			74	75	1	20.5
		185.5	186.5	1	11.7			76	79	3	14.4
								85	88	3	11.79
				92	94	2	8.61				
				165	167	2	11.46				
18GC024	4400	11	18	7	4.71	18GC024	4400	11	14	3	6.27
		26.93	33.5	6.57	9.59			31	33.5	2.5	19.07
		40	59.5	19.5	7.94			49	51	2	13.04
		64	87	23	6.71			52	54	2	9.73
		124	133.5	9.5	6.33			58.75	59.5	0.75	25.28
								64	66.2	2.2	9.81
				79	82	3	7.73				
				85	87	2	9.89				
18GC025	4500	30	40.25	10.25	5.21	18GC025	4500	30	32	2	7.25
		46	56	10	7.16			52	54.1	2.1	15.19
		59.96	70.8	10.84	7.05			59.96	63	3.04	8.89
		85.87	87.58	1.71	25.14			85.87	87.58	1.71	25.14
		158.18	161	2.82	2.08						
18GC026	4550	27.75	33.63	5.88	8.06	18GC026	4550	27.75	32.96	5.21	8.08
		42	59.54	17.54	11.39			46	51	5	17.22
								55.85	57.55	1.7	16.59
								58.67	60.29	1.65	21.54

Table 78: Assay highlights from 2018 drilling.

The higher grade graphite mineralization is found within the coarser grained quartz-biotite-garnet-sillimanite schist. The graphite is observed as wavy laminations and semi-massive intervals up to just over 1 m. Garnets are usually present and may range from 2 mm up to 2 cm. The graphite following foliation sometimes exhibits structural habits such as crenulations illustrating the presence of graphite prior to a structural event. Some semi-massive intervals appear to be hydrothermally brecciated, indicating hydrothermal fluids were present at some point in the mineralized system. It is still unclear as to what degree structural and hydrothermal controls had on the graphite mineralization.

The quartz-biotite schist has lower grade disseminated graphite. This unit is finer grained and sometimes appears to have a relic porphyritic texture implying the potential for a volcanic protolith. Disseminated pyrrhotite is found up to 0.5% within the quartz-biotite schist between the two main sillimanite- and graphite-rich units.

The higher grade graphite mineralization is primarily found in an upper and lower zone within the quartz-biotite-garnet-sillimanite schist with a lower grade quartz biotite schist in the middle (Figures 91-95). The 2018 drilling continued to show that the upper zone of mineralization is fairly consistent. There may be a decrease in mineralization closer to the fault as shown in section 4500E (Figure 94), but more drilling would need to confirm this. The lower zone of mineralization is more variable in the grade and thickness of higher grade graphite mineralization. This lower lithologic unit also has more variability in thickness with more interbedded quartz-biotite schist to the west (sections 4350E and 4400E, Figures 91 and 92) and overall thinning to the east (section 4500, Figure 94).

Four of the drill holes drilled this year were collared below the break in slope of the Kigluaik mountain front as no previous drill holes had done. Each of these drill holes encountered a large, fault gouge zone immediately below the thickening overburden before going into bedrock. The thickness of the fault zone was anywhere between 2 m to 15 m. The gouge appeared to have pieces of milled up graphitic schist and quartz diorite. This fault zone is interpreted to be part of the basin-bounding Kigluaik fault system. Understanding where this fault (or fault splays) are located is important as this bounds the northwest extent of graphite mineralization.



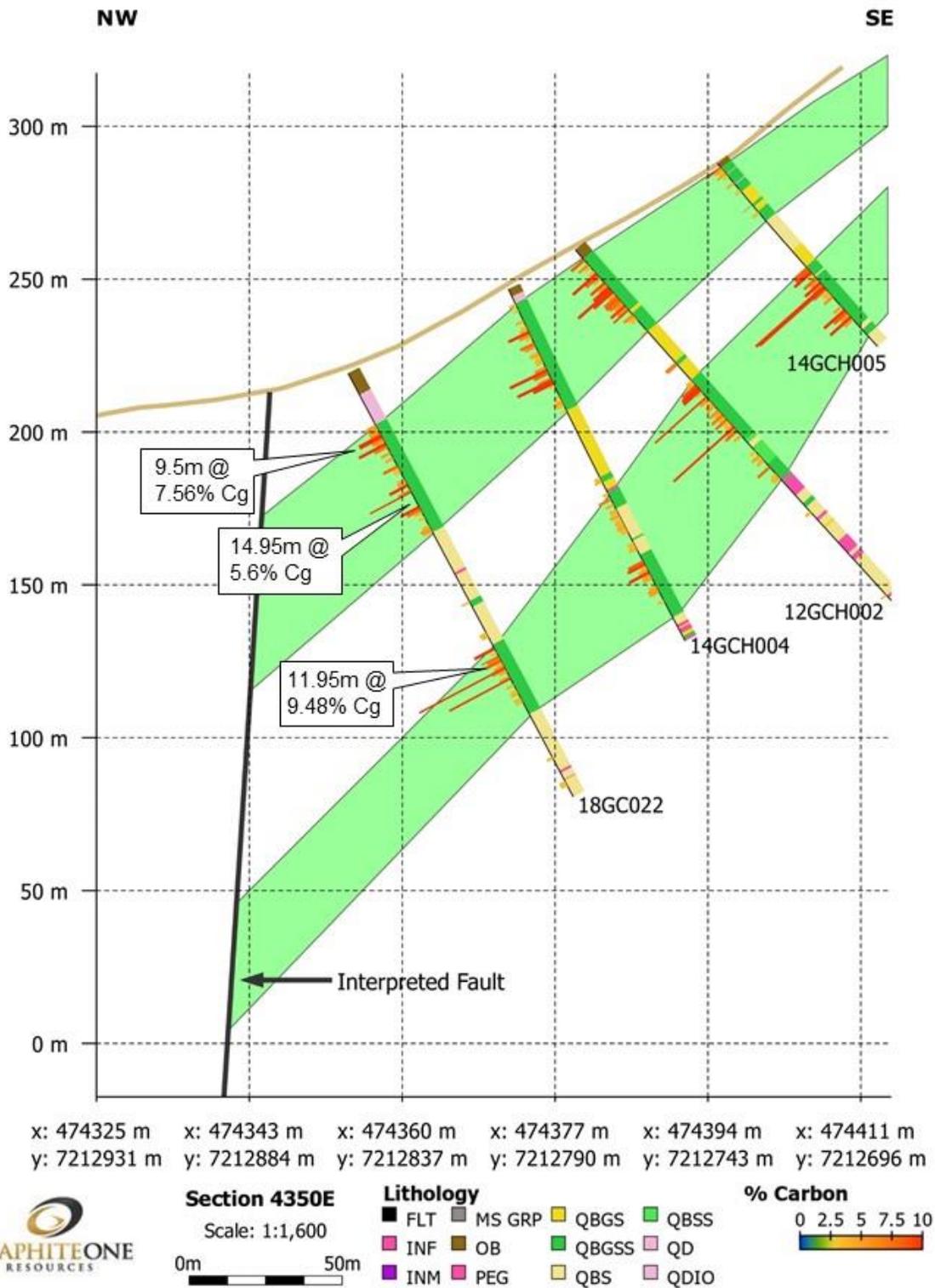


Figure 91: Section 4350E.

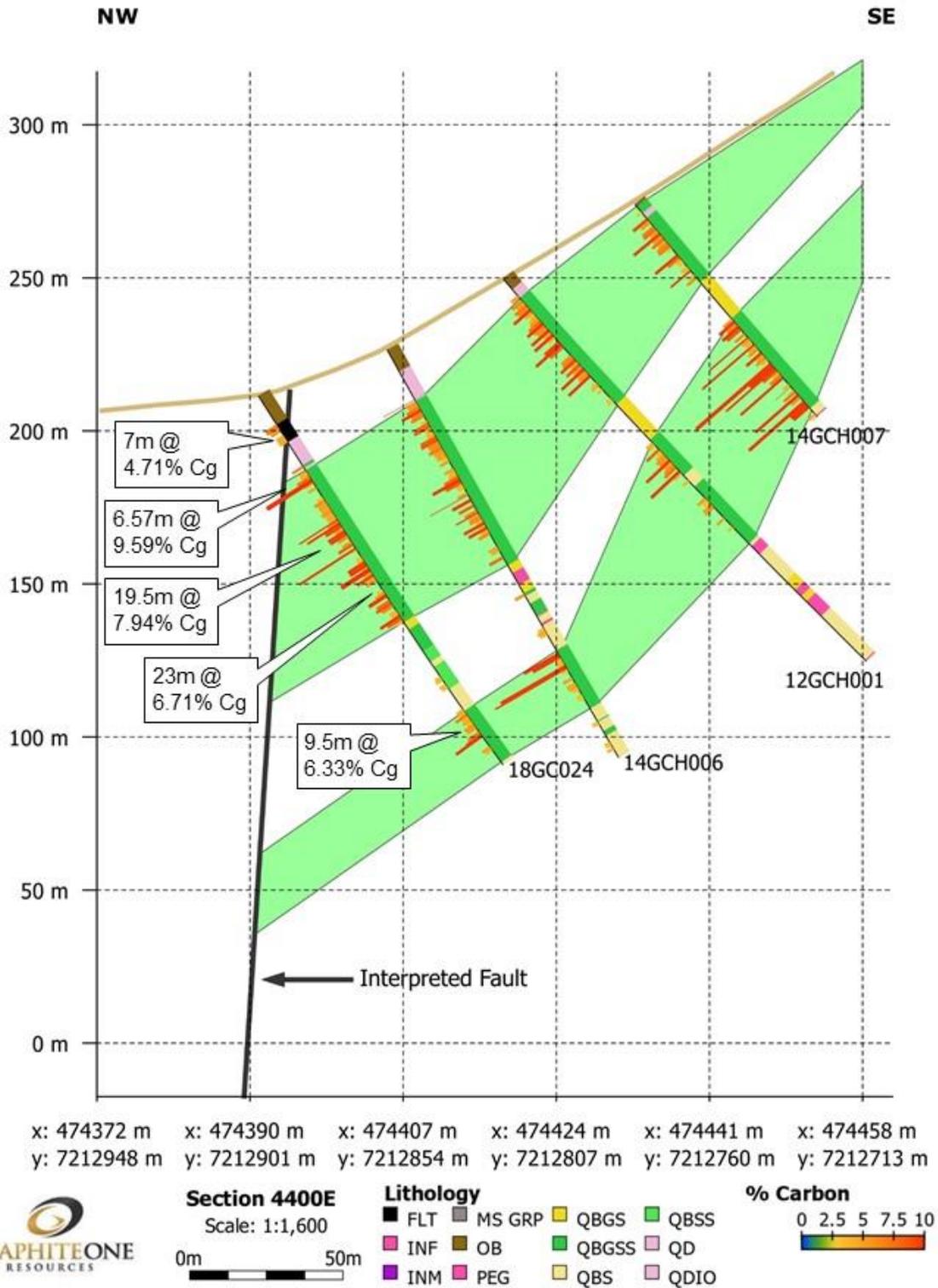


Figure 92: Section 4400E.

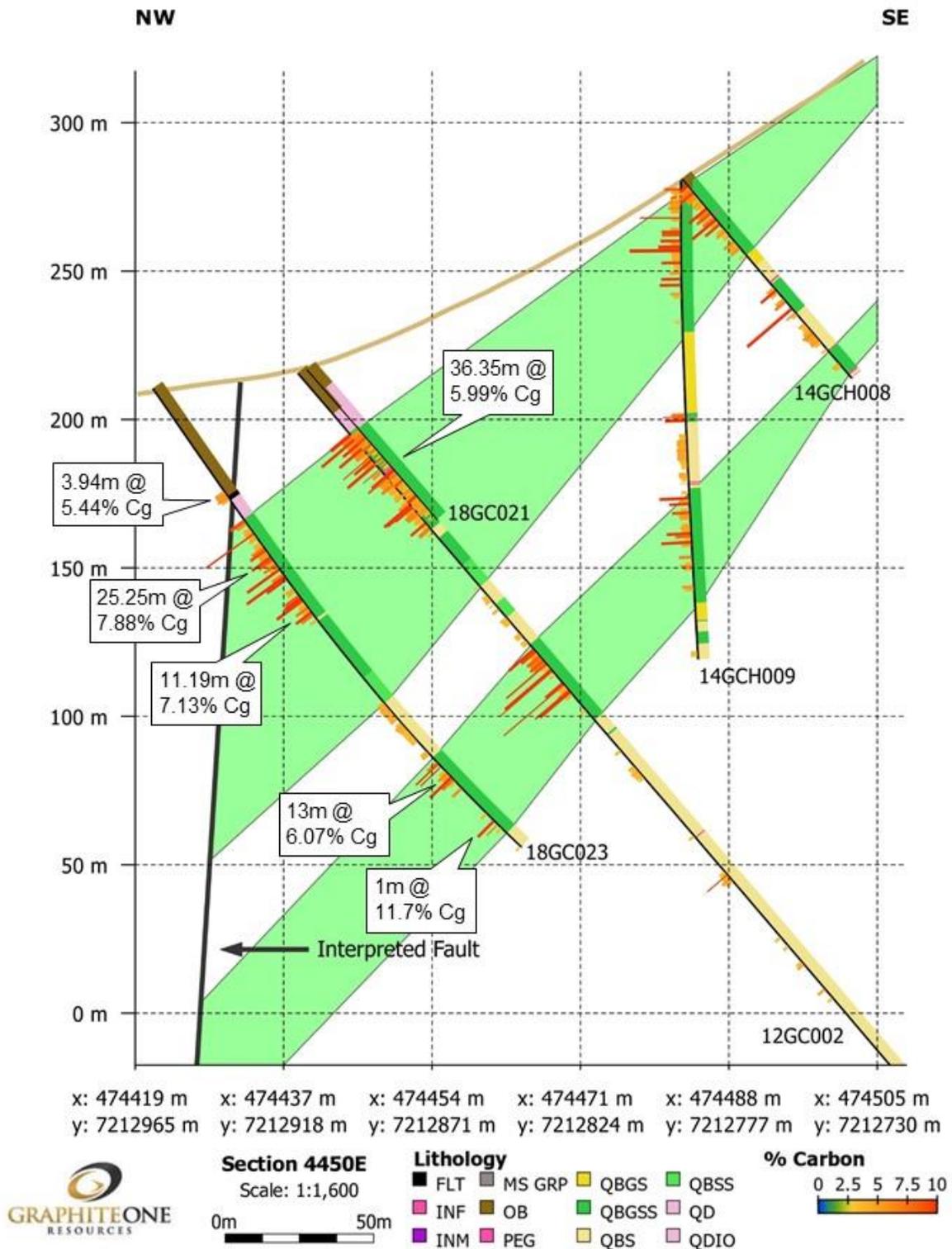


Figure 93: Section 4450E.

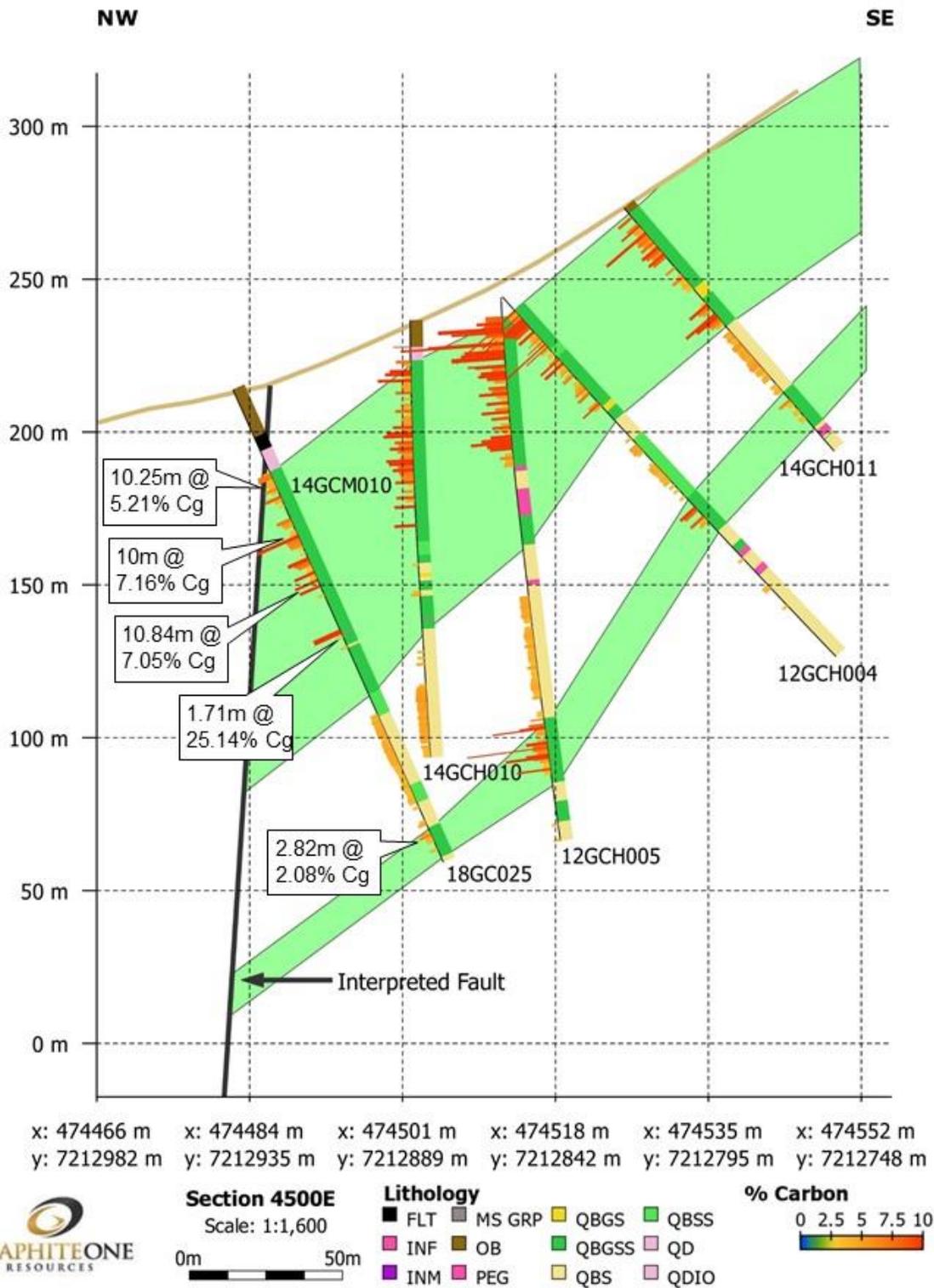


Figure 94: Section 4500E.

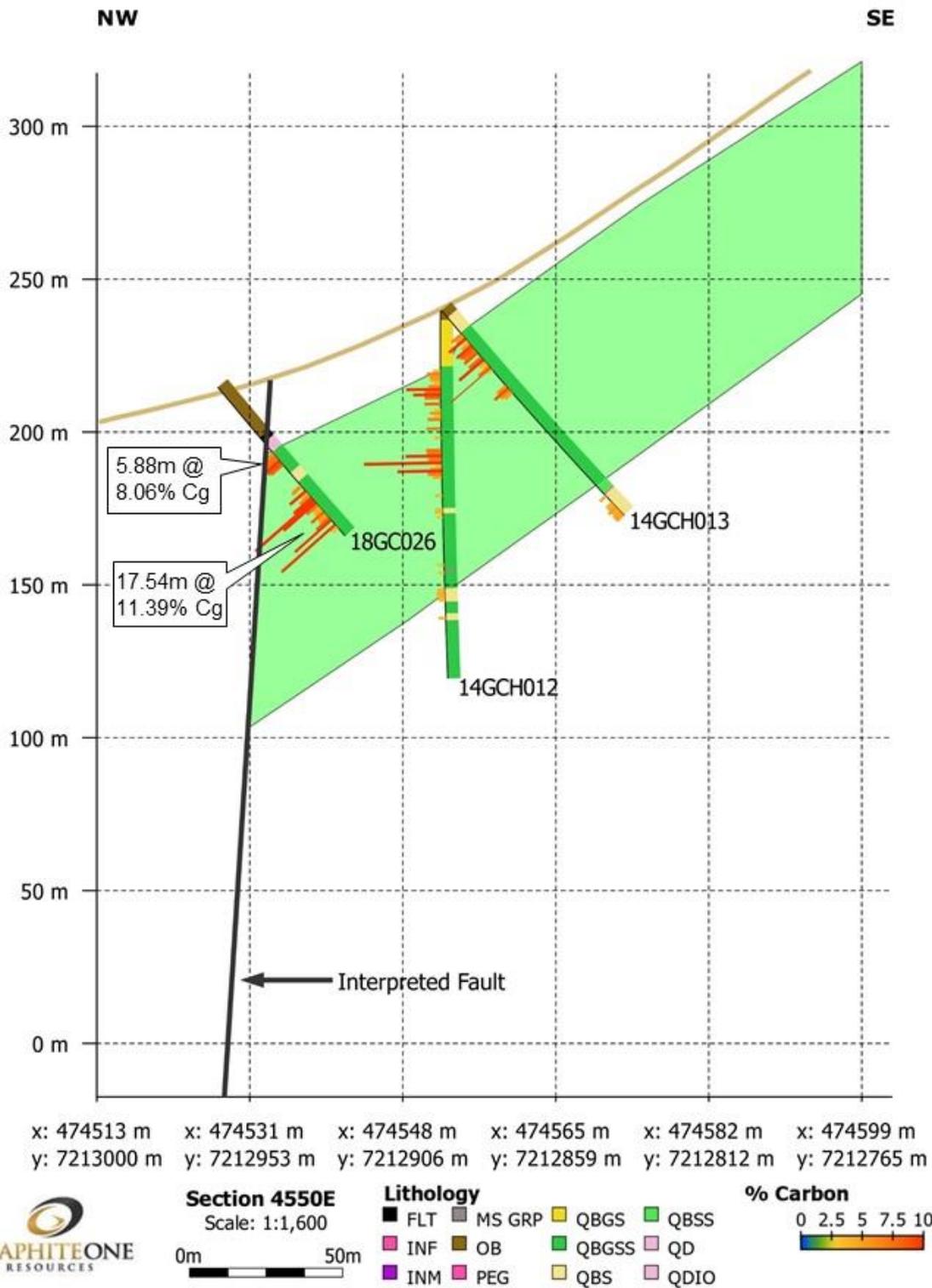


Figure 95: Section 4550E.

25.2 Resource

The Graphite Creek Resource estimate has been classified as ‘Measured,’ ‘Indicated’ and ‘Inferred’ according to the CIM definition standards. The classification was based on geological confidence, data quality and grade continuity. The most relevant factors used in the classification process were:

- Drill hole spacing density;
- Level of confidence in the geological interpretation where the observed stratigraphic horizons are easily identifiable along strike and across the deposit, which provides confidence in the geological and mineralization continuity; and
- Estimation parameters (i.e., continuity of mineralization).

Graphite Creek Resource Estimate Update: March 2019				
MINERAL RESOURCE CLASSIFICATION	CUT-OFF GRADE (% Cg)	TONNAGE (MILLION TONNES)	GRAPHITE GRADE (% Cg)	CONTAINED GRAPHITE (TONNES)
INFERRED	4.0	125.48	7.1%	8,850,296
	5.0	91.89	8.0%	7,342,883
	6.0	65.94	9.0%	5,922,778
	7.0	44.01	10.2%	4,504,835
	8.0	29.77	11.6%	3,440,831
INDICATED	4.0	12.57	6.9%	864,110
	5.0	9.26	7.7%	715,363
	6.0	6.45	8.7%	561,470
	7.0	4.32	9.8%	423,790
	8.0	2.8	11.1%	309,862
MEASURED	4.0	2.19	7.2%	157,634
	5.0	1.69	8.0%	135,171
	6.0	1.22	9.0%	109,456
	7.0	0.84	10.1%	84,904
	8.0	0.57	11.3%	64,825
MEASURED + INDICATED	4.0	14.76	6.9%	1,021,744
	5.0	10.95	7.8%	850,534
	6.0	7.67	8.8%	670,926
	7.0	5.16	9.9%	508,694
	8.0	3.37	11.1%	374,687

Table 79: March 2019 Graphite Creek updated resource with inferred, indicated, and measured resources

It should be noted the dip and location of the Kigluaik Fault that trends parallel and is adjacent to the mineralization of the deposit is a controlling factor of the graphite resource. The updated fault surface in the area of new 2018 drill results indicated a potential dip to the NW and a location 20-100 meters to the south-east of the previous interpretation of the fault. Outside of the new 2018 drilling, the fault has been interpreted as being vertical. The vertical surface and new location of the fault results in a



truncation in the down dip extension of mineralization in places. However, the observed stratigraphic horizons show remarkable consistency along strike with little deviation along strike which provides confidence in the geological and mineralization continuity.

26 Recommendations

Follow-up drilling is needed to bring more indicated resources up to measured resources in the core area of the Graphite Creek deposit. An estimated 30-50 drill holes averaging 150 m in depth are needed at 50m spacing. Exploration drilling along strike of the deposit which is also open for kilometers on either side of the indicated resource area is also recommended but may not be necessary in the near term.

Drilling in 2018 encountered a large fault that appears to not have been intersected previously. This fault is likely a part of the Kigluaik fault system, which is a basin-bounding fault system separating the entire Kigluaik Mountains from the Imuruk Basin. This fault would bound the down-dip extent of the graphite mineralization. Further drilling targeting to intersect this fault will give better control on to the extent of the graphite resource. Understanding the nature of this structural zone will also be important in the mine planning process.

Drilling should be done with oriented core. Oriented core will provide structural information which will aid in understanding the geologic controls on mineralization (folding, foliation, faulting, etc.) and also provide geotechnical information on joints, fractures, faults, etc. which will be important for mine design.

Geotechnical drilling should also be implemented to begin studies for excavation stability analyses, optimal pit slope angles, and pit architecture for mine design purposes.

Metallurgical studies should continue with the material collected in 2018 and 2014.

Environmental baseline studies and community outreach should be ongoing.

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28 Appendices

28.1 Claim Table

Claim Number	Claim Name	Claim Owner	Township	Stake Date
ADL 710571	GRAPHITE CREEK 1	Graphite One (Alaska) Inc	K005S035W34	29-Oct-11
ADL 710572	GRAPHITE CREEK 2	Graphite One (Alaska) Inc	K005S035W34	29-Oct-11
ADL 710573	GRAPHITE CREEK 3	Graphite One (Alaska) Inc	K005S035W34	29-Oct-11
ADL 710574	GRAPHITE CREEK 4	Graphite One (Alaska) Inc	K005S035W35	29-Oct-11
ADL 710575	GRAPHITE CREEK 5	Graphite One (Alaska) Inc	K005S035W35	29-Oct-11
ADL 710576	GRAPHITE CREEK 6	Graphite One (Alaska) Inc	K005S035W27	29-Oct-11
ADL 710577	GRAPHITE CREEK 7	Graphite One (Alaska) Inc	K005S035W26	29-Oct-11
ADL 710578	GRAPHITE CREEK 8	Graphite One (Alaska) Inc	K005S035W26	29-Oct-11
ADL 710579	GRAPHITE CREEK 9	Graphite One (Alaska) Inc	K005S035W25	29-Oct-11
ADL 710580	GRAPHITE CREEK 10	Graphite One (Alaska) Inc	K005S035W25	29-Oct-11
ADL 710581	GRAPHITE CREEK 11	Graphite One (Alaska) Inc	K005S035W26	29-Oct-11
ADL 710582	GRAPHITE CREEK 12	Graphite One (Alaska) Inc	K005S035W25	29-Oct-11
ADL 710583	GRAPHITE CREEK 13	Graphite One (Alaska) Inc	K005S035W25	29-Oct-11
ADL 710584	GRAPHITE CREEK 14	Graphite One (Alaska) Inc	K005S034W30	29-Oct-11
ADL 710585	GRAPHITE CREEK 15	Graphite One (Alaska) Inc	K005S034W30	29-Oct-11
ADL 710586	GRAPHITE CREEK 16	Graphite One (Alaska) Inc	K005S034W29	29-Oct-11
ADL 710587	GRAPHITE CREEK 17	Graphite One (Alaska) Inc	K005S034W29	29-Oct-11
ADL 710588	GRAPHITE CREEK 18	Graphite One (Alaska) Inc	K005S034W20	29-Oct-11
ADL 710589	GRAPHITE CREEK 19	Graphite One (Alaska) Inc	K005S034W20	29-Oct-11
ADL 710590	GRAPHITE CREEK 20	Graphite One (Alaska) Inc	K005S034W21	29-Oct-11
ADL 710591	GRAPHITE CREEK 21	Graphite One (Alaska) Inc	K005S034W21	29-Oct-11
ADL 710592	GRAPHITE CREEK 22	Graphite One (Alaska) Inc	K005S034W22	29-Oct-11
ADL 710593	GRAPHITE CREEK 23	Graphite One (Alaska) Inc	K005S034W22	29-Oct-11
ADL 710594	GRAPHITE CREEK 24	Graphite One (Alaska) Inc	K005S034W22	29-Oct-11
ADL 710595	GRAPHITE CREEK 25	Graphite One (Alaska) Inc	K005S034W23	29-Oct-11
ADL 710596	GRAPHITE CREEK 26	Graphite One (Alaska) Inc	K005S034W23	29-Oct-11
ADL 710597	GRAPHITE CREEK 27	Graphite One (Alaska) Inc	K005S034W23	29-Oct-11
ADL 710598	GRAPHITE CREEK 28	Graphite One (Alaska) Inc	K005S034W23	29-Oct-11
ADL 710772	GC 001	Graphite One (Alaska) Inc	K005S034W22	22-Nov-11
ADL 710773	GC 002	Graphite One (Alaska) Inc	K005S034W28	22-Nov-11
ADL 710774	GC 003	Graphite One (Alaska) Inc	K005S034W28	22-Nov-11
ADL 710775	GC 004	Graphite One (Alaska) Inc	K005S034W27	22-Nov-11
ADL 710776	GC 005	Graphite One (Alaska) Inc	K005S034W27	22-Nov-11
ADL 710777	GC 006	Graphite One (Alaska) Inc	K005S034W26	22-Nov-11
ADL 710778	GC 007	Graphite One (Alaska) Inc	K005S034W26	22-Nov-11
ADL 710779	GC 008	Graphite One (Alaska) Inc	K005S034W30	22-Nov-11
ADL 710780	GC 009	Graphite One (Alaska) Inc	K005S034W30	22-Nov-11
ADL 710781	GC 010	Graphite One (Alaska) Inc	K005S034W29	22-Nov-11
ADL 710782	GC 011	Graphite One (Alaska) Inc	K005S034W29	22-Nov-11



Claim Number	Claim Name	Claim Owner	Township	Stake Date
ADL 710783	GC 012	Graphite One (Alaska) Inc	K005S034W28	22-Nov-11
ADL 710784	GC 013	Graphite One (Alaska) Inc	K005S034W28	22-Nov-11
ADL 710785	GC 014	Graphite One (Alaska) Inc	K005S035W36	22-Nov-11
ADL 710786	GC 015	Graphite One (Alaska) Inc	K005S035W36	22-Nov-11
ADL 710787	GC 016	Graphite One (Alaska) Inc	K005S034W31	22-Nov-11
ADL 710788	GC 017	Graphite One (Alaska) Inc	K005S034W31	22-Nov-11
ADL 710789	GC 018	Graphite One (Alaska) Inc	K005S034W32	22-Nov-11
ADL 710790	GC 019	Graphite One (Alaska) Inc	K005S034W32	22-Nov-11
ADL 710791	GC 020	Graphite One (Alaska) Inc	K005S034W33	22-Nov-11
ADL 617072	GCX-01	Graphite One (Alaska) Inc	K005S034W24	4-Jun-12
ADL 617073	GCX-02	Graphite One (Alaska) Inc	K005S034W13	4-Jun-12
ADL 617074	GCX-03	Graphite One (Alaska) Inc	K005S034W13	4-Jun-12
ADL 617075	GCX-04	Graphite One (Alaska) Inc	K005S034W14	4-Jun-12
ADL 617076	GCX-05	Graphite One (Alaska) Inc	K005S034W14	4-Jun-12
ADL 617077	GCX-06	Graphite One (Alaska) Inc	K005S034W14	4-Jun-12
ADL 617078	GCX-07	Graphite One (Alaska) Inc	K005S034W14	4-Jun-12
ADL 617079	GCX-08	Graphite One (Alaska) Inc	K005S034W13	4-Jun-12
ADL 617080	GCX-09	Graphite One (Alaska) Inc	K005S034W13	4-Jun-12
ADL 617081	GCX-10	Graphite One (Alaska) Inc	K005S033W18	4-Jun-12
ADL 617082	GCX-11	Graphite One (Alaska) Inc	K005S033W07	4-Jun-12
ADL 617083	GCX-12	Graphite One (Alaska) Inc	K005S034W12	4-Jun-12
ADL 617084	GCX-13	Graphite One (Alaska) Inc	K005S034W12	4-Jun-12
ADL 617085	GCX-14	Graphite One (Alaska) Inc	K005S034W11	4-Jun-12
ADL 617086	GCX-15	Graphite One (Alaska) Inc	K005S034W12	4-Jun-12
ADL 617087	GCX-16	Graphite One (Alaska) Inc	K005S034W12	4-Jun-12
ADL 617088	GCX-17	Graphite One (Alaska) Inc	K005S033W07	4-Jun-12
ADL 617571	GCX-18	Graphite One (Alaska) Inc	K005S033W16	29-Aug-12
ADL 617572	GCX-19	Graphite One (Alaska) Inc	K005S033W16	29-Aug-12
ADL 617573	GCX-20	Graphite One (Alaska) Inc	K005S033W21	29-Aug-12
ADL 617575	GCX-25	Graphite One (Alaska) Inc	K005S033W17	29-Aug-12
ADL 617576	GCX-26	Graphite One (Alaska) Inc	K005S033W17	29-Aug-12
ADL 617577	GCX-27	Graphite One (Alaska) Inc	K005S033W20	29-Aug-12
ADL 617579	GCX-32	Graphite One (Alaska) Inc	K005S033W17	29-Aug-12
ADL 617580	GCX-33	Graphite One (Alaska) Inc	K005S033W17	29-Aug-12
ADL 617581	GCX-34	Graphite One (Alaska) Inc	K005S033W20	29-Aug-12
ADL 617584	GCX-39	Graphite One (Alaska) Inc	K005S033W18	29-Aug-12
ADL 617585	GCX-40	Graphite One (Alaska) Inc	K005S033W18	29-Aug-12
ADL 617586	GCX-41	Graphite One (Alaska) Inc	K005S033W19	29-Aug-12
ADL 617590	GCX-46	Graphite One (Alaska) Inc	K005S033W18	29-Aug-12
ADL 617591	GCX-47	Graphite One (Alaska) Inc	K005S033W19	29-Aug-12
ADL 617595	GCX-52	Graphite One (Alaska) Inc	K005S034W24	29-Aug-12
ADL 617596	GCX-53	Graphite One (Alaska) Inc	K005S034W24	29-Aug-12



Claim Number	Claim Name	Claim Owner	Township	Stake Date
ADL 617597	GCX-54	Graphite One (Alaska) Inc	K005S034W25	29-Aug-12
ADL 617598	GCX-55	Graphite One (Alaska) Inc	K005S034W25	29-Aug-12
ADL 617599	GCX-57	Graphite One (Alaska) Inc	K005S034W24	29-Aug-12
ADL 617600	GCX-58	Graphite One (Alaska) Inc	K005S034W25	29-Aug-12
ADL 617601	GCX-59	Graphite One (Alaska) Inc	K005S034W25	29-Aug-12
ADL 617602	GCX-61	Graphite One (Alaska) Inc	K005S034W26	29-Aug-12
ADL 617603	GCX-62	Graphite One (Alaska) Inc	K005S034W35	29-Aug-12
ADL 617604	GCX-63	Graphite One (Alaska) Inc	K005S034W26	29-Aug-12
ADL 617605	GCX-64	Graphite One (Alaska) Inc	K005S034W35	29-Aug-12
ADL 617606	GCX-65	Graphite One (Alaska) Inc	K005S034W27	29-Aug-12
ADL 617607	GCX-66	Graphite One (Alaska) Inc	K005S034W34	29-Aug-12
ADL 617608	GCX-67	Graphite One (Alaska) Inc	K005S034W27	29-Aug-12
ADL 617609	GCX-68	Graphite One (Alaska) Inc	K005S034W34	29-Aug-12
ADL 617610	GCX-69	Graphite One (Alaska) Inc	K005S034W33	29-Aug-12
ADL 617574	GCX-21	Graphite One (Alaska) Inc	K005S033W21	8-Sep-12
ADL 617578	GCX-28	Graphite One (Alaska) Inc	K005S033W20	8-Sep-12
ADL 617582	GCX-35	Graphite One (Alaska) Inc	K005S033W20	8-Sep-12
ADL 617583	GCX-36	Graphite One (Alaska) Inc	K005S033W29	8-Sep-12
ADL 617587	GCX-42	Graphite One (Alaska) Inc	K005S033W19	8-Sep-12
ADL 617588	GCX-43	Graphite One (Alaska) Inc	K005S033W30	8-Sep-12
ADL 617589	GCX-44	Graphite One (Alaska) Inc	K005S033W30	8-Sep-12
ADL 617592	GCX-48	Graphite One (Alaska) Inc	K005S033W19	8-Sep-12
ADL 617593	GCX-49	Graphite One (Alaska) Inc	K005S033W30	8-Sep-12
ADL 617594	GCX-50	Graphite One (Alaska) Inc	K005S033W30	8-Sep-12
ADL 716202	GPH 23	Graphite One (Alaska) Inc	K005S034W22	3-Oct-12
ADL 716203	GPH 24	Graphite One (Alaska) Inc	K005S034W22	3-Oct-12
ADL 716207	GPH 28	Graphite One (Alaska) Inc	K005S034W23	3-Oct-12
ADL 716197	GPH 18	Graphite One (Alaska) Inc	K005S034W20	4-Oct-12
ADL 716198	GPH 19	Graphite One (Alaska) Inc	K005S034W20	4-Oct-12
ADL 716199	GPH 20	Graphite One (Alaska) Inc	K005S034W21	4-Oct-12
ADL 716200	GPH 21	Graphite One (Alaska) Inc	K005S034W21	4-Oct-12
ADL 716204	GPH 25	Graphite One (Alaska) Inc	K005S034W23	4-Oct-12
ADL 716205	GPH 26	Graphite One (Alaska) Inc	K005S034W23	4-Oct-12
ADL 716206	GPH 27	Graphite One (Alaska) Inc	K005S034W23	4-Oct-12
ADL 716185	GPH 06	Graphite One (Alaska) Inc	K005S035W27	6-Oct-12
ADL 716186	GPH 07	Graphite One (Alaska) Inc	K005S035W26	6-Oct-12
ADL 716187	GPH 08	Graphite One (Alaska) Inc	K005S035W26	6-Oct-12
ADL 716189	GPH 10	Graphite One (Alaska) Inc	K005S035W25	6-Oct-12
ADL 716190	GPH 11	Graphite One (Alaska) Inc	K005S035W26	6-Oct-12
ADL 716191	GPH 12	Graphite One (Alaska) Inc	K005S035W25	6-Oct-12
ADL 716192	GPH 13	Graphite One (Alaska) Inc	K005S035W25	6-Oct-12
ADL 716193	GPH 14	Graphite One (Alaska) Inc	K005S034W30	6-Oct-12



Claim Number	Claim Name	Claim Owner	Township	Stake Date
ADL 716194	GPH 15	Graphite One (Alaska) Inc	K005S034W30	6-Oct-12
ADL 716195	GPH 16	Graphite One (Alaska) Inc	K005S034W29	6-Oct-12
ADL 716196	GPH 17	Graphite One (Alaska) Inc	K005S034W29	6-Oct-12
ADL 716201	GPH 22	Graphite One (Alaska) Inc	K005S034W22	6-Oct-12
ADL 716181	GPH 02	Graphite One (Alaska) Inc	K005S035W34	7-Oct-12
ADL 716182	GPH 03	Graphite One (Alaska) Inc	K005S035W34	7-Oct-12
ADL 716188	GPH 09	Graphite One (Alaska) Inc	K005S035W25	7-Oct-12
ADL 716180	GPH 01	Graphite One (Alaska) Inc	K005S035W34	8-Oct-12
ADL 716183	GPH 04	Graphite One (Alaska) Inc	K005S035W35	8-Oct-12
ADL 716184	GPH 05	Graphite One (Alaska) Inc	K005S035W35	8-Oct-12
ADL 720914	GCN 001	Graphite One (Alaska) Inc	K005S034W15	11-Jun-15
ADL 720915	GCN 002	Graphite One (Alaska) Inc	K005S034W15	11-Jun-15
ADL 720916	GCN 003	Graphite One (Alaska) Inc	K005S034W15	11-Jun-15
ADL 720917	GCN 004	Graphite One (Alaska) Inc	K005S034W15	11-Jun-15
ADL 720918	GCN 005	Graphite One (Alaska) Inc	K005S034W20	11-Jun-15
ADL 720919	GCN 006	Graphite One (Alaska) Inc	K005S034W20	11-Jun-15
ADL 720920	GCN 007	Graphite One (Alaska) Inc	K005S034W21	11-Jun-15
ADL 720921	GCN 008	Graphite One (Alaska) Inc	K005S034W21	11-Jun-15
ADL 721240	GCN 009	Graphite One (Alaska) Inc	K005S034W17	20-Nov-15
ADL 721241	GCN 010	Graphite One (Alaska) Inc	K005S034W17	20-Nov-15
ADL 721242	GCN 011	Graphite One (Alaska) Inc	K005S034W16	20-Nov-15
ADL 721243	GCN 012	Graphite One (Alaska) Inc	K005S034W16	20-Nov-15
ADL 721244	GCN 013	Graphite One (Alaska) Inc	K005S034W17	20-Nov-15
ADL 721245	GCN 014	Graphite One (Alaska) Inc	K005S034W17	20-Nov-15
ADL 721246	GCN 015	Graphite One (Alaska) Inc	K005S034W16	20-Nov-15
ADL 721247	GCN 016	Graphite One (Alaska) Inc	K005S034W16	20-Nov-15
ADL 721248	GCN 017	Graphite One (Alaska) Inc	K005S034W09	20-Nov-15
ADL 721249	GCN 018	Graphite One (Alaska) Inc	K005S034W09	20-Nov-15
ADL 721250	GCN 019	Graphite One (Alaska) Inc	K005S034W10	20-Nov-15
ADL 721251	GCN 020	Graphite One (Alaska) Inc	K005S034W10	20-Nov-15
ADL 721252	GCN 021	Graphite One (Alaska) Inc	K005S034W09	20-Nov-15
ADL 721253	GCN 022	Graphite One (Alaska) Inc	K005S034W09	20-Nov-15
ADL 721254	GCN 023	Graphite One (Alaska) Inc	K005S034W10	20-Nov-15
ADL 721255	GCN 024	Graphite One (Alaska) Inc	K005S034W10	20-Nov-15
ADL 721256	GCN 025	Graphite One (Alaska) Inc	K005S034W03	20-Nov-15
ADL 721257	GCN 026	Graphite One (Alaska) Inc	K005S034W03	20-Nov-15
ADL 721258	GCN 027	Graphite One (Alaska) Inc	K005S034W03	20-Nov-15
ADL 721259	GCN 028	Graphite One (Alaska) Inc	K005S034W03	20-Nov-15
ADL 721260	GCN 029	Graphite One (Alaska) Inc	K005S034W02	20-Nov-15
ADL 721261	GCN 030	Graphite One (Alaska) Inc	K004S033W31	20-Nov-15
ADL 721262	GCN 031	Graphite One (Alaska) Inc	K004S033W31	20-Nov-15
ADL 721263	GCN 032	Graphite One (Alaska) Inc	K004S033W32	20-Nov-15



Claim Number	Claim Name	Claim Owner	Township	Stake Date
ADL 721264	GCN 033	Graphite One (Alaska) Inc	K004S033W32	20-Nov-15
ADL 721265	GCN 034	Graphite One (Alaska) Inc	K004S033W31	20-Nov-15
ADL 721266	GCN 035	Graphite One (Alaska) Inc	K004S033W31	20-Nov-15
ADL 721267	GCN 036	Graphite One (Alaska) Inc	K004S033W32	20-Nov-15
ADL 721268	GCN 037	Graphite One (Alaska) Inc	K004S033W32	20-Nov-15
ADL 721269	GCN 038	Graphite One (Alaska) Inc	K004S033W30	20-Nov-15
ADL 721270	GCN 039	Graphite One (Alaska) Inc	K004S033W30	20-Nov-15
ADL 721271	GCN 040	Graphite One (Alaska) Inc	K004S033W29	20-Nov-15
ADL 721272	GCN 041	Graphite One (Alaska) Inc	K004S033W29	20-Nov-15
ADL 721273	GCN 042	Graphite One (Alaska) Inc	K004S033W29	20-Nov-15
ADL 721274	GCN 043	Graphite One (Alaska) Inc	K004S033W29	20-Nov-15



28.2 2018 Drill Assays

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC021	17.78	19	1.22	-0.05
18GC021	19	20	1	-0.05
18GC021	20	21	1	-0.05
18GC021	21	22	1	-0.05
18GC021	22	23	1	-0.05
18GC021	23	24	1	-0.05
18GC021	24	25	1	-0.05
18GC021	25	26	1	-0.05
18GC021	26	26.65	0.65	1.26
18GC021	26.65	28	1.35	5.58
18GC021	28	29	1	6.92
18GC021	29	30	1	6.96
18GC021	30	31	1	9.11
18GC021	31	32	1	5.55
18GC021	32	33	1	5.57
18GC021	33	34	1	8.16
18GC021	34	35	1	3.02
18GC021	35	36	1	7.06
18GC021	36	37	1	3.23
18GC021	37	38	1	2.49
18GC021	38	38.9	0.9	3.03
18GC021	38.9	39.37	0.47	22.6
18GC021	39.37	40	0.63	5.09
18GC021	40	41	1	1.63
18GC021	41	41.44	0.44	3.39
18GC021	41.44	41.8	0.36	16.1
18GC021	41.8	43	1.2	3.23
18GC021	43	44.3	1.3	2.5
18GC021	44.3	45	0.7	14.6
18GC021	45	45.65	0.65	17.6
18GC021	45.65	46	0.35	3.65
18GC021	46	47	1	7.44
18GC021	47	48	1	4.92
18GC021	48	49	1	5.26
18GC021	49	50	1	8.92
18GC021	50	51	1	4.59
18GC021	51	52	1	4.22
18GC021	52	53	1	3.78
18GC021	53	54	1	5.98
18GC021	54	55	1	4.42
18GC021	55	56	1	5.71
18GC021	56	57	1	11.4

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC021	57	58	1	4.61
18GC021	58	59	1	5.36
18GC021	59	60	1	5.27
18GC021	60	61	1	4.35
18GC021	61	62	1	5.24
18GC021	62	63	1	5.14
18GC021	63	64	1	3.19
18GC021	64	65	1	2.55
18GC021	65	66	1	3.09
18GC021	66	67.06	1.06	2.37
18GC022	9	10	1	-0.05
18GC022	10	11	1	-0.05
18GC022	11	12	1	0.08
18GC022	12	12.63	0.63	-0.05
18GC022	12.63	13.46	0.83	-0.05
18GC022	13.46	15	1.54	-0.05
18GC022	15	16	1	-0.05
18GC022	16	17	1	-0.05
18GC022	17	18	1	-0.05
18GC022	18	19	1	0.57
18GC022	19	20	1	5.46
18GC022	20	22.5	2.5	5.4
18GC022	22.5	24	1.5	12.6
18GC022	24	25	1	6.37
18GC022	25	25.7	0.7	4.93
18GC022	25.7	26.7	1	15.2
18GC022	26.7	27.74	1.04	7.21
18GC022	27.74	28.5	0.76	1.84
18GC022	28.5	29	0.5	1.59
18GC022	29	30	1	5.25
18GC022	30	31	1	1.85
18GC022	31	32	1	4.51
18GC022	32	33	1	2.33
18GC022	33	34	1	2.38
18GC022	34	35	1	8.1
18GC022	35	36	1	3.34
18GC022	36	37	1	3.31
18GC022	37	38	1	1.95
18GC022	38	39	1	2.56
18GC022	39	40	1	4.44
18GC022	40	41	1	4.8
18GC022	41	42	1	10.3



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC022	42	43	1	2.27
18GC022	43	43.7	0.7	6.91
18GC022	43.7	44.26	0.56	23.4
18GC022	44.26	45	0.74	1.44
18GC022	45	46.02	1.02	1.91
18GC022	49.07	50	0.93	10.6
18GC022	50	51	1	7.63
18GC022	51	52	1	4.18
18GC022	52	53	1	2.77
18GC022	53	54	1	3.3
18GC022	54	55	1	2.43
18GC022	55	56	1	2.32
18GC022	56	57	1	3.94
18GC022	57	58	1	5.53
18GC022	58	58.91	0.91	4.94
18GC022	58.91	60	1.09	0.06
18GC022	60	61	1	-0.05
18GC022	61	61.65	0.65	0.24
18GC022	61.65	62.43	0.78	0.67
18GC022	62.43	63	0.57	-0.05
18GC022	63	64	1	0.13
18GC022	64	65	1	0.13
18GC022	65	66	1	0.27
18GC022	66	67	1	0.06
18GC022	67	68	1	0.1
18GC022	68	69	1	0.11
18GC022	69	70	1	0.68
18GC022	70	71	1	0.87
18GC022	71	72	1	0.27
18GC022	72	73	1	0.62
18GC022	73	73.9	0.9	0.24
18GC022	73.9	74.82	0.92	-0.05
18GC022	74.82	75.29	0.47	0.15
18GC022	75.29	76	0.71	0.31
18GC022	76	77	1	0.24
18GC022	77	78	1	0.26
18GC022	78	79	1	0.32
18GC022	79	80.3	1.3	0.39
18GC022	80.3	81	0.7	0.12
18GC022	81	82	1	0.17
18GC022	82	83	1	0.09
18GC022	83	84	1	0.15
18GC022	84	84.46	0.46	0.18
18GC022	84.46	85	0.54	4.62

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC022	85	85.6	0.6	2.76
18GC022	85.6	86	0.4	0.17
18GC022	86	87	1	2.13
18GC022	87	88	1	2
18GC022	88	89	1	0.36
18GC022	89	89.68	0.68	0.1
18GC022	89.68	90.5	0.82	1.05
18GC022	90.5	91.54	1.04	-0.05
18GC022	91.54	92.52	0.98	0.8
18GC022	92.52	93.27	0.75	1.29
18GC022	93.27	94	0.73	2.34
18GC022	94	95	1	1.74
18GC022	95	96	1	1.7
18GC022	96	97	1	3.86
18GC022	97	98	1	3.47
18GC022	98	99	1	2.9
18GC022	99	100	1	1.93
18GC022	100	100.6	0.58	0.87
18GC022	100.58	101.5	0.92	2.93
18GC022	101.5	102.5	1	11.4
18GC022	102.5	103	0.5	2.4
18GC022	103	104	1	3.34
18GC022	104	104.6	0.6	2.74
18GC022	104.6	105	0.4	9.48
18GC022	105	106	1	6.94
18GC022	106	107	1	8.49
18GC022	107	108	1	3.61
18GC022	108	108.8	0.78	5.54
18GC022	108.78	109.4	0.62	48.6
18GC022	109.4	110	0.6	7.44
18GC022	110	111	1	4.09
18GC022	111	112	1	2.46
18GC022	112	112.8	0.79	5.6
18GC022	112.79	113.5	0.66	34.8
18GC022	113.45	114	0.55	1.57
18GC022	114	115	1	2.62
18GC022	115	116	1	4.11
18GC022	116	117	1	2.92
18GC022	117	118	1	3.44
18GC022	118	119	1	4.22
18GC022	119	120	1	0.59
18GC022	120	121	1	3.89
18GC022	121	122	1	3.74
18GC022	122	123	1	2.17



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC022	123	124	1	2.15
18GC022	124	125	1	1.9
18GC022	125	126	1	1.39
18GC022	126	127	1	1.29
18GC022	127	128	1	1.57
18GC022	128	129	1	2.39
18GC022	129	130	1	1.55
18GC022	130	131	1	1.73
18GC022	131	132	1	1.14
18GC022	132	133	1	2.64
18GC022	133	134	1	2.66
18GC022	134	135	1	1.84
18GC022	135	136	1	1.76
18GC022	136	137	1	0.28
18GC022	137	138	1	2.37
18GC022	138	139	1	1.85
18GC022	139	140	1	2.6
18GC022	140	141	1	2.38
18GC022	141	142	1	2.86
18GC022	142	143	1	3.31
18GC022	143	144	1	2.07
18GC022	144	145	1	0.23
18GC022	145	146	1	0.49
18GC022	146	147	1	0.49
18GC022	147	148	1	0.5
18GC022	148	149	1	2.33
18GC022	149	150	1	2.77
18GC022	150	151	1	1.47
18GC022	151	152	1	3.33
18GC022	152	153	1	3.25
18GC022	153	154	1	0.92
18GC022	154	155	1	1.22
18GC022	155	156	1	0.8
18GC022	156	157	0.97	1.02
18GC023	42	44.3	2.3	5.56
18GC023	44.3	45	0.7	6.26
18GC023	45	45.94	0.94	4.53
18GC023	45.94	47	1.06	-0.05
18GC023	47	48	1	-0.05
18GC023	48	49	1	-0.05
18GC023	49	50	1	-0.05
18GC023	50	51	1	-0.05
18GC023	51	52	1	-0.05

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC023	52	53	1	0.07
18GC023	53	53.75	0.75	-0.05
18GC023	53.75	55	1.25	8.99
18GC023	55	56	1	5.81
18GC023	56	57	1	2.92
18GC023	57	58	1	3.96
18GC023	58	59.4	1.4	4.52
18GC023	59.4	60	0.6	30.5
18GC023	60	61	1	3.89
18GC023	61	62	1	4.61
18GC023	62	63	1	2.71
18GC023	63	64	1	4.01
18GC023	64	65	1	4.23
18GC023	65	66	1	7.31
18GC023	66	67	1	9.53
18GC023	67	68	1	5.32
18GC023	68	69	1	5.55
18GC023	69	70	1	11.9
18GC023	70	71	1	8.61
18GC023	71	72	1	4.14
18GC023	72	73	1	7.53
18GC023	73	74	1	4.69
18GC023	74	75	1	20.5
18GC023	75	76	1	2.57
18GC023	76	77	1	6.8
18GC023	77	78	1	24.1
18GC023	78	79	1	12.3
18GC023	79	80	1	2.16
18GC023	80	81	1	1.62
18GC023	81	82	1	2.33
18GC023	82	83	1	4.85
18GC023	83	84	1	4.91
18GC023	84	85	1	2.52
18GC023	85	86	1	8.68
18GC023	86	87	1	10.3
18GC023	87	88	1	16.4
18GC023	88	89	1	3.57
18GC023	89	90	1	4.27
18GC023	90	91	1	7.4
18GC023	91	92	1	4.29
18GC023	92	93	1	9.86
18GC023	93	94	1	7.36
18GC023	94	95.23	1.23	2.95
18GC023	95.23	96.19	0.96	4.25



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC023	96.19	97	0.81	0.14
18GC023	97	98	1	-0.05
18GC023	98	99	1	-0.05
18GC023	99	100	1	0.28
18GC023	100	101	1	0.86
18GC023	101	102	1	-0.05
18GC023	102	103	1	-0.05
18GC023	103	104	1	-0.05
18GC023	104	105	1	-0.05
18GC023	105	106	1	0.39
18GC023	106	107	1	-0.05
18GC023	107	108	1	0.07
18GC023	108	109	1	-0.05
18GC023	109	110	1	0.1
18GC023	110	111	1	-0.05
18GC023	111	112	1	-0.05
18GC023	112	113	1	0.07
18GC023	113	114	1	0.11
18GC023	114	115	1	0.54
18GC023	115	116	1	-0.05
18GC023	116	117	1	0.13
18GC023	117	118	1	0.06
18GC023	118	119	1	0.07
18GC023	119	120	1	-0.05
18GC023	120	121	1	-0.05
18GC023	121	122	1	0.96
18GC023	122	123	1	2.91
18GC023	123	124	1	2.17
18GC023	124	125	1	1.49
18GC023	125	126	1	1.68
18GC023	126	127	1	2
18GC023	127	128	1	1.86
18GC023	128	129	1	2.65
18GC023	129	130	1	1.7
18GC023	130	131	1	2.2
18GC023	131	132	1	3.73
18GC023	132	133	1	4.07
18GC023	133	134	1	4.59
18GC023	134	135	1	4.46
18GC023	135	136	1	4.2
18GC023	136	137	1	3.94
18GC023	137	138	1	4.17
18GC023	138	139	1	4.28
18GC023	139	140	1	2.68

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC023	140	141	1	3.39
18GC023	141	142	1	4.72
18GC023	142	143	1	4.26
18GC023	143	144	1	3.77
18GC023	144	145	1	3.51
18GC023	145	146	1	3.51
18GC023	146	147	1	3.53
18GC023	147	148	1	3.3
18GC023	148	149	1	3.45
18GC023	149	150	1	2.11
18GC023	150	151	1	1.62
18GC023	151	152	1	2.56
18GC023	152	153	1	2.9
18GC023	153	154	1	4
18GC023	154	155	1	4.22
18GC023	155	156	1	2.31
18GC023	156	157	1	2.31
18GC023	157	158	1	2.7
18GC023	158	158.9	0.89	6.63
18GC023	158.89	159.5	0.61	15.9
18GC023	159.5	160.3	0.75	2.09
18GC023	160.25	160.8	0.5	14.6
18GC023	160.75	162	1.25	1.8
18GC023	162	163	1	3.97
18GC023	163	164	1	6.14
18GC023	164	165	1	4.68
18GC023	165	166	1	15.2
18GC023	166	167	1	7.71
18GC023	167	168	1	3.79
18GC023	168	169	1	2.31
18GC023	169	170	1	1.93
18GC023	170	171	1	6.51
18GC023	171	172	1	2.11
18GC023	172	173	1	2.67
18GC023	173	174	1	1.99
18GC023	174	175	1	2.32
18GC023	175	176	1	2.22
18GC023	176	177	1	2.25
18GC023	177	178	1	1.7
18GC023	178	179	1	2.94
18GC023	179	180	1	2.12
18GC023	180	181	1	0.99
18GC023	181	182	1	2.44
18GC023	182	183	1	3.9



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC023	183	184	1	2.98
18GC023	184	185	1	2.02
18GC023	185	185.5	0.5	1.93
18GC023	185.5	186.5	1	11.7
18GC023	186.5	187	0.5	1.57
18GC023	187	187.5	0.5	1.79
18GC023	187.5	188	0.5	7.86
18GC023	188	189	1	2.23
18GC023	189	190	1	3.48
18GC023	190	191	1	2.41
18GC023	191	192	1	2.14
18GC023	192	193	1	0.27
18GC023	193	194	1	1.83
18GC023	194	195	1	1.95
18GC023	195	196	1	1.88
18GC023	196	197	1	0.72
18GC023	197	198	1	2.45
18GC023	198	198.7	0.73	3.12
18GC024	11	12.75	1.75	6.81
18GC024	12.75	14	1.25	5.51
18GC024	14	15.1	1.1	1.43
18GC024	15.1	18	2.9	4.35
18GC024	18	19	1	-0.05
18GC024	19	20	1	-0.05
18GC024	20	21	1	-0.05
18GC024	21	22	1	-0.05
18GC024	22	23	1	-0.05
18GC024	23	24	1	-0.05
18GC024	24	25	1	-0.05
18GC024	25	26	1	-0.05
18GC024	26	26.93	0.93	0.52
18GC024	26.93	27.9	0.97	6.46
18GC024	27.9	28.9	1	0.29
18GC024	28.9	30	1.1	4.09
18GC024	30	31	1	4.27
18GC024	31	32	1	7.47
18GC024	32	33.5	1.5	26.8
18GC024	33.5	34	0.5	5.46
18GC024	34	35	1	2.28
18GC024	35	36	1	4.97
18GC024	36	37	1	2.92
18GC024	37	38	1	2.41
18GC024	38	39	1	2.71

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC024	39	40	1	3.36
18GC024	40	41	1	6.13
18GC024	41	42	1	4.88
18GC024	42	43	1	4.98
18GC024	43	44	1	4.75
18GC024	44	45	1	5.81
18GC024	45	46	1	4.43
18GC024	46	47	1	4.63
18GC024	47	47.75	0.75	4.17
18GC024	47.75	48.25	0.5	22.6
18GC024	48.25	49	0.75	6.24
18GC024	49	49.75	0.75	19.3
18GC024	49.75	51	1.25	9.28
18GC024	51	52	1	4.79
18GC024	52	53	1	9.82
18GC024	53	54	1	9.63
18GC024	54	55	1	5.92
18GC024	55	56	1	2.43
18GC024	56	57	1	5.42
18GC024	57	58	1	8.62
18GC024	58	58.75	0.75	2.84
18GC024	58.75	59.5	0.75	33.7
18GC024	59.5	60	0.5	3.35
18GC024	60	61	1	1.75
18GC024	61	62	1	1.77
18GC024	62	63	1	3.1
18GC024	63	64	1	3.43
18GC024	64	65.2	1.2	9.79
18GC024	65.2	66.2	1	9.83
18GC024	66.2	66.7	0.5	3.67
18GC024	66.7	68.2	1.5	16.9
18GC024	68.2	69	0.8	4.39
18GC024	69	70.1	1.1	9.52
18GC024	70.1	70.9	0.8	4.48
18GC024	70.9	72	1.1	5.9
18GC024	72	73	1	2.04
18GC024	73	74	1	1.84
18GC024	74	75	1	2.09
18GC024	75	76	1	3.39
18GC024	76	76.85	0.85	5.49
18GC024	76.85	78.1	1.25	10.4
18GC024	78.1	79	0.9	1.7
18GC024	79	80	1	7.69
18GC024	80	81	1	8.97



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC024	81	82	1	6.53
18GC024	82	83	1	2.04
18GC024	83	84	1	3.93
18GC024	84	85	1	3.94
18GC024	85	86	1	11.6
18GC024	86	87	1	8.18
18GC024	87	88	1	3.97
18GC024	88	89	1	0.09
18GC024	89	90	1	0.1
18GC024	90	91	1	0.71
18GC024	91	92	1	-0.05
18GC024	92	93	1	0.06
18GC024	93	94	1	1.04
18GC024	94	95	1	0.42
18GC024	95	96	1	0.44
18GC024	96	97	1	-0.05
18GC024	97	98	1	0.38
18GC024	98	99	1	1.65
18GC024	99	100	1	1.12
18GC024	100	101	1	2.26
18GC024	101	102	1	1.51
18GC024	102	103	1	1.53
18GC024	103	104	1	2.57
18GC024	104	105	1	2.19
18GC024	105	106	1	0.72
18GC024	106	107	1	2.65
18GC024	107	108	1	1.95
18GC024	108	109	1	2.39
18GC024	109	110	1	3.41
18GC024	110	111	1	3.75
18GC024	111	112	1	2.37
18GC024	112	113	1	3.71
18GC024	113	114	1	3.17
18GC024	114	115	1	2.21
18GC024	115	116	1	1.75
18GC024	116	117	1	1.89
18GC024	117	118	1	1.95
18GC024	118	119	1	1.88
18GC024	119	120	1	1.7
18GC024	120	121	1	2.09
18GC024	121	122	1	2.65
18GC024	122	123.1	1.08	4.01
18GC024	123.08	124	0.92	3.91
18GC024	124	125	1	6.9

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC024	125	126	1	3.98
18GC024	126	127	1	4.67
18GC024	127	128	1	3.55
18GC024	128	129	1	5.77
18GC024	129	130.2	1.15	5.25
18GC024	130.15	131.1	0.9	2.19
18GC024	131.05	132	0.95	6.98
18GC024	132	132.5	0.5	9.14
18GC024	132.5	133.5	1	16.1
18GC024	133.5	134	0.5	2.1
18GC024	134	135	1	2.28
18GC024	135	136	1	1.48
18GC024	136	137	1	1.87
18GC024	137	138	1	4.95
18GC024	138	139	1	3.93
18GC024	139	140	1	2.32
18GC024	140	141	1	1.73
18GC024	141	142	1	2.33
18GC024	142	143	1	2.03
18GC024	143	143.7	0.68	1.51
18GC024	143.68	144.8	1.1	2.12
18GC025	27	28	1	-0.05
18GC025	28	29.5	1.5	0.05
18GC025	29.5	30	0.5	3.82
18GC025	30	31	1	7.07
18GC025	31	32	1	7.42
18GC025	32	33	1	3.65
18GC025	33	34	1	4.5
18GC025	34	35	1	3.88
18GC025	35	36	1	6.6
18GC025	36	37	1	3.75
18GC025	37	37.9	0.9	2.32
18GC025	37.9	39	1.1	8.4
18GC025	39	40.25	1.25	4.17
18GC025	40.25	41	0.75	2.73
18GC025	41	42	1	3.09
18GC025	42	43	1	2.57
18GC025	43	44	1	1.8
18GC025	44	45	1	2.66
18GC025	45	46	1	2.42
18GC025	46	47	1	7.66
18GC025	47	48	1	5.65
18GC025	48	49	1	4.77



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC025	49	50	1	2.5
18GC025	50	51	1	3.18
18GC025	51	52	1	3.9
18GC025	52	53.1	1.1	22.7
18GC025	53.1	54.1	1	6.93
18GC025	54.1	55	0.9	6.61
18GC025	55	56	1	6.14
18GC025	56	57.04	1.04	3.17
18GC025	57.04	58	0.96	2.67
18GC025	58	59	1	3.04
18GC025	59	59.96	0.96	1.94
18GC025	59.96	61.15	1.19	11.1
18GC025	61.15	62	0.85	8.23
18GC025	62	63	1	6.81
18GC025	63	64	1	3.04
18GC025	64	65	1	3.43
18GC025	65	66	1	10.9
18GC025	66	67	1	3.15
18GC025	67	67.82	0.82	3.9
18GC025	67.82	68.75	0.93	12.4
18GC025	68.75	69.8	1.05	2.84
18GC025	69.8	70.8	1	11.2
18GC025	70.8	71.84	1.04	2.72
18GC025	71.84	73	1.16	0.47
18GC025	73	74	1	3.45
18GC025	74	75	1	1.27
18GC025	75	76	1	1.45
18GC025	76	77	1	0.12
18GC025	77	78	1	0.23
18GC025	78	79	1	0.84
18GC025	79	80	1	1.06
18GC025	80	81	1	0.6
18GC025	81	82	1	1.3
18GC025	82	83	1	0.86
18GC025	83	84	1	0.13
18GC025	84	85	1	0.43
18GC025	85	85.87	0.87	0.45
18GC025	85.87	87.58	1.71	14.7
18GC025	87.58	87.9	0.32	-0.05
18GC025	87.9	89	1.1	3.2
18GC025	89	90	1	0.86
18GC025	90	91	1	-0.05
18GC025	91	91.64	0.64	-0.05
18GC025	91.64	92.5	0.86	3.62

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC025	92.5	93	0.5	-0.05
18GC025	93	94	1	-0.05
18GC025	94	95	1	0.73
18GC025	95	96	1	-0.05
18GC025	96	97	1	-0.05
18GC025	97	98	1	-0.05
18GC025	98	99	1	-0.05
18GC025	99	100	1	-0.05
18GC025	100	101	1	-0.05
18GC025	101	102	1	0.33
18GC025	102	103	1	0.37
18GC025	103	104	1	-0.05
18GC025	104	105	1	-0.05
18GC025	105	106	1	0.26
18GC025	106	107	1	-0.05
18GC025	107	108	1	-0.05
18GC025	108	109	1	-0.05
18GC025	109	110	1	2.25
18GC025	110	111	1	2.56
18GC025	111	112	1	1.77
18GC025	112	113	1	1.71
18GC025	113	114	1	1.33
18GC025	114	115	1	1.77
18GC025	115	116	1	1.11
18GC025	116	117	1	3.93
18GC025	117	118	1	3.97
18GC025	118	119	1	4.62
18GC025	119	120	1	4.11
18GC025	120	121	1	4.37
18GC025	121	122	1	4.43
18GC025	122	123	1	4.5
18GC025	123	124	1	4.65
18GC025	124	125	1	3.56
18GC025	125	126	1	4.12
18GC025	126	127	1	4.52
18GC025	127	128	1	4.34
18GC025	128	129	1	4.72
18GC025	129	130	1	4.4
18GC025	130	131	1	4.49
18GC025	131	132	1	4.44
18GC025	132	133	1	4.33
18GC025	133	134	1	4.22
18GC025	134	135	1	3.65
18GC025	135	136	1	3.61



Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC025	136	137	1	3.37
18GC025	137	138	1	3.1
18GC025	138	139	1	3.37
18GC025	139	140	1	3.44
18GC025	140	141	1	3.4
18GC025	141	142	1	4.46
18GC025	142	143	1	3.8
18GC025	143	144	1	3.51
18GC025	144	145	1	3.35
18GC025	145	146	1	3.54
18GC025	146	147	1	4.17
18GC025	147	148	1	3.86
18GC025	148	149	1	2.03
18GC025	149	150	1	3.29
18GC025	150	151	1	2.24
18GC025	151	152	1	2.03
18GC025	152	153	1	2.06
18GC025	153	154	1	2.86
18GC025	154	155	1	3.28
18GC025	155	156	1	4.5
18GC025	156	157	0.95	1.17
18GC025	156.95	158.2	1.23	1.31
18GC025	158.18	159	0.82	5.2
18GC025	159	159.9	0.9	6.53
18GC025	159.9	161	1.1	3.83
18GC025	161	162	1	3.67
18GC025	162	163	1	2.58
18GC025	163	164	1	2.98
18GC025	164	165	1	4.18
18GC025	165	166	1	2
18GC025	166	167	1	2.01
18GC025	167	167.5	0.47	1.78
18GC025	167.47	168.5	1.03	2.03
18GC025	168.5	169.3	0.82	1.6
18GC026	25	26	1	-0.05
18GC026	26	27	1	-0.05
18GC026	27	27.75	0.75	-0.05
18GC026	27.75	29	1.25	6.27

Hole_ID	From_m	To_m	Interval_m	Cg_%
18GC026	29	30	1	7.5
18GC026	30	31	1	7.84
18GC026	31	32	1	10.3
18GC026	32	32.96	0.96	8.98
18GC026	32.96	33.63	0.67	7.86
18GC026	33.63	34	0.37	0.6
18GC026	34	35	1	2.2
18GC026	35	36	1	2.95
18GC026	36	37	1	2.74
18GC026	37	38	1	0.29
18GC026	38	39	1	0.19
18GC026	39	40	1	0.06
18GC026	40	40.63	0.63	0.31
18GC026	40.63	41.6	0.97	1.82
18GC026	41.6	42	0.4	5.09
18GC026	42	43	1	6.27
18GC026	43	44	1	2.31
18GC026	44	45	1	10.5
18GC026	45	46	1	4.23
18GC026	46	47	1	6.54
18GC026	47	48	1	11.9
18GC026	48	49	1	38.9
18GC026	49	50	1	21.4
18GC026	50	51	1	7.37
18GC026	51	52	1	4.24
18GC026	52	53.04	1.04	4.52
18GC026	53.04	54.06	1.02	8.39
18GC026	54.06	55	0.94	5.12
18GC026	55	55.85	0.85	5.59
18GC026	55.85	56.7	0.85	8.78
18GC026	56.7	57.55	0.85	24.4
18GC026	57.55	58.64	1.09	2.43
18GC026	58.64	59.54	0.9	36
18GC026	59.54	60.29	0.75	4.19
18GC026	60.29	61	0.71	3.22
18GC026	61	62	1	2.7
18GC026	62	62.97	0.97	2.3
18GC026	62.97	64.01	1.04	2.63



28.3 Assay Certificates



Quality Analysis ...



Innovative Technologies

Date Submitted: 24-Sep-18
Invoice No.: A18-13756
Invoice Date: 17-Oct-18
Your Reference: Graphite Creek Project

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
Canada

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

61 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT A18-13756

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Notes:

CERTIFIED BY:



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



Report: A18-13756

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Unit Symbol	Graph
Lower Limit	%
Method Code	IR
732501	< 0.05
732502	< 0.05
732503	< 0.05
732504	< 0.05
732505	< 0.05
732506	< 0.05
732507	< 0.05
732508	< 0.05
732509	1.26
732510	3.12
732511	5.58
732512	6.92
732513	6.96
732514	9.11
732515	5.55
732516	5.57
732517	8.16
732518	3.02
732519	7.06
732520	< 0.05
732521	3.23
732522	2.49
732523	3.03
732524	22.6
732525	< 0.05
732526	5.09
732527	1.63
732528	3.39
732529	16.1
732530	2.39
732531	3.23
732532	2.50
732533	14.6
732534	< 0.05
732535	17.6
732536	< 0.05
732537	3.85
732538	7.44
732539	4.92
732540	< 0.05
732541	5.26



Report: A18-13756

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
732542	8.92
732543	4.59
732544	4.22
732545	3.78
732546	5.98
732547	4.42
732548	5.71
732549	11.4
732550	1.06
732551	4.61
732552	5.96
732553	5.27
732554	4.95
732555	5.24
732556	5.14
732557	3.19
732558	2.55
732559	3.09
732560	< 0.05
732561	2.37



Report: A18-13756

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.01
Graphite 4A Cert	4.18
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
732510 Orig	3.14
732510 Dup	3.09
732520 Orig	< 0.05
732520 Dup	< 0.05
732530 Orig	2.38
732530 Dup	2.40
732540 Orig	< 0.05
732540 Dup	< 0.05
732550 Orig	1.06
732550 Dup	1.06
732551 Orig	4.61
732551 Split	4.89
PREP DUP	
732559 Orig	3.09
732559 Dup	3.09
Method Blank	< 0.05
Method Blank	< 0.05
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 24-Sep-18
Invoice No.: A18-13757
Invoice Date: 19-Oct-18
Your Reference: Graphite Creek Project

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
Canada

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

174 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT **A18-13757**

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Notes:

CERTIFIED BY:



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Quality Control

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TELEPHONE +905 648-9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL Ancaster@actlabs.com ACTLABS GROUP WEBSITE www.actlabs.com



Report: A18-13757

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
732562	< 0.05
732563	< 0.05
732564	0.08
732565	< 0.05
732566	< 0.05
732567	< 0.05
732568	< 0.05
732569	< 0.05
732570	3.14
732571	< 0.05
732572	0.57
732573	5.46
732574	5.40
732575	12.6
732576	6.37
732577	4.93
732578	15.2
732579	7.21
732580	< 0.05
732581	1.84
732582	1.59
732583	5.25
732584	1.85
732585	4.51
732586	2.33
732587	2.38
732588	8.10
732589	3.34
732590	2.38
732591	3.31
732592	1.95
732593	2.56
732594	4.44
732595	4.80
732596	10.3
732597	2.27
732598	6.91
732599	23.4
732600	< 0.05
732601	1.44
732602	1.91



Report: A18-13757

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	10.6
%	7.63
Lower Limit	< 0.05
Methoc Code	IR
732603	10.6
732604	7.63
732605	< 0.05
732606	4.18
732607	2.77
732608	3.30
732609	2.43
732610	1.08
732611	2.32
732612	3.94
732613	5.53
732614	4.94
732615	0.06
732616	< 0.05
732617	0.24
732618	0.67
732619	< 0.05
732620	< 0.05
732621	0.13
732622	0.13
732623	0.27
732624	0.06
732625	0.10
732626	0.11
732627	0.68
732628	0.87
732629	0.27
732630	3.11
732631	0.62
732632	0.24
732633	< 0.05
732634	0.15
732635	0.31
732636	0.24
732637	0.26
732638	0.32
732639	0.39
732640	< 0.05
732641	0.12
732642	0.17
732643	0.09
732644	0.15



Report: A18-13757

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Methoc Code	IR
732645	0.18
732646	4.62
732647	2.76
732648	0.17
732649	2.13
732650	2.40
732651	2.00
732652	0.36
732653	0.10
732654	1.05
732655	< 0.05
732656	0.80
732657	1.29
732658	2.34
732659	1.74
732661	1.70
732662	3.86
732663	3.47
732664	2.90
732665	1.93
732666	0.87
732667	2.93
732668	11.4
732669	2.40
732670	1.05
732671	3.34
732672	2.74
732673	9.48
732674	6.94
732675	8.49
732676	3.61
732677	5.54
732678	48.6
732679	0.51
732680	< 0.05
732681	7.44
732682	4.09
732683	2.46
732684	5.60
732685	34.8



Report: A18-13757

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Methoc Code	IR
732686	< 0.05
732687	1.57
732688	2.62
732689	4.11
732690	3.09
732691	2.92
732692	3.44
732693	4.22
732694	0.59
732695	3.89
732696	3.74
732697	2.17
732698	2.15
732699	1.90
732700	< 0.05
732701	1.39
732702	1.29
732703	1.57
732704	2.39
732705	1.55
732706	1.73
732707	1.14
732708	2.64
732709	2.66
732710	2.41
732711	1.84
732712	1.76
732713	0.28
732714	2.37
732715	1.85
732716	2.60
732717	2.38
732718	2.86
732719	3.31
732720	< 0.05
732721	2.07
732722	0.23
732723	0.49
732724	0.49
732725	0.50
732726	2.33
732727	2.77



Report: A18-13757

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
732728	1.47
732729	3.33
732730	1.07
732731	3.25
732732	0.92
732733	1.22
732734	0.80
732735	1.02



Report: A18-13757

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
732597 Dup	3.33
732601 Orig	1.44
732601 Dup	1.43
732608 Orig	3.29
732608 Dup	3.30
732611 Orig	2.32
732611 Split PREP DUP	1.98
732620 Orig	< 0.05
732620 Dup	< 0.05
732630 Orig	3.13
732630 Dup	3.10
732640 Orig	< 0.05
732640 Dup	< 0.05
732654 Orig	1.04
732654 Dup	1.05
732661 Orig	1.70
732661 Split PREP DUP	1.82
732663 Orig	3.48
732663 Dup	3.45
732673 Orig	9.47
732673 Dup	9.48
732683 Orig	2.46
732683 Dup	2.47
732693 Orig	4.23
732703 Orig	1.57
732703 Dup	1.57
732711 Orig	1.84
732711 Split PREP DUP	1.71
732712 Orig	1.76
732712 Dup	1.77
732722 Orig	0.24
732722 Dup	0.23
732735 Orig	1.02
732735 Dup	1.02
Method Blank	< 0.05
Method Blank	< 0.05
Method Blank	< 0.05



Report: A18-13757

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Unit Symbol	Graph
Lower Limit	%
Method Code	0.05
Method Blank	IR
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 28-Sep-18
Invoice No.: A18-14133
Invoice Date: 19-Oct-18
Your Reference:

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
Canada

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

52 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT **A18-14133**

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Notes:

CERTIFIED BY:



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



Report: A18-14133

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	5.56
%	6.26
Lower Limit	4.53
Method Code	< 0.05
IR	< 0.05
732736	< 0.05
732737	< 0.05
732738	< 0.05
732739	< 0.05
732740	< 0.05
732741	< 0.05
732742	< 0.05
732743	< 0.05
732744	< 0.05
732745	< 0.05
732746	0.07
732747	< 0.05
732748	8.99
732749	5.81
732750	3.15
732751	2.92
732752	3.96
732753	4.52
732754	30.5
732755	< 0.05
732756	3.89
732757	4.61
732758	2.71
732759	4.01
732760	< 0.05
732761	4.23
732762	7.31
732763	9.53
732764	5.32
732765	5.55
732766	11.9
732767	8.61
732768	4.14
732769	7.53
732770	2.40
732771	4.69
732772	20.5
732773	2.57
732774	6.80
732775	24.1
732776	12.3



Report: A18-14133

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
792777	2.16
792778	1.62
792779	2.33
792780	< 0.05
792781	4.85
792782	4.91
792783	2.52
792784	8.68
792785	10.3
792786	16.4
792787	3.57



Report: A18-14133

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	3.98
Graphite 4A Cert	4.18
Graphite 4A Meas	4.01
Graphite 4A Cert	4.18
Graphite 4A Meas	4.01
Graphite 4A Cert	4.18
Graphite 14 Meas	14.1
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
732745 Orig	< 0.05
732745 Dup	< 0.05
732755 Orig	< 0.05
732755 Dup	< 0.05
732765 Orig	5.55
732765 Dup	5.55
732775 Orig	24.1
732775 Dup	24.1
732785 Orig	10.3
732785 Split PREP DUP	11.2
732785 Orig	10.4
732785 Dup	10.3
Method Blank	< 0.05
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 01-Oct-18
Invoice No.: A18-14211
Invoice Date: 29-Oct-18
Your Reference: GPH18-04

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
Canada

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

126 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT **A18-14211**

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Notes:

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



Report: A18-14211

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	4.27
%	7.40
Lower Limit	0.05
Method Code	IR
732788	4.27
732789	7.40
732790	1.06
732791	4.25
732792	9.86
732793	7.36
732794	2.95
732795	4.25
732796	0.14
732797	< 0.05
732798	< 0.05
732799	0.28
732800	< 0.05
732801	0.86
732802	< 0.05
732803	< 0.05
732804	< 0.05
732805	< 0.05
732806	0.39
732807	< 0.05
732808	0.07
732809	< 0.05
732810	3.19
732811	0.10
732812	< 0.05
732813	< 0.05
732814	0.07
732815	0.11
732816	0.54
732817	< 0.05
732818	0.13
732819	0.06
732820	< 0.05
732821	0.07
732822	< 0.05
732823	< 0.05
732824	0.96
732825	2.91
732826	2.17
732827	1.49
732828	1.68



Report: A18-14211

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
732829	2.00
732830	2.39
732831	1.86
732832	2.65
732833	1.70
732834	2.20
732835	3.73
732836	4.07
732837	4.59
732838	4.46
732839	4.20
732840	< 0.05
732841	3.94
732842	4.17
732843	4.28
732844	2.68
732845	3.39
732846	4.72
732847	4.26
732848	3.77
732849	3.51
732850	1.05
732851	3.51
732852	3.53
732853	3.30
732854	3.45
732855	2.11
732856	1.62
732857	2.56
732858	2.90
732859	4.00
732860	< 0.05
732861	4.22
732862	2.31
732863	2.31
732864	2.70
732865	6.63
732866	15.9
732867	2.09
732868	14.6
732869	1.80
732870	3.16



Report: A18-14211

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
732571	3.97
732572	6.14
732573	4.68
732574	15.2
732575	7.71
732576	3.79
732577	2.31
732578	1.93
732579	6.51
732581	2.11
732582	2.67
732583	1.99
732584	2.32
732585	2.22
732586	2.25
732587	1.70
732588	2.94
732589	2.12
732590	2.39
732591	0.99
732592	2.44
732593	3.90
732594	2.98
732595	2.02
732596	1.93
732597	11.7
732598	1.57
732599	1.79
732500	< 0.05
732501	7.86
732502	2.23
732503	3.48
732504	2.41
732505	2.14
732506	0.27
732507	1.83
732508	1.95
732509	1.88
732510	1.05
732511	0.72
732512	2.45



Report: A18-14211

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Unit Symbol	Graph
Lower Limit	%
Method Code	0.05
732513	IR
	3.12

Page 5/7



Report: A18-14211

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	3.98
Graphite 4A Cert	4.18
Graphite 4A Meas	3.98
Graphite 4A Cert	4.18
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
732797 Orig	< 0.05
732797 Dup	< 0.05
732807 Orig	< 0.05
732807 Dup	< 0.05
732817 Orig	< 0.05
732817 Dup	< 0.05
732827 Orig	1.49
732827 Dup	1.48
732836 Orig	4.07
732836 Dup	4.06
732837 Orig	4.59
732837 Split PREP DUP	4.49
732846 Orig	4.74
732846 Dup	4.70
732856 Orig	1.62
732856 Dup	1.61
732866 Orig	15.9



Report: A18-14211

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	%
Unit_Symbol	
Lower_Limit	0.05
Method Code	IR
732866 Dup	15.9
732881 Orig	2.10
732881 Dup	2.11
732887 Orig	1.70
732887 Split	1.76
PREP DUJ	
732890 Orig	2.38
732890 Dup	2.39
732900 Orig	< 0.05
732900 Dup	< 0.05
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 04-Oct-18
Invoice No.: A18-14544
Invoice Date: 05-Nov-18
Your Reference: Graphite Creek Project

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
United States

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

80 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT **A18-14544**

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Notes:

CERTIFIED BY:



Emmanuel Esemé, Ph.D.
Quality Control

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



Report: A18-14544

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	6.81
%	5.51
Lower Limit	0.05
Method Code	IR
732514	6.81
732515	5.51
732516	1.43
732517	4.35
732518	< 0.05
732519	< 0.05
732520	< 0.05
732521	< 0.05
732522	< 0.05
732523	< 0.05
732524	< 0.05
732525	< 0.05
732526	< 0.05
732527	0.52
732528	6.46
732529	0.29
732530	3.16
732531	4.09
732532	4.27
732533	7.47
732534	26.8
732535	5.46
732536	2.28
732537	4.97
732538	2.92
732539	2.41
732540	< 0.05
732541	2.71
732542	3.36
732543	6.13
732544	4.88
732545	4.98
732546	4.75
732547	5.81
732548	4.43
732549	4.63
732550	2.41
732551	4.17
732552	22.6
732553	0.08
732554	6.24



Report: A18-14544

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Unit Symbol	Graph
Lower Limit	%
Method Code	IR
7325955	19.3
7325956	< 0.05
7325957	9.26
7325958	4.79
7325959	9.82
7325960	< 0.05
7325961	9.63
7325962	5.92
7325963	2.43
7325964	5.42
7325965	8.62
7325966	2.84
7325967	33.7
7325968	< 0.05
7325969	3.35
7325970	1.06
7325971	1.75
7325972	1.77
7325973	3.10
7325974	3.43
7325975	9.79
7325976	9.83
7325977	3.67
7325978	16.9
7325979	4.39
7325980	< 0.05
7325981	9.52
7325982	4.46
7325983	5.90
7325984	2.04
7325985	1.84
7325986	2.09
7325987	3.39
7325988	5.49
7325989	10.4
7325990	3.16
7325991	1.70
7325992	7.69
7325993	8.97



Report: A18-14544

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 14 Meas	14.5
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.4
Graphite 14 Meas	14.55
Graphite 14 Cert	14.4
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
732523 Orig	< 0.05
732523 Dup	< 0.05
732533 Orig	7.48
732533 Dup	7.47
732543 Orig	6.17
732543 Dup	6.10
732553 Orig	0.08
732553 Dup	0.08
732563 Orig	2.43



Report: A18-14544

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
7325653 Split	2.47
PREP DUP	
7325666 Orig	2.85
7325666 Dup	2.83
7325772 Orig	1.77
7325772 Dup	1.77
7325882 Orig	4.49
7325882 Dup	4.47
7325992 Orig	7.69
7325992 Dup	7.69
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 04-Oct-18
Invoice No.: A18-14545
Invoice Date: 05-Nov-18
Your Reference: Graphite Creek Project

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
United States

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

72 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT **A18-14545**

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Notes:

CERTIFIED BY:



Emmanuel Esemé, Ph.D.
Quality Control

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



Report: A18-14545

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
732594	6.53
732595	2.04
732596	3.93
732597	3.94
732598	11.6
732599	8.18
733000	< 0.05
733001	3.97
733002	0.09
733003	0.10
733004	0.71
733005	< 0.05
733006	0.06
733007	1.04
733008	0.42
733009	0.44
733010	2.41
733011	< 0.05
733012	0.38
733013	1.65
733014	1.12
733015	2.26
733016	1.51
733017	1.53
733018	2.57
733019	2.19
733020	0.06
733021	0.72
733022	2.65
733023	1.95
733024	2.39
733025	3.41
733026	3.75
733027	2.97
733028	3.71
733029	3.17
733030	1.07
733031	2.21
733032	1.75
733033	1.89
733034	1.95



Report: A18-14545

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
733035	1.88
733036	1.70
733037	2.06
733038	2.65
733039	4.01
733040	< 0.05
733041	3.91
733042	6.90
733043	3.88
733044	4.67
733045	3.55
733046	5.77
733047	5.25
733048	2.19
733049	6.98
733050	3.15
733051	9.14
733052	16.1
733053	2.10
733054	2.28
733055	1.48
733056	1.87
733057	4.95
733058	3.98
733059	2.32
733060	< 0.05
733061	1.73
733062	2.93
733063	2.03
733064	1.51
733065	2.12



Report: A18-14545

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 14 Meas	14.5
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.4
Graphite 14 Meas	14.55
Graphite 14 Cert	14.4
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
733006 Orig	0.06
733006 Dup	0.06
733016 Orig	1.50
733016 Dup	1.51
733026 Orig	3.75
733026 Dup	3.75
733036 Orig	1.70
733036 Dup	1.70
733043 Orig	3.98



Report: A18-14545

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
733043 Split	4.02
PREP DUP	
733045 Orig	3.55
733045 Dup	3.54
733055 Orig	1.48
733055 Dup	1.49
733065 Orig	2.11
733065 Dup	2.13
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 09-Oct-18
Invoice No.: A18-14772
Invoice Date: 05-Nov-18
Your Reference: Graphite Creek

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
United States

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

80 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT A18-14772

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Notes:

CERTIFIED BY:



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Report: A18-14772

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
733066	< 0.05
733067	0.05
733068	3.82
733069	7.07
733070	1.07
733071	7.42
733072	3.65
733073	4.50
733074	3.88
733075	6.60
733076	3.75
733077	2.32
733078	8.40
733079	4.17
733080	< 0.05
733081	2.73
733082	3.09
733083	2.57
733084	1.80
733085	2.66
733086	2.42
733087	7.66
733088	5.65
733089	4.77
733090	3.16
733091	2.50
733092	3.18
733093	3.90
733094	22.7
733095	6.93
733096	6.61
733097	6.14
733098	3.17
733099	2.67
733100	< 0.05
733101	3.04
733102	1.94
733103	11.1
733104	8.23
733105	6.81
733106	3.04



Report: A18-14772

Activation Laboratories Ltd.

Results

Analyte Symbol	C: Graph %
733107	3.43
733108	10.9
733109	3.15
733110	2.98
733111	3.90
733112	12.4
733113	2.84
733114	11.2
733115	2.72
733116	0.47
733117	3.45
733118	1.27
733119	1.45
733120	< 0.05
733121	0.12
733122	0.23
733123	0.84
733124	1.06
733125	0.60
733126	1.30
733127	0.86
733128	0.13
733129	0.43
733130	1.08
733131	0.45
733132	14.7
733133	< 0.05
733134	3.20
733135	0.86
733136	< 0.05
733137	< 0.05
733138	3.62
733139	< 0.05
733140	< 0.05
733141	< 0.05
733142	0.73
733143	< 0.05
733144	< 0.05
733145	< 0.05



Report: A18-14772

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.02
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.02
Graphite 4A Cert	4.18
Graphite 4A Meas	4.01
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55



Quality Analysis ...



Innovative Technologies

Date Submitted: 09-Oct-18
Invoice No.: A18-14773
Invoice Date: 05-Nov-18
Your Reference: Graphite Creek Project

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
United States

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

80 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT A18-14773

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Notes:

CERTIFIED BY:



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Quality Control

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



Report: A18-14773

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
733146	< 0.05
733147	< 0.05
733148	< 0.05
733149	0.33
733150	3.10
733151	0.37
733152	< 0.05
733153	< 0.05
733154	0.26
733155	< 0.05
733156	< 0.05
733157	< 0.05
733158	2.25
733159	2.56
733160	< 0.05
733161	1.77
733162	1.71
733163	1.33
733164	1.77
733165	1.11
733166	3.93
733167	3.97
733168	4.62
733169	4.11
733170	2.43
733171	4.37
733172	4.43
733173	4.50
733174	4.65
733175	3.56
733176	4.12
733177	4.52
733178	4.34
733179	4.72
733180	< 0.05
733181	4.40
733182	4.49
733183	4.44
733184	4.33
733185	4.22
733186	3.65



Report: A18-14773

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
733187	3.61
733188	3.37
733189	3.10
733190	1.06
733191	3.37
733192	3.44
733193	3.40
733194	4.46
733195	3.80
733196	3.51
733197	3.35
733198	3.54
733199	4.17
733200	< 0.05
733201	3.86
733202	2.03
733203	3.29
733204	2.24
733205	2.03
733206	2.06
733207	2.86
733208	3.28
733209	4.50
733210	3.16
733211	1.17
733212	1.31
733213	5.20
733214	6.53
733215	3.83
733216	3.67
733217	2.58
733218	2.98
733219	4.18
733220	< 0.05
733221	2.00
733222	2.01
733223	1.78
733224	2.03
733225	1.60



Report: A18-14773

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.02
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.02
Graphite 4A Cert	4.18
Graphite 4A Meas	4.01
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.00
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55



Report: A18-14773

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	Graph
Unit_Symbol	%
Lower_Limit	0.05
Method Code	IR
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
733158 Orig	2.26
733158 Dup	2.24
733168 Orig	4.62
733168 Dup	4.62
733178 Orig	4.36
733178 Dup	4.33
733188 Orig	3.38
733188 Dup	3.37
733195 Orig	3.80
733195 Split	3.80
PREP DUP	
733197 Orig	3.35
733197 Dup	3.35
733207 Orig	2.86
733207 Dup	2.87
733217 Orig	2.57
733217 Dup	2.60
Method Blank	< 0.05



Quality Analysis ...



Innovative Technologies

Date Submitted: 09-Oct-18
Invoice No.: A18-14775
Invoice Date: 05-Nov-18
Your Reference: Graphite Creek Project

Graphite One Resources
11401 Olive Lane
Anchorage
AK 99515
United States

ATTN: Stan Foo

CERTIFICATE OF ANALYSIS

52 Pulp samples were submitted for analysis.

The following analytical package(s) were requested: Code 5D-C-Graphitic Infrared

REPORT A18-14775

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Notes:

CERTIFIED BY:



Emmanuel Esemé, Ph.D.
Quality Control

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



Report: A18-14775

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
733226	< 0.05
733227	< 0.05
733228	< 0.05
733229	6.27
733230	2.42
733231	7.50
733232	7.84
733233	10.3
733234	8.98
733235	7.86
733236	0.60
733237	2.20
733238	2.95
733239	2.74
733240	< 0.05
733241	0.29
733242	0.19
733243	0.06
733244	0.31
733245	1.82
733246	5.09
733247	6.27
733248	2.31
733249	10.5
733250	1.07
733251	4.23
733252	6.54
733253	11.9
733254	< 0.05
733255	38.9
733256	< 0.05
733257	21.4
733258	< 0.05
733259	7.97
733260	< 0.05
733261	4.24
733262	4.52
733263	8.39
733264	5.12
733265	5.59
733266	8.78



Report: A18-14775

Activation Laboratories Ltd.

Results

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
793267	24.4
793268	< 0.05
793269	2.43
793270	3.14
793271	36.0
793272	< 0.05
793273	4.19
793274	3.22
793275	2.70
793276	2.30
793277	2.63



Report: A18-14775

Activation Laboratories Ltd.

QC

Analyte Symbol	C-
Graph	
Unit Symbol	%
Lower Limit	0.05
Method Code	IR
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.02
Graphite 4A Cert	4.18
Graphite 4A Meas	4.04
Graphite 4A Cert	4.18
Graphite 4A Meas	4.02
Graphite 4A Cert	4.18
Graphite 4A Meas	4.01
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 4A Meas	4.03
Graphite 4A Cert	4.18
Graphite 14 Meas	14.4
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.2
Graphite 14 Cert	14.3
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
Graphite 14 Meas	14.3
Graphite 14 Cert	14.55
733227 Orig	< 0.05
733227 Dup	< 0.05
733241 Orig	0.29
733241 Dup	0.29
733251 Orig	4.22
733251 Dup	4.24
733261 Orig	4.25
733261 Dup	4.22
733271 Orig	36.1
733271 Dup	35.9
733275 Orig	2.70
733275 Split PREP DUP	2.67
Method Blank	< 0.05



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QC

Analyte Symbol	C-
Unit Symbol	Graph
Lower Limit	%
Method Code	0.05
Method Blank	IR
Method Blank	< 0.05



28.4 Certificate of Authors

