Lycopodium

South Star Battery Metals Corp.

BamaStar Graphite Project

Preliminary Economic Assessment

National Instrument 43-101 Technical Report

5187-GREP-001

November 2024

south star
BATTERY METALS CORP

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1.0 SUMMARY

1.1 Introduction

Lycopodium Minerals Canada Ltd. ("Lycopodium"), in conjunction with Mercator Geological Services Limited ("Mercator"), AGP Mining Consultants Inc. ("AGP"), MetPro Management Inc., Global Resource Engineering ("GRE"), and Dorfner Anzaplan GmbH ("ANZAPLAN") has prepared a preliminary economic assessment ("PEA") and associated National Instrument 43-101 ("NI 43-101") Technical Report (the "Technical Report" or "Report") for South Star Battery Minerals ("South Star") on the BamaStar Graphite Project ("BamaStar", or the "Project", or the "Property"), with proposed physical locations in Coosa and Mobile Counties, Alabama, USA.

The responsibility of the contributing parties are as follows:

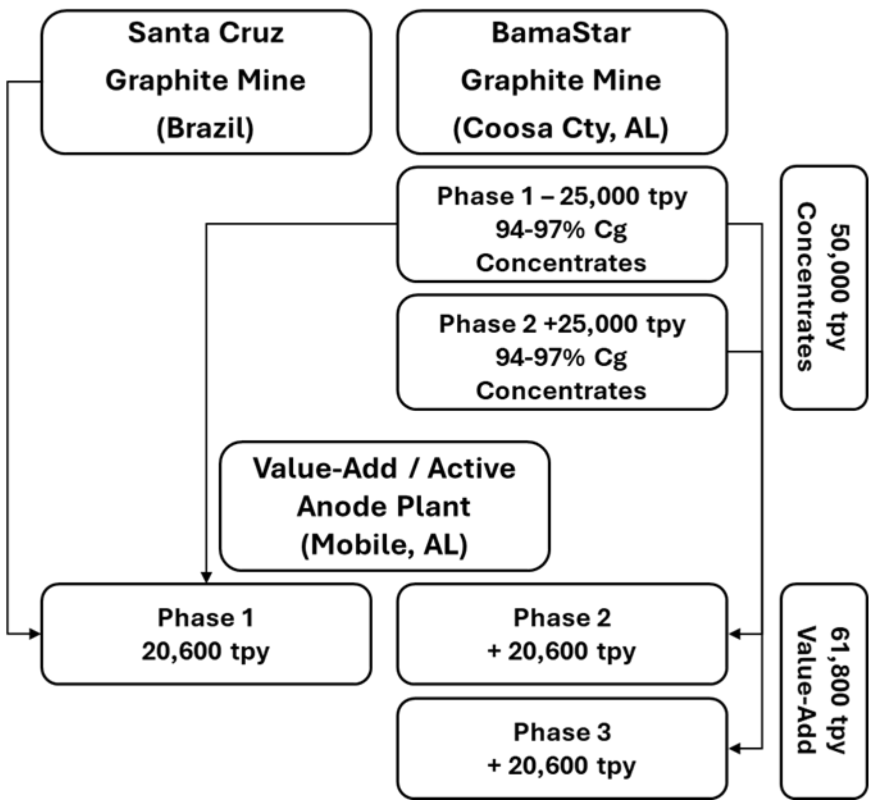
- Lycopodium was commissioned by South Star to manage and coordinate the work related to the PEA as lead study consultant.
- Lycopodium was responsible for the design and cost estimating of the crushing facilities, process plant, and surface infrastructure.
- Mercator was responsible for the Mineral Resource Estimate ("MRE").
- AGP was responsible for the mining design, mine production schedule, co-disposal facility design, and mine and co-disposal capital and operating costs.
- GRE was responsible for site wide water management, geochemical assessment, and environmental studies, as well as planning, assessment, licensing, and permitting.
- MetPro was responsible to manage metallurgical testing performed by SGS Mineral Services ("SGS") and interpret historic and current metallurgical test results.
- ANZAPLAN was responsible for the design and cost estimating of the downstream Coated Spherical Purified Graphite Plant ("CSPG")

South Star is developing a vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery ("LIB"), fuel cell and industrial graphite markets. The project consists of a graphite mine and concentrate processing facility in Coosa County, Alabama, as well as a Value-Add Plant in Mobile, Alabama for value addition transformation. The Value-Add Plant will receive natural flake graphite ("NFG") concentrates from both BamaStar and South Star's flagship Santa Cruz Graphite Mine in northeastern Brazil's Bahia state, which is currently commissioned and ramping up Phase 1 production ("Santa Cruz Mine" or "Santa Cruz").

The PEA presents South Star's proposed strategic plan over the next six to seven years, which is to have two mines each producing approximately 50,000 tonnes/year ("tpy") of NFG and the Value-Add Plant producing approximately 60,000 tpy of active anode materials and other critical value-add products. Figure 1.1 presents the phased strategic production plan.

South Star plans to develop the facilities in a phased approach as the markets and clients request additional production. The phased approach significantly reduces the financial, operating, technical and commercial risks. All aspects of production are being designed using industry standard, commercially available equipment and proven flowsheet / designs. The engineering / construction documents, equipment selection and approaches are consolidated and standardized for each phase so that supply chain, maintenance and future expansions can be simplified and advanced quickly. The modular design for the Value-Add Plant will allow most of the major equipment to be pre-mounted and pre-assembled in controlled environments at the factory, trucked to site and dropped on foundations.

Figure 1.1 BamaStar Phased, Strategic Production Plan



The design and development details for the mine and concentrator are presented throughout this report, while the details of the Value-Add Plant are principally presented in Section 24 of the PEA. The economic analysis of the combined production facilities is presented in Chapter 22.

1.2 Property Description and Location

The Project is located in northeast Coosa County, State of Alabama, USA, within Township 24 North and Range 19 East. The Project can be accessed about 77 direct km (~ 48 miles) from Birmingham and about 13 road km from Sylacauga along US Highway 280. The approximate geographic centre of the Project is approximately 30°04'30"N and 86°09'52"W at ~293 m (961 ft) AMSL (UTM coordinates 577978mE and 3659893mN, NAD83, UTM Zone 16N).

1.2.1 Land Tenure

The Project comprises two Mineral Lease Agreements (“MLA”s) that are contiguous, cover approximately 660 acres (267 ha), and are covered under corresponding Surface Use Agreements (“SUA”s). One of the two MLAs, the Ceylon Mine Prospect, covers the historical past-producing Ceylon Graphite Mine. Both MLAs were entered into on February 28, 2019, one with KADRA Timber, LLC (“KADRA”) and Rodney Rushing (Rushing Prospect) and one with Carolyn Mills Family, LLC (“Mills”) (Ceylon Mine Prospect). The Rushing Prospect MLA was amended on October 12, 2022, to include two addition areas of land. The optionor for both MLAs is Charge Minerals LLC (“Charge Minerals”) and the optionee is South Star Battery Metals Alabama Corp. (“SSBMA”), a wholly owned subsidiary of South Star. MLAs were originally a five-year term with a possible two-year extension, and both are subject to concurrent SUAs. On 27 February 2024, the MLAs were extended two years expiring on February 28, 2026.

1.2.2 Surface Rights and Legal Access

Charge Minerals negotiated SUAs with the holders of the surface rights for the Rushing and Ceylon Mine Prospects. The agreements allow South Star to access the lands and to carry out exploration work on the properties such as surface sampling, trenching, and drilling.

The SUA for the Rushing Prospect acreage was entered into on 28 February 2019 (and amended 12 October 2022), with a duration of five years. It calls for damage payments of $1,000 per acre with a 15-acre minimum paid by Charge Minerals at signing. The SUA was extended along with the MLA for two years on 27 February 2024.

1.2.3 Current Permits and Permitting

The completed 2022 drilling program had such a small disturbance footprint that no permit was required. South Star has subsequently received and a National Pollutant Discharge Elimination System General Permit (“NPDES”) that will cover future drilling and exploration activities on the Project. The NPDES has an effective date of coverage of 30 December 2022 and has an expiration date of 31 March 2026. Permits required for the future project are discussed in Section 20.2.

1.2.4 Environmental Liabilities

The site was mined for graphite in the 1940s, and as a result, has a legacy mine pit and legacy mine tailings. On a 17-19 April site visit, Larry Breckenridge from GRE noticed that the old Ceylon mine pit had evidence of Acid Rock Drainage ("ARD") with pH 3.4 seeps occurring at one location in the bottom of the old pit. Nearby rocks were coated with acidic sulphur salts and had an acidic paste pH. The legacy mine tailings, which were likely processed from geochemically – inert oxide mineralized material were pH neutral. GRE believes that these legacy environmental issues are not currently a significant impact to local water quality, but they are indicative of the fact that an ARD management strategy must be part of the mining plan. Geochemical characterization and geochemical mitigation are presented in Section 20.1 of this report.

1.2.5 Earn-In Agreement

On 7 December 2021, South Star announced the terms of their Earn-In Agreement (the "Agreement") to earn up to 75% of the properties from Hexagon Energy Minerals Limited ("Hexagon", ASX: HXG) and US Critical Minerals LLC ("USCM"), the latter being a privately held exploration company incorporated in the USA, which have 80% and 20% ownership, respectively. To satisfy the terms of the Agreement, South Star must complete the following:

The drilling, resource estimation and analysis needed to produce a NI 43-101 guided PEA within three years (completed at the effective date of this Technical Report).

Fund an annual minimum expenditure of CA$250,000 (approximately US$184,000, for a total of CA$750,000 (approximately US$552,000) to earn 75% of the Project (completed).

Extend or renew, as needed, the currently existing MLAs and SUAs on the Project to ensure that they are valid for a period of a minimum of 12 months beyond the three-year term of the definitive earn-in period (completed with the 27 February 2024 extension).

Upon satisfaction of the three items listed above, South Star shall have the right, but not the obligation, to acquire 75% of the Project.

1.2.6 Royalties, Agreements and Encumbrances

Both the Rushing and Ceylon Mine Prospects are subject to a 1.7% Net Smelter Return ("NSR") during a Trial Production Period ("TPP") defined as concentrate production >1,000 tpa and <10,000 tpa with a minimum annual royalty of $65,000. Upon Commercial Mining Commencement defined as >10,000 tpa of concentrate, the NSR increases to 2.0% with a $125,000 per year minimum.

1.3 Accessibility, Climate, Local Resources, Infrastructure and Physiography

1.3.1 Climate and Operating Season

The nearest climatic data available is for Sylacauga, northeast of the Project. It has an average temperature of 61.7°F (16.5°C). The warmest month is July with an average temperature of 78.7°F (25.9°C). The coolest month on average is January with an average temperature of 43.2°F (6.2°C). The maximum average high is 90.6°F (32.6°C) in July, and the minimum average low is 31.4°F (-0.3°C) in January. Average annual precipitation is 55.2 in (140.2 cm). It rains all year with the wettest months being March with an average of 5.9 in (15.0 cm). Snow is rare with an average of 0.8 in (cm). It is humid in the summer. The state is prone to tropical storms, hurricanes, thunderstorms, and tornadoes. Due to the moderate climate of this region of United States, the exploration operating season is year-round.

1.3.2 Local Resources and Infrastructure

Infrastructure in the immediate area of the Property, includes 4-lane US HWY 280 which cuts through the Project area, US HWY 231 further east of the Project area, and numerous well-maintained logging access roads. A high-tension electrical transmission line cuts through the southwestern area of the Property and a natural gas line is located in the area. There are two cell/radio towers on the access road into the Ceylon Mine Prospect just south of Hwy 280 and within a couple hundred metres of the historical Ceylon Mine. The nearest major airport with scheduled flights is in Birmingham, and there is a small airfield at Sylacauga. The Project is about 225 miles (~362 km) from the major port at Mobile, Alabama.

The Property is close to centres of population such as Sylacauga, Stewartville and Goodwater, which could supply the workforce and logistical needs of a graphite mine. The Property is also within 75 km of major cities Birmingham and Montgomery. The City of Sylacauga has train and bus stations, a small airport, health care facilities, schools, postal service, and several lodges and motels. It primarily provides services for recreation and heavy industry. Manufacturing, mining, agriculture and forestry all play a role in the overall industrial output of the city.

The southeastern USA is rapidly developing into a major hub for the EV industry and the LIBs needed to power them. In addition, a significant aerospace and defense industrial hub is centered around Huntsville, Alabama, providing further market opportunities for high-purity, value-added graphite products. Graphite is included in the US Critical Minerals List and was recently added to the National Defense Stockpile List. Alabama state and local officials are pro-development and support both primary extractive and downstream processing industries (South Star Battery Metals, 2023).

Figure 1.2 BamaStar Strategic Location in US Battery, Defense and Technology Hub

1.3.3 Physiography and Water Availability

The Property is located in an area of shallow ridges and valleys with elevations ranging from approximately 820 to 1,148 ft. AMSL (250 to 350 m). The land use is forestry with thick mixed hardwoods and pines (mostly white), and significant areas of pine plantations which are harvested every few decades.

Small creeks on the Property offer plenty of water for exploration work such as diamond drilling and pressure washing of surface exposures / trenches.

1.4 History

The Project is located within the Alabama Graphite Belt ("AGB") and covers the historical Ceylon Graphite Mine. The AGB is a 112 km (70 miles) long, northeast-trending belt in Clay, Coosa and Chilton counties, Alabama.

The presence of graphitic schists in Alabama was recognized by M. Tuomey before the Civil War (1861-65; Jones, 1929). Dr. Gessner, employed by the Confederate government to recover sulphur from the pyrite deposit at Pyriton, is credited with the first discovery of flake graphite in Alabama (Clemmer et al., 1941). The first commercial graphite operation was in 1899 when the Allen Graphite Company built a mill using a patented oil flotation process and produced the first refined graphite in Alabama, at a mill near the Quenelda deposits in Clay County.

By 1906, there were several mines in operation and by 1913 the graphite industry was well established in central Alabama. World War I caused the disruption of foreign graphite imports, leading to significantly higher prices and the Alabama graphite industry boomed. By 1918 there were 25 flotation plants operating in the district with a total production in 1918 of 7.8 million pounds (3.5 million kg) of graphite (Pallister and Thoenen, 1948). However, the end of WWI and the resumption of foreign imports depressed prices and the Alabama graphite industry dwindled to seven operating plants in 1920. In 1929, the last two mines in the district, the Ceylon Graphite Company in Coosa County and the Superior Flake Plant in Clay County, were closed.

At the start of World War II (1939), C. J. Johnson rebuilt the mill at the Ceylon Graphite Mine and began production of flake graphite on a small scale. In 1940, as a result of the interruption of graphite imports from Madagascar, the US Bureau of Mines made a preliminary survey of the Alabama graphite deposits to determine the viability of resumption of mining, with a report by Clemmer et al. (1941). As the demand for graphite rose, the War Production Board, the Metals Reserve Company and the reconstruction Finance Corporation (all federally funded) turned their attention to the AGB district. After World War II, production declined rapidly due to the resumption of imports and a decline in prices, and graphite mining soon ceased in Alabama when international trade routes reopened (Edmundson, 2021). By 1950, only the Pocahontas Mine near Ashland and the Bama Mine in Chilton County were still in production, and they closed in 1953. Alabama graphite production has been idle since that time.

The two most significant mines in the southwestern portion of the AGB were the Ceylon Graphite and Bama mines. The Ceylon deposit, now termed the BamaStar deposit, is located about 12.9 km (8 miles) west of the town of Goodwater. One of the largest mines in the district, it operated from 1916 to 1929 and from 1939 to 1947. The principal working development during the later period was 282 m (925 feet) long, up to 91 m (300 feet) wide and up to 21.3 m (70 feet) deep on a series of leads striking N45°E and dipping 55°SE. The grade ranged from 2% to 6% graphite and averaged 3% (Wilson and Redwood, 2015).

1.4.1 Historical Exploration Work

Work was completed on the property between 24 April and 24 August 2019, by Hexagon and Charge Minerals (Carman, 2019). Exploration programs included geological mapping, in-situ XRF analyses, prospecting, in-situ XRF soil analyses, trenching, exploration pits, bulk sampling, reference geophysical testing on rock samples, and reference bulk density measurements on rock samples.

A total of 29 trenches, totalling approximately 2,905 m (9,531 ft), were excavated to a depth of about 2 m across the Ceylon Mine and Rushing Prospects of the Project with 765 samples submitted for laboratory analysis. A portion of the bulk sample material was shipped to the GIRCU Laboratory in Guangzhou, China for initial bench-scale beneficiation testing (Liu, 2020). Geological Setting and Mineralization

1.4.2 Regional Geology and the Alabama Graphite Belt

The Project is located at the southern end of the Appalachian Mountain range, a northeast trending belt of folded and metamorphosed rocks of Neoproterozoic to Lower Paleozoic age. These are covered by the onlap Coastal Plain Sediments of Cretaceous and younger age in the southern half of Alabama. The rocks of the southwestern end of the Appalachians are generally separated into four physiographic and geologic provinces which are, from northwest to southeast: The Interior Low Plateau, the Appalachian Plateau, the Valley and Ridge, and the Piedmont.

The Piedmont Province is formed of Neoproterozoic to early Paleozoic metamorphic rocks. The metamorphic grade increases across the Piedmont from lower greenschist facies in the northwest to high grade migmatite facies in the southeast. It is divided into three lithotectonic provinces which are, from northwest to southeast: The Northern Piedmont, Inner Piedmont, and Southern Piedmont, each bounded by major faults. The physiography of the Northern Piedmont is characterized by prominent ridges with peaks up to 2,407 ft. (734 m), becoming lower to the southeast. The Inner and Southern Piedmonts have much more subdued topography. The Northern Piedmont and has three main structural blocks: 1) Talladega, 2) Coosa, and 3) Tallapoosa, with the AGB located in the Coosa Block.

The AGB extends for approximately 60 miles (~100 km) along a northeast strike (~N30E) from eastern Chilton County, across Coosa County, and into southwestern Clay County. The belt varies in width but is approximately 3-5 miles (~5-8 km) wide. The AGB is broken up by the Millerville Fault into a southwestern belt (Chilton and Clay counties,) where the graphite mineralization occurs within the Higgins Ferry Group, and into a northeastern belt (Clay County), where this same geologic unit is referred to as the Poe Bridge Group. Flake graphite occurs within both schist (quartz-sillimanite-mica-graphite-roscoelite schist) and quartzite (quartz-mica-graphite) lithologies. The graphitic schist unit is highly oxidized and weathered down to depths of 10-30 m (33-98 ft) depending on topography and variations in mineralogy / structure. At depth below the oxidation zone, both the graphitic schist and quartzite units have significant amounts of pyrite and pyrrhotite present.

1.4.3 Property Geology

The Project is located within the Higgins Ferry Group. Stratigraphically, the Higgins Ferry Group is categorized as an interbedded sequence of three major lithologic units. The first unit is described as an assemblage of is coarse to fine grained biotite-feldspar-quartz gneiss, sericite-feldspar-muscovite schist, ±biotite±garnet-muscovite schist, and biotite-garnet-feldspar gneiss. The second unit is described as ±roscoelite-graphite-quartz schist and graphitic quartzite, representing the primary mineralized unit on the property. The third unit is described as garnet quartzite and garnetiferous altered mafic rocks. Amphibolite (actinolite-chlorite-hornblende) and pyroxenite bodies, grouped as the Mitchell Dam Amphibolite, may be present locally along with scattered pegmatites. Aluminous units commonly have kyanite, sillimanite, and sericite porphyroblasts.

Field mapping has defined the Project area as metamorphosed rocks that include pelitic sediments (without graphite), quartz-bearing sediment with variable graphite content, sillimanite-graphite-rich sediments, and amphibolite gneiss (without quartz or graphite).

1.4.4 Property Mineralization

Graphite lode mineralization (bedrock hosted) has been identified across the Property and is present in several different units. The dominant lithologies that contain graphite are, in decreasing grade, friable quartzite, quartzite, quartz-sillimanite gneiss, sillimanite gneiss. This is an inverse correlation with total silica content. The current BamaStar Graphite Deposit extends for approximately 2.8 km (1.7 miles) along strike, averages 25 m (82 ft) in width, and extends down to at least 325 m (1,066 ft). The deposit is open along strike and at depth.

1.5 Deposit Types

The target mineralization style at the Project is graphitic lode deposits where flake-graphite mineralization is hosted by high-grade metamorphic rocks (gneiss). Landis (1971) tentatively concluded that graphite formation is primarily dependent on metamorphic temperature and forms above 400°C, with pressure and variation in starting material constituting secondary controls.

Flake-graphite deposits in the AGB occur as disseminated graphite hosted in metamorphosed siliceous sedimentary rocks including quartz-mica schists, micaceous quartzites, or micaceous feldspathic quartzites. These rocks occur in folded metamorphosed sequences of detrital sedimentary rocks. Associations with anomalous vanadium, including the vanadium-mica roscoelite, and nickel, as well as other anomalous elements has been documented (Wilson and Redwood, 2015).

The deposits themselves are individual beds or lenses that are richer in graphite than associated beds. The size, form, and persistence of the deposits are functions, in part, of the thickness and extent of the original sedimentary beds, and in part, of deformation. Their attitudes are functions of local and regional deformation.

1.6 Exploration

South Star has completed metallurgical test work (2022), diamond drilling (October-December 2022 and May–October 2023), a maiden Mineral Resource Estimate ("MRE") (February 2023), mineralogical studies (2023), and an NI 43-101 Technical Report in support of the maiden MRE (April 2023). Since October 2023, South has been completing work programs in support of a PEA that is subject of this Technical Report, including metallurgical, environmental, and economical studies and an updated MRE.

1.7 Drilling

The maiden drilling campaign on the Project was completed between17 October and 9 November 2022, with final assays reported at the end of December 2022. The program consisted of 12 vertical diamond drill holes for 506 m (CMD22 series). A second drilling campaign on the Project was completed between 19 May and 5 October 2023, with final assays reported in November 2023. The program consisted of 15 drill holes for 1,885 m (CMD23 series). The drilling programs were contracted to Logan Drilling USA and of HQ size core was recovered. Sampling protocol resulted in 100% of the drill length as half-core samples sent for analytical testing at Activation Laboratories Ltd. ("Actlabs") in Ontario, Canada.

1.8 Sample Preparation, Analyses and Security

Mr. Jesse Edmunson (Registered Professional Geologist, State of Alabama) and Mr. Chris Carmen were contracted by Charge Minerals and subsequently South Star to supervise the trenching, drilling, and sampling programs completed on the Project, including quality assurance and quality control ("QAQC") protocols.

All samples collected for the drilling and trenching programs were sent to Actlabs for analysis, an accredited commercial analytical firm registered to ISO/IEC 17025:2017 and ISO 9001:2015 standards. Both South Star and Charge Minerals are fully independent of Actlabs. The Actlabs facility in Ancaster, Ontario carried out the sample login / registration, sample weighing, sample preparation and analyses for graphitic carbon by infrared ("IR") spectroscopy (Actlabs code 5D-C-Graphite) and specific gravity (select samples). Preparation reflected each sample crushed to approximately 80% < 2 mm and split using a riffle splitter. Each sample split was pulverized to approximately 95% < 105 µm.

QAQC programs were completed for both the 2019 trenching and 2022-2023 drilling programs. The trenching sampling program consisted of 765 trench samples with an additional 42 certified reference material ("CRM") and 38 field duplicate quality control samples. The drilling programs consisted of 1,601 core samples with an additional 63 CRM, 93 quarter core duplicate, and 92 blank quality control samples. No significant issues were found in the QAQC programs.

The Author has concluded that the sample preparation, analysis, QAQC, and security procedures implemented by Charges Minerals for the 2019 trenching program and South Star for the 2022 and 2023 drill programs are consistent with the CIM Mineral Exploration Best Practice Guidelines and current industry standards. Associated analytical results are assessed to be acceptable for Mineral Resource estimation purposes.

1.9 Data Verification

Author Matthew Harrington, P.Geo., completed a site visit to the Project on 17/18 April 2024 on behalf of South Star that included independent witness check samples, field checks, review of exploration and QAQC protocols and procedures, and inspection of project facilities and security. No issues were identified that negatively impact the findings and conclusions of this Technical Report.

A comprehensive data verification program was completed for the Project database that included verification of drill hole collars, trench locations, downhole surveys, analytical results, lithology, and mineralized intervals against original records, including original drill logs, plan maps, sections, original assay certificates, core photos, presentations, and reports. The Author concludes the results of the data verification program are acceptable and results can be used in the MRE.

1.10 Mineral Processing and Metallurgical Testing

1.10.1 Guangdong Institute of Resources Comprehensive Utilization (GIRCU)

A total of 10 samples (one Weathered Graphite Ore ("WGO"), one Sulphide Graphite Ore ("SGO") and eight CMB mineralized material samples) with a total mass of 920 kg (2,028 lb) were shipped to GIRCU in Guangzhou, China in September 2019. The weathered sample was selected for the flowsheet development program. Bench-scale lab samples were prepared and fixed carbon ("FC") grades ranged between 1.77% FC for the SGO sample and 3.73% FC for the CMB002 sample.

The samples were subjected to rougher and various cleaner circuits. Generally, the samples produced concentrates with grades ranging from 96.2% FC to 98.0% FC after three stages of cleaning. Open circuit recoveries into the 3rd cleaner concentrate ranged between 85.5% and 95.4%.

1.10.2 North Carolina State University Mineral Research Laboratory

On 3 May 2022, South Star announced that it had contracted North Carolina State University Mineral Research Laboratory ("MRL") to complete a metallurgical testing program using 3 x 1-tonne samples of mineralized material from various targets within the Project (South Star news release 3 May 2022). A one-ton sample was prepared using samples from three locations and delivered to MRL in August 2022. The bulk sample locations were chosen to be representative of mineralization from across the Project.

The 3 tonnes of bulk sampled material from the Project were milled and subjected to rougher and cleaner flotation steps to produce approximately 30 kg of 94% Cg flake graphite concentrate, successfully confirming the general flowsheet.

1.10.3 SGS

Three composite samples from the BamaStar deposit were shipped to SGS in Lakefield, Canada for metallurgical testing, which was supervised by Oliver Peters (from MetPro). The three samples included composites from the Oxide, Transitional, and Fresh mineralization. The samples were composited from bulk samples that were collected at the Project. The samples for the current test program were obtained by sub-sampling several bulk bags to form the three composites.

Bench-scale lab samples were prepared, and total carbon grades ranged between 2.54% C(t) for the fresh rock composite sample to 3.36% C(t) for the oxide composite sample. The samples were subjected to Whole Rock and ICP_OES analysis with results generally consistent with the GIRCU results. Comminution tests were performed, including Bond abrasion, Bond ball / rod grindability tests, as well as SMC tests.

The three composite samples were subjected to a total of eight cleaner flotation tests to develop a flowsheet using conditions from the GIRCU test program and experience with similar deposits. Based on the results of the limited number of tests that were completed on the BamaStar material, the metallurgical performance of the three composites has been summarized in Table 1.1.

Table 1.1 Summary of Metallurgical Performance

Criteria	Units	Oxide	Transitional	Fresh
Recovery (projected closed-circuit)	% C(t)	87.5	91.5	90.3
Concentrate Grade	% C(t)	99.8	96.4	94.4
+150 µm Graphite Concentrate	% Mass	24.4	28.6	17.9
-150 µm Graphite Concentrate	% Mass	75.6	71.4	82.1

1.11 Mineral Resource Estimates

The MRE for the BamaStar Graphite Deposit was prepared by Mr. Matthew Harrington of Mercator. The effective date for the MRE is 24 July 2024.

Mineral Resources were prepared in accordance with the Canadian Institute of Mining ("CIM") Definition Standards for Mineral Resources and Mineral Reserves ("MRMR") May 2014 ("CIM Definition Standards") and the CIM Estimation of MRMR Best Practice Guidelines, November 2019 ("CIM Best Practices"). Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

The following summarizes the estimation methodology:

- Drill hole database validation.
- 3D modelling of geology, mineralization, weathering intensity, and redox state.
- Assay sample and geostatistical analysis including sample frequency, grade, density assignment, capping, compositing and variography.
- Block modelling and grade estimation.
- Block model validation.
- Assessment of reasonable prospects for eventual economic extraction.
- Mineral Resource classification.
- Mineral Resource reporting.

The BamaStar Graphite Deposit MRE is presented in Table 1.2. The QP is not aware of any factors or issues that materially affect the MRE other than normal risks faced by mining projects in the state in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors and additional risk factors regarding Inferred Mineral Resources. Risks inherent to the MRE include, but not limited to, fluctuations in the parameters applied to define reasonable prospects for eventual economic extraction, such as graphite products / pricing, mining costs, and metallurgical recoveries, and uncertainties in the geological interpretation.

Table 1.2 BamaStar Graphite Deposit Mineral Resource Estimate – Effective Date: 24 July, 2024*

Type	Redox State	Cut-off Cg %	Category	Tonnes Mt	Cg %	Contained Graphite (Mt)
Open Pit	Oxide	0.90	Inferred	15.1	2.24	0.338
	Transition	0.90	Inferred	8.3	2.16	0.179
	Fresh	1.37	Inferred	28.8	1.96	0.564
	Combined	0.90 / 0.90 / 1.37	Inferred	52.2	2.07	1.08

Mineral Resource Estimate Notes:*

1. ***Mineral Resources were prepared in accordance with the CIM Definition Standards (2014) and the CIM MRMR Best Practice Guidelines (2019).***
2. ***Graphitic carbon (Cg %) grade was estimated from 1.5 m downhole assay composites using Inverse Distance Squared. No grade capping was applied. Model block size is 15 m (x) by 15 m (y) by 5 m (z). Block volume was assigned on a partial percentage basis.***
3. ***A redox state geological model was developed from verified drill hole and trenching data and used to estimate oxide, transition, and fresh material in the block model.***
4. ***A weathering intensity geological model was developed from verified drill hole and trenching data and used to estimate weathering intensity as strong, moderate, weak, and unweathered in the block model.***
5. ***Bulk density was applied based on weathering intensity and reflects average bulk density determinations of 2.52 g/cm^3, 2.57 g/cm^3, 2.73 g/cm^3, and 2.81 g/cm^3 for strong, moderate, weak, and unweathered respectively. The average bulk density for the Mineral Resource is 2.72 g/cm^3.***
6. ***Open Pit Mineral Resources are defined within an optimized pit shell with a pit slope angle of 46^0 and includes a 100 m offset from the highway for mining and 500 m offsets from the highway for oxide and transition-fresh zones respectively where blasting may be required. The pit has an overall 1:1.5 strip ratio (waste: mineralized material).***
7. ***All prices are in US$ currency.***
8. ***Graphite product pricing parameters used in pit optimization include: $980/t bulk concentrate (94.4% to 98.4% total carbon), $3,500/t purified flake/99.95% (micronized, 8 um), $9,500/t CSPG (18 um), and $11,500/t CSPG (8 um). Revenue assumptions are based on assumed sales of 3% bulk concentrate, 19% purified flake (micronized, 8 um), 63% CSPG (18 um), and 15% CSPG (8 um).***
9. ***Costs used in pit optimization vary based on redox state and location and include: waste mining at $2.23/t to $3.10/t moved plus an incremental mining cost of $0.06/t to $0.07/t below the base elevation (250 or 270 masl) and $2.20/t to $3.25/t for mineralized material processing plus an incremental mining costs of $0.03/t to $0.07/t below the base elevation (250 or 270 masl). The processing cost varied by redox state with processing at $11/t to $18.15/t processed, and G&A at $1.74/t processed.***
10. ***Combined graphite recoveries (mill feed to final product) of 84.98% oxide, 84.98% transition, and 86.10% fresh material were applied. Upgrading of the bulk concentrate to finished products used a 94% recovery.***

11. ***Open Pit Mineral Resources are reported at a cut-off grade of 0.90 % Cg for oxide and transition material and 1.37 % Cg for fresh material within the optimized pit shell. The cut-off grade reflects the marginal cut-off grade to define reasonable prospects for eventual economic extraction by open pit mining methods.***
12. ***Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.***
13. ***Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. Mineral Resource tonnages are rounded to the nearest 100,000.***

1.12 Mining Methods

AGP's opinion is that with current graphite pricing levels and knowledge of the mineralization and previous mining activities, open pit mining offers the most reasonable approach for development of the BamaStar Project. This is based on the size of the resource, tenor of the grade, grade distribution and proximity to topography for the deposits.

There are three distinct pit areas as part of the plan within the project boundaries. These are the North Pit, South Pit and Small South Pit. All the pits were designed with 10 m (33 ft) bench heights and 46-degree overall angles. The pit ramps are sized to accommodate a 55-tonne truck with ramp gradients of 10% and widths of 21.6 m (71 ft).

The North Pit is divided into two main phases and contains 29.9 Mt of mill feed grading 2.1% Cg with 48.9 Mt of waste for an overall strip ratio of 1.6:1 (waste:feed). The South Pit also has two phases with a total mill feed tonnage of 8.9 Mt grading 2.09% Cg with 13.4 Mt of waste for a strip ratio of 1.4:1 (w:f). The Small South Pit has 3.5 Mt grading 2.25% Cg with 4.2 Mt of waste and strip ratio of 1.57:1 (w:f).

The mine schedule for open pit mining consists of 42.3 Mt of mill feed grading 2.11 Cg% (diluted) over a processing life of 19 years. Open pit waste tonnage totals 66.5 Mt and will be placed into various waste storage areas together with filtered tailings. The overall open pit strip ratio is 1.6:1 of waste: mill feed. The mine schedule utilizes open pit mining areas to supply mill feed up to a maximum of 2.6 Mtpa to the mill facility.

The deposit outcrops and therefore no pre-stripping is required although some site preparation is necessary with the establishment of access and sediment ponds. Mill feed is stockpiled over the mine life to assist in grade management with a peak capacity of 3.5 Mt in Year 11 then declines to zero with stockpile reclaim over the remainder of the mine life.

Oxide mill feed material is the focus of the early mine schedule for the first six years with any transition or fresh material stockpiled awaiting a plant upgrade. Year 6 onwards all material types are processed as encountered. With the focus on oxide material, drilling and blasting is not required until Year 3 and beyond.

1.13 Recovery Methods

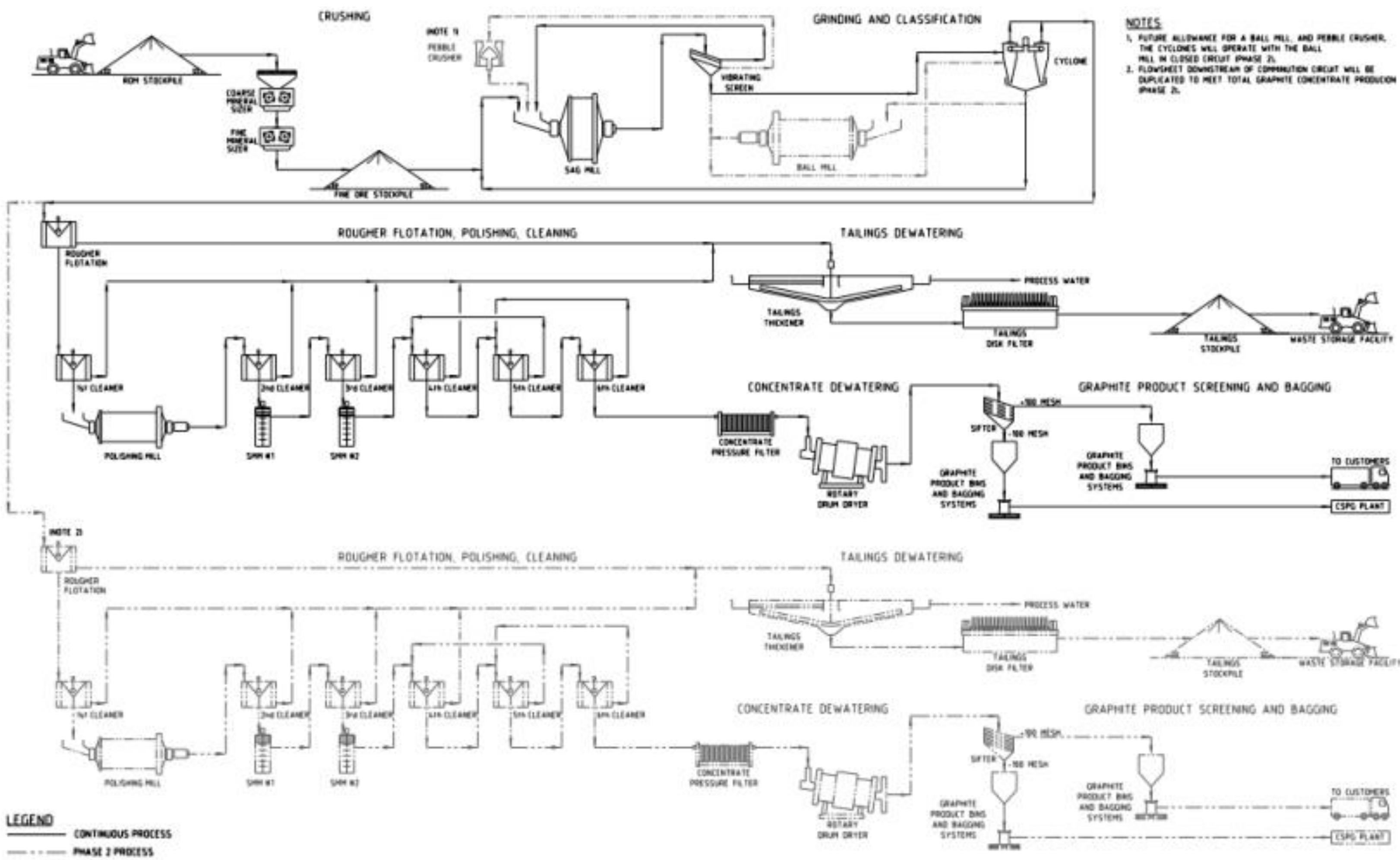
The BamaStar Concentrator plant is located near the open pit mine and the US HWY 280. To reduce the initial capital-cost ("CAPEX") and operating-cost ("OPEX") estimates, the phased plant is designed to produce 25,000 tpy (27,600 tnpy) of graphite concentrate processing 1,300,00 tpy oxide material during Phase 1 and another 25,000 t/y (27,600 tnpy) graphite concentrate in Phase 2 processing 2,600,000 tpy more compact material. Phase 2 has a similar design flowsheet to Phase 1, but with additional grind capacity to handle the more compact material coming from the mine.

A simplified flowsheet presented in Figure 1.3 summarized the plant process. The run of mine ("ROM") material will be transported to the ROM stockpile. A front-end loader feed the ROM material on a coarse mineral sizer followed by a fine mineral sizer. The crushed fine material will be ground in a semi-autonomous grinding ("SAG") mill. The SAG mill discharge is screened on a vibrating screen, and the oversize recycled to the SAG mill. The undersize is pumped to the cyclones. The SAG mill operates is in closed circuit with cyclones. The cyclone overflow gravitates to the rougher flotation, and the underflow returns to the SAG mill. Most of the liberated graphite is recovered at the rougher stage. The flotation reagents used are diesel oil and methyl isobutyl carbinol ("MIBC"). The rougher concentrate is upgraded further in six cleaning stages to produce a high-grade graphite concentrate. The rougher concentrate from the first cleaning stage is polished in a polishing mill using ceramic grinding media to scrub off gangue minerals from the flakes. Similarly, the graphite concentrates from the second and third cleaner flotation is polished in stirred media mills ("SMM") using ceramic grinding media. The third cleaner concentrate is upgraded in the fourth, fifth and sixth cleaner flotation stages. The rougher tailings and the cleaner tailings from first to fourth cleaner flotation stages will be dewatered in a tailings thickener. Thickened tailings will be dewatered further in a disc filter to produce filtered tailings and sent to the waste storage facility for co-disposal. The filtered tails will allow for approximately 80% of the process water to be recovered and recirculated.

The final graphite concentrate from the sixth cleaner flotation is dewatered in a filter press followed by a rotary dryer to reduce the moisture content. The dried graphite concentrate will be screened to produce +150 µm (+100 mesh) and – 150 µm (-100 mesh) products and bagged in a bagging system. The +150 µm (+100 mesh) product is shipped to the customers whereas the –150 µm (-100 mesh) product and is sent to the CSPG plant for battery production.

The flowsheet includes layout allowance for future installation of a ball mill, and a pebble crusher for handling the increased throughput in Phase 2. The flowsheet downstream of comminution circuit will be duplicated for processing the compact material in Phase 2 as shown in the simplified flowsheet.

Figure 1.3 Simplified Process Flowsheet



Source Lycopodium 2024

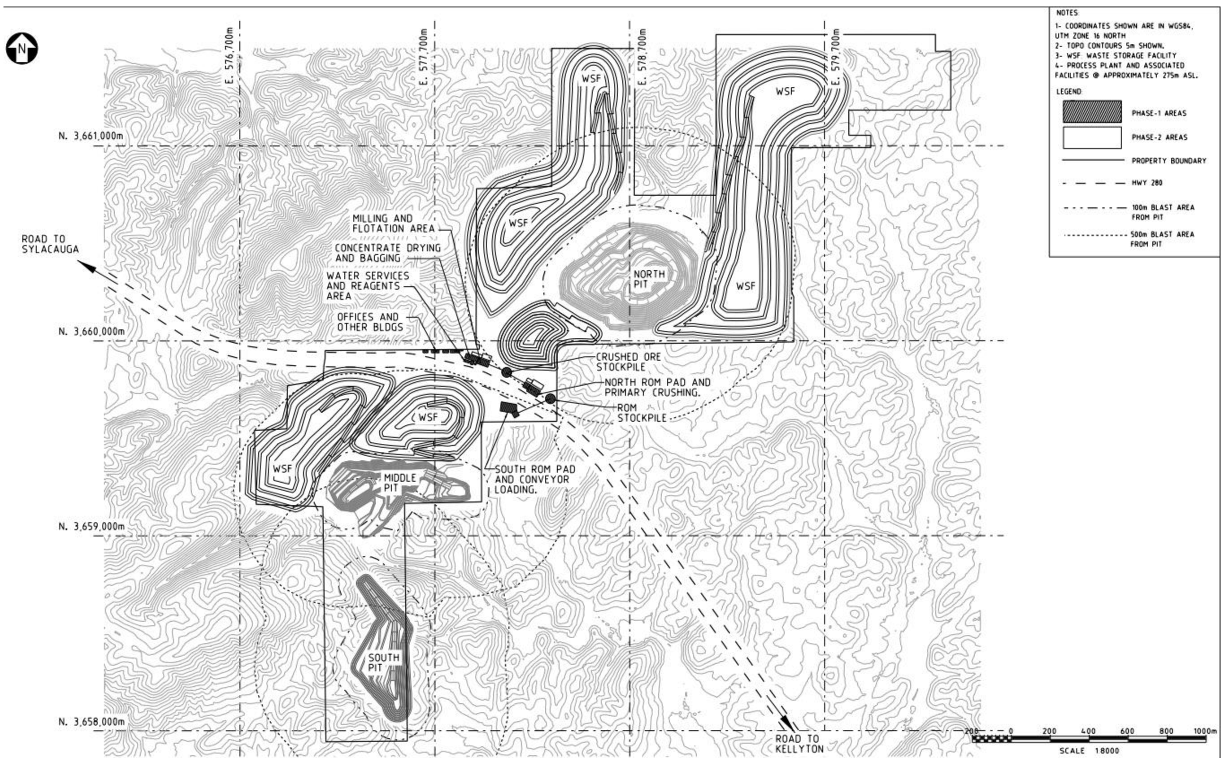
1.14 Project Infrastructure

1.14.1 Mine and Process Plant

Infrastructure to support operations at the Project will consist of site civil work, process and non-process buildings, water management, a waste storage facility ("WSF") with co-disposal, and electrical power distribution.

Mine facilities and process facilities will include services with potable water, fire protection, compressed air, power, diesel, communication, and sanitary systems. The BamaStar Property Overall Site Layout at the end of mine life is shown in Figure 1.4.

Figure 1.4 Figure BamaStar Property Overall Site Plan - LOM



1.14.2 Water Management

Based on preliminary model runs, on-site water had the potential to meet most of the water makeup requirements. As a result, GRE considered that nearly all sediment ponds, pits, and site drainages would be managed in such a way that water could be captured and conveyed to the plant. However, to give the plant sufficient water at higher production rates, or during dry conditions, either an offsite source of makeup water or substantially increased storage will be required. Section 18.6 discusses the site-wide water management plan.

1.15 Market Studies and Contracts

Graphite is a laminar, crystalline, naturally occurring form of carbon indispensable to many critical military and commercial platforms. It has unique physical and chemical characteristics such as chemical inertness, thermal stability, high electrical conductivity, thermodynamics and lubricity that make it suitable for a variety of industrial and emerging value-add applications, with end-uses ranging from armour plating to electrodes. The proliferation of value-add applications, particularly for electric vehicle ("EV") batteries, drives substantial demand increase globally. For many of these uses, no suitable substitutes are currently available.

In 2023, global supply for NFG concentrates was approximately 1.55 Mt and China accounted for nearly 78% of the production. China, a Foreign Entity of Concern ("FEOC"), also is responsible for the production of 98% of the CSPG and dominates the synthetic graphite markets globally with 1.4 Mt of production in 2023. The United States currently produces no NFG, has operational no midstream or downstream processing facilities and is 100% dependent on graphite imports, with most coming from a FEOC. The U.S. imported approximately 110,000t of graphite in 2023, with materials mainly coming from China, Madagascar, Brazil and Canada.

Globally, graphite has been classified as a 'critical mineral' by governments of countries such as the Unites States, Canada, the European Union, and Australia among others. The US Department of Energy ("DOE") classifies graphite as high risk / high importance in both the short-term and medium-term because of its importance in LiB, energy storage and defence applications. Increasingly, geopolitical tensions, supply-chain disruptions and a drive for more diverse production alternatives is driving production back on-shore or near-shore in the West. Geopolitics is highly relevant for the graphite markets.

It is estimated that there is currently a projected demand of approximately 7.2Mt of NFG required by 2035 or a current supply shortfall of approximately 5.65 Mt, based on 2023 supply. It's estimated that this is the equivalent to a shortfall of approximately 95 new average size graphite mines required by 2035. Graphite demand is estimated to exceed creating a deficit beginning in 2025 / 2026.

South Star is developing a vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery, fuel cell and industrial graphite markets. The project consists of a graphite mine and concentrate processing facility in Coosa County, AL, as well as a stand-alone Value-Add Plant in Mobile, AL for value addition transformation. First production is planned by 2027. The combined phases of the Value-Add Plant would produce sufficient CSPG for approximately 1 million electric vehicles ("EVs"), assuming 75kg of CSPG per vehicle and a 50% / 50% blend of synthetic and NFG CSPG.

Products and pricing for the BamaStar Project is presented in Table 1.3.

Table 1.3 BamaStar Products and Pricing Summary

Graphite Type	Selling Price USD/t	Annual Production tpy	Grade Fixed Carbon	Particle Size Mesh / Micron
Medium Flake Graphite Concentrates	$1200	3,700	95 –97%	+150 Mesh
Fines Flake Graphite Concentrates	$800	21,300	96 –99%	-150 Mesh
CSPG No. 1 Coated Spherical Purified Graphite (18 µm) Active Anode Material	$9,750	10,500	≥ 99.95%	D50 = 18 µm
CSPG No. 2 Coated Spherical Purified Graphite (8 µm) Active Anode Material	$10,500	2,100	≥ 99.95%	D50 = 8 µm
PMG No. 1 Battery-Grade Specialty Conductivity Enhancer * Ultra Fine *	$9,300	8,000	≥ 99.95	D50 = ≤ 8 µm

1.16 Environmental Studies, Permitting and Social or Community Impact

Section 20 presents the environmental studies performed on the site. Because of the presence of sulphide minerals (pyrite in particular), SSBM contracted GRE to perform a geochemical characterization study. This study determined that the waste rock is potentially acid consuming (“PAC”) or non-acid generating (“NAG”). It also determined that the whole tailings product is potentially acid generating (“PAG”).

Studies determined that the best solution to mitigate ARD and Metal Leaching (ML) risk is to co-dispose Acid Consuming (“AC”) waste rock with PAG tailings. This ‘waste blending’ mitigation strategy is a widely applied best practice for mitigating geochemical risk (INAP 2009).

The status of future permitting is discussed in Section 20.2. In summary, the site will need various state and federal permits. This includes the National Pollution Discharge Elimination (“NPDES”) permit for site-wide excess water discharge and the US Army Corp of Engineers 404 permits for impacts to waters of the state and/or wetlands. However, Alabama is a business-friendly jurisdiction, and all permits can be acquired within the project development timeline.

1.17 Capital and Operating Costs

This section provides an overview of the CAPEX and OPEX estimates for open pit mining of the BamaStar deposits, as well as the construction of a process plant, Waste Storage Facility ("WSF") which includes co-disposal, and associated infrastructure. According to the PEA design, it is expected that the process plant would have an average capacity of 1.3 Mtpy (1.43 Mtnpy) for the initial phase, producing 25,000 tpy (27,560 Mtnpy) of graphite concentrate and the mine will have a life of 19 years. Phase 1 mine and concentrator is planned to be online and producing in 2027, and Phase 2 is planned to be constructed in 2030 and producing in 2031.

The CAPEX is based on the assumption that the Project obtains all relevant permits in a timely manner to meet the Project Schedule. The CAPEX reflects Engineering, Procurement, and Construction Management ("EPCM") type execution. Unless otherwise stated, all costs presented in this report are in United States Dollars ("USD or US$"). An exchange rate of 1.00 USD = 1.36 Canadian Dollar ("CAD" or "CA$") was utilized when applicable.

This CAPEX estimate reflects the joint efforts of Lycopodium, South Star and specialty consultants retained by South Star – AGP and GRE. Lycopodium was responsible for compiling the submitted data into the overall estimate but did not review or validate the inputs from South Star or its other consultants. Table 1.4 outlines the responsibilities of each company for input of information into the capital cost estimate.

Table 1.4 Cost Estimate Responsibilities

Company	Responsibility
Lycopodium	Process plant, on-site infrastructure.
AGP	Mining, Waste Storage Facility.
GRE	Environmental geochemistry, water balance and site water management closure costs.
South Star	Owner's costs, salvage values and taxes (included in the financial model).
Anzaplan	CSPG Plant, and its on-site infrastructure.

1.17.1 Capital Cost Estimate Summary – Mine and Process Plant

The mine, process plant and associated infrastructure capital cost estimate for the PEA are based on the Association for the Advancement of Cost Estimation ("AACE") Class 5 estimate, with an accuracy range of +50/-35%. Table 1.5 presents a summary of the mine and process plant CAPEX.

Table 1.5 Mine and Processing Plant Capital Cost Summary

Mine and Processing Plant	Phase 1 Initial Capital Costs $M	Phase 2 Initial Capital Costs $M
Mining – Open Pit Capital	14.5	-
Process Plant	44.2	36.5
Infrastructure – Process Plant	7.3	-
Direct cost	**66**	**36.5**
Project Delivery Costs	7.8	5.5
Owners Costs	6.6	3.7
Indirect Cost	**14.4**	**9.2**
Contingency	**16.5**	**11.4**
Total Capital Costs (initial)	**96.9**	**57.2**

Table 1.6 presents a summary of the sustaining CAPEX for the Project. In addition, a US$2.3M closure bond would need to be secured prior to start of construction and would be carried as a financial instrument. The bond purchase price is assumed to be returned after successful closure of the facilities

Table 1.6 Mine and Processing Plant Sustaining Capital Cost Summary

Mine and Processing Plant	Sustaining Capital Costs $M
Mining – Open Pit Capital	29.0
Process Plant	3.7
Total Sustaining Costs	**32.7**

1.17.2 Capital Cost Estimate Summary – Value-Add Anode Plant

The capital costs estimate for the Value-Add Plant are based on an Association for the Advancement of Cost Estimation (“AACE”) Class 5 estimate, with an accuracy range of -20 % to -50 % (low) and +30 % to +100 % (high).

Table 1.7 presents a summary of the total capital costs for the ‘Capital Cost Summary for Graphite Purification, Spheroidization and Coating per Expansion Phase.

Table 1.7 Value-Add Anode Plant Initial Capital Cost Summary

Value-Add Plant	Initial Capital Costs $M
Purification	32.9
Spheroidization	98.1
Coating	138.0
Total Capital Costs (initial)	**269.0**

The capital costs estimated for the Value-Add Plant has two expansion phases, each $269.0M, for a total estimated capital expansion cost of $538M for Phase 2 and Phase 3. The CAPEX contingency of 25% is reasonable, considering optimisation of equipment costs will be achieved by sourcing certain non-critical equipment from non-western sources.

Table 1.8 presents a summary of the sustaining capital costs for the Value-Add Anode Plant.

Table 1.8 Sustaining Capital Cost Summary – VAP all three phases

Value-Add Plant	Sustaining Capital Costs $M
All three Value-Add Anode Plants	84.7

1.17.3 Capital Cost Estimate Summary

Table 1.9 presents a summary of the total CAPEX and sustaining capital costs for the Project.

Table 1.9 Total LOM Project CAPEX Estimate Summary

Area	Phase 1 Capex US$ M	Phase 2 CAPEX US$ M	Phase 3 CAPEX US$ M	Sustaining Capital US$ M	Total US$ M
Mining & Processing Plant	96.9	57.2	-	32.7	186.8
Value Add Plant	269	269	269	84.7	891.7
Total Capital Costs	**365.9**	**326.2**	**269**	**117.4**	**1,078.5**

1.17.4 Operating Cost Estimate Summary – Mine and Process Plant

The summary of the total processing costs per tonne are shown in Table 1.10 as follows over the Life of Mine (Year 1-19):

Table 1.10 Operating Cost Summary for the Mine and Processing Plant

Mine and Processing Plant	Unit	Value
Mining – Open Pit Operating ($/t moved)	[USD$/t moved]	4.07
Mining – Open Pit Operating ($/t mill feed)	[USD$/t mill feed]	10.46
Process Plant	[USD$/t mill feed]	9.78
General and Administration (G&A)	[USD$/t mill feed]	2.19
Concentrate Trucking, Port, Shipping	[USD$/t mill feed]	1.41
Total Operating Cost	**[USD$/t mill feed]**	**23.84**
Mining – Operating Cost	[USD$/t concentrate]	555.7
Process Plant – Operating Cost	[USD$/t concentrate]	519.3
General and Administration (G&A)	[USD$/t concentrate]	116.3
Concentrate Trucking, Port, Shipping	[USD$/t concentrate]	55.0
Total Operating Cost	**[USD$/t concentrate]**	**1,246.4**
Mining – Operating Cost	[USD$M/a]	23.29
Process Plant – Operating Cost	[USD$M/a]	21.77
General and Administration (G&A)	[USD$M/a]	4.88
Concentrate Trucking, Port, Shipping	[USD$M/a]	3.14
Total Operating Costs	**[USD$M/a]**	**53.08**

1.17.5 Operating Cost Estimate Summary – Value-Add Anode Plant

See Table 1.11 for summary of Value-Add Anode Plant operating costs.

Table 1.11 Operating Costs Summary for Graphite Purification, Spheroidization and Coating

Description	Unit	Value
Purification	[USD$M/a]	11.92
Spheroidization (including uncoated SPG fines by-product)	[USD$M /a]	5.26
Coating	[USD$M /a]	9.32
Total (cSPG)	**[USD$M /a]**	**26.49**
SG&A	[USD$M /a]	2.88
Contingency	[USD$M /a]	2.65
Total (including contingency) USD$M	**[USD$M /a]**	**32.03**
Total USD/Tonne	**[USD/ t_{sales}**	**1,555**

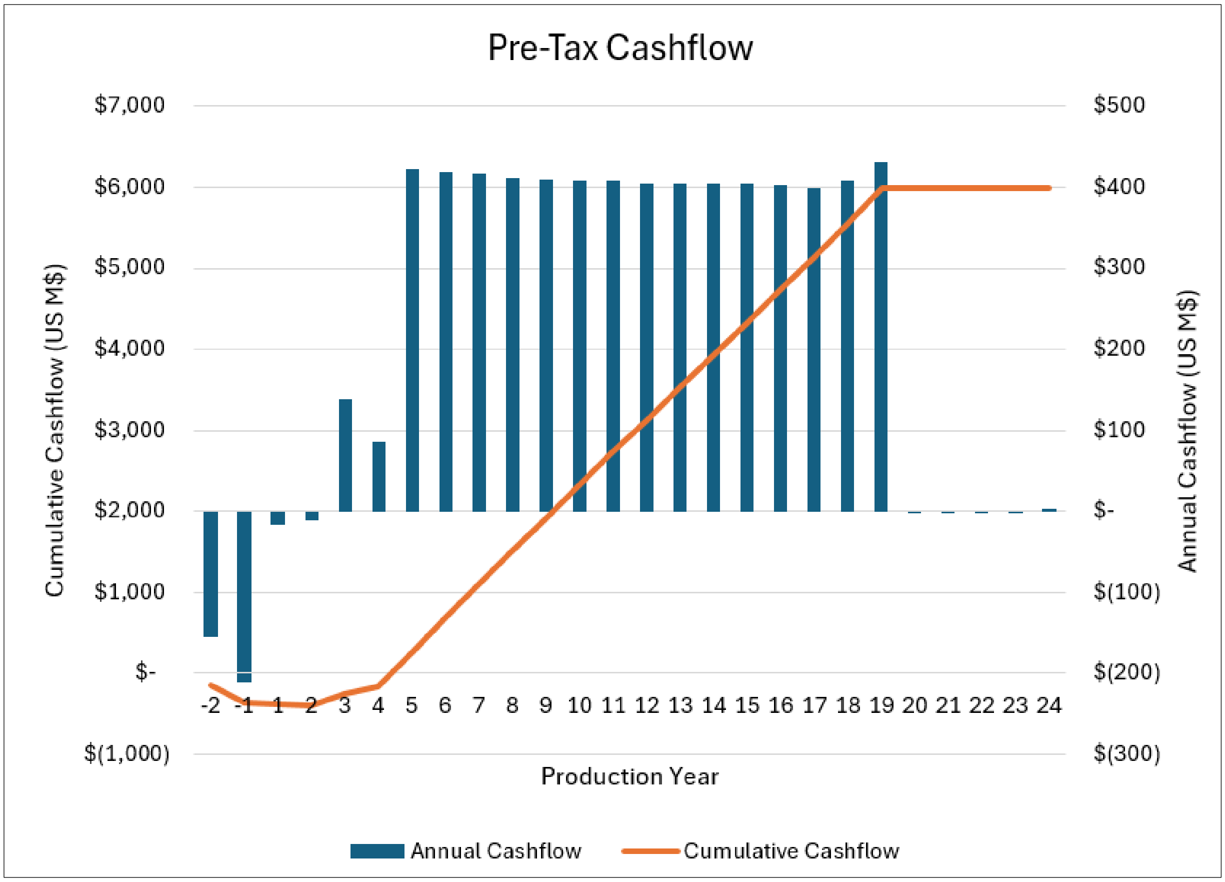
1.18 Economic Analysis

The pretax model was prepared by Lycopodium while South Star provided applicable taxation guidance for federal, state and local jurisdictions, which were incorporated into cash flow model by South Star to also provide after-tax results. The results of the economic analysis are listed in Table 1.12, while Figure 1.5 graphically illustrates the Pre-Tax Cashflow.

Table 1.12 Economic Analysis Results

Description	Unit	LOM
Preproduction Capex + Contingency	US$M	365.9
Subsequent Capex + Contingency	US$M	595.2
Sustaining and Closure + Contingency	US$M	117.3
Average Gross Revenue	US$M/yr	518.8
Total Gross Revenue	US$M	9,857.2
Total Operating Costs	US$M	2,471.7
Average LOM Operating Margin	%	72.3
Pretax Total Cashflow	US$M	5,985.8
Total Taxes	US$M	1,657.9
After-Tax Total Cashflow	US$M	4,276.9
Average LOM Cashflow Margin	%	43.4
Pre-tax NPV 8%	US$M	2,368.8
Pre-tax IRR	%	34.8
Pre-tax Payback Period	yr	4.4
After-tax NPV 8%	US$M	1.598.3
After-tax IRR	%	27.4
After-tax Payback Period	yr	5.1

Figure 1.5 Pre-Tax Cash Flow



Sensitivity Analysis

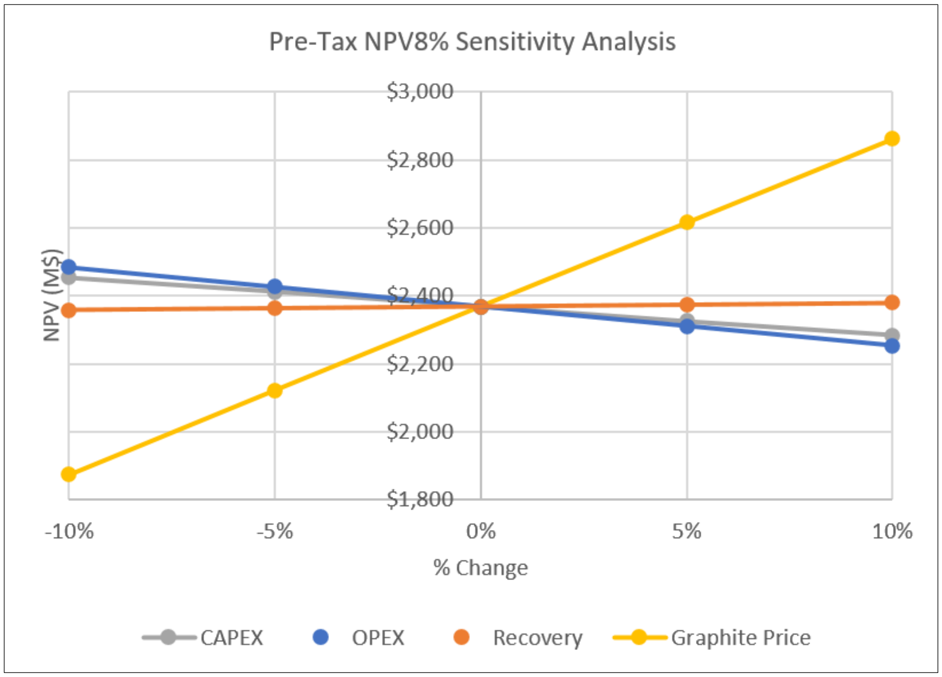
A sensitivity analysis was conducted on the pre-tax NPV and pre-tax IRR at an 8% discount rate.

The Pre-Tax NPV sensitivities are shown in Table 1.13 and Figure 1.6.

Table 1.13 Pre-Tax NPV (8%) Sensitivity Analysis

Pre-Tax NPV (8%) Sensitivity Analysis					
	-10%	-5%	0%	5%	10%
CAPEX	$2,454	$2,411	$2,369	$2,326	$2,283
OPEX	$2,484	$2,426	$2,369	$2,311	$2,254
Recovery	$2,358	$2,363	$2,369	$2,374	$2,379
Graphite Price	$1,875	$2,122	$2,369	$2,616	$2,863

Figure 1.6 Pre-Tax NPV (8%) Sensitivity Analysis Chart

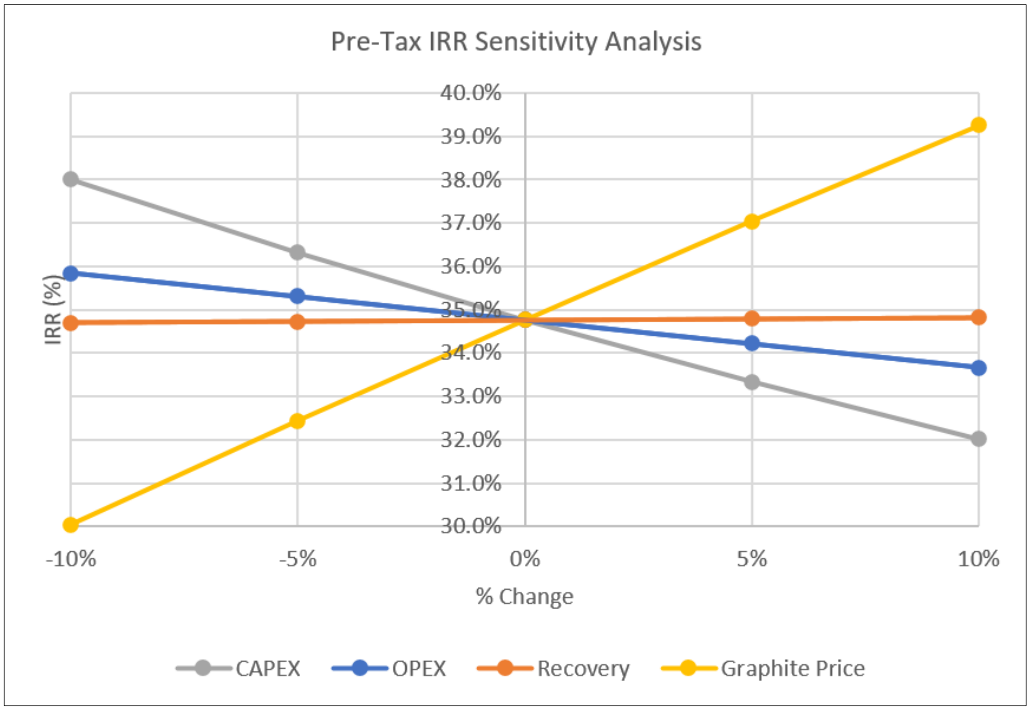


The Pre-Tax IRR sensitivities are shown in Table 1.14 and Figure 1.7.

Table 1.14 Pre-Tax IRR Sensitivity Analysis

IRR Sensitivity Analysis					
	-10%	**-5%**	**0%**	**5%**	**10%**
CAPEX	38.0%	36.3%	34.8%	33.3%	32.0%
OPEX	35.8%	35.3%	34.8%	34.2%	33.7%
Recovery	34.7%	34.7%	34.8%	34.8%	34.8%
Graphite Price	30.0%	32.4%	34.8%	37.0%	39.3%

Figure 1.7 Pre-Tax IRR Sensitivity Analysis Chart



1.19 Other Relevant Data Information

Dorfner Anzaplan GmbH ("ANZAPLAN") has been engaged by South Star Battery Metals Corp. ("South Star" or "the Client") to perform a preliminary economic assessment ("PEA") on a value-add graphite active anode manufacturing facility ("the Value-Add Anode Plant" or "the Anode Plant") in the USA.

Section 24.0 outline the PEA on the battery material plant for value addition transformation of natural flake graphite ("NFG") concentrates from South Star's flagship Santa Cruz Graphite Mine in northeastern Brazil's Bahia state, currently being developed ("Santa Cruz Mine" or "Santa Cruz"), and the Pre-Development Graphite Project in the USA state of Alabama ("the BamaStar Graphite Project", or "BamaStar").

South Star is developing a vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery and fuel cell markets. This strategy includes NFG concentrator plants at Santa Cruz and BamaStar.

The value addition transformation of NFG concentrates from Santa Cruz and BamaStar into high-purity, battery-grade, active anode material, will be performed by a centrally located, Value-Add Anode Plant. It is planned to locate the Value-Add Anode Plant on a vacant, zoned 1-2 Heavy Industrial site, in Happy Hill, Mobile, Alabama ("AL"). This site will be distinct from the graphite properties and will upgrade and refine NFG concentrate from the Santa Cruz and BamaStar.

The Anode Plant will include graphite micronization, spheroidization, hydrofluoric ("HF") and hydrochloric ("HCl") acid purification and conventional pitch tar coating, to produce active anode spherical purified graphite ("SPG") that is coated ("CSPG"), suitable for Li-ion battery applications. The Value-Add Anode Plant entails a phased approach to increase production. Phase 1 will process 21,300 tpa NFG from Santa Cruz. Phase 2 and Phase 3 will each process 21,300 tpa NFG from BamaStar.

The PEA presents a scenario with concentrates from both BamaStar and Santa Cruz providing feedstock for the Value-Add Anode Plant, the technical and economic ("techno-economic") basis of this scenario is outlined in Section 24.0.

Terms of reference

ANZAPLAN was retained by South Star to (a) purify NFG concentrate of a sample from BamaStar to produce battery-grade (≥99.95 percentage by weight ("wt.-%") fixed carbon ("FC")) purified NFG for performance testing by others, and (b) provide independent expert engineering design and cost estimation of the Value-Add Anode Plant as part of the PEA on the BamaStar Graphite Project.

Purification performed by ANZAPLAN did not include material from the Santa Cruz. The supplied BamaStar NFG concentrate sample for purification was produced during a 2022 pilot metallurgical testing program at the North Carolina State University Mineral Research Laboratory ("MRL").

One kilogram of the purified BamaStar NFG was shipped to the USA to prepare for performance testing, and to carry out laboratory performance tests. The USA sample preparation and performance tests were performed by independent service providers and laboratories, under the supervision of South Star.

The laboratory performance tests performed in the USA by others, were done to confirm suitability of the graphite from BamaStar to achieve general battery specifications.

Engineering and cost estimation of the Anode Plant were not based on the purification performed by ANZAPLAN, or USA sample preparation and performance tests by others. To generate the process design criteria ("PDC"), mass balance and process flow, as well as to specify major process equipment, it was assumed the key characteristics of the flake graphite (contained impurities, concentrate grades, flake sizes, electrical conductivity, and others) are the same for Santa Cruz and BamaStar.

1.19.1 Reliance on Other Experts

South Star engaged ANZAPLAN to purify NFG concentrate from BamaStar for downstream preparatory and performance testing in the USA by others. On 11 July 2024, 1 kg (2.2 lbs) of the purified BamaStar NFG was shipped to the USA. The USA sample preparation and performance tests were performed by independent service providers and laboratories under the supervision of South Star. The authors responsible for Section 24.0 rely on the expert responsible for Section 24.6.2 and Section 24.6.3, confirming suitability of the graphite from BamaStar to achieve general battery specifications.

1.19.2 Property Description and Location

It is planned to locate the Value-Add Anode plant on a vacant site, containing all industrial utilities, in Happy Hill, Mobile, AL. The site has been zoned 1-2 Heavy Industrial, has been stabilized and is serviced with all industrial utilities.

The city of Mobile, AL, is located on the east coast of the USA and centrally located on the USA Gulf Coast. The address of the proposed site is Stimrad Road, Mobile, AL 36610. It is located east of the Interstate 165 ("I-I65") Highway, west of Telegraph Road, and directly south of Stimrad Road. The site is located ~140 miles (220 km) from New Orleans and within ~500 miles (800 km) of Houston, Orlando, and Atlanta.

Local Resources and Infrastructure

Mobile is the largest Gulf Coast city between New Orleans and Tampa. Major rail, ship and highway transportation systems converge along the Mobile River at the Port of Mobile to link Mobile businesses with the nation and the world. Port of Mobile is the only deep-water port in Alabama. The Port provides weekly container carrier services worldwide.

Transportation infrastructure and services in Mobile includes five class 1 railroads, two interstate systems and five federal highways. The Mobile Airport Authority owns and operates two airports which both have Federal Aviation Administration Part 139 Certification. Mobile has five major hospitals and is home to several colleges and universities.

Alabama Power Company has an abundant electric production capacity of more than 6,000 MW with an expansive grid of 230 KV and 115 KV transmission lines in the Gulf Coast area.

Spire (formerly Mobile Gas) has an extensive natural gas infrastructure network spanning 100+ miles (160 km) of large-diameter pipelines with interconnections to multiple interstate pipelines and a local distribution company that has reliably served the region for more than 150 years.

Mobile Area Water and Sewer System ("MAWSS") provides safe drinking water and sanitary sewer service in the Mobile metropolitan area. Water is continually fed by groundwater, streams, and rainfall. MAWSS has an alternative source of water to provide raw water for industrial use. Many area industries draw and treat water directly from the Tombigbee or Mobile rivers for industrial use.

1.19.3 Mineral Processing and Metallurgical Testing

ANZAPLAN received 5 kg (11 lb) of NFG derived from BamaStar and successfully purified 2 kg (4.4 lb) using HF and HCl to a FC content of ≥99.95% from the NFG concentrate, which had a FC content of 93.47%, thereby confirming the suitability of the graphite from BamaStar for achieving battery-grade anode purity. Subsequently, 1 kg (2.2 lb) of the purified NFG was micronized, spheronized and coated with a standard carbon pitch at an US independent laboratory, and the resulting CSPG was transported to a US battery design laboratory for slurry design, as well as coin cell and pouch cell performance testing. The battery-ready CSPG characteristics are presented in Table 1.15.

Table 1.15 BamaStar CSPG Characteristics

Detail	CSPG
Fixed Carbon (%)	>99.95
Tap Density (g/cm^3)	259.6
Scott Volume (g/cm^3)	0.75
BET Surface Area (m^2/g)	2.6
Particle Size Distribution:	
D10 (µm)	6.8
D50 (µm)	17.2
D90 (µm)	33.7

All mid- and downstream transformational technologies and processes, including all associated equipment and consumables (including reagents) for the proposed Value-Add Plant are state-of-the-art, conventional and well-established, and are the industry standards utilized by global leaders in commercial graphite processing and active anode materials manufacturing. South Star will use only off-the-shelf equipment and technologies that are commercially available, accepted and expected by all major potential battery clients. No new, unproven or proprietary technologies and/or processes are being proposed, nor is there any new IP relating any aspect of the Value-Add Plant.

As detailed above, the purified BamaStar NFG was successfully transformed into a battery-ready BamaStar CSPG, engineered to demonstrate the BamaStar NFG's ability to achieve the exacting Tier-1 OEM CSPG specification similar to the technical specification of Contemporary Amperex Technology Co., Limited ("CATL") — the world's largest LIB manufacturer — specifically for the USA's largest EV manufacturer, Tesla, Inc. ("Tesla").

The BamaStar CSPG mixed perfectly in a conventional commercial anode slurry recipe, using industry-standard conductive additives, binders and solvents. The initial electrochemical performance coin cell test results of BamaStar CSPG demonstrate capacity and first-cycle loss that meets or exceeds the performance of Tier-1 commercial NFG-based comparable battery-ready CSPG products. Specifically, the BamaStar CSPG experienced a first-cycle loss of 7% and reversible gravimetric capacity of 361 mAh/g (approaching the theoretical maximum of 372 mAh/g for natural graphite). In pouch-cell testing, the BamaStar CSPG also showed significant potential capabilities for fast-charging LIB applications, with stable cycling up to 3C.

1.19.4 Recovery Methods

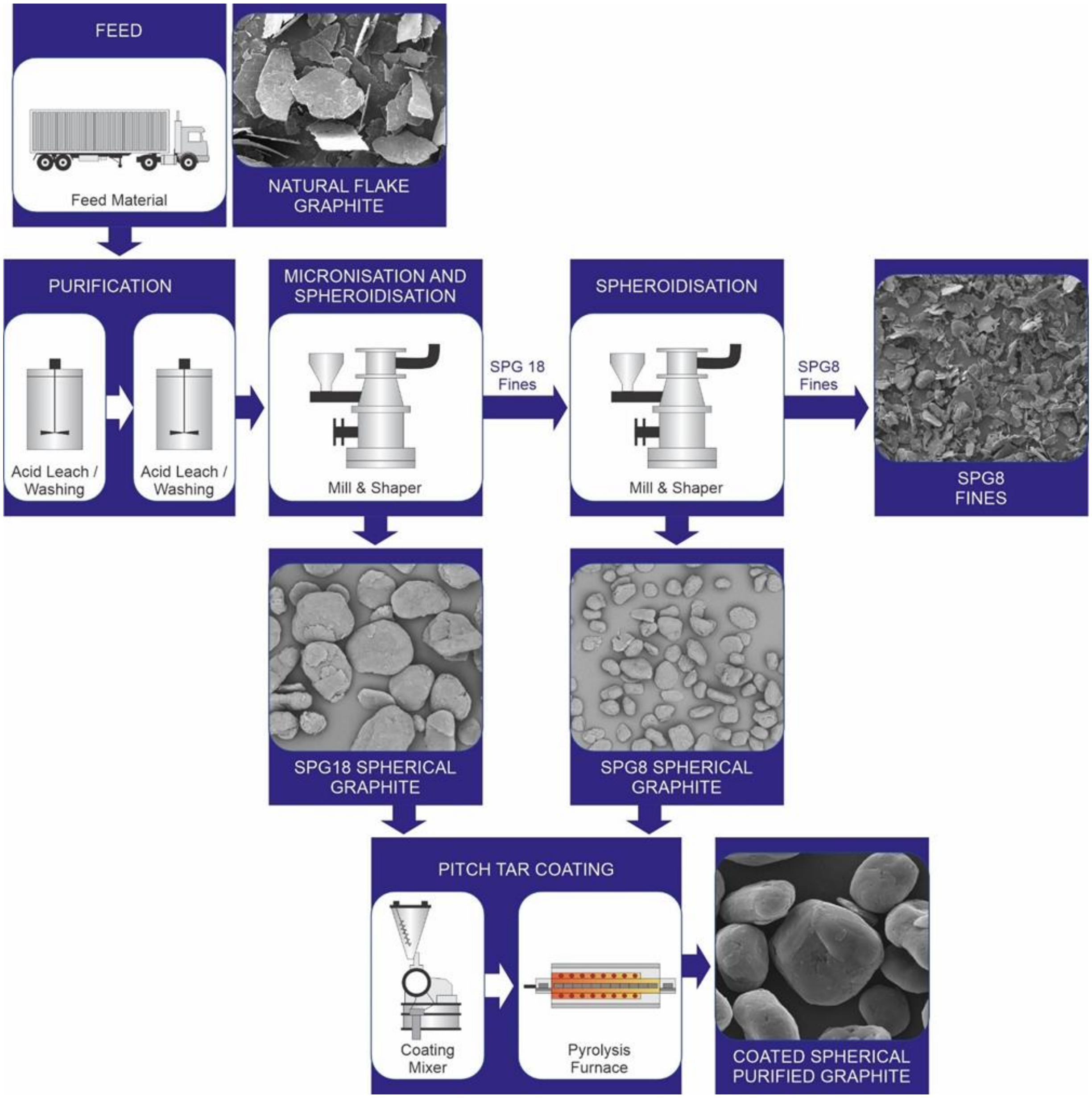
Outlined below are the nominal design production and throughput rates per expansion phase.

The Value-Add Anode Plant comprise three separate plants i.e. Purification Plant, Spheroidization Plant and a Coating Plant. The Value-Add Anode Plant is designed to produce 12,600 tpa of CSPG, comprising Medium CSPG and Fine CSPG products, with a FC content of ≥99.95 wt.-%. In addition, the Anode Plant will produce an uncoated SPG fines by-product at 8,000 tpa. The design of the Anode Plant is based on a NFG feed rate of 21,300 tpa per expansion phase, containing an FC content of ≥95.0 wt.-%. The NFG is purified using HF and HCl in the Purification Plant to produce 20,000 tpa of purified NFG with a FC content of ≥99.95 wt.-%. This is fed to the Spheroidization Plant where the NFG is first micronized followed by spheroidization. The spheroidization consists of two stages to yield 10, 000 tpa of Medium SPG and 2,000 tpa of Fine SPG. The purified spheroidized products is fed to the coating plant, which after adding pitch tar, yield 12,600 tpa of battery-grade, active anode, CSPG product with a FC content of ≥99.95 wt.- %.

All nominal design throughputs are based on operating hours of 7,500 hours per year.

The overall process flow is graphically presented in the Figure below.

Figure 1.8 Overall process flow of Value-Add Anode Plant



1.19.5 Infrastructure

It is planned to be located the Value-Add Anode Plant on a vacant, flat, Heavy Industrial site in Mobile, AL. The site is very close to international containerized harbor, urban nodes, rail and air transport infrastructure, and Interstate Highways. The site is connected by tar road (Stimrad Road) and U.S. 43 (Telegraph Road) to the Port of Mobile where Class I freight can be loaded and offloaded. From Interstate I-65 other international ports, rail and air transportation are available for local USA and international transportation of raw material, reagents and finished products.

The site contains major industrial utilities. During the next phase EIA disposal and processing for HF-treatment wastewater will be assessed. Bulk power will be supplied by Alabama Power Company from their expansive grid of 230 KV and 115 KV transmission lines. Bulk gas will be supplied by Spire either directly or through an established local distribution company. Water and sanitary services are foreseen to be provided by MAWSS. Extraction and treatment of water directly from the Tombigbee or Mobile rivers for industrial use, as performed by many industries in the area, will be considered as an alternative option.

The supporting infrastructure requirements for the Anode Plant includes internet, electricity, water, natural gas, access road, storm water industrial effluent removal, waste management, and communication / internet connectivity. Necessary infrastructure to be established, not normally provided as part of industrial utilities, are vehicle (motor and truck) parking bays, internal roads, stepdown transformers from bulk power supply, power distribution, water distribution, water purification, compressed air, steam generation, and effluent treatment.

1.19.6 Environmental Studies, Permitting and Social or Community Impact

Given the preliminary assessment stage of the Value-Add Anode Plant, no ESIA has been performed, permitting applications submitted or consultations with local communities performed. The authors of Section 24.0 are not aware of any known environmental or social issues considering that the site has been cleared, is vacant and has been zoned 1-2 Heavy Industrial.

The Anode Plant does not produce radioactive or Class 1 explosives. Hazardous waste generated by the Anode Plan will be aligned with that found generally at many businesses, industrial and chemical facilities. All waste associated office, automotive, maintenance, chemical and liquid, non-hazardous regulated material disposal, recyclable, used oil, laboratory, hazardous, and industrial will be handled in accordance with local, state, and federal laws and will only be disposed of at fully licensed and insured waste processing facilities.

1.20 Interpretations & Conclusions

Based on the deposit characteristics, strategic location, potential favourable economics, and performance characteristics of the products, the BamaStar Graphite Project is an important resource in the heart of one of the most important, EV, defense and stationary storage belts in the contiguous US. At the time of this report, the US currently produces no graphite and is 100% import dependent. There is a coming imbalance between supply and demand of graphite globally and potential supply chain disruptions highlight the current danger for the US and its allies for a mission critical input to industrial, energy, and defense sectors, amongst others.

BamaStar has significant potential advantages including:

- Start of mining operations in oxide material, which allows for less expensive initial CAPEX and OPEX for the Project when compared to hard rock deposits during the critical payback period.

- Location in the contiguous US with excellent access to existing infrastructure and logistics which could result in a much lower capital intensity, when compared to viable alternatives.

- Project installations reside on private mining claims and private property; as a result, licensing and permitting could be secured in as little as 18-24 months, based on preliminary consultations with local consultants.

- The Project potentially has further benefits when combined with production from South Star's Santa Cruz Graphite Mine in Brazil. Some of the production from the Santa Cruz Graphite Mine is planned to supplement feed stock to the Project's VAP. In addition, in case of any shortfall or production interruption from the BamaStar Concentrator, the Santa Cruz mine could provide some redundancy for the Project to meet production targets if economically beneficial. First concentrate production is planned for Q4 2024 at Santa Cruz and integrated value-add production in the US is planned for 2027.

- The proposed Value-Add Plant built on a vacant, zoned Heavy Industrial property near the Port of Mobile with existing utilities, logistics and other infrastructures available. This allows for potentially much lower capital intensity as existing infrastructure, logistics and supply chains are utilized and require less investment.

- Ability to potentially scale in a phased, modular approach to control risks and deal effectively with market conditions, financing requirements, permitting, and licensing schedules and commercial realities.

The results of the PEA demonstrate that the Project is financially viable with potentially favourable economics, products with strong performance characteristics, relatively modest capital intensities and in a strategic location. The authors of the PEA recommend that the BamaStar Graphite Project be advanced to the Feasibility Study which can be completed in approximately 18 months after the start of drilling and all required permits have been secured.

1.21 Recommendations

1.21.1 Summary

Considering the positive outcome to this Report, it is recommended to continue developing the Project through additional studies. Table 1.16 summarizes the proposed budget to advance the Project through to a Feasibility Study ("FS").

Table 1.16 Recommended Budget Summary for Feasibility Study

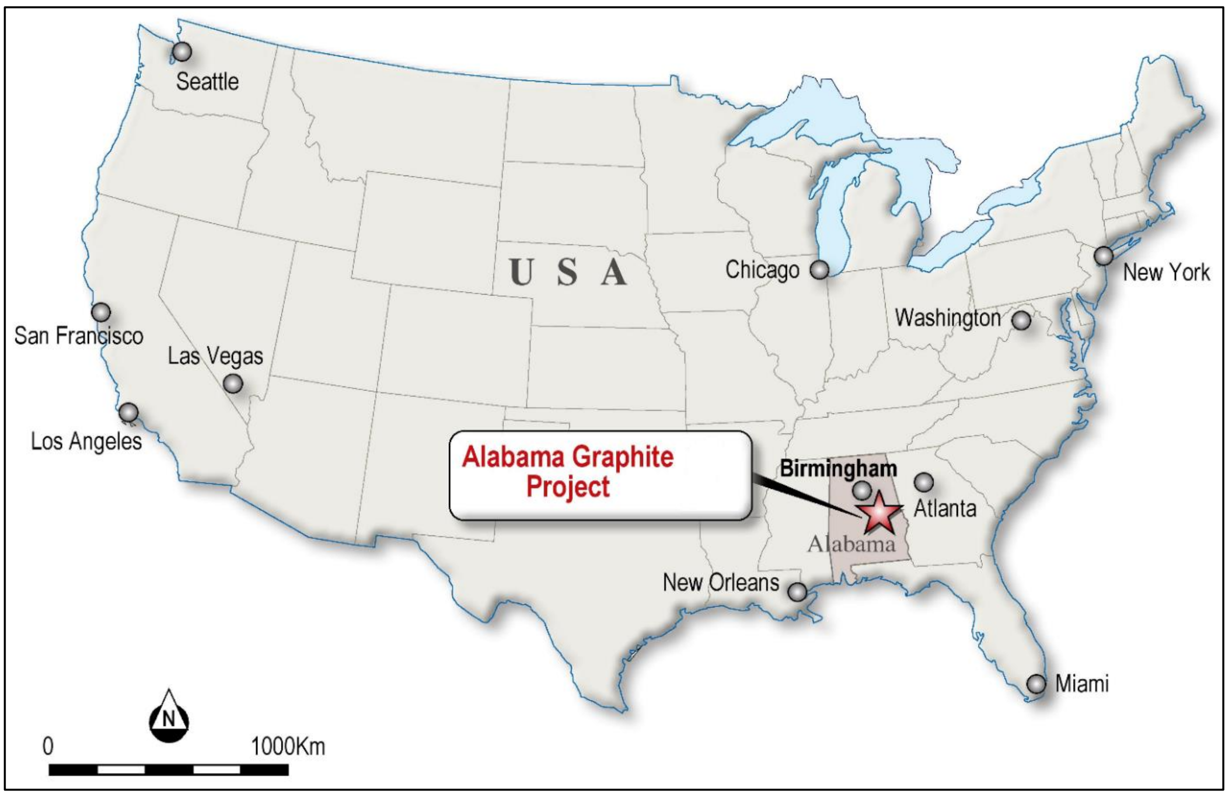
Description	Cost US$
Exploration & Mineral Resources / Reserves Estimates	2,000,000
Mining & Mining Geotechnical	1,550,000
Metallurgy (Concentrator)	320,000
Metallurgy (CSPG Plant)	500,000
Infrastructure Geotechnical	250,000
Power	50,000
Highway Crossing / Highway Relocation	150,000
Water Management	200,000
Waste Storage Facility	100,000
Environmental and Permitting	1,000,000
CSPG Plant Design	1,650,000
Concentrator Process Plant	1,000,000
Recommended Study Budget Subtotal:	**8,770,000**
NEPA Study / Permitting (if required)	500,000
Small Commercial Pilot Plant (Alternative)	4,500,000
Recommended Study Budget Total with Alternatives:	**13,770,000**

2.0 INTRODUCTION

2.1 Introduction

At the request of Canadian public company South Star Battery Metals Corp. ("South Star", or the "Company", or the "Issuer"), Lycopodium Minerals Canada Ltd. ("Lycopodium"), in conjunction with Mercator Geological Services Ltd. ("Mercator"), AGP Mining Consultants Inc. ("AGP"), MetPro Management Inc. ("MetPro"), Global Resource Engineering ("GRE"), and has prepared this Preliminary Economic Analysis ("PEA") and associated National Instrument 43-101 ("NI 43-101) Technical Report ("Technical Report" or "Report") on the BamaStar Graphite Project ("BamaStar", or the "Project", or the "Property"), located in Coosa County, Alabama, USA (Figure 2.1).

Figure 2.1 Country-Scale Location of the BamaStar (Alabama) Graphite Project in the Alabama Graphite Belt



Source: South Star Battery Metals, 2023

The responsibility of the contributing parties are as follows:

- Lycopodium was commissioned by South Star to manage and coordinate the work related to the PEA as lead study consultant. Lycopodium was responsible for the design and cost estimating of the crushing facilities, process plant, and surface infrastructure.

- Mercator was responsible for the MRE.
- AGP was responsible for the mining design, mine production schedule, co-disposal facility design, and mine and co-disposal capital and operating costs.
- GRE was responsible for site wide water management, geochemical assessment, and environmental studies, as well as planning, assessment, licensing, and permitting.
- MetPro was responsible to manage and interpret metallurgical testing performed by SGS.
- ANZAPLAN was responsible for the design and cost estimating of the downstream Coated Spherical Graphite Plant ("CSPG").

Readers are cautioned that the PEA report is preliminary in nature.

2.2 Terms of Reference and Purpose of the Technical Report

The Project consists of an open pit mine and an associated processing facility along with on-site and off-site infrastructure to support the operation. The operation is designed to have an open pit mine with a plant potential of producing 25,000 tonnes concentrate per year ("tpy") in Phase 1 and an additional 25,000 tonnes concentrate per year in Phase 2. This Technical Report was prepared to provide sufficient information to conduct a PEA of developing the BamaStar property.

The Technical Report was prepared in accordance with the Canadian disclosure requirements of NI 43-101 and Form 43-101 F1. Mineral Resources are reported in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum's "Definition Standards for Mineral Resources and Mineral Reserves" (2014) ("CIM Definition Standard") and "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (2019) ("CIM Best Practice Guidelines")

The individuals listed on the cover of this report, by virtue of their education, experience and professional association, are considered Qualified Persons (QPs) as defined by NI 43-101.

2.3 Information Sources and References

The Report is based in part on internal Company technical reports, production reports, previous studies, maps, published government reports, Company letters and memoranda, electronic database, and public information as cited throughout the Report and listed in Section 27. These reports and maps were reviewed for the purposes of the Report. It is also based on the information cited in Section 3.

Company personnel and related consultants were actively consulted before and during the Report preparation and during the Personal Inspection of the Property.

Additional information was reviewed and acquired through public online sources including South Star's website, through SEDAR+ (System for Electronic Document Analysis and Retrieval), and various corporate websites.

2.4 Previous Technical Reports

Jobin-Bevans, S., Siriunas, J., Mortimer, S 2023: National Instrument 43-101 Technical Report and Mineral Resource Estimate on the BamaStar Graphite Project, Alabama USA. Report prepared by Caracle Creek International Consulting Inc. and Atticus Geoscience Consulting S.A.C. Effective date 12 March 2023; report issue date 24 April 2023.

2.5 Effective Date

The effective date of the Mineral Resource Estimate ("MRE") for the BamaStar Graphite Deposit is 24 July 2024.

The effective date of the PEA report and the economic analysis is 10 October 2024.

2.6 Qualified Persons

The following individuals are considered qualified persons ("QPs") as defined by the NI 43-101.

- Jacob Makil, P.Eng., Lycopodium
- Matthew Harrington, P.Geo, Mercator
- Gordon Zurowski, AGP
- Oliver Peters, P.Eng., MetPro
- Sunil Koppalkar, P.Eng., Lycopodium
- J. Larry Breckenridge, P.E., GRE
- Derick R. de Wit, ANZAPLAN
- Preetham Nayak, P.Eng., Lycopodium

Table 2.1 outlines the responsibilities for the various sections of the Report and the name of the corresponding Qualified Person.

Table 2.1 Reports Responsibility Table

Qualified Person (QP)	Responsible Sections
Jacob Makil, P.Eng., Lycopodium	1.1, 1.14.1, 1.17, 1.17.1, 1.17.3, 1.20, 1.21.1, 2.1, 2.2, 2.5, 2.8, 3.1, 18.1, 18.2, 18.3, 18.4, 18.5, 21.1, 21.3, 25.12.1, 25.13 26.1, 26.7, 26.8.
Matthew Harrington, P.Geo., Mercator	1.2.1, 1.2.2, 1.2.5, 1.2.6, 1.3.1, 1.3.2,1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.21.1, 2.3, 2.4, 2.5, 2.7.1, 3.2, 4 except 4.7 and 4.8, 5 except 5.5, 6, 7, 8, 9, 10, 11, 12, 14 except 14.5, 23, 25.1, 25.2, 25.3, 25.5, 25.15.1.1, 26.15.2.1, 26.1, 26.2.
Gordon Zurowski, AGP	1.12, 1.21.1, 2.7.2, 15, 16, 21.2, 21.5, 25.6, 25.15.1.2, 25.15.2.2, 26.1, 26.3, 26.10.
Oliver Peters, P.Eng., MetPro	1.10, 1.21.1, 13, 25.4, 25.15.1.3, 25.15.2.3, 26.1, 26.4.
Sunil Koppalkar, P.Eng., Lycopodium	1.13, 1.17.4, 1.21.1, 17, 21.6, 25.7, 25.15.1.4
J. Larry Breckenridge, P.E., GRE	1.2.3, 1.2.4, 1.14.2, 1.16, 1.21.1, 2.7.3, 4.7, 4.8, 5.5, 16.3.10, 18.6, 20, 21.7, 25.8, 25.9, 25.15.1.5, 25.15.1.6, 26.6, 26.9, 26.11.
Derick R. de Wit, FAusIMM, ANZAPLAN	1.15, 1.17.2, 1.17.5, 1.21.1, 3.5, 21.4, 21.7, 24, 25.10, 25.11, 25.12.2, 26.5.
Preetham Nayak, P.Eng., Lycopodium	1.18, 3.3, 3.4, 22, 25.13.

2.7 Personal Inspection (Site Visit)

2.7.1 QP M. Harrington Site Visit

Report author M. Harrington, P.Geo., completed a personal inspection (site visit) of the Property between 17/18 April 2024. The purpose of the personal inspection was to complete independent witness ("IW") check sampling programs of drill core from the Property and satisfy NI 43-101 requirements for personal inspection and data verification. Author M. Harrington completed or directly supervised the following tasks and inspections:

- Reviewed and inspected the South Star core logging, core sampling and core storage facilities located in Sylacauga, Alabama.
- Compared select core intervals with original drill logs and sampled intervals.
- Collected 13 IW quarter core samples from the 2022 and 2023 drill programs.
- Reviewed historical exploration programs including the 2019 trenching program completed by Charge Minerals.

Reviewed data collection and QAQC procedures for the drilling and sampling programs. Completed a field inspection and drill collar coordinate check program. The personal inspections completed by Author M. Harrington confirmed the following:

- The South Star core facility is secure and there was evidence of proper QAQC procedures in place for core logging and sampling.

- Graphite mineralization and descriptions were consistent with observations documented in drill logs / reporting for the reviewed drill core.

- Graphite mineralization was evident in the core samples reviewed and sample intervals were properly documented in core boxes and in the core logging database.

- Access to most Property areas is good through secondary roads.

- The drill collar coordinate checking program carried out provided consistent results with drill hole database records.

Based on a detailed review of both historical and South Star exploration programs and the respective QAQC procedures, the Author is satisfied this meets the data verification requirements under NI 43-101. The South Star drilling programs were designed according to CIM Mineral Exploration Best Practice Guidelines and no issues or fatal flaws arising from the personal inspection were detected. Results from the IW sampling and check assay program are discussed further in Section 12 of this Technical Report (Data Verification).

2.7.2 QP G. Zurowski Site Visit

Mr. Zurowski conducted a site visit to the property for one day on 17 April 2024. The BamaStar property and nearby limestone quarry were toured with South Star personnel.

While on site Mr. Zurowski reviewed drill core from the pit areas, visited the south pit area (the North area was not available for viewing at the time), waste dump locations and proposed infrastructure locations including the waste storage areas, property access roads, and adjacent highway.

Meetings were held on site with the various team members including South Star personnel responsible for geology drilling and mapping.

2.7.3 QP L. Breckenridge Site Visit

Larry Breckenridge performed a visit from 17-19 April 2024.

While on site, he evaluated the geochemical conditions of the 1940s operation including the open pit and the mine tailings. This included water quality screening with a pH sensor and a conductivity sensor. He spent a day looking at exploration core and assessing the geochemical properties of future waste rock and mine tailings, and he assisted in the collection of the PEA geochemical samples.

Mr. Breckenridge walked the site to observe surface water conditions and site drainage. Cris Carman, (consulting geologist), and Jesse Edmonson, of US Critical Metals, accompanied Mr. Breckenridge and provided historical background information.

2.8 Units of Measure, Abbreviations, Initialisms and Technical Terms

Table 2.2 and Table 2.3 summarize many of the terms, units, abbreviations and conversions used in the Report; neither of these lists is exhaustive. All units in the Report are based on the International System of Units ("SI"), except for units that are industry standards, such as troy ounces for the mass of precious metals.

Assay and analytical results for trace elements and precious metals are stated in metric units, as per standard Canadian and international practice, including metric tonnes (“tonnes, t”) and kilograms (“kg”) for weight, kilometres (“km”) or metres (“m”) for distance, hectares (“ha”) for area, and percentage (“%”) for graphitic carbon (“Cg”).

Table 2.2 Units of Measure and Conversion

Measurement Type	Unit	Abbreviation	SI Conversion
Area	Acre	acre	4,046.86 m^2
Area	Hectare	ha	10,000 m^2
Area	Square Kilometre	km^2	(100 ha)
Area	Square Mile	mi^2	259.00 ha
Concentration	Grams Per Metric Ton	g/t	1 part per million
Length	Foot	ft	0.3048 m
Length	Mile	mi	1,609.34 km
Mass	Troy Ounce	oz	31.10348 g
Mass	Metric Ton	T, tonne	1000 kg
Temperature	Degrees Fahrenheit	°F	°F=°C x 9/5 +32

Table 2.3 Abbreviations and Initialisms (conversion)

Abbreviation	Name / Initialism (Conversion)
AMSL	Above Mean Sea Level
CAD	Canadian Dollar
°C	Degree Celsius

Abbreviation	Name / Initialism (Conversion)
cm	Centimetre
Cg	Graphitic Carbon
Corp.	Corporation
DDH	Diamond Drill Hole
E	East
EM	Electromagnetic
g/t	Grams Per Tonne (1 Ppm)
Ga	Billion Years
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
Inc.	Incorporation
IP	Induced Polarization
kg	Kilogram = 2.205 Pounds
km	Kilometre = 0.6214 Mile
lb	Pound; 1lb = 0.453kg
Ltd.	Limited
m	Metre = 3.2808 Feet
Ma	Million Years
Mag	Magnetics
mm	Millimetre
N	North
NSR	Net Smelter Return Royalty
NTS	National Topographic System
ppb	Parts Per Billion
ppm	Parts Per Million
qtz	Quartz
S	South
t	Tonne
tn	Short Ton
tpy	Tonnes Per Year
tnpy	Short Ton Per Year
tpd	Tonnes Per Day
TSX-V	Tsx Venture Exchange
USD	United States Dollar
UTM	Universal Transverse Mercator
VLF	Very Low Frequency
W	West
yr.	Year

The currency used is United States Dollars ("USD" or "US$"), unless specified otherwise. Unless otherwise stated, coordinates are given in NAD83 projected coordinate system, UTM Zone 16N (EPSG:26916).

Table 2.4 Abbreviations for Value-Add Products

Definition	Abbreviation
percent	%
degrees	o
degrees Celsius	ºC
per	/
micron(s)	µm
annum	a
less than	<
less than or equal to	≤
greater than	>
greater than of equal to	≥
Alabama, USA	AL
Association for the Advancement of Cost Engineering	AACE
Benchmark Mineral Intelligence	BMI
Block Flow Diagram	BFD
Brunauer-Emmett-Teller	BET
Canadian Institute of Mining, Metallurgy, and Petroleum	CIM
Capital Expenditure	CAPEX
Coated Spherical Purified Graphite	CSPG
CSX Transportation	CSXT
Defense Production Act	DPA
Department of Defense	DoD
Discounted Cash Flow	DCF
Dorfner Anzaplan GmbH	ANZAPLAN
Environmental and Social Impact Assessment	ESIA
Environmental Impact Assessment	EIA
Euro	EUR
Fixed Carbon	FC
g	gram(s)
h	hour
Hydrochloric	HCl
Hydrofluoric	HF

Definition	Abbreviation
Interstate 165	I-I65
Kilograms	kg
Mobile Area Water and Sewer System	MAWSS
National Instrument	NI
Natural Flake Graphite	NFG
Norfolk Southern Railway	NS Rail
North Carolina State University Mineral Research Laboratory	MRL
Operating Expenditure	OPEX
Particle Size Distribution	PSD
Percentage by weight	wt.-%
Pre-Development Graphite Project in the USA state of Alabama	the BamaStar Graphite Project or BamaStar
Preliminary Economic Assessment	PEA
Process Design Criteria	PDC
Qualified Person	QP
Recommended Practice	RP
Sales, General and Administrative	SG&A
Santa Cruz Graphite Mine in Northeastern Brazil's Bahia state	Santa Cruz Mine or Santa Cruz
Social Impact Assessment	SIA
South Star Battery Metals Corp.	South Star
Spherical Purified Graphite	SPG
SRG Mining Inc.	SRG
t	tonne(s)
Technical And Economic	techno-economic
United States Dollar	USD
Value-Add Graphite Active Anode Manufacturing Facility	the Value-Add Anode Plant or the Anode Plant
X-ray Diffraction	XRD

3.0 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs are relying upon information provided by South Star and its legal counsel concerning any legal, environmental, or any option or royalty matters relating to the Property. In preparing this Technical Report, the authors have fully relied upon certain work, opinions and statements from other experts. The authors consider the reliance on other experts, as described in this section, as being reasonable based on their knowledge, experience and qualifications.

3.2 Mineral Tenure and Surface Rights

This information includes the Earn-In Agreement for the Project between South Star and Hexagon Energy Mineral Limited and U.S. Critical Mineral LCC entered into on 7 December 2021, which includes the Mineral Lease Agreements and Surface Use Agreements applicable to the Project. The Earn-In Agreement and Mineral Lease Agreements were reviewed by the QP to the extent possible to disclose any legal, environmental liabilities, option agreements, joint ventures, and any royalty matters relating to the Property.

The QP has not independently verified the status of, nor legal titles relating to, the Mineral Lease Agreements and Surface Use Agreements for the Project. No warranty or guarantee, be it express or implied, is made by the QP with respect to the completeness or accuracy of the surface rights and mineral titles comprising the Project.

3.3 Markets

Markets and product commercial pricing are prepared with information provided by Benchmark Mineral Intelligence (“BMI”), Fastmarkets, published studies and reports, as well as confidential, independent market studies for specific products or sectors. South Star’s Santa Cruz Mine is also a producing graphite concentrates with confidential sales and ongoing negotiations of future sales. The QP, Preetham Nayak, have fully relied upon, and disclaim responsibility for, information supplied by experts retained by South Star for graphite marketing and pricing. This information is presented in Chapter 19 and was used to prepare the economic model presented in Chapter 22.

3.4 Taxation

The QP, Preetham Nayak have fully relied upon and disclaim responsibility for information supplied by South Star staff and experts retained by South Star, and information related to taxation as applied to the economic model presented in Chapter 22. The after-tax model presented in Chapter 22 was prepared by South Star finance team.

3.5 Downstream Transformation and Electrochemical Performance

South Star engaged ANZAPLAN in May 2024 to purify NFG concentrate from BamaStar for downstream preparatory and performance testing in the USA by others. ANZAPLAN successfully produced 2 kg battery-grade (≥99.95FC) purified NFG. On 11 July 2024, 1 kg of the purified BamaStar NFG was shipped to the USA. The subsequent US sample preparation, transformation and performance tests were performed by independent service providers and laboratories under the supervision of South Star. ANZAPLAN is responsible for the presentation of the results related to the purification of the BamaStar precursor into battery-grade purified NFG, and South Star, along with the US Lab Partners, are responsible for subsequently transforming the purified NFG from ANZAPLAN into mid- and downstream value-add products and the performance testing for LiB suitability.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Property Location

The Project is located about 77 direct km (48 miles) from Birmingham, Alabama and about 13 road km (8 miles) from Sylacauga, Alabama along US Highway 280 (Figure 4.1; Figure 4.2). The approximate geographic centre of the Project is approximately 30°04'30"N and 86°09'52"W at ~293 m AMSL (UTM coordinates 577978mE and 3659893mN, NAD83, UTM Zone 16N).

Figure 4.1 Location Map – BamaStar Deposit – Alabama

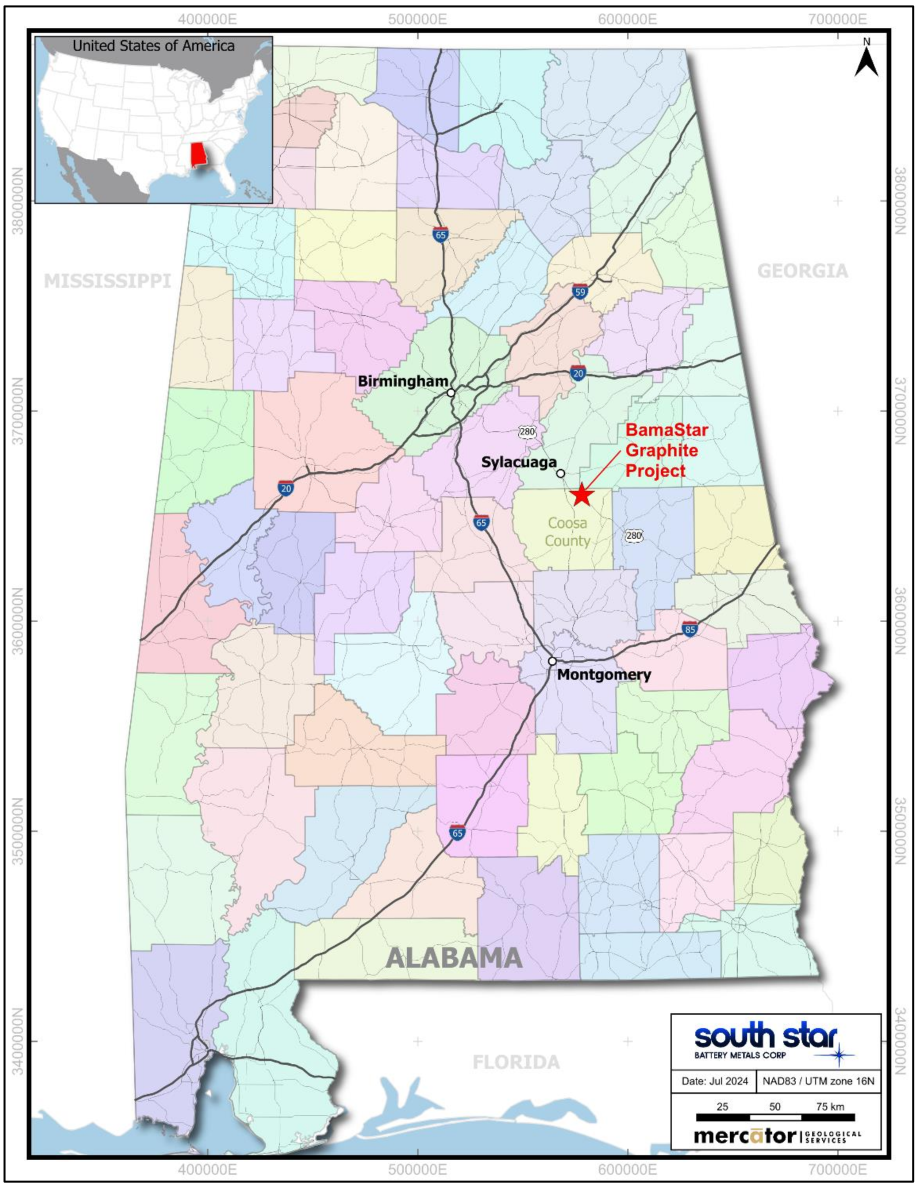
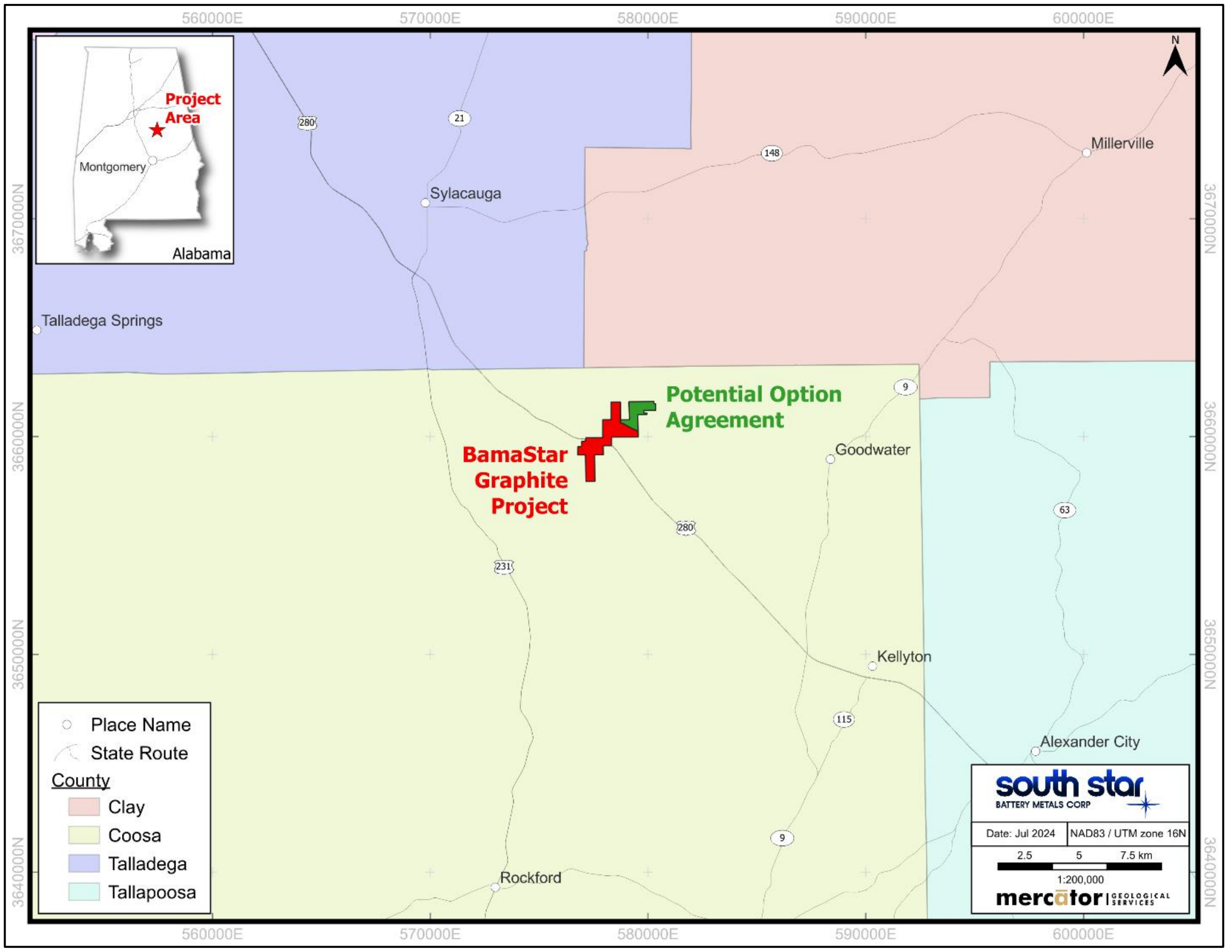


Figure 4.2 Location Map - BamaStar Deposit – Coosa County



4.2 Land Tenure

The Project comprises two Mineral Lease Agreements ("MLA"s) that are contiguous, cover approximately 660 acres (267 ha), are covered under Surface Use Agreements ("SUA"s), and are located in Coosa County, Alabama. One of the two MLAs, the Ceylon Mine Prospect, covers the historical past-producing Ceylon Graphite Mine (Figure 4.3) (Table 4.1). Both MLAs were entered into on 28 February 2019, one with KADRA Timber, LLC ("KADRA") and Rodney Rushing (Rushing Prospect) and one with Carolyn Mills Family, LLC ("Mills") (Ceylon Mine Prospect). The Rushing Prospect MLA was amended on 12 October 2022, to include two addition areas of land. The optionor for both MLAs is Charge Minerals LLC ("Charge Minerals") and the optionee is South Star Battery Metals Alabama Corp. ("SSBMA"), a wholly owned subsidiary of South Star. MLAs were originally a five-year term with a possible two-year extension, and both are subject to concurrent SUAs. On 27 February 2024, the MLAs were extended two years expiring on 28 February 2026 (South Star news release March 5, 2024). With respect to Figure 4.3, the Ceylon Mine Prospect is number 1 and the Rushing Prospect is numbers 2 and 3 (original MLA) and numbers 4 and 5 (amended MLA). A Potential Option Agreement northeast of the Rushing Prospect, encompassing 3 tracts for approximately 985 ha, is available to South Star at the same terms if the Company wishes to option it.

Figure 4.3 Property Mineral Lease Agreement Map

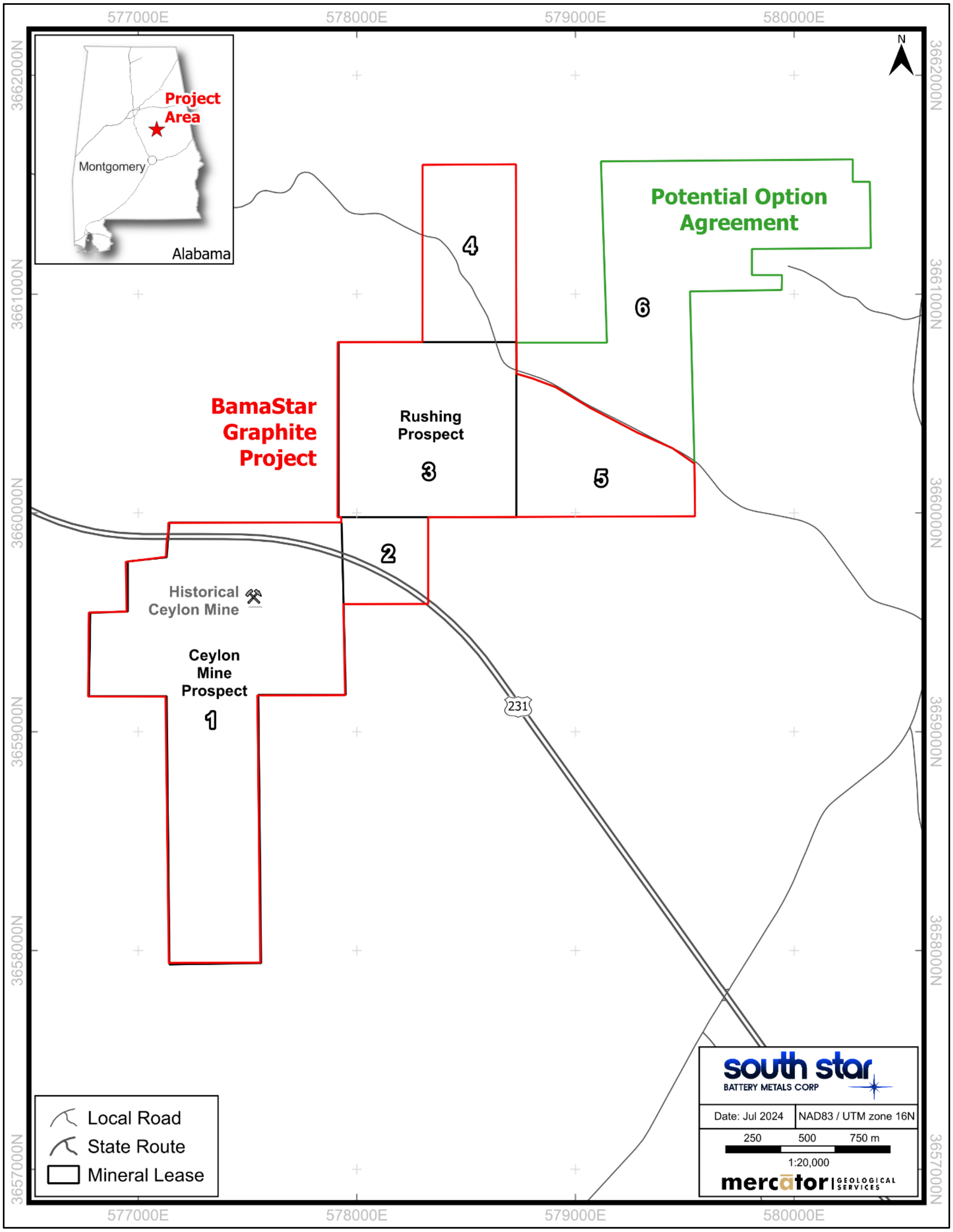


Table 4.1 Property Mineral Lease Agreement

Mineral Lease Agreement	Start	Lessor	Description	Area acre	Area ha	Comments
Rushing Prospect (KADRA)	Initial 28-Feb-2019	Rodney E. Rushing	E1/2 of W1/2 of S10 T24N R19E	80	32	Subject to Concurrent Surface Use Agreements
			NW1/4 of SW1/4 of S10 T24N R19E	40	16	
			SW1/4 of SW1/4 of S10 T24N R19E	40	16	
			NW1/2 of NW1/4 of S15 T24N R19E; less ~12 acres ROW for US HWY 280	28	11	
	Amended 12-Oct-2022		E1/2 of NW1/4 of S10 T24n R19E	80	32	US$12,000 paid at signing
			SE1/4 of S10 T24N R19E; portion that lies south of County Road 66	83	34	
Ceylon Mine Prospect (Mills)	28-Feb-2019	Carolyn Mills	W1/2 of SE1/4, NE1/4 south of US HWY 280, SE1/4 of NW1/4, SE1/4 of NE1/4 of NW1/4 of S16 T24N R19E	270	109	Subject to Concurrent Surface Use Agreements
			NW1/4 of NE1/4 of S21 T24N R19E; save and except one square acre in the SE1/4	39	16	
			Totals:	**660**	**267**	

4.3 Holding Costs

A total of $39,000 was paid by Charge Minerals at signing of the MLAs (28 February 2019) plus another $35,000 for the SUAs. Subsequently, on 12 October 2022, another $12,000 was paid by South Star via Charge Minerals for the amendment which added 163 acres to the Rushing Prospect.

As all rentals and surface damages were paid in advance, there are no ongoing holding costs other than the liability insurance annual premium which is currently $1,252 per year.

4.3.1 Rushing Prospect

Charge Minerals paid $10,000 rental at signing plus a $9,000 establishment fee. Rental is $5/acre/year with a $2,000 per year minimum and five years payable in advance.

The Rushing Prospect is subject to a 1.7% Net Smelter Return royalty ("NSR") during a Trial Production Period ("TPP") defined as concentrate production >1,000 tpa and <10,000 tpa with a minimum annual royalty of $65,000.

Upon Commercial Mining Commencement defined as >10,000 tpa of concentrate, the NSR increases to 2% with a $125,000 per year minimum.

The SUA for the Rushing Prospect acreage was also entered into on 28 February 2019 (and amended 12 October 2022), with a duration of five years. It calls for damage payments of $1,000 per acre with a 15-acre minimum paid by Charge Minerals at signing. The SUA was extended along with the MLA for two years on 27 February 2024.

4.3.2 Ceylon Mine Prospect

Charge Minerals paid $10,000 rental at signing plus a $10,000 establishment fee. Rental is $5/acre/year with a $2,000 per year minimum and five years payable in advance.

The Ceylon Mine Prospect is subject to a 1.7% NSR during a TPP defined as concentrate production >1,000 tpa and <10,000 tpa with a minimum annual royalty of $65,000.

Upon Commercial Mining Commencement defined as >10,000 tpa of concentrate, the NSR increases to 2% with a $125,000 per year minimum.

The SUA for the Ceylon Mine Prospect acreage was also entered into on 28 February 2019, with a duration of five years. It calls for damage payments of $1,000 per acre with a 20-acre minimum also paid by Charge Minerals at signing. The SUA was extended along with the MLA for two years on 27 February 2024.

4.4 Corporate Structure and Earn-In Agreement

South Star is a Canadian public company, traded on the TSX-V under the symbol STS and on the OTCQB under the symbol STSBF. SSBMA is a wholly owned subsidiary of South Star and is incorporated in the State of Alabama.

On 7 December 2021, South Star announced the terms of their Earn-In Agreement (the "Agreement") to earn up to 75% of the Project from Hexagon Energy Minerals Limited ("Hexagon", ASX: HXG) and U.S. Critical Minerals LCC ("USCM"), a privately held exploration company incorporated in the United States, which share an 80% and 20% ownership, respectively. To satisfy the terms of the Agreement, South Star must complete the following:

1. The drilling, Mineral Resource estimation and analysis needed to produce a NI 43-101 compliant Preliminary Economic Analysis ("PEA") within three years (completed at the effective date of this Report).

2. Fund an annual minimum expenditure of CAD$250,000 (~USD$184,000) (CAD$750,000 total) (~USD$552,000) to earn 75% of the Project (completed).

3. Extend or renew, as needed, the currently existing MLAs and SUAs on the Project to ensure they are valid for a period of a minimum of 12 months beyond the three-year term of the definitive earn-in period (completed by the 27 February 2024 extension).

Upon satisfaction of the first three items listed above, South Star shall have the right, but not the obligation, to acquire 75% of the Project.

1. For a period of six months following the exercise of the 75% earn-in option ("Option Period"), Hexagon and USCM individually have the right, but not the obligation, to sell their remaining 25% interest in the Project for a payment of CAD$250,000 (~USD$184,000) in South Star shares.

2. During the Option Period expenditures will be shared pro rata. Failure by any party to pay their share shall result in a proportional dilution of interest in the Project.

3. Should South Star's interest in the Project increase to 90% or greater, South Star shall have the right, but not the obligation, to purchase the entire remaining interest not owned or under its control.

4. Within six months of the Project achieving Commercial Production ("Production Bonus"), South Star shall make a payment of CAD$250,000 (~USD$184,000) in South Star shares. The Production Bonus shall be proportionately reduced to reflect any reduction in the remaining 25% interest held by the parties.

4.5 Mineral Rights in Alabama

The ownership of the mineral rights is a matter of public record in the Probate Records of Coosa County, Alabama. The authority for the State of Alabama non-fuel minerals surface mining is the Alabama Department of Labor, Mining Division. No assessment work is required to hold mineral rights on private land. The mineral rights were granted in perpetuity. The Coosa mineral rights are identified by their township, range, section and, where relevant, quarters, in the same manner as land rights, and do not have an identification number or name. The mineral rights have not been surveyed.

The mineral rights are patents of private land that were issued before the introduction of the General Mining Law of 1872, which governs mining on Federal public lands, hence this law is not applicable to the Project and the mineral rights are not held as either patented or unpatented lode claims. Thus, the mineral rights do not have claim names and are not defined by metes and bounds (Wilson and Redwood, 2015).

4.5.1 Public Land Survey System

In the U.S.A., land surveying under the Public Land Survey System ("PLSS"), was developed by the General Land Office (Government Land Office Grid System) and is used in states west of Ohio. This system divides surveyed lands into townships, ranges, sections and quarters which are numbered as follows (Wilson and Redwood, 2015):

- Township measures the distance north or south of a base line which is a designated parallel. A township usually measures six miles. The first six miles north of the base line is township one north, written T.1 N.

- Range measures east or west from the principal meridian which is a designated meridian. Ranges are also usually six miles in size. The first six miles west of the principal meridian is written range one west, R. 1 W.

- Townships are subdivided into sections. Each township is six miles by six miles and contains 36 sections of one mile by one mile. The northeast corner is section 1. They are numbered to the west in the north row, then to the east in the second row, and so on in a snake-like pattern.

- Sections are subdivided into northeast, northwest, southeast and southwest quarters of 160 acres, for example NW ¼ (northwest quarter). They are further subdivided into quarters of 40 acres and are designated by the smallest quarter followed by the largest quarter, for example, NE ¼, SW ¼ means the northeast quarter of the southwest quarter.

4.6 Surface Rights and Legal Access

Charge Minerals negotiated SUAs with the holders of the surface rights for the Rushing and Ceylon Mine Prospects. The agreements allow South Star to access the lands and to carry out exploration work on the properties such as surface sampling, trenching, and drilling. Terms of the agreements are presented in section 4.3.

4.7 Permits and Permitting

South Star has received and a National Pollutant Discharge Elimination System General Permit ("NPDES") that will cover future drilling and exploration activities on the Project. The NPDES has an effective date of coverage of 30 December 2022 and has an expiration date of 31 March 2026.

The Author is not aware of any other permits or requirements necessary for South Star to carry out exploration programs on the Project including the work programs recommended in this Report.

Section 20.2 describes the permits necessary to execute the LOM plan. This includes many state-level and federal-level permits.

4.8 Environmental Liabilities

The site was mined for graphite in the 1940s, and as a result, has a legacy mine pit and legacy mine tailings. On a 17-19 April site visit, Larry Breckenridge from GRE noticed that the old mine pit had evidence of Acid Rock Drainage ("ARD") with pH 3.4 seeps occurring at one location in the old pit. Nearby rocks were coated with acidic sulphur salts and had an acidic paste pH. The legacy mine tailings, which were likely processed from geochemically – inert oxide mineralized material, were pH neutral. GRE believes that these legacy environmental issues are not currently a significant impact to local water quality, but they are indicative of the fact that an ARD management strategy must be part of the mining plan. Geochemical characterization and geochemical mitigation are presented in Section 20 of this Report.

4.9 Royalties and Encumbrances

Both the Rushing and Ceylon Mine Prospects are subject to a 1.7% NSR during a TPP defined as concentrate production >1,000 tpa and <10,000 tpa with a minimum annual royalty of $65,000. Upon Commercial Mining Commencement defined as >10,000 tpa of concentrate, the NSR increases to 2.0% with a $125,000 per year minimum.

4.10 Other Significant Factors and Risks

The Authors are not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform exploration work on the property including the work programs recommended in the Report.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The Project is in northeast Coosa County, State of Alabama, USA, within Township 24 North and Range 19 East. The Project can be accessed using US HWY 280 which cuts through the Project area. Birmingham, Alabama, which has a large international airport is located about 75 direct km (46.6 miles) northeast and Montgomery, Alabama, the State capital, is located about 75 direct km (46.6 miles) south. Access roads, logging roads, and hunting trails provide reasonable access throughout the property.

5.2 Climate

The climate zone of Alabama is classified as humid subtropical (Cfa) under the Koppen Climate Classification. The Holdridge Life Zones Climate Classification is subtropical moist forest. The nearest climatic data available is for Sylacauga, northeast of the Project (weatherbase.com). It has an annual average temperature of 61.7°F (16.5°C). The warmest month is July with an average temperature of 78.7°F (25.9°C). The coolest month on average is January with an average temperature of 43.2°F (6.2°C). The maximum average high is 90.6°F (32.6°C) in July, and the minimum average low is 31.4°F (-0.3°C) in January. Average annual precipitation is 55.2 in (140.2 cm). It rains all year with the wettest months being March with an average of 5.9 in (15.0 cm). Snow is rare with an average of 0.8 in (2.03 cm). It is humid in the summer. The state is prone to tropical storms, hurricanes, thunderstorms, and tornadoes.

Due to the moderate climate of this region of United States, the exploration operating season is year-round, with the main climate limitations being heavy rainfall.

5.3 Local Resources and Infrastructure

The City of Sylacauga, located in Talladega County, Alabama about 13 road km (8 miles) northeast of the property, had a population of about 12,578 in the 2020 census. Sylacauga is known for its quarries of fine white marble bedrock. Major highways that run through the city include US Routes 280 and 231, as well as Alabama State Route 21.

Infrastructure in the immediate area of the property includes 4-lane US HWY 280, which cuts through the Project area, US HWY 231 further east of the Project area, and numerous well-maintained logging access roads. A high-tension electrical transmission line runs through the southwestern area of the property and a natural gas line is located in the area. There are two cell / radio towers on the access road into the Ceylon Mine Prospect just south of Hwy 280 and within a couple hundred metres of the historic Ceylon Mine. The nearest major airport with scheduled flights is in Birmingham, and there is a small airfield at Sylacauga. The Project is about 225 miles (~362 km) from the major port at Mobile, Alabama.

The property is close to centres of population such as Sylacauga, Stewartville and Goodwater, which could supply the workforce and logistical needs of a graphite mine. The City of Sylacauga has train and bus stations, a small airport, health care facilities, schools, postal service, and several lodges and motels. It primarily provides services for recreation and heavy industry. Manufacturing, mining, agriculture and forestry all play a role in the overall industrial output of the city.

The southeastern United States is rapidly developing into a major hub for the Electric Vehicle ("EV") industry and the Lithium-ion Batteries ("LiB") needed to power them. In addition, a significant aerospace and defense industries hub is centered around Huntsville, Alabama providing further market opportunities for high purity, value-added graphite products. Graphite is included in the list of US Critical Minerals and was recently added to the National Defense Stockpile List. Alabama State and local officials are pro-development and support both primary extractive and downstream processing industries (South Star News Release, 29 November 2023).

Land uses in the region of the Project include recreational activities (hunting, fishing, and hiking), mineral exploration, and forestry. Water is abundant in small streams and in Mitchell Lake, a large impoundment on the Coosa River to the west of the property not on or near the mineral rights. No usable mining infrastructure currently exists within property boundaries.

The area within 3 miles (5 km) of the property is sparsely populated, so a mine should not directly affect many communities. Mining has been a traditional industry in the area and there are several active quarries in the region.

There potentially exists sufficient surface area within the current MLAs to utilize in potential future tailings, waste disposal, heap leach pad areas, and processing plants, with additional land available with the Potential Option Agreement to the northeast of the Rushing Prospect.

5.4 Physiography

The property is located in an area of shallow ridges and valleys with elevations ranging from approximately 820 to 1,148 ft. amsl (250 to 350 m). The land use is forestry with thick mixed hardwoods and pines (mostly white), and significant areas of pine plantations which are harvested every few decades. There are clearings at towns and for agriculture. Due to extensive weathering, natural outcrops are sparse, and most useful exposures are in road cuts, stream drainages, or historic mine excavations.

5.5 Water Availability

Small creeks on the property offer plenty of water for exploration work such as diamond drilling and pressure washing of surface exposures / trenches. Section 18.6 discusses the water availability for project development and future operations.

5.6 Flora and Fauna

Because of its topography and climate, Alabama is one of the most ecologically diverse states in the U.S.A. Flora is dominated by thick mixed hardwood forests and large stands of white pine, while fauna is typical of rural areas in southern Alabama (Wildlife & Freshwater Fisheries District 2, Coosa County) with turkeys, deer, feral hogs, turtles, frogs, and a wide variety of insects and fish.

6.0 HISTORY

The Project is located within the Alabama Graphite Belt ("AGB") and covers the historical Ceylon Graphite Mine. The AGB is a 112 km (70 miles) long, northeast-trending belt that spans the Clay, Coosa and Chilton counties, Alabama. Most of the descriptive history that follows has been taken from Wilson and Redwood (2015), who extracted the history mainly from Pallister and Thoenen (1948) and Durgin (2013). Mineralization described herein is not necessarily indicative of the mineralization found on the Project.

6.1 History of the Alabama Graphite Belt

The presence of graphitic schists in Alabama was recognized by M. Tuomey before the Civil War (1861-65; Jones, 1929). Dr. Gessner, employed by the Confederate government to recover sulphur from the pyrite deposit at Pyriton, is credited with the first discovery of flake graphite in Alabama (Clemmer et al., 1941). The first attempt at development was in 1888, but an experimental mill using water for flotation was unsuccessful. The first commercial graphite operation was in 1899 when the Allen Graphite Company built a mill using a patented oil flotation process and produced the first refined graphite in Alabama, at a mill near the Quenelda deposits in Clay County.

By 1906, there were several mines in operation and by 1913 the graphite industry was well established in central Alabama. World War I caused the disruption of foreign graphite imports, leading to significantly higher prices and the Alabama graphite industry boomed. By 1918 there were 25 flotation plants operating in the district with a total production in 1918 of 7.8 million pounds (3.5 million kg) of graphite (Pallister and Thoenen, 1948).

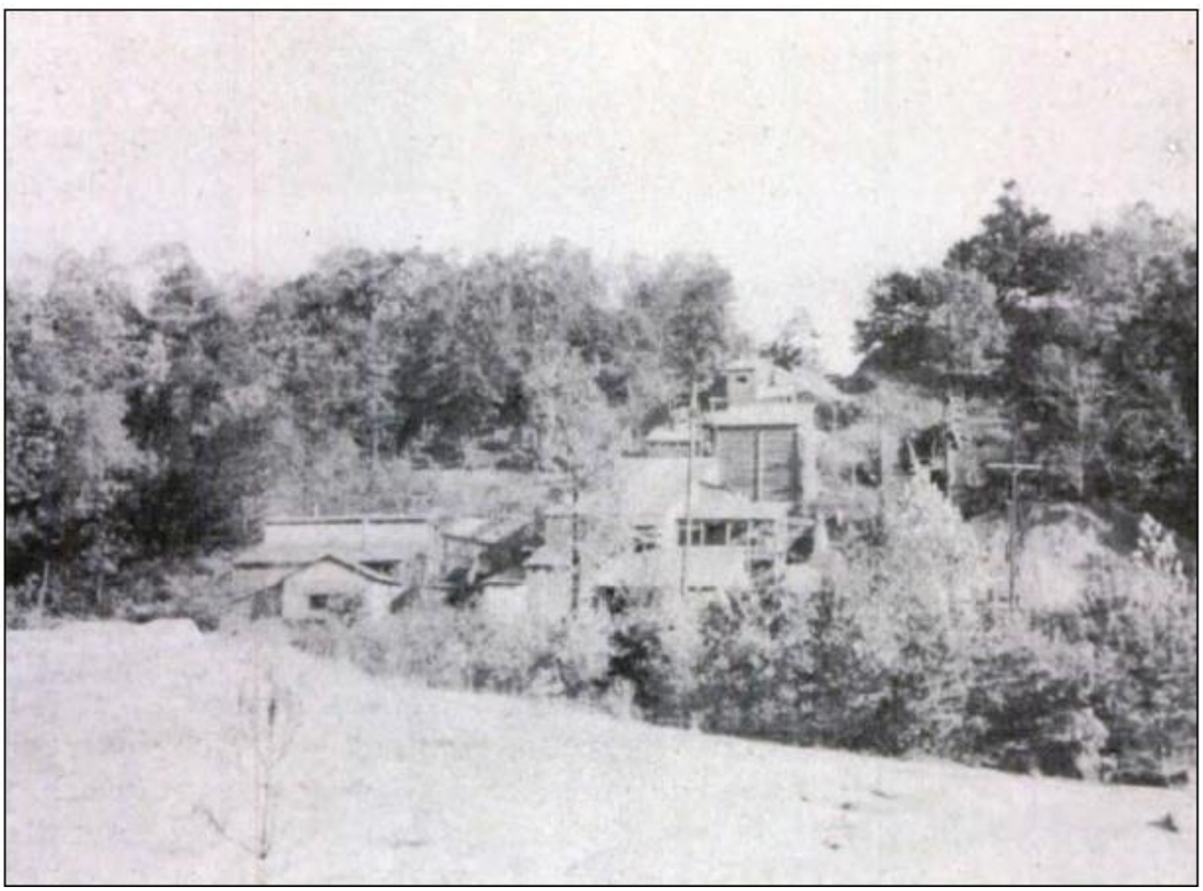
However, the end of WWI and the resumption of foreign imports depressed prices and the Alabama graphite industry dwindled to seven operating plants in 1920. In 1929, the last two mines in the district, the Ceylon Graphite Company in Coosa County and the Superior Flake Plant in Clay County, were closed.

At the start of World War II in 1939, C. J. Johnson rebuilt the mill at the Ceylon Graphite Mine and began production of flake graphite on a small scale. In 1940, as a result of the interruption of graphite imports from Madagascar, the US Bureau of Mines made a preliminary survey of the Alabama graphite deposits to determine the viability of resumption of mining, with a report by Clemmer et al. (1941). As the demand for graphite rose, the War Production Board, the Metals Reserve Company and the reconstruction Finance Corporation (all federally funded) turned their attention to the district, and a detailed study was carried out between 1942 and 1944 which resulted in a report by Pallister and Thoenen (1948). A field laboratory was established in Ashland with the capacity for pilot crushing-milling-flotation testing and graphite analyses. In 1943 the Crucible Flake mill of Haile Mines Inc. and the Alabama Flake Graphite Co. plant (Gisler, 1943) began to produce, and the three plants produced 8.1 million pounds (3.7 million kg) of graphite, with Alabama again ranking first in graphite production in the US. The Crucible Flake mill was closed at the end of 1943, leaving only two producers in the district. A thorough review was made of all the known graphite producing areas in the district in 1942-44 (Pallister and Thoenen, 1948).

After World War II, production declined rapidly due to the resumption of imports and a decline in prices, and graphite mining soon ceased in Alabama when international trade routes reopened (Edmundson, 2021). By 1950, only the Pocahontas Mine near Ashland and the Bama Mine in Chilton County were still in production, and they closed in 1953. Alabama graphite production has been idle since that time. The processing plants have all been dismantled, burned down or overgrown, and the graphite workings are hidden under more than 60 years vegetation. With the current resurgence of interest in graphite deposits, attention is being turned again to the central AGB district (Wilson and Redwood, 2015).

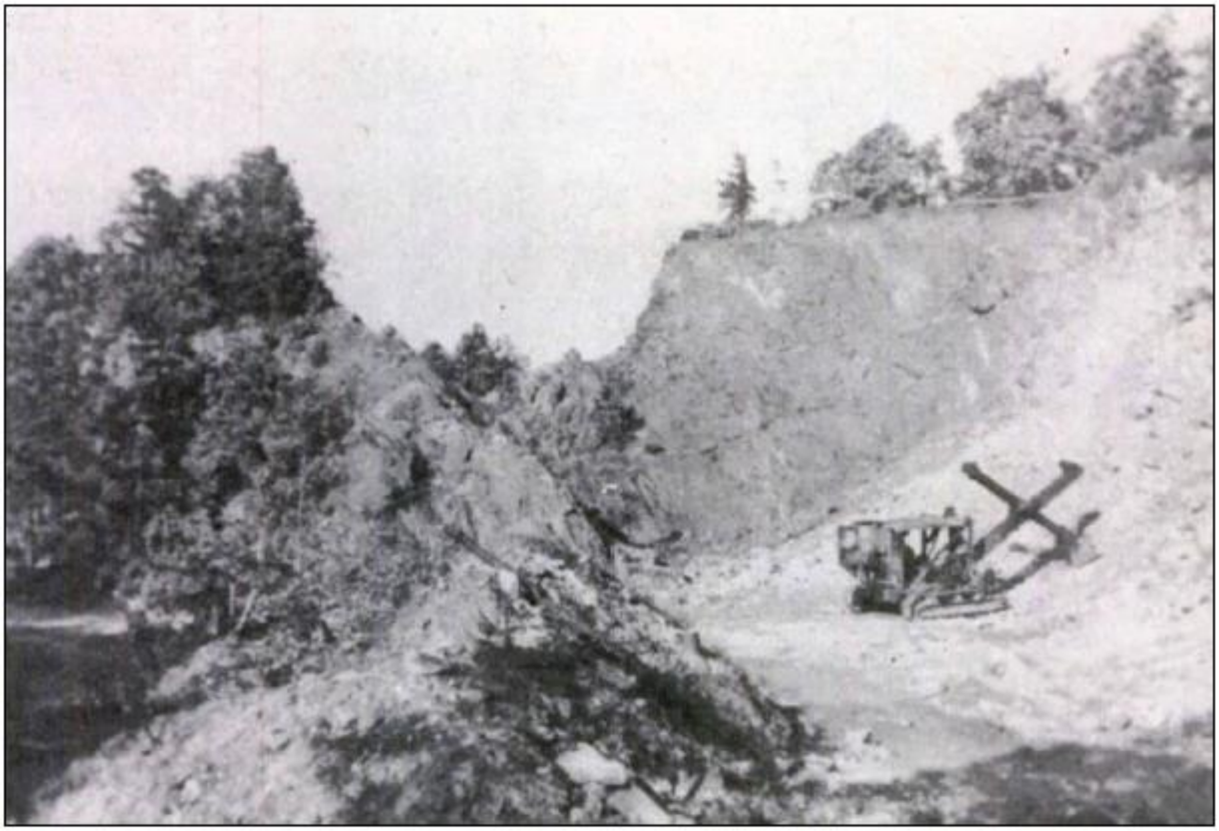
The two most significant historic mines in the southwestern portion of the AGB were the Ceylon and Bama mines. The Ceylon deposit, now part of the BamaStar Deposit, is located about 12.9 km (8 miles) west of the town of Goodwater. One of the largest mines in the district, it operated from 1916 to 1929 and from 1939 to 1947 (Figure 6.1 and Figure 6.2). The principal working development during the later period was 282 m (925 feet) long, up to 91 m (300 feet) wide and up to 21.3 m (70 feet) deep on a series of leads striking N45°E and dipping 55°SE. The grade ranged from 2% to 6% graphite and averaged 3% (Wilson and Redwood, 2015). This graphite was mainly utilized for domestic steel production, lubricants, and gun powder.

Figure 6.1 Ceylon Graphite Company Mill in the 1940's, Coosa County, Alabama



Source: Pallister and Thoenen, 1948

Figure 6.2 Shovel operating at the Ceylon Graphite Company pit in the 1940s, Coosa County



Source: Pallister and Thoenen, 1948

6.2 Prior Ownership and Ownership Changes

In the Spring of 2019, USCM spun out the Ceylon Mine Prospect and Rushing Prospect MLAs to Charge Minerals, then to Hexagon Resources Limited (name change November 25, 2019, to Hexagon Energy Materials Limited) ("Hexagon"). On 3 November 2021, South Star announced that it had agreed to key terms of a proposed Earn-In and Option Agreement on what was then referred to as the Ceylon Graphite Project with public company Hexagon and private company USCM (South Star news release dated 3 November 2021). On 7 December 2021, South Star announced that it had entered into a binding Earn-in and Option Agreement giving South Star the right to earn-in to up to 75% of the Project (South Star news release dated 7 December 2021).

6.3 Hexagon and Charge Minerals - 2019

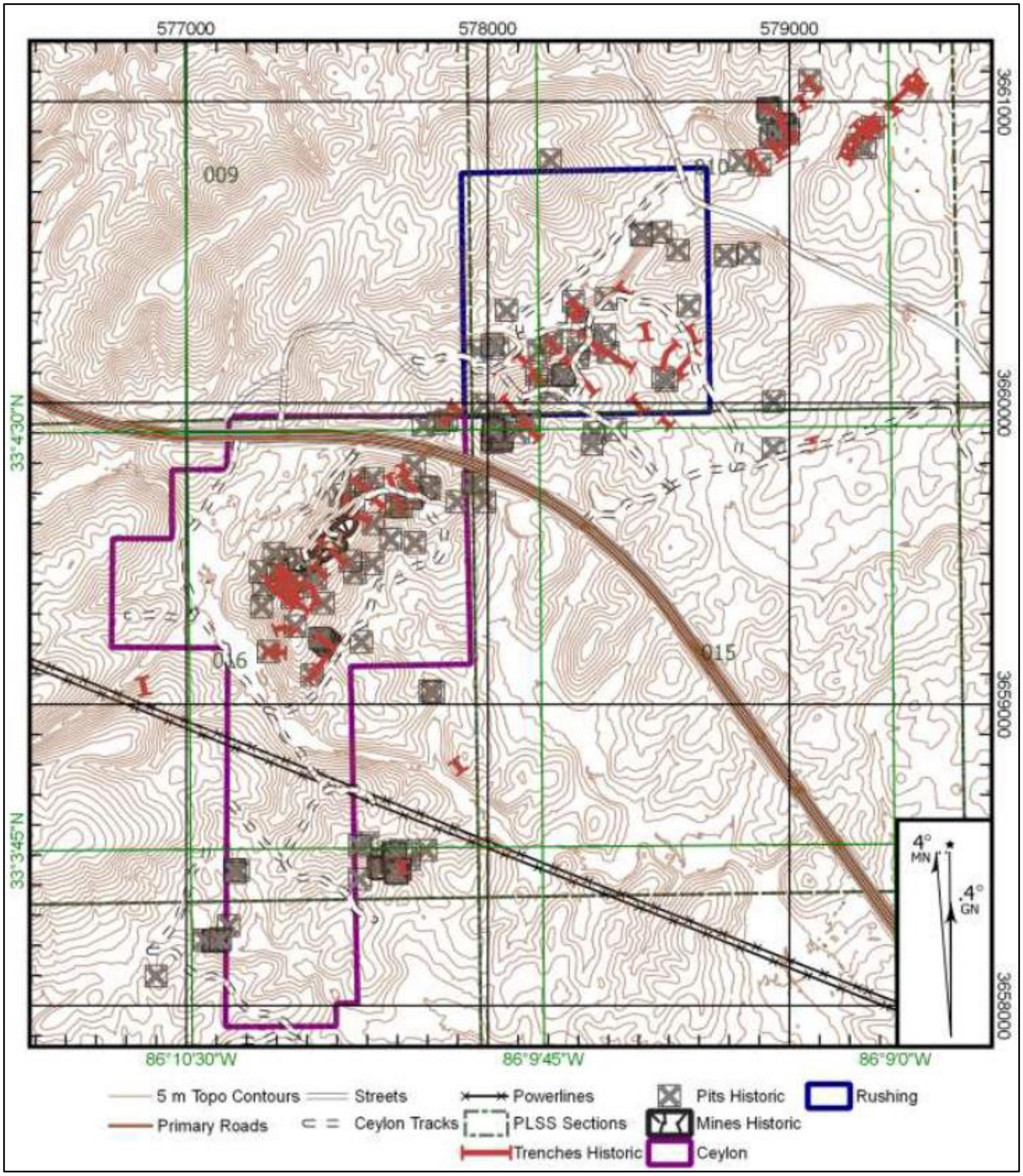
Work was completed on the property between 24 April and 24 August 2019 by Hexagon and Charge Minerals (Carman, 2019). A summary of all work conducted is presented in Table 6.1. The Rushing Prospect and the Ceylon Mine Prospect MLAs were smaller than the current property area (Figure 6.3).

Coordinate data was collected in WGS84 using a GRAMIN GPS 62CS and converted to Universal Transverse Mercator ("UTM") projection NAD1983 Zone 16N. GPS errors were generally low (±3 m) in open areas but degraded in forested areas (as much as ±10 m). Trench data were collected as intervals or length along trench and converted to UTM using surveys and GPS coordinates. An oblique Mercator local coordinate system was used to plot cross sections with a 45° rotation and an origin southwest of the graphite belt (downtown Clanton) to ensure no coordinate overlap (Carman, 2019).

Table 6.1 Summary of Hexagon and Charge Minerals Exploration Activities (Carman, 2019)

Period	Operator	Description	Field Work / Comments
2019: 14 April to 24 August	Hexagon Resources (renamed Hexagon Energy Materials Limited) and Charge Minerals	Updated Outcrop Lithology and Interpreted Geological Maps	1:2000 Scale Rushing Prospect; 1:500 Scale Ceylon Mine Prospect; 3,200 Locations, 1,116 Structural Measurements
		Compilation Of Recent and Past Geochemical Data Into 1 Database	83 Tested Using Pxrf Analyzer (37 Elements)
		Geophysical Bench Tests	883 Rock Reference Samples Tested for Magnetic Susceptibility
		Analysis Of Structural and Geochemical Data	10 Rock Samples Tested for Density (Ceylon Mine Prospect)
		Plotting Of Rock Types and Chemistry, Strip Logs for Trenches and Rock-Type Chemistry	49 Rock Grab Samples from Ceylon Mine Prospect and 34 from Rushing Prospect (69 for Graphite and 11 For Gold)
		Determinations And Characterization of Target Zones	63 Rock Grab Samples from Ceylon Mine and Rushing Prospects
		Interpretation Of Ceylon Mine Prospect Stratigraphy	1,051 In-Situ Pxrf Soil Testing Trial using Handheld XRF (32 Elements)
		Cross-Section Interpretation and Tonnage Potential	68 In-Situ Pxrf Rock Testing using Handheld XRF (32 Elements); Geologically Logged; Structural Measurements
		29 Trenches	Totalling 2,905 M; 765 Samples
		90 Exploration Pits	Excavated to Expose Bedrock; Spot Tested using Pxrf (32 Elements); Pits Geologically Logged; Structural Measurements
		8 Bulk Sample Pit Locations	Samples Crushed and Stored in One-Tonne Bulk Sacks with Generally 15 Sacks per Site; each One Tonne Sack Sampled for Graphite (115 Samples) and One Sample from each Site for Multi-Element Chemistry
		Bulk Rock Density Measurement	26 Rock Samples from First 4 Bulk Sample Pits Tested for Density; 11 Rock Grab Samples from Trenching Program used for Density Measurements
		Mineral Processing and Metallurgical Testing	Portion of the Bulk Sample Shipped to GIRCU Laboratory in Guangzhou, China for Initial Bench-Scale Beneficiation Testing

Figure 6.3 Historical Mine Workings and Pits

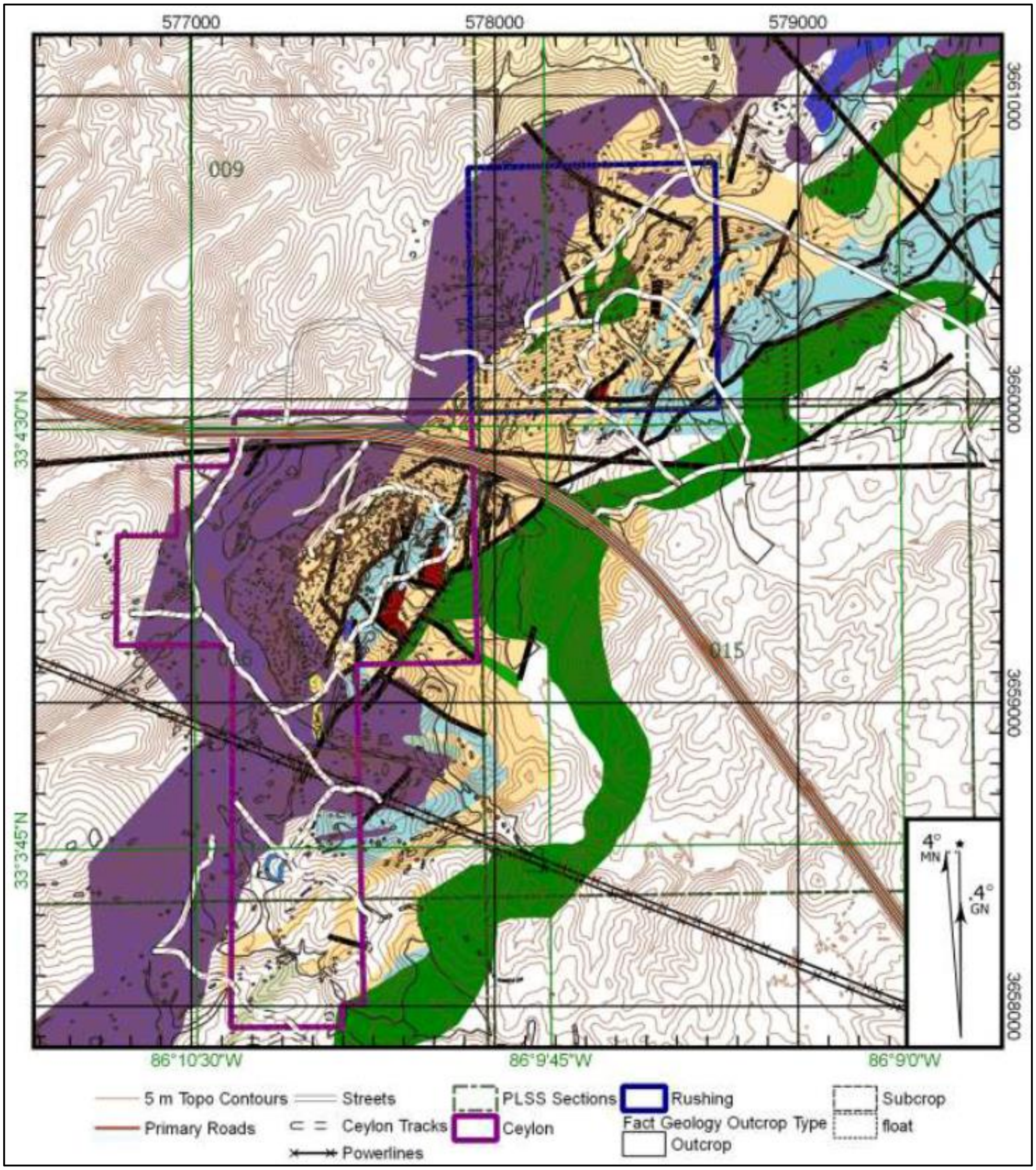


Source: Carmen, 2019

6.3.2 Geological Mapping

A comprehensive mapping program during the first half of 2019 generated a detailed geological and structural picture of the Project area as well as along strike to the northeast and southwest (Figure 6.4) (South Star news release dated 20 December 2021).

Figure 6.4 Detailed Geological Map Developed from Historical Exploration Programs



6.3.3 In-Situ XRF Analysis

Eighty-three surface rock grab samples (49 from Ceylon Mine Prospect and 34 from Rushing Prospect) were collected and analysed for 37 elements both in the field, with a XMET8000 handheld XRF analyzer, and at an independent laboratory. Mineralized zones were characterized into several geo-metallurgical domains related to the intensity of weathering, graphite grades, gangue mineralogy and host lithology.

6.3.4 Prospecting

A total of 63 rock grab samples were collected during prospecting near and within Ceylon Mine and Rushing Prospects and submitted for analysis (Carman, 2019).

6.3.5 In-Situ XRF Soil Analysis

A total of 1,051 in-situ pXRF soil measurements were made to test the use of a handheld XRF (32 elements) in exploration or graphite mineralized horizons (Carman, 2019).

6.3.6 Trenching

A total of 29 trenches, totalling approximately 2,905 m, were excavated to a depth of about 2 m across the Ceylon Mine and Rushing Prospects of the Project (Figure 6.5). The trench lengths were spot tested using a handheld pXRF (32 elements) and 765 samples were submitted for laboratory analysis, along with control standards (5 per hundred for a total of 42) and replicate samples (5 per hundred for a total of 38) (Carman, 2019). A total of 99 samples from mineralized trench sections were submitted for 58 multi-element chemistry (Carman, 2019). Graphite contents ranged from 0% to 4.93% Cg. Results support the conclusion that the deposit continues at depth below the historic Ceylon Mine pit floor, laterally and on strike at least 1,000 m to the northeast and to the south-southwest (South Star news release December 20, 2021).

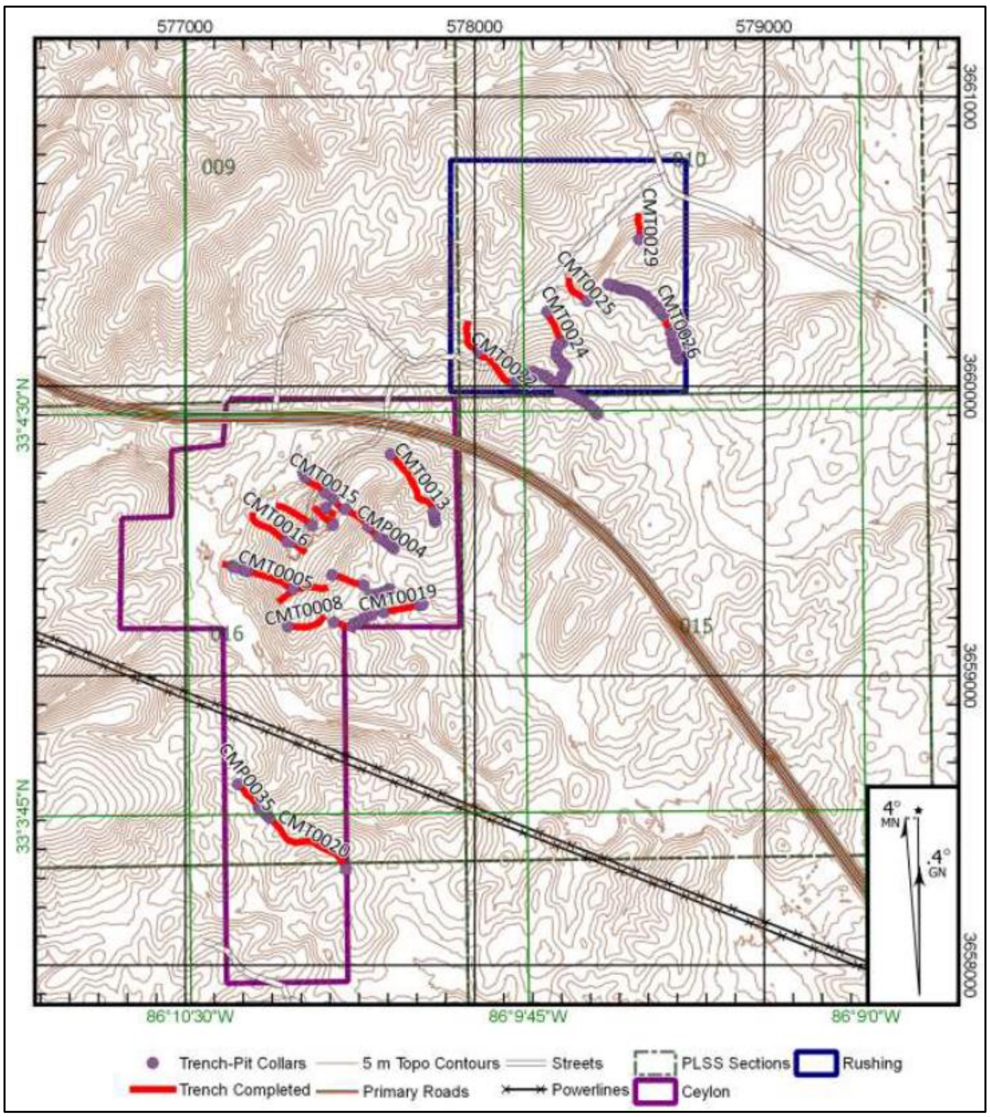
6.3.7 Exploration Pits

A total of 90 exploration pits were excavated across the Ceylon Mine and Rushing Prospects (Figure 6.5). The pits were excavated to expose bedrock and each pit was spot tested using a handheld pXRF (32 elements), geologically logged and structural measurements made (Carman, 2019).

6.3.8 Bulk Sampling

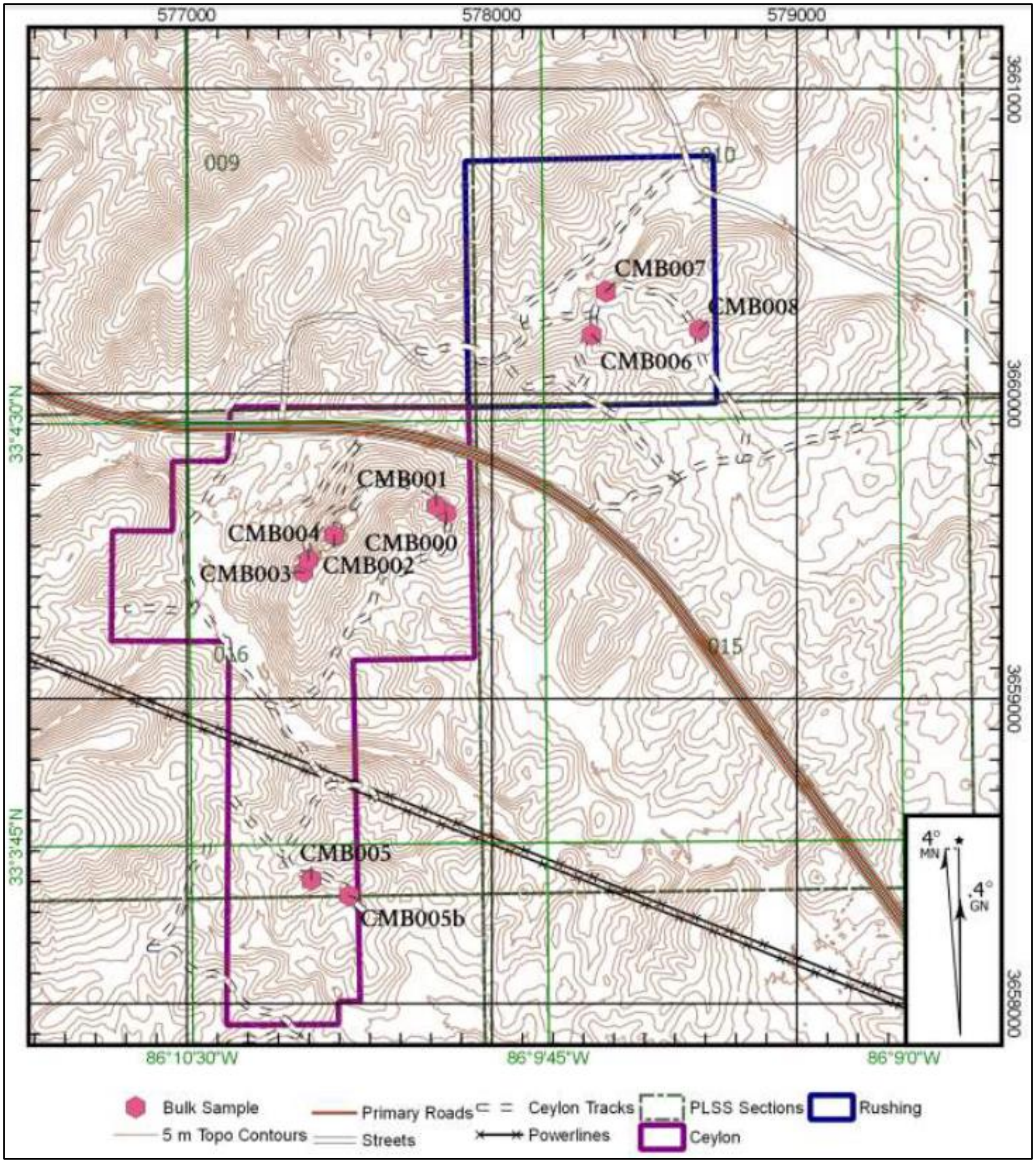
A 100-tonne bulk sample was excavated, crushed and bagged (~one-tonne sacks, generally 15 sacks per site) from eight pits across the Property (Figure 6.6; Table 6.2). The sample pits were selected to provide representative samples of the different graphite-bearing units identified during the mapping and trenching programs (South Star news release 20 December 2021). Each one-tonne sack was carefully tagged and catalogued (Figure 6.7) and a small representative sample was taken for laboratory analyses (115 samples) of graphite and multi-element chemistry. The sample bags were transferred to a secure, dry warehouse in the nearby city of Sylacauga, Alabama where approximately 75 tonnes of the bulk sample remained (South Star news release 20 December 2021).

Figure 6.5 Location Map for 2019 Trenches and Exploration Pits



Source: Carmen, 2019

Figure 6.6 Location Map for 2019 Bulk Sample Sites



Source: Carmen, 2019

Figure 6.7 2019 Bulk Sample Program

Source: South Star news release December 20, 2021

Table 6.2 Coordinates of 2019 Bulk Sample Site (Carmen, 2019)

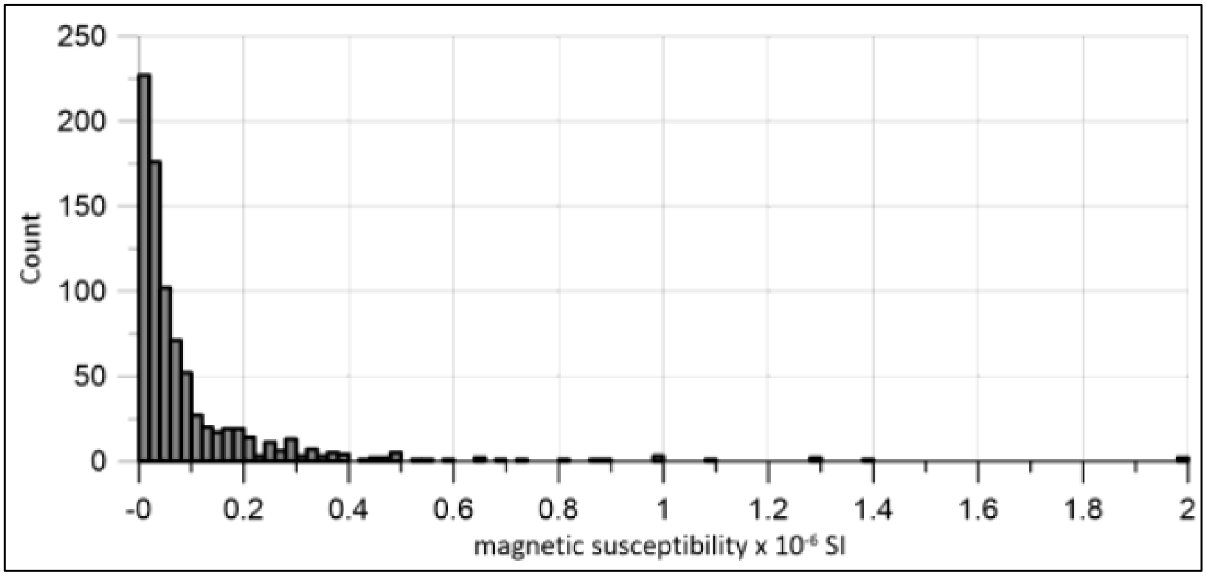
Sample	Easting mE	Northing mN	Elev. mZ	Lode	Batch	Report	Cg %
CMB001	577,817	3,659,633	313	CM03	A19-10939	25-Sep-19	3.96
CMB002	577,483	3,659,536	320	CM01	A19-10939	25-Sep-19	3.63
CMB003	577,382	3,659,415	319	CM02	A19-10939	25-Sep-19	2.47
CMB004	577,398	3,659,454	319	CM01	A19-10939	25-Sep-19	2.40
CMB005	577,408	3,658,406	301	CS01	A19-10939	25-Sep-19	2.81
CMB006	578,328	3,660,194	295	RR01	A19-10939	25-Sep-19	3.42
CMB007	578,374	3,660,335	289	RR01	A19-10939	25-Sep-19	3.29
CMB008	578,680	3,660,210	289	RR04	A19-10939	25-Sep-19	3.55

****NAD83 UTM Zone 16N and masl coordination***

6.3.9 Magnetic Susceptibility

A total of 883 rock reference samples were tested for magnetic susceptibility (Carman, 2019). Few of the reference rock samples were magnetic, with most magnetic susceptibility values <0.2 x 10-6 SI (Figure 6.8).

Figure 6.8 Histogram of Megnetic Susceptibility Results for 883 Rock Reference Samples



Source: Carmen, 2019

The trenches were not tested for magnetic susceptibility. Gossan and amphibolite units are in general more magnetic, though some quartz-sillimanite and sillimanite-garnet / biotite gneiss units are as well. Magnetic susceptibility does not demonstrate a positive correlation with graphite content (Carman, 2019).

6.3.10 Specific Gravity

A specific gravity determination program was completed that included 11 rock grab samples from the 2019 trenching program and 26 rock samples from the first four 2019 bulk sample pits (Camren, 2019). Specific gravity determinations were completed using the water immersion method. Results are presented int Table 6.3.

Table 6.3 Specific Gravity Determinations Completed During the 2019 Exploration Program*

Sample	Weight (g) Total	Weight (g) Water	SG g/cm^3	Rock Type gneiss	Cg %	Sulphide	Comments	WX
A549	930	366	2.54	Quartzite				
A549	928	366	2.54	Quartzite				
A549	280	118	2.37	Quartzite				
A550	1034	411	2.52	Quartzite		Po 4%		
A551	790	342	2.31	Quartzite		Po		
A552	787	345	2.28	Quartz-Sillimanite				
A553	988	430	2.3	Quartz-Sillimanite				
A554	2060	770	2.68	Quartzite		Po		
A555	588	245	2.4	Quartzite		Po, Py		
A556	1046	463	2.26	Pegmatite				
A557	959	376	2.55	Quartzite				
CMB000-1	1014	480	2.11	Quartz-Sillimanite	3		Pit Dug but Not Sampled	3
CMB000-2	1086	518	2.1	Quartz-Sillimanite	3		Pit Dug but Not Sampled	3
CMB000-3	1594	788	2.02	Quartz-Sillimanite	3		Pit Dug but Not Sampled	3
CMB000-4	685	333	2.06	Quartz-Sillimanite	3		Pit Dug but Not Sampled	3
CMB000-5	719	324	2.22	Quartz-Sillimanite	3		Pit Dug but Not Sampled	3
CMB001-1	1300	593	2.19	Quartz-Sillimanite	4		Air Bubbles	3
CMB001-2	1231	553	2.23	Quartz-Sillimanite	4		Air Bubbles	3
CMB001-3	871	388	2.24	Quartz-Sillimanite	4		Air Bubbles	3
CMB001-4	872	395	2.21	Quartz-Sillimanite	4		Air Bubbles	3
CMB001-5	961	418	2.3	Quartz-Sillimanite	4		Air Bubbles	3
CMB002-1	928	361	2.57	Quartzite	3	Py		1
CMB002-2	857	339	2.53	Quartzite	3	Py		1
CMB002-3	971	379	2.56	Quartzite	3	Py		1
CMB002-4	754	298	2.53	Quartzite	3	Py		1
CMB002-5	1314	517	2.54	Quartzite	3	Py		1
CMB003-1	1261	514	2.45	Sillimanite	3			2
CMB003-2	861	362	2.38	Sillimanite	3			2
CMB003-3	1765	728	2.42	Sillimanite	3			2

Sample	Weight (g) Total	Weight (g) Water	SG g/cm^3	Rock Type gneiss	Cg %	Sulphide	Comments	WX
CMB003-4	1670	678	2.46	Sillimanite	3			2
CMB003-5	1302	538	2.42	Sillimanite	3			2
CMB004-1	873	376	2.32	Quartz-Sillimanite	4	minor	"Blue Rock"	2
CMB004-2	1483	649	2.29	Quartz-Sillimanite	4	minor	"Blue Rock"	2
CMB004-3	1378	603	2.29	Quartz-Sillimanite	4	minor	"Blue Rock"	2
CMB004-4	1618	685	2.36	Quartz-Sillimanite	4	minor	"Blue Rock"	2
CMB004-5	1620	698	2.32	Quartz-Sillimanite	4	minor	"Blue Rock"	2
CMB004-6	1372	598	2.29	Quartz-Sillimanite	4	minor	"Blue Rock"	2

**** Cg % is an estimated percentage from field observations and not an analytical value. WX represents weathering intensity coded between 0 (none or low) to 3 (strong).***

6.3.11 Mineral Processing and Metallurgical Testing

A portion of the bulk sample was shipped to the GIRCU Laboratory in Guangzhou, China for initial bench-scale beneficiation testing (Liu, 2020). The testing indicated a traditional crush / grind / flotation concentration circuit could achieve grades of 95%-97% Cg with approximately 86% recoveries. In general, 75%-80% of the sample concentrates (by mass) were -80 mesh material and the balance being +80 mesh material. The graphitic samples were described as well liberated and easy to process (South Star news release 20 December 2021).

7.0 GEOLOGICAL SETTING

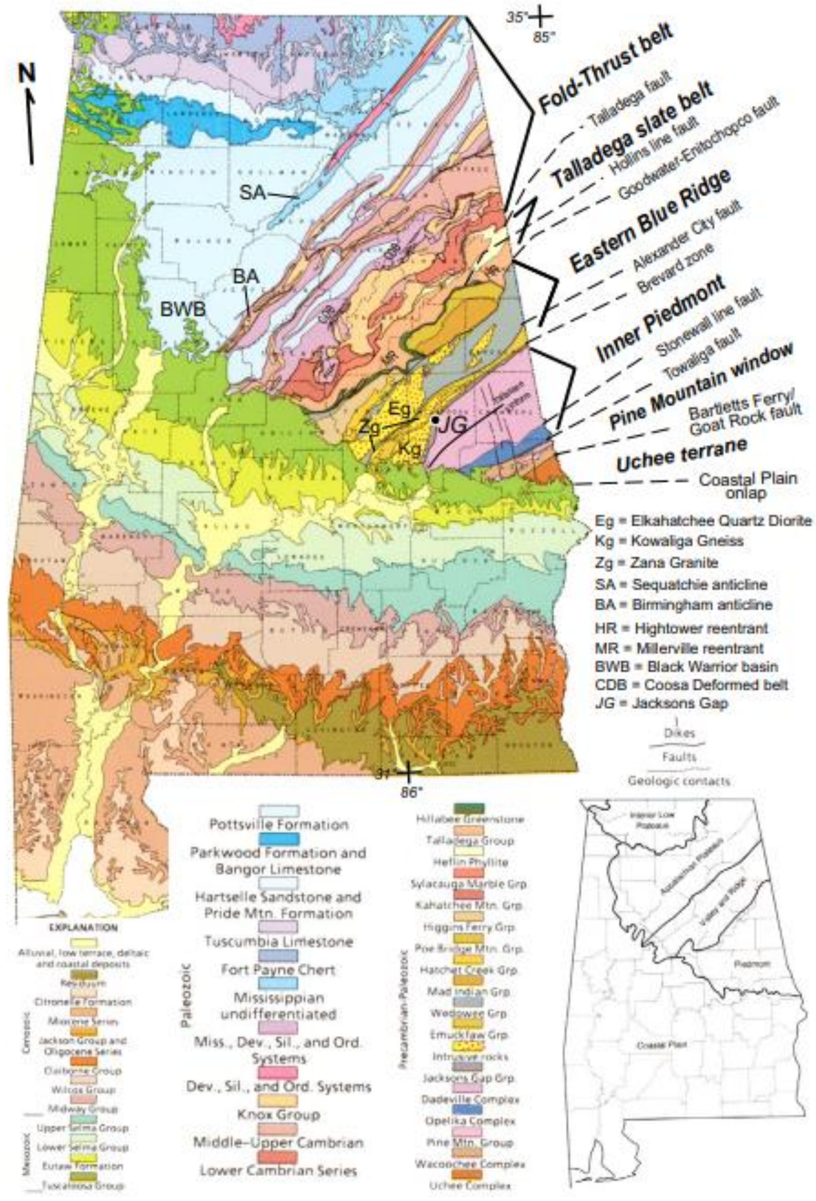
7.1 Regional Geology

The Project is located at the southern end of the Appalachian Mountain range, a northeast trending belt of folded and metamorphosed rocks of Neoproterozoic to Lower Paleozoic age. These are covered by the onlap Coastal Plain Sediments of Cretaceous and younger age in the southern half of Alabama. The geology of Alabama is shown in Figure 7.1. The rocks of the southwestern end of the Appalachians are generally separated into four physiographic and geologic provinces which are, from northwest to southeast: The Interior Low Plateau, the Appalachian Plateau, the Valley and Ridge, and the Piedmont. Raymond et al. (1988) characterizes these four provinces in detail in “Alabama Stratigraphy”.

The Interior Low Plateau to the north is primarily a Paleozoic limestone plateau of moderate relief. To the south and east is the Appalachian Plateau that has been folded and faulted into sandstone and shale synclinal plateaus and, in the eastern part, three linear anticlinal limestone valleys with more resistive sandstone ridges. Overall, the Interior Low and Appalachian Plateau can be defined as a thick series of carbonates overlain by sandstones and shales of Cambrian to Pennsylvanian age. The Valley and Ridge Province is a fold-thrust belt, with east dipping thrusts of carbonates, sandstones, and shales of Cambrian to Pennsylvanian age, similar to the stratigraphy of the Appalachian and Interior Low Plateaus. It is separated from the Appalachian Plateau by a large scale east-dipping thrust fault and consists of a series of subparallel ridges and valleys.

The Piedmont Province is formed of Neoproterozoic to early Paleozoic metamorphic rocks. The metamorphic grade increases across the Piedmont from lower greenschist facies in the northwest to high grade migmatite facies in the southeast. It is divided into three lithotectonic provinces which are, from northwest to southeast: The Northern Piedmont, Inner Piedmont, and Southern Piedmont, each bounded by major faults. The physiography of the Northern Piedmont is characterized by prominent ridges with peaks up to 2,407 ft. (734 m), becoming lower to the southeast. The Inner and Southern Piedmonts have much more subdued topography. The AGB is located in the Northern Piedmont.

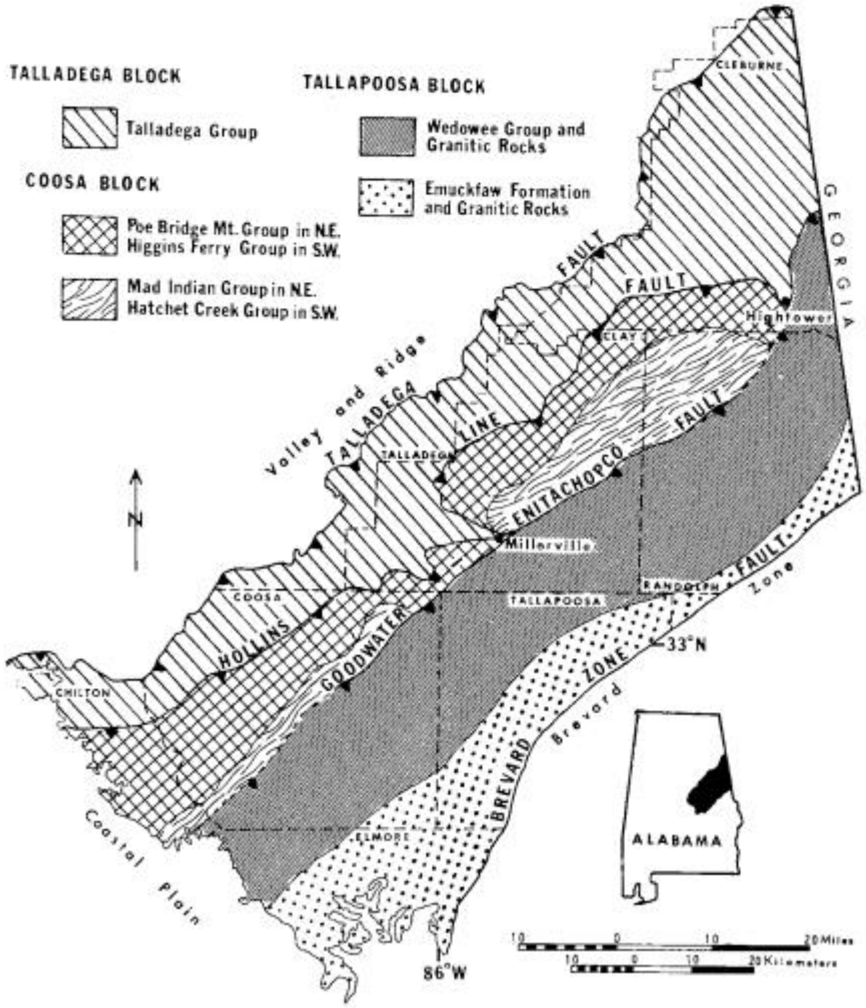
Figure 7.1 General Geology of Alabama with Major Terranes, Structures, and Belts Shown in the Northeastern Part of the State



Source: Edmonson, 2021

The Northern Piedmont is faulted against the Appalachian fold and thrust belt on the northwest along the Talladega-Cartersville fault system and incudes three regional structural blocks bounded by major reverse fault systems; Talladega, Coosa, and Tallapoosa (Figure 7.2).

Figure 7.2 Lithotectonic Blocks of the Northern Piedmont Province



Source: Adapted from Tull, 1978

The Talladega Block on the northwestern limit is comprised of low grade greenschist facies metasedimentary and metavolcanic rocks (marble, phyllite, sandstone, chert, quartzite, greenstones). The central Coosa Block is comprised of high grade, upper greenschist to kyanite and sillimanite grade metamorphic rocks (phyllite, schist, graphite schist, gneiss, migmatitic gneiss, quartzite, amphibolites), including the AGB, and abundant pegmatite and small granitoid bodies. The Tallapoosa Block on the southeastern limit is comprised of high grade, middle to upper amphibolite facies metasedimentary rocks (phyllite, gneiss), metavolcanic (amphibolite) and metamorphosed ultramafic and mafic rocks (pyroxenite, gabbro), with large areas of quartz diorite to granitic plutonic rocks. The Coosa Block is thrust over the younger, lower-greenschist facies metamorphic rocks of the Talladega Block along the Hollins Line Fault. Regionally, the Coosa block is interpreted to be part of the Eastern Blue Ridge terrane which formed on the rifted margin of Laurentia on the breakup of the Rodinia super-continent in the Neoproterozoic and consists of rifted margin metasedimentary and rift-related volcanic rocks (Hatcher, 2010). The southern part underwent metamorphism to upper amphibolite facies in the Taconian orogeny at 460 to 455 Ma (Upper Ordovician) and is bounded on the west side by the Taconian suture (Hollins Line Fault) which can be traced for the length of the Appalachians, with different names. The Western Blue Ridge terrane including the Talladega belt is a Laurentian margin terrane of Neoproterozoic to Lower Carboniferous (Mississippian) age which was deformed and accreted in the Devonian to Mississippian Neoacadian orogeny (Hatcher, 2010).

The Inner and Southern are the other two lithotectonic provinces of the Piedomont Province. The Inner Piedmont includes two groups of high-grade metamorphic rocks, including schists, gneisses and amphibolites, the Dadeville (schist, amphibolite, gneiss, granitic gneiss) and Opelika (schist, gneiss) complexes, with pyroxenite lenses and deformed granites. The Southern Piedmont occupies the southeastern corner of the region. It is also underlain by high grade metamorphic rocks of the Pine Mountain, Wacoochee and Uchee complexes. The Pine Mountain contains quartzite, quartzitic schists, and dolomitic marble. The Wacoochee is largely granitic gneiss and feldspathic muscovite-biotite schist. The Uchee contains a dioritic gneiss and a leucocratic quartz diorite. Folding is much less evident there.

7.1.1 Geology of the AGB

The AGB of northeastern Alabama, is located in the Northern Piedmont or the Eastern Blue Ridge District of the Piedmont Province. As discussed above, the Northern Piedmont is formed of Neoproterozoic to early Paleozoic metamorphic rocks and has three main structural blocks: 1) Talladega, 2) Coosa, and 3) Tallapoosa, with the AGB located in the Coosa Block (Edmondson, 2021).

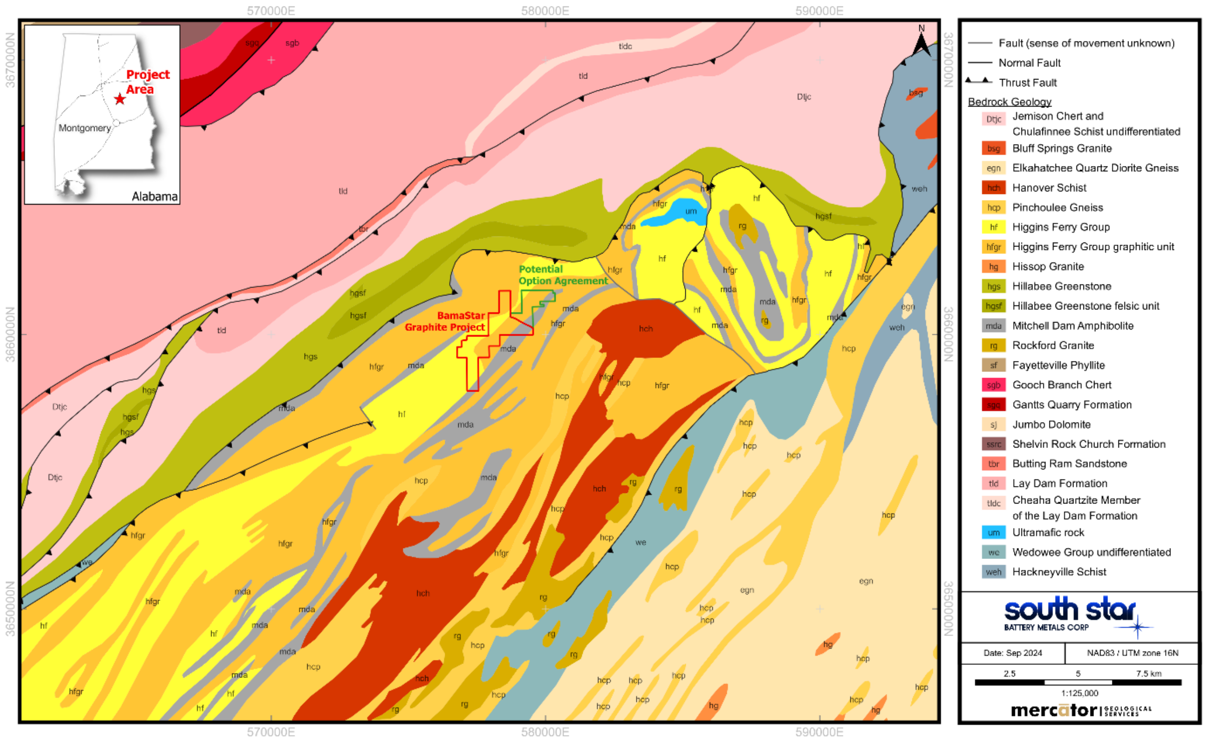
The AGB extends for approximately 60 miles (~100 km) along a northeast strike (~N30E) from eastern Chilton County, across Coosa County, and into southwestern Clay County. The belt varies in width but is approximately 3-5 miles (~5-8 km) wide. The AGB is broken up by the Millerville Fault into a southwestern belt (Chilton, Coosa, and Clay counties,) where the graphite mineralization occurs within the Higgins Ferry Group, and into a northeastern belt (Clay County), where this same geologic unit is referred to as the Poe Bridge Mountain Group. Flake graphite occurs within both schist (quartz-sillimanite-mica-graphite-roscoelite schist) and quartzite (quartz-mica-graphite) lithologies. The graphitic schist unit is highly oxidized and weathered down to depths of 10-30 m depending on topography and variations in mineralogy / structure. At depth below the oxidation zone, both the graphitic schist and quartzite units have significant amounts of pyrite and pyrrhotite present (Edmundson, 2021).

Metamorphic rocks of the AGB are sillimanite to kyanite grade, meaning upper green schist to blue schist facies. The rocks are generally well-foliated; however, this geologic imprint is due to more recent structural deformation and postdates metamorphism related to the formation of graphite. Graphite mineralization has been reported to dip both more shallowly and more steeply than foliation in various parts of the belt.

Property Geology and Mineralization

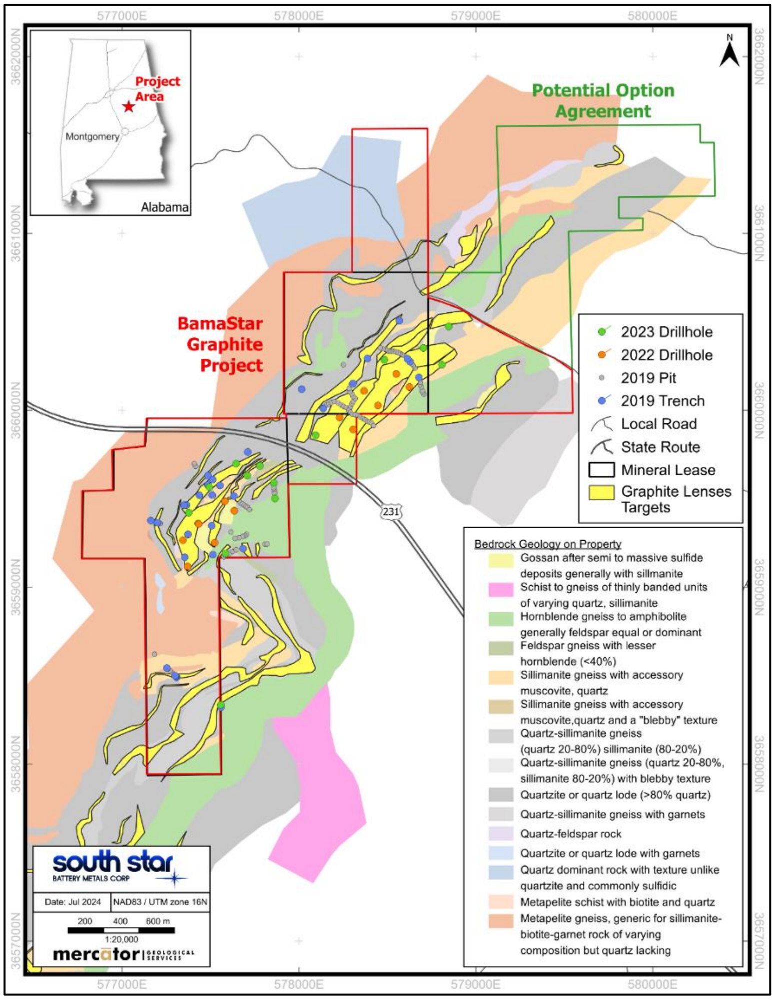
The Project is located within the Higgins Ferry Group (Figure 7.3). Stratigraphically, the Higgins Ferry Group is categorized as an interbedded sequence of three major lithologic units. The first unit is described as an assemblage of coarse to fine grained biotite-feldspar-quartz gneiss, sericite-feldspar-muscovite schist, ±biotite±garnet-muscovite schist, and biotite-garnet-feldspar gneiss. The second unit is described as ±roscoelite-graphite-quartz schist and graphitic quartzite and is mineralized unit on the property. The third unit is described as garnet quartzite and garnetiferous altered mafic rocks. Amphibolite (actinolite-chlorite-hornblende) and pyroxenite bodies, grouped as the Mitchell Dam Amphibolite, may be present locally along with scattered pegmatites. Aluminous units commonly have kyanite, sillimanite, and sericite porphyroblasts.

Figure 7.2 Bedrock Geology Map of the Project



Field mapping has defined the Project area as metamorphosed rocks that include pelitic sediments (without graphite), quartz-bearing sediment with variable graphite content, sillimanite-graphite-rich sediments, and amphibolite gneiss (without quartz or graphite) (Carman, 2019) (Figure 7.3).

Figure 7.3 Field Geology Map of the Project



Source: Adapted from Carman, 2019

7.1.2 Stratigraphy

The historical Ceylon Mine is located on a prominent hill of graphitic gneiss and quartzite, which are part of a property stratigraphy that, from west to east, includes a pelitic package without graphite, a quartz bearing package with variable graphite that grades into a graphitic sillimanite bearing package, an amphibolite bearing gneiss without quartz or graphite, and more quartz + sillimanite-rich rocks with graphite (Figure 7.4 and Figure 7.5) (Carman, 2019).

The dip of measured bedding is generally low angle (0-30°) and has an overall easterly orientation. A few sedimentary younging indicators imply the sequence is upright. The following sub-sections list the major packages from west to east (Carman, 2019):

Western Metapelite

The western most rocks on the Property are a package of metapelite rocks. These are characterized by the general lack of quartz and the presence of garnets or biotite pseudomorphs. Other important minerals are sillimanite and muscovite, and chlorite may sometimes be present. Rock types are classified as sillimanite-garnet, sillimanite-biotite, sillimanite-garnet-biotite, muscovite-garnet, and biotite-quartz. The uppermost (eastern) metapelite often contains trace graphite as it approaches the overlying graphitic units.

Quartzite

The main graphitic package is demarcated by resistive, graphitic quartzite interbedded with less defined recessive rocks. There are multiple prominent quartzite beds (at least 5) interbedded with feldspar and/or sillimanite gneiss that are often micaceous clays in strongly weathered areas. In general, the quartzite, especially at the bottom of the package, includes muscovite. Garnets are not noted. Amphibolite bearing units can be found, especially in the north, and generally near the base of the package. From pXRF trench chemistry results it is interpreted that many of the recessive units are likely volcanic sourced. There is often a sharp contact between quartz and the overlying sillimanite bearing units (possible syn-sedimentary fault) but this contact can also be gradational. At the historical Ceylon Mine the quartzite is very well indurated and often contains sulphide minerals. It is possible there was hydrothermal activity during deposition (leading to silica infusion).

Figure 7.3 Field Photographs of Rock Units in the Ceylon Mine Prospect Area (part 1)

Gossan (top) with shallow dip

Gossanous sillimanite gneiss

Quartzite

Feldspar gneiss

Thin-bedded quartzite overlain by quartzite

Possible sedimentary channel fill

Source: Carman, 2019

Figure 7.4 Field photographs of rock units in the Ceylon Mine Prospect area (part 2)

Source: Carman, 2019

Sillimanite Gneiss

The next package is dominated by sillimanite gneiss. This unit has a varying sillimanite–quartz content that generally become more sillimanite rich to the east. This unit is also graphitic, though visual estimates indicate somewhat less than the quartz rich rocks. Two unique rocks in the sequence are a feldspar-quartz unit and a "blebby" textured sillimanite gneiss. This blebby texture could be due to large crystals of retrogressed kyanite.

Gossan

An ex-sulphide gossan (pyrite / pyrrhotite) caps the sillimanite rocks in the Ceylon Mine Prospect area where the underlying sillimanite gneiss is highly sulphidic. Below the hard iron-oxide gossan is an unknown unit that weathers to micaceous and iron-rich clay. Thinner gossan is found north of the highway at the Rushing Prospect. Assays show no Au-Ag enrichment and pXRF shows no significant base metal endowment. This unit is interpreted to be associated with syn-sedimentary faults.

Quartzite Cap

A micaceous (muscovite), graphitic quartzite is present above the gossan in the Ceylon Mine Prospect area. This unit is not noted in the Rushing Prospect area and is likely faulted out.

Amphibolite (feldspar-amphibole gneiss)

The next unit is predominantly feldspar-amphibole gneiss that is generally recessive. Regional bedrock mapping categorizes this unit as amphibolite although locally the unit is feldspar dominant. Fresh amphiboles are a green to black color and somewhat talcy (likely Mg-rich). There is a major fault on the eastern side of Ceylon Mine Prospect that juxtaposes this unit with various lower units (down to sillimanite gneiss). It appears this unit also contains some quartz-rich rocks with graphite of unknown thickness.

Quartzite

Above the amphibole-bearing rocks is a return to quartz-rich lithology with some degree of structural juxtaposition. These rocks are variably graphitic. They are possibly a structural repetition of the basal quartzite–amphibolite rocks but not enough exploration has been conducted to determine this and they can easily be a continuation of the sedimentary sequence. Much of the rocks in the east are thinly-bedded with varying quartz and sillimanite on a centimetre scale and can contain graphite.

7.1.3 Facies Changes

As this is a (metamorphosed) sedimentary sequence facies changes are expected and might be critical to graphite mineralization. Overall, it appears there are more distinct quartzite units to the northeast, with lesser gossan indicating some facies change. How this affects the distribution of graphite is not yet known (Carman, 2019).

7.1.4 Structure

Structural measurements in the Ceylon Mine Prospect area are dominated by metamorphic foliation (Carman, 2019). Original sedimentary bedding planes are very hard to see within and near the historic workings. Occasionally bedding is discernible and is generally easier to distinguish on the north side of the highway at the Rushing Prospect. All measurements are given as dip direction-dip angles (Carman, 2019).

The Ceylon Mine Prospect area is metamorphosed to amphibolite-facies and represents an up-thrusted block, with the overall structural regime summarized as follows (Carman, 2019):

- Isoclinal folds are not present on outcrop scale and are not supported by structural measurement.
- Close to tight folds and broad open folds are present in outcrop and map scale.
- A fold interference pattern could be present.
- Generally, bedding dips to the southeast at a shallow angle that is less than the foliation angle.
- Beds may be folded with steep and shallow dip sections.
- Foliation cannot be used as an exploration guide to extrapolate the position of a mineralized sedimentary body.
- Changes in bedding orientation are likely due to faulting / shearing as opposed to strong folding.
- There was likely foliation-parallel slip.
- Thrust faults cannot be ruled out.
- Many east-facing slopes are nearly dip slopes.
- Beds tend to fall over to steeper on dip slopes (east facing slopes) and to shallower on escarpments (west facing slopes).

Field photographs showing structural features are provided in Figure 7.5, Figure 7.6 and Figure 7.7.

Figure 7.5 Field Photographs Showing Structural Features on the Project (part 1)

Folds in amphibolite *Shallow dip quartz-sillimanite gneiss in creek*

Source: Carman, 2019

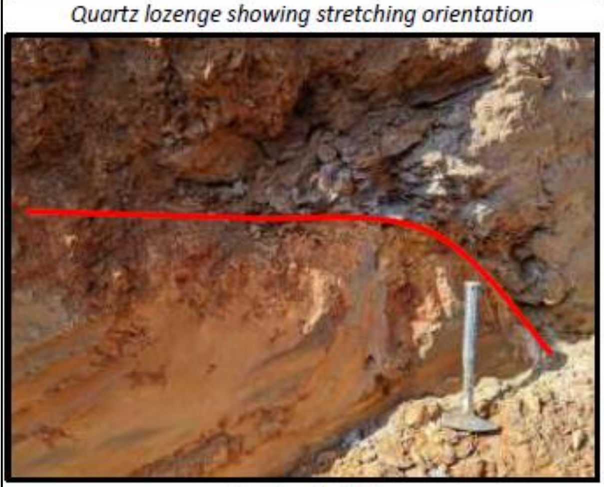
Figure 7.6 Field Photographs Showing Structural Features on the Project (part 2)

Crenulated gneiss

Shallow bedding (red) and steep foliation/fracture

Quartz lozenge showing stretching orientation

Shallow bedding (red) and steep foliation



Small scale fold

Outcrop scale fold/crenulation, East on slope of Ceylon

Source: Carman, 2019

Figure 7.7 Field Photographs Showing Structural Features on the Project (part 3)

Sulfide-rich shear zone NE of Ceylon

Very lineated quartz in a shear zone ridge NE of Ceylon

Small scale folded quartz vein

Shallow bedding near Ceylon Mine

Outcrop scale fold with nearly horizontal bedding. Along Co Rd 66

Source: Carman, 2019

Bedding

Bedding is generally low angle with an overall average of 130°-30°. North of the highway, bedding is very uniform with an average of 135°-17°. South of the highway there is some evidence of asymmetric folding with orientation changing from 150°-50° through 123°-31° to 090°-14°. However, this change in orientation can also be explained with faults (Carman, 2019).

The structural data does not support isoclinal folds and the stereonet distribution pattern does not show small-scale folds. Open to close folds are visible at the outcrop scale and kink / asymmetric folds are interpreted from the geological mapping and seen in outcrop. Alternately stereonet patterns could indicate a fold interference pattern with broad dome shapes or possibly even the presence of sheath folds. Bedding in the amphibole units is more distorted and folded on an outcrop scale relative to other rock types (Carman, 2019).

Foliation

The dominant foliation is a metamorphic overprint that is very constant across the property at 135°-45°. This foliation is interpreted as perpendicular to the sigma-1 orientation (maximum shortening) and it is 90° separate from the average lineation orientation (230°-45°) (which should be sigma-3) (Carman, 2019).

Faults

Shear foliation was measured in rocks with strong structural schistosity and is generally steep (125°-75°). This indicates northeast-striking faults are present. This may be due to axial-planar type slipping. Both high-grade and retrograde metamorphic shear zones were noted. Shear zones often contain sulphide minerals. Brittle faults that postdate metamorphism are a subvertical, conjugate set with nearly north-south orientation (078°-68° and 274°-78°).

Thrust faults were not directly observed in the study area, but the basal thrust (Talladega Thrust) that overthrusts amphibolite on greenschist metamorphic grades is present 2 km (~1 mile) to the northwest. It is possible many apparently conformable contacts could be thrust faults, although the rock units generally change toward the east without an obvious repetition. It is also possible the low-angle, mapped contacts might be thrust faults instead of bedding.

Lineation's

Stretching lineation's were measured on the plane of foliation and are strongly concentrated at 230°-45°. A subset also plots on a great-circle which may imply a post-lineation folding event whose pole is at 330°-30°, roughly coincident with the dominant foliation orientation. The lack of obvious folding in either the foliation or bedding orientations might imply this event was concurrent and related to the sigma-2 orientation or a broad scale refolding event. Slipping lineation's are striations along faults / shears and show an average, sub-horizontal slip direction along an east-northeast orientation (Carman, 2019).

7.2 Weathering

Rock units can be heavily oxidized and weathered in the near surface to depths of 10 to 50 m. Oxide material can be strongly weathered to saprolite and friable. This grades into transitional material that demonstrates weak to moderate weathering and oxidation. Fresh material below the transitional boundary does not demonstrate any weathering or oxidation.

It was historically noted that graphite weathers in the soil horizon with flake size degradation (Pallister, 1948,) although the effect on total carbon was not indicated. For example, rocks in river bottoms (deeper erosion) and rocks in the bottom of the historical Ceylon Mine pit have higher apparent (visual) grades. This was noted during trenching where deeper samples always had visually more graphite than those at surface. Figure 7.9 shows the vertical gradient of graphite with a visual increase in graphite content from surface to depth (Carman, 2019).

Figure 7.8 Trench CTM0021 Showing the Soil Horizon

Source: Carmen, 2019

Clay zones that have no rock in trenches between graphitic units may not be fully tested. The pXRF chemistry on these zones indicates the rocks are part of the same package, though this does not imply they will be graphitic. Additionally, the effect of weathering on graphite grade is not known, though visually it appears to decrease with more weathering. This was also noted in the bulk sample program where the deeper the pit, the better the visual graphite grade (Carman, 2019).

7.3 Property Mineralization

Graphite mineralization occurs within both the Rushing and Ceylon Mine Prospects of the Project, the latter which includes the historical Ceylon Graphite Mine. The current MRE detailed in section 14, referred to as the BamaStar Graphite Deposit, extends across both. The current BamaStar Graphite Deposit extends for 2,800 m along strike, a maximum dip extent of 600 m, and a maximum depth below surface of 325 m. The deposit is open along strike and at depth.

Graphite lode mineralization (bedrock hosted) has been identified across the property and is present in several different units. The dominant lithologies that contain graphite are, in decreasing grade, friable quartzite, quartzite, quartz-sillimanite gneiss, sillimanite gneiss. This is an inverse correlation with total silica content.

Graphite is also present in quartz-sericite schist, in quartz veins, and along pegmatite dikes. No discernible flake size difference was noted amongst the lithology types except the more schistose rocks (near shear zones), pegmatites, and quartz veins appear to upgrade flake size. Flake size is affected by weathering any flake size differences noted in rocks at surface will be affected by resilience to weathering (Carman, 2019).

Rocks that contain garnets were not observed to contain graphite, except for the uppermost western metapelite that contains small garnets and trace graphite; below the base of the main graphitic units. Amphibolite and feldspar-amphibole gneiss do not contain graphite although they may be interbedded with quartzite that does (Carman, 2019).

8.0 DEPOSIT TYPES

The target mineralization style at the Project is graphitic lode deposits where flake-graphite mineralization is hosted by high-grade metamorphic rocks (gneiss).

Graphite deposits may occur as flake graphite, vein graphite, and amorphous graphite (Mitchell, 1993):

"Graphite generally occurs as a result of metamorphism (regional or contact) of organic matter in sediments. Flake graphite is assumed to be derived from fine-grained sediments rich in organic matter. As metamorphic grade increases, carbonaceous material converts to "amorphous" graphite. Flake graphite forms from its amorphous precursor at or beyond amphibolite grade metamorphism (Landis, 1971). Vein graphite is assumed to form by partial volatilization of graphite and subsequent recrystallization during regional granulite and/or charnockite facies metamorphism. Amorphous graphite is generally considered to have originated by thermal or regional metamorphism of coal or carbonaceous sediments.

Positive vanadium and nickel anomalies and negative boron anomalies are possible signatures for graphite if geochemical survey data are available. The presence of sulphides and trace amounts of uranium may be an indicator."

Landis (1971) tentatively concluded that graphite formation is primarily dependent on metamorphic temperature and forms above 400°C, with pressure and variation in starting material constituting secondary controls.

8.1 Alabama Graphite Belt

Flake-graphite deposits in the AGB occur as disseminated graphite hosted in metamorphosed siliceous sedimentary rocks including quartz-mica schists, micaceous quartzites, or micaceous feldspathic quartzites. These rocks occur in folded metamorphosed sequences of detrital sedimentary rocks (USGS, 1960).

The deposits themselves are individual beds or lenses that are richer in graphite than associated beds. The size, form, and persistence of the deposits are functions, in part, of the thickness and extent of the original sedimentary beds, and in part, of deformation. Their attitudes are functions of local and regional deformation (USGS, 1960).

Deposits in Coosa County of the AGB are flake-graphite deposits hosted in high-grade metamorphic rocks. They are associated with anomalous vanadium, including the vanadium-mica roscoelite, and nickel, as well as other anomalous elements (Wilson and Redwood, 2015).

9.0 EXPLORATION

Table 9.1 provides a summary of the work completed by the issuer on the Project. Historical exploration work completed on the property is described in Section 6. Details of each work program are discussed in detail in their respective section.

Table 9.1 Summary of South Star Exploration Activities

Period	Type	Description
May 2022	Metallurgical Test Work	University North Carolina Mineral Research Laboratory (MRL); small-scale pilot test on 3 x 1 tonne samples; produced 15-18 kg of graphite concentrate
October-November 2022	Environmental	background water quality testing; installed piezometer in drill hole CMD-22-012
October-December 2022	Diamond Drilling Program	12 holes, 506 m; Logan Drilling USA; Actlabs (assays)
January-February 2023	MRE	maiden MRE
January-February 2023	Mineralogical Studies	Mineral Liberation Analyses - Actlabs
April 2023	NI 43-101 Technical Report	in support of the maiden MRE
May 2023 – October 2023	Diamond Drilling Program	15 holes, 1,885 m; Logan Drilling USA; Actlabs (assays)
April 2024 – September 2024	Economic	ANZAPLAN; economic study on a value-add graphite active anode manufacturing plant
April 2024 – September 2024	Environmental	GRE; geochemical characterization study for ARD mitigation.
April 2024 – September 2024	Metallurgical Test Work	SGS; three composite samples from oxide, transition, and fresh material; eight cleaner flotation tests to develop a flowsheet based on GIRCU test program.
July 24, 2024	Updated MRE	Mercator; Updated MRE subject of this Report
Technical Report Effective Date	PEA and NI 43-101 Technical Report	PEA subject of this Report

10.0 DRILLING

10.1 Overview

South Star has completed two diamond drilling campaigns on the Project. The maiden drill program was completed in 2022 and consisted of 12 diamond drill holes for 506 m (CMD22 series). The second drill program was completed in 2023 and consisted of 15 diamond drill holes for 1,885 m (CMD23 series). Operations and procedures were similar for both programs and are summarized below together.

Logan Drilling USA was contracted to complete the drill programs and mobilized a rubber track-mounted diamond drilling core rig. Drilling staff and geological field staff stayed in Sylacauga, Alabama. South Star field staff prepared the drill platforms and set drill collar locations using a handheld GPS (Garmin GPSMAP64) and wooden marker stakes, with front sight and back sight stakes set for angled drill holes. All holes completed in 2022 were vertical and all but one (CMD23016, vertical) completed in 2023 were angled and oriented towards an azimuth of approximately 300^0. HQ core (61.1 mm diameter) drill core was recovered for both programs.

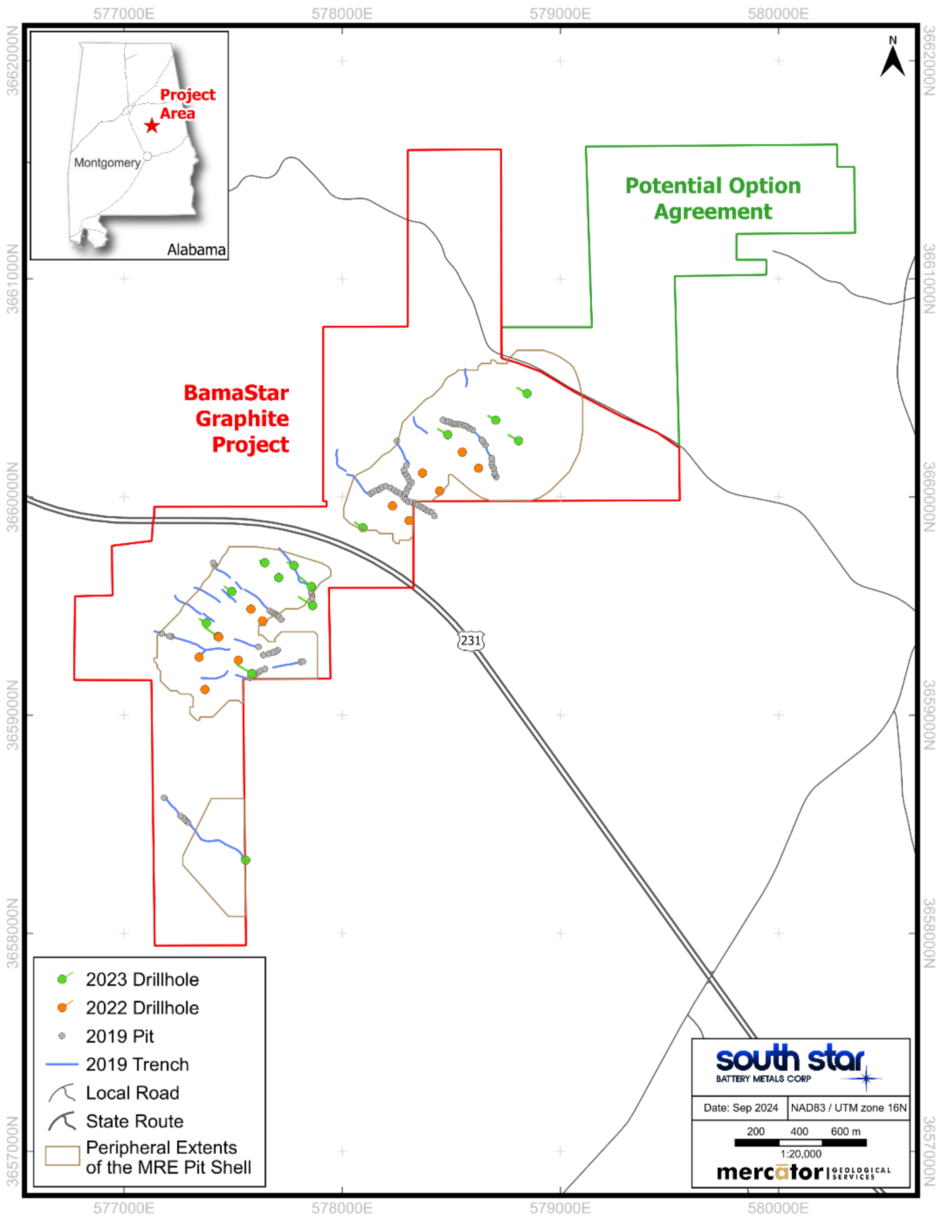
After hole completion and drill rig demobilization from the platform, the drill hole collar location was surveyed using an RTK GPS (Hemisphere S321 as the rover), using the Alabama Department of Transportation CORS network (as the base), with real time data over the cellular data network. Only 'fixed' solutions were saved for use with the collar file (HRMS and VRMS averaged 2.1 cm and 4.2 cm, with maximum 4.3 cm and 6.9 cm, respectively). Repeated measurements at drill hole CMD-22-011, around the piezometer monument, give a vertical range elevation of 10.4 cm.

Downhole deviations for all but five drill holes were measured using REFLEX EZ-TRACTM survey instrument taking three readings over the length of the drill hole, at the collar, middle, and end of hole. Drill holes CDM23020 and CDM23024 to CDM23027 were scheduled for downhole deviation measurements but were never provided by the drilling contractor.

Core logging and processing (cutting, sampling and storage) was completed at rented secure facilities in Sylacauga, Alabama. Information regarding lithologies, alteration, mineralization, structure, assay and geochemical samples, rock quality determination ("RQD"), and QAQC samples were recorded. The entire length of the hole was photographed before and after sampling and photos are labelled with the hole number followed by the box numbers. All geological information collected on the drill core was digitally recorded using Excel spreadsheets, periodically exporting the information to an external hard drive.

Report author Harrington has investigated and verified, where possible, the drilling, core logging, sampling, and QAQC procedures used during the 2022 and 2023 drilling programs on the Project and is of the opinion that field staff used procedures meeting the CIM exploration best practices guidelines and current industry standards. Detailed data from drilling programs described below have been incorporated into the validated drilling database that supports the MRE described in Section 14 of this Technical Report. Figure 10.1 provides a summary collar location plan.

Figure 10.1 Summary Collar Location Map for Project Drill Hold Database



Core recovery is variable throughout the weathering profile. Mean core recovery percentages and mean core assay Cg % by weathering intensity are presented in Table 10.1. In general, core recovery decreases with increased weathering intensity. Low recovery intervals are most common within areas with significant soil / clay development, significant fault gauge, and strongly weathered feldspar schists and gneisses but can also occur within strongly weathered graphitic quartzites and quartz dominated gneisses.

Table 10.1 Core Recovery by Weathering Intensity

Weathering Intensity	Logged Length m	Mean Core Recovery %	Mean Assay Cg %
Strong	237	49	1.18
Moderate	289	64	1.59
Weak	350	91	1.60
Unweathered	1,514	97	0.99

Mean assay Cg % compared to core recovery and weathering intensity shows highest average values for moderate and weakly weathered rock and lowest average values for strongly weathered and unweathered rock. This Cg % distribution does not fully agree with visual estimates identified during mining operations at the Ceylon Mine and the trenching / pit program completed in 2019 that noted increased graphite grade with decreased weathering intensity. The Cg % to weathering intensity ratio observed in drill core may be related to the unbiased core sampling protocol implemented by South Star, which reflects half-core sampling the entire length of drilled core regardless of visual graphite percentages, and therefore potentially sampling large lengths of weakly graphitic lithologies within unweathered rock.

A fault gauge interval was identified in drill hole CDM23024 between 8 m to 11 m downhole and corresponding to a logged core recovery of 17%. Graphite analytical results returned over this interval are 3.53% Cg/ 1.5 m and 3.6% Cg / 1.5 m downhole. These results are anonymously high with respect to the correlated graphite horizon and the Author has assessed insufficient material was present for a reliable sample. As such, assay database entries for these intervals were assigned “0” % Cg. No other intervals were identified with both anomalously high Cg % and anomalously low core recovery.

Overall, the Author does not believe core recovery has a material impact on the accuracy and reliability of the graphite analytical results, however further studies are recommended to assess the relationship between core recovery and graphite grade.

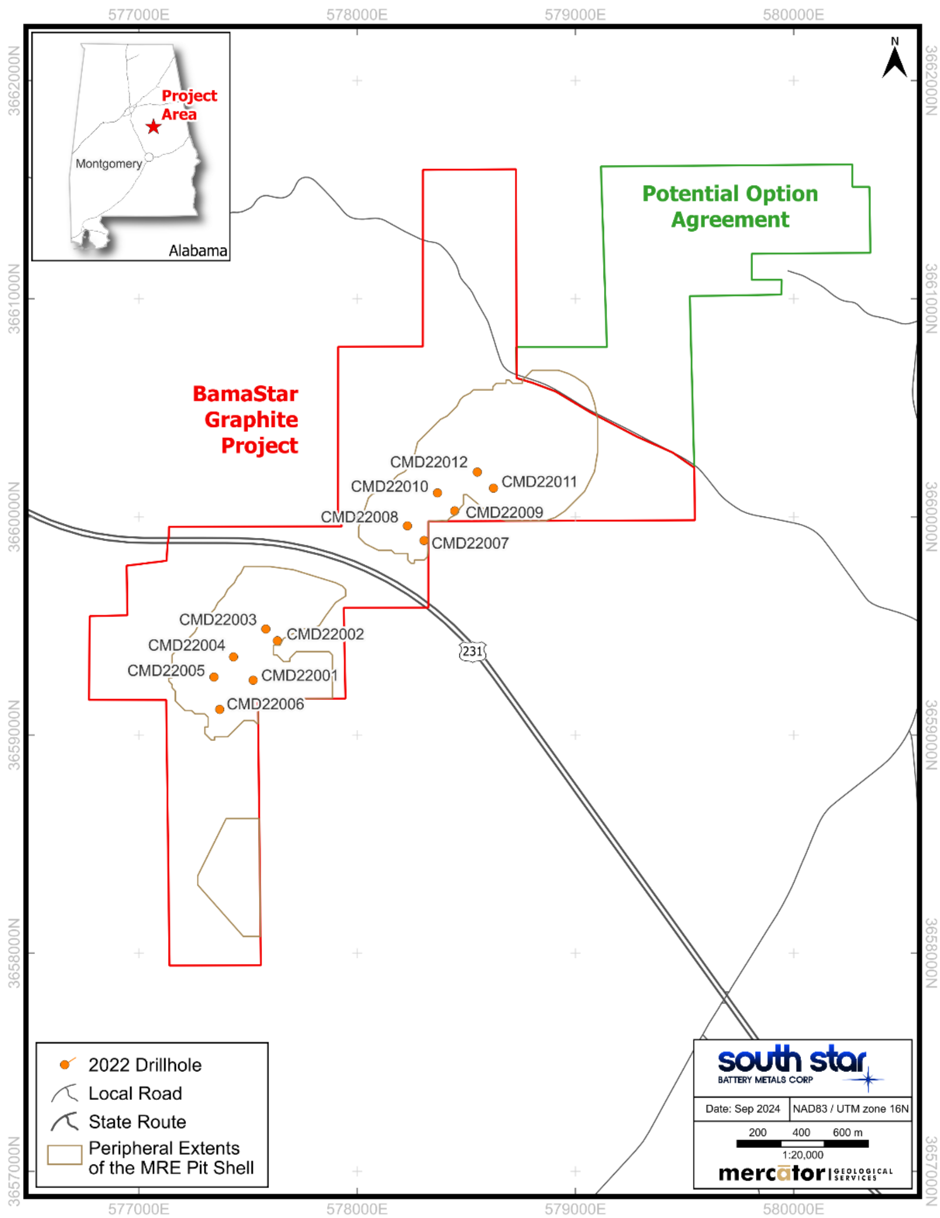
10.2 2022 Drill Program

The maiden drilling campaign on the Project was completed between 17 October and 9 November 2022, with final assays reported at the end of December 2022. The program consisted of 12 vertical diamond drill holes for 506 m (CMD22 series) (Table 10.2, Figure 10.2).

Table 10.2 Collar Table for 2022 Diamond Drill Program

Hole ID	Easting*	Northern*	Elevation*	Depth m	Azimuth ⁰	Dip ⁰
CMD22001	577523.28	3659251.80	278.78	50	252.18	-89.53
CMD22002	577633.97	3659432.68	282.92	47	166.00	-88.53
CMD22003	577581.12	3659486.48	306.63	44	10.99	-89.37
CMD22004	577433.16	3659358.54	322.51	59	31.92	-88.80
CMD22005	577343.72	3659266.24	324.99	43	97.69	-89.63
CMD22006	577369.98	3659117.95	298.31	38	172.23	-88.40
CMD22007	578306.02	3659892.16	296.29	32	147.39	-89.03
CMD22008	578229.86	3659959.38	302.84	26	106.74	-89.49
CMD22009	578446.42	3660027.93	287.17	29	317.38	-89.08
CMD22010	578367.45	3660110.32	301.64	32	177.39	-89.31
CMD22011	578624.03	3660132.02	282.10	59	300.89	-89.98
CMD22012	578549.93	3660205.85	286.83	47	106.09	-89.36

Figure 10.2 Collar Location Map for the 2022 Diamond Drill Program



The 2022 drill program was focused on testing near surface graphite potential. Most drill holes did not fully intersect the graphitic stratigraphy and underlying metapelite schists, which are considered to mark the end the main graphite bearing units. The program was designed to follow up results returned from the 2019 trenching and pit program and provide definition of graphite distribution within oxide, transition, and fresh material. One hundred percent of the drilled length was sampled as half-core samples and sent to Activation Laboratories Ltd. ("Actlabs") in Ontario, Canada, for graphitic carbon (% Cg) testing using infrared analysis. Actlabs is an accredited independent laboratory with the ISO 9001:2015 & ISO / IEC 17025:2017 registrations.

All drill holes returned significant thicknesses of graphite mineralization and provided support for an initial model of stratigraphy, redox zonation, weathering zonation, and graphite bearing units. Significant intercepts for the 2022 drill program are presented in Table 10.3. Reported lengths are downhole lengths and are approximately 80% of true widths.

Table 10.3 Significant Intercepts for the 2022 Diamond Drill Program

Hole Id	From (m)	To (m)	Length (m)*	Cg (%)
CMD22001	5.00	21.50	16.50	2.74
CMD22002	14.00	24.50	10.50	1.81
and	29.00	47.00	18.00	2.68
CMD22003	14.00	44.00	30.00	2.30
CMD22004	8.00	59.00	51.00	2.29
CMD22005	5.00	42.50	37.50	1.96
CMD22006	3.50	14.00	10.50	2.07
and	18.50	24.50	6.00	1.23
CMD22007	2.00	29.00	27.00	2.16
CMD22008	2.00	12.50	10.50	1.47
CMD22009	6.50	21.50	15.00	2.15
CMD22010	0.00	27.50	27.50	1.96
CMD22011	0.00	27.50	27.50	1.75
and	35.00	47.00	12.00	1.90
CMD22012	20.00	45.50	25.50	1.82

**** Downhole length. True widths are approximately 80% of downhole length.***

10.3 2023 Drill Program

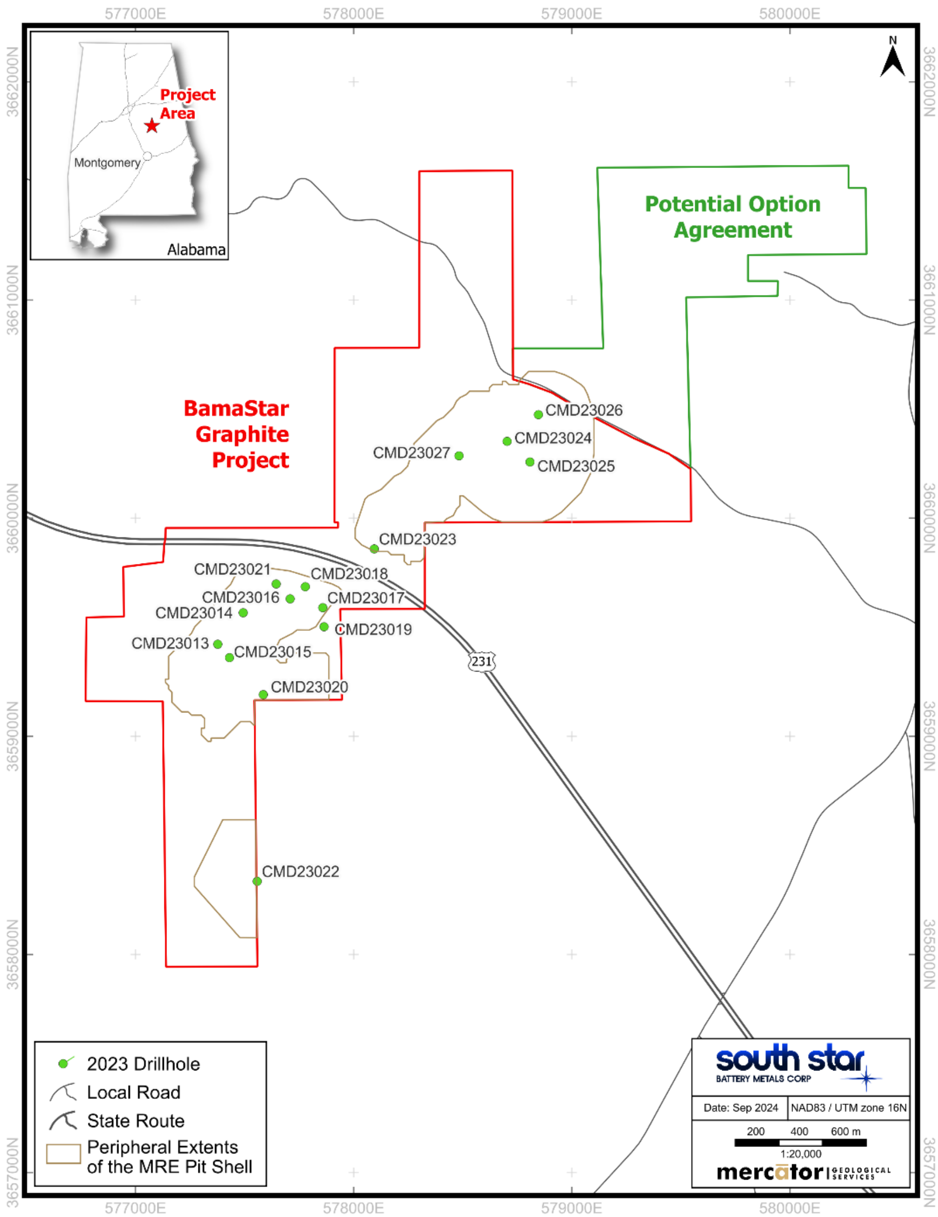
The 2023 drilling campaign on the Project was completed between 7-9 May and 5 October 2023, with final assays reported in November 2023. The program consisted of 15 drill holes for 1,885 m (CMD23 series) (Table 10.4, Figure 10.3).

Table 10.4 Collar Table for 2023 Diamond Drill Program

Hole ID	Easting*	Northern*	Elevation*	Depth m	Azimuth °	Dip °
CMD23013	577376.83	3659422.34	318.55	107	303.23	-71.84
CMD23014	577493.35	3659566.67	324.29	125	304.37	-72.87
CMD23015	577430.57	3659360.86	323.55	140.6	302.83	-61.23
CMD23016	577708.67	3659630.41	307.98	95	356.30	-90.00
CMD23017	577858.09	3659589.94	300.76	128	307.69	-59.07
CMD23018	577778.10	3659686.07	316.22	95	293.78	-70.56
CMD23019	577864.19	3659502.51	292.44	155	301.36	-61.27
CMD23020	577585.54	3659191.34	282.30	149	300.00	-60.00
CMD23021	577644.71	3659698.62	338.55	74	291.80	-71.73
CMD23022	577557.64	3658335.64	287.23	83	298.39	-75.22
CMD23023	578094.16	3659859.23	301.12	86	303.46	-60.18
CMD23024	578703.00	3660352.34	300.60	173	300.30	-77.00
CMD23025	578807.82	3660257.77	276.60	182	300.30	-73.00
CMD23026	578846.47	3660474.61	289.62	146	300.30	-70.00
CMD23027	578482.68	3660286.02	292.83	146	300.30	-70.00

***** ***NAD83 UTM Zone 16N coordination and masl elevation.***

Figure 10.3 Collar Location Map for 2023 Drill Program



The 2023 drill program was focused on intersecting the graphitic units along strike, up and down dip, and at depth with respect to the 2022 drill program.

Drill holes CDM23013, CDM23014, and CDM23015 were drilled up dip of the 2022 drill holes in the Ceylon Mine Prospect area. All drill holes intersected graphitic metamorphosed quartz sediments and were terminated in feldspar-biotite gneiss. Although these holes were not extended into the metapelite rocks, the current geological interpretation suggests they intersected all available graphite bearing units.

Drill holes CDM23016, CDM23017, CDM23018, CDM2319, and CDM23021 were drilled on strike to the northeast of the 2022 drill holes in the Ceylon Mine Prospect area. All drill holes intersected graphitic metamorphosed quartz sediments and were similarly terminated in non-graphitic units of feldspar-biotite gneiss or, as with CDM23016 and CDM23021, rocks characterized as metapelite. The current geological interpretation suggests that additional graphitic units may be present at depth, and it is recommended that several drill holes be completed in the area to fully intersect the stratigraphic sequence to better correlate both marker and graphitic units.

Drill hole CMD23020 was drilled on the south side of a fault that is interpreted to disrupt continuity of the Ceylon Mine Prospect stratigraphy to the south. The stratigraphic sequence is notably different than north of the interpreted structure with only minor graphitic quartz-sillimanite-feldspar schists intersected.

Drill hole CMD23022 was drilled on the southern extent of the Ceylon Mine Prosect and intersected multiple intervals of graphitic metamorphosed quartz sediments that correlate well with results from overlying trench CMT0020. Correlation with the main Ceylon Mine Prospect area is not well understood.

Drill hole CMD23023 was drilled on strike to the southwest of the 2022 drill holes in the Rushing Prospect area. Multiple intervals of graphitic metamorphosed quartz sediments were intersected, however, graphite unit thickness, intervening lithologies, characterized as a mix of amphibolite and feldspar-biotite gneiss, and depth of metapelite rocks suggest a change in stratigraphic positioning or sequence with respect to the Ceylon Mine Prospect area.

Drill hole CMD23027 was drilled up dip of CDM22012 in the Rushing Prospect area. Multiple intervals of graphitic metamorphosed quartz sediments were intersected, and the drill hole was terminated in metapelite rocks.

Drill holes CDM23024, CDM23025, and CDM23026 were drilled on strike to the northeast of the 2022 drill holes in the Rushing Prospect area. All drill holes intersected graphitic metamorphosed quartz sediments and were terminated in graphitic quartzite. The current geological interpretation suggests that additional graphitic units may be present at depth, and it's recommended that several drill holes be completed to fully intersect the stratigraphic sequence to better correlate both marker and graphitic units.

One hundred percent of the recovered core length was sampled as half-core samples and sent to Actlabs for graphitic carbon (% Cg) testing using infrared analysis. Actlabs is an accredited independent laboratory with the ISO 9001:2015 & ISO/IEC 17025:2017 registrations.

All drill holes returned significant thicknesses of graphite mineralization and provided support for updated models of stratigraphy, redox zonation, weathering zonation, and graphite units. Significant intercepts for the 2022 drill program are presented in Table 10.5. Reported lengths are downhole lengths and are approximately 80% to 100% of true widths.

Table 10.5 Significant Intercepts for the 2023 Diamond Drill Program

Hole Id	From m	To m	Length m	Cg %
CMD23013	0.00	8.00	8.00	2.57
and	29.00	36.50	7.50	1.42
and	72.40	76.56	4.16	2.44
CMD23014	2.00	20.00	18.00	2.09
and	42.50	45.50	3.00	2.16
and	81.60	85.40	3.80	1.94
CMD23015	9.00	62.30	53.30	2.31
and	80.20	82.10	1.90	2.39
and	106.50	116.00	9.50	1.88
CMD23016	0.00	59.00	59.00	2.23
and	70.76	79.00	8.24	2.90
CMD23017	5.00	35.00	30.00	3.25
and	73.81	119.55	45.74	2.28
CMD23018	0.00	63.40	63.40	2.39
and	83.25	87.80	4.55	2.78
CMD23019	68.38	70.31	1.93	3.25
and	86.78	144.67	57.89	2.44
CMD23020	5.00	9.38	4.38	2.07
and	68.00	81.50	13.50	1.14
CMD23021	0.00	34.65	34.65	2.38
and	52.79	64.80	12.01	2.46
CMD23022	5.00	36.03	31.03	3.35
and	44.03	68.80	24.77	1.79
and	71.00	75.50	4.50	1.70
CMD23023	0.00	18.50	18.50	2.22
and	24.02	42.74	18.72	1.43
CMD23024	5.00	14.00	9.00	2.15
and	22.78	64.48	41.70	1.94
and	71.81	75.50	3.69	1.09
and	99.66	159.50	59.84	1.36
and	164.00	173.00	9.00	1.30
CMD23025	0.00	46.70	46.70	1.97
and	76.90	82.80	5.90	2.07
and	144.50	182.00	37.50	2.01
CMD23026	5.00	26.33	21.33	2.48

Hole Id	From m	To m	Length m	Cg %
and	42.74	62.00	19.26	0.87
and	98.00	146.00	48.00	1.43
CMD23027	2.00	23.17	21.17	2.33
and	44.55	93.50	48.95	1.59
and	95.00	111.50	16.50	1.26

**** Downhole length. True widths are approximately 80 to 100% of downhole length.***

11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

South Star completed two diamond drilling programs in 2022 and 2023 totalling 27 drill holes for 2,391 m. Historical sampling programs includes 29 trenches for 2,905 linear meters completed by Charge Minerals in May of 2019. The sample preparation, analyses, security, and QAQC descriptions below relate to both the South Star drilling programs and the historic Charge Minerals trenching program.

Mr. Jesse Edmunson (Registered Professional Geologist, State of Alabama) and Mr. Chris Carmen were contracted by Charge Minerals and subsequently South Star to supervise the trenching, drilling, and sampling programs completed on the Project, including quality assurance and quality control ("QAQC") protocols.

Mr. Edmunson and Mr. Carmen advised the Author that all logging, sampling and sample shipment preparation activities were carried out under secure conditions at either the previous (2019 trenching and 2022 drill program) and current (2023 drill program) core logging and storage facility in Sylacauga, Alabama. Drill core was under custody of South Star personnel from the time it was picked up from the drill site to the time associated samples were shipped to the primary laboratory for preparation and analysis.

11.1 Sampling Method and Approach

11.1.1 Trenching Program - 2019

Trenches were excavated in prospective strata depended on site access and topographic relief. Field staff primarily excavated and sampled normal to the target horizon, but this was not always possible due to the terrain and other obstacles. The trenches were dug to either blade refusal or a maximum depth of 2 m if there was no rock exposure.

Trenches were logged for as much information as possible including colour, weathering intensity, shear intensity, lithology, visual graphite, mineralogy and structural measurements. All logging was measured in meters with a tape ruler. Trenches were spot tested on average every 3 m with a pXRF.

Trench sample locations were determined by GPS with recorded waypoints at start, end, and every 10 m along the trench. Whenever feasible these points were collected multiple times and averaged to improve location accuracy. Additionally, the trenches were surveyed with a laser range finder for azimuth and inclination; however, the GPS tracks were determined to be more accurate and were ultimately combined with LiDAR data from the USGS survey to calculate UTM coordinates.

The base of the trench wall was channel sampled for graphite in nominal 3 m intervals within graphitic units and were lengthened in areas with lower graphite visual estimates for an overall sample length average of 4 m. Samples were bagged and tagged on site and were transported approximately 15 km by Charge Minerals personnel from the site to a secure storage and logging facility in Sylacauga. Samples were shipped by UPS to Actlabs for analysis.

Duplicates were collected in the field from the same sample intervals as a separate sample (not split from the original), to monitor the repeatability of the entire methodology, from sample collection through lab analysis. Seven hundred and sixty-five samples were submitted from the trench program for independent laboratory analysis plus standards (5 per hundred for a total of 41) and duplicates (5 per hundred for a total of 38).

11.1.2 Drill Programs – 2022 to 2023

Core (HQ size core, 61.1 mm diameter) was collected from the drill and placed into core boxes at the drill site, approximately 3 m per box, by the drilling contractor (Logan Drilling USA). Small wooden tags mark the distance drilled in metres at the end of each run. On each filled core box, the drill hole number and sequential box numbers are marked by the drill helper and checked by the site geologist. Once filled and identified, each core tray is covered with a sliding wooden cover and secured shut.

The drill core was transported by field staff from the site to the respective secure core facility in Sylacauga. For the historical 2019 trenching program and 2022 drill program, this facility was located approximately 15 km from site. A new secure storage and logging facility located in Sylacauga, Alabama was rented by South Star for the 2023 drill program and visited by the Author during his site visit.

The collar locations of completed drill holes were each marked with a wooden picket at the rehabilitated sites so that a follow up GPS measurement could be made.

Geological core logging recorded lithology, alteration, texture, colour, mineralization, structure, RQD, and sample intervals. All geotechnical logging, geological logging and sample data was recorded and entered into a computer database. As the core was logged, it was marked for sampling at a nominal sample interval of 1.5 m, with the entire hole being sampled. Once the core is logged and marked for sampling, the sequential boxes were photographed on the logging tables.

Core sections marked for sampling were sawn in half with one half of the core being placed in sample bags with the corresponding sample tags and the bag being sealed. Bags are also marked externally with the sample tag number. Certified reference and blank material are inserted into the sample stream on a regular basis. Duplicate core samples were prepared by splitting the core in half with a core saw (primary sample), and then select duplicate intervals were made by quartering the halved core.

The half and quarter core samples were shipped in plastic crates via UPS shipping from Chelsea, Alabama to the Actlabs analytical facility in Ancaster, Ontario, Canada.

Half-core from the Project is stored and cross-stacked in palletized piles within the current secure logging facility in Sylacauga.

11.2 Analysis

All samples collected for the drilling and trenching programs were sent to Actlabs, an accredited commercial analytical firm registered to ISO/IEC 17025:2017 and ISO 9001:2015. Both South Star and Charge Minerals are fully independent of Actlabs. The Actlabs facility in Ancaster, Ontario carried out the sample login / registration, sample weighing, sample preparation and analyses.

Samples are crushed to 80% less than 2 mm and a riffle split is pulverized to 95% passing 105 microns. A 0.5 g sample is subjected to a multistage furnace treatment to remove all forms of carbon except for graphitic carbon. Either a resistance or induction furnace is used for analysis. The inductive elements of the sample and accelerator couple with the high frequency field of the induction furnace. In a pure oxygen environment, the heat generated by this coupling cause the sample to combust. During combustion, carbon-bearing elements are reduced, releasing the carbon, which immediately binds with the oxygen to form carbon monoxide ("CO") and carbon dioxide ("CO_2"), the majority being CO_2. Carbon is measured as CO_2 in the infrared ("IR") cell as gases flow through the IR cells. CO_2 absorbs IR energy at a precise wavelength within the IR spectrum. Energy from the IR source is absorbed as the gas passes through the cell, preventing it from reaching the IR detector. All other IR energy is prevented from reaching the IR detector by a narrow bandpass filter. Because of the filter, the absorption of IR energy can be attributed only to CO_2. The concentration of CO_2 is detected as a reduction in the level of energy at the detector. The analysis is performed using ELTRA Instruments. The lower detection limit for C as graphitic carbon ("Cg") is 0.05% Cg.

For statistical purposes within the Report, any analytical result that was reported to be less than the detection limit was set to one half of that detection limit (e.g., a result reported as <0.05 was set to a numeric value of 0.025).

11.3 QAQC

Two different CRMs were inserted into the sample stream for Project sampling programs: GGC-9 ('low grade' material, certified value of 2.41% Cg with a standard deviation of 0.27) and GGC-12 ('medium grade' material, certified value of 5.27% Cg with a standard deviation of 0.38). These CRMs are produced by Geostats Pty Ltd. of O'Connor, Western Australia and were sourced from flake graphite deposits in Australia (GGC-9) and Mozambique (GGC-12).

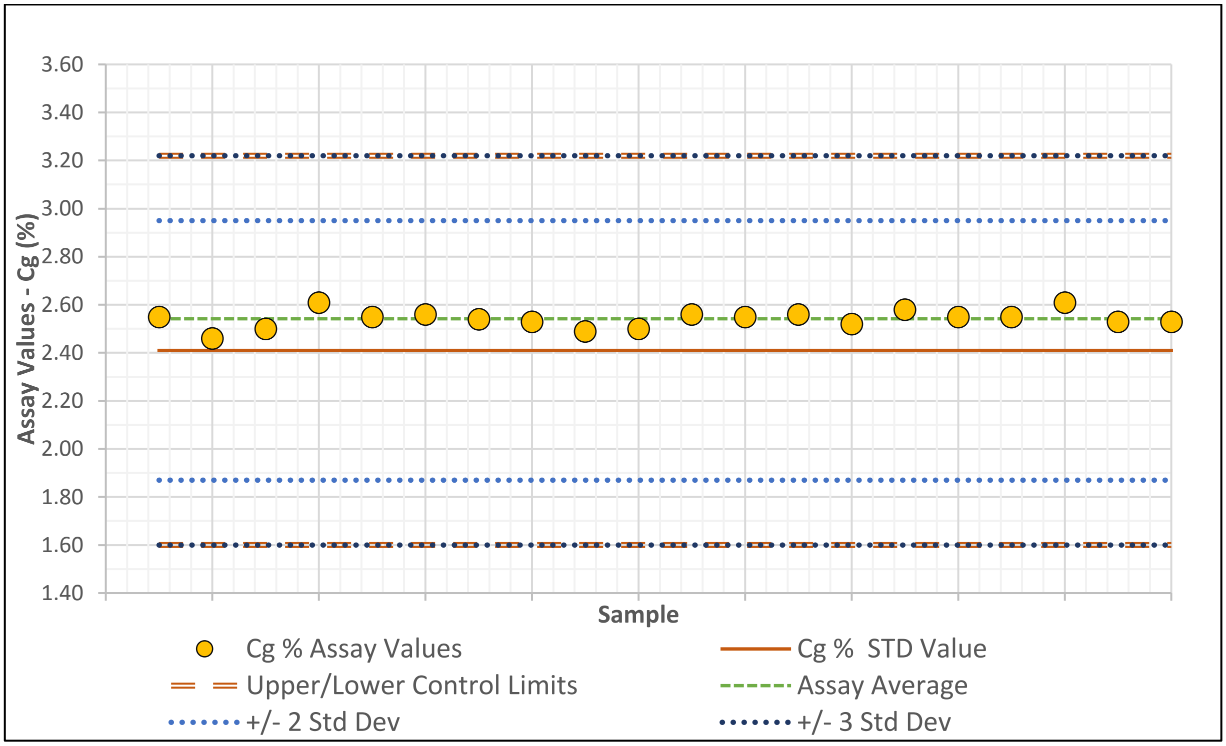
Actlabs also carries out their own analysis of CRMs, runs blank aliquots, and carries out duplicate and replicate ('preparation split') analyses within each sample batch as part of their own internal monitoring of quality control. Actlabs internal QAQC procedures returned acceptable results.

11.3.1 Trenching Program - 2019

CRM

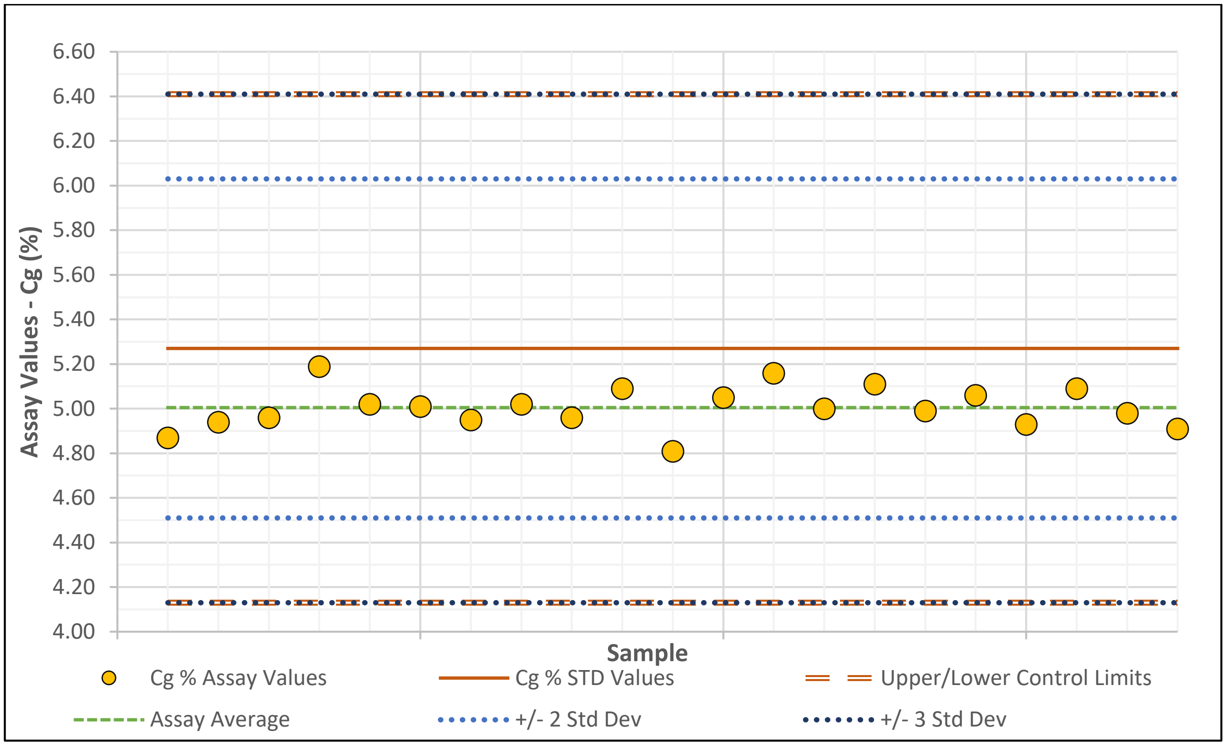
A total of 42 CRM samples, 20 samples of GGC-9 and 21 samples of GGC-12, were submitted for analysis by Charge Minerals as part of the trenching program in 2019. Figure 11.1 and Figure 11.2 present the performance of each CRM. All values of GGC-9 were returned above the expected value, showing a slight high bias, and all values of GGC-12 were returned below the expected value, showing a slight low bias. All CRM values returned were within two standard deviations and the low and high bias trends may indicate a laboratory precision issue with those specific materials. Results are assessed to be acceptable with no significant issues present.

Figure 11.1 CRM GGC-9: 2019 Trenching Program



Source: Mercator, 2024

Figure 11.2 CRM GGC-12: 2019 Trenching Program

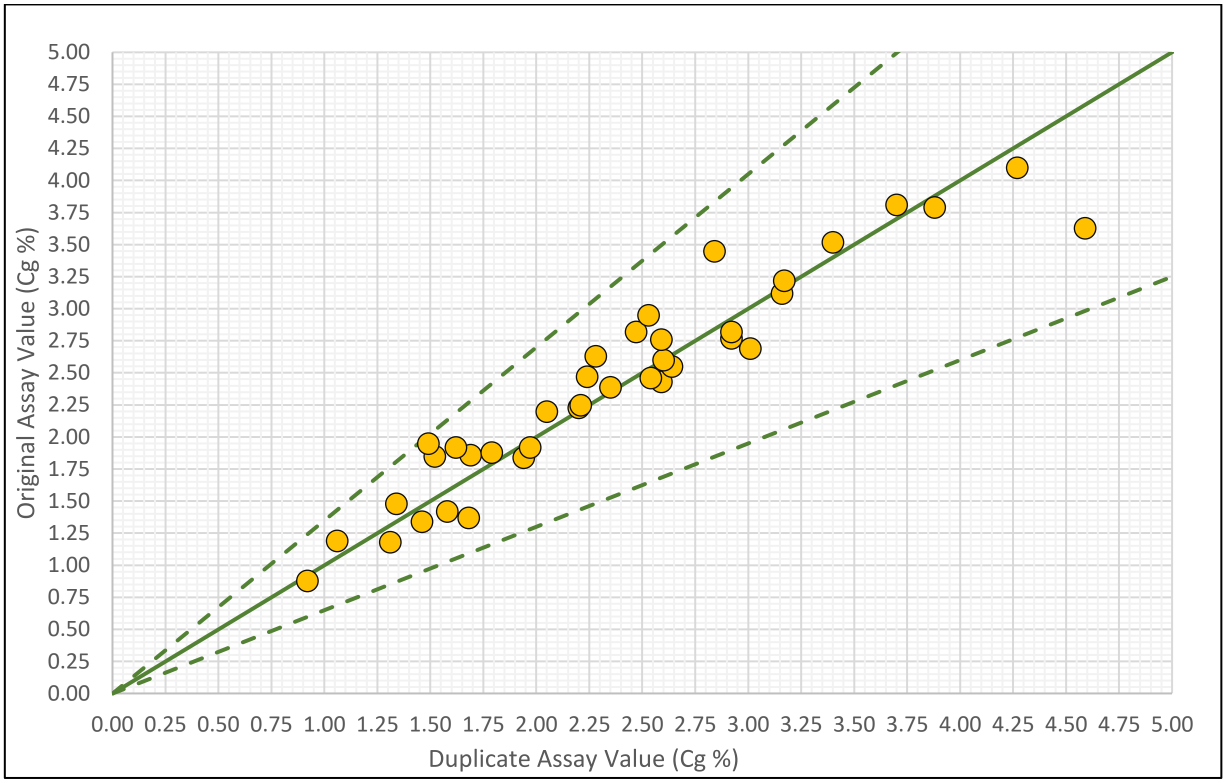


Source: Mercator, 2024

Field Duplicates

A total of 38 field duplicate samples were collected for the 2019 trenching program. Duplicates were collected in the field from the same sample intervals as a separate sample (not split from the original), to monitor the repeatability of the entire methodology, from sample collection through lab analysis. Results for duplicate pairs (duplicate vs original) are presented in Figure 11.3. Duplicate split pairs correlate well along a 1:1 trend. This is interpreted as indicating that grade distributions at the sampled scale are relatively homogenous and that associated analyses reflect acceptable precision.

Figure 11.3 Field Duplicates: 2019 Trenching Program



Source: Mercator, 2024

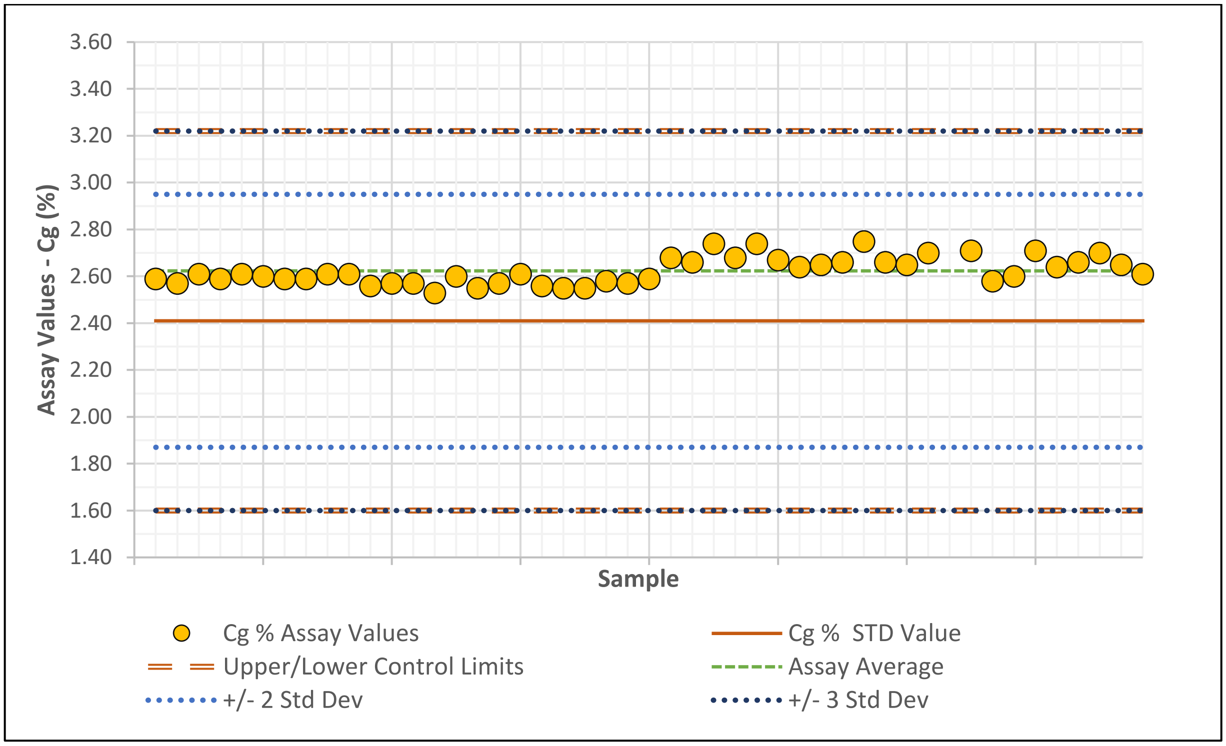
11.3.2 Drill Programs – 2022 and 2023

A total of 1,601 core samples were submitted for analysis during the 2022 and 2023 drill programs. South Star staff inserted 248 quality control samples during the programs inclusive of CRM (63), core duplicate (93), and blank (92) samples. Insertion rate approximately reflects 1:25 for CRMs and 1:17 for core duplicate and blank samples.

CRM

A total of 63 CRM samples, 47 samples of GGC-9 and 46 samples of GGC-12, were submitted for analysis by South Star as part of the 2022 and 2023 drill programs. Figure 11.4 and Figure 11.5 present the performance of each CRM. Results are assessed to be acceptable with no significant issues present. Two CRM results were identified as incorrectly labelled (GGC-9 instead of GGC-12) and were corrected by the Author.

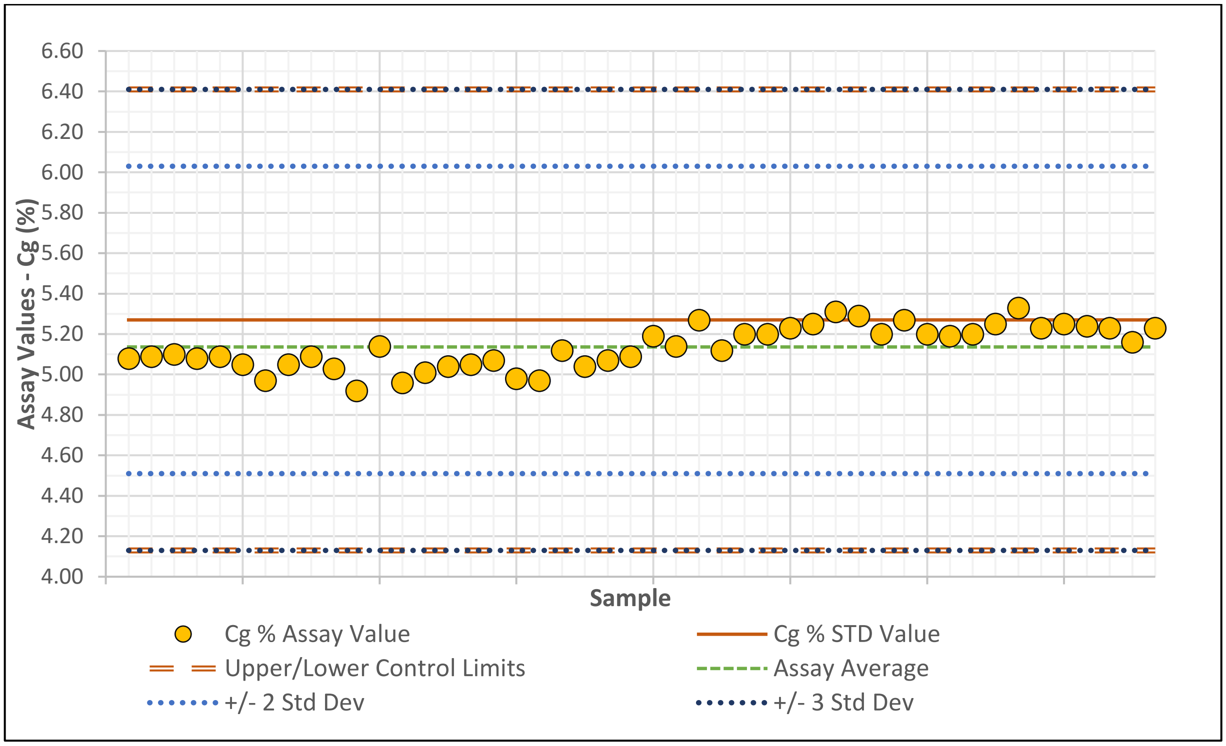
Figure 11.4 CRM GGC-9: 2022 and 2023 Drill Programs



Source: Mercator, 2024

All values of GGC-9 were returned above the expected value, showing a slight high bias, but within two standard deviations. This is the same trend demonstrated for GGC-9 in the 2019 trench sampling program and again may indicated a laboratory precision issue with the CRM.

Figure 11.5 CRM GGC-12: 2022 and 2023 Drill Program

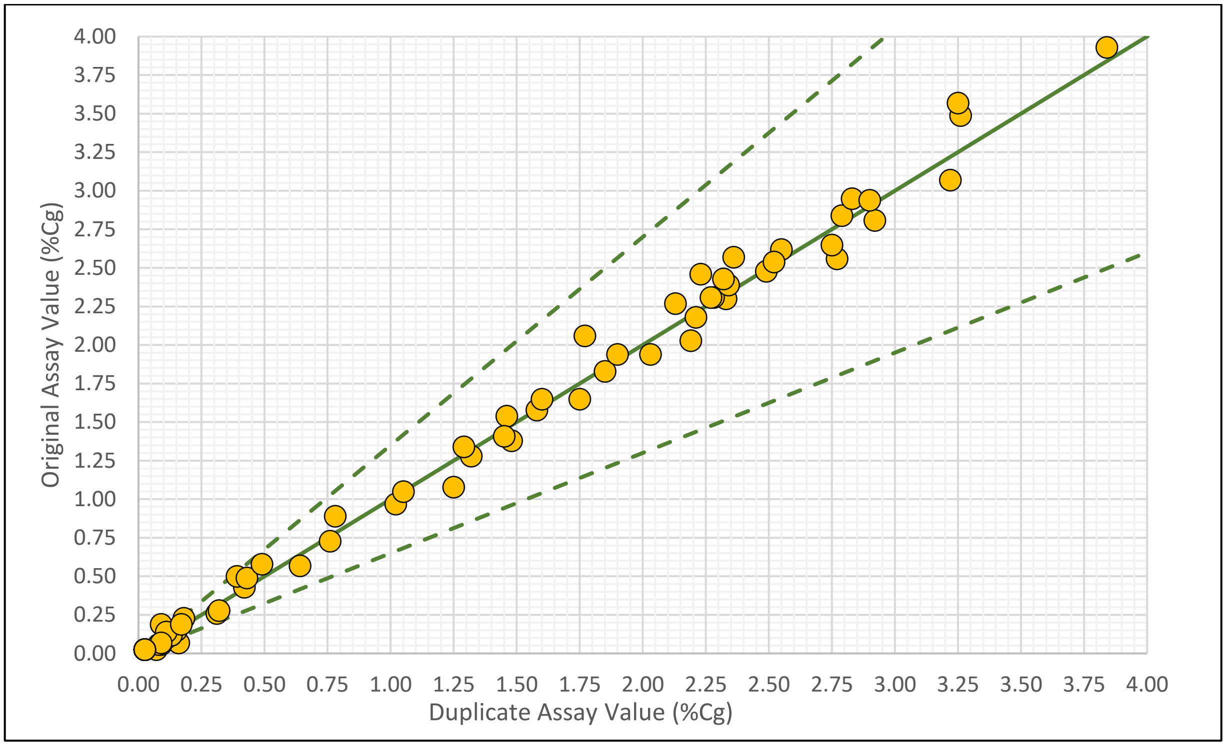


Values of GGC-12 were all returned below the expected value during the 2022 drill program, showing a slight low bias and a similar trend as the 2019 trenching program. During the 2023 drill program, values were returned closer to the expected value but again with a slight low bias. All GGC-12 values returned were within two standard deviations.

Core Duplicates

A total of 93 quarter core duplicates were prepared by South Star during the 2022 and 2023 drill programs. Results for duplicate pairs (duplicate vs original) are presented in Figure 11.6. Duplicate split pairs correlate well along a 1:1 trend. The highest variance between duplicate pairs is observed at lower graphite concentrations, where three duplicate values deviate more than 30% from original values. This reflects samples with less than 0.20% Cg for both the original and duplicate and may represent variability of grade distributions at those levels. Overall, results of the core duplicate program are interpreted to indicate that grade distributions at the sampled scale are relatively homogenous and that associated analyses reflect acceptable precision.

Figure 11.6 Quarter Core Duplicates: 2022 and 2023 Drill Programs

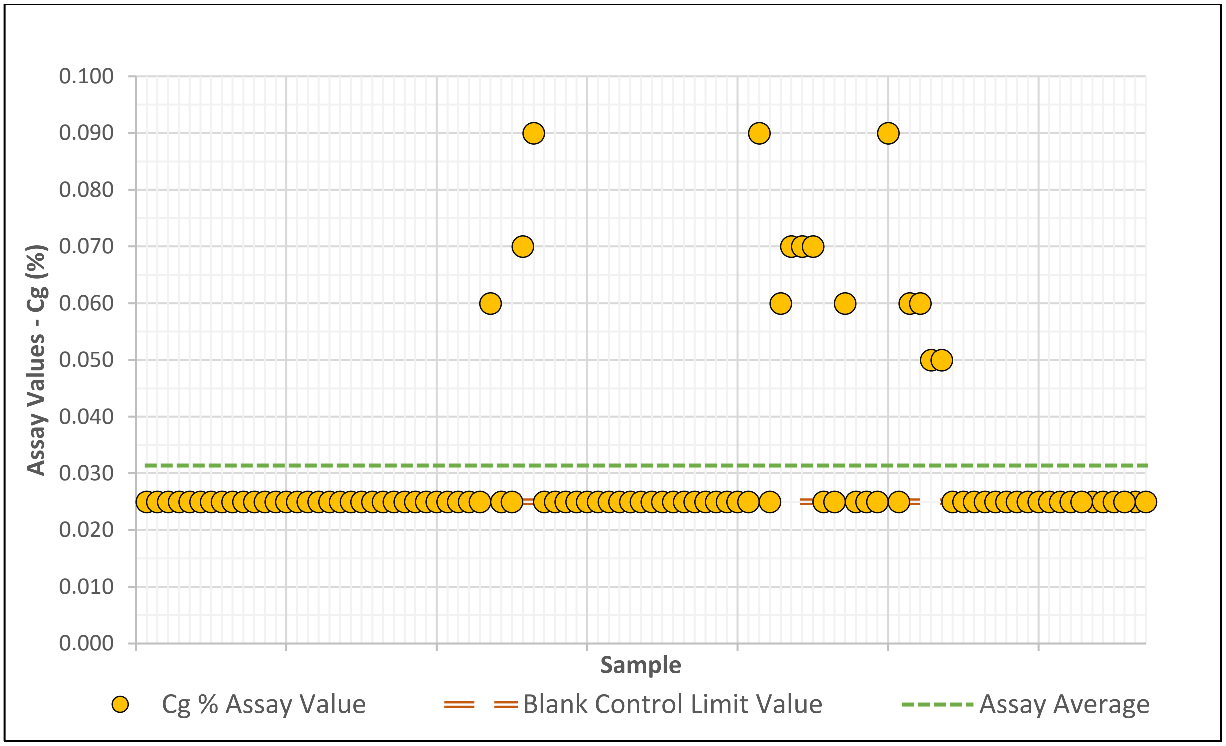


Source: Mercator, 2024

Blanks

A total of 92 blank samples were inserted in the sample stream by South Star during the 2022 and 2023 drill programs. Blank material consisted of non-mineralized white quartz purchased from local hardware stores. Results for the blank sample program are presented in Figure 11.7. Anomalous Cg % values were returned for several samples in two separate sample batches, both during the 2023 drilling program. Most anomalous Cg % values are proceeded by a core sample with elevated levels of graphite and may represent contamination during sample preparation. However, all blank sample results are less than two times the detection limit and no evidence of problematic sample cross-contamination is present.

Figure 11.7 Blanks: 2022 and 2023 Drill Programs



Source: Mercator, 2024

11.4 Author Comment on Sample Preparation, Analysis and Security Programs

The Author has concluded that the sample preparation, analysis, QAQC, and security procedures implemented by Charges Minerals for the 2019 trenching program and South Star for the 2022 and 2023 drill programs are consistent with the CIM Mineral Exploration Best Practice Guidelines and current industry standards. Associated analytical results are assessed to be acceptable for Mineral Resource estimation purposes.

12.0 DATA VERIFICATION

Data verification procedures carried out by the authors to support the BamaStar Deposit MRE and associated Technical Report consisted of four main components:

- Review of public record and internal source documents cited by previous operators and South Star with respect to key geological interpretations, previously identified geochemical or geophysical anomalies and historical exploration and drilling results.
- Completion of a MRE Database Verification Program by author Mr. Matthew Harrington, P.Geo., of historical exploration and current drilling results.
- Completion of a site visit to the Project on the 17/18 April 2024 by author Mr. Matthew Harrington, P.Geo., on behalf of South Star. No issues were identified that negatively impact the findings and conclusions of this Technical Report.

12.1 Review of Supporting Documents, Databases, and Assessment Reports

The Authors have reviewed historical and current data and information regarding past and current exploration work on the Property. The Authors were provided a comprehensive historical digital geological database from South Star for the purpose of reviewing the Project and preparing the Technical Report. The Project database included technical reports, maps, figures, assay data, assay certificates, mineralogical and metallurgical study reports, and location data detailing both current and historical work conducted on the Project. South Star was entirely cooperative in supplying the Authors with all the information and data requested and there were no limitations or failures to conduct the verification.

The Authors have no reason to doubt the adequacy of the historical sample preparation, security and analytical procedures and have complete confidence in all historical information and data that was reviewed.

12.2 Mineral Resource Estimate Drill Hole Database Validation Program

The Author supervised a drill hole database validation program in support of the current MRE that included the following items:

- 100% verification of drill core analytical results against original assay certificates, inclusive of drill core specific gravity determinations.
- 100% verification of trench channel sample analytical results against original assay certificates.
- 100% verification of drill hole and trench location coordinates against available original records.
- Review of downhole hole survey measurements and assessment of deviation severity.

- Select comparison of compiled database lithological entries with respect to original drill logs and core photos.
- Depth From – Depth To logical checks for all database interval tables.

The Project drill hole database includes verified results for 27 drill holes (2,391 m) and 29 trenches (2,905 linear meters) with a total of 2,275 Cg % assays and 93 core specific gravity measurements. Implementation of the database validation and review procedures described above resulted only minor database entry corrections. This mostly reflected Depth From – Depth To logical corrections for lithology interval tables, minor elevations changes for several trenches to properly register against the LiDAR topography surface, and two core assay values replaced with "0" Cg % based on poor core recovery (as described in section 10). Corrections were incorporated to create the validated and functional drilling database used in the MRE.

12.3 Site Visit

On April 17 and 18, 2024 author Mr. Harrington, P.Geo., visited the BamaStar Deposit site accompanied by Mr. Jesse Edmunson and Mr. Chris Carmen, both of whom supervised the trenching, drilling, and sampling programs completed on the Project that support the current MRE. Mr. Edmunson and Mr. Carmen are consultants to South Star. Access to the Rushing Prospect was prohibited during the site visit due seasonal hunting and as such the Author was only able to access the Ceylon Mine Prospect.

Field checks were undertaken where possible to validate hole numbers, locations and casing orientations with respect to digital database records. All drill casing is reported to be removed from the property and monuments are not regularly installed to mark drill collars in the field. This protocol is to align with the SUA with the landowner. Drill collars have been marked by a wooden stake with no written identification (Figure 12.1). One drill hole was found to be cemented (CDM22003) and one drill hole was found to have casing left (CDM23019). It is recommended that South Star develops a permanent marker and identification system for drill holes that agrees with the landowner wishes and the SUA.

Figure 12.1 Drill Collar Locations for CDM22003 (left) and CDM23014 (right)

Source: Mercator, 2024

The Author was able to verify 12 drill collar locations, and evidence of drill activity such as drill pads and drill trails were located for all drilling areas inspected. NAD83 UTM Zone 16N coordinates for located collars and drill site areas were collected using a Garmin E-trek handheld GPS instrument and these were recorded for later checking of database drill collar location coordinates. Results showed acceptable correlation between datasets, with variance of a few metres recorded. Observations regarding character of forest cover, site elevations, surface drainage, road and drill pad features, exploration conditions and coordination, and general access road conditions were also noted during the site visit. This included the historical Celyon Mine (Figure 12.2).

Figure 12.2 Historical Ceylon Mine Area and Waste Pile

Source: Mercator, 2024

Review of core provided characterization of lithology, alteration, weathering, structure, and graphite mineralization intersected by drilling along with core recovery and RQD measurements. These were found to be consistent with descriptions presented in the digital drill hole database and drill logs. Logged graphite percentages corresponded well with graphite percentages observed in core. The Author reviewed the data collection and QAQC procedures for the drilling and sampling programs completed with South Star staff.

The Author collected 13 quarter core check samples from previously half core sampled core as part of an IW check sample program. South Star staff assisted in locating and retrieving requested core boxes from pallets of stack core at the secure facility in Sylacauga, Alabama. The Author completed all other aspects of the check sample program including tagging, marking, sawing, bagging, sealing, and photographing (Figure 12.3). Drill core cutting was carried out by the Author using a diamond saw. Efforts were made during the core sampling program to obtain representative samples across the deposit grade ranges, weathering states, and oxidation states. Samples were identified using tags from a three-tag sample book system and placed in sample bags and sealed. Secure possession of the check samples was maintained until shipment by UPS to Mercator's office located in Dartmouth, Nova Scotia, Canada. Both a CRM and a blank sample were inserted into the batch of check samples. Check samples were subsequently sent to ALS Canada Ltd. ("ALS") for analysis of graphitic carbon by IR spectroscopy (ALS code C-IR18) and specific gravity (ALS code OQ-GRA08). Sample preparation was completed by ALS with each sample crushed to approximately 70% < 2 mm and split using a riffle splitter. Each sample split was pulverized to approximately 85% < 75 µm. ALS is an accredited commercial analytical firm registered to ISO/IEC 17025:2017 and ISO 9001:2015 and independent to both South Star and Charge Minerals. Results are presented in Table 12.1 and Figure 12.4.

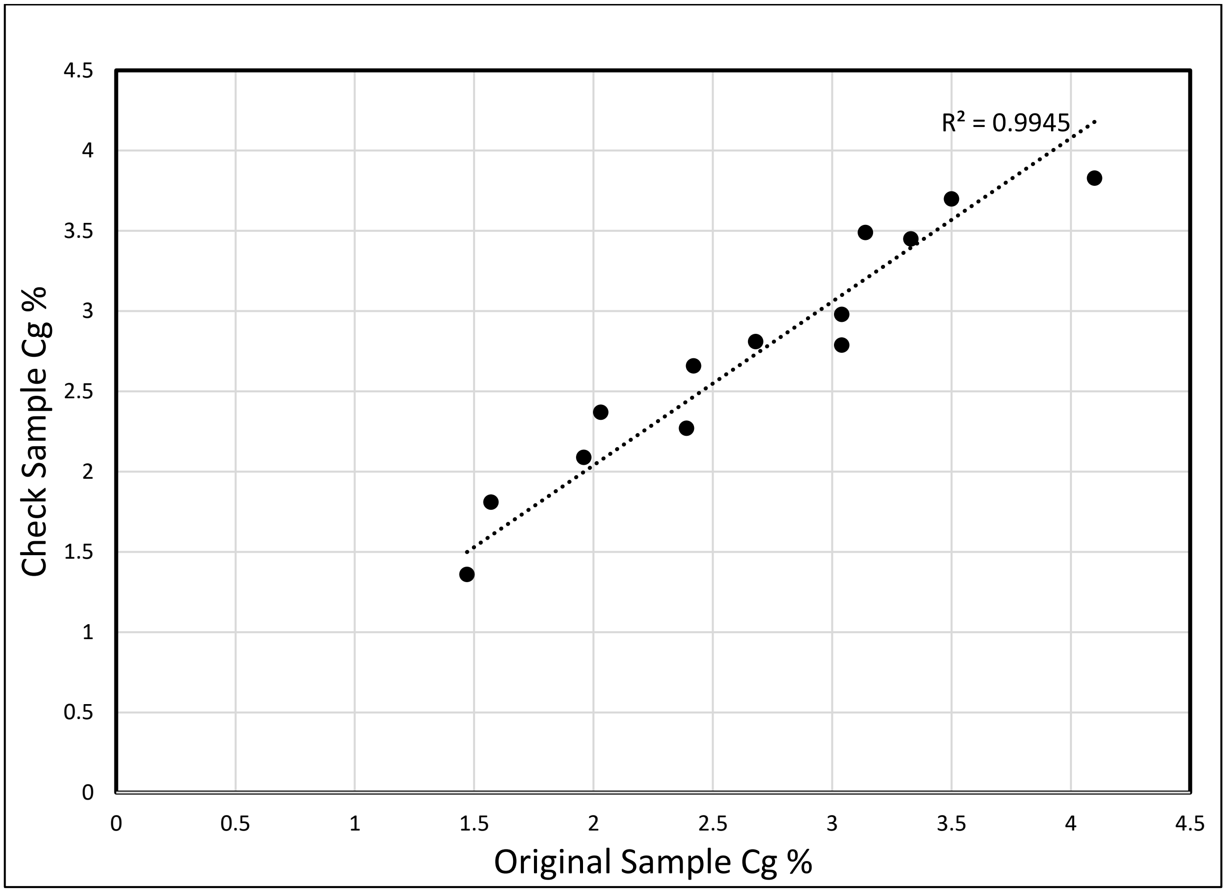
Figure 12.3 Check Sample MGS002956 (CMD23026 15.5 m – 17 m depth)

Source: Mercator, 2024

Table 12.1 2024 Independent Site Visit Check Sample Results

			Cg %		Specific Gravity		Weathering Intensity Average SG
Drillhole	**From m**	**To m**	**Original**	**Check**	**Original**	**Check**	
CMD23-025	146.00	147.50	3.04	2.79		2.94	Unweathered (2.81)
CMD23-025	81.50	82.80	2.39	2.27		2.82	Unweathered (2.81)
CMD22-002	14.00	15.50	1.57	1.81		2.90	Weak (2.73)
CMD22-002	32.00	33.50	3.50	3.70		2.82	Unweathered (2.81)
CMD23-026	9.50	11.00	1.96	2.09		2.61	Strong (2.52)
CMD23-026	15.50	17.00	3.33	3.45		2.80	Moderate (2.57)
CMD23-015	9.00	10.50	4.10	3.83		2.45	Strong (2.52)
STD GGC-09			2.41 +/- 0.27	2.78			
CMD23-015	28.50	30.00	2.03	2.37		2.61	Weak (2.73)
CMD23-015	40.50	42.00	2.42	2.66		2.67	Weak (2.73)
BLANK				0.07			
CMD23-023	5.00	6.50	3.04	2.98	2.51	2.46	Strong (2.52)
CMD23-023	33.50	35.00	1.47	1.36		2.86	Weak (2.73)
CMD23-016	72.00	73.50	2.68	2.81		2.79	Unweathered (2.81)
CMD22-007	11.00	12.50	3.14	3.49		2.69	Unweathered (2.81)

Figure 12.4 2024 Independent Site Visit Check Sample Results



Graphite results returned from ALS show acceptable correlation with original sample values reported in the Project database and no issues were identified with respect to the blank sample and CRM results. R2 values for the data set are displayed in Figure 12.4 and the variability between the two sample sets is considered to be influenced by core-scale heterogeneity of graphite distribution.

Insufficient original specific gravity determinations were available to make a comparison with ALS values. Average specific gravity values associated with weathering intensity of each checked sampled interval were compared to the ALS values (Table 12.1). Sufficient variance is present between the two datasets to suggest additional specific gravity determinations are required to better understand bulk density in the deposit. Results indicate that application of average values may lack precision and accuracy locally attributed to variances in lithology, weathering, and oxidation.

12.4 Author Comment on Data Verification

Based on observations made during the 2024 site visit and further discussions with South Star staff, the Author has determined that, work programs carried out to date on the Property are consistent with descriptions reported and that the procedures employed are consistent with current industry standards and of good quality. The Author recommends that a more permanent field marker and identification system be established for future exploration programs. In the opinion of the Author, the assay data is adequate for the purpose of the Technical Report including verifying drill core assays, estimating Mineral Resources, and for a PEA.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Historical Test Program – GIRCU

A total of 10 samples (one Weathered Graphite Ore (WGO), one Sulphide Graphite Ore (SGO) and 8 CMB) with a total mass of 920 kg were shipped by Hexagon Resources to the Guangdong Institute of Resources Comprehensive Utilization (GIRCU) in Guangzhou, China in September 2019. The mass of the weathered mineralized material was 252 kg and the remaining sampled weighted between 51.3 kg and 63.8 kg. The weathered sample was selected for the flowsheet development program.

Each sample was stage crushed to -2 mm (10 mesh). Sub-samples were extracted for particle size analysis and chemical analysis. The results of the chemical and size fraction analysis on the WGO sample are presented in Table 13.1 and Table 13.2, respectively. The fixed carbon (FC[1]) of the sample was 3.00% FC and the total sulphur grade was low at 0.13% S. The main gangue elements were silica, aluminium, and iron oxides. The size fraction analysis revealed only marginal upgrading in the minus 0.25 mm to plus 0.074 mm size fractions.

Table 13.1 Head Analysis of WGO Sample

Assays (%)					
FC	S	SO3			
3.00	0.13	0.26			
Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	Na_2O
17.01	0.06	9.12	4.1	1.16	0.682
P_2O_5	Rb_2O	SiO_2	TiO_2	V_2O_5	
0.2	0.02	63.7	0.72	0.08	
Ba	Br	Cl	Cr	Cu	Mo
0.83	<0.01	0.02	0.03	0.02	0.01
Mn	Mo	Nb	Ni	Sr	Zr
0.01	0.038	<0.01	<0.01	0.01	0.02

Table 13.2 Size Fraction Analysis

Size (mm)	Mass(%)	FC (%)	FC Distribution (%)
+0.50	29.07	1.29	12.43
-0.50/+0.25	16.69	3.06	16.93
-0.25/+0.18	3.70	5.13	6.28
-0.18/+0.15	7.39	5.76	14.10
-0.15/+0.074	12.91	5.72	24.48
-0.074	30.27	2.57	25.79
Total	**100.00**	**3.02**	**100.00**

[1] Fixed carbon is the solid combustible residue that remains after a sample is heated to 500°C for one hour to eliminate the volatiles. The fixed-carbon content of a sample is then determined by subtracting the percentages of moisture, volatile matter, and ash from the sample.

Pertinent chemical analysis results of the other nine sample, which are treated as variability samples, are presented in Table 13.3. The fixed carbon grades ranged between 1.77% FC for the SGO sample and 3.73% FC for the CMB002 sample. Sulphur grades were generally low but exceeded 1.5% S in the CMB002 and CMB004 samples.

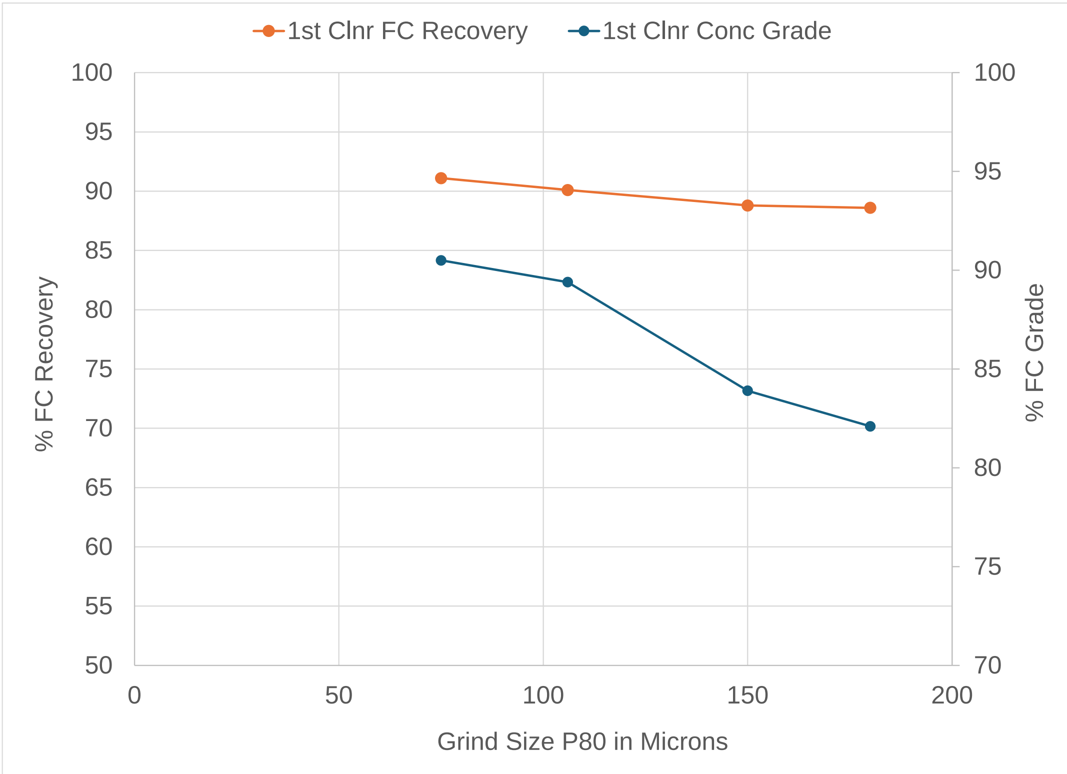
Table 13.3 Chemical Analysis of Main Elements of Variability Samples

Sample	Assays (%)				
	FC	S	V_2O_5	Mo	Fe
SGO	1.77	0.14	0.20	0.012	1.63
CMB001	3.52	0.16	0.01	0.014	3.64
CMB002	3.73	1.57	0.24	0.015	2.05
CMB003	2.62	0.12	0.20	0.013	2.39
CMB004	2.50	2.44	0.01	0.012	2.65
CMB005	2.11	0.10	0.19	0.014	3.16
CMB006	2.83	0.15	0.12	0.011	4.10
CMB007	2.90	0.13	0.02	0.013	5.29
CMB008	3.24	0.01	0.02	0.022	6.46

13.1.1 Rougher Optimization

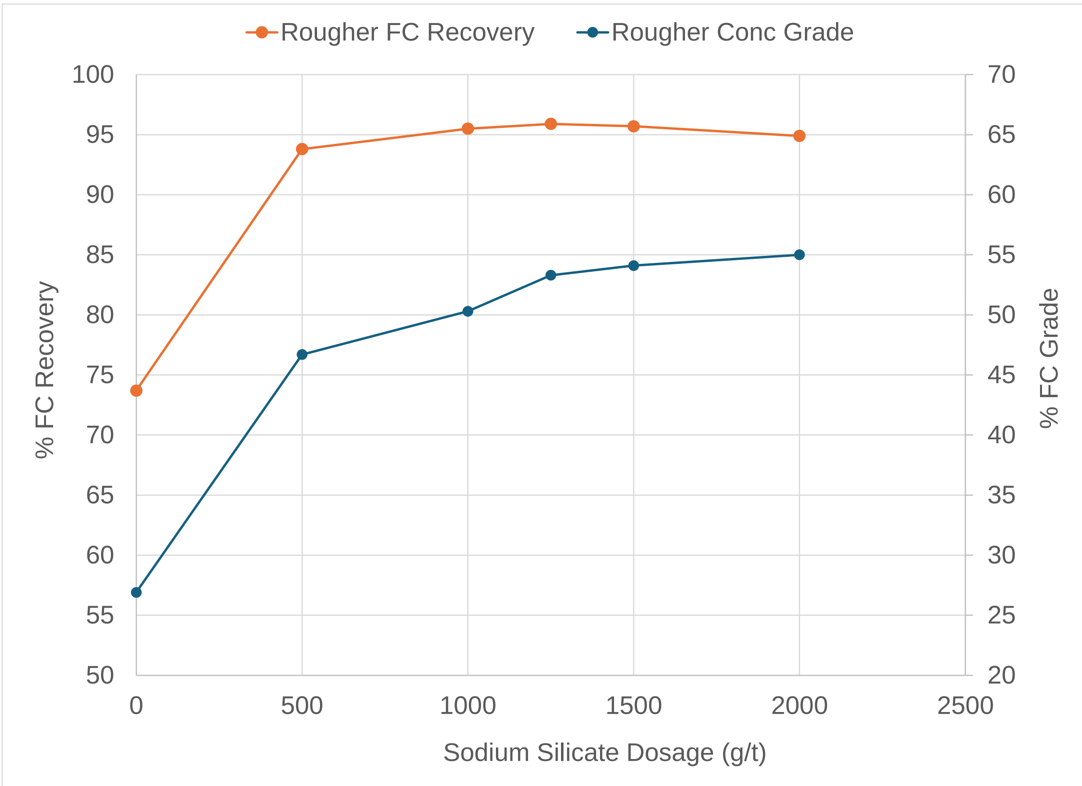
Rougher tests were carried out at grind sizes of P_{80} = 180, 150, 106, and 75 microns (µm). The rougher concentrate was subjected to a single stage of cleaning. The reagents that were used included 80 g/t kerosene as the collector, 53.7 g/t pine oil as the frother, and 1,000 g/t sodium silicate as a dispersant. The rougher concentrate was upgraded in the cleaner using 600 g/t sodium silicate. The fixed carbon recovery into the first cleaner concentrate and the first cleaner concentrate grades are presented in Figure 13.1. Reducing the grind size had only marginal impact on the fixed carbon recovery from 88.6% in the test with the coarsest grind size to 91.1% at the finest grind size. However, grade improvements were notable from 82.1% FC at the coarsest grind size to 90.5% FC at the finest grind size. The data suggests that a primary grind size of P_{80} = 106 µm is the best compromise between graphite recovery, 1st cleaner concentrate grade, and required grinding energy.

Figure 13.1 1st Cleaner Concentrate Grade and Recovery as a Function of Primary Grind Size



Sodium silicate is an effective dispersant and gangue depressant. Five different concentrations of sodium silicate were evaluated (0, 500, 1,000, 1,250, 1,500 and 2,000 g/t). The grind size of P_{80} = 0.106 mm, a kerosene dosage of 80.4 g/, and a pine oil dosage of 53.7 g/t was selected for the test series. The results of the six tests including a benchmark test without sodium silicate are shown in Figure 13.2. The baseline test without sodium silicate produced the lowest rougher concentrate grade of 26.9% FC and lowest fixed carbon recovery of 73.7%. As the sodium silicate dosage was increased from 500 g/t to 2,000 g/t, the associated concentrate grade improved from 46.7% FC to 55.0% FC. The fixed carbon recoveries were not affected significantly, ranging from 93.8% at 500 g/t to 95.9% at 1,250 g/t. The data suggests that a dosage of 1,250 g/t is optimum.

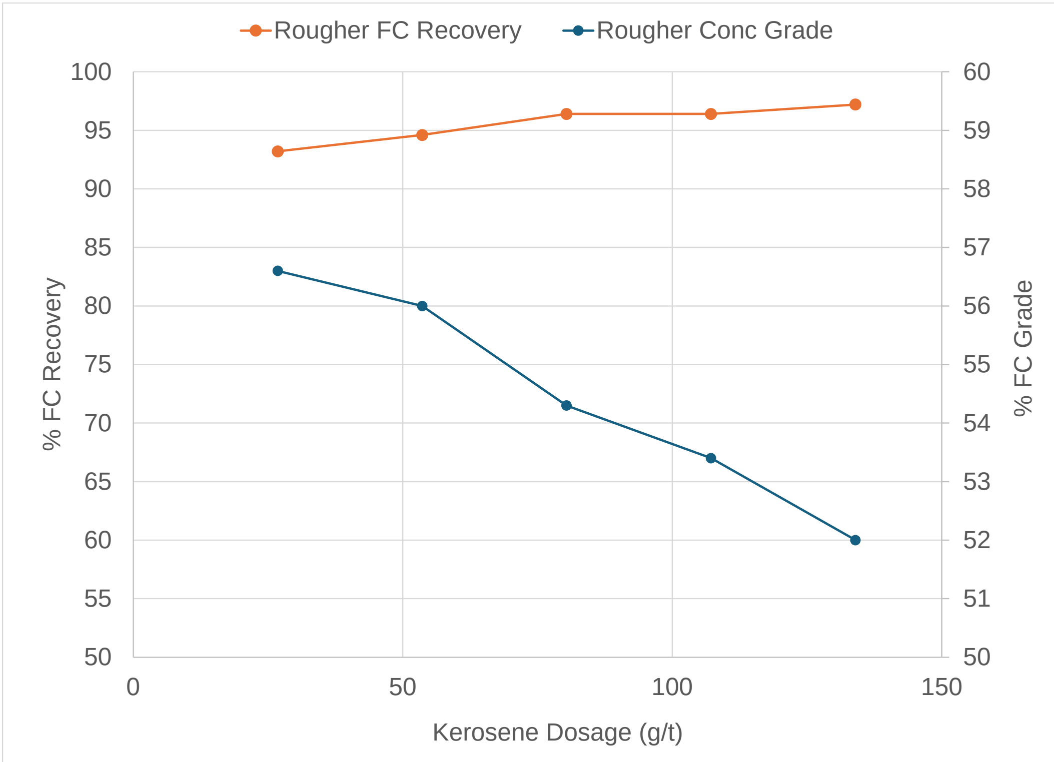
Figure 13.2 Fixed Carbon Rougher Concentrate Grade and Reovery for Different Sodium Silicate Dosages



Five different kerosene dosages between 26.8 g/t and 134 g/t were evaluated. A grind size of P_{80} = 0.106 mm was maintained as well as a sodium silicate and pine oil dosage of 1,250 g/t and 53.7 g/t, respectively. The results of the five rougher tests are presented in Figure 13.3.

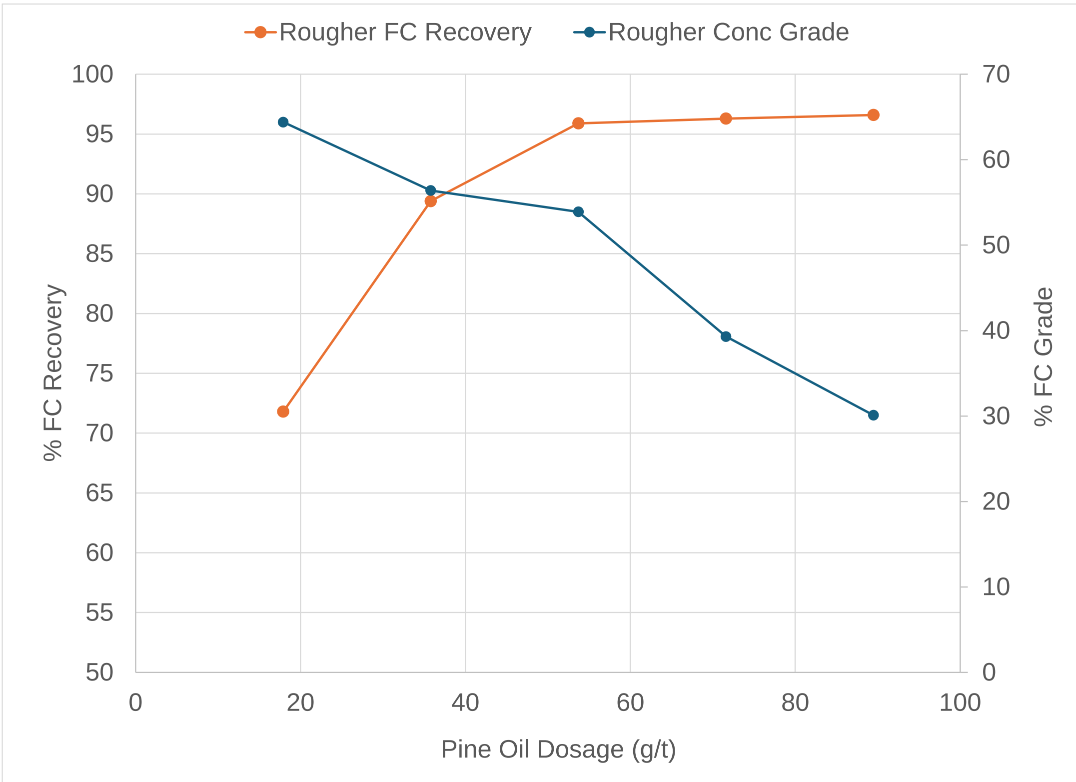
As the kerosene dosage was increased, the fixed carbon recovery gradually improved from 93.2% to 97.2%. However, at the same time, the rougher concentrate grade gradually deteriorated from 56.6% FC to 52.0% FC. Overall, the rougher concentrate grade and fixed carbon recovery values changed relatively moderately, and a kerosene dosage of 80.4 g/t was selected for the following tests, which yielded a fixed carbon recovery of 96.4% and a rougher concentrate grade of 54.3% FC.

Figure 13.3 Fixed Carbon Rougher Concentrate Grade and Recovery for Different Kerosene Oil Dosages



The impact of pine oil dosages between 17.9 g/t and 89.5 g/t were evaluated. The grind size was maintained at P_{80} of 0.106 mm, the sodium silicate dosage at 1,250 g/t, and the kerosene dosage at 80.4 g/t. The fixed carbon recovery into the rougher concentrate and the associated fixed carbon concentrate grade as a function of the pine oil dosage is depicted in Figure 13.4. A dosage of 53.7 g/t was required to achieve a fixed carbon recovery into the rougher concentrate of at least 95%. Increasing the dosage further had little effect on the recovery but resulted in significant rougher concentrate grade decreases from 53.9 % FC at 53.7 g/t to only 30.1% FC at 89.5 g/t. Hence, a dosage of 53.9 g/t is recommended. No alternative frothers such as methyl isobutyl carbinol (MIBC) were evaluated.

Figure 13.4 Fixed Carbon Rougher Concentrate Grade and Recovery for Different Pine Oil Dosages



Four incremental scavenger concentrates with additional kerosene and pine oil dosages improved the rougher recovery gradually from 96.0% to 98.6%. However, only the first scavenger concentrate yielded an acceptable grade of 8.4% FC and total rougher and scavenger fixed carbon recovery of 98.0%. The additional three scavenger stages recovered only an incremental fixed carbon of 0.6% at a 50% higher mass recovery. Hence, one incremental scavenger stage is considered sufficient.

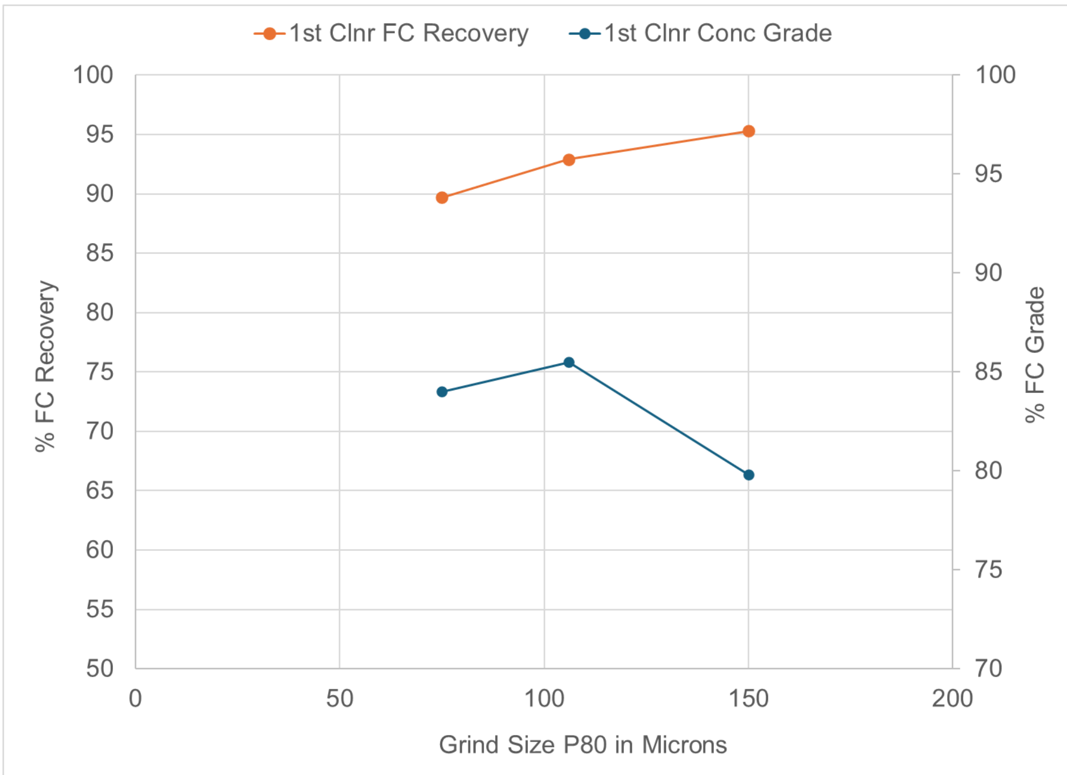
13.1.2 Cleaner Flotation Test

Cleaner flotation tests were carried out to increase the grade of the rougher concentrate. The tests were executed to target rougher concentrate regrind sizes of P_{80} = 150, 106, and 75 µm.

The rougher flotation stage was performed using the optimized conditions of a primary grind size of P_{80} = 106 µm, 1,250 g/t sodium silicate, 80.4 g/t kerosene, and 53.7 g/t pine oil. The rougher concentrate was then reground to the three target sizes. The mill discharge was conditioned with 200 g/t sodium silicate and then upgraded in a single stage of cleaner flotation.

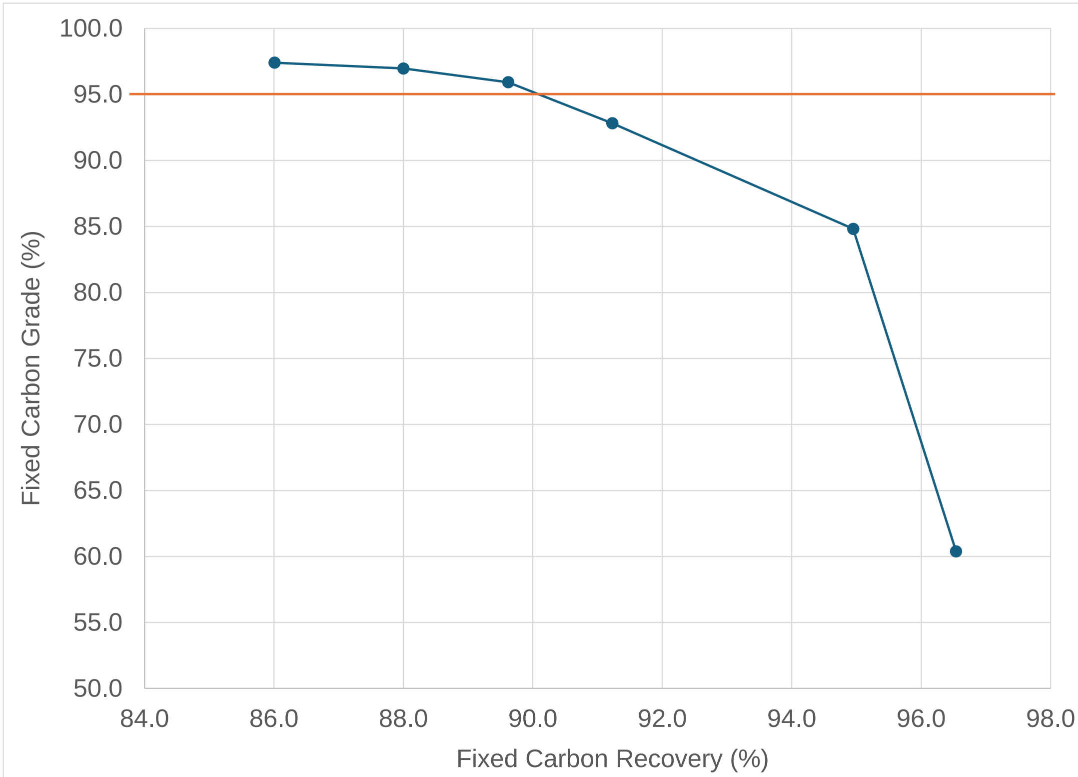
The results of the three primary cleaner tests are depicted in Figure 13.5 and reveal that the fixed carbon recovery gradually increased from 89.7% for the coarsest grind to 95.3% for the finest grind time. However, the grade reached a maximum of 85.5% FC at the medium regrind size of P_{80} = 106 µm and then decreased for the coarser and finer grind sizes. Based on these results, the lab established a primary regrind size target of P_{80} = 106 µm.

Figure 13.5 Fixed Carbon First Cleaner Concentrate Grade and Recovery for Different Regrind Sizes



Since the concentrate grade of 85.5% FC was still below a minimum acceptable grade of 95% FC, the lab carried out a test with five stages of cleaner flotation to determine the point at which the minimum concentrate grades are achieved. The rougher flotation conditions were identical to the previous cleaner flotation test. The rougher concentrate was reground to achieve a mill discharge P_{80} of 106 µm. The mill discharge was conditions with 200 g/t of sodium silicate, 13.4 g/t kerosene, and 8.95 g/t pine oil before the five stages of cleaner flotation commenced. The final concentrate and five cleaner tailings were submitted for fixed carbon analysis to generate a grade recovery relationship. The fixed carbon grade versus fixed carbon recovery curve is presented in Figure 13.6. The minimum concentrate grade of 95% C(t) was achieved after three stages of cleaning with a grade of 95.9% FC and an open circuit fixed carbon recovery of 89.6%. The final concentrate after five stages of cleaning graded 97.4% FC at an open circuit fixed carbon recovery of 86.0%.

Figure 13.6 Cleaner Flotation Test Fixed Carbon Grade versus Fixed Carbon Recovery



13.1.3 Variability Flotation Testing

The remaining nine samples were subjected to an open circuit cleaner test using the same conditions that were applied to the weathered sample. Grind time requirements were determined for the remaining nine samples to achieve a primary grind size target of P_{80} = 106 µm and a rougher concentrate regrind size target of P_{80} = 106 µm.

The fixed carbon grade versus fixed carbon recovery curves of the nine variability samples are presented in Figure 13.7. Six of the eight variability samples responded consistent with the weathered sample and only the CMB002 and CMB004 composites failed to produce combined concentrate grades of 95% FC. The remaining seven samples produced grades of 96.2% FC to 98.0% FC after three stages of cleaning. Open circuit fixed carbon recoveries into the 3rd cleaner concentrate ranged between 85.5% and 95.4%.

The two poorly performing samples were characterized by much higher sulphur grades compared to the other eight samples, which suggests that they represented the fresh mineralization lower within the resource. The sulphur head grade has been plotted against the third cleaner concentrate grade in Figure 13.8, which shows a strong correlation between the sulphur head grade and the ability to produce acceptable concentrate grades. The data is limited to two samples with elevated sulphur values and will need to be validated with more samples to confirm the relationship.

Figure 13.7 Multiple Cleaner Flotation Stages on Fixed Carbon Recovery and Grade – Variability Samples

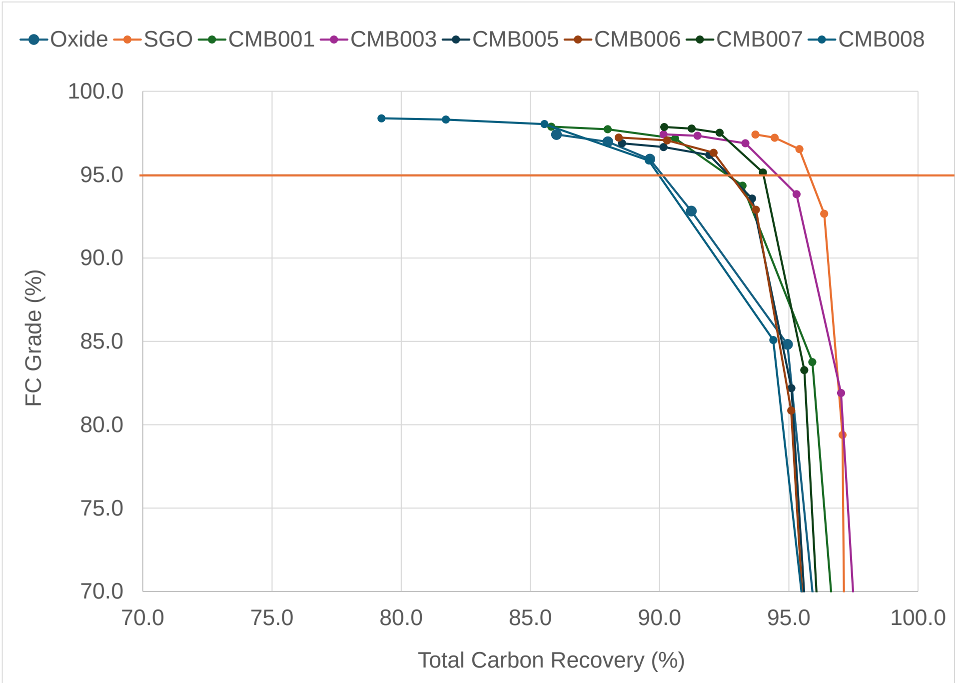
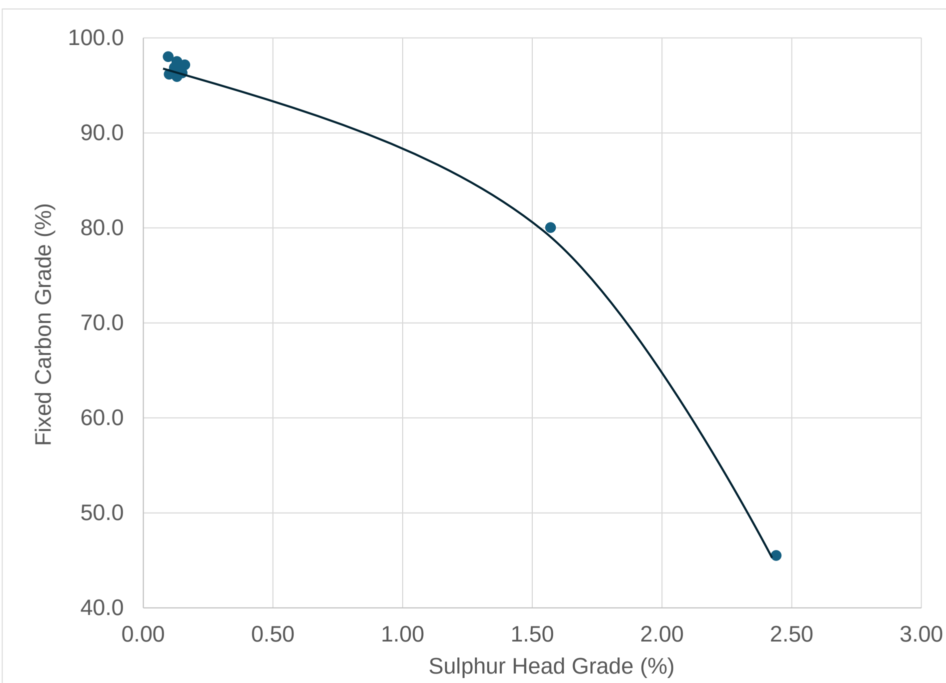


Figure 13.8 Sulphur Head Grade Versus Fixed Carbon Grade in Concentrate



The final concentrates of the 10 samples were submitted for a size fraction analysis. The mass and grade distribution of the concentrates is depicted in Figure 13.9 and Figure 13.10, respectively. The 10 samples displayed a noticeable range of flake size distribution, which is expected for this type of deposit. For example, the mass recovery into the +180 microns varied between 2.2% for the CMB008 sample and 16.3% for the SGO sample. The CMB004 sample stood out with a very high -45 microns content of 53.1%. These results suggest that a comprehensive variability flotation program will be required once optimized flowsheet and conditions have been determined.

With regard to concentrate grades, most size fractions yielded fixed carbon grades well above 95% FC. As expected, the -45 µm products produced slightly lower grades since the small flakes are more difficult to fully liberate and entrained gangue minerals tend to report to this size fraction. The CMB002 and CMB004 samples stood out with lower concentrate grades. None of the size fractions of the CMB004 sample produced a grade of 90% FC and the -45 µm size fraction graded only 20.9% FC.

Figure 13.9 Mass Distribution of Size Fractions in Final Cleaner Concentrate

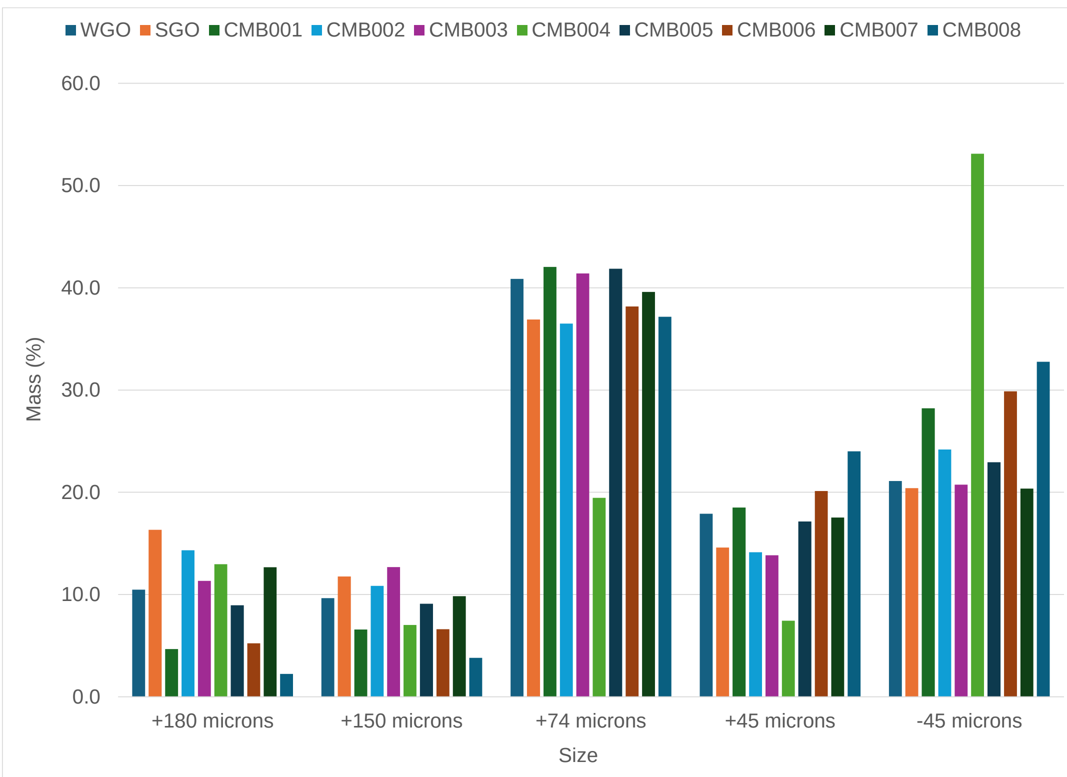
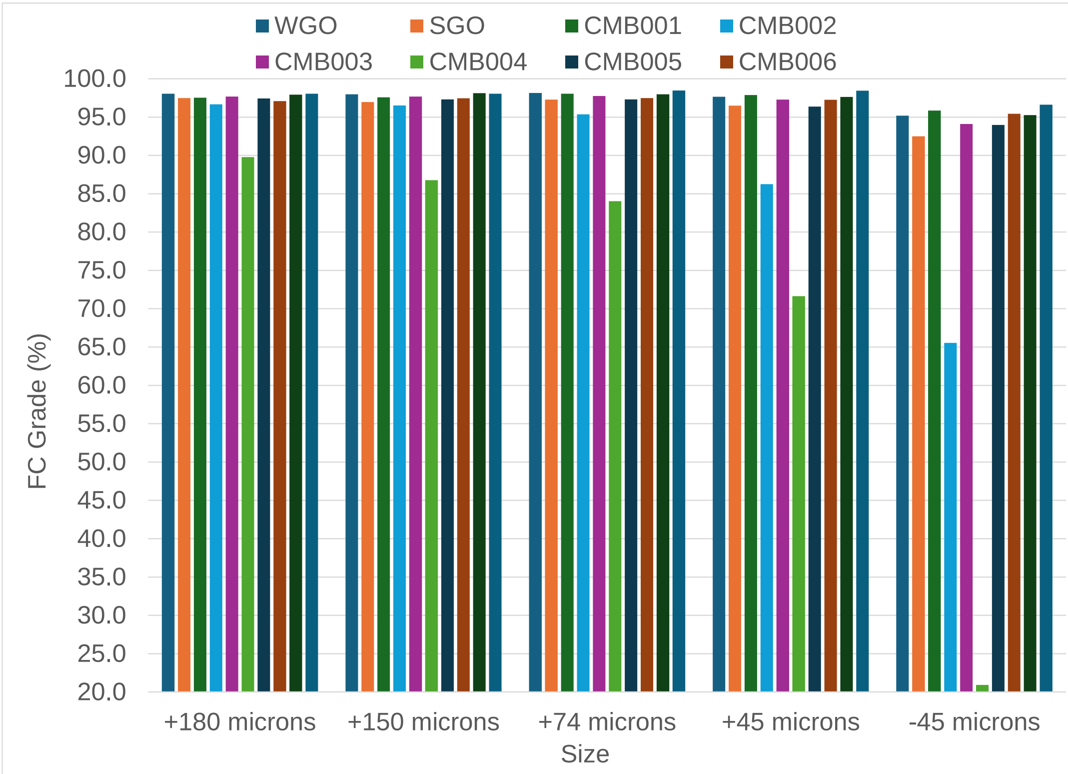


Figure 13.10 Grade Distribution of Size Fractions in Final Cleaner Concentrate



13.2 North Carolina State University Mineral Research Laboratory

On 3 May 2022, South Star announced that it had contracted North Carolina State University Mineral Research Laboratory ("MRL") to complete a metallurgical testing program using 3 x 1-tonne samples of mineralized material from various targets within the Project (South Star news release 3 May 2022). A one-ton sample sack was prepared using samples from three locations and delivered to MRL in August 2022. The bulk sample locations were chosen to be representative of mineralization from across the Project.

The 3 tonnes of bulk sampled material from the Project was milled and subjected to rougher and cleaner flotation steps to produce approximately 30 kg of 94% Cg flake graphite concentrate, successfully confirming the general flowsheet.

13.3 Metallurgical Testing at SGS

13.3.1 Sample Preparation and Chemical Characterization

Three composite samples from the BamaStar deposit were shipped to SGS Lakefield in Canada for metallurgical testing. The three samples included composites from the Oxide, Transitional, and Fresh mineralization. The samples were composited from bulk samples that were collected at the project site. The samples for the 2024 test program were obtained by sub-sampling several bulk bags to form the three composites.

Upon receipt, the three composites were stage-crushed to -6 mesh, homogenized, and then split into 4 kg test charges. Further, sub-samples for chemical analysis were extracted and submitted to the SGS analytical group. The results of the total carbon, graphitic carbon, and sulphur head analysis for the three samples are presented in Table 13.4. Most of the carbon present in the samples was in form of graphitic carbon, and the head grades ranged from 2.36% C(g) for the Fresh composite to 3.04% C(g) for the Oxide Composite.

Table 13.4 Total Carbon, Graphitic Carbon, and Sulphur Analysis

Composite ID	Assays, %		
	C(t)	C(g)	S
Oxide	3.36	3.04	0.03
Transitional	2.67	2.63	0.67
Fresh	2.54	2.36	1.38

The results of the whole rock analysis and ICP-OES scan are shown in Table 13.5 and Table 13.6, respectively. The most abundant element in all three samples was silica, followed by aluminium and iron. The results are consistent with the data that was obtained by GIRCU. Reported in their oxide from, these three elements accounted for approximately 90% of the sample mass. Titanium oxide concentrations of 0.45% TiO2 to 0.69% TiO2 is an indication that rutile could be present in the mineralized material. Mineralogical analysis will be required to determine the titanium oxide bearing mineral(s).

The concentrations of deleterious elements were generally low. Barium levels were slightly elevated and could build up in the process water if the barium is present in the form of a water-soluble sulphate.

Table 13.5 Whole Rock Analysis Results

Composite ID	Assay, %						
	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O
Oxide	69.8	11.5	7.30	0.66	0.12	0.33	2.70
Transitional	77.0	9.11	3.68	0.44	0.06	0.22	1.98
Fresh	79.8	8.19	2.48	0.73	0.45	0.37	1.99
Composite ID	**TiO_2**	**P_2O_5**	**MnO**	**Cr_2O_3**	**V_2O_5**	**LOI**	**Sum**
Oxide	0.69	0.05	< 0.01	0.02	0.04	6.21	99.4
Transitional	0.51	0.07	< 0.01	0.03	0.11	6.41	99.6
Fresh	0.45	0.21	< 0.01	0.03	0.08	5.08	99.9

Table 13.6 ICP-OES Analysis Results

Composite ID	Assays, g/t								
	As	Ba	Be	Bi	Cd	Co	Cu	Li	Mo
Oxide	< 30	7,050	1.94	< 20	< 3	< 4	85	31	58
Transitional	< 30	2,600	1.55	< 20	< 3	7	93	31	39
Fresh	< 30	3,530	2.34	< 20	< 3	12	71	38	37
Composite ID	**Ni**	**Pb**	**Sb**	**Se**	**Sn**	**Sr**	**Tl**	**Y**	**Zn**
Oxide	27	< 30	< 10	< 30	< 20	73.0	< 30	17.6	17
Transitional	61	< 30	< 10	< 30	< 20	47.8	< 30	19.6	158
Fresh	88	< 30	< 10	< 30	< 20	65.7	< 30	26.9	101

13.3.2 Comminution Testing

The three BamaStar composite samples were subjected to comminution testing to support the sizing of the crushing and grinding circuit. The comminution tests completed included Bond abrasion, Bond rod mill grindability, Bond ball mill grindability, and SMC testing. The results are summarized in Table 13.7 and are discussed in more detail in the following sections.

Table 13.7 Comminution Test Summary

Sample Name	Relative Density	JK Parameters		Work Indices (kWh/t)		AI
		A x b	SCSE	RWI	BWI	(g)
Oxide	2.42	329	5.2	4.7	6.7	0.041
Transition	2.44	207	5.7	7.8	11.9	0.121
Fresh	2.59	73.4	7.6	10.0	13.9	0.231

Bond Abrasion Tests

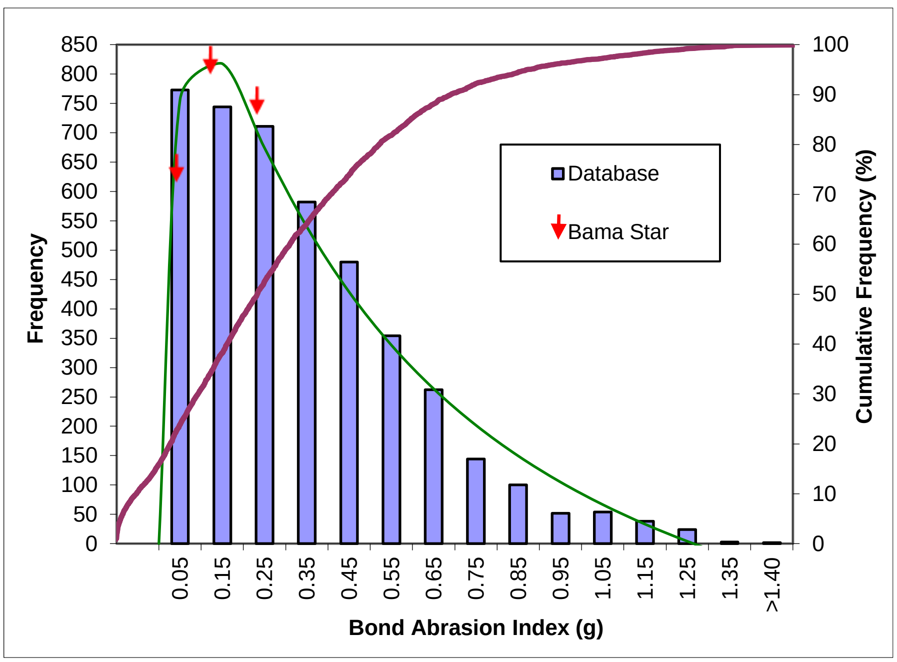
The results of the Bond abrasion tests on the three composites are shown in Table 13.8 together with the percentage of abrasivity in the large SGS database of historic test results. As somewhat expected, the abrasivity gradually increases with depth. The Oxide material yielded a very low Bond abrasion index (Ai) of 0.041 g, which placed it into the 10th percentile of all samples tested at SGS. Even the Fresh composite only displayed moderate abrasivity at 0.231 g.

Table 13.8 BamaStar Bond Abrasion Test Results

Sample Name	AI (g)	Percentile of Abrasivity
Oxide	0.041	10
Transition	0.121	22
Fresh	0.231	40

The results of the Bond abrasion tests are also illustrated in Figure 13.11 together with a histogram of the SGS Ai database.

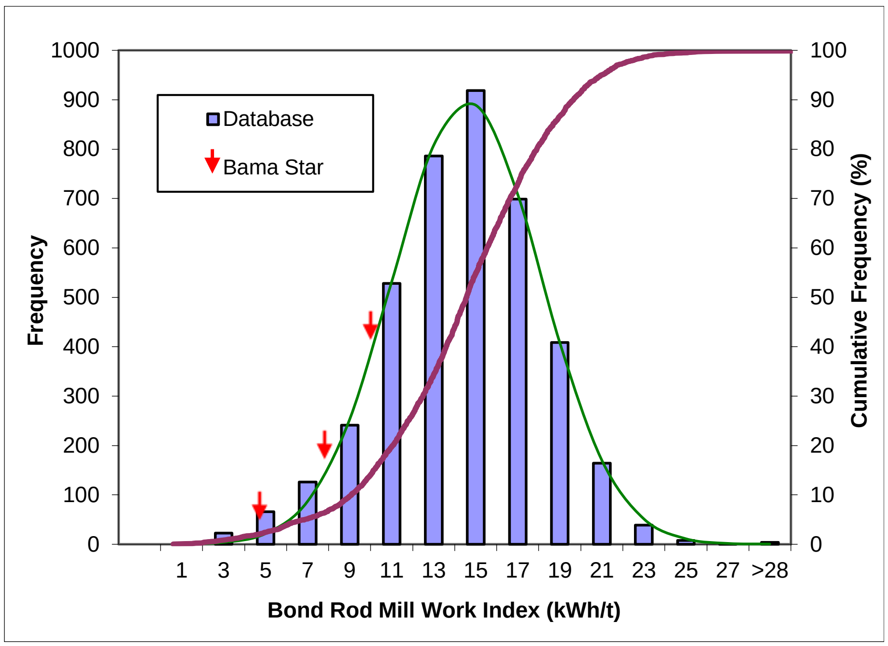
Figure 13.11 BamaStar Bond Abrasion Tests Results and SGS Database Histogram



Bond Rod Mill Grindability Tests

A Bond rod mill grindability test was carried out on the three composites at the standard mesh of grind of 14 mesh. The rod mill grindability work indices ranged between 4.7 kWh/t for the Oxide composite and 10.0 kWh/t for the Fresh composite. The RWI values place the BamaStar mineralization into the very soft category at the 1st to 11th percentile of hardness of more than 4,000 samples tested by SGS. The RWI value for the Bama Star composites has been plotted in Figure 13.12, together with the histogram of the SGS RWI database.

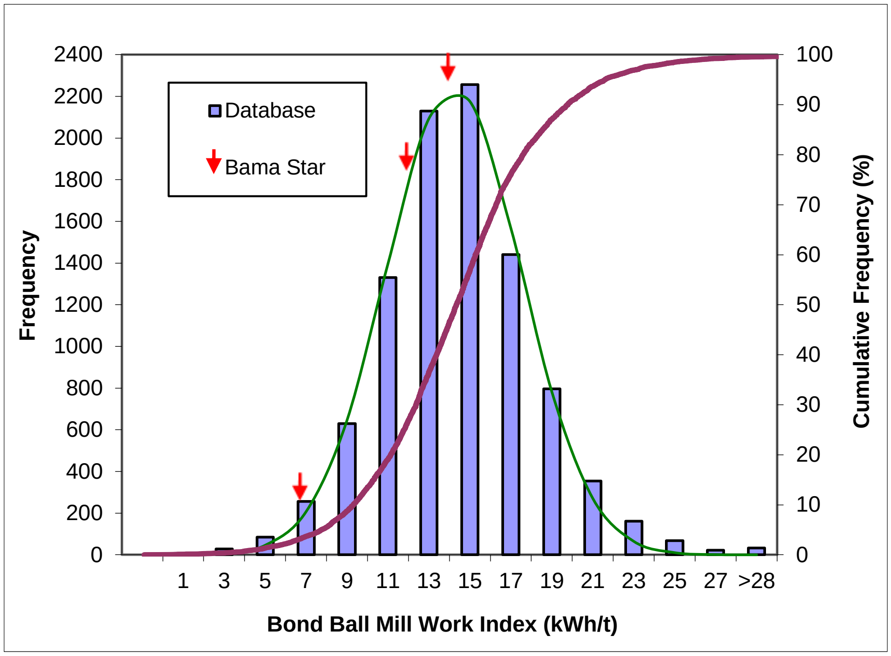
Figure 13.12 BamaStar Bond Rod Mill Tests Results and SGS Database Histogram



Bond Ball Mill Grindability Tests

Bond ball mill grindability tests were carried out at a mesh of grind of 250 µm (60 mesh) to reflect that rougher P_{80} grind size target of approximately 200 microns that was established in flotation tests prior to completion of the Bond ball mill grindability tests. The tests produced ball mill work indices between 6.7 kWh/t for the Oxide composite and 13.7 kWh/t for the Fresh composite. The BWI values place the BamaStar mineralization into the soft to medium hardness category and at the 2nd to 45th percentile of hardness of more than 9,500 samples tested by SGS. The BWI value for the BamaStar composites has been plotted in Figure 13.13, together with the histogram of the SGS BWI database.

Figure 13.13 BamaStar Bond Ball Mill Tests Results and SGS Database Histogram



SMC Tests

The results of SMC tests that were performed on the three composites are presented in Table 13.9. The SCSE values ranged between 5.24 kWh/t for the Oxide composite and 7.59 kWh/t for the Fresh composite, which corresponds to the 1st and 18th percentile of the JKTech database.

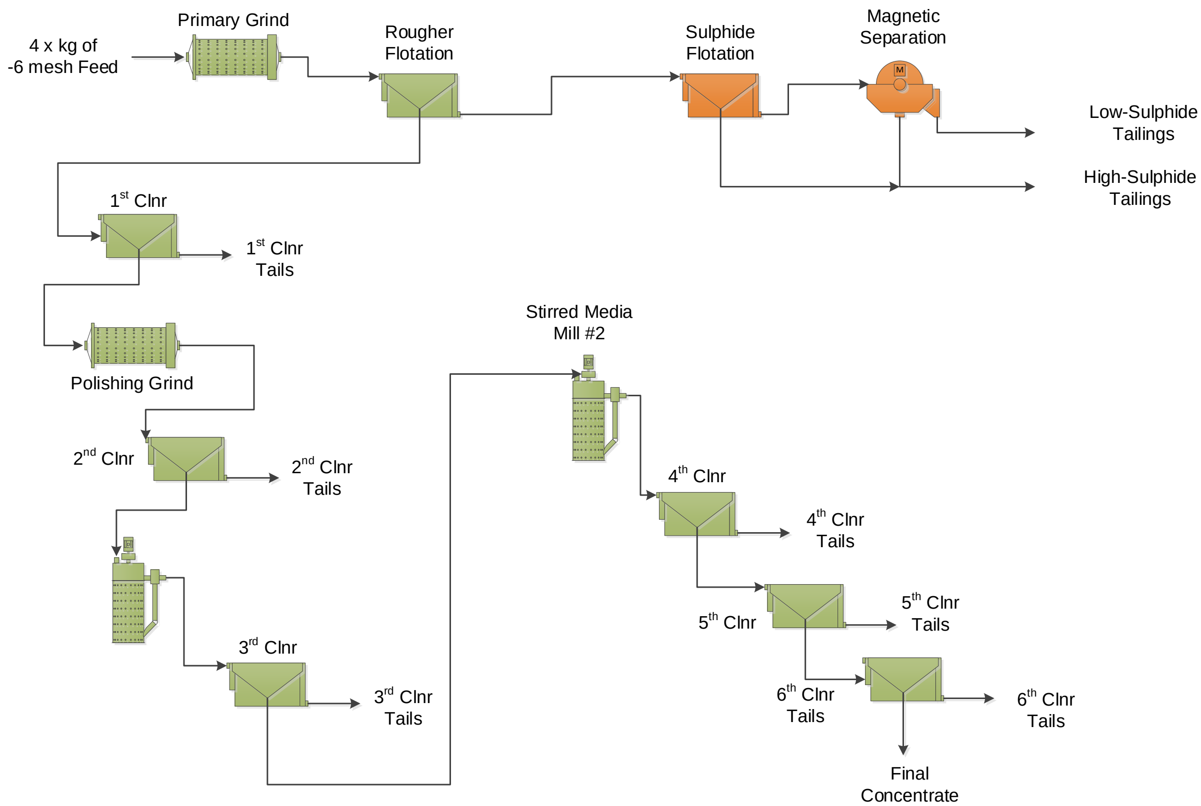
Table 13.9 Parameters derived from the SMC Test® Results

Sample	A	B	A*b	t_a	SCSE (kWh/t)	Database Percentile
Oxide	69.9	4.71	392.2	3.52	5.24	0.9
Transitional	65.1	3.18	207.0	2.20	5.70	2.6
Fresh	61.7	1.19	73.4	0.73	7.59	18.3

13.3.3 Flotation

A total of eight cleaner flotation tests were conducted on the three composites. Given the limited scope of the metallurgical test program, flowsheet and conditions were chosen based on the results obtained in the GIRCU test program and experience with similar deposits. The flowsheet that was used in the test program is depicted in Figure 13.14. The part of the flowsheet highlighted in green was employed in all eight tests while the desulphurization circuit highlighted in orange was only included in tests F7 and F8.

Figure 13.14 BamaStar Flowsheet



The reagent regime consisted of diesel as the graphite collector, methyl isobutyl carbinol (MIBC) as the frother, and sodium silicate as a gangue dispersant. The primary grind times were adjusted to achieve grind sizes between P_{80} = 120 and 245 µm. The flotation times and reagent dosages were established during testing based on the properties of the froth.

A summary of the mass balances of the two tests performed on the oxide composite is provided in Table 13.10. Both tests produced a final concentrate grading over 99% C(t) at open circuit total carbon recoveries of 88%. Reducing the primary grind and polishing time in test F4 had little impact on the final product and it may be possible to further reduce the grinding energy input, which will have to be investigated during a full process optimization program.

Table 13.10 Simplified Mass Balances for Oxide Composite

Test	Product	Weight %	Assays, % C(t, g)		% Distribution C(t)
F1 Rougher P80 =120 microns Polish 30 min SMM #1 10 min SMM #2 5 min	6th Clnr Conc	2.8	99.5		87.5
	5th Clnr Conc	2.8	99.4		88.5
	4th Clnr Conc	2.9	99.0		89.2
	3rd Clnr Conc	2.9	98.0		90.4
	2nd Clnr Conc	3.0	95.5		91.2
	1st Clnr Conc	3.3	89.3		92.6
	Rougher Conc	6.6	46.4		95.9
	Rougher Tails	93.4	0.14		4.1
	Head (calc.)	100.0	3.18		100.0
F2 Rougher P80 =140 microns Polish 20 min SMM #1 10 min SMM #2 5 min	6th Clnr Conc	2.8	99.1		87.9
	5th Clnr Conc	2.9	98.6		89.8
	4th Clnr Conc	3.0	97.5		91.1
	3rd Clnr Conc	3.1	95.2		92.1
	2nd Clnr Conc	3.4	86.9		93.3
	1st Clnr Conc	5.3	57.3		94.4
	Rougher Conc	6.8	44.9		96.2
	Rougher Tails	93.2	0.13		3.8
	Head (calc.)	100.0	3.20		100.0
C(g)					

The results of the three cleaner flotation tests conducted on the Transitional composite are presented in Table 13.11. While the open circuit recoveries of approximately 92% for the Transitional composite were slightly higher compared to the Oxide composite, the final concentrate grades of 94.4 C(t) to 96.4% C(t) were noticeably lower. The total carbon recovery of 95.3% in test F7 is slightly overstated since no carbon analysis was conducted on the sulphide concentrate products.

Coarsening the primary grind size from P_{80} = 178 µm in test F2 to P_{80} = 215 µm in test F5 did not have any impact on the rougher recovery and the rougher tailings graded 0.06% C(g) in both tests. This suggests that a primary grind size of P_{80} = 200 µm should be targeted for the Transitional composite until more information is available after the completion of a full process development program.

The initial polishing time of 30 minutes followed by two stages of stirred media milling at 10 minutes and five minutes produced a concentrate grading at least 96.4% C(t), which exceeded the minimum concentrate grade target of 92.0 - 94.0% C(t) that was established by South Star senior management.

Table 13.11 Simplified Mass Balances for Transitional Composite

Test	Product	Weight %	Assays, % C(t, g)	Assays, % S	% Distribution C(t)
F2 Rougher P80 =178 microns Polish 30 min SMM #1 10 min SMM #2 5 min	6th Clnr Conc	2.2	96.4	-	91.5
	5th Clnr Conc	2.2	94.6	-	92.6
	4th Clnr Conc	2.4	90.0	-	93.4
	3rd Clnr Conc	2.7	78.7	-	94.0
	2nd Clnr Conc	3.6	61.0	-	95.1
	1st Clnr Conc	7.2	30.7	-	96.6
	Rougher Conc	9.1	24.6	-	97.6
	Rougher Tails	90.9	0.06	-	2.4
	Head (calc.)	100.0	2.28	-	100.0
F5 Rougher P80 =215 microns Polish 20 min SMM #1 10 min SMM #2 5 min	6th Clnr Conc	2.6	94.5	-	92.4
	5th Clnr Conc	2.7	91.5	-	92.7
	4th Clnr Conc	2.9	85.6	-	93.0
	3rd Clnr Conc	3.3	76.3	-	93.4
	2nd Clnr Conc	4.2	60.3	-	94.2
	1st Clnr Conc	8.6	30.0	-	95.7
	Rougher Conc	10.6	25.1	-	98.0
	Rougher Tails	89.4	0.06	-	2.0
	Head (calc.)	100.0	2.71	-	100.0
F7 Rougher P80 =227 microns Polish 20 min SMM #1 10 min SMM #2 10 min	6th Clnr Conc	2.6	94.4	-	95.3
	5th Clnr Conc	2.7	91.7	-	95.7
	4th Clnr Conc	2.9	85.6	-	96.0
	3rd Clnr Conc	3.4	73.9	-	96.9
	2nd Clnr Conc	4.6	55.2	-	97.4
	1st Clnr Conc	9.2	27.7	-	98.0
	Rougher Conc	12.3	20.8	-	98.4
	Sulphide Rougher Conc	2.4	-	3.27	0.0
	Sulphide Ro Conc & 1,000 G Mags	2.5	-	3.16	0.0
	Sulphide Ro Conc & 3,000 G Mags	2.9	-	2.84	0.0
	Sulphide Ro Conc & 7,000 G Mags	3.9	-	2.22	0.0
	Sulphide Ro Conc & 15,000 G Mags	5.2	-	1.77	98.4
	15,000 Gauss Non-mags	82.4	0.05	0.08	1.6
	Head (calc.)	100.0	2.61	0.18	100.0
C(g)					

The results of the three cleaner flotation tests conducted on the Fresh composite are presented in Table 13.12. The open circuit recovery remained high at 90-93% in tests F3 and F6. Again, test F8 with the sulphide rejection circuit was not included in the open circuit recovery assessment since the sulphide concentrates were not assayed for C(t).

The total carbon grades of the concentrates were the lowest of the three composites at 91.0 – 94.4% C(t). The highest concentrate grade of 94.4% C(t) was obtained in test F3 with a primary grind size of P_{80} = 195 µm. Coarsening the primary grind size to P_{80} = 245 microns in test F6 did not lead to higher graphite losses to the rougher tailings but resulted in a lower rougher concentrate grade of 20.8% C(t) compared to approximately 25% C(t) in the other two tests. The current design of the cleaning circuit was unable to achieve sufficient liberation. It is anticipated that an optimization of the regrind conditions will produce higher concentrate grades.

The cleaning circuit in test F3 employed the same polishing and stirred media grinding stages and grind times as the other two domain composites (30 minutes Polish, 10 minutes SMM #1, and 5 minutes SMM #2).

Table 13.12 Simplified Mass Balances for Fresh Composite

Test	Product	Weight	Assays, %		% Distribution
		%	C(t, g)	S	C(t)
F3 Rougher P80 =195 microns Polish 30 min SMM #1 10 min SMM #2 5 min	6th Clnr Conc	2.4	94.4	-	90.3
	5th Clnr Conc	2.5	90.7	-	91.6
	4th Clnr Conc	2.8	83.7	-	93.9
	3rd Clnr Conc	3.3	70.6	-	94.6
	2nd Clnr Conc	4.9	48.5	-	94.9
	1st Clnr Conc	10.7	22.1	-	95.2
	Rougher Conc	12.1	19.6	-	95.8
	Rougher Tails	87.9	0.12	-	4.2
	Head (calc.)	100.0	2.49	-	100.0
F6 Rougher P80 =245 microns Polish 30 min SMM #1 10 min SMM #2 10 min	6th Clnr Conc	2.5	91.0	-	93.3
	5th Clnr Conc	2.7	85.3	-	93.7
	4th Clnr Conc	3.1	74.9	-	94.1
	3rd Clnr Conc	3.9	60.2	-	94.7
	2nd Clnr Conc	5.9	39.7	-	95.5
	1st Clnr Conc	12.8	18.5	-	95.9
	Rougher Conc	14.3	16.7	-	96.5
	Rougher Tails	85.7	0.10	-	3.5
	Head (calc.)	100.0	2.47	-	100.0
F8 Rougher P80 =230 microns Polish 20 min SMM #1 10 min SMM #2 10 min	6th Clnr Conc	2.4	92.9	-	94.0
	5th Clnr Conc	2.5	89.6	-	94.6
	4th Clnr Conc	2.8	82.5	-	95.1
	3rd Clnr Conc	3.4	66.8	-	95.8
	2nd Clnr Conc	5.7	41.0	-	96.9
	1st Clnr Conc	12.3	18.9	-	97.5
	Rougher Conc	14.4	16.4	-	98.3
	Sulphide Rougher Conc	4.4	-	5.73	0.0
	Sulphide Ro Conc & 1,000 G Mags	4.4	-	5.62	0.0
	Sulphide Ro Conc & 3,000 G Mags	4.6	-	5.40	0.0
	Sulphide Ro Conc & 7,000 G Mags	5.0	-	5.07	0.0
	Sulphide Ro Conc & 15,000 G Mags	5.6	-	4.50	98.3
	15,000 Gauss Non-mags	80.0	0.05	0.12	1.7
	Head (calc.)	100.0	2.39	0.39	100.0
C(g)					

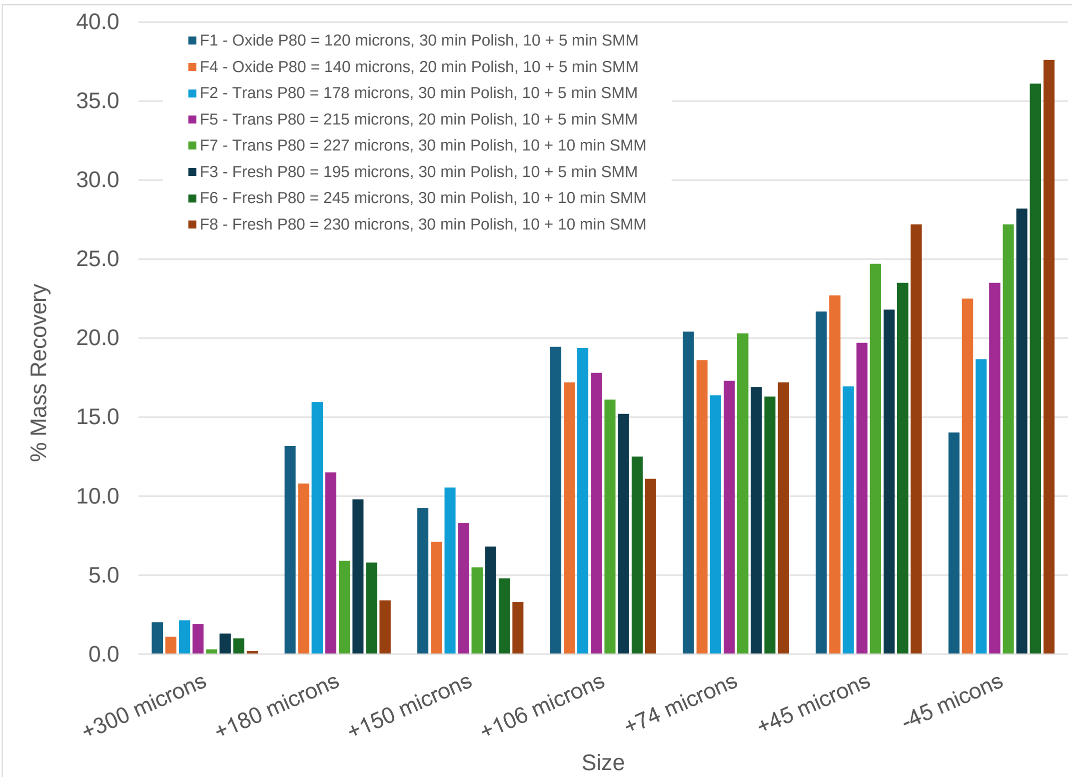
The total carbon grade of the final concentrate is only one qualifying property, and the flake size distribution is another critical variable that determines the value of a specific graphite concentrate. Hence, the final concentrates of each cleaner flotation test were subjected to a size fraction analysis. The mass recovery into the different size fractions is presented in Figure 13.15.

The mass recovery into the plus 150 microns size fraction ranged between 28.6% in test F2 using the Transitional sample and 6.9% in test F8 using the Fresh sample. Despite shorter primary and polishing grind times in the second Oxide test F4, the mass recovery into the coarser size fractions of plus 150 µm decreased from 24.4% in test F1 to 11.9% in test F4. Since both, the final concentrate grade and the open circuit graphite recovery, was almost identical in the two tests, the difference in flake size distribution can only be explained with test-to-test variance.

The best concentrate grade and coarsest flake size distribution for the Transitional composite was achieved in test F2 with 28.6% of the mass reporting to the plus 150 µm size fractions. The other two tests on the Transitional composite explored coarser primary grind sizes, reducing polishing time, and increased SMM #2 grind time but failed to improve on the results of test F2.

The Fresh composite produced the finest flake size distribution of the three composites. Test F3, which included a primary grind of P_{80} = 195 µm, 30 minutes polishing, 10 minutes of SMM #1, and 5 minutes of SMM #2 generated the best coarsest product of the three Fresh composite tests, but still only 17.9% of the concentrate mass reported to the plus 150 µm size fractions. This value decreased to 11.6% and 6.9% in tests F6 and F8 with coarser primary grind and longer SMM #2 grind time.

Figure 13.15 Size Fraction Analysis – Mass Distribution

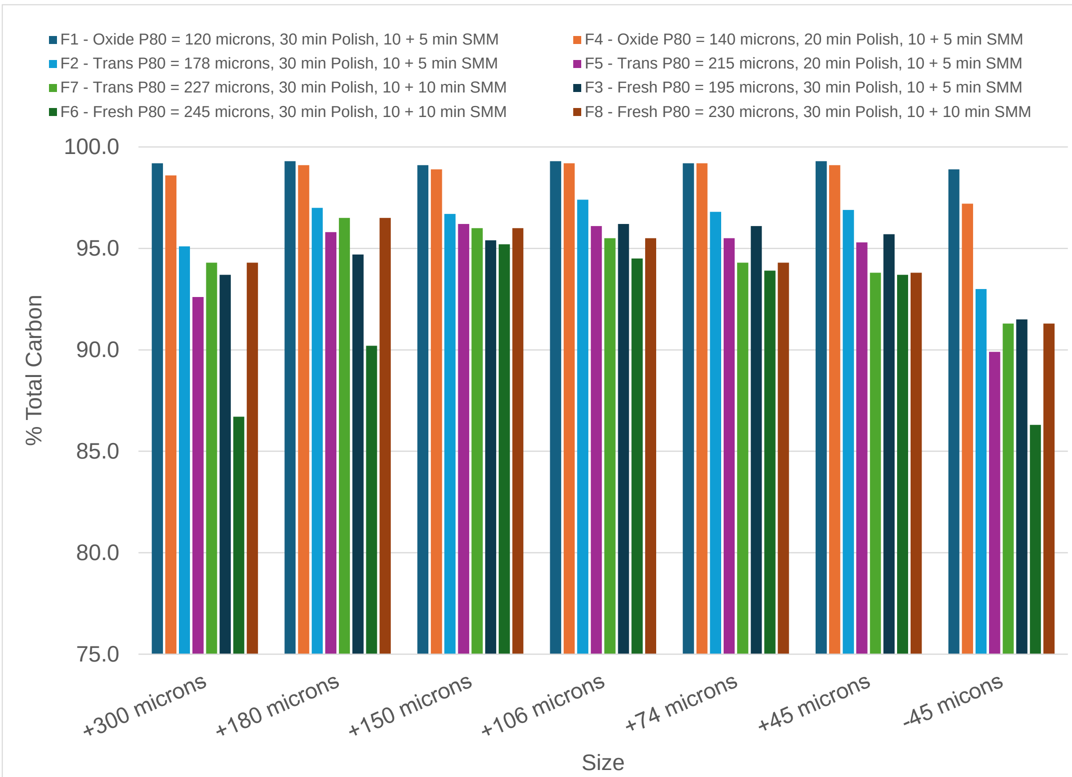


The total carbon grades of the various size fractions are shown in Figure 13.16. The Oxide composite produced very high total carbon grades of at least 97.2% C(t) in all size fractions of the two tests F1 and F4. Excluding the minus 45 µm product, the minimum total carbon grade increased to 98.6% C(t). Reducing the polishing time from 30 minutes in test F1 to 20 minutes in test F4 had little impact on the grades overall but resulted in a grade decrease of the minus 45 microns product from 98.9% C(t) to 97.2% C(t).

The total carbon grades of the size fractions of the Transitional composite decreased noticeably compared to the Fresh composite but still yielded 95.1% or higher in all size fractions of test F2 except the minus 45 µm product. Reducing the polishing time resulted in lower grades in each size fraction. A coarser primary grind size combined with a longer secondary stirred media grind time almost matched the results of test F2 but at the finer product size mentioned above.

The Fresh composite grades were similar to the Transitional composite with values typically between 93.5% C(t) and 96.5% C(t). The best test F3 produced total carbon grades of at least 93.7% C(t) in all size fractions except the minus 45 µm product. The conditions in this test are consistent with the ones that also produced the best results for the Oxide and Transitional composites (30 minutes polishing, 10 minutes SMM #1, and five minutes SMM #2).

Figure 13.16 Size Fraction Analysis – Grade Distribution

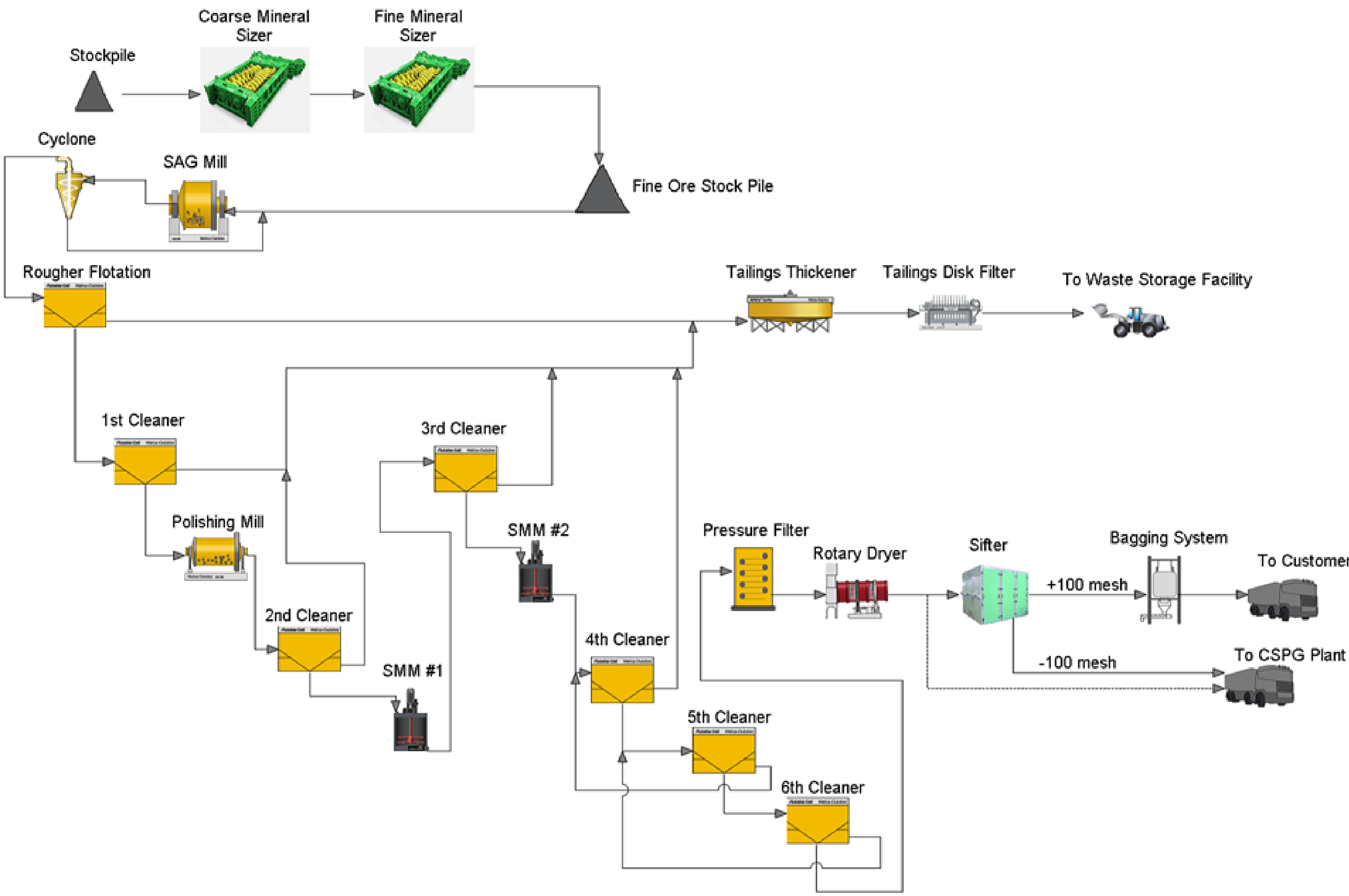


Based on the results of the limited number of tests that were completed on the BamaStar material, the metallurgical performance of the three composites has been summarized in Table 13.13. For design purposes, an average mass recovery into the plus 150 µm size fractions of 25% should be assumed with the balance of 75% reporting to the minus 150 µm product. The proposed flowsheet for the BamaStar deposit is depicted in Figure 13.17, which assumes that no desulphurization is required.

Table 13.13 Summary of Metallurgical Performance

Criteria	Units	Oxide	Transitional	Fresh
Recovery (projected closed-circuit)	% C(t)	87.5	91.5	90.3
Concentrate Grade	% C(t)	99.8	96.4	94.4
+150 micron Graphite Concentrate	% Mass	24.4	28.6	17.9
-150 micron Graphite Concentrate	% Mass	75.6	71.4	82.1

Figure 13.17 Proposed BamaStar Flowsheet



14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

The definition of Mineral Resource and associated Mineral Resource categories used in this Technical Report are those recognized under NI 43-101 and set out in the CIM Definition Standards. Assumptions, threshold parameters, and deposit modelling methodology associated with the MRE are discussed below in Sections 14.2 through 14.8.

The BamaStar Graphite Deposit MRE, effective date 24 July 2024, was prepared for South Star by Mr. Matthew Harrington, P.Geo., of Mercator. The updated MRE includes all available information up to and including the results of the 2023 diamond drill hole program.

14.2 Geological Interpretation Used in Resource Estimate Property Location

Flake-graphite is hosted in metamorphosed siliceous sedimentary rocks including quartz-mica schists, micaceous quartzites, or micaceous feldspathic quartzites. These rocks occur in thrust-fault and folded metamorphosed sequences of detrital sedimentary rocks. Individual beds or lenses are richer in graphite than associated beds, with the size, form, and persistence a function, in part, of the thickness and extent of the original sedimentary bed, and in part, of deformation. Their attitudes are functions of local and regional deformation.

Correlations of graphitic units are based on the stratigraphic sequence developed from property scale mapping (Carman, 2019) and include, from west to east, a metapelite package without graphite, a quartz bearing package with variable graphite that grades into a sillimanite bearing package also with graphite, an amphibolite bearing gneiss without quartz or graphite, and more quartz + sillimanite-rich rocks with graphite.

14.3 Methodology of Resource Estimate

14.3.1 Data Validation

On 7 May 2024, Mercator received data files from South Star containing diamond drill hole information from the 2022 and 2023 drilling programs, and pit and trench information collected by Charge Minerals in 2019. Provided information included collar locations of diamond drill holes, pits and trenches, downhole surveys, assay results, drill core logs, surface mapping, rock quality designation, and density measurements.

The Project drill hole database includes verified results for 27 drill holes (2,391 m) and 29 trenches (2,905 linear meters) with a total of 2,275 Cg % assays and 93 core specific gravity measurements. Implementation of the database validation and review procedures described in section 12.2 resulted only minor database entry corrections. This mostly reflected Depth From – Depth To logical corrections for lithology interval tables, minor elevations changes for several trenches to properly register against the LiDAR topography surface, and two core assay values replace with "0" Cg % based on poor core recovery (as described in section 10). Corrections were incorporated to create the validated and functional drilling database used in the MRE.

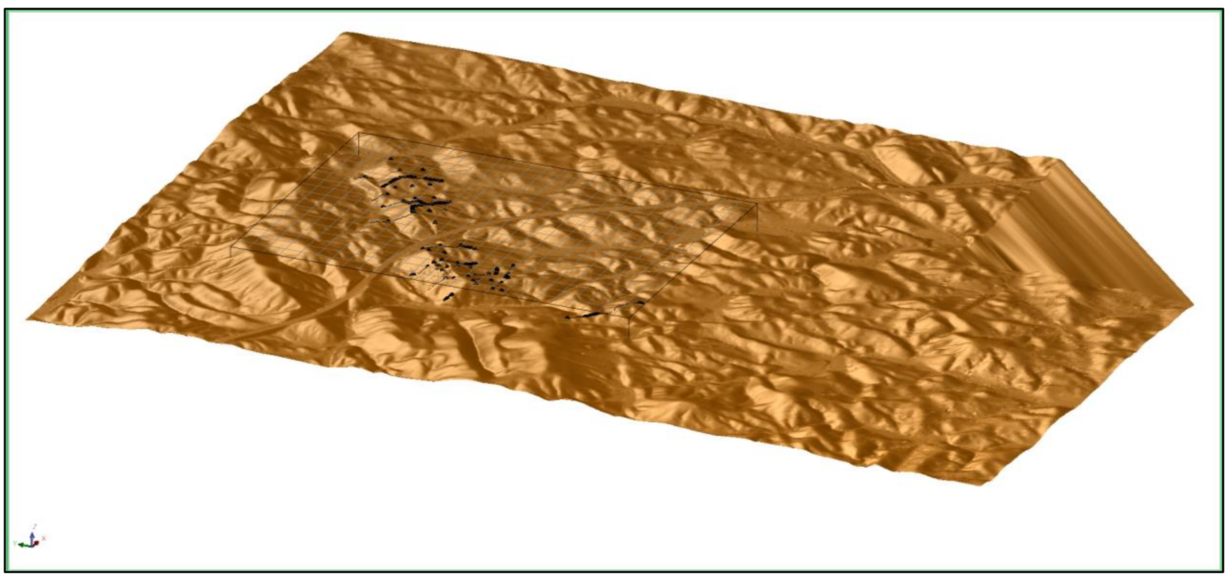
14.3.2 Geological Modelling

Geological models were created using diamond drill hole, trench, test pit and surface mapping information to represent a 3D interpretation for property lithology, major structures, weathering, redox state and mineralization. These models constitute the basis for the Mineral Resource. All solid models developed for the Mineral Resource were constrained within the current property boundary excluding the Potential Option Agreement.

Topography

A digital terrain model ("DTM") for 10 m resolution LiDAR surface has been developed for the property. Where applicable, the topographic surface DTM was applied as the top surface constraint (Figure 14.1).

Figure 14.1 Isometric View to the Northeast of the Topographic DTM (100 m grid)

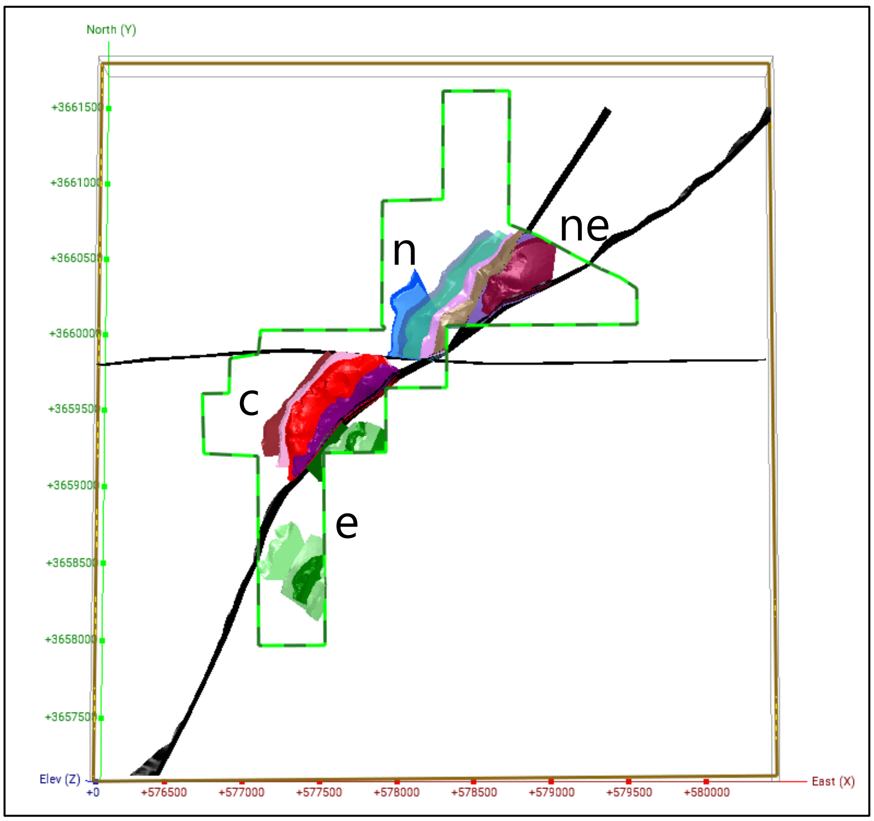


Source: Mercator, 2024

Structure

The exploration program carried out in 2019 by Charge Minerals included the characterization of faults by measuring their orientations, which were mapped as surfaces with locally measured dip and strike direction. Notable fault surfaces were modelled in Seequent Leapfrog Geo v2023.2.1 ("Leapfrog") when they could be observed through displacement of multiple surface outcrops and were consistent with the mapped fault trace. In total, four faults were modelled as surfaces: three with north-northeast direction and one inferred fault with east-west direction. The four modelled faults define four fault blocks referred to as: Northeast ("ne"), North ("n"), East ("e"), and Central ("c") (Figure 14.2).

Figure 14.2 Isometric View to the Northeast of the Topographic DTM (100 m grid)



Source: Mercator, 2024

Lithology

The lithological model was based primarily on the geological logging of the diamond drill holes, trenches and pits with additional information extracted from surface mapping. Where conflicting lithology types were noted between the geological mapping and the drill core, the data in the drill core was used in preference. One likely reason for the conflicting lithology types between surface and subsurface core data is the intensity of weathering near surface making the original protolith difficult to determine.

The lithology codes were grouped to better define the modellable units (Table 14.1). The lithological model was developed to a draft state to assist with graphitic unit correlation. The metapelite was used as a marker horizon for determining mineralized zones

Table 14.1 Lithologies Logged from the Input Data with Groupings used in the Lithology Model

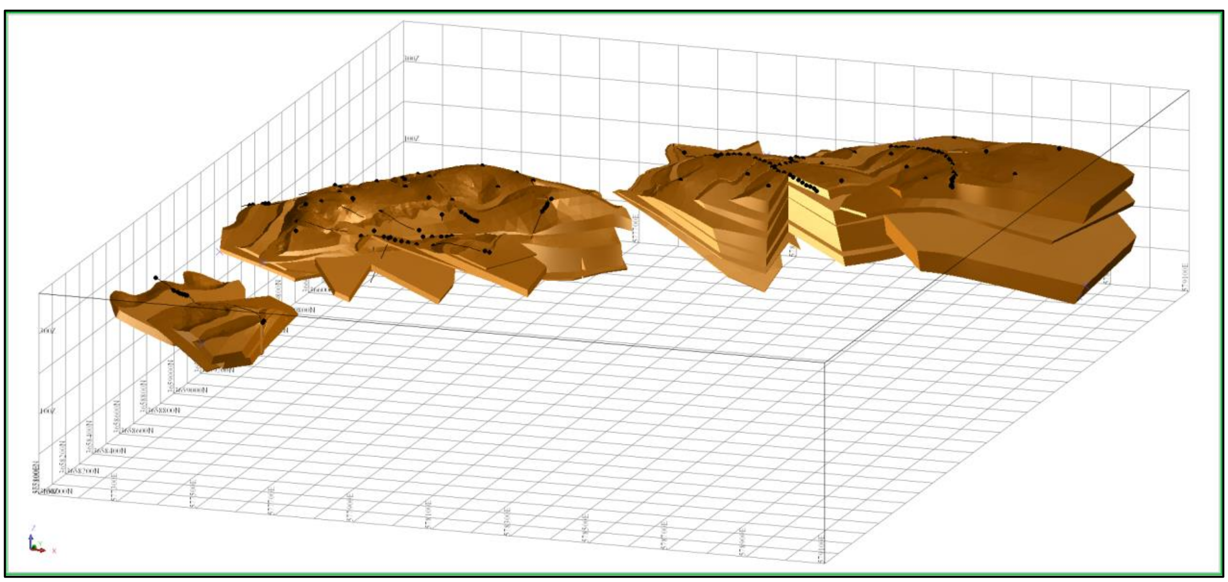
Code	Lithology	Group	Length m	%
PQX	Metapelite schist with chlorite and quartz		52.7	0.95%
PE	Metapelite gneiss, generic for sillimanite-biotite-garnet rock of varying composition but quartz lacking		42.7	0.77%
PQB	Metapelite schist with biotite and quartz		15.0	0.27%
PEC	Metapelite gneiss, sillimanite-biotite-garnet rock with a clotty texture and trace graphite		5.5	0.10%
PEG	Pegmatite dike, generally albite, quartz and muscovite		130.8	2.36%
QZE	Quartzite or quartz lode (>80% quartz)		672.7	12.13%
QZT/QBT/QKY	Quartz with tourmaline		223.9	4.04%
QZW	Quartz dominant rock with texture unlike quartzite and commonly sulfidic		40.6	0.73%
QV/QVN	Quartz vein		28.7	0.52%
QFD	Quartz-feldspar rock		27.5	0.50%
QZF	Quartzite (quartz >80%) that is less silicified and more recessive weathering		24.9	0.45%
QGT	Quartzite or quartz lode with garnets		12.7	0.23%
GSC	Schist to gneiss of thinly banded units of varying quartz, sillimanite, feldspar and graphite		290.3	5.23%
PWG	Metapelite gneiss of sillimanite or feldspar and garnet with a bleached look		73.9	1.33%
PSBG	Metapelite gneiss-schist with sillimanite plus biotite and/or garnet		62.8	1.13%
GNS	Undifferentiated gneiss generally with sillimanite and/or feldspar		15.7	0.28%
QSM	Quartz-sillimanite gneiss (quartz 20-80%, sillimanite 80-20%)		686.1	12.37%
QSMB	Quartz-sillimanite gneiss (quartz 20-80%, sillimanite 80-20%) with blebby texture		50.9	0.92%
GSM	Sillimanite gneiss with accessory muscovite, quartz		801.4	14.45%
GSMB	Sillimanite gneiss with accessory muscovite, quartz and a "blebby" texture		164.8	2.97%
SSM	very schistose sillimanite gneiss		16.0	0.29%
GFB	Feldspar and Biotite dominate rock (60%/40, 40%/60%)		566.5	10.21%
AMP	Hornblende gneiss to amphibolite generally feldspar equal or dominant		92.6	1.67%
AMPL	Feldspar gneiss with lesser hornblende (<40%)		13.0	0.24%
SAP	Saprolite of undistinguishable rock lacking quartz		211.2	3.81%
GOS	Gossan after semi to massive sulfide deposits generally with sillimanite		32.7	0.59%

Code	Lithology	Group	Length m	%
CLAY	Clays		994.3	17.93%
RCR	Red clay soil		73.0	1.32%
NODIG	Not Digitized or Empty		25.0	0.45%
RSO	Orange, somewhat sandy soil		13.0	0.23%
RSG	Grey, sandy soil		1.0	0.02%
FEST	Solid, iron rich rock		0.2	0.00%
SHR/FLT	Shear Zone, generally schist but also lineated/rotated gneiss		72.8	1.31%
LC	Lost core, poor recovery		11.8	0.21%

Mineralization

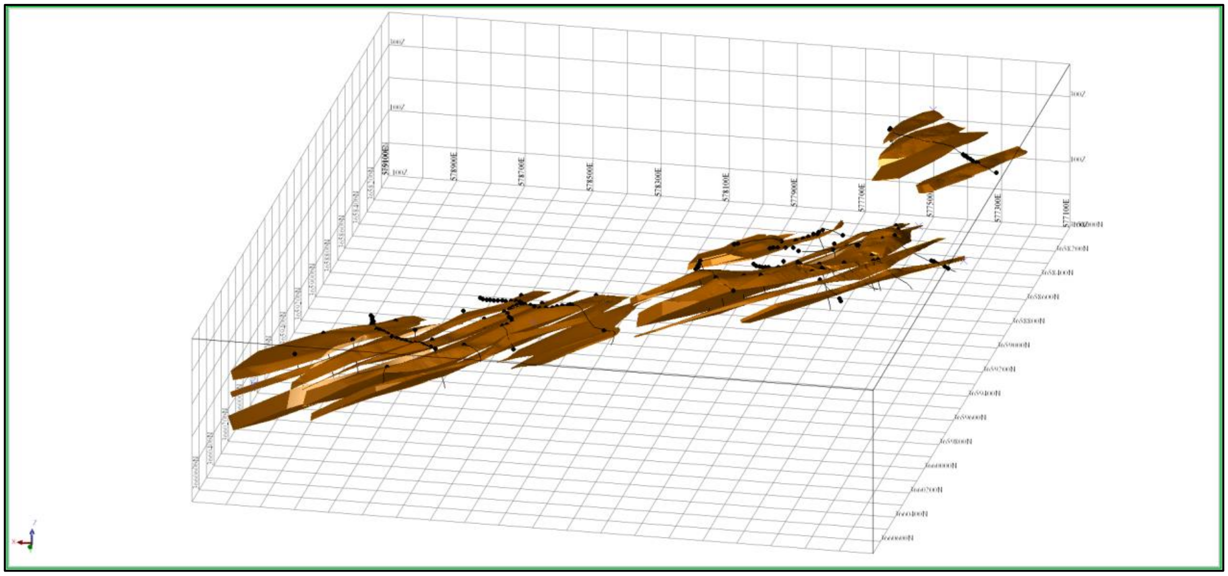
A graphitic carbon cut-off grade of 0.70% over 5 m downhole was used to define the mineralized domains. A few intercepts were accepted below that length support for continuity purposes, generating graphite intercepts up to 60 m thick with an average thickness of 22 m. The outer contact points of each intercept were used to generate hanging wall and footwall surface meshes, and the meshes were subsequently used to develop 3D solid models for each unit. Solid models were projected along strike and down dip by half the distance to the nearest drill hole, to a bounding fault surface, or by 300 m where a constraining drill hole / fault was not present (Figure 14.3 and 14.4).

Figure 14.3 Isometric View to the Northwest of the Graphite Solid Models (100 m grid)



Source: Mercator, 2024

Figure 14.4 Isometric View to the Southwest of the Graphite Solid Models (100 m grid)



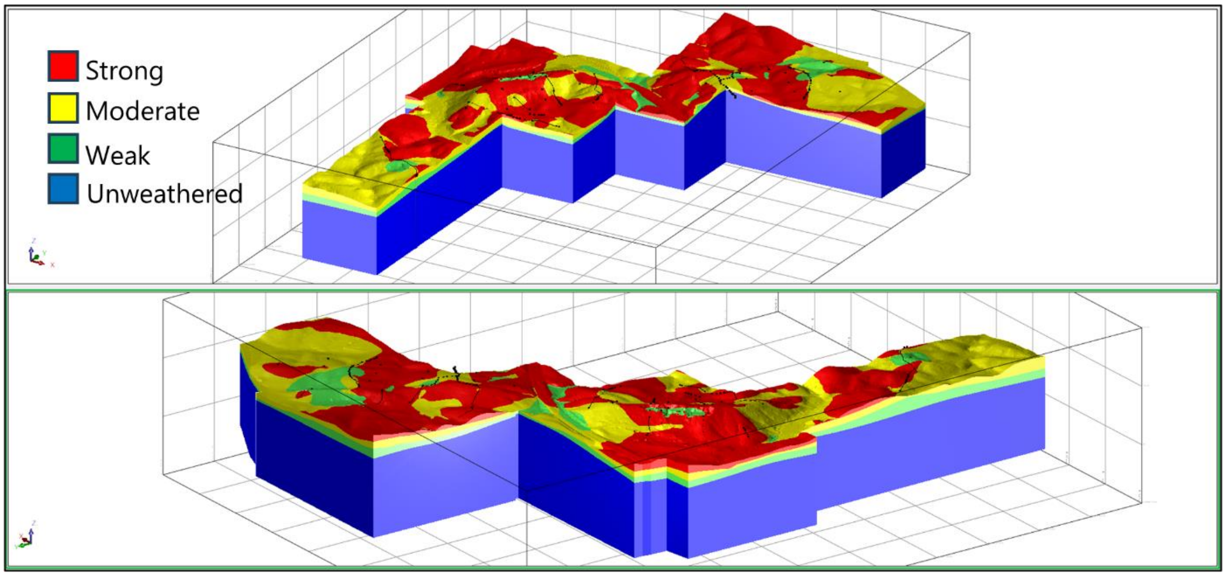
Source: Mercator, 2024

A total of 18 graphite units were modelled within the 4 fault blocks. The modelled graphite units occur over a strike length of over 2,800 m, a maximum dip extent of 600 m, and a maximum depth below surface of 325 m.

Weathering

A weathering model was developed based on logged weathering intensity of strong, moderate, weak, and unweathered in the Project database (Figure 14.5). Solid models were developed from a deposit model in Leapfrog by correlating the contacts between the 4 weathering intensity types. The weathering model constrains density assignment in the block model.

Figure 14.5 Isometric View to the Northwest (top) and Southwest (bottom) of Weathering Solid Models (250 m grid)

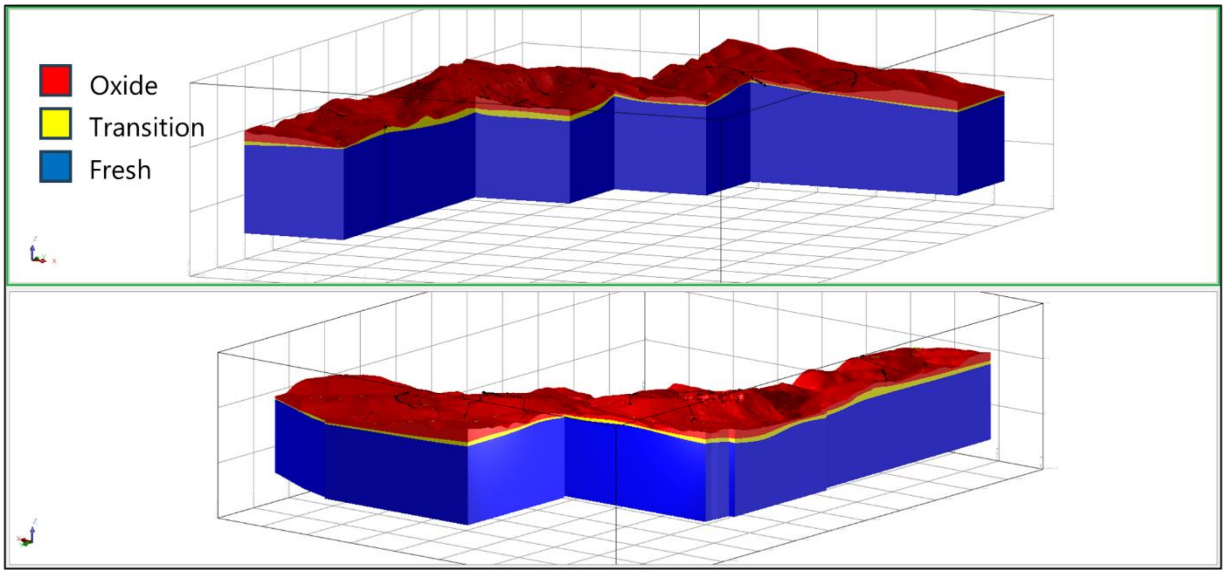


Source: Mercator, 2024

Redox

A redox model was developed based on logged redox state of oxide, transition, and fresh material in the Project database (Figure 14.6). Solid models were developed from a deposit model in Leapfrog by correlating the contacts between the three redox types. Every drill hole except CDM23014, which collared into transition material at the base of the historical Ceylon Mine pit, collared into oxide material with thickness of several to 10s of meters. As such, the current model represents an almost continuous horizon of oxide material at the surface, extending through lower lying areas waterways, valleys and the highway. Accuracy of the redox model depreciates away from drill hole and trench data and continued exploration is recommended to better define local oxide, transition, and fresh material thickness. The redox model constrains assignment of mining costs, processing cost, and metallurgical recovery.

Figure 14.6 Isometric View to the Northwest (top) and Southwest (bottom) of Redox Solid Models (250 m grid)



Source: Mercator, 2024

14.3.3 Data Analysis and Assay Compositing

A statistical analysis was completed on the assay data contained within the mineralized domain wireframes, considering both trench sample data and drill holes samples. Table 14.2 and Table 14.3 shows the summary length-weighted statistics for the modelled graphite domains. The basic statistical evaluation shows the slightly variable nature of the graphite grades within the mineralized domains, which is expected within this type of system. The considered variability within each domain result in coefficients of variation (CV) less than one.

Table 14.2 Assay Length-Weighted Statistics for the Graphite Domains

Domain	Count	Length	Mean	Standard Deviation	Coefficient of Variation	Variance	Minimum	Lower Quartile	Median	Upper Quartile	Maximum
c1	101	278.03	2.60	1.14	0.44	1.30	0.33	1.73	2.94	3.45	4.36
c2	537	1156.38	2.17	0.78	0.36	0.62	0.03	1.72	2.25	2.64	4.96
c3	50	133.50	1.70	0.77	0.45	0.59	0.03	1.00	1.63	2.37	3.60
c4	37	84.36	2.06	0.90	0.44	0.81	0.03	1.43	2.20	2.71	4.05
e1	46	101.73	3.03	1.05	0.35	1.11	0.03	2.36	3.17	3.68	5.20
e2	60	143.37	2.37	0.83	0.35	0.69	0.00	1.95	2.47	2.76	4.68
e3	10	21.78	1.62	0.57	0.35	0.32	0.79	1.10	1.60	2.19	2.57
e4	10	13.50	1.14	0.33	0.29	0.11	0.35	0.87	1.36	1.42	1.54
e5	14	70.00	1.16	0.38	0.33	0.15	0.45	0.97	1.13	1.37	1.81

Domain	Count	Length	Mean	Standard Deviation	Coefficient of Variation	Variance	Minimum	Lower Quartile	Median	Upper Quartile	Maximum
n1	74	109.20	1.99	0.71	0.35	0.50	0.03	1.65	1.97	2.46	3.50
n2	41	62.86	1.95	0.83	0.42	0.68	0.03	1.51	1.92	2.44	3.78
n3	141	287.29	2.27	1.00	0.44	1.01	0.03	1.39	2.23	3.08	4.30
n4	51	132.52	1.27	0.72	0.57	0.52	0.03	0.90	1.09	1.48	3.22
n5	4	7.78	1.90	1.25	0.66	1.57	0.03	1.54	1.54	3.14	3.14
n6	6	15.80	2.02	0.62	0.31	0.39	0.98	1.34	2.30	2.39	2.71
ne1	85	173.03	2.41	1.24	0.52	1.54	0.03	1.41	2.43	3.60	4.93
ne2	27	37.16	1.39	1.07	0.77	1.14	0.03	0.14	1.46	2.28	3.34
ne3	57	85.50	1.68	0.63	0.37	0.39	0.27	1.32	1.68	1.95	3.04
All Domains	1351	2913.79	2.13	0.94	0.44	0.89	0.03	1.49	2.20	2.72	5.20

Table 14.3 Basic Statistics for the Graphite Domains by Diamond Drill Hole or Trench Sample Type

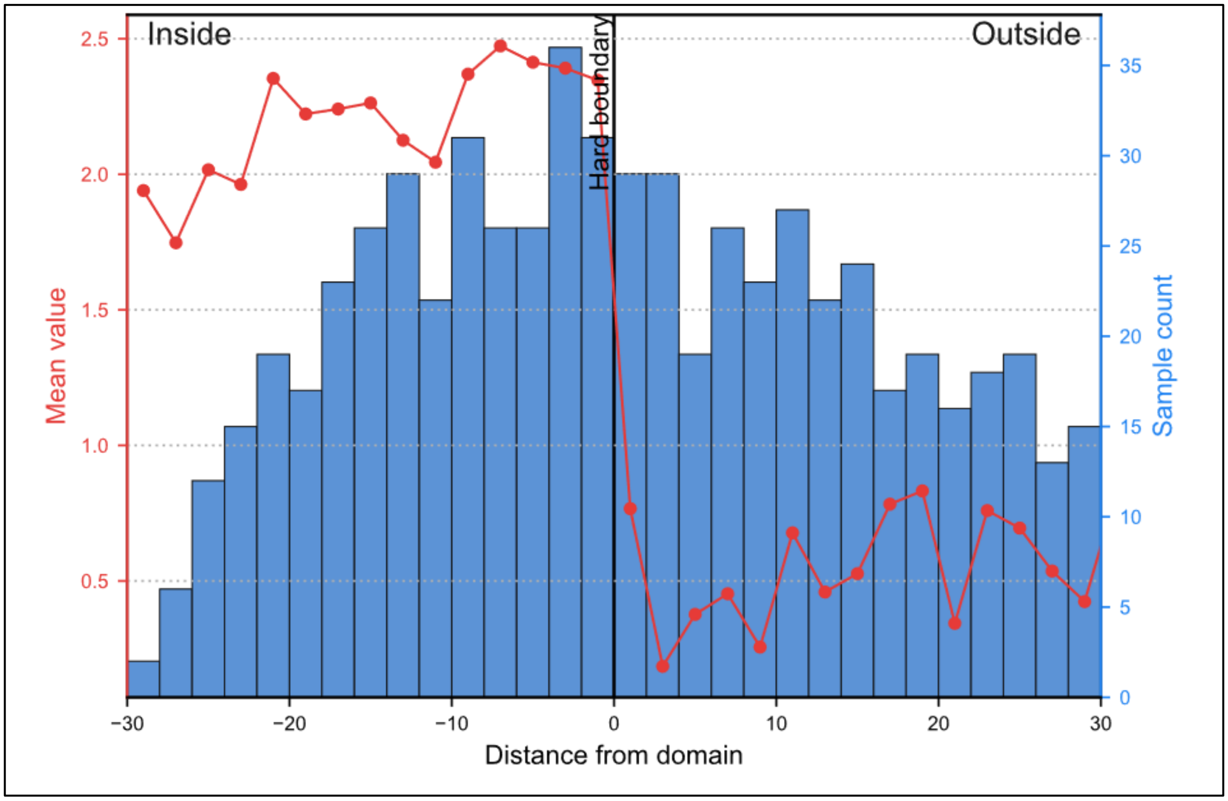
Domain	Sample Type	Count	Length	Mean	Standard Deviation	Coefficient of Variation	Variance	Minimum	Lower Quartile	Median	Upper Quartile	Maximum
c1	Drill hole	48	69.43	2.73	0.94	0.34	0.88	0.69	2.08	2.83	3.53	4.27
	Trench	53	208.60	2.55	1.20	0.47	1.44	0.33	1.56	2.97	3.45	4.36
c2	Drill hole	324	482.48	2.30	0.77	0.34	0.60	0.03	1.91	2.36	2.72	4.96
	Trench	213	673.90	2.07	0.78	0.38	0.61	0.03	1.57	2.16	2.60	4.37
c3	Drill hole	25	37.20	2.36	0.78	0.33	0.62	0.03	2.09	2.39	2.73	3.60
	Trench	25	96.30	1.44	0.59	0.41	0.35	0.76	0.98	1.18	1.73	2.81
c4	Drill hole	11	17.46	2.03	0.72	0.36	0.52	0.43	1.61	2.23	2.46	3.10
	Trench	26	66.90	2.07	0.95	0.46	0.90	0.03	1.37	2.20	2.81	4.05
e1	Drill hole	22	31.03	3.35	1.39	0.42	1.94	0.03	3.08	3.59	4.38	5.20
	Trench	24	70.70	2.89	0.84	0.29	0.71	1.37	2.20	2.94	3.60	4.18
e2	Drill hole	16	24.77	1.79	0.76	0.43	0.58	0.16	1.20	1.97	2.30	2.98
	Trench	44	118.60	2.49	0.79	0.32	0.63	0.00	1.98	2.50	2.82	4.68
e3	Drill hole	6	8.88	1.88	0.48	0.26	0.24	1.30	1.54	1.68	2.28	2.57
	Trench	4	12.90	1.43	0.59	0.41	0.35	0.79	1.10	1.60	1.60	2.19
e4	Drill hole	10	13.50	1.14	0.33	0.29	0.11	0.35	0.87	1.36	1.42	1.54
	Trench	0	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA

Domain	Sample Type	Count	Length	Mean	Standard Deviation	Coefficient of Variation	Variance	Minimum	Lower Quartile	Median	Upper Quartile	Maximum
e5	Drill hole	0	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Trench	14	70.00	1.16	0.38	0.33	0.15	0.45	0.97	1.13	1.37	1.81
n1	Drill hole	74	109.20	1.99	0.71	0.35	0.50	0.03	1.65	1.97	2.46	3.50
	Trench	0	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
n2	Drill hole	41	62.86	1.95	0.83	0.42	0.68	0.03	1.51	1.92	2.44	3.78
	Trench	0	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
n3	Drill hole	87	127.29	1.58	0.79	0.50	0.63	0.03	1.04	1.39	2.06	3.99
	Trench	54	160.00	2.82	0.79	0.28	0.62	0.28	2.23	2.92	3.38	4.30
n4	Drill hole	31	44.22	1.34	0.89	0.66	0.79	0.03	1.11	1.26	1.58	3.22
	Trench	20	88.30	1.23	0.62	0.51	0.39	0.62	0.90	0.99	1.48	3.08
n5	Drill hole	2	2.18	0.85	1.23	1.44	1.51	0.03	0.03	0.03	1.76	1.76
	Trench	2	5.60	2.31	1.13	0.49	1.28	1.54	1.54	1.54	3.14	3.14
n6	Drill hole	1	1.30	0.98	NA	NA	NA	0.98	0.98	0.98	0.98	0.98
	Trench	5	14.50	2.11	0.55	0.26	0.30	1.34	1.75	2.30	2.39	2.71
ne1	Drill hole	66	104.53	2.13	1.16	0.54	1.34	0.03	1.18	2.13	3.20	4.34
	Trench	19	68.50	2.82	1.27	0.45	1.62	0.10	2.25	3.21	3.70	4.93
ne2	Drill hole	27	37.16	1.39	1.07	0.77	1.14	0.03	0.14	1.46	2.28	3.34
	Trench	0	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA
ne3	Drill hole	57	85.50	1.68	0.63	0.37	0.39	0.27	1.32	1.68	1.95	3.04
	Trench	0	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA

Contact Analysis

Visual analysis of graphite grade distribution indicated a well-defined boundary between mineralized and non-mineralized material. Modelling of graphite domains was based on assay Cg % contacts. Figure 14.7 shows the statistical analysis of Cg % across the c2 domain contact, which is representative of all graphite domains modelled in the deposit. All modelled graphite domains were treated has hard boundaries during grade interpolation.

Figure 14.7 Contact Plot of the c2 Graphite Domain



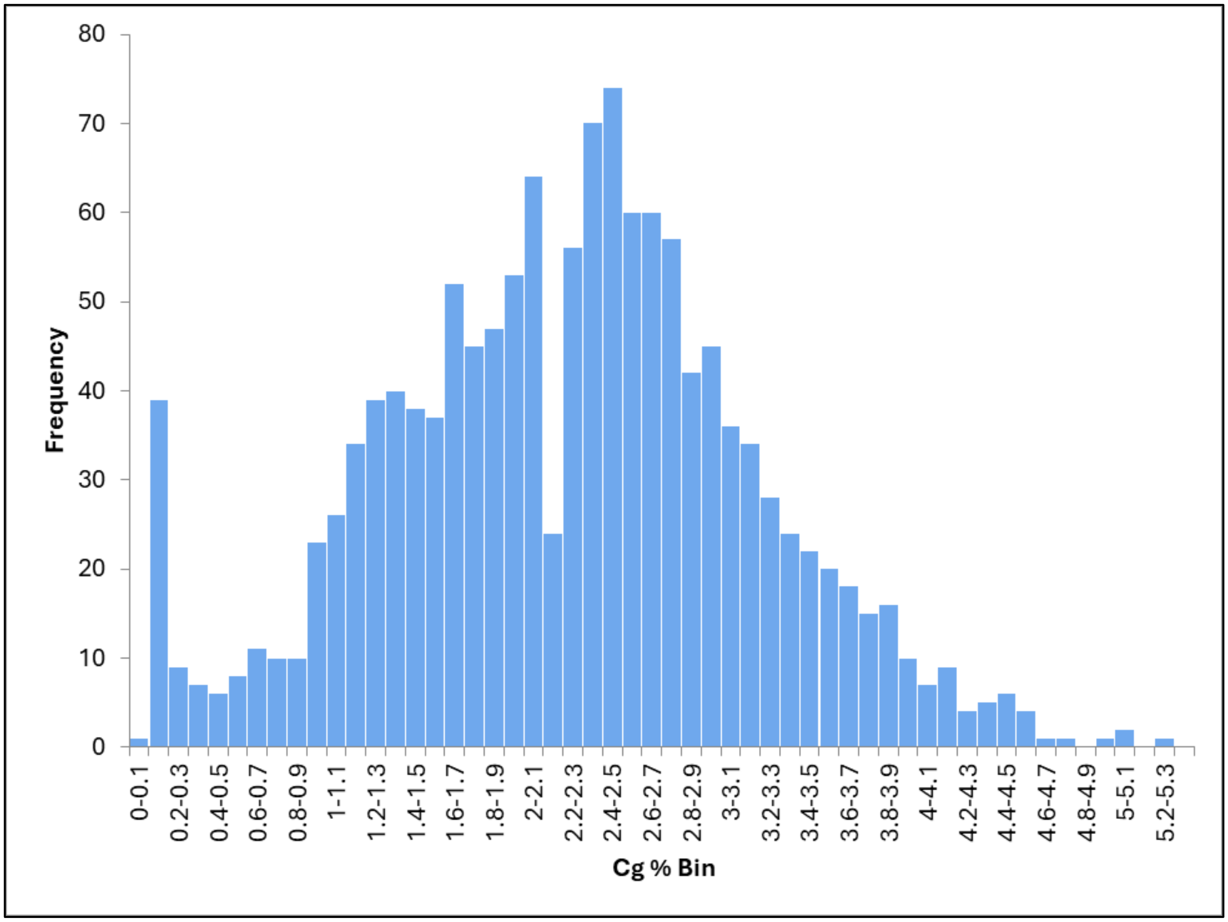
Source: Mercator, 2024

Compositing and Capping

To facilitate compositing of downhole assay data, a drill hole intercept table consisting of drill hole intervals to be composited for each area was created using solid model drill hole intersections. Assay sample length statistics showed a mean sample length of 1.5 m, with a minimum and maximum length of 0.17 m and 5 m respectively. Downhole assay composites measuring 1.5 m in length and constrained to the drill hole intercepts for each area were created for graphitic carbon (%) using Surpac's 'best-fit' method. Minimum and maximum acceptable composite lengths were selected at 1.125 m and 1.875 m, respectively, and composites created outside the minimum and maximum support thresholds were manually modified to meet the selection criteria.

Through analysis of graphite grade distribution, it was determined that high values in the assay dataset occur within zones where drill log descriptions support the presence of spatially correlative higher-grade material. Maximum graphite levels present are also considered to be consistent with the mineralization styles present and no true outliers are observed (Figure 14.8). No high-grade capping factors were applied to the sample analytical results prior to or after compositing.

Figure 14.8 Graphite Grade Distribution within all Graphite Domains



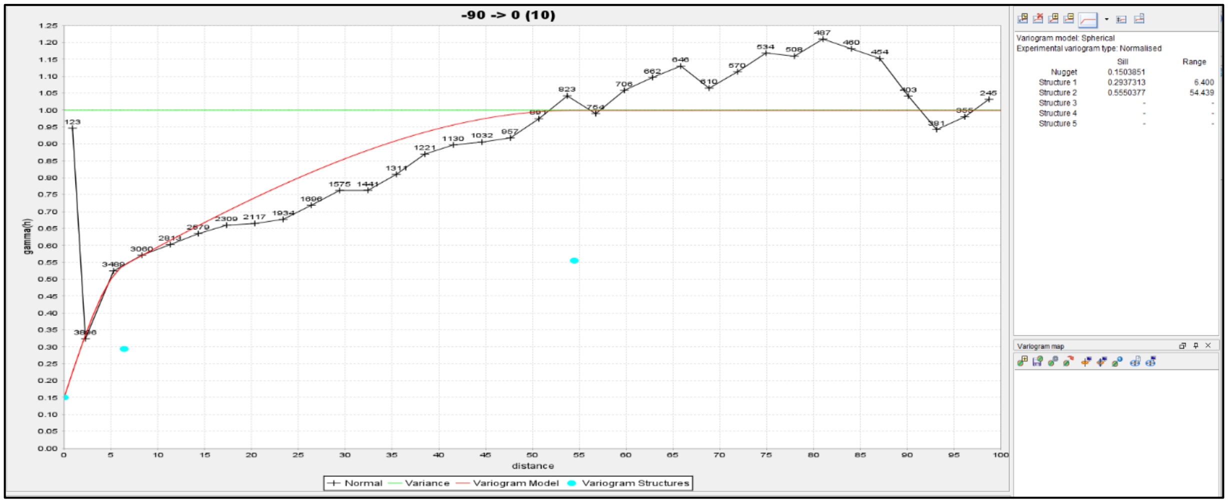
Source: Mercator, 2024

14.3.4 Variography

The Author prepared experimental downhole and direction variograms from the 1.5 m assay composite dataset. Best results were obtained from assessment for the global mineralized structure by combining composites from all 18 graphite domains. Results obtained from the variogram analysis was considered representative for each grade domain.

Acceptable spherical model results were obtained for downhole variograms, thereby providing assessment of global nugget values and creating a basis of consideration for interpolation ellipsoid minor axis ranges (Figure 14.9).

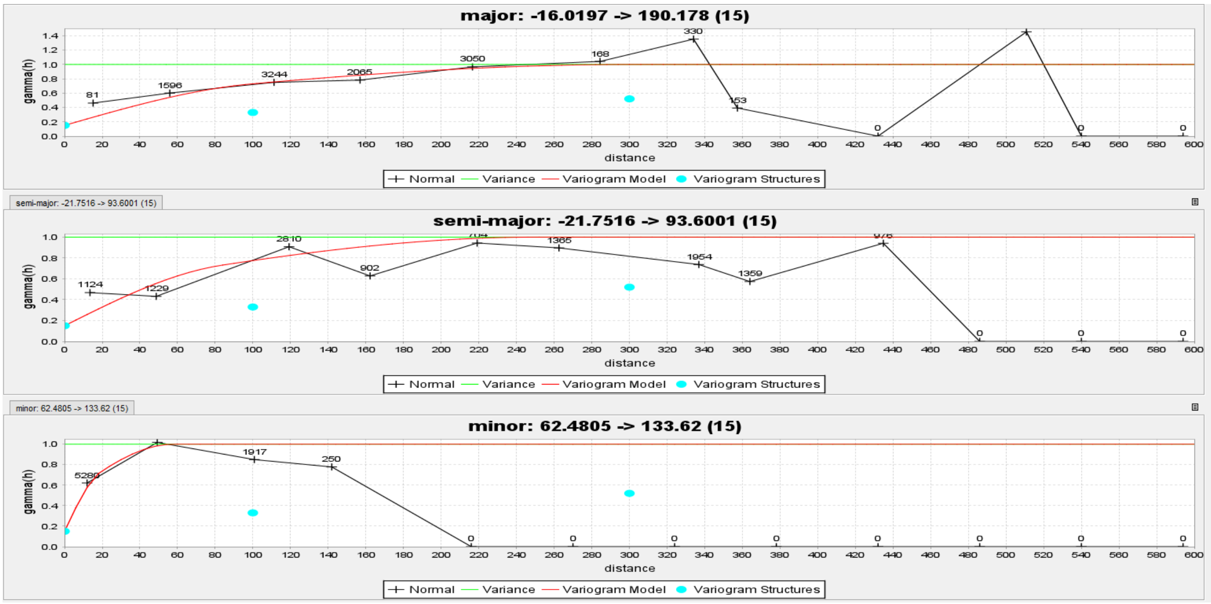
Figure 14.9 Downhole Variogram for Global Assay Composite



Source: Mercator, 2024

Directional variogram modelling provided definition of two structures with a maximum range of 300 m for the major axis of continuity and 250 m for the semi-major axis of continuity, showing primary trends oriented southwest-northeast and secondary trends northwest-southeast (Figure 14.10). A 16^0 plunge was defined towards the southwest along the primary axis and 23^0 plunge towards the southeast along the semi-major axis. These orientations conform very well the interpreted trends of graphitic units, with the minor axis oriented perpendicular to strike and dip. Experimental variogram results showed sills close to the variance and low nugget values and help characterize graphite distribution in the deposit. Parameters determined during the variography assessment are presented in Table 14.4.

Figure 14.10 Directions Variograms for Global Assay Composite Dataset



Source: Mercator, 2024

Table 14.4 Variography Parameters

Variogram Model (Spherical, Normalized)		
Parameter	Sill	Range (m)
Nugget	0.15	
Structure 1	0.33	100
Structure 2	0.52	200
Ellipsoid Orientation (Surpac ZXY LRL)		
Bearing	190	
Plunge	-16	
Dip	22.5	
Anisotropy Ratios		
Major / Semi Major	1.2	
Major / Minor	5.2	

14.3.5 Block Model

The block model extents are presented in Table 14.5 and were defined using UTM NAD83 (Zone 16N) coordination and elevation relative to sea level. No rotation was applied to the block model. Standard block size for the model is 15 m by 15 m by 5 m (X, Y, Z) with partial percent volume estimation applied.

Table 14.5 Block Model Parameters

Type	Y (Northing m)	X (Easting m)	Z (Elevation m)
Minimum Coordinates	3,657,800	576,004	-110
Maximum Coordinates	3,661,460	579,499	380
User Block Size	15	15	5

**** UTM NAD83 Z16N coordination and masl datum***

14.3.6 Estimation Parameters

Interpolation ellipsoid ranges were developed through consideration of the variogram assessment, geological interpretation, project history, drill hole spacing, and Mineral Resource categorization requirements.

Each graphite domain was assigned a unique ellipsoid orientation to align with the local geometry of mineralization. Ellipsoids were fixed with a primary orientation of 190^0 azimuth, as derived from variography, and rotated in plunge and dip to best fit the domain. Assigned plunges in the primary, southwest, direction range between 3^0 to 16^0 and assigned plunges in the secondary, northeast, direction range between 15^0 and 30^0.

Inverse Distance Squared ("ID2") grade interpolation methodology was used to assign block graphitic carbon grades based on the 1.5 m assay composites. A multi-pass interpolation approach consisting primarily of three separate stages was developed to populate the block model using progressively increasing ellipsoid ranges for each pass. Interpolation passes, implemented sequentially from pass one to pass three, progressed from being restrictive to more inclusive in respect to the composites available and number of composites required to assign block grades. Grade domain boundaries were set as hard boundaries for grade estimation purposes and grade interpolation was restricted to the 1.5 m assay composites associated with the drill hole intercepts assigned to each deposit area solid. Block discretization was set at 2 (Y) x 2 (X) x 2 (Z). Table 14.6 summarizes the estimation parameters.

Table 14.6 Summary of Estimation Parameters

Interpolation Pass	Range			Contributing Composites		
	Major m	Semi-Major m	Minor m	Minimum	Maximum	Maximum Per Drill Hole
1	75.00	62.50	12.50	4	9	3
2	150.00	125.00	25.00	4	9	3
3	300.00	250.00	50.00	2	6	3
4	375.00	312.50	62.50	2	3	3
5	450.00	375.00	75.00	2	3	3

Most of the blocks within each domain were estimated within the first three interpolation passes. Pass 4 was used to estimate blocks along the peripheries of mineralized structures within a lower confidence category. The fifth interpolation pass was used for the n5 and n6 domains that had widely spaced sample data in one trench and one drill hole. Ordinary Kriging ("OK") was used to carry out a comparison estimation.

14.3.7 Specific Gravity

Specific gravity was assigned in the block model using average values for each weathering domain based on 93 specific gravity determinations collected in 26 diamond drill holes including 53 measurements from 12 holes for the 2022 program and 43 measurements from 14 holes for the 2023 program. The 37 specific gravity measurements collected in 14 surface locations (2019 surface exploration program) were not used in determining the averages because some values were without a weathering code. Specific gravity determinations are assumed to be representative of bulk density.

Average drill core specific gravity measurements with each weathering domain are presented in Table 14.7. A background specific gravity value of 2.7 g/cm^3 (t/m^3) was assigned to rock distal to the mineralized areas where weathering data was not available.

Table 14.7 Core Specific Gravity Summarized by Weathering Domain

Weathering Domain	Drill Hole Samples	Average g/cm^3	Minimum g/cm^3	Maximum g/cm^3
Unweathered	52	2.81	2.56	2.99
Weak	20	2.73	2.53	2.92
Moderate	12	2.57	2.44	2.85
Strong	9	2.52	2.41	2.57
	93			

14.4 Model Validation

The block model estimation has been validated using the following techniques:

- Visual inspection of the estimated block grades relative to the assay composites.
- A comparison of the sample composite means with the estimated means from each of the block model domains.
- A swath plot evaluation of the block model and composite grades.

14.4.1 Visual Validation

A detailed visual inspection of the block model was performed both in section and in plan to ensure that the results obtained in the interpolation are representative of the geology and grade distribution. The estimated graphite grades in the model are a valid representation of the sample data taken from the drill holes and trenches. Figures 14.11 and 14.12 provide representative cross-sections of the block model.

Figure 14.11 Representative Cross-Section for the Ceylon Mine Prospect

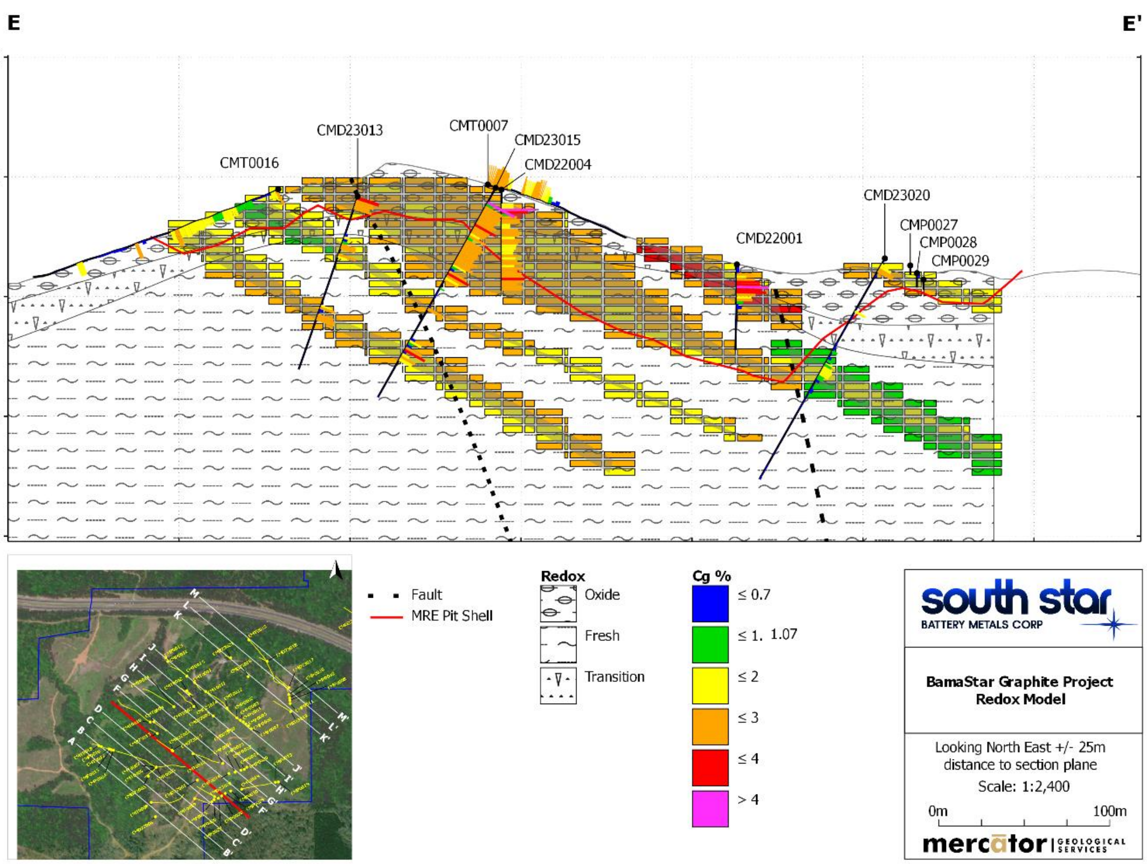
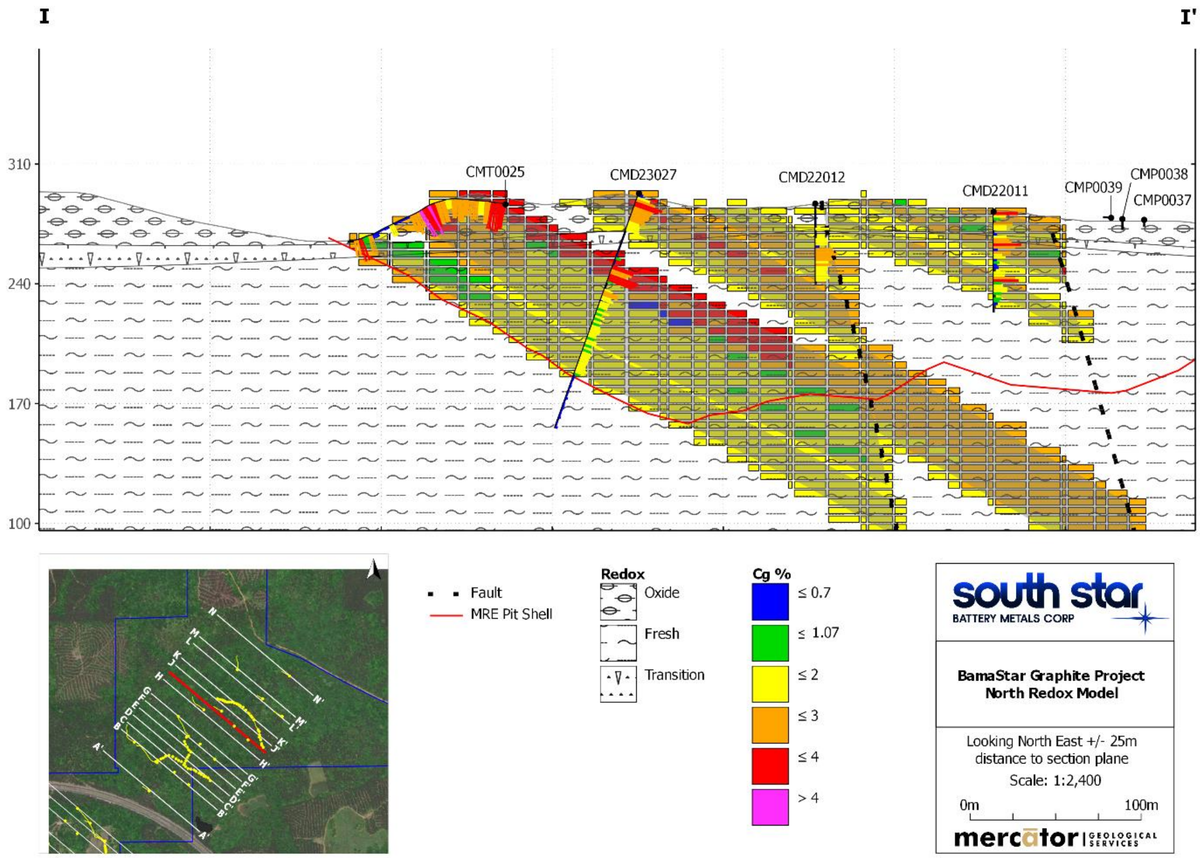


Figure 14.12 Representative Cross-Section for the Rushing Prospect



14.4.2 Comparison of Means

Block model statistics for all interpolated blocks were reported and tabulated at a zero-cut-off value to facilitate inspection of associated statistical parameters. Results appear below in Table 14.8 with acceptable results. Block values are lower than composite values due to the large difference in population sizes. This type of analysis can be less meaningful in partial percent models where block volumes are not equal.

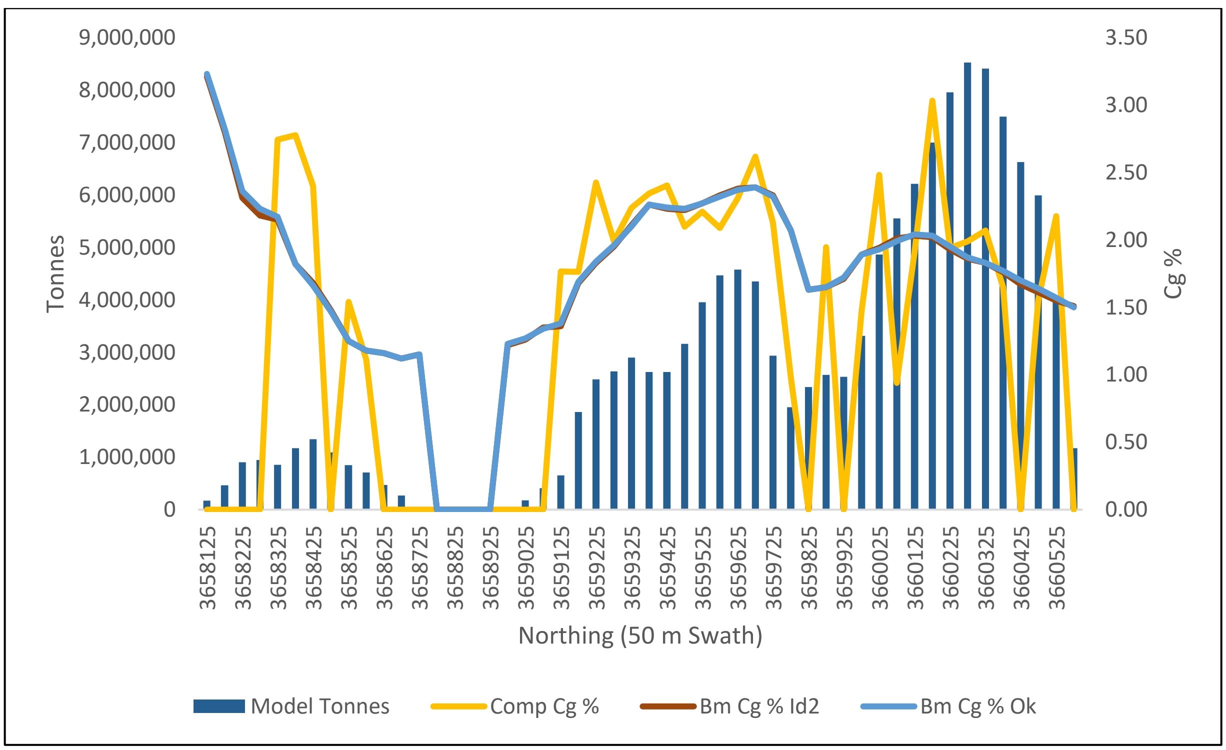
Table 14.8 Block Model Parameters

Variable	Composites %	Cg % OK	Cg % ID^2
Minimum value	0.00	0.00	0.00
Maximum value	5.09	4.62	4.66
Mean	2.12	1.92	1.91
Median	2.14	1.88	1.89
Variance	0.86	0.43	0.47
Standard deviation	0.93	0.66	0.68
Coefficient of variation	0.44	0.34	0.36
Number of samples	1,956	73,294	73,294

14.4.3 Swath Plots

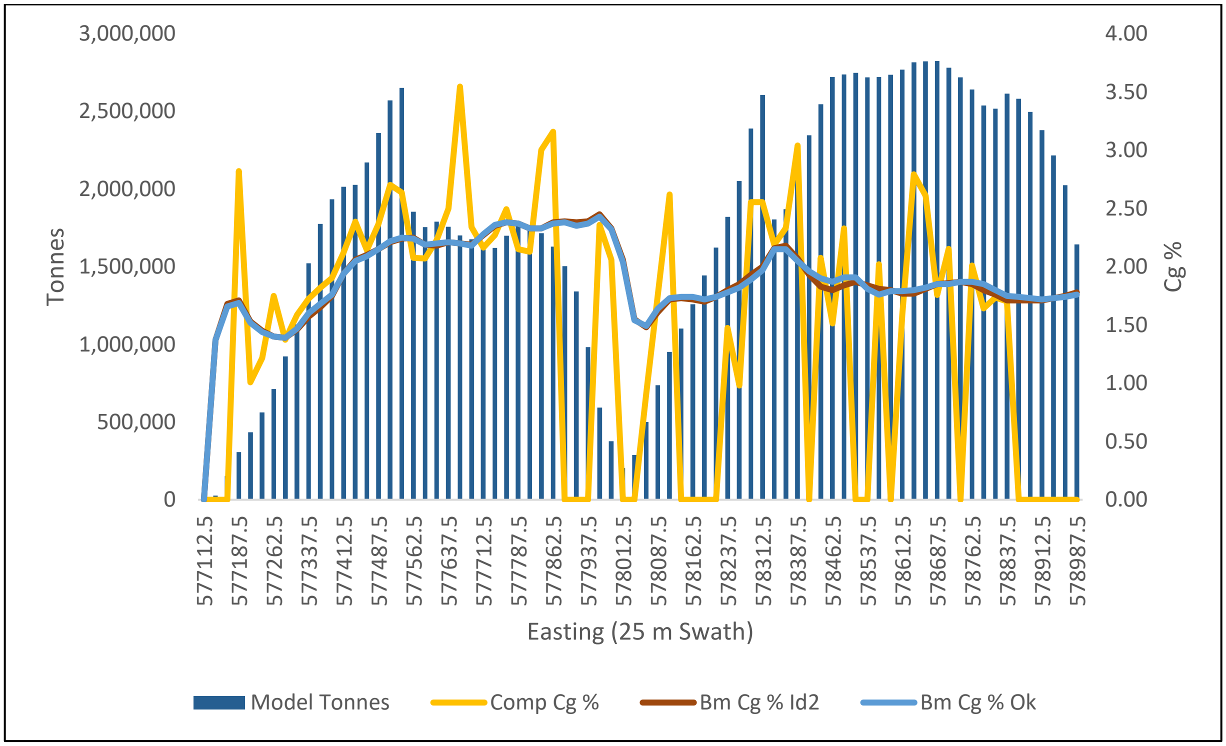
The block model was populated with an OK estimation and a set of swath plots were generated to compare the accepted ID2 estimation with the OK block and assay composite values. Figure 14.13 to 14.15, in general, shows that there is a good correlation between the assay composite data and the estimated block grades. Overall, the validation results indicate that the ID2 model is a reasonable reflection of the input data.

Figure 14.13 Swath Plot: Northing



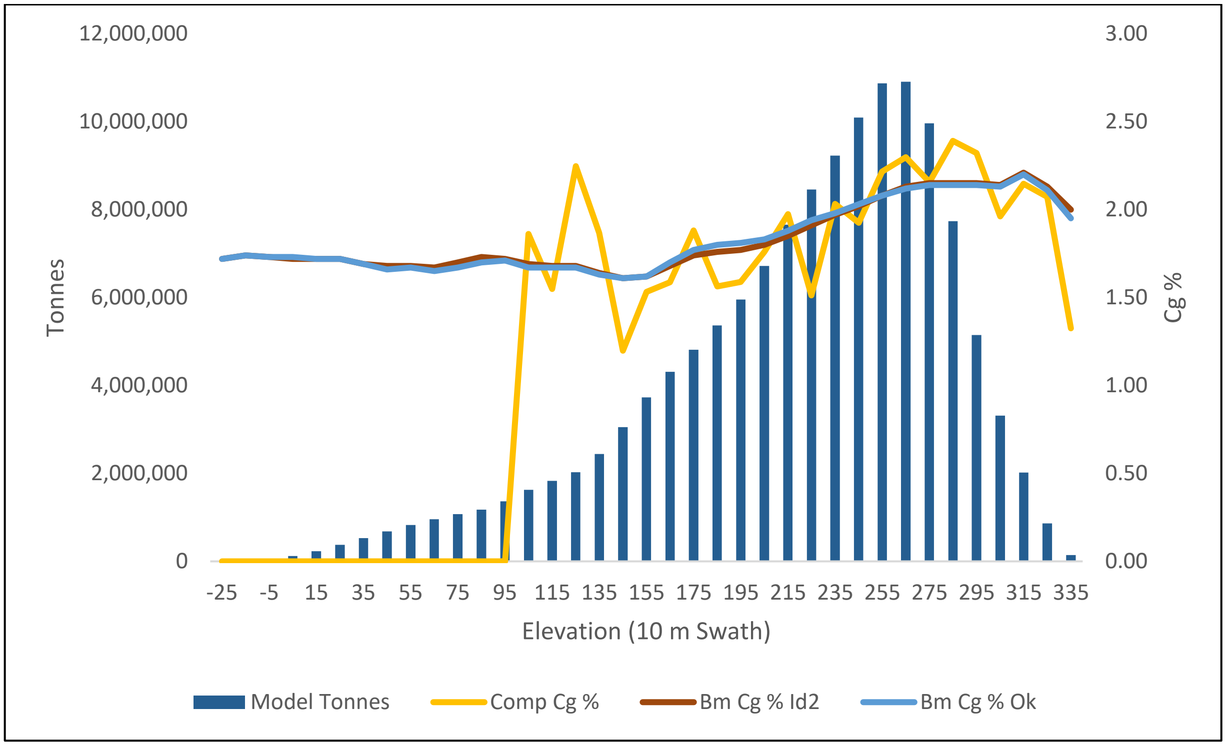
Source: Mercator, 2024

Figure 14.14 Swath Plot: Easting



Source: Mercator, 2024

Figure 14.15 Swath Plot: Elevation



Source: Mercator, 2024

14.5 Reasonable Prospects for Eventual Economic Extraction

The reasonable prospects for eventual economic extraction requirement set out in the CIM Definition Standards was addressed for the Deposit by means of developing an optimized pit shell to constrain Mineral Resources amenable to open pit mining methods.

The pit shell was generated with Hexagon Mine Plan 3D version 16.03, MineSight® Economic Planner version 4.00-13 software using the Lerchs-Grossman ("LG") algorithm, and the input parameters presented in Tables 14.9, 14.10, and 14.11. The reader is cautioned that the results from the pit optimization are used solely for the purpose of addressing reasonable prospects for eventual economic extraction by an open pit mining scenario and do not represent an estimate of Mineral Reserves. The results are used as a guide to assist in the preparation of a MRE and to select an appropriate Mineral Resource reporting cut-off grade.

Table 14.9 Pit Optimization Parameters – Graphite Product Pricing*

Product	Pricing $/t
+ 80/95% Mesh Price	1,400
+ 100/95% Mesh Price	1,100
- 100/95% Mesh Price	800
Blended Bulk Concentrate	980
Purified Flake / 99.95%, Micronized Graphite (8 um)	3,500
cSPG (18 microns)	9,500
cSPG (8 microns)	11,500

Revenue assumptions are based on assumed sales of 3% bulk concentrate, 19% purified flake/99.5 % (micronized, 8 um), 63% cSPG (18 um), and 15% cSPG (8 um)

Table 14.10 Pit Optimization Parameters – Mining Costs

		Southwest Pit			Northeast Pit		
Parameter	Units	Oxide	Transition	Fresh	Oxide	Transition	Fresh
Waste - Base	$/t moved	2.228	2.680	2.970	2.363	2.811	3.104
Incremental below the base elevation (250 or 270)	$/t moved	0.055	0.050	0.055	0.066	0.059	0.066
Feed - Base	$/t moved	2.204	2.800	3.103	2.353	2.944	3.252
Incremental below the base elevation (250 or 270)	$/t moved	0.028	0.025	0.028	0.066	0.059	0.066

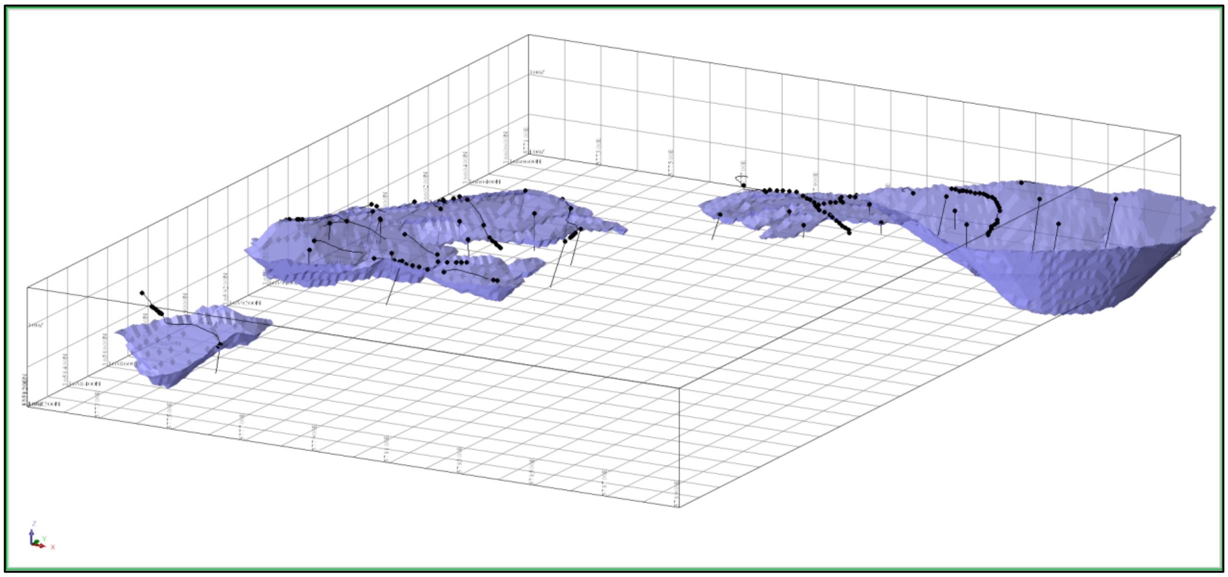
Table 14.11 Pit Optimization Parameters – Processing Costs and Recovery

		Southwest Pit			Northeast Pit		
Parameter	Units	Oxide	Transition	Fresh	Oxide	Transition	Fresh
Processing Cost	$/t feed	9.70	9.70	16.75	9.80	9.80	16.85
Tailings Cost	$/t feed	1.30	1.30	1.30	1.30	1.30	1.30
Total Processing Cost	$/t feed	11.00	11.00	18.05	11.10	11.10	18.15
G&A Cost	$/t feed	1.74	1.74	1.74	1.74	1.74	1.74
Total Processing + G&A	$/t feed	12.74	12.74	19.79	12.84	12.84	19.89
Recovery (mill feed to final product)*	%	84.90%	84.98%	86.10%	84.90%	84.98%	86.10%

**** Upgrading of the bulk concentrate to finished products used a 94% recovery.***

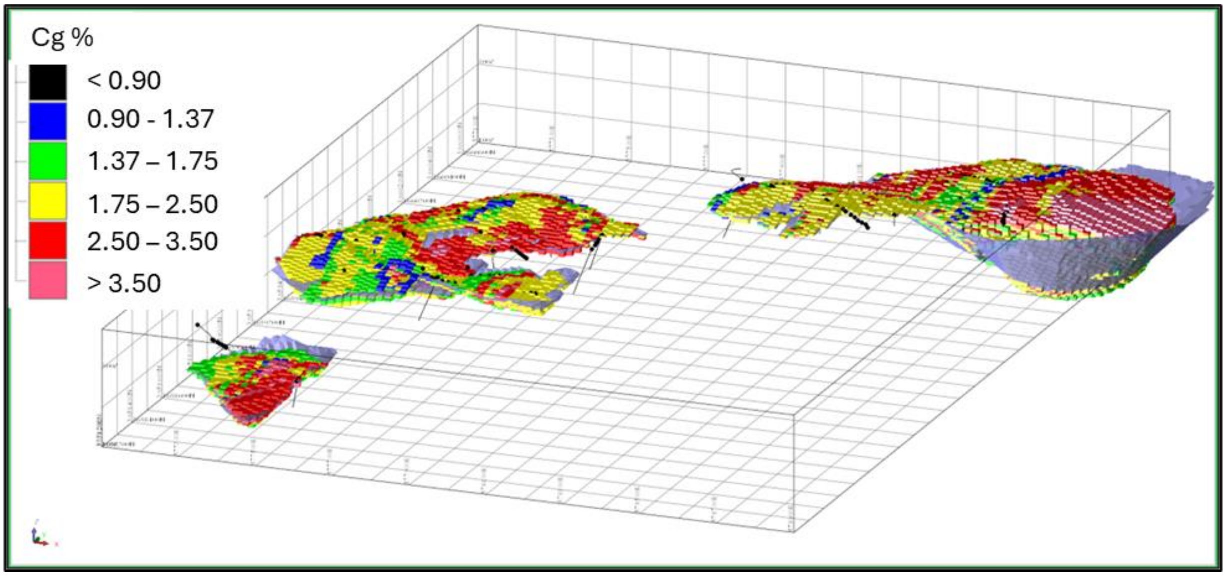
Open Pit Mineral Resources are reported at a cut-off grade of 0.90 % Cg for oxide and transition material and 1.37 % Cg for fresh material within the optimized pit shell. The cut-off grade reflects the marginal cut-off grade to define reasonable prospects for eventual economic extraction by open pit mining methods. The pit supports a pit slope angle of 46° and includes a 100 m offset from the highway for mining free-dig material and 500 m offsets from the highway for oxide and transition-fresh zones respectively where blasting may be required. The pit has an overall 1:1.5 strip ratio (waste: mineralized material). Figures 14.16 and 14.17 show the optimized pit.

Figure 14.16 Optimized Pit



Source: Mercator, 2024

Figure 14.17 BamaStar Graphite Deposit Mineral Resource with Optimized Pit



Source: Mercator, 2024

14.6 Resource Category Parameters Used in Current Mineral Resource Estimate

Definitions of Mineral Resources and associated Mineral Resource categories used in this Technical Report are those set out in the CIM Definition Standards. Several factors were considered in defining resource categories, including drill hole spacing, geological interpretations and number of informing assay composites and average distance of assay composites to block centroids. Specific definition parameters for each resource category applied in the current estimate are set out below. Inferred category Mineral Resources have been assigned.

Inferred Resources: Inferred Mineral Resources are defined as all blocks with interpolated grades that have a maximum distance to the nearest contributing composite of 150 m if defined by a single drill hole and a maximum distance to the nearest contributing composite of 300 m if defined by two or more drill holes. This primarily represents blocks interpolated by the first, second and third interpolation passes.

Application of the selected Mineral Resource categorization parameters specified above defined distribution of Inferred MRE blocks within the block model. To eliminate isolated and irregular category assignment artifacts, the peripheral limits of blocks in close proximity to each other that share the same category designation and demonstrate reasonable continuity were wireframed and developed into discrete solid models. All blocks within these “category” solid models were re-classified to match that model’s designation. This process resulted in more continuous zones of Inferred Mineral Resource and limited occurrences of orphaned blocks. This process included blocks interpolated in the fourth and fifth interpolation passes that were designed to fill the modelled volumes.

14.7 Statement of Mineral Resource Estimate

Block grade, block density and block volume parameters for the BamaStar Graphite Deposit were estimated using methods described in preceding sections of this Technical Report. Subsequent application of resource category parameters set out above resulted in the MRE presented in Table 14.12. Figures 14.18 through 14.21 present the Mineral Resource.

Table 14.122 BamaStar Graphite Deposit Mineral Resource Estimate – Effective Date: July 24, 2024*

Type	Redox State	Cut-off Cg %	Category	Tonnes Mt	Cg %	Contained Graphite (Mt)
Open Pit	Oxide	0.90	Inferred	15.1	2.24	0.338
	Transition	0.90	Inferred	8.3	2.16	0.179
	Fresh	1.37	Inferred	28.8	1.96	0.564
	Combined	0.90 / 0.90 / 1.37	Inferred	52.2	2.07	1.08

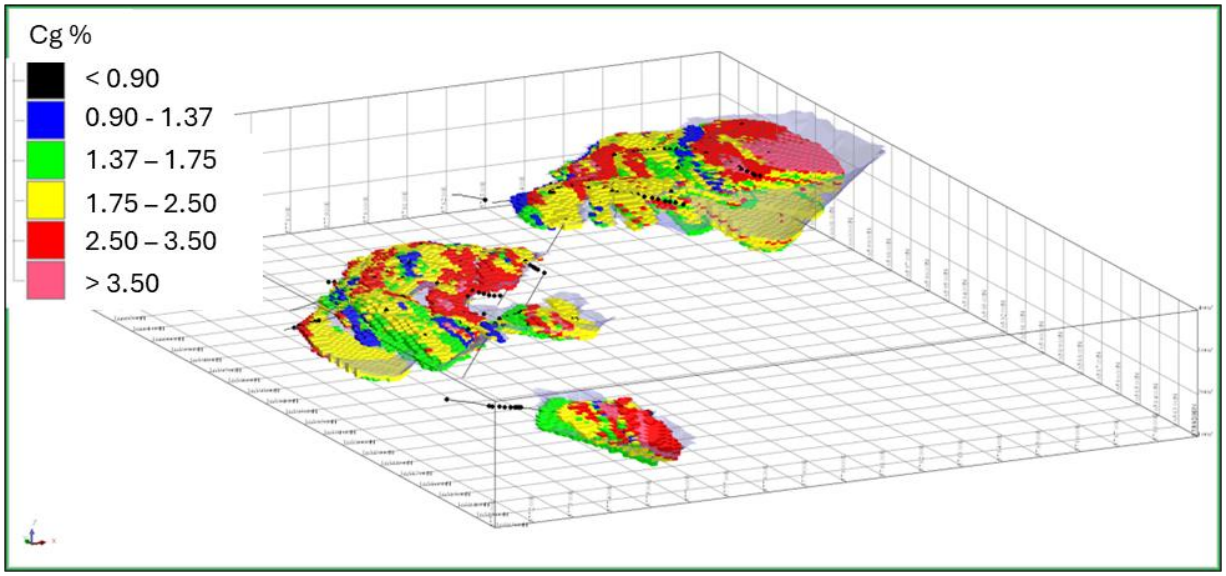
Mineral Resource Estimate Notes:*

1. ***Mineral Resources were prepared in accordance with the CIM Definition Standards (2014) and the CIM MRMR Best Practice Guidelines (2019).***
2. ***Graphitic carbon (Cg %) grade was estimated from 1.5 m downhole assay composites using Inverse Distance Squared. No grade capping was applied. Model block size is 15 m (x) by 15 m (y) by 5 m (z). Block volume was assigned on a partial percentage basis.***
3. ***A redox state geological model was developed from verified drill hole and trenching data and used to estimate oxide, transition, and fresh material in the block model.***
4. ***A weathering intensity geological model was developed from verified drill hole and trenching data and used to estimate weathering intensity as strong, moderate, weak, and unweathered in the block model.***
5. ***Bulk density was applied based on weathering intensity and reflects average bulk density determinations of 2.52 g/cm^3, 2.57 g/cm^3, 2.73 g/cm^3, and 2.81 g/cm^3 for strong, moderate, weak, and unweathered respectively. The average bulk density for the Mineral Resource is 2.72 g/cm^3.***
6. ***Open Pit Mineral Resources are defined within an optimized pit shell with a pit slope angle of 46^0 and includes a 100 m offset from the highway for mining and 500 m offsets from the highway for oxide and transition-fresh zones respectively where blasting may be required. The pit has an overall 1:1.5 strip ratio (waste: mineralized material).***
7. ***All prices are in US$ currency.***
8. ***Graphite product pricing parameters used in pit optimization include: $980/t bulk concentrate (94.4% to 98.4% total carbon), $3,500/t purified flake/99.95% (micronized, 8 um), $9,500/t CSPG (18 um), and $11,500/t CSPG (8 um). Revenue assumptions are based on assumed sales of 3% bulk concentrate, 19% purified flake (micronized, 8 um), 63% CSPG (18 um), and 15% CSPG (8 um).***
9. ***Costs used in pit optimization vary based on redox state and location and include: waste mining at $2.23/t to $3.10/t moved plus an incremental mining cost of $0.06/t to $0.07/t below the base elevation (250 or 270 masl) and $2.20/t to $3.25/t for mineralized material processing plus an incremental mining costs of $0.03/t to $0.07/t below the base elevation (250 or 270 masl). The processing cost varied by redox state with processing at $11/t to $18.15/t processed, and G&A at $1.74/t processed.***
10. ***Combined graphite recoveries (mill feed to final product) of 84.98% oxide, 84.98% transition, and 86.10% fresh material were used. Upgrading of the bulk concentrate to finished products used a 94% recovery.***
11. ***Open Pit Mineral Resources are reported at a cut-off grade of 0.90 % Cg for oxide and transition material and 1.37 % Cg for fresh material within the optimized pit shell. The cut-off grade reflects the marginal cut-off grade to define reasonable prospects for eventual economic extraction by open pit mining methods.***

12. Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.

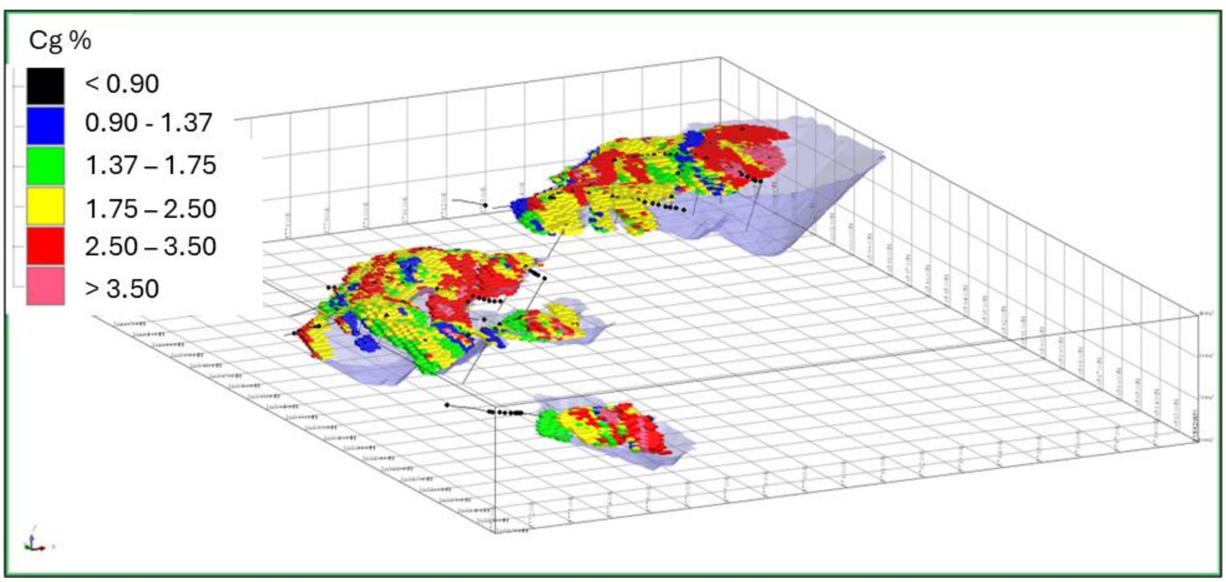
13. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. Mineral Resource tonnages are rounded to the nearest 100,000.

Figure 14.18 BamaStar Graphite Deposit Combined Mineral Resource – Isometric View to the Northeast



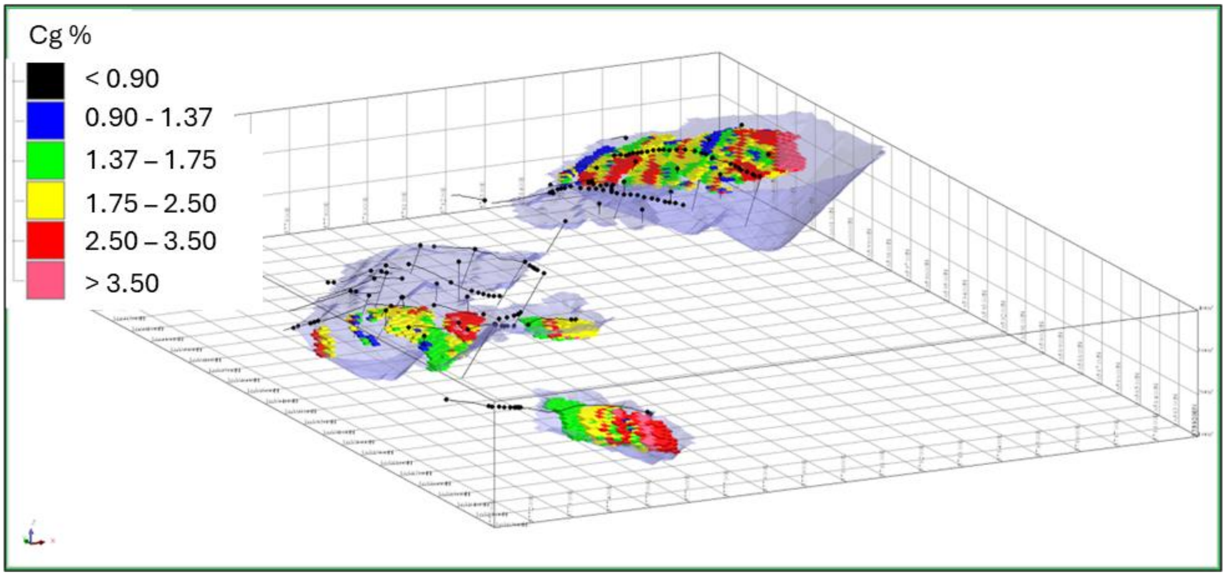
Source: Mercator, 2024

Figure 14.19 BamaStar Graphite Deposit Oxide Mineral Resource – Isometric View to the Northeast



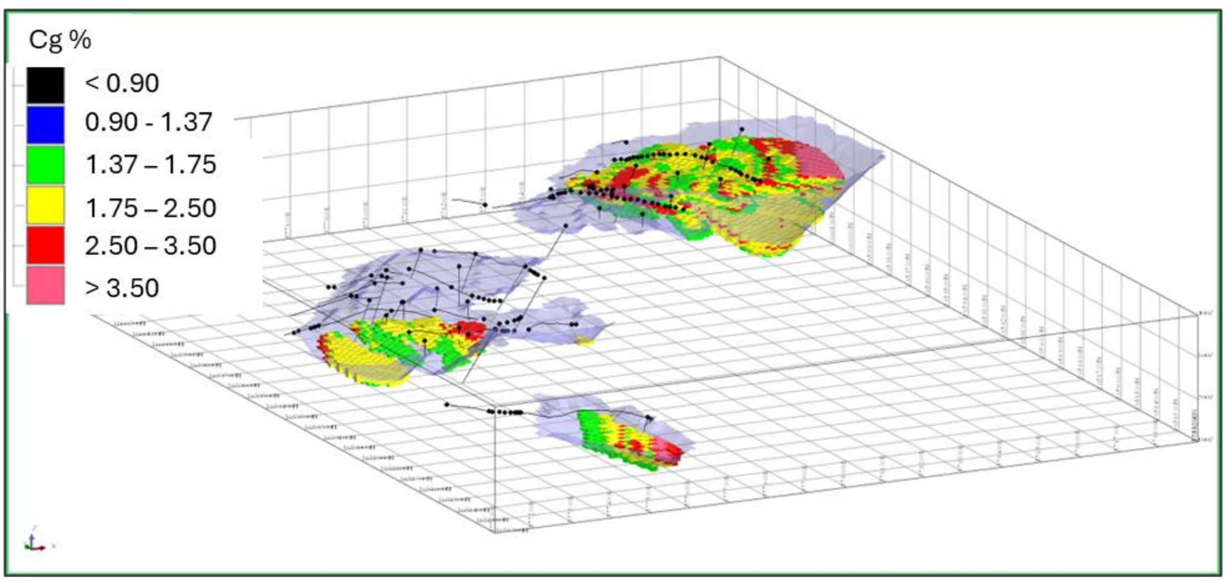
Source: Mercator, 2024

Figure 14.20 BamaStar Graphite Deposit Transition Mineral Resource – Isometric View to the Northeast



Source: Mercator, 2024

Figure 14.21 BamaStar Graphite Deposit Fresh Mineral Resource – Isometric View to the Northeast



Source: Mercator, 2024

14.8 Project Risks that Pertain to the Mineral Resource Estimate

Factors that may materially impact the Project Mineral Resource include, but are not limited to, the following:

- Changes to the long-term graphite price assumptions including unforeseen long-term negative market pricing trends.
- Changes to the deposit scale interpretations of mineralization geometry and continuity including:
  - Thickness and distribution of redox state
  - Thickness and distribution of weathering intensity
  - The stratigraphic sequence is not fully understood in both the Ceylon and Rushing Prospects areas as well as the continuity between the two
  - Faults present may locally shift mineralization, and these are not well defined.
- Inaccuracies of deposit modelling and grade estimation programs with respect to actual metal grades and tonnages contained within the deposit.
- Variography was completed on the deposit dataset based on limited samples pairs and could not be resolved for individual units. As such, grade trends may not be fully understood. The relationship between poor core recovery and graphitic carbon grade is not well understood at this time.
- Mineral Resource density is assigned based on average values for weathering intensity and has limitations with respect to local variability and precision.
- Changes to the input values for mining, processing, and G&A costs to constrain the Mineral Resource.
- Changes to metallurgical recovery assumptions including metallurgical recoveries that fall outside economically acceptable ranges.
- Variations in geotechnical, hydrological, and mining assumptions.
- Changes in the assumptions of marketability of the final product.
- Issues with respect to mineral tenure, land access, land ownership, environmental conditions, permitting, and social license.

At this time, the Author does not foresee any significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the drilling information and MRE disclosed in this Technical Report.

15.0 MINERAL RESERVE ESTIMATES

No reserves are declared as the study considers the use of Inferred Material. This section is not Applicable.

16.0 MINING METHODS

16.1 Introduction

The BamaStar Project (Project) is located in central Alabama and is situated approximately 13 km (8 miles) to the east of Sylacauga, Alabama along Highway 280. The past producing Ceylon Graphite open pit mine is on property. It has been established that there are still significant open pit mineral resources on the property. The Mineral Resources for the Project includes the north and south zones split by Highway 280.

AGP's opinion is that with current graphite pricing levels and knowledge of the mineralization and previous mining activities, open pit mining offers the most reasonable approach for development of the BamaStar Project. This is based on the size of the resource, tenor of the grade, grade distribution and proximity to topography for the deposits.

The mine schedule for open pit mining consists of 42.3 Mt of mill feed grading 2.11 Cg% (diluted) over a processing life of 19 years. Open pit waste tonnage totals 66.5 Mt and will be placed into various waste storage areas together with filtered tailings. The overall open pit strip ratio is 1.6:1 of waste: mill feed. The mine schedule utilizes open pit mining areas to supply mill feed up to a maximum of 2.6 Mtpa to the mill facility.

The deposit outcrops and therefore no pre-stripping is required although some site preparation is necessary with the establishment of access and sediment ponds. Mill feed is stockpiled over the mine life to assist in grade management with a peak capacity of 3.5 Mt in Year 11 then declines to zero with stockpile reclaim over the remainder of the mine life.

Oxide mill feed material is the focus of the early mine schedule for the first six years with any transition or fresh material stockpiled awaiting a plant upgrade. Year 6 onwards all material types are processed as encountered.

16.2 Mining Geotechnical

The BamaStar project has not had a detailed geotechnical evaluation completed for the PEA study. A site visit was completed by AGP, and the previous open pit mine workings reviewed. The previous pit was small in nature compared to the proposed PEA pits. Observations of the core in proposed deeper zones provided confidence that reasonable mining slopes could be maintained in the designs.

Wall slopes were assumed at a 46-degree overall slope for the generation of pit shells and final designs

These will need to be verified with a geotechnical program as the project advances through the next stages of study and development

16.3 Open Pit

16.3.1 Geologic Model Importation

The 2024 resource estimate for BamaStar was provided by Mercator Geological Services and discussed in Section 14 of this report. It has an effective date of 24 July 2024. CSV block model format files were created as whole block models for use in open pit mine planning tasks.

Framework details of the open pit block model is provided in Table 16 1. Mining model planning items are displayed in Table 16 2. The mining models created by AGP in Hexagon MinePlan® includes additional items for mine planning purposes. MinePlan® was used for the mining portion of the PEA, utilizing their included Lerchs Grossman ("LG") shell generation, pit and dump design and mine scheduling tools. Inferred material was used as the model is currently all classed as Inferred.

Table 16.1 Open Pit Model Frameworks

Framework Description	Model Value
MinePlan® file 10 (control file)	BSTR10.dat
MinePlan® file 15 (model file)	BSTR152.AGP
X origin (m)	576,004
Y origin (m)	3,657,800
Z origin (m) (max)	-110 (380)
Rotation (degrees clockwise)	0
Number of blocks in X direction	233
Number of blocks in Y direction	244
Number of blocks in Z direction	98
X block size (m)	15
Y block size (m)	15
Z block size (m)	5

Table 16.2 BamaStar Model Item Descriptions

Field Name	Min	Max	Precision	Units	Comments
Class	0	3	1	-	1 – Measured, 2 – Indicated, 3 – Inferred
CG%	0	100	0.01	%	Cg percent
CODRD	0	10	1	-	1 = Oxide, 2 = Transition, 3 = Sulphide, 4 = Mixed
CODMI	0	10	1	-	1 = Oxide, 2 = Transition, 3 = Sulphide, 4 = Mixed
AIR	0	100	0.01	%	Partial Percent Air
BRDOX	0	100	0.01	%	Partial Percent Block Redox Oxidized
BRDRD	0	100	0.01	%	Partial Percent Block Redox Reduced

Field Name	Min	Max	Precision	Units	Comments
BRDTR	0	100	0.01	%	Partial Percent Block Redox Transition
BRDUK	0	100	0.01	%	Partial Percent Block Redox Unknown
BWFR	0	100	0.01	%	Partial Percent Block Weathering Fresh
BWMO	0	100	0.01	%	Partial Percent Block Weathering Moderate
BWST	0	100	0.01	%	Partial Percent Block Weathering Strong
BWUK	0	100	0.01	%	Partial Percent Block Weathering Unknown
BWWK	0	100	0.01	%	Partial Percent Block Weathering Weak
MRE%	0	100	0.01	%	Partial Percent MRE
MRDOX	0	100	0.01	%	Partial Percent MRE and Redox Oxidized
MRDRD	0	100	0.01	%	Partial Percent MRE and Redox Reduced
MRDTR	0	100	0.01	%	Partial Percent MRE and Redox Transition
MWFR	0	100	0.01	%	Partial Percent MRE and Weathering Fresh
MWMO	0	100	0.01	%	Partial Percent MRE and Weathering Moderate
MWST	0	100	0.01	%	Partial Percent MRE and Weathering Strong
MWWK	0	100	0.01	%	Partial Percent MRE and Weathering Weak
WST%	0	100	0.01	%	Partial Percent Waste
WROX	0	100	0.01	%	Partial Percent Waste and Redox Oxidized
WRDRD	0	100	0.01	%	Partial Percent Waste and Redox Reduced
WRDTR	0	100	0.01	%	Partial Percent Waste and Redox Transition
WRDUK	0	100	0.01	%	Partial Percent Waste and Redox Unknown
WWFR	0	100	0.01	%	Partial Percent Waste and Weathering Fresh
WWMO	0	100	0.01	%	Partial Percent Waste and Weathering Moderate
WWST	0	100	0.01	%	Partial Percent Waste and Weathering Strong
WWUK	0	100	0.01	%	Partial Percent Waste and Weathering Unknown
WWWK	0	100	0.01	%	Partial Percent Waste and Weathering Weak
SGAIR	0	5	0.01	g/t	Specific Gravity Air
SGMRE	0	5	0.01	g/t	Specific Gravity MRE
SGWST	0	5	0.01	g/t	Specific Gravity Waste
TOPO	0	100	0.01	%	Topo percentage
MINE	0	1	1	-	Mine Air =0, Rock =1
PIT	0	2	1	-	Pit North Area = 2, Pit South Area = 1
RCODE	0	100	1	-	Restriction code for hwy use in LG calculations
RHWY	0	100	1	-	Flag code for trans/oxide blasting restriction and hwy use in LG
WHPIT	0	99	1	-	Code combination for WHEATH and PIT using LG
VLT	0	100000	0.01	$/tonne	Value per tonne calculated by LG
VLB	-100000	10000000	0.01	$/block	Value per block calculated by LG

Field Name	Min	Max	Precision	Units	Comments
BLCKT	0	4	1	-	Number of waste blocks touching a mill feed block
DTON	0	5000	0.01	-	Diluted tonnes
DDEN	0	5	0.01	-	Diluted density
CG%D	0	100	0.01	%	Graphitic carbon grade – diluted
MRE%D	0	100	0.01	%	MRE% diluted
ROUTE	0	100	5	-	Dilution test routing:1=mineralized feed,2=Mineralized waste, 3=waste
CONT	0	100	5000	-	Calculated concentrate tonnage
SLP	0	100	10	-	Slope angle

16.3.2 Economic Pit Shell Development

The open pit ultimate size and phasing opportunities were completed with various input parameters including estimates of the expected mining, processing, and G&A costs, as well as metallurgical recoveries, pit slopes, and reasonable long-term graphite price assumptions for the various expected products. AGP worked together with the team and South Star personnel to select appropriate operating cost, recovery and revenue parameters for the BamaStar open pits.

Wall slopes for pit optimization were based on the values discussed in Section 16.2.

The mining costs are estimates based on cost estimates for equipment from vendors and previous studies completed by AGP. The costs represent what is expected as a blended cost over the life of the mine for all material types to the various dump locations. Process costs and a portion of the G&A costs were developed by AGP in consultation with Lycopodium personnel and other team members of the PEA.

The parameters used are shown in Table 16 3. Costs and revenues are in United States dollars for use in pit shell determination unless otherwise noted. The mining cost estimates are based on the use of 55 tonne trucks using an approximate waste dump configuration to determine incremental hauls for mill feed and waste. Bulk graphite concentrates and upgraded products are used in the revenue calculations.

The intent was to produce 40,000 t of final upgraded product as the output. The upgrading percentages and distributions and recovery assumptions are based on testwork and planned product targeting.

Table 16.3 Economic Pit Shell Parameters (US Dollars unless otherwise noted)

Description/Value	Description	Oxide	Transition	Fresh
Target – Final Product (tonnes)		**40,000**	**40,000**	**40,000**
Required Mill Feed	Tonnes per year	2,377,926	2,377,926	2,251,377
Mill Feed	Feed Grade (Cg%)	2.32	2.32	2.32
	Graphite Recovery (%)	90.4	90.4	91.6

Description/Value	Description	Oxide	Transition	Fresh
	Concentrate Grade (total carbon)	98.4	98.4	94.4
Mill Production (concentrate)	Dry Equivalent Tonnes / year	50,683	50,683	50,683
	Filter Cake Moisture (%)	15	15	15
	Filter Cake Weight (tpy)	58,285	58,285	58,285
Purification	Grade (total carbon)	99.95	99.95	99.95
	Recovery (%)	94.0	94.0	94.0
83.96%	Tonnage to Value-Add Process (dry)	42,553	42,553	42,553
16.04%	Tonnage to Sell for Bulk Concentrate	8,130	8,130	8,130
100%	Total Mill Concentrate Required (t)	50,683	50,683	50,683
Products				
Percentage	Bulk Concentrate (tonnes)			
15%	+80/95% Mesh	1,219	1,219	1,219
30%	+100/95% Mesh	2,439	2,439	2,439
55%	-100/95% Mesh	4,471	4,471	4,471
100%	Total	8,130	8,130	8,130
	Upgraded Product from Purification (tonnes)			
40%	Purified Flake / 99.95%, Micron (10um)	16,000	16,000	16,000
50%	cSPG (18 microns)	20,000	20,000	20,000
10%	cSPG (8 microns)	4,000	4,000	4,000
100%	Total	40,000	40,000	40,000
Pricing Assumptions				
$/tonne	+80/95% Mesh	1,250	1,250	1,250
$/tonne	+100/95% Mesh	1,000	1,000	1,000
$/tonne	-100/95% Mesh	700	700	700
$/tonne	Purified Flake / 99.95%, Micron (10um)	3,250	3,250	3,250
$/tonne	cSPG (18 microns)	8,750	8,750	8,750
$/tonne	cSPG (8 microns)	10,750	10,750	10,750
Revenue				
	Bulk Concentrate Sales	$7.1 M	$7.1 M	$7.1 M
	Purified Flake / 99.95%, Micron (10um)	$52.0 M	$52.0 M	$52.0 M
	cSPG (18 microns)	$175.0 M	$175.0 M	$175.0 M
	cSPG (8 microns)	$43.0 M	$43.0 M	$43.0 M
	Total	$277.1 M	$277.1 M	$277.1 M
Unit Costs ($/t con)	Upgrading Costs			
$55.50	Less transportation of filter cake	$3.2 M	$3.2 M	$3.2 M
$1,250.00	Less purification	53.2 M	53.2 M	53.2 M

Description/Value	Description	Oxide	Transition	Fresh
$800.00	Less micronization / shaping	$32.0 M	$32.0 M	$32.0 M
$825.00	Less coating	$19.8 M	$19.8 M	$19.8 M
	Total Upgrade Costs	$108.2 M	$108.2 M	$108.2 M
	Subtotal Graphite Value	$168.9 M	$168.9 M	$168.9 M
2%	Less Royalty	$3.4 M	$3.4 M	$3.4 M
	Final Graphite Value	$165.5 M	$165.5 M	$165.5 M
	Per Tonne final product	**$3,438**	**$3,438**	**$3,438**
	Per Tonne of feed processed	$69.59	$69.59	$73.51
Power Cost				
$/Kwhr	Power to Site	0.107	0.107	0.107
Fuel Cost				
$/l	Fuel to Site	0.79	0.79	0.79
Mining Cost *				
South Pit – Base elevation is 250 masl				
Waste	Base Cost ($/t moved)	2.23	2.68	2.97
	Increment below base ($/t moved)	0.055	0.050	0.055
Mill Feed	Base Cost ($/t moved)	2.20	2.80	3.10
	Increment below base ($/t moved)	0.028	0.025	0.028
North Pit – Base elevation is 270 masl				
Waste	Base Cost ($/t moved)	2.36	2.81	3.10
	Increment below base ($/t moved)	0.066	0.059	0.066
Mill Feed	Base Cost ($/t moved)	2.35	2.94	3.25
	Increment below base ($/t moved)	0.066	0.059	0.066
Processing and G&A				
Processing Cost	South Pit $/t mill feed	11.00	12.70	18.05
	North Pit $/t mill feed	11.10	11.10	18.15
G&A Cost	South Pit $/t mill feed	1.74	1.74	1.74
	North Pit $/t mill feed	1.74	1.74	1.74
Process + G&A Cost	South Pit $/t mill feed	12.74	14.44	19.79
	North Pit $/t mill feed	12.84	12.84	19.89

**** mining costs based on using 55 t haul trucks***

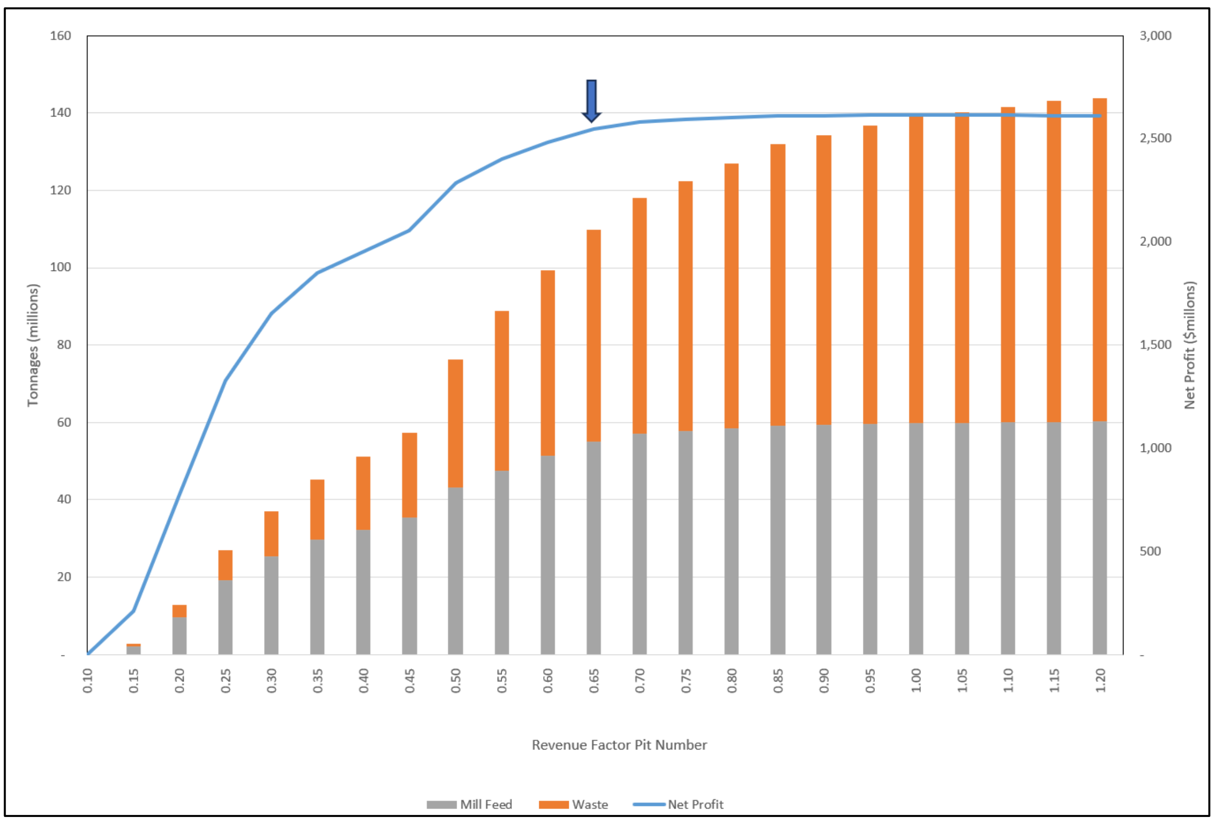
The mining cost includes blasting for the Fresh rock.

Restrictions were applied to the block model for offsets for the highway and also blasting restrictions. The highway offset for mining was set at 100 m and for blasting activity is at 500 m. This ensured that no fresh rock would be mined within the offset.

Nested LG pit shells were generated with the net graphite price varying between $329/t and $3,948/t to examine sensitivity to the price per tonne of the final product with a revenue factor ("RF") equal to one of $3,438/t of final product. This was done to gain an understanding of the deposit and highlight potential opportunities in the design process to follow. Diluted Inferred resource material was used in the final analysis. The resulting nested pit shells assist in visualizing natural breakpoints in the deposit and selecting shells to act as design guidance for phase design. The net profit before capital for each pit was calculated on an undiscounted basis for each pit shell using the above base case prices. Mill feed / waste tonnages and net profit were plotted against revenue factor and are displayed in Figure 16.1.

The chosen pit shell represented the RF=0.65 pit shell. Sets of internal shells were examined to assist in developing pit shells but were primarily focused on an initial phase in oxide with the subsequent phase in fresh rock to the RF=0.65 pit.

Figure 16.1 Lerch Grossman Pits by Revenue Factor



Source: AGP (2024)

16.3.3 Dilution

Both the North pit and SW resource models were provided in a whole block format. Whole block models means that for any given block, it is routed as either mill feed or waste. The block size within each of the models was 5 m by 5 m in plan, and 5 m high. The approach used to apply external dilution in an appropriate manner is described in the following paragraphs.

Dilutions skins are considered around a mill feed block if the mill feed block is in contact with neighbouring waste blocks. The first step in this method was to define mill feed and waste blocks. A cutoff of 0.90% Cg for oxide and transition was used while the fresh cutoff was 1.40% Cg was used. Only Inferred blocks were used as the model contains no Indicated or Measured material. These cut-off values represent the marginal cut-off as it includes the sum of process costs and G&A costs. The second step includes determining the number of waste neighbour contacts for each mill feed block. For each waste neighbour, a dilution tonnage and grade are applied to the mill feed block based on the specified dilution skin thickness. The third step is to reduce the tonnage in the neighbouring waste blocks to remove the diluting material.

The dilution material is added to the parent mill feed block and removed accordingly in neighbouring waste blocks to achieve a material balance. For the whole block method, the diluted model includes revised diluted density and metal grades for all blocks.

A dilution skin thickness of 0.6 m was used for the model which resulted in the diluted mill feed containing 2.9% more tonnes and a 2.8% lower grade than the in-situ mill feed summary. AGP considered this dilution as acceptable due to the nature of the mineralization zones being mined.

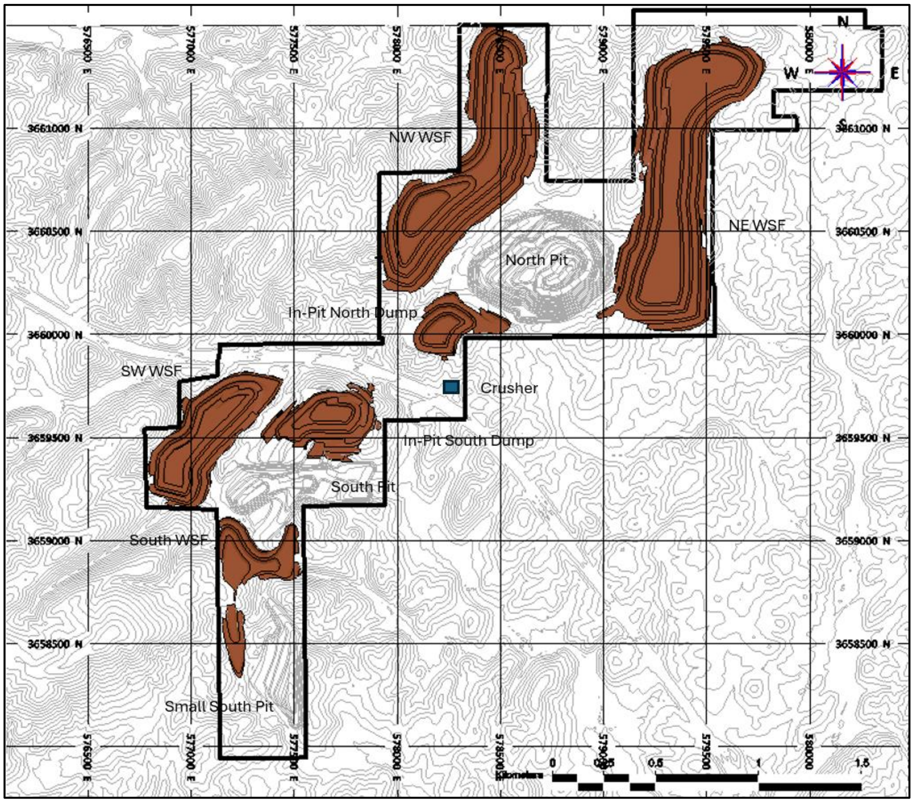
16.3.4 Pit Design

Pit designs were developed for the North, South and Small South pit areas. The pit locations are displayed in Figure 16.2.

The North Pit design consists of two phases although three are scheduled with Phase 0 representing a subset of Phase 1. The South and Small South pit designs also are comprised of two phases each. Generally, the first phase in each area is the oxide mining while the second phase includes the transition and fresh material although a small amount of transition mill feed may be mined with the first phase.

All pits were developed using 10 m bench heights.

Figure 16.2 Pit and Waste Storage Facility Locations



Source: AGP (2024)

Geotechnical parameters discussed in Section 16.2 were applied to pit designs.

Equipment sizing for ramps and working benches is based on the use of 55 tonne rigid frame haul trucks. The operating width used for the truck is 5.1 m. This means that single lane access is 16.6 m (2x operating width plus berm and ditch) and double lane widths are 21.6 m (3x operating width plus berm and ditch). Ramp gradients are 10% for the pits and 8% for the dumps.

Tonnes and grade for the designed pit phases are reported in Table 16.4 using the diluted tonnes and grade from the models. The cutoff grade used for mine planning purposes was for oxide and transition material 1.1% Cg and the fresh material was 1.5% Cg. The marginal cutoffs by comparison are 0.90% for oxide and transition and 1.4% for fresh material.

Table 16.4 Pit Phase Tonnages and Grades

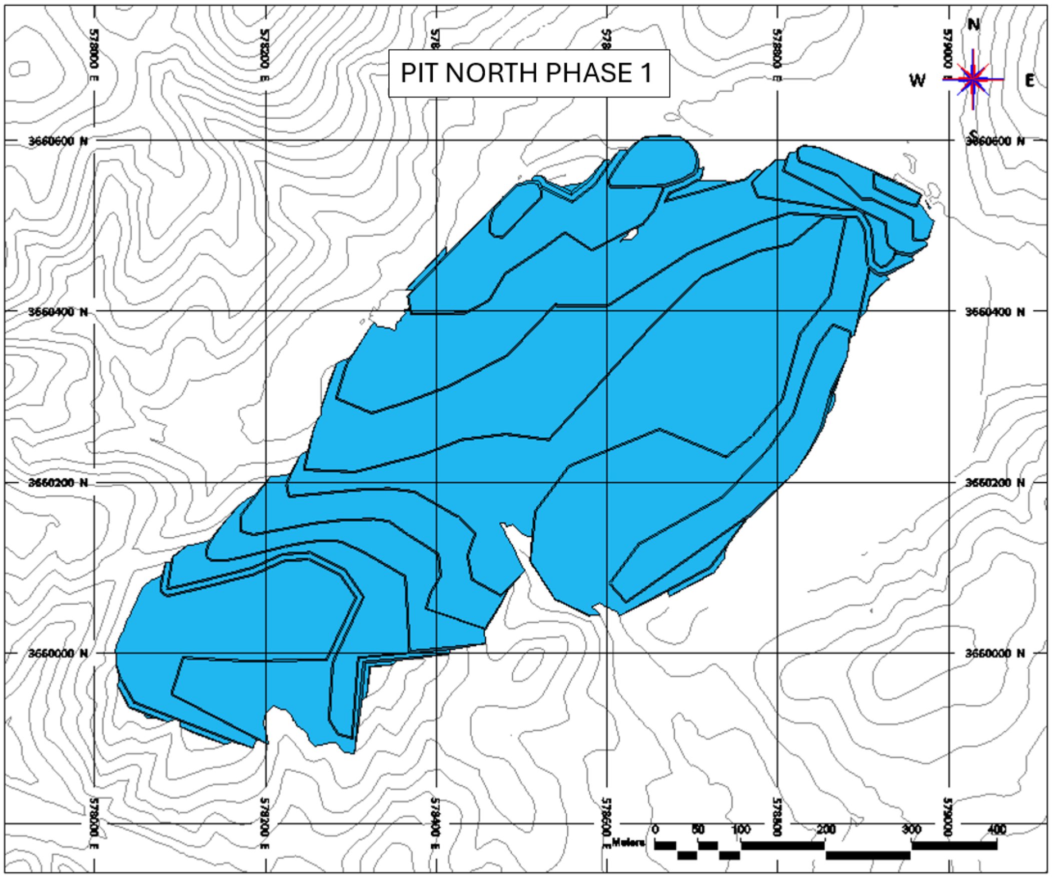
Pit	Phase	Oxide Mill Feed		Transition Mill Feed		Fresh Mill Feed		Total Mill Feed		Waste	Total	Strip
		Mt	%	Mt	%	Mt	%	Mt	%	Mt	Mt	Ratio
North	0	2.89	2.19	0.16	2.03	-	-	3.04	2.18	1.84	4.88	0.60
	1	4.01	2.35	0.14	2.18	-	-	4.14	2.35	3.03	7.17	0.73
	2	0.16	2.25	4.91	2.12	17.66	2.02	22.73	2.04	44.04	66.77	1.94
North Total		**7.05**	**2.28**	**5.20**	**2.12**	**17.66**	**2.02**	**29.91**	**2.10**	**48.90**	**78.82**	**1.64**
South	1	4.49	2.14	0.38	2.14	0.02	2.26	4.89	2.14	4.90	9.79	1.00
	2	0.26	2.10	1.37	2.04	2.38	2.01	4.00	2.03	8.52	12.52	2.13
South Total		**4.75**	**2.14**	**1.74**	**2.06**	**2.40**	**2.01**	**8.89**	**2.09**	**13.42**	**22.31**	**1.44**
Small South	1	0.74	2.23	0.08	2.41	-	-	0.82	2.24	1.18	2.00	1.13
	2	0.12	2.52	1.33	2.37	1.23	2.10	2.68	2.26	3.03	5.71	1.42
Small South Total		**0.86**	**2.27**	**1.41**	**2.37**	**1.23**	**2.10**	**3.50**	**2.25**	**4.21**	**7.71**	**1.57**
BamaStar Total		**12.66**	**2.23**	**8.35**	**2.15**	**21.28**	**2.02**	**42.30**	**2.11**	**66.53**	**108.83**	**1.57**

North Phase 0 and Phase 1

North Phase 0 is the first phase mined in the North pit. Phase 0 has been designed to provide initial oxide material to commission the process facility and start mining activity. Phase 1 continues mining along the ridge and at depth.

Phase 0 is mined from 305 masl down to 265 masl while Phase 1 mines from 325 masl to 245 masl as it goes to the highest point on the ridge. The design is shown in Figure 16.3.

Figure 16.3 North Phase 1 Design

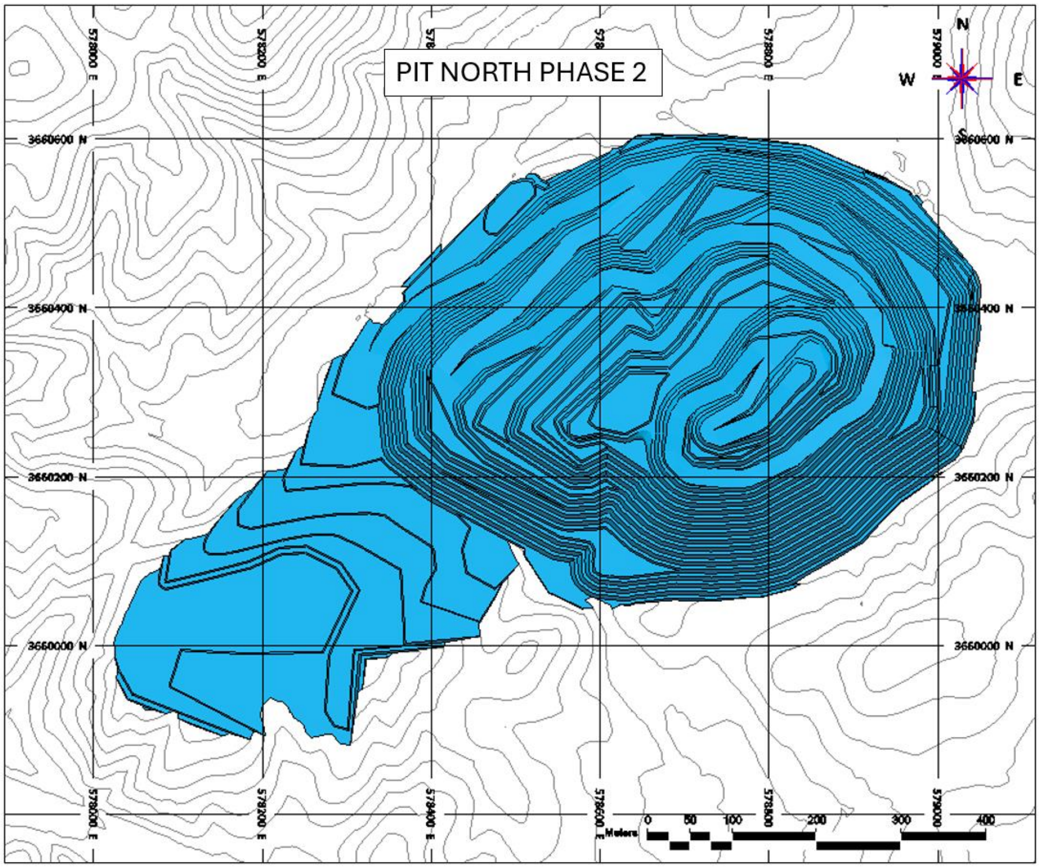


Source: AGP (2024)

North Phase 2

North Phase 2 mines the fresh portion of the ridge on the north side of the highway with the appropriate 500 m offset. This phase mines from the 275 masl to 80 masl level. The design is shown in Figure 16.4

Figure 16.4 North Phase 2 Design

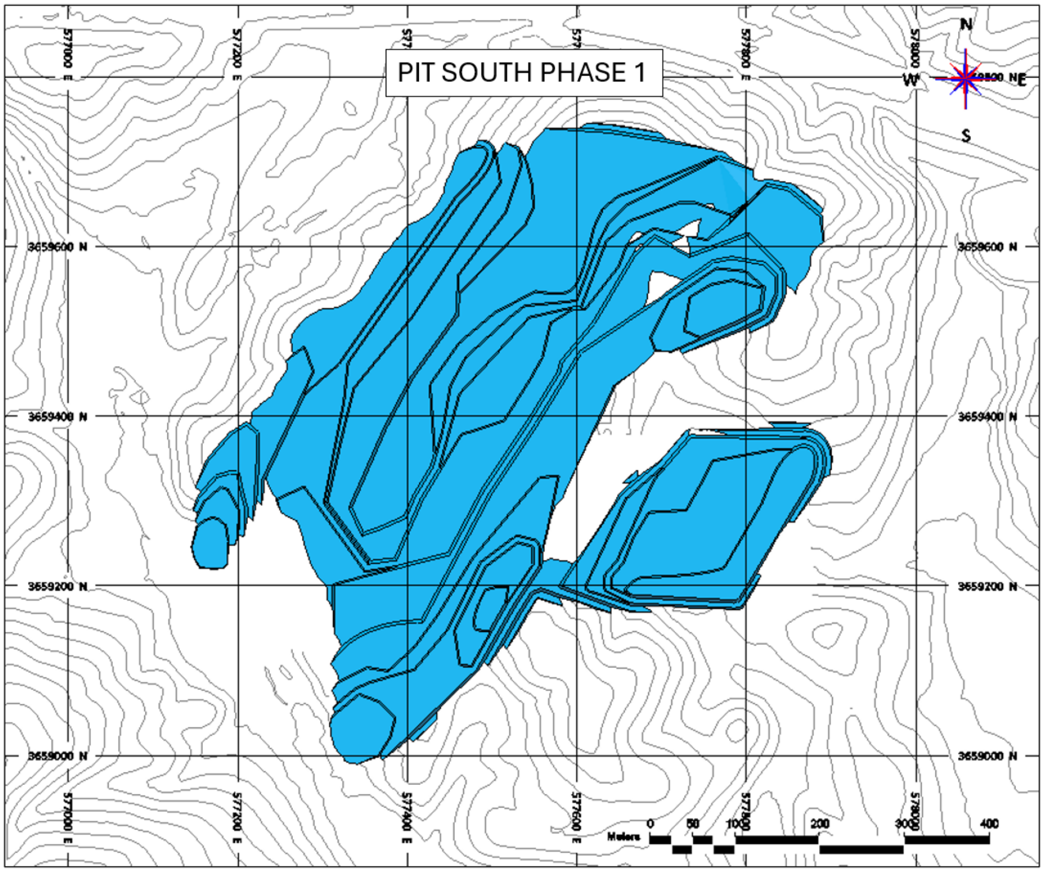


Source: AGP (2024)

South Phase 1

South Phase 1 is mined from 335 masl down to 245 masl. The primary focus of this phase is the removal of oxide material. The design is shown in Figure 16.5.

Figure 16.5 South Phase 1 Design

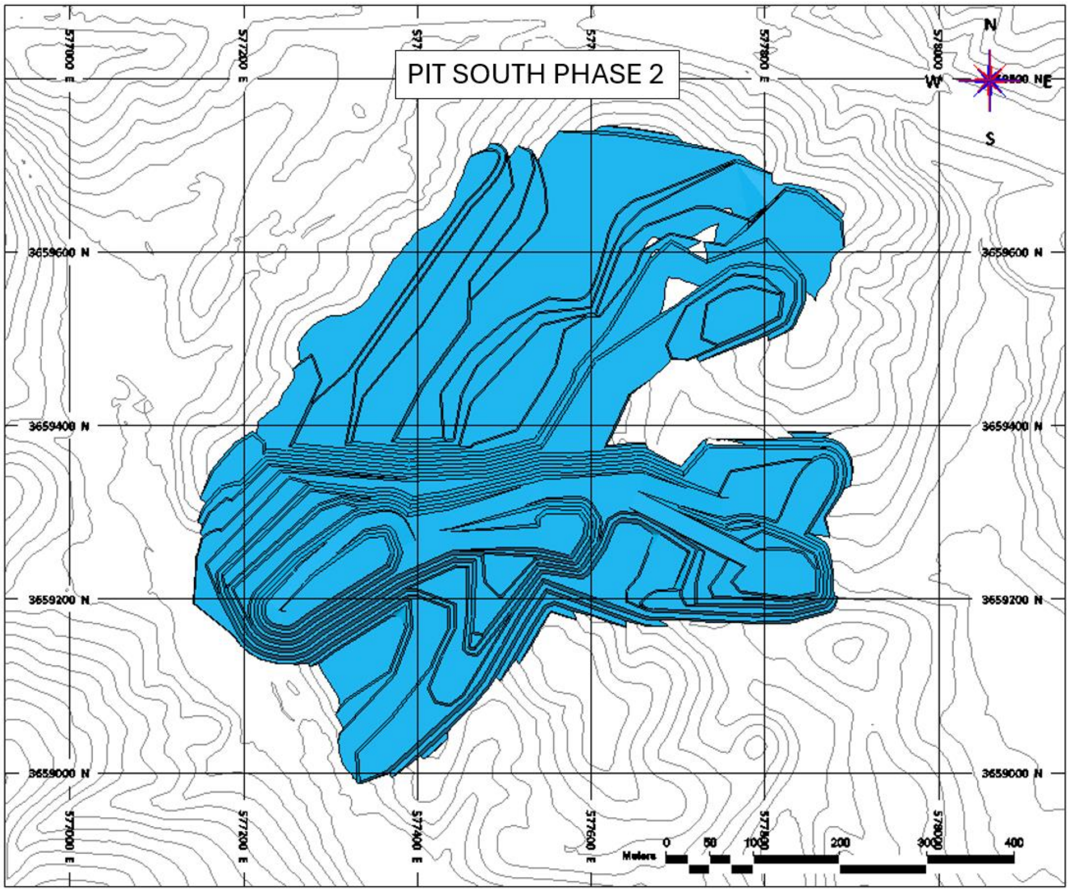


Source: AGP (2024)

South Phase 2

South Phase 2 is the final phase of the South area and targets the transition and fresh materials. This phase is mined from 310 masl down to 205 masl. The design is shown in Figure 16.6.

Figure 16.6 South Phase 2 Design

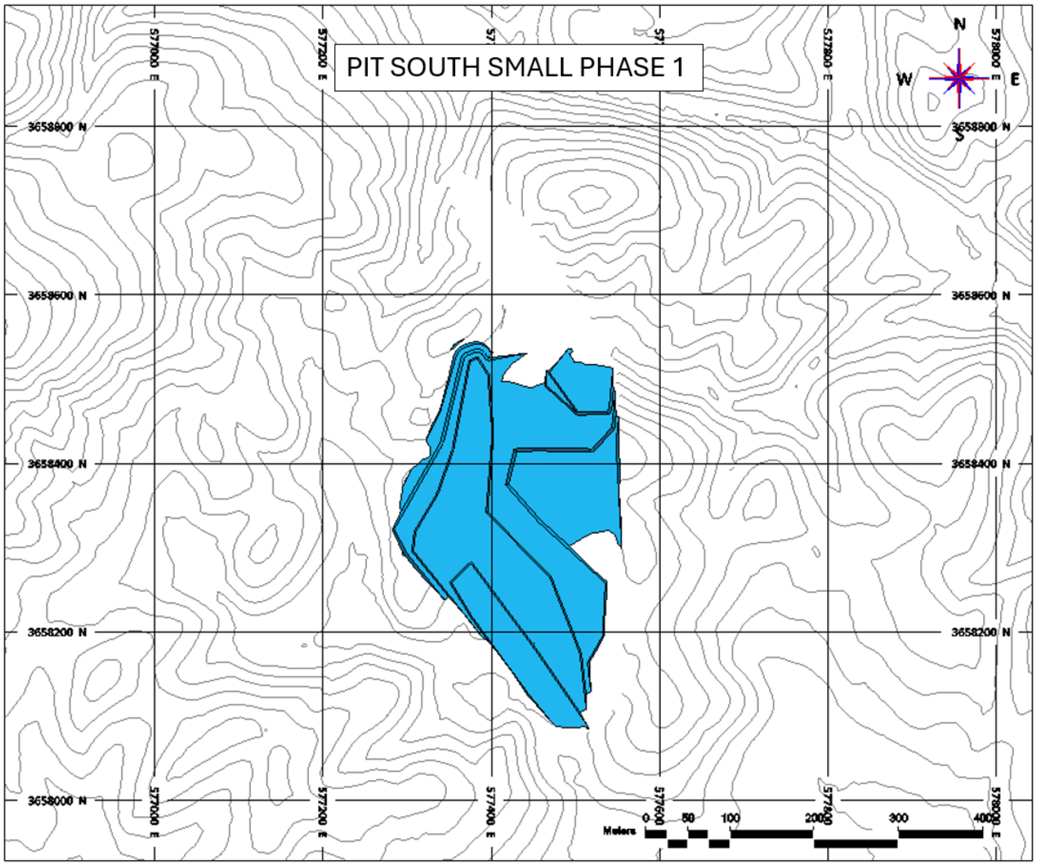


Source: AGP (2024)

South Small Phase 1

South Small phase 1 is located to the south of the South Phases across a small drainage. The first phase targets oxide and the second phase fresh rock. This phase is mined from 300 masl down to 265 masl. The design is shown in Figure 16.7.

Figure 16.7 South Small Phase 1 Design

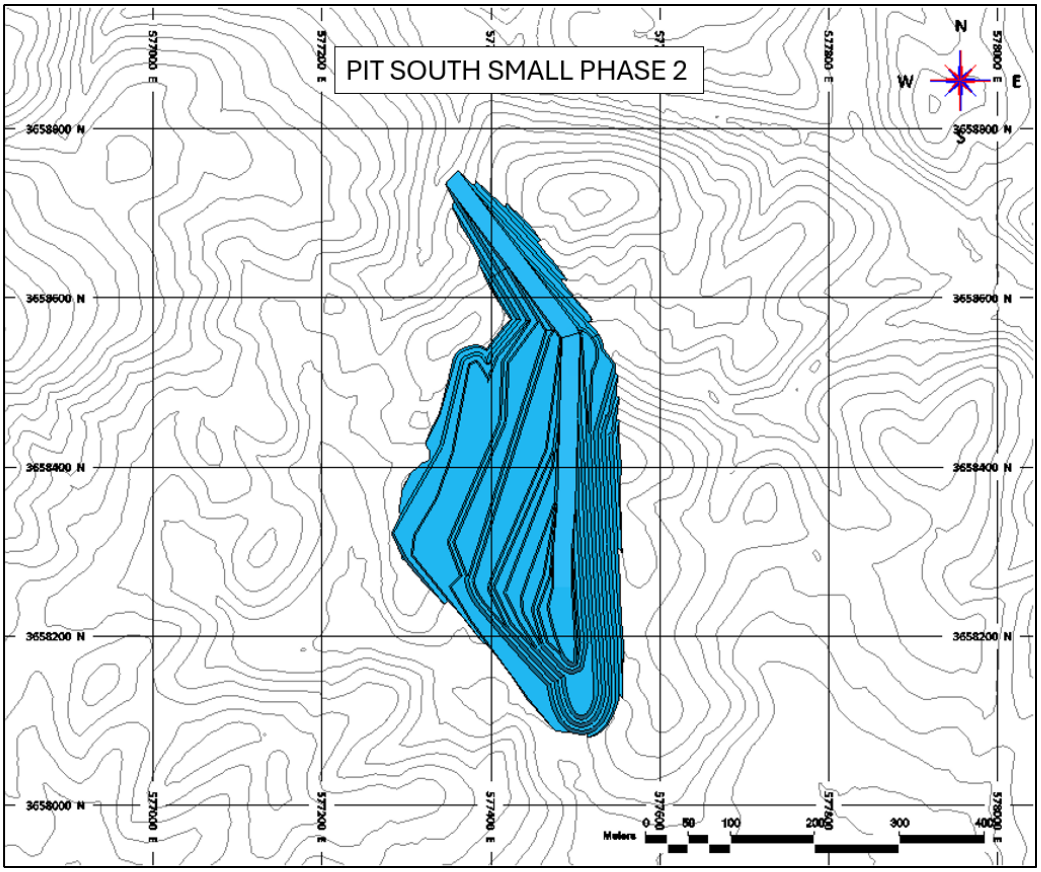


Source: AGP (2024)

South Small Phase 2

South Small Phase 2 is focused on the fresh rock at depth in the Small South area. This phase is mined from 290 masl down to 215 masl. The design is shown in Figure 16.8.

Figure 16.8 Southwest Phase 1 Design



Source: AGP (2024)

16.3.5 Waste Storage Facility Design

Various rock types are present in the material mined within the final pits. The waste storage facilities ("WSF") are also including the volume associated with the filtered tailings from the concentrator on site. The material is co-mingled in the facilities and compacted.

The design of the WSF's used a swell factor of 1.30 for waste and tailings. All waste storage facilities were designed with a 37° face slope and overall slopes of 21.8° (3H:1V). They were also designed with 20 m lift heights and 23.5 m berms.

Waste storage facilities will be actively reclaimed as they are developed. Dozers will re-slope them as they are advanced to allow revegetation to occur as soon as possible. Drainage ditches will need to be in place along the waste dump boundaries so that water does not flow directly into other waterways.

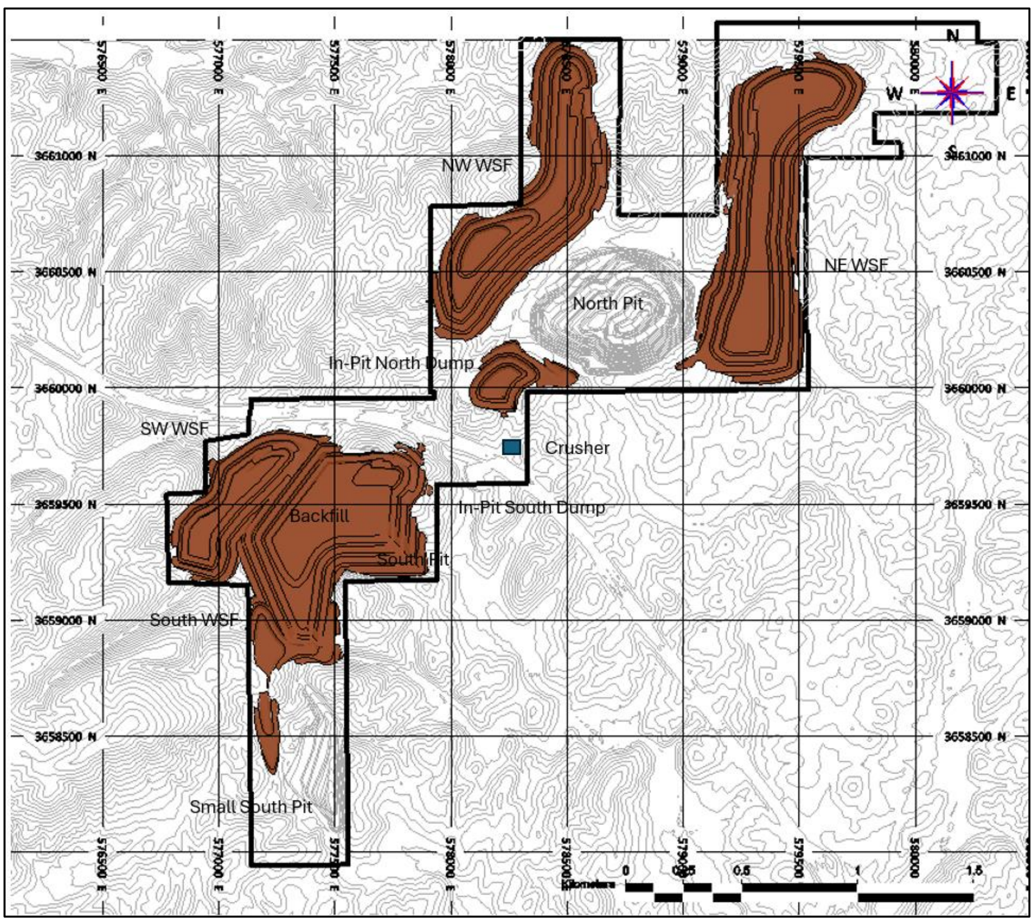
The capacities for the waste storage facilities are displayed in Table 16.5.

Table 16.5 Waste Storage Facilities Summary

Waste Storage Facility	Capacity M lcm
Northwest Waste Storage Facility (NW WSF)	14.1
Northeast Waste Storage Facility (NE WSF)	19.0
North Inpit Dump (on oxide pit)	1.1
Southwest Waste Storage Facility (SW WSF)	6.1
South Waste Storage Facility (South WSF)	1.3
South Inpit Dump (on oxide pit)	2.5
South Backfill (over full pit)	16
Total	**60.1**

The waste destinations are displayed in Figure 16.9.

Figure 16.9 Waste Destinations



Source: AGP (2024)

16.3.6 Mine Schedule

The mine schedule for open pit mining consists of 42.3 Mt of mill feed grading 2.11% Cg providing mill feed for 19 production years. Open pit waste tonnage totals 66.5 Mt and will be placed into waste storage facilities. The overall open pit strip ratio is 1.6:1. The mine schedule utilizes the pit phases described previously to send a maximum of 2.6 Mtpa of feed to the mill facility.

The deposit outcrops and therefore no pre-stripping is required although some site preparation is necessary with the establishment of access and sediment ponds. Mill feed is stockpiled over the mine life to assist in grade management with a peak capacity of 3.5 Mt in Year 11 then declines to zero with stockpile reclaim over the remainder of the mine life.

Oxide mill feed material is the focus of the early mine schedule for the first six years with any transition or fresh material stockpiled awaiting a plant upgrade. Year 6 onwards all material types are processed as encountered.

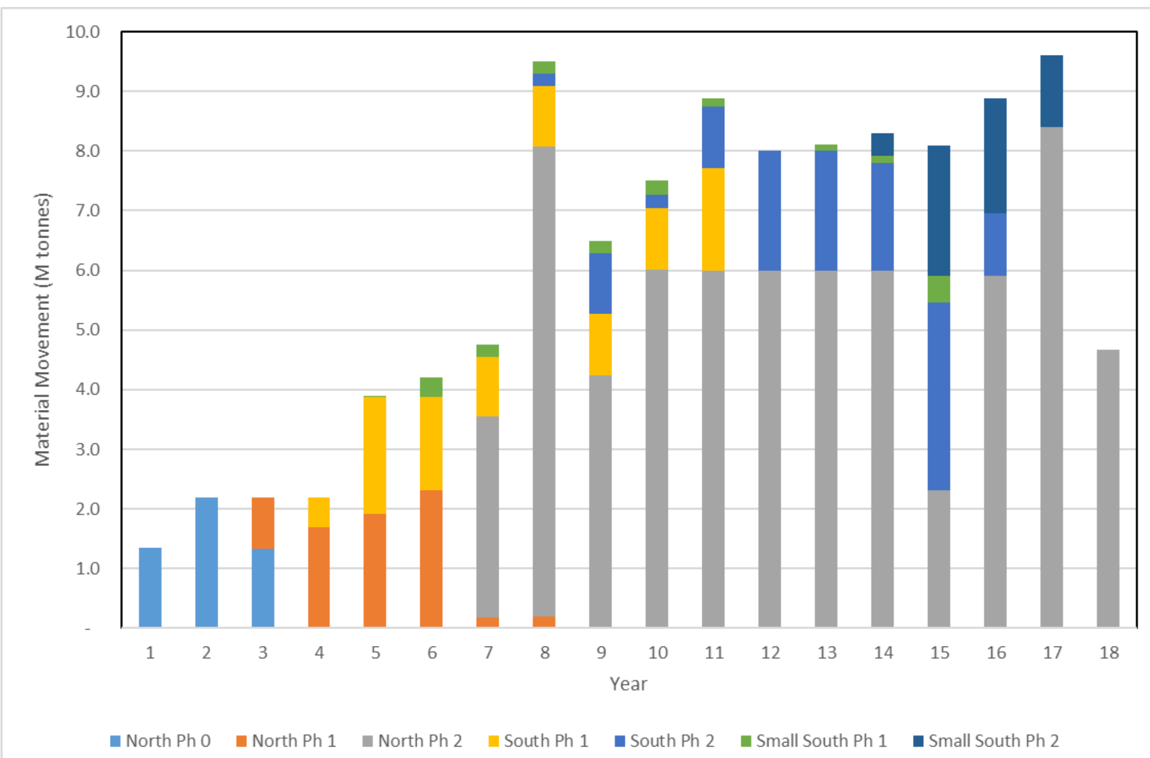
The timing of open pit mining total tonnes is displayed in Table 16.6 and Figure 16.10. A maximum descent rate of 10 (5 m) benches per year per phase was applied for open pit mining to ensure that reasonable mining operations and mill feed control would occur. Typically, it was not more than 4 benches per year. The open pit mining started in year 1 and continued uninterrupted until year 18. Year 19 in both Table 16.6 and Figure 16.10 only show 18 years as the final year, year 19, was fed from the stockpile. Process tonnages and graphite grade are shown in Figure 16.11 and reflects the 19-year life of mine.

Table 16.6 Annual Material Mined by Source

	Mined Material by Source							
	North Pit			**South Pit**		**Small South Pit**		**Total**
Year	**ph 0 Mt**	**ph 1 Mt**	**ph 2 Mt**	**ph Mt**	**ph 2 Mt**	**ph 1 Mt**	**ph 2 (Mt**	**Mt**
1	1.3	-	-	-	-	-	-	1.3
2	2.2	-	-	-	-	-	-	2.2
3	1.3	0.9	-	-	-	-	-	2.2
4	-	1.7	-	0.5	-	-	-	2.2
5	-	1.9	-	2.0	-	-	-	3.9
6	-	2.3	-	1.6	-	0.3	-	4.2
7	-	0.2	3.4	1.3	-	0.2	-	4.8
8	-	0.2	7.9	1.0	0.2	0.2	-	9.5
9	-	-	4.2	1.0	1.0	0.2	-	6.5
10	-	-	6.0	1.0	0.2	0.2	-	7.5
11	-	-	6.0	1.7	1.0	0.1	-	8.9

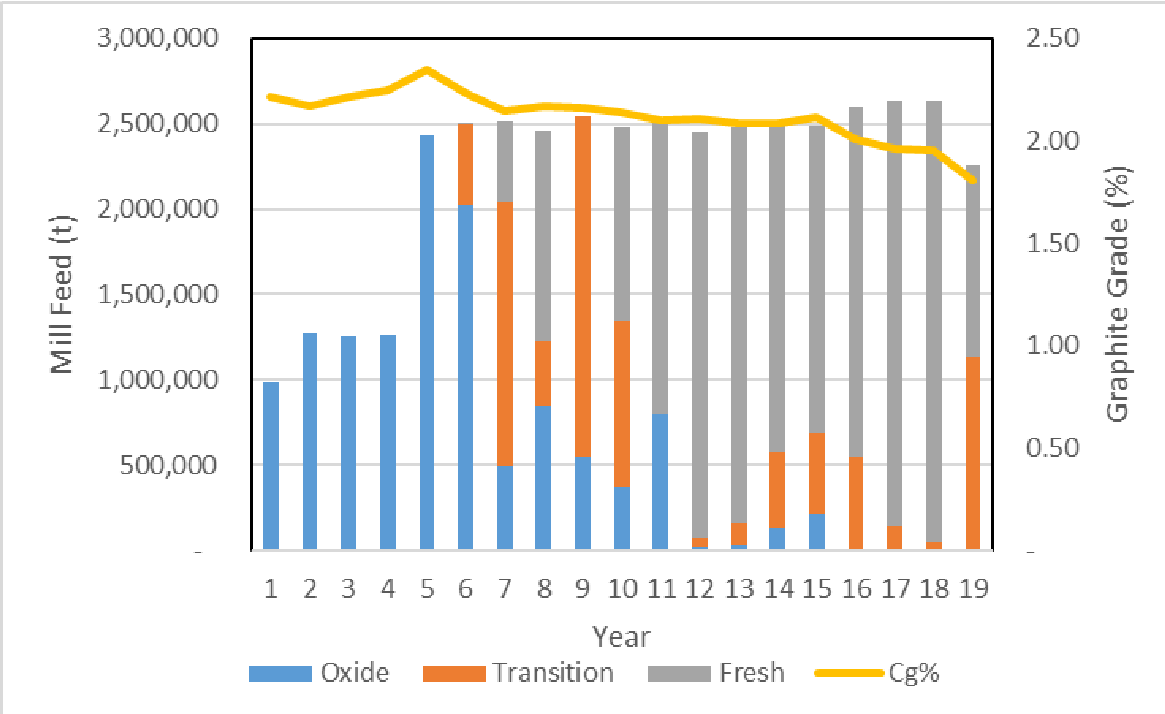
	Mined Material by Source							
	North Pit			South Pit		Small South Pit		Total
Year	**ph 0 Mt**	**ph 1 Mt**	**ph 2 Mt**	**ph Mt**	**ph 2 Mt**	**ph 1 Mt**	**ph 2 (Mt**	**Mt**
12	-	-	6.0	-	2.0	-	-	8.0
13	-	-	6.0	-	2.0	0.1	-	8.1
14	-	-	6.0	-	1.8	0.1	0.4	8.3
15	-	-	2.3	-	3.1	0.5	2.2	8.1
16	-	-	5.9	-	1.1	-	1.9	8.9
17	-	-	8.4	-	-	-	1.2	9.6
18	-	-	4.7	-	-	-	-	4.7
Total	**4.9**	**7.2**	**66.8**	**9.8**	**12.5**	**2.0**	**5.7**	**108.8**

Figure 16.10 Tonnes Mined by Phase – Mine Life



Source: AGP (2024)

Figure 16.11 Processed Tonnage by Material Type and Graphite Grade



Source: AGP (2024)

The detailed mine schedule was summarized on an annual basis and is shown in Table 16.7.

Table 16.7 Mine Schedule

Period	Mill Feed		To Stockpile		From Stockpile		Waste	Total Movement
	Tonnes x1000	Cg% dil	Tonnes x1000	Cg% dil	Tonnes x1000	Cg% dil	Tonnes x1000	Tonnes x1000
1	979,960	2.22	-	-	-	-	361,287	1,341,246
2	1,268,701	2.17	-	-	-	-	931,299	2,200,000
3	1,256,497	2.22	143,095	2.04	-	-	800,409	2,200,000
4	1,259,597	2.24	81,409	2.31	-	-	855,174	2,196,180
5	2,429,097	2.34	168,272	2.17	-	-	1,302,141	3,899,510
6	2,501,893	2.24	183	1.53	392,776	2.15	2,089,318	4,591,394
7	2,517,057	2.15	36,484	1.81	-	-	2,202,124	4,755,665
8	2,464,766	2.17	2,191,186	2.15	1,525	1.98	4,844,048	9,500,000
9	2,545,498	2.16	2,498,089	2.09	2,001,702	2.17	3,456,412	8,500,000
10	2,483,613	2.14	1,440,453	2.08	1,992,340	2.11	5,575,934	9,500,000
11	2,514,069	2.10	1,970,482	2.06	617,409	2.11	5,015,449	9,500,000
12	2,453,125	2.11	1,361,060	2.01	1,500,000	2.09	5,685,814	9,500,000
13	2,483,473	2.09	1,220,245	1.95	1,892,898	2.07	6,296,282	10,000,000
14	2,516,725	2.08	1,446,639	1.95	1,695,966	2.05	6,036,636	10,000,000
15	2,485,494	2.12	1,876,384	1.98	1,911,415	1.95	5,638,122	10,000,000
16	2,603,899	2.00	1,079,812	2.02	1,112,927	2.03	6,316,289	10,000,000
17	2,635,373	1.96	653,930	1.89	394,851	2.28	6,710,697	10,000,000
18	2,639,449	1.95	-	-	392,469	2.09	2,413,860	5,053,309
19	2,260,862	1.81	-	-	2,260,862	1.81	-	2,260,862
Total	**42,299,147**	**2.11**	**16,167,723**	**2.04**	**16,167,137**	**2.04**	**66,531,296**	**124,998,165**

Mineralized material in the production schedule was split into weathering profile bins to assist in realistic mill feed management. The stockpiled material, together with pit phase sequencing, was utilized to ensure the mill is processing the best material available during the schedule.

Significant activities near the pit prior to mine operations will include establishing proper roads to the mill feed crusher and to the various waste storage areas. Operationally, ditching around the pits to intercept surface run-off will help to minimize reductions in mine production due to storm events.

The initial production focus will be on the smallest footprint in the north pit area with an oxide only focus. This material requires no drilling and blasting and a less complex process plant. The intent is to defer the upgrading of the processing facility until Year 6 with the oxide only focus. Any transition material encountered in those first six years will be stockpiled for later processing.

Year 1 production assumes the plant will be able to ramp up and mill almost 1.0 Mt of mill feed. Subsequent years will show a steady increase in mill throughput to maintain the required final product tonnage from the produced concentrate. The variation in the mill feed tonnage reflects expected grade and recovery variations.

Mining will focus on the North pit for the first three years mining oxide. In Year 4 the South pit area will be opened, again focused initially on oxide mill feed production. The Small South pit area will be opened in Year 5 to assist in the oxide mill feed tonnage required and will continue to be mined until the end of the mine life.

Oxide production in the north pit will be essentially complete in Year 7 when mining of North Pit Phase 2 will start. This generates transitional and fresh feed material for the facility until the end of the mine life.

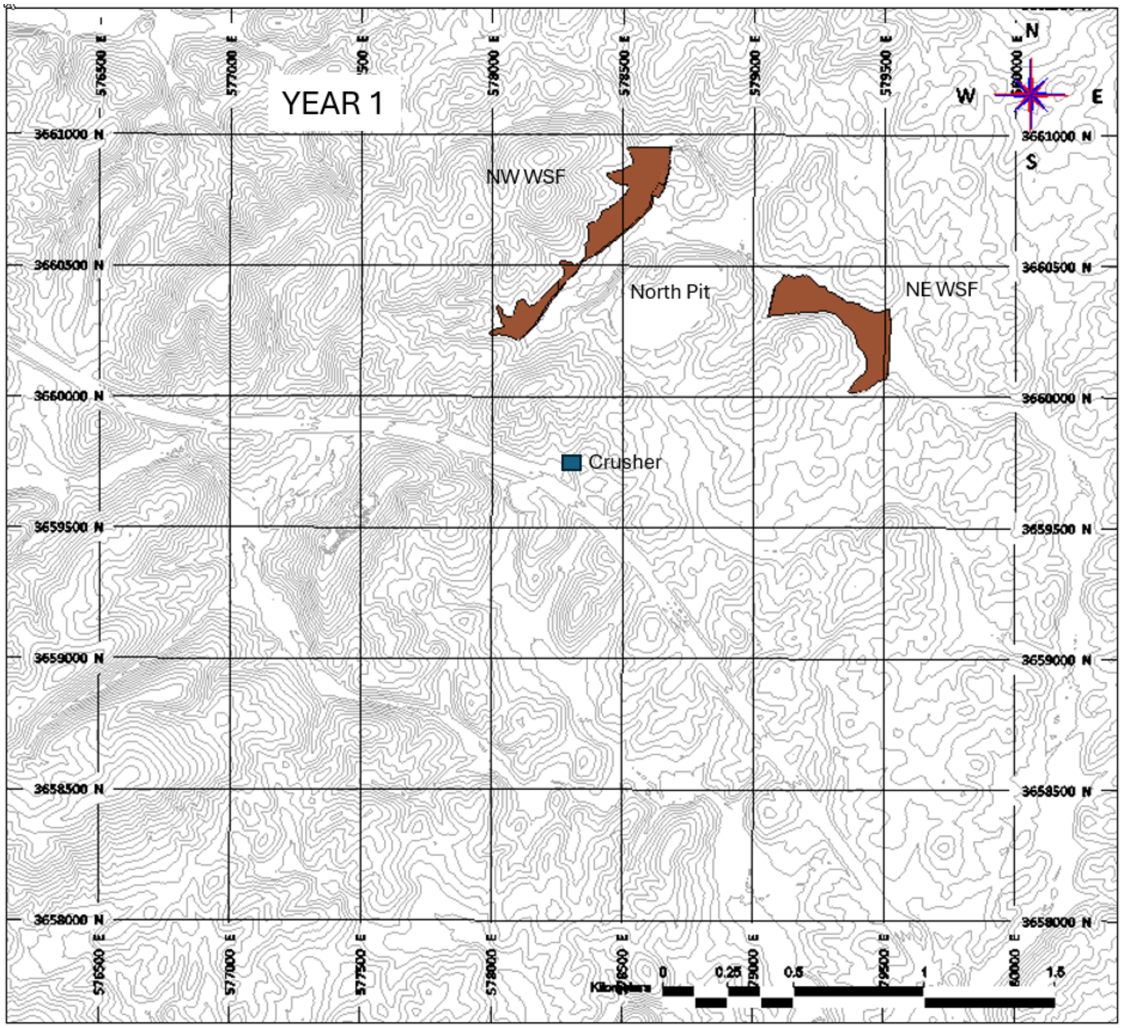
Fresh production in the South Pit area starts in Year 10 and will continue until Year 16 when the pit becomes available for backfilling. The Small South Pit area starts production of fresh and transition material in Year 12 and continues until the end of the mine life.

Small in pit dumps are used in the North and South areas where oxide only was mined. This allows waste volumes to be stored within the current property boundaries. As mentioned, the South Pit will be used as a backfill location once mining of Phase 2 is complete.

Material movement between the North and South pit areas will utilize sizers/crushers and conveyors over the existing highway to avoid conflicts with traffic. This includes the movement of waste material from the North Pit to backfill the South Pit.

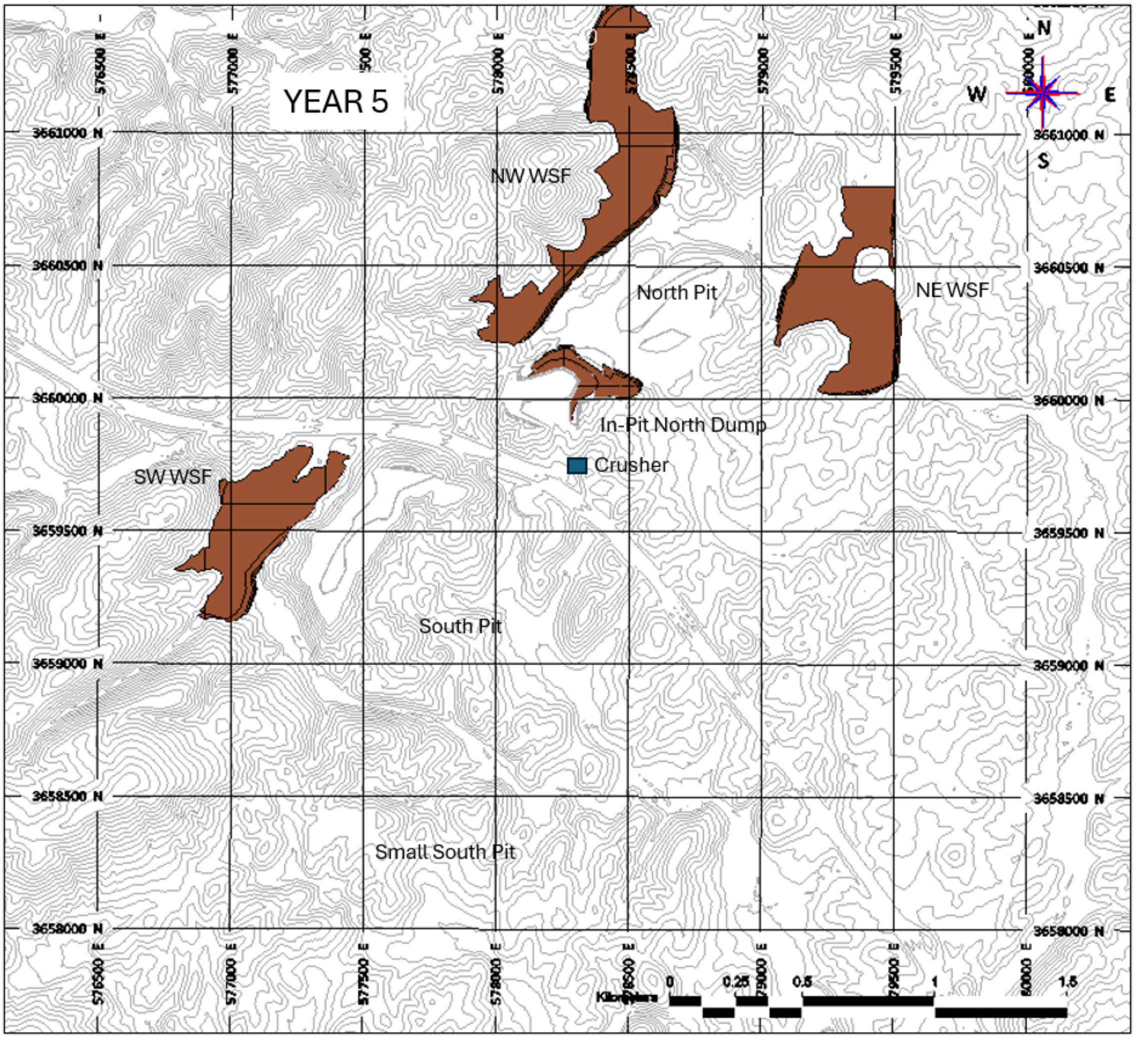
Selected end-of-year positions for the open pits and waste storage facilities are shown in Figure 16.12 to Figure 16.16.

Figure 16.12 End of Year 1



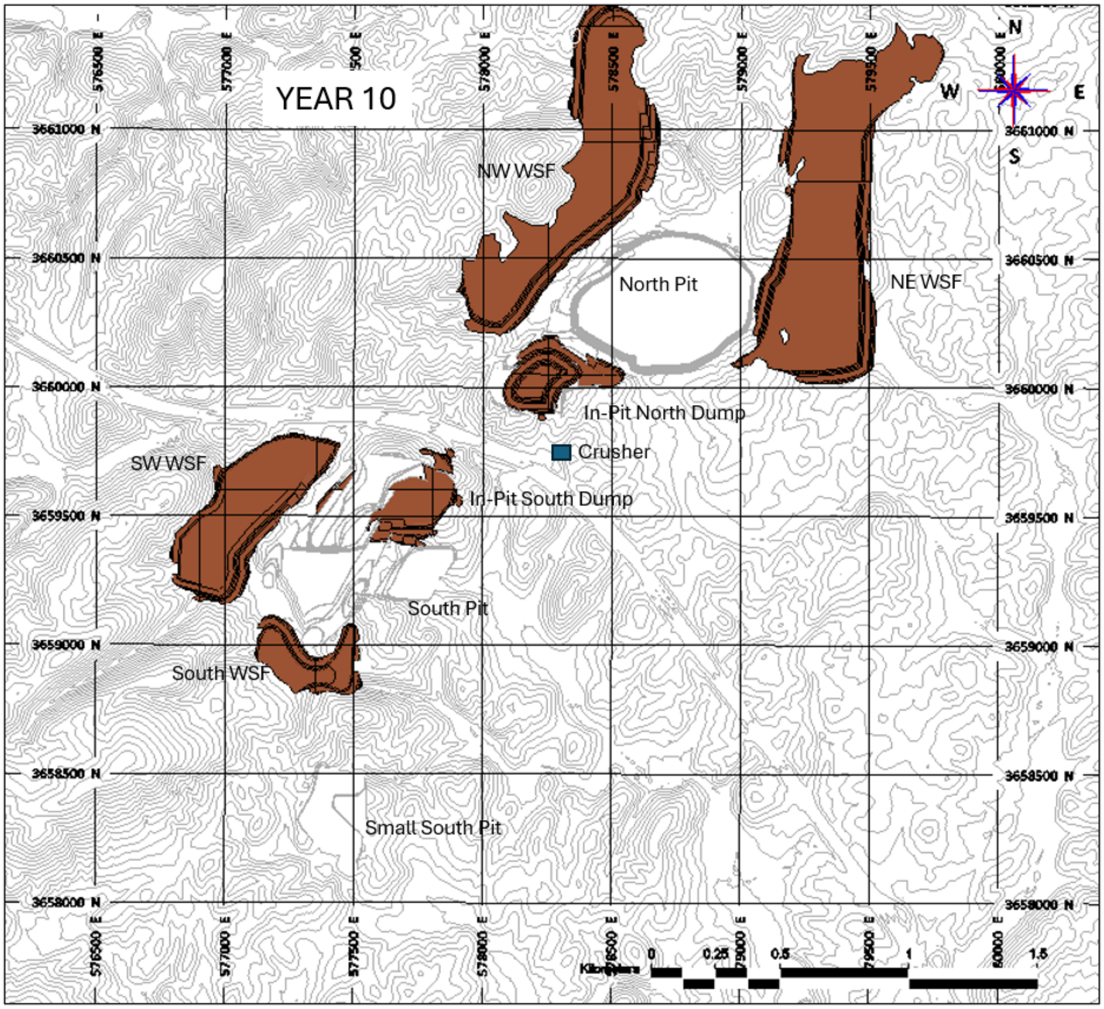
Source: AGP (2024)

Figure 16.13 End of Year 5



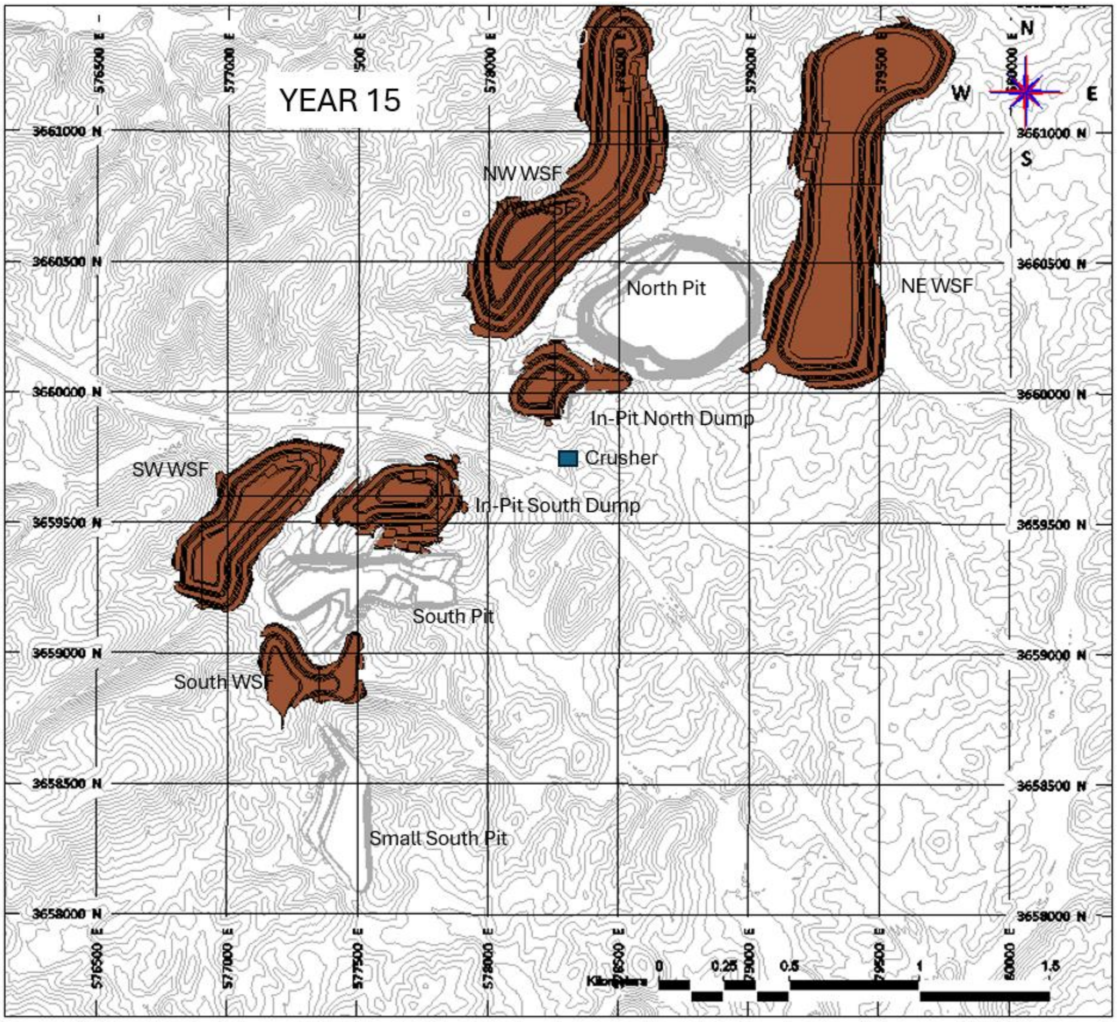
Source: AGP (2024)

Figure 16.14 End of Year 10



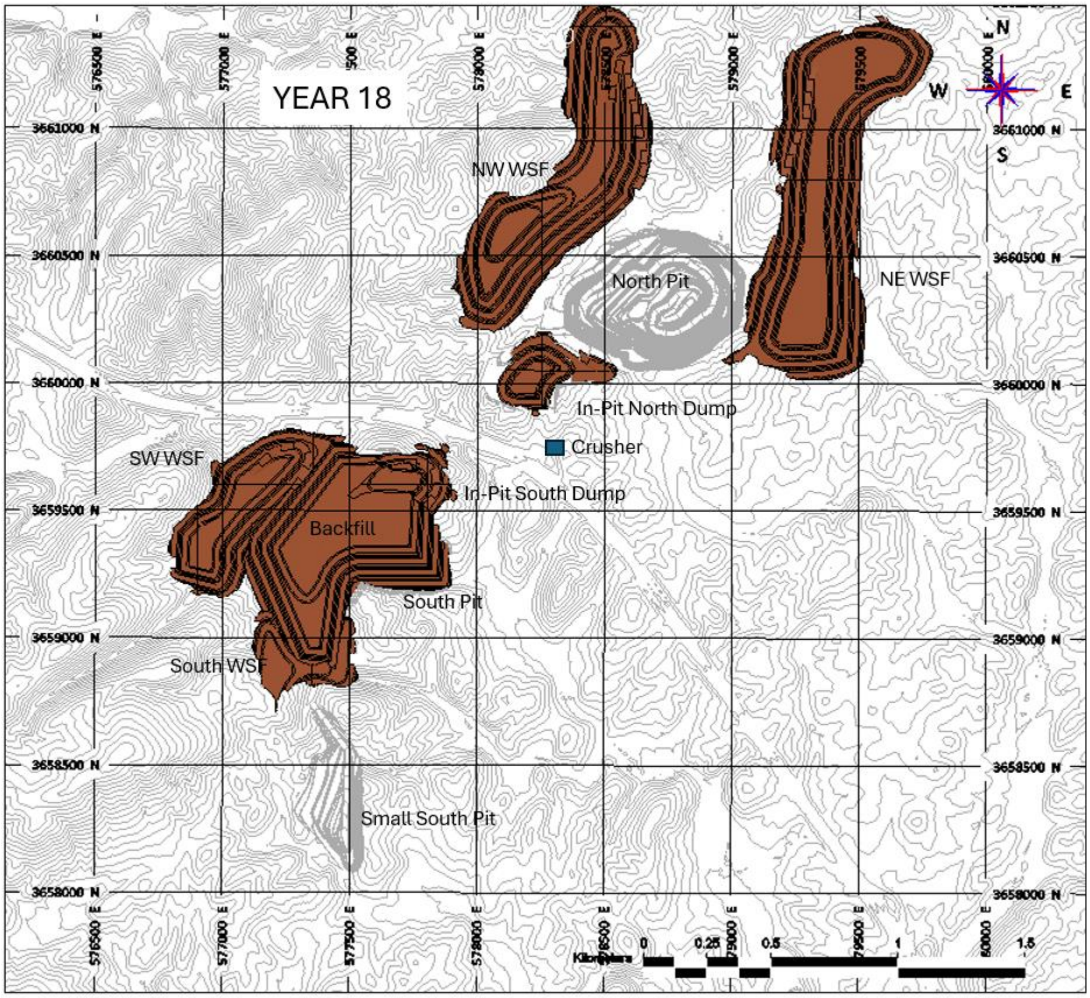
Source: AGP (2024)

Figure 16.15 End of Year 15



Source: AGP (2024)

Figure 16.16 End of Year 19



Source: AGP (2024)

16.3.7 Mine Equipment Selection

The mining equipment selected to meet the required production schedule is conventional mining equipment with the associated support equipment for road maintenance, bench preparation, production assistance and sedimentation / surface ditching maintenance.

Drilling will be completed with down the hole hammer (DTH) drills with a 140 mm bit. This provides the capability to drill 10 m bench heights in a single pass for efficiency in blasting and advanced grade control. Drilling is not expected until Year 3 with light blasting needed to loosen material and allow production to be efficient.

The primary loading units will be 5.7 m^3 front end loaders supported by 6.5 m^3 hydraulic excavators. It is expected that one of the loaders will be at the primary crusher for the majority of its operating time. The haulage trucks will be conventional 55 tonne rigid body trucks.

The support equipment fleet will be responsible for the usual road, pit, and dump maintenance requirements. Aggregate production of up to approximately 70 kt per year will be required for stemming and road crush purposes. In addition, smaller road maintenance equipment is included to keep drainage ditches open and sedimentation ponds functional.

16.3.8 Blasting and Explosives

Blast patterns are the same for feed and waste material. The blast patterns will be 4.1 m x 3.6 m (spacing x burden). Holes will be 10 m plus an additional 1.1 m sub-drill for a total 11.1 m.

The power factor with this pattern size will be 0.30 kg/t. Primarily ANFO explosives will be used with emulsion required 20% when wet conditions are encountered.

The blasting cost is estimated using quotations from a local vendor. The mine is responsible for guiding the loading process, including placement of boosters / Nonels, and stemming and firing the shot.

16.3.9 Grade Control

Grade control will be completed with face samples initially then with drill cuttings when drilling and blasting starts. To ensure proper control is maintained, 25% of the waste material will be sampled as well in areas of low-grade mineralization. These samples / holes will be used to find undiscovered veinlets or pockets of mineralization. These grade control holes serve to define the mill feed grade and mineralization contacts.

Samples collected will be sent to the assay laboratory and assayed for use in the short-range mining model.

16.3.10 Pit Dewatering

Pit dewatering is expected to be a normal mine operation activity with water reuse part of the management strategy. Efficient and cost-effective dewatering will play a role in the Project development. Dewatered slopes may allow a reduction in the strip ratio by permitting steeper inter-ramp angles that would also be inherently safer. This will be accomplished with the expected drills as they are able to do up holes into the wall as the pit is developed.

It is estimated that pumping rates will initially be in the 1,400 m^3/day range but as the mine expands will rise to peaks of 15,400 m^3/day. The volumes will vary during the operations. The water will need to be pumped to the environment discharge point near the sedimentation ponds. Storm events have the potential to impact mining operations, but stockpiles will allow the mine time to empty the pits in a reasonable manner. The capital cost estimate in Section 21 has considered the number of pumps required on site to handle the pumping needs.

The dewatering system includes the pumps, sumps, and pipelines responsible for moving water from the pit to the discharge points. Labour for this is already included in the General and Mine Engineering category of the mine operating cost. The mine has a dedicated road / pump crew.

Additional dewatering in the form of horizontal drain holes is also part of the dewatering operating costs. These holes will be drilled starting in Year 3 when the drills arrive on site. The design concept is a series of holes 50 m in length, angled up slightly and drilled into the highwalls. They will allow the water behind the wall to drain freely and prevent pore water pressure build-up.

17.0 RECOVERY METHODS

The process design is based on a phased approach flowsheet designed for the recovery of graphite, while minimizing initial capital expenditure and operating costs. The main design criteria for equipment selection included suitability for duty, reliability, and ease of maintenance. The plant layout provides ease of access to all equipment for operating and maintenance requirements while facilitating ease of concurrent construction in multiple areas.

The phased design basis includes:

- 1,300,000 tpy oxide material processing for producing 25,000 tpy graphite concentrate during Phase 1.
- 2,600,000 tpy fresh material processing for producing 25,000 tpy graphite concentrate during Phase 2.
- Crushing plant at 70% utilization (6,132 h/y).
- Grinding, flotation and thickening areas at 92% utilization (8,059 h/y).
- Filtration at 80% utilization (7,008 h/y).

17.1 Selected Process

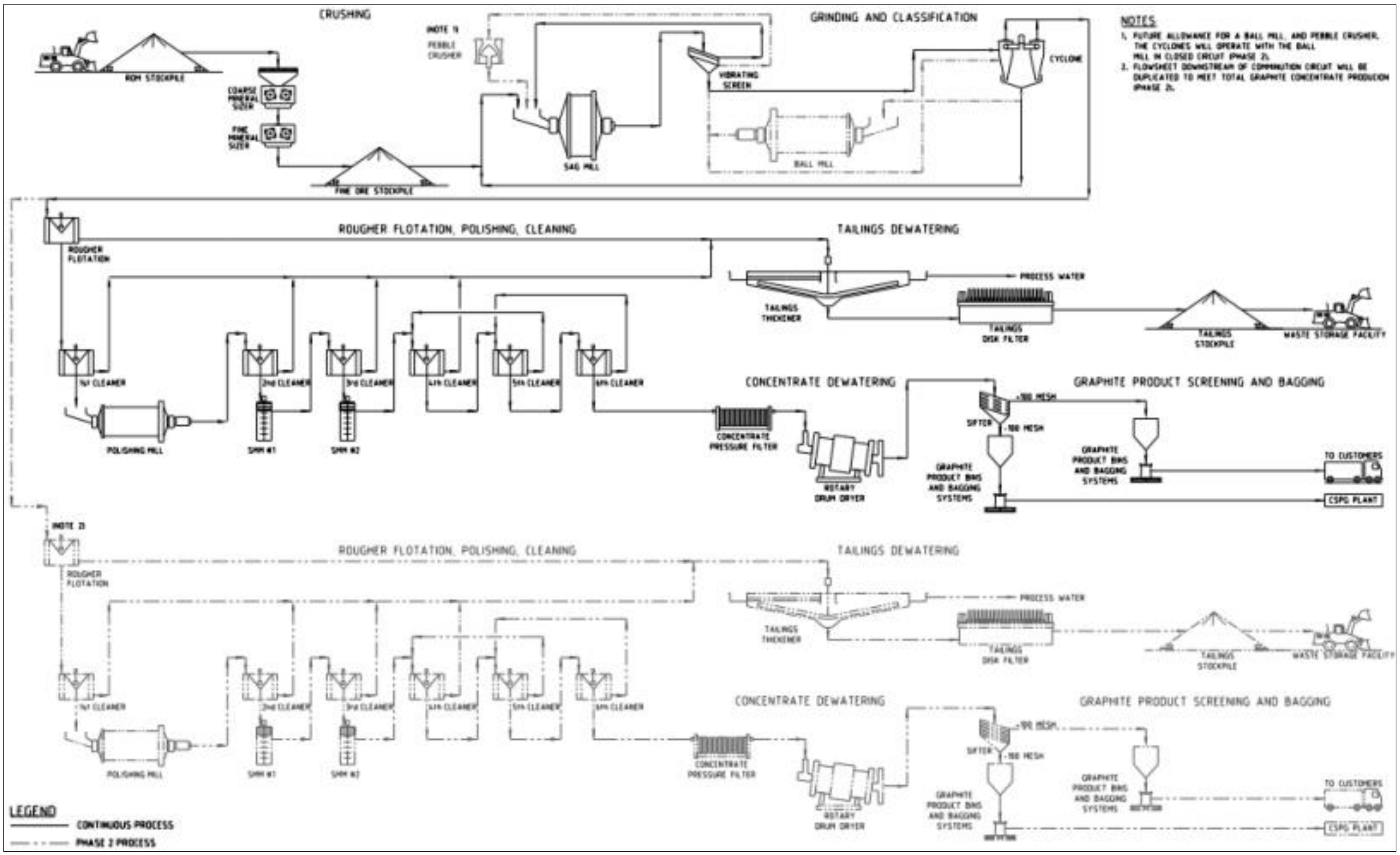
The process design consists of the following process unit operations:

- One coarse mineral sizer and a fine mineral sizer to provide crushed product with 80% passing (P_{80}) of 70 mm.
- Grinding and classification using a SAG Mill, operated in closed circuit with cyclones to achieve the desired P_{80} of 200 microns (“µm”).
- Layout allowance for future installation of a Ball Mill, and a Pebble crusher in the grinding circuit to meet the increased throughput during Phase 2 expansion.
- Graphite Flotation circuit consisting of one stage rougher and six stages of cleaning with two polishing steps for graphite recovery and grade improvement.
- Dewatering of the graphite concentrate in a filter press followed by a rotary dryer.
- Tailings dewatering in a conventional thickener followed by a disc filter to produce dry stackable tailings. The tailings filter cake is sent to a waste storage facility.
- Layout allowance for future installation of a thickener and a disc filter for tailings dewatering.

- The flowsheet downstream of comminution is duplicated for Phase 2 such that the concentrator will have two processing lines in parallel, each line producing 25,000 tpy of graphite concentrate for a total 50,000 tpy graphite concentrate.

An overall process flow diagram depicting the unit operations incorporated in the selected process flowsheet is presented in Figure 17.1.

Figure 17.1 Simplified Process Flowsheet



Source: Lycopodium, 2024

17.2 Key Process Design Criteria

Key process design criteria are summarized in Table 17.1.

Table 17.1 Key Process Design Criteria

Description	Units	Phase 1	Phase 2	Source
Daily Throughput	t/d	3,871	7,743	Calculated
Average Annual Throughput	t/y	1,300,000	2,600,000	SouthStar
Crusher Circuit Operating Percentage	%	70.0%	70.0%	Industry
Processing Plant Operating Percentage	%	92.0%	92.0%	Consultant
Filtration Operating Percentage	%	80.0%	80.0%	Industry
Crushing Operating Hours Per Year	h/y	6,132	6,132	Calculated
Milling Operating Hours Per Year	h/y	8,059	8,059	Calculated
Filtration Operating Hours Per Year	h/y	7,008	7,008	Calculated
Head Grade	% C(g)	2.11%	2.11%	SouthStar
Graphite Concentrate Production	t/y	25,220	53,014	Calculated
Overall Concentrate Grade	% C(g)	98.3%	94.4%	Testwork
Overall Graphite Recovery	%	90.3%	91.2%	Testwork
Graphite Product Distribution				
Coarse (+ 100 mesh or 150 µm)	%	25.0%	25.0%	Consultant
Fine (-100 mesh or 150 µm)	%	75.0%	75.0%	Consultant

17.3 Process and Plant Description

17.3.1 Overall Process Description

Run of mine material will be delivered to the ROM stockpile by dump trucks. A front-end loader will feed mineralized material into the hopper of the coarse mineral sizer. The discharge from the coarse mineral sizer feed the fine mineral sizer to produce a crushed material with a P_{80} of 70 mm. The crushed material is stockpiled in a fine mineralized material stockpile. The stockpile is sized to store the crushed material for 24 hours so that the milling section is decoupled from the crushing plant.

The sizers in series can handle increased throughput in Phase 2. The grinding section consists of a SAG mill, a vibrating screen, and cyclones for processing the oxide mineralized material during Phase 1. The simplified flowsheet shows the allowance for future installation a ball mill, and a pebble crusher for handling the increased throughput in Phase 2.

The graphite flotation circuit consists of a rougher flotation followed by 6-stages of cleaner flotation for graphite grade improvement. An overflow type polishing mill and two stirred media mills in the cleaning circuit remove impurities from the graphite particle surface using ceramic grinding media.

The rougher tailings and the tailings from 1st Cleaner to 4th Cleaner report to a conventional thickener followed by a disc filter for tailings dewatering. The filtered tailings will be sent to the waste storage facility.

Phase 1 flowsheet is designed to produce 25,000 tpa graphite concentrate and to meet the increased throughput in Phase 2, the flowsheet down stream of comminution (flotation, graphite product dewatering, drying, bagging, and tailings dewatering) will be duplicated to produce another 25,000 tpy concentrate as shown on the simplified flowsheet.

Graphite concentrate dewatering will be carried out on a filter press followed by a rotary dryer to reduce the moisture content whereas the tailings dewatering is carried out in a thickener followed by disc filtration. The filtered tailings will be co-disposed.

The dried graphite concentrate will be screened to produce two products; + 100 mesh (150 µm) and - 100 mesh (150 µm) and then bagged separately in a bagging system. The - 100 mesh product will be sent to the Coated Spherical Purified Graphite (CSPG) plant for battery production while the +100 mesh product to other customers.

17.3.2 Crushing Plant

The crushing plant consists of a coarse mineral sizer and a fine mineral sizer in series to process both soft oxide material in the earlier years of the mine plan and harder fresh material in Phase 2. A front-end loader dumps the ROM material into the feed hopper on top of the coarse mineral sizer. The discharge from the coarse mineral sizer feeds the fine mineral sizer. Crushed product, P_{80} of 70 mm, from the mineral sizers will be transferred to a fine mineralized material stockpile via the stockpile feed conveyor.

The fine mineralized material stockpile is designed to store 24 hr of fine mineralized material for milling decoupling the crushing plant from the milling section.

17.3.3 Grinding and Classification

Grinding is carried out in a SAG mill operated in closed circuit with cyclones to produce a ground product with a P_{80} of 200 µm. A vibrating screen on the SAG discharge separates the oversized material. The oversize material is recycled to the SAG mill and the undersize material is pumped to the cyclones. This circuit is designed for grinding the oxide material.

In the future, a ball mill, and a pebble crusher will be added to the grinding circuit to process the increased throughput. The oversized material from the vibrating screen will feed the pebble crusher in the SAG mill circuit. The screen undersize and the ball mill discharge will be pumped to the cyclones. The cyclones operate in closed circuit with the ball mill in Phase 2. The underflow feed the ball mill whereas the cyclone overflow gravitates to the rougher flotation.

17.3.4 Rougher Flotation

The cyclone overflow from the grinding circuit feeds the graphite rougher flotation cells. Rougher flotation aims at maximizing graphite recovery. Most of the liberated graphite will be recovered at this stage.

17.3.5 Cleaner Flotation

Cleaner flotation consists of six cleaning stages to upgrade the graphite concentrate grade, including three concentrate polishing steps in the 1st, 2nd, and 3rd cleaner flotation stages. Polishing operation helps to remove contaminants from the graphite particle surface to improve the grade. The rougher concentrate feeds the 1st cleaner. The 1st cleaner concentrate will be polished in a polishing mill and feed the 2nd cleaner. The 2nd cleaner concentrate will be further polished in a polishing mill and feed the 3rd cleaner. The 3rd cleaner concentrate and the 5th cleaner tails feed the 4th cleaner. The 4th cleaner concentrate and the 6th cleaner tails feed the 5th cleaner. The 5th cleaner concentrate feeds the 6th cleaner. The 6th cleaner concentrate will be dewatered in a pressure filter.

The 1-4th cleaner tails along with the rougher tails report to the tailings thickener.

17.3.6 Concentrate Dewatering, Screening, and Bagging

Graphite concentrate from the 6th Cleaner will be dewatered on a pressure filter. The filtered concentrate will be dried on a rotary dryer to reduce the moisture content to 0.5%. The dried concentrate will be screened to generate +100 mesh and -100 mesh products. The products will be bagged in bagging systems and stored. The +100 mesh product will be sent to the customers and -100 mesh product and will be shipped to the Coated Spherical Purified Graphite (“CSPG”) plant for battery production.

17.3.7 Tailings Dewatering

The rougher tailings and the tailings from 1st Cleaner to 4th Cleaner will be dewatered in a conventional thickener using flocculant. The thickener underflow feed the filtration feed tank and will be dewatered on a disc filter. The filtered tailings will be sent to the waste storage facility.

17.3.8 Reagents

The operations will require a reagent inventory of Diesel oil, Methyl Isobutyl Carbinol (MIBC), and flocculant.

Graphite Collector (Diesel Oil)

Diesel Oil will be delivered in Intermediate Bulk Containers ("IBC") of 1000 litres capacity and will be stored to provide approximately two days of inventory. The diesel oil will be used as collector for graphite flotation.

Frother (MIBC)

MIBC will be delivered in IBC of 1000 litres capacity and will be stored to provide approximately 3-4 days of inventory. The MIBC will be used as frother for graphite flotation.

Flocculant

Flocculant will be delivered in 1000 kg bags and will be stored to provide approximately 29 days of inventory. Flocculant will be used to aid dewatering of the solids in tailings thickener.

17.3.9 Plant Services

Air

Plant and instrument air will be supplied from air compressors. The air will be dried before distribution to the various air receivers and users.

Water

Three types of water will be used in the plant: process, potable, and raw water. A water treatment plant will be installed to generate potable water to supply safety showers and for site ablutions. Raw water will be required to supply to both the filtered water system and potable water treatment plant.

Raw water will also be used for dust suppression in the crushing plant area and for make-up water in the milling area. A portion of the raw water will be reserved in the raw water tank as fire water, which will be distributed through the fire water main to the site fire hoses.

18.0 PROJECT INFRASTRUCTURE

18.1 Introduction

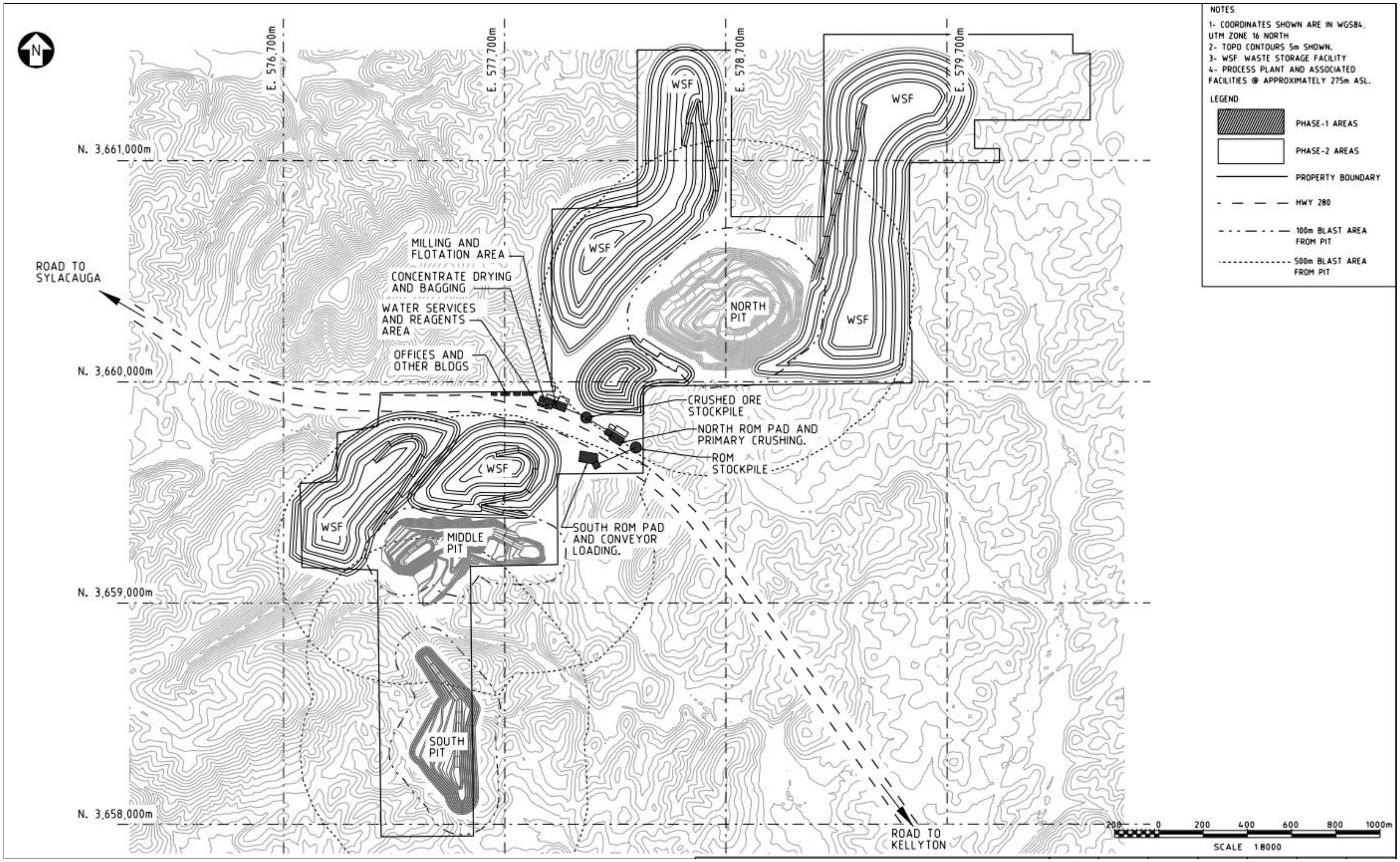
Infrastructure to support the South Star Battery Minerals, BamaStar Graphite Property will consist of site civil work, process buildings and non-process buildings, water management, a waste storage facility ("WSF") with co-disposal, and electrical power distribution.

Mine facilities and process facilities will include services with potable water, fire protection, compressed air, power, diesel, communication, and sanitary systems. The BamaStar Property Overall Site Layout is shown in Figure 18.1.

The processing plant and the WSF, with co-disposal will be located within the BamaStar property, along with most ancillary project infrastructure. Infrastructure for the Project will include:

- Process plant, including crushing, stockpile, and mill.
- Process and non-process (ancillary) buildings.
- Access roads.
- High voltage ("HV") substation and site-wide electrical distribution.
- Fuel storage and dispensing area.
- Waste rock storage facility and co-disposal storage facility.
- Water management ditches and collection ponds.

Figure 18.1 BamaStar Site Layout



18.1.2 Site Layout

Locating the site facilities was based on the following considerations:

- Within the claim boundary.
- Most appropriate location for co-disposal facility.
- Suitable geotechnical conditions.
- Stockpiles and waste rock facilities are near mine pits to reduce haul distances.
- Process plant is in an area with low risk of flooding.
- Administration, processing plant and offices are in close proximity to limit travel distances.

18.1.3 Site Preparation

Forest clearing and topsoil removal will be required for the processing plant, mining pits, stockpiling areas, and other buildings and facilities.

Existing roads connected to the project site enable access to the properties. Typical method of clearing and topsoil removal, excavation, drains, safety bunds and aggregates will be employed to construct additional roads and upgrade existing roads as required.

18.2 Access Roads

18.2.1 Existing Roads

The BamaStar Graphite Project is located in northeast Coosa County, State of Alabama, USA, within Township 24 North and Range 19 East. The Project can be accessed using US HWY 280 which cuts through the Project area. The Project can be accessed from Birmingham which has a large international airport and is located about 75 direct km northeast of the Project area or from Montgomery, Alabama, the State capital, which is about 75 direct km from the Property.

18.2.2 Mine Haul Roads

Mine haul roads will be approximately 22 m in width and constructed as new roads prior to the start of mining activity. The initial construction of haul roads will be between the ROM pad and North pit located north of the highway, with later construction of roads linking the South pit to the ROM pad located South of the highway.

18.3 Crushing and Process Plant Areas

The process plant will be located on the Property. Crushing and Process plant areas will be located on a concrete pad, the areas are summarized in Table 18.1 and described in the following sections.

Table 18.1 Crushing and Process Plant Areas

Description	L m	W m	A m^2
Primary Crushing	15	15	225
Stockpile and Reclaim	45	45	2,205
Milling, Flotation Area & Drying	45	60	2,700
Concentrate Product Sizing and Bagging	60	30	1,800
Tails Handling	25	30	750

18.3.2 Primary Crusher Area and Stockpile & Reclaim Building

Mine haul trucks will deliver ROM on the north side and south side of the Highway 280, to feed the common crushing circuit utilizing two mineral sizers in series located on the north side of Highway 280. The ROM delivered south of the highway will cross the highway via a conveyor to feed the common crushing station located north of the highway. The crushing area will be equipped with dust collection systems. The primary crushing area will house the ROM hopper equipped with a static grizzly, vibrating grizzly feeder, two mineral sizers in series, chutes and additional platework. In addition, access platforms and reinforced concrete will be utilised for the pad to support the coarse and fine mineral sizers. A concrete reclaim tunnel will be utilized to reclaim crushed mineralized material via a conveyor for the mill feed.

18.3.3 Processing Plant Areas

The process plant is comprised of the following areas:

- Milling and Flotation Area & Drying.
- Tails Handling.
- Concentrate Product Sizing and Bagging.

Large-scale process areas will be complete with concrete slabs and pedestals. Area or mobile cranes will be available for equipment servicing in the process plant.

The Milling area will include Grinding and Classification.

The mill area includes a ground floor, one elevated concrete floor. The various equipment will be accessed by purpose-built mezzanine platforms for maintenance, service and sampling.

The Grinding area for Phase 1 will contain the SAG Mill, cyclone feed hopper / pumps, cyclone cluster and trash screen. In Phase 2, a new ball mill along with pebble crushing and a vibrating screen will be included.

The Flotation Area will include Rougher Flotation and Polishing Mill, Flotation Cleaner, Regrinding, and Concentrate Filtration and Drying.

The flotation area for Phase 1 will contain the tanks required by the rougher and cleaner flotation circuits, primary flotation circuit tanks, 100-Mesh flotation sorting, concentrate stirred mills, and the tanks designed for the concentrate flotation circuits. The flotation area will also house the ancillary equipment for these circuits, including pumps. Phase 2 will be a duplicate of the equipment from Phase 1.

The Drying Area for Phase 1 will contain the graphite filter press feed tank, graphite filter press, rotary kiln dryer, dried graphite screen, three product size bins and two product size bulk bag areas, along with their respective transfer conveyors. Phase 2 will be a duplicate of the equipment from Phase 1.

The Tailings area for Phase 1 will contain the tailings stock tank, tailings filter feed pumps and the tailings filter disk filter. The tailings thickener will be located outside, adjacent to the process plant. Phase 2 will be a duplicate of the equipment from Phase 1.

The Concentrate Product Sizing and Bagging area will be enclosed in a fabric covered building to ensure products remain dry. The area will include product sizing, bagging and Storage.

18.4 Non-Process (Ancillary) Buildings

18.4.1 Buildings

Plant ancillary buildings located on the Property are described in the following sections. Refer to Table 18.2 below for a Non-Process (Ancillary) Building description summary.

Table 18.2 Non-Process (Ancillary) Buildings

Description	Construction	L m	W m	H m	A m^2
Mining Truck Shop / Wash Bay, and Dry	Fabric	56	17	11	255
Plant, Administration Office and Dry Facilities	Modular	40	15	3	600
Security Gatehouse	Modular	18	4	3	72
Plant Maintenance Workshop	Fabric	30	15	8	450
Process Area Warehouse	Fabric	25	15	8	375
Reagent Storage	Fabric	20	15	6	300
Laboratory	2 x 40' Containers	25	5	2.6	125

18.4.2 Mine Truck Shop & Truck Wash Bay

A truck maintenance facility that will service the mining fleet's CAT 773F 55t trucks, is located southeast of the North open pit. For the 3,560 t/d operation, only two truck bays, plus a wash bay is required. The building type will be a fabric covered building. The tire yard is located beside the truck shop.

18.4.3 Plant Maintenance Workshop

The plant maintenance shop will be located close to the process plant. Buildings will have a reinforced concrete raft foundation and fabric.

18.4.4 Process Area Warehouse

The process area warehouse will be located close to the process plant. Buildings will have a reinforced concrete raft foundation and fabric. One tonne super sacs containing graphite product will be stacked in two levels, with up to two days of bulk bag product storage capacity. In addition, the warehouse will be used to store reagents in 1 m^3 totes. Diesel fuel as a reagent will be stored in a small tank outside the Mill.

18.4.5 Plant and Administration Offices and Dry Facilities

New administrative offices will be located near the process plant. Buildings will be a single-story, prefabricated modular design placed on precast concrete footings. The administrative building will include offices, meeting rooms, lunchroom, washrooms, men's and women's dry, lockers, first-aid and showers, and will be equipped with heating, ventilation and air conditioning ("HVAC").

18.4.6 Security Gatehouse

The security gatehouse will be a small, prefabricated building with a single boom gate, located south of the process plant near the east entrance. Site inductions for visitors and new employees can be conducted at this point.

18.4.7 Laboratory

The laboratory will be a two 40′ shipping containers with all the fittings for a laboratory on precast concrete blocks.

18.4.8 Explosive Storage Facility

A suitable location for explosive storage south of the mine truck shop was identified based on minimum allowable distances. Regular deliveries will minimize the amount of explosives stored on site.

18.5 Plant - Water Supply & Fuel Services

18.5.1 Raw Water Supply

Raw water is supplied from the mine site to a raw water storage tank. The Fresh / Raw Water Tank is designed with a storage capacity of 1,295 m^3, which is approximately 12 hours of storage capacity. Raw water is used for all purposes requiring clean water with low dissolved solids and low salt content in the following areas:

- Gland water for pumps.
- Reagent make-up.
- Cooling water for mill motors.
- Potable water.

Raw water from the mine site will be used to provide additional make-up water requirements of approximately 32.3 m^3/h for Phase 1, and approximately another 63.9 m^3/h for Phase 2.

18.5.2 Process Water Supply

The tailings thickener overflow water is stored in the process water tank and is distributed from there to different addition points throughout the processing plant. The SAG mill, SAG mill screen, flotation cells, polishing mills, vibrating screen, and the stirred mills require the addition of process water. The process tank will have a 12-hour capacity of 5,550 m^3/h.

18.5.3 Potable Water

Fresh water will be treated with a pre-packaged potable water system for drinking, cooking, and showers. It will also be used for emergency shower and eyewash stations throughout the plant. The facility will be located near the Administration area. It consists of a modular potable water treatment plant, day tank, and buried distribution pipes around the facilities. The potable water distribution piping network at the site will be plastic thermally insulated and installed beneath the frost line.

Fresh water will be pumped to the potable water system for treatment and distribution. The potable water system will treat water to the local potable water standard. The system will be shop-mounted on skids and delivered to site as a containerized system. Once on site, these modules will be connected to the distribution network.

18.5.4 Sewage Treatment

Provisions for the sewage treatment system has been included in the design. A buried sewer-pipe reticulation network collects sewage from the various buildings across the administration and crushing area facilities, into a combined main system which flows to a point in the plant area and discharges to a sewage treatment plant (”STP”). This system will treat the incoming water to the required criteria for treated water discharge / infiltrate into the natural environment. Solids will be collected and transported off site to the appropriate waste management facility.

The STP will include the following unit operations:

- Septic tank.
- Equalization tank with raw water pumps.
- Membrane bio-reactor system (”MBR”).
- Aeration system.
- Activated sludge treatment process.
- Ultra-filtration with membranes.

The treatment system will be shop-mounted on skids and delivered to site as a containerized system.

18.5.5 Fire Water

Raw water will be the prime source of fire water at the site. Fire water is contained in the raw water storage tank. The total volume of the tank is estimated to be 1,500 m^3, of which 880 m^3 is designated for fire water and 620 m^3 for raw water distribution. Level controls will assure that the level of the tank does not fall below the 880 m^3 volume mark. The raw water tank will be installed at the administration area. The tank provides two hours of fire-water storage. Each tank will be equipped with a circulation pump to equalize the temperature inside the tank. The tank level is maintained using make-up water supplied from the mine site.

Provisions for one fire pump station, containing two fire pumps, one of which is reserved as standby, has included for the fire water flows. A fire main system with continued recirculation will be provided. The fire main system provides the fire protection to all site buildings and facilities.

The fire service main will be installed to supply water to the dry-barrel hydrants, standpipes, and hose reel stations from the water reserve. The fire-water piping system will be independent from any industrial water network. Fire-water pipe sections will be designed to deliver the required flows and delivery pressure at any location.

Standpipe systems, including hose stations, will be provided throughout the site and plant buildings as required by regulatory and fire insurance.

Fire sprinkler protection will be provided as required by code and fire insurance, including the site administration area, laboratory, plant workshop and warehouse, fire pump station, and Mine Truck Shop and dry. In addition, a foam/water system will be provided for the diesel fuel tank farm.

18.5.6 Fuel Storage and Distribution

One 100,000 L double-walled fuel tanks and dispensing station are located adjacent to the mine truck shop facilities. Diesel fuel is delivered to each station via tanker truck from a local supplier. Total onsite storage is estimated at three days of steady-state operations.

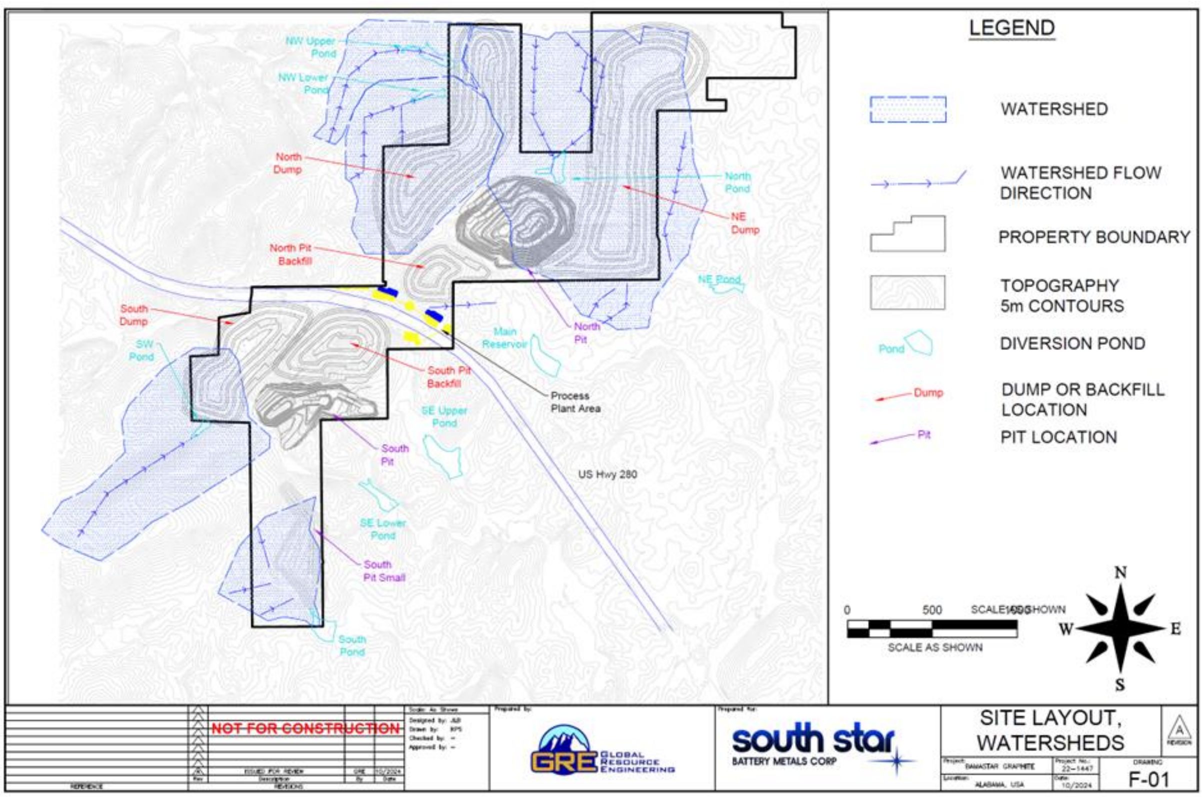
Regular light vehicles will be refuelled offsite. Larger mining equipment, including haul trucks, will be refuelled either by fuel delivery vehicles or at the dispensing station adjacent the Mine Truck Shop facility.

All storage and refuelling areas are protected with a concrete-lined and bunded area, with drains connected to the oil–water separators.

18.6 Hydrology, Water Balance and Water Supply

The site is located on or near the ridgetops of several small drainage basins. As a result, the hydrology is characterized by small ephemeral drainages in steep, incised, and multi-directional drainage basins. The site drains to all compass directions, with a general trend to the South towards the Topopkin Creek, Ray Creek, and Matthews Creek which flow into the much larger Hatchet Creek. Because the site must meet a sediment discharge standard (measured as total suspended solids) for all water that comes in contact with mining operations or mining infrastructure (contact water), it is necessary to build and manage sediment ponds at key locations around the site. Furthermore, mine infrastructure blocks some small ephemeral drainage basins which require ponds. Figure 18.2 shows the hydrologic site layout map with delineated watersheds and the location of necessary sediment and water management ponds.

Figure 18.2 Site Hydrology, Ultimate Site Configuration



The climate (see Section 5) in the region is characterized by a higher-than-average temperatures and precipitation than most of the contiguous United States. Alabama is also susceptible to tropical rain events including hurricanes and tornadoes. A literature search of extreme storm events determined that the 25-year, 24-hour storm event was 159.98 mm, and the 100 year 24-hour storm was 182.84 mm. Site infrastructure to control the runoff generated by such extreme events must be designed in the next stages of project development.

18.6.2 Water Balance

The BamaStar project relies on mineral processing using concentration by flotation. This processing method is water-intensive, and even with a dewatered filtered tailings product and a dewatered - concentrate, the processing consumes water. Figure 17.1 shows a schematic of the metallurgical processing and the water movement between key elements of the water-related site infrastructure.

Process Inputs

Table 18.3 shows the key water balance inputs pertaining to the process described Sections 17 and the infrastructure described in Section 18. Values in were obtained from a metallurgical water balance produced by Oliver Peters at MetPro

Table 18.3 Model Process Parameters

Parameter	Value	Unit	Source
Concentrate Production Rate (Years 1 to 6) of graphite	25,000	tonnes/year	METPRO
Concentrate Production Rate (Years 6 to End of Mine Life)	50,000	tonnes/year	METPRO
Process Water Recovery	80	%	METPRO
Makeup Water Demand, Years 1 to 6	32.31	m^3/hr	METPRO
Makeup Water Demand, Years 6 to EOM	63.94	m^3/hr	METPRO

Water Balance Schematic

Low production and high production water schematics are shown in Figure 18.3 and Figure 18.4.

Figure 18.3 Water Balance Schematic 25k TPA

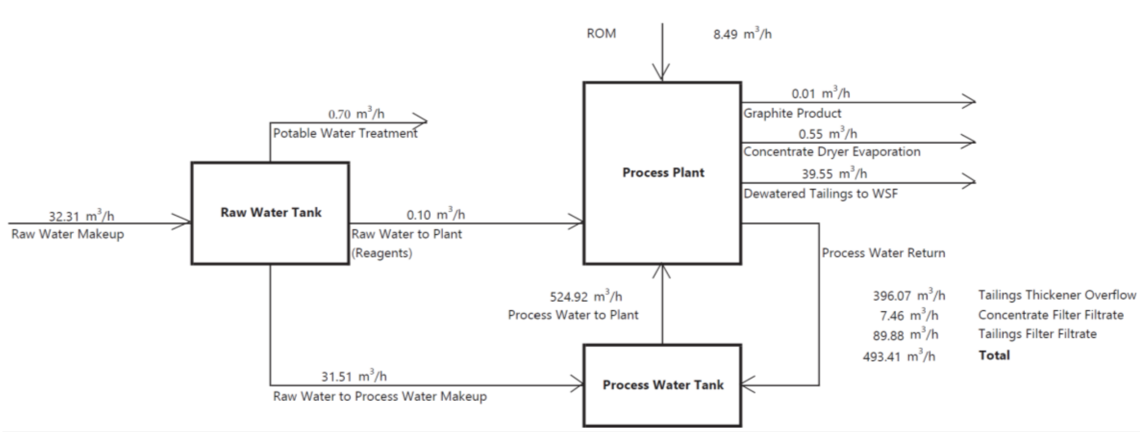
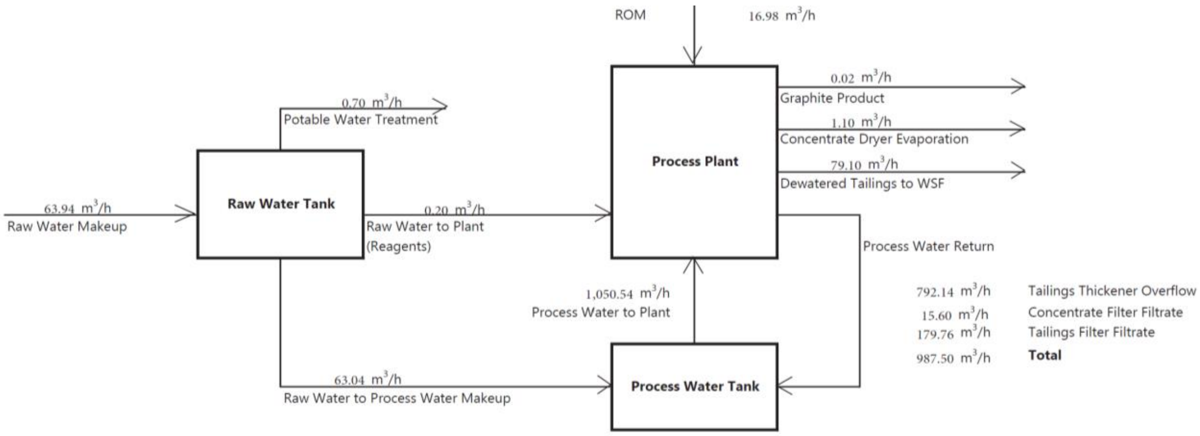


Figure 18.4 Water Balance Schematic 50k TPA Concentrate



The process plant is the center of the water balance. It receives nominal water from moisture contained in the graphite mill feed, water reclaim from the tailings thickener, water extracted from the tailings filtration plant, and makeup water from the water treatment plant.

The tailings thickener and filter have the largest single water loss onsite. Losing 39.55 m^3/hr of water to entrained tailings moisture under the low-production alternative, and 79.10 m^3/hr under the high production alternative. The total makeup water requirement is roughly equal to this entrained water loss in tailings at approximately 32.31 m^3/hr at 25k tpa and approximately 63.94 m^3/hr at 50k tpa processed. It is important to note that tailings filtration test work has not been performed at the PEA level, and that the 80% assumption for process water recovery (see Table 18.3) is estimated.

Water Balance Objectives

The primary objectives of the water balance are to determine the following (in order of priority):

- How will the makeup water requirement be achieved?
- Can it be provided from on-site sources, or does it require off-site water abstractions?
- Is the source robust – can it be relied upon with varying climate conditions?
- Must the site discharge excess water?
- What on-site water storage infrastructure is appropriate for the operations to achieve reliable water supply?

These questions were determined through the creation of a site-wide water balance model ("SWWB").

Water Management Plan

Based on preliminary model runs, GRE discovered that on-site water had the potential to meet project needs, but the site would still require additional on-site storage or off-site water sources. As a result, GRE considered that nearly all sediment ponds, pits, and site drainages would be managed in such a way that water could be captured, stored, and conveyed to the plant. Figure 18.5 shows the site-wide water management plan incorporated into the SWWB.

Figure 18.5 Site-Wide Water Management Plan, Ultimate Site Configuration

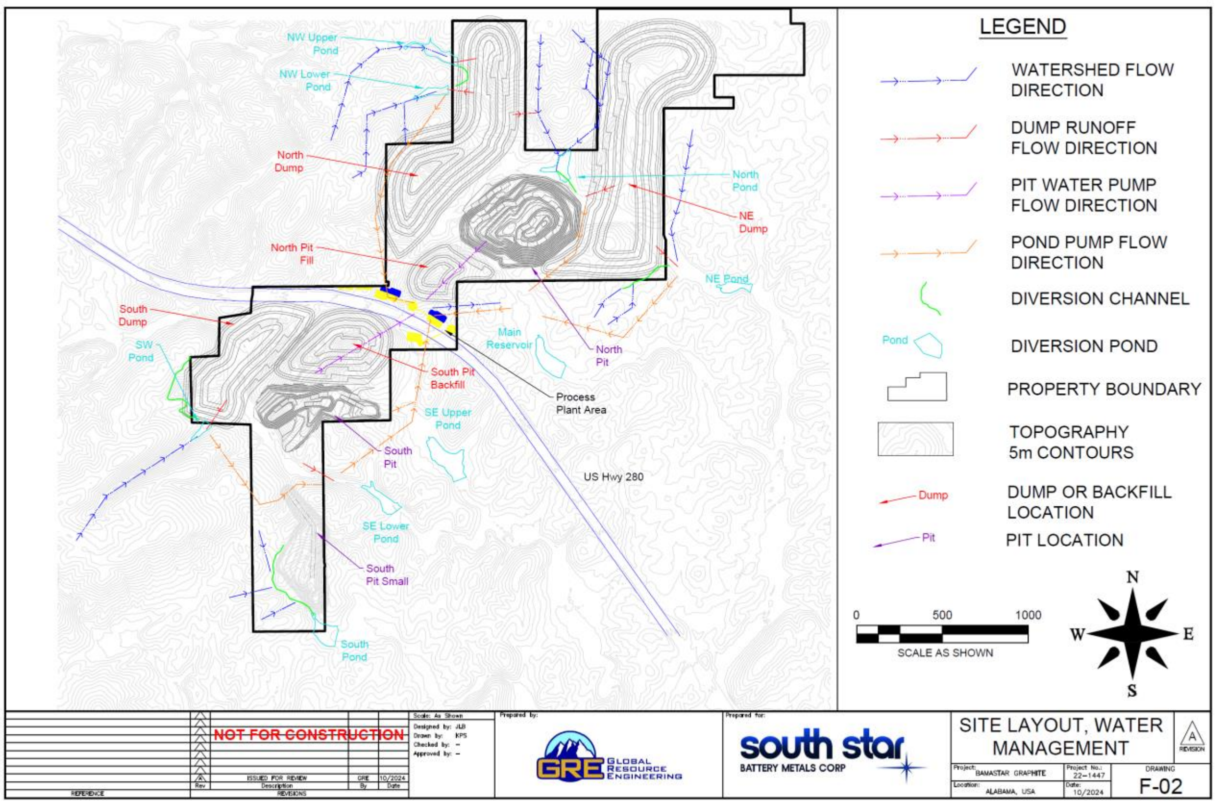


Figure 18.5 shows that the SW Pond, the NW Upper Ponds, and the North Pond are 'trapped water' locations which must be collected in a pond because the drainage is blocked by waste dumps. Water from these ponds and from direct precipitation landing on the pits will be prioritized for fulfilling mill water shortages. Because of its distance from the site, the South Small pit and pond diversions will not be incorporated into the makeup water collection system. This plan assumes that a pipeline will pass over the road on the same bridges used to convey South Pit material to the plant.

Water Storage

Each sediment pond or water storage facility considers the limits of a jurisdictional dam in Alabama. No pond has an embankment higher than 25 feet (7.62 m) nor a storage above 50-acre feet (61,000 m^3) (Alabama State Legislature, 2023). The Main Reservoir, near the plant, will be the primary active water storage facility for the site, and Table 18.4 shows the estimated volumes of each sediment pond.

Table 18.4 Model Sediment Pond Values

Pond	Volume (m^3)
Northwest Upper	35,026
Northwest Lower	14,251
North	2,610
Main Reservoir	29,694
Northeast	15,351
Southeast Upper	39,997
Southeast Lower	22,468
Southwest	12,302
South	30,957
Total Storage	**202,656**

This is the total available water storage possible with non-jurisdictional dams, and it was incorporated as the base-case storage condition for the SWWB.

Water Balance Model Code and Area of Study

Using the aforementioned inputs GRE created a GoldSim water balance which captures the gains, losses, and storage of water around the site. GoldSim is an industry-standard probabilistic water balance modelling platform which can incorporate statistical and stochastic analysis to assist with water management planning. The model considered not only the site infrastructure but also the watersheds above and immediately below the site infrastructure. The model was run in monthly timesteps throughout the mine life.

Table 18.5 and Table 18.6 show the areas of major site facilities over time.

Table 18.5 Model Pit Areas

Year	North Pit m^2	South Pit m^2	Small South Pit m^2
1	0	60,672	0
2	34,185	93,829	0
3	72,506	119,278	0
4	142,099	165,259	0
5	179,256	208,484	0
6	183,753	255,669	0
7	234,296	296,251	0
8	285,704	33,309	0
9	349,261	336,736	0
10	399,911	336,947	0
11	418,218	337,194	0
12	418,920	337,050	21,130
13	418,920	337,050	96,174
14	418,920	337,050	107,586
15	418,920	337,050	107,586
16	418,920	337,050	107,586
17	418,920	337,050	107,586
18	418,920	337,050	107,586

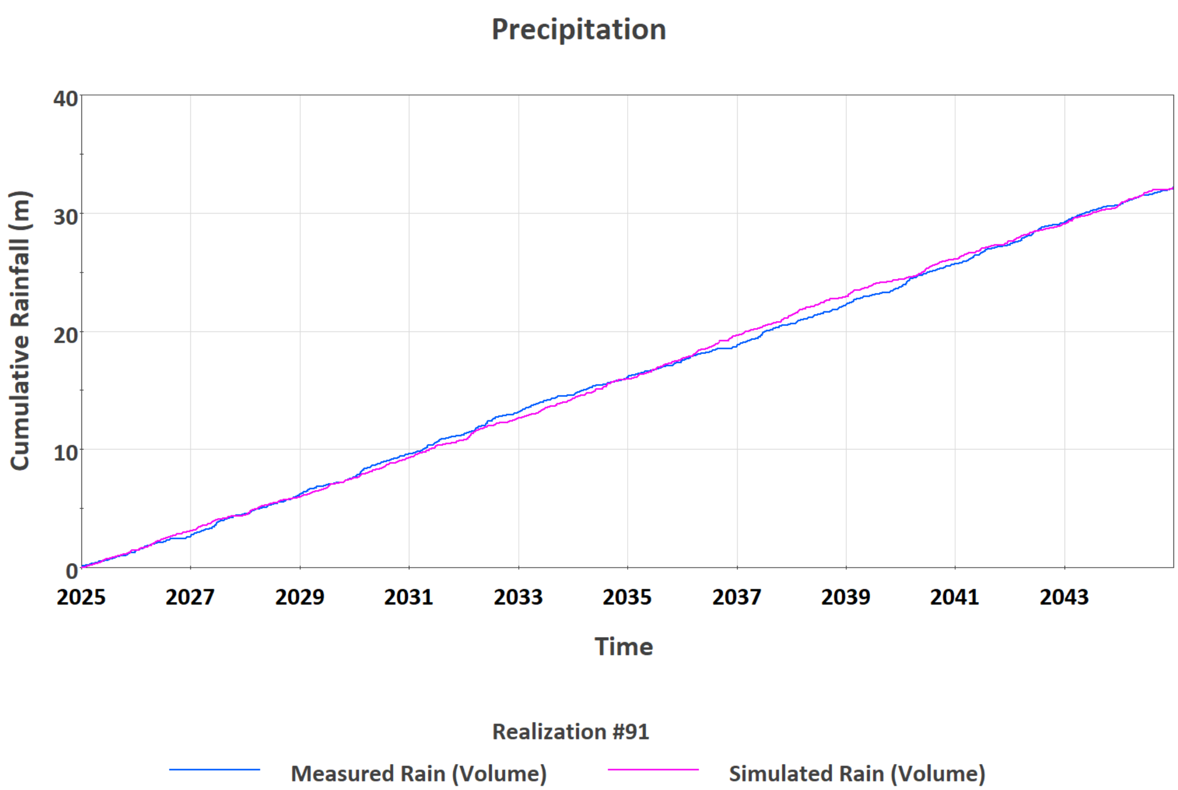
Table 18.6 Model Dump Areas

Year	North Dump m^2	Northeast Dump m^2	South Dump m^2
1	83,705	72,053	0
5	259,417	203,931	67,370
10	380,332	492,244	111,578
15	423,908	534,713	111,578
18	423,908	534,713	115,470

Climate Inputs

For the PEA water balance, GRE used the last 10 years of historic rainfall as a time-series, deterministically reporting how much rain accumulated each day from June 2014 to June 2024. To build a probabilistic model, this time series was then input through a Markov Chain that defines different parameters based on historical rainfall data. Using GoldSim, GRE incorporated stochastic analysis and probabilistic modeling to simulate precipitation without having to directly input the data into a time series. This allowed GRE to evaluate median (or normal climate) rainfall conditions against measured rainfall conditions (Figure 18.6).

Figure 18.6 Simulated Rainfall vs. Measured Rainfall (Accumulated), Realization #91



To evaluate the robustness of the project's water supply, GRE applied the driest year (2016) as if it were each year of the mine plan. To determine the highest excess water condition, GRE applied the wettest year (2020) as if it were each year of the mine plan. Single extreme storm events were not included in the model, but the excess water condition had 1,961 mm per year, compared to the average of 1,621 mm per year, and could be considered to include extreme storms within it. The driest condition had 1,152 mm per year.

Evaporation was considered only on pond surfaces, with a 0.7 correction factor from NOAA-derived evaporation estimates.

Table 18.7 Model Precipitation Data Utilized in the SWWB (NOAA)

Year	Precipitation mm
2014*	894
2015	1,463
2016	1,152
2017	1,929
2018	1,625
2019	1,471
2020	1,961
2021	1,662
2022	1,827
2023	1,502
2024*	850

****Indicate partial years of precipitation, from July to December.***

Table 18.8 Model Evaporation (NOAA)

Year	Evaporation mm
January	33.78
February	43.21
March	72.19
April	89.61
May	110.41
June	113.44
July	111.66
August	110.41
September	88.19
October	71.30
November	44.98
December	37.16

Runoff Assumptions

The runoff values in Table 18.9 represent the percentage of runoff supplied by each of the locations. The specific value chosen for each location was based on values developed and accepted by the State of California as part of their Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment (California State Water Resources Control Board, 2011). These parameters are the most sensitive inputs within the water balance as the actual runoff for each location will need to be determined as mine life progresses.

Table 18.9 Runoff Coefficients

Location	Value
Site Runoff	0.2
Pit Runoff, Warm Months (Temperature > 21 C)	0.95
Pit Runoff, Cold Months (Temperature < 21 C)	0.8
Waste Dump Runoff	0.1
Plant Area Runoff	0.8

Water supply from each basin or facility was calculated based on the aerial coverage of each pit or catchment, with respect to time, and the amount of simulated precipitation that fell upon each area. Depending on the location, the appropriate runoff coefficient was then applied to convert the rainfall into runoff. Each watershed reports to the appropriate down-gradient pond. Water from the pits and ponds is conveyed directly to the process plant water supply.

The model does not consider inputs to the pit from groundwater. At present, no hydrogeologic data exists, but based on the exploration drilling to date, it does not appear that groundwater will be a significant component of the water entering the pit. Subsequent studies must characterize and predict groundwater-derived pit dewatering requirements.

Model Results

The model results are shown by tracking the plant water excess or deficit, in m^3/hour, or the storage rate in the ponds. Figure 18.7 through Figure 18.9 show the excess water or deficit in the system under the base-case (normal climate) conditions described above. Values below the zero axis are water deficit conditions.

Figure 18.7 Process Plant Water Supply, Base-Case Conditions

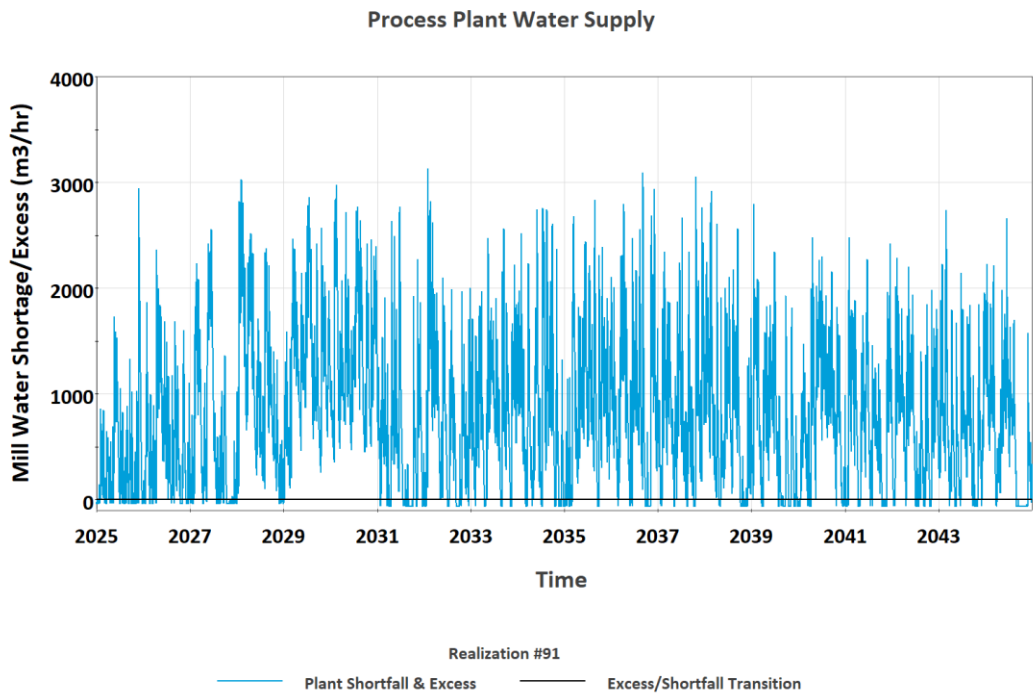


Figure 18.8 Process Plant Water Supply, Base-Case 2 years Low Production Rate

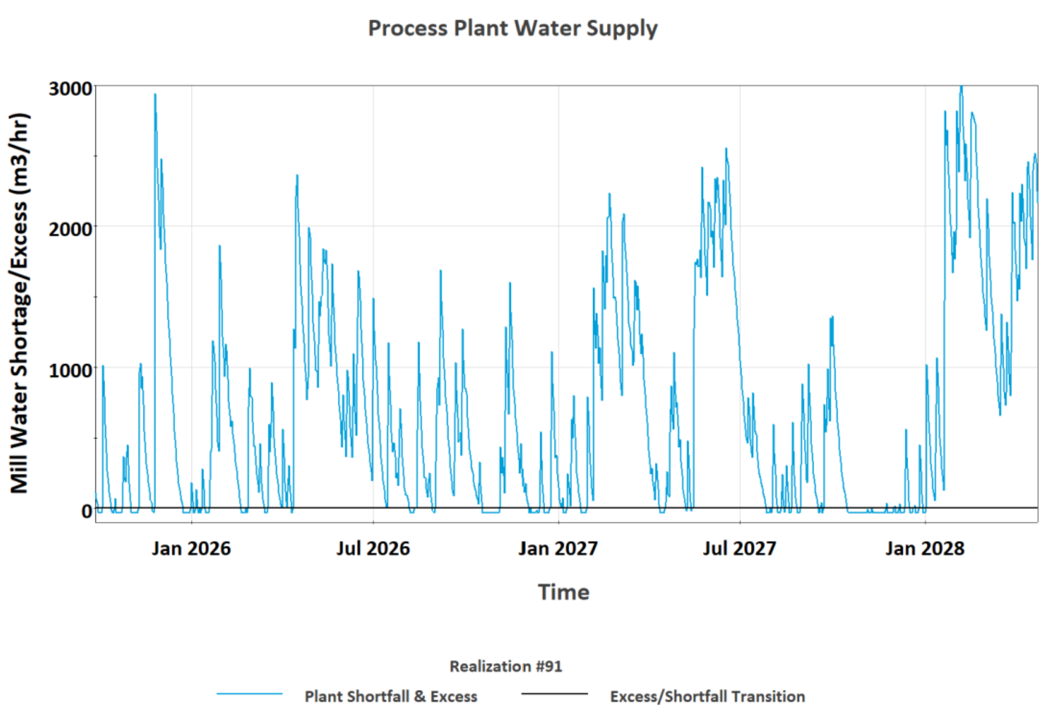
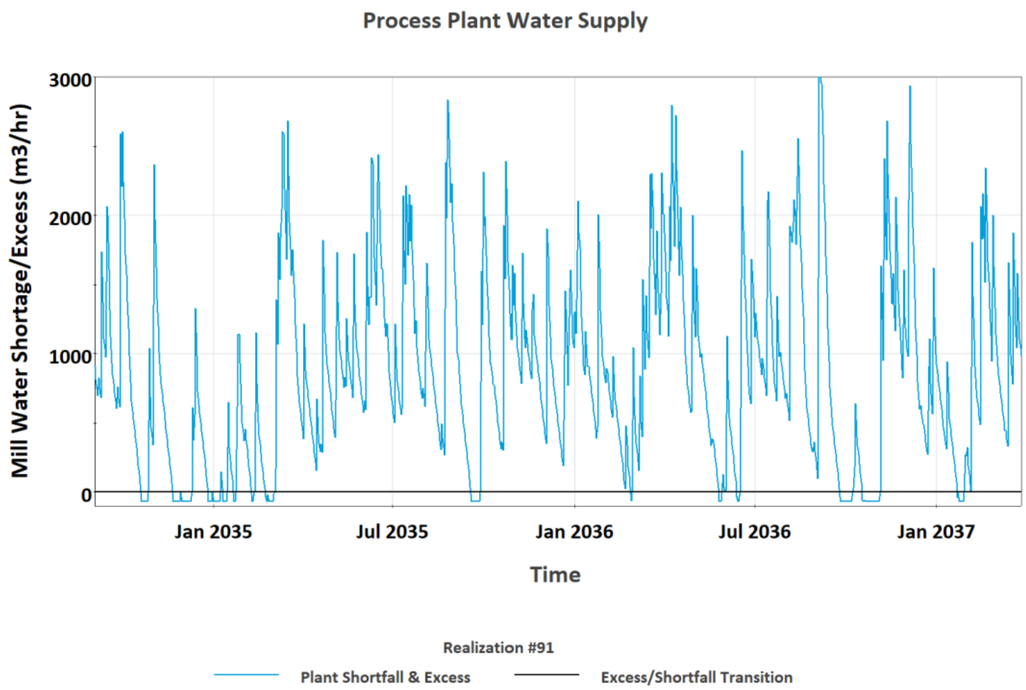


Figure 18.9 Process Plant Water Supply, Base-Case 2 Years High Production Rate



The graphs in Figure 18.7 through Figure 18.9 show the following:

- At the lower production rate, occasional water deficits are observed throughout the year, followed by periods of large water excess that is consumed over time.
- Under higher production conditions, the mine experiences water deficit conditions more frequently.
- Over the entire life of mine, the mine will have many days when there is no water stored in the on-site ponds.

The results shown above are reinforced by Figure 18.10 which shows the water storage under base case conditions for the same period. Water deficit conditions below the zero axis in Figure 18.7 through Figure 18.9 correspond to zero storage events in Figure 18.10.

Figure 18.10 Pond Water Storage: Base-Case Conditions

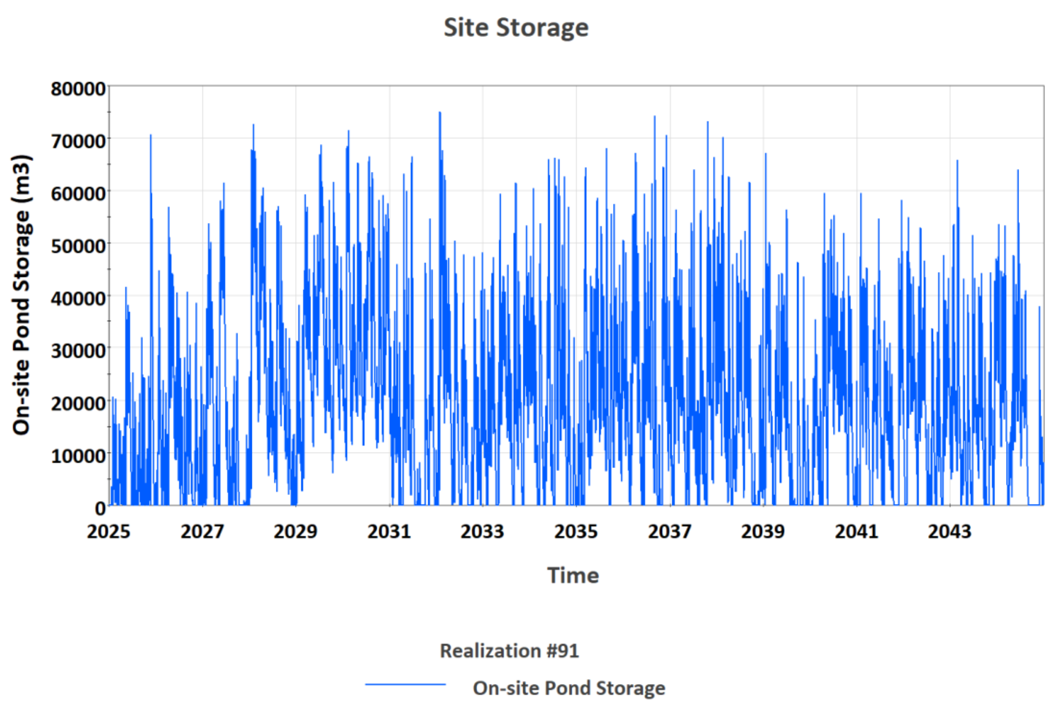


Figure 18.11 through Figure 18.13 present the plant water shortage under dry conditions.

Figure 18.11 Plant Water Supply, Dry Conditions

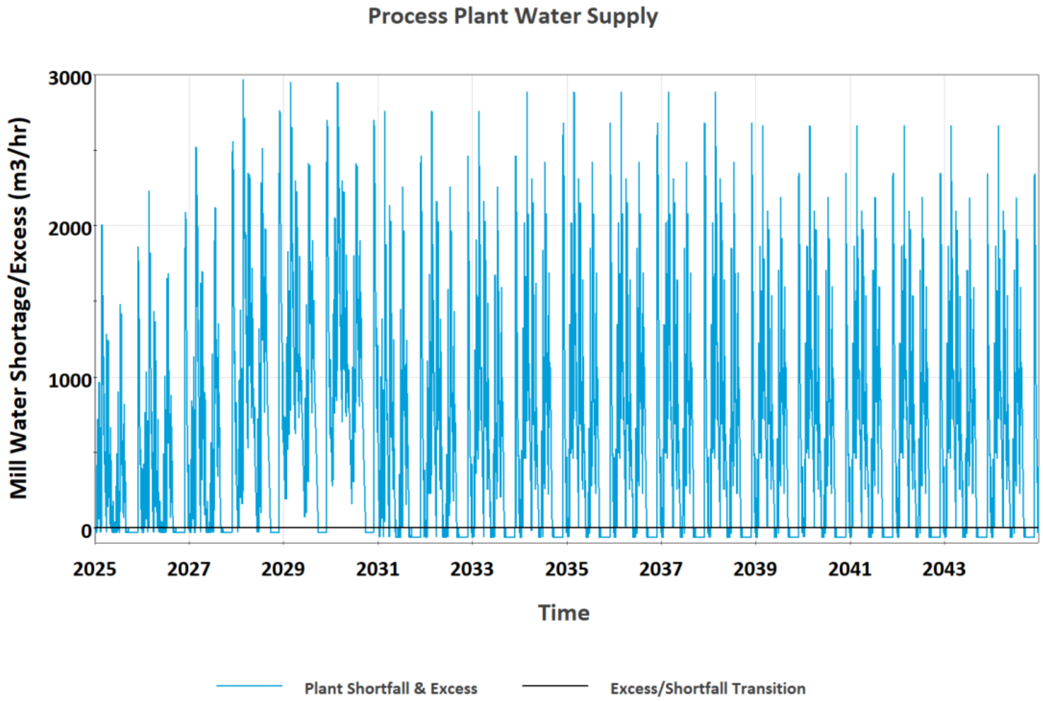


Figure 18.12 Plant Water Supply, Dry Conditions 2 Years Low Production Rate

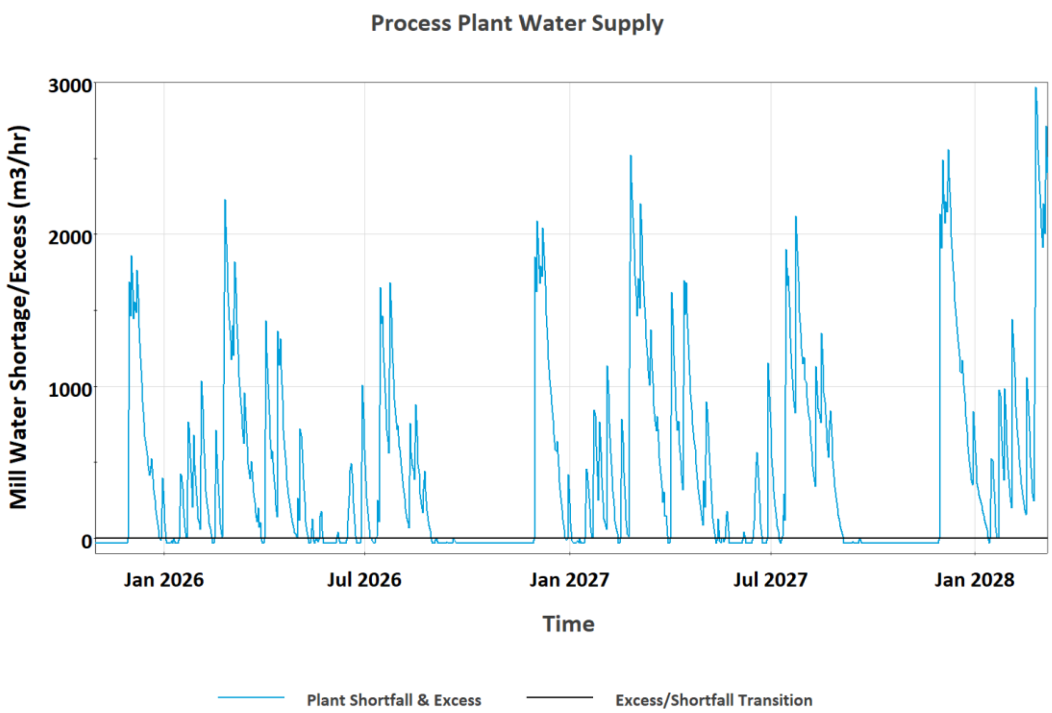
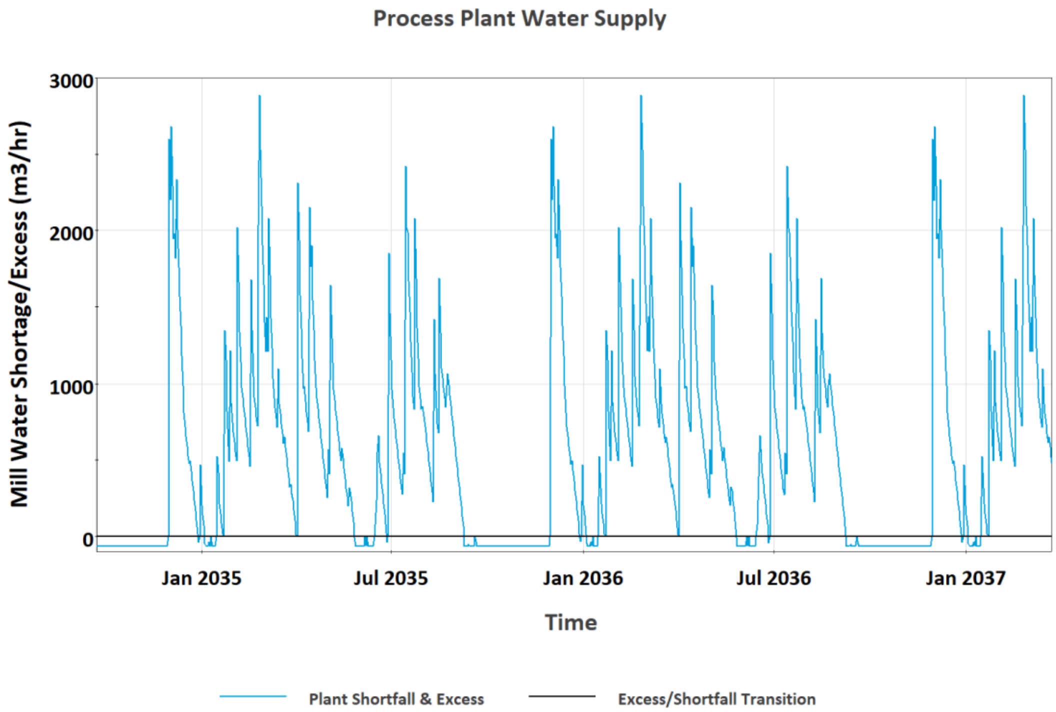


Figure 18.13 Plant Water Supply, Dry Conditions 2 Years High Production Rate



When compared to the base case, repeatedly dry years create more consistent and more prevalent water curtailment conditions for the plant, especially during the last few months of each year. This indicates that based on the existing storage (see Table 18.5.2), dry years would create an unacceptable number of production days with water limitations as well.

Figure 18.14 through Figure 18.16 show the mine excess or deficit if the wettest year (2020) is repeated for mine life.

Figure 18.14 Plant Water Supply, Wet Conditions

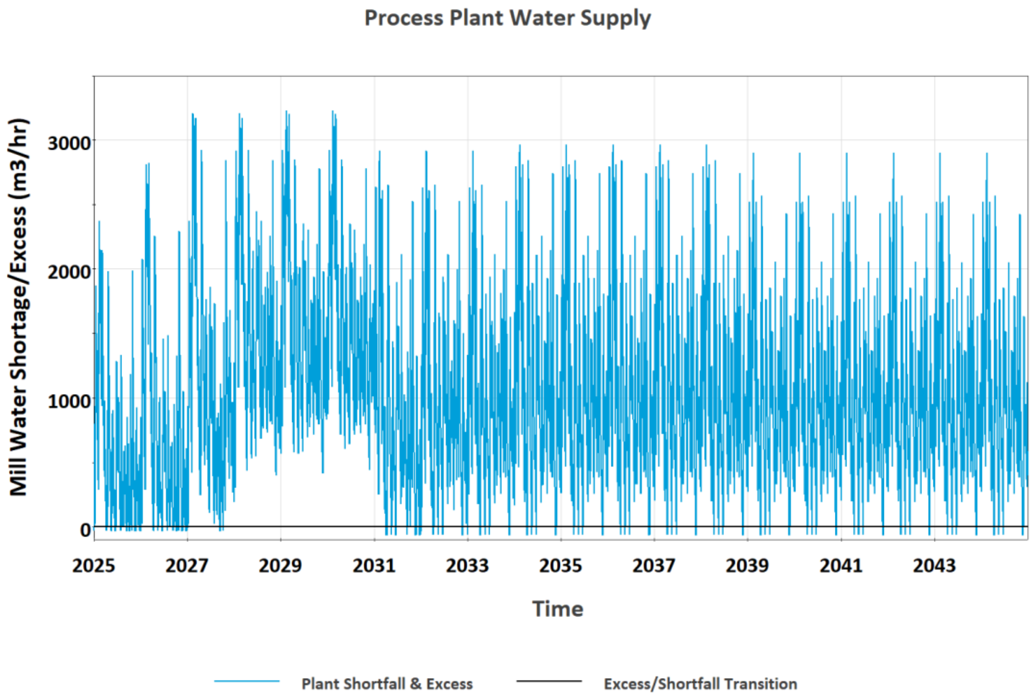


Figure 18.15 Plant Water Supply, Wet Conditions 2 Years Low Production Rate

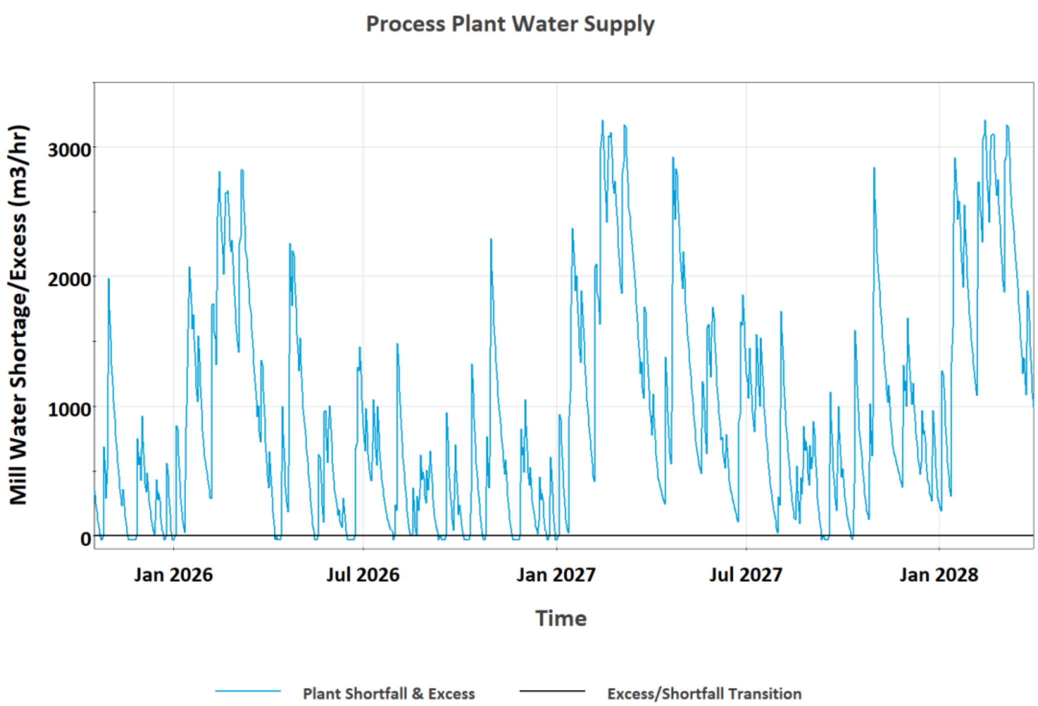
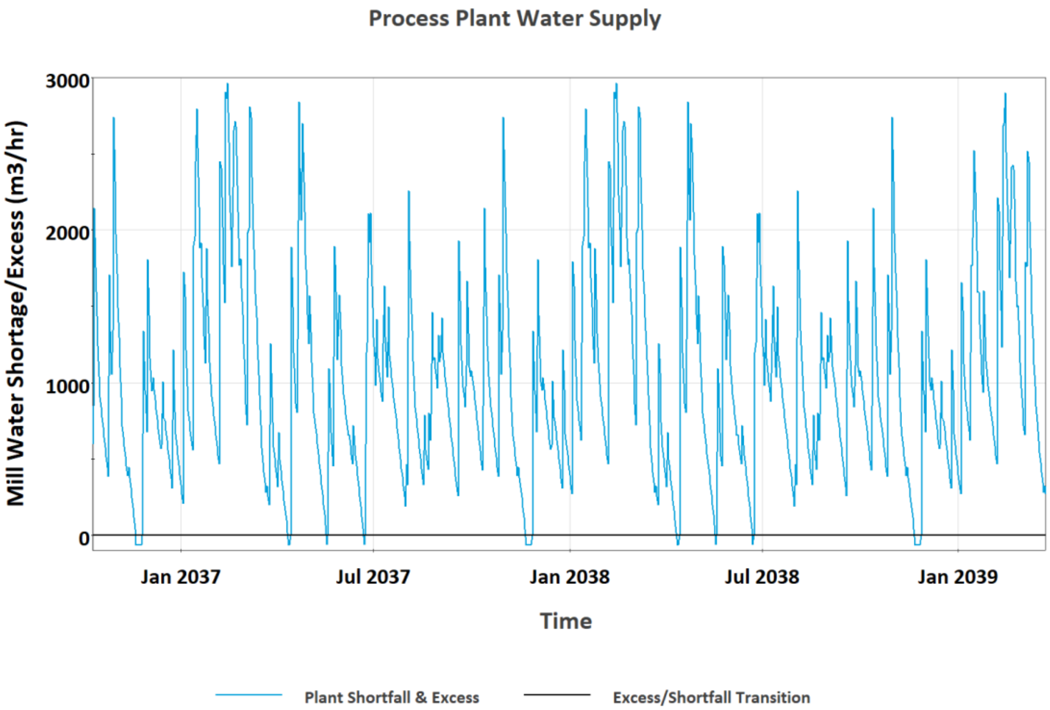


Figure 18.16 Plant Water Supply, Water Conditions 2 Years High Production Rate



Under repeated wet year conditions, water deficit conditions do occur, but much more infrequently.

Model Scenario: More On-site Storage

The water-deficit situation predicted under all conditions will ultimately require additional water supply (off-site or on-site). However, additional water storage has the potential to mitigate the water-deficit situation further. Figure 18.17 and Figure 18.18 show the water balance under base-case conditions and dry conditions, respectively, for a total augmented water storage of 500,000 m^3 (or an addition of 300,000 m^3 to the existing sediment pond combined storage volume).

Figure 18.17 Augmented Water Storage: Base-Case Conditions

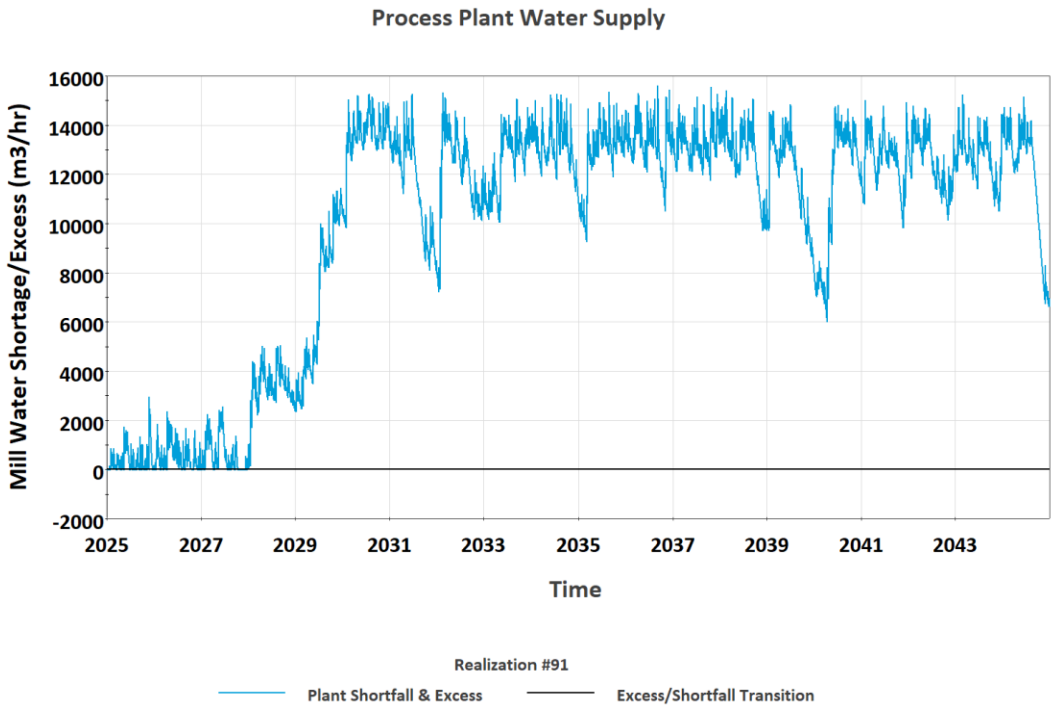
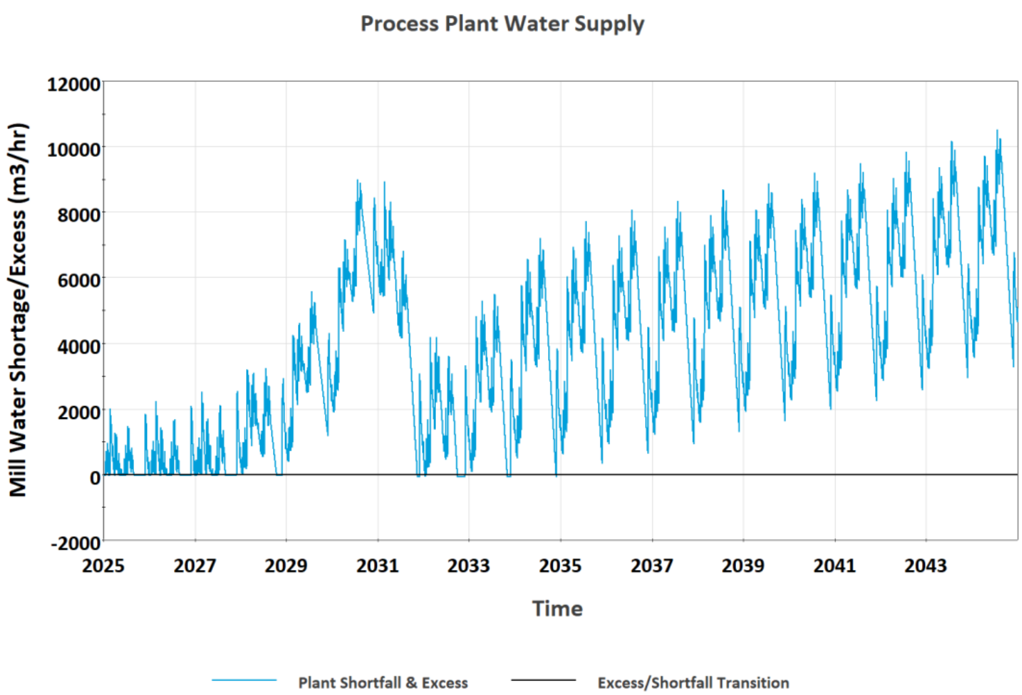


Figure 18.18 Augmented Water Storage: Dry -Case Conditions



The operation requires an additional source of makeup water for reliable operations, or it needs a substantially increased storage pond capacity distributed throughout the site. Table 18.10 summarizes the amount of shortfall days that will need to be mitigated by these other water sources.

Table 18.10 Water Shortfall Days and Percents

Scenario	Shortfall Days	Percent Shortfall Days*
Base Case	998	13.7%
Wet	262	3.6%
Dry	2,417	33.1%
Base Case + 300k m^3 Storage	309	4.2%
Dry Case + 300k m^3 Storage	632	8.6%

Assumes 7305 simulation days.

Off-site water can come from either surface water or groundwater sources. Increased storage capacity must involve utilizing land not currently in the concession package and/or the permitting of a jurisdictional dam.

The results of the model are highly sensitive to rainfall quantities and the process water recycle rate. Additional work is necessary to define climate variability, tailings dewatering properties, and groundwater-sourced pit dewatering inputs. Section 26 discusses water balance recommendations.

Finally, the additional water quantity required is modest for a mining project of this size. For example, a typical copper flotation process uses ~0.5 m^3 of water for each tonne of mineralized material processed (Worley.com, 2023). The BamaStar project uses 0.22 m^3 of water per tonne of mineralized material processed for the different production rates. This is equivalent to the make-up requirement of 32.31 m^3/hour (142.2 gpm or 8.975 L/s) and 63.94 m3/hr (281.3 gpm or 17.76 L/s) for the respective production rates. Finding this source of water locally will be included in the next phase of engineering studies, but GRE believes that it will not be difficult to supply this relatively modest quantity of water.

19.0 MARKET STUDIES AND CONTRACTS

This section has been prepared with information provided by Benchmark Mineral Intelligence ("BMI"), Fastmarkets, published studies and reports, as well as confidential market studies for specific products or sectors.

19.1 Introduction

Flake graphite is a natural form of carbon, characterized by its bi-dimensional hexagonal crystalline structure. There are four commercially available types of graphite, which have significantly varying characteristics, properties and uses:

- Natural Flake Graphite (high crystallinity).
- Natural Amorphous Graphite (low crystallinity).
- Natural Vein/Lump Graphite from Sri Lanka (high crystallinity).
- Synthetic/Artificial Graphite that is generally derived from petroleum, coal, or natural and synthetic organic materials (high crystallinity).

Graphite has very unique chemical, electrical, mechanical and thermal properties, including the following:

- High electrical and thermal conductivity.
- Highly refractory.
- Chemically inert and non-toxic.
- High resistance to oxidation.
- High mechanical strength.
- High natural lubricity.
- High thermal shock resistance.
- It is not deformed or debased by high temperatures or pressures.
- Low friction coefficient.

NFG uses are generally split into two main groups: industrial and value-add applications. Industrial applications include refractories, high strength steels, lubricants, friction products, crucibles and foundries, amongst others. Generally, industrial applications use NFG concentrates that range in grade from 75% – 98% FC, and generally have a grain size distribution ranging from a D50 of -325 mesh ("#") for fines to a +50 # for coarse grain fraction. Typically, the classification for fines versus the coarse grain fractions is split around the 140#. On average, the market demand for NFG for industrial applications grows similar to the Global GDP growth rate.

Value-add applications take the NFG concentrates as a precursor and reprocess it to change the purity and/or the grain size distribution. These two main physical characteristics of grade (purity) and the grain size distribution largely determine the suitable applications and influence product pricing. Value-add products generally have grades ranging from >98% to 99.95% FC, while the grain size commonly ranges from very fine (D_{50} of 5-8 µm) to extremely coarse (D_{50} of +50 #). As a rule, the fines go into battery and conductivity enhancement products, while the coarse grain fractions are used for speciality batteries, foils, gaskets, graphene and fire retardants, for example.

Graphite is vital to the renewable-energy transition and various clean– and/or green energy transition technologies. A highly refined, specialized flake graphite (CSPG) serves as a non-substitutable technology material that plays an indispensable role in all rechargeable lithium-ion batteries ("LiB") for electric vehicles. Purified, micronized graphite (or "PMG") also plays an important role for a variety of products used in defense, nuclear, energy storage and other technology applications.

The Li-ion battery is ubiquitous. For the foreseeable future, this technology powers nearly everything, from smartphones to electric vehicles. Perhaps more than any other device, the Li-ion battery has enabled the technological revolution of the 21st century, and this sector is driving the demand for NFG at around a 20% CAGR.

19.2 Graphite Supply and Demand Trends

In 2023, global supply for NFG concentrates was approximately 1.55Mt and China, a foreign entity of concern ("FEOC"), accounted for nearly 78% of the production. China also is responsible for the production of 98% of the CSPG and dominates the synthetic graphite markets globally with 1.4Mt of production in 2023. The United States currently produces no NFG, has no midstream or downstream processing facilities operational and is 100% dependent on graphite imports. The U.S. imported approximately 110,000t of graphite in 2023, with materials mainly coming from China (60-65%), and the balance imported from Madagascar, Brazil and Canada.

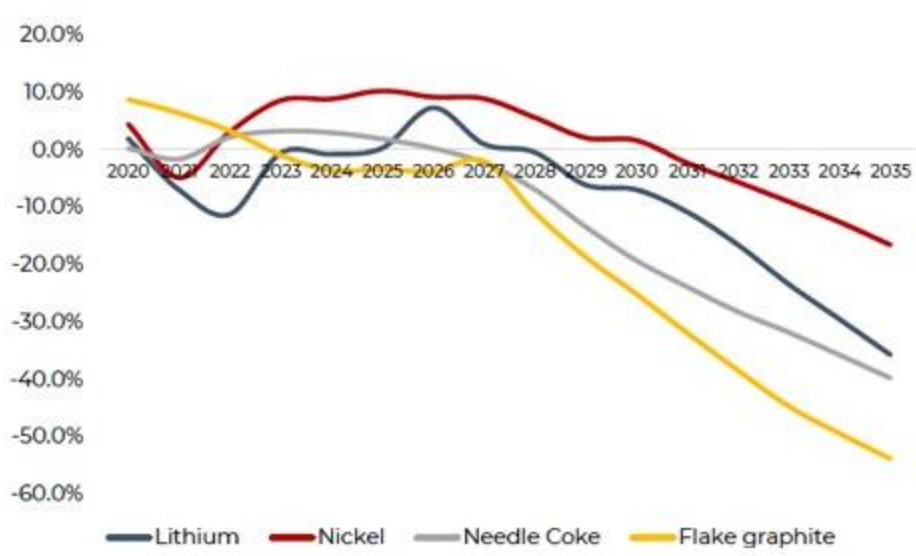
Globally, graphite has been classified as a "critical mineral" by governments of countries such as the United States, Canada, the European Union, and Australia among others. The US Department of Energy ("DOE") classifies graphite as high risk / high importance in both the short-term and medium-term because of its importance in LiB, energy storage and defense applications. Increasingly, geopolitical tensions, supply-chain disruptions and a drive for more diverse production alternatives is driving production back on-shore or near-shore in the West. Geopolitics is highly relevant for the graphite markets.

On average, it takes 10-15 years to bring a mine from discovery into production, although this schedule can vary greatly based on the following factors:

- Exploration and Development.
- Permits and regulatory approvals.
- Test work, studies and project design.
- Procurement lead-times and equipment manufacturing.
- Construction and infrastructure.
- Commissioning and production ramp-up.
- Price volatility and backdrop of commodity cycles.

BMI estimates that there is currently a projected demand of approximately 7.2 Mt of NFG required by 2035 or a current supply shortfall of approximately 5.65 Mt, based on 2023 supply. BMI estimates that this is the equivalent to a shortfall of approximately 95 new average size graphite mines required by 2035. The graphite supply deficit is presented in Figure 19.1 and emphasizes the extreme market imbalance that is expected to begin around 2026 / 2027.

Figure 19.1 Market Balance as a Percentage of Total Demand



Source: Benchmark Forecasts

South Star is developing a vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery, fuel cell and industrial graphite markets. The BamaStar Project consists of a graphite mine and concentrate processing facility in Coosa County, AL, as well as a stand-alone Value-Add Plant in Mobile, AL for value addition transformation. First production is planned by 2027. The combined phases of the Value-Add Plant would produce sufficient CSPG for approximately 1 million electric vehicles ("EVs"), assuming 75kg of CSPG per vehicle and a 50% / 50% blend of synthetic and NFG anode materials.

The Value-Add Plant will receive NFG concentrates from both BamaStar, as well as South Star's flagship Santa Cruz Graphite Mine in northeastern Brazil's Bahia state, which is currently being commissioned. Santa Cruz is the first new graphite production in the Americas this century and is on schedule to be in Phase1 commercial production in Q4 2024.

19.3 Graphite Products & Uses

As a result of the above-referenced properties, flake graphite is processed and refined to produce a wide range of graphite products for numerous applications, including the following:

- ENERGY STORAGE: anode materials for Li-ion batteries for electric vehicles and electrical grid storage applications; and Li-ion and other batteries for consumer, communications, aerospace, medical and military applications.

- CONDUCTIVITY ADDITIVES: conductivity enhancer utilized to increase battery electrochemical performance; due to graphite's low resistivity high electrical conductivity, it is suitable for all primary and secondary battery chemistries and for both battery electrodes, specifically, the positive electrode ("cathode") and the negative electrode ("anode"). Graphite is the only common non-metal that is an excellent conductor of electricity. Significant demand drivers include lead-acid battery additives and dopants for synthetic graphite electrodes specifically, designed for electric-arc-furnace ("EAF") steel-manufacturing markets.

- THERMAL MANAGEMENT: applications include thermally conductive products utilized for heat dissipation, flame retardants/suppressants and other thermal management applications including thermosets, thermoplastic, elastomers, fluoroelastomer-based composites, insultations, geothermal grouts, in addition to traditional industrial thermal applications, including refractory materials, crucibles, steel and foundry additives, and casting molds.

- ENGINEERED PRODUCTS: products manufactured using graphite powder additives such as fire retardants, powder metallurgy, foils, friction materials (e.g., brake linings, clutch facings), carbon brushes, graphite felts, boards, plates, carbon composites, and machined products, including electrodes, furnace parts and heat exchangers.

- INDUSTRIAL LUBRICANTS: arguably the most versatile of all self-lubricating materials applications relying on graphite's natural lubricity such as lubricants (wet, dry, self-lubricating, rail, nuclear-grade, aerospace, agriculture, military specifications, food grade), greases (e.g., water resistant, anti-corrosive, anti- wear / friction), drilling fluids, coatings, and dispersions.

- PLASTICS, POLYMERS AND COMPOSITE MATERIALS: as graphite is one of the lightest of all reinforcing agents, graphite is engineered for applications such as biocompatible, thermoplastic polymers and plastics (e.g., graphite is used as a polymer additive mainly for improving tribological, mechanical and conductive characteristics), and high-performance laminate composite materials produced with polyether ether ketone ("PEEK") or polyaryletherketone ("PAEK"), in addition to jet and rocket engine nozzles, gaskets, seals, and anti-static / friction materials.

- The BamaStar PEA considers NFG concentrate sales from BamaStar and three high-value battery-graphite products that South Star is planning to produce at the BamaStar Anode Plant in Mobile, Alabama. Table 19.1 presents a summary of the product descriptions and pricing details used in the PEA economic analysis. Table 19.2 presents a summary of potential products and pricing details, which require additional testing, but are to be incorporated into the upcoming feasibility study.

Table 19.1 Summary of South Star's BamaStar Anode Plant Products, Pricing Assumptions, and Planned Annual Production per Plant Phase / Module.

Graphite Type	Selling Price USD/t	Annual Production tpy	Grade Fixed Carbon	Processes	Particle Size Mesh / Micron
BamaStar Medium Flake Graphite Concentrates; Precursor for Value-Add Plant	$1200	3,700	95 –97%	• Mechanical Concentration • Froth Flotation	+150 Mesh
BamaStar Fines Flake Graphite Concentrates; Precursor for Value-Add Plant	$800	21,300	96 –99%	• Mechanical Concentration • Froth Flotation	-150 Mesh
CSPG No. 1 Coated Spherical Purified Graphite (18 µm) Active Anode Material	$9,750	10,500	≥ 99.95%	• Chemical Purification • Micronization • Spheronization • Carbon Coating	D_{50} = 18 µm

Graphite Type	Selling Price USD/t	Annual Production tpy	Grade Fixed Carbon	Processes	Particle Size Mesh / Micron
CSPG No. 2 Coated Spherical Purified Graphite (8 μm) Active Anode Material	$10,500	2,100	≥ 99.95%	• Chemical Purification • Micronization • Spheronization • Carbon Coating	D_{50} = 8 μm
PMG No. 1 Battery-Grade Specialty Conductivity Enhancer * Ultra Fine *	$9,300	8,000	≥ 99.95	• Produced from CSPG No. 2 • off-spec production (prior to Surface Treatment) • Remilled	D_{50} = ≤ 8 μm

(Source: Internal Market Study July/2024)

Table 19.2 Summary of South Star's BamaStar Potential Additional Value-Add Plant Products

Graphite Type	Selling Price USD/t	Grade Fixed Carbon	Processes	Particle Size Mesh / Micron
Conductive Expanded Graphite Powder (Ultra-Premium Thermal & Electrical Conductivity Additive)	$50,000	≥ 99.95	• The Graphite Foils are ground to expanded graphite powder • Depending on the grinding (fine to coarse) different particle sizes or grain sizes are possible • Air Classifying Mill to achieve desired Particle Size Distribution	≤ 5 to > 25 μm
Graphite Foils	$30,000	≥ 99.95	• Chemical Purification • Oxidation Treatment • Interlayer Processing via Acid Intercalation (Nitric & Sulfuric Acid) • Washing (thermostatic bath) • Dehydration & Drying • High- Temperature Expansion (Thermal Shock)	+ 80 Mesh

Graphite Type	Selling Price USD/t	Grade Fixed Carbon	Processes	Particle Size Mesh / Micron
Battery-Grade/Purified Expanded Graphite Flake	$13,500	≥ 99.95	• Chemical Purification • Oxidation Treatment • Interlayer Processing via Acid Intercalation (Nitric & Sulfuric Acid) • Washing (thermostatic bath) • Dehydration & Drying • High- Temperature Expansion (Thermal Shock)	+ 80 Mesh
Battery-Grade/Purified Expandable Graphite Flake	$9,500	≥ 99.95	• Chemical Purification • Oxidation Treatment • Interlayer Processing via Acid Intercalation (Nitric & Sulfuric Acid) • Washing (thermostatic bath) • Dehydration & Drying	+ 80 Mesh
Expandable Graphite Flake	> $6,500	95 to 98	• Oxidation Treatment • Interlayer Processing via Acid Intercalation (Nitric & Sulfuric Acid) • Washing (thermostatic bath) • Dehydration & Drying	+ 80 Mesh
Spherical Purified Flake Graphite Anode Powder (“SPG” or “uncoated SPG”)	$3,850	≥ 99.95%	• Chemical Purification • Micronization • Spheronization	+ 80 Mesh
Battery-Grade Purified Flake Graphite Concentrate (CSPG precursor feedstock)	TBD	≥ 99.95%	• Chemical Purification	+ 50 to – 100 Mesh
Micronized Flake Graphite Powder	TBD	90 to 99 wt-% C	• Micronization	< 100μm

19.4 Product Growth Trends for PEA

NFG concentrates are priced based on grade and flake size distribution. The majority of the concentrates (fines) will be upgraded and turned into value-add product, while about 15-20% of the production (medium grain fraction) is planned to be sold as concentrates in the domestic markets. Each concentrator module will produce approximately 25,000 tpy of NFG concentrates, of which 21,300tpy of a 96-99% FC will be trucked to the Value-Add Plant in Mobile at an average transfer price of USD800/t. 3,700 tpy of the medium grain concentrate with a 95-97% FC will be sold into domestic markets at an average market price of USD1,200/t.

The value-add products are split into three main products and markets per each production phase of the Value-Add Plant (21,300 tpy of concentrate precursor to produce 20,600 tpy of value-add products):

- CSPG No. 1: 10,500 tpy of >99.95 FC Coated Spherical Purified Graphite with (18 μm) Active Anode Material directed to LiB Markets for EVs at an average price of USD 9,500/t. There is little production outside of China, and this market is a high growth sector with significant supply deficits in the near-term.

- CSPG No. 2: 2,100 tpy of >99.95% FC Coated Spherical Purified Graphite with (8 μm) Active Anode Material directed to LiB Markets for EVs at an average price of USD 11,500/t. There is little production outside of China, and this market is a high growth sector with significant supply deficits in the near-term.

- PMG No. 1: 8,000 tpy of >99.95% FC Battery-Grade Specialty Conductivity Enhancer (Ultra Fine ≤ 8 μm) at an average price of USD 11,500/t. This premium conductive carbon demand is estimated to grow around 15% per year from to approximately 181,000 tpy in 2035. There almost no production outside of China, and this market is a high growth sector with significant supply deficits in the near-term. Secondary markets also include lead-acid and alkaline batteries.

20.0 ENVIRONMENTAL CONSIDERATIONS AND PERMITTING

20.1 Environmental Geochemistry

GRE performed industry-standard geochemical sampling program based on the protocols and recommendations in the Global Acid Rock Drainage ("GARD") Guide published by the International Network for Acid Prevention (INAP, 2009). The objective of this work was to determine if the waste rock mine tailings, and post-mining pit wall rock had the potential to create Acid Rock Drainage ("ARD") or Metal Leaching ("ML"). This included the following data sets:

- Static geochemical tests on:
  - Future mine waste rock from a range of exploration hole locations, depths, and oxidation states
  - Rock from old pits left from mining in the 1940s
  - Mine Tailings including:
    - Depyritized tailings from the processing of transition and fresh mineralized material
    - Pyrite-concentrate tailings from transition and fresh mineralized material
- Long-duration kinetic tests on a range of rock from exploration holes, including oxide waste, transition waste, and fresh rock waste in the future mine plan.
- X-Ray Diffraction Samples: mineral analysis on assay pulps from the exploration core, focusing on total sulphur and leachable metals

The results of the PEA-level environmental geochemistry testing and analysis program is presented in the following subsections.

20.1.1 Static Sampling of Waste Rock

A total of 23 rock samples were collected including:

- Nineteen samples from the exploration core collected in the 2023 drilling program.
- One sample from old mine tailings found on site (from the 1940s mill).
- Three samples from an open pit left over from mining activity in the 1940s.

Samples were selected to encompass the entire range of waste rock types that could be encountered during the LOM. Samples were analyzed for the following industry-standard static geochemical testing program at the SGS Laboratory in Burnaby, Canada:

- Acid Base Accounting (ABA) by modified Sobek (Lawerence & Wang, 1996).
- Whole Rock Analysis.
- Metals by aqua regia digestion and Inductively Coupled Plasma Mass Spectrometry (ICP-MS).
- Synthetic Precipitation Leaching Procedure (SPLP) (US EPA, 1994).

ABA

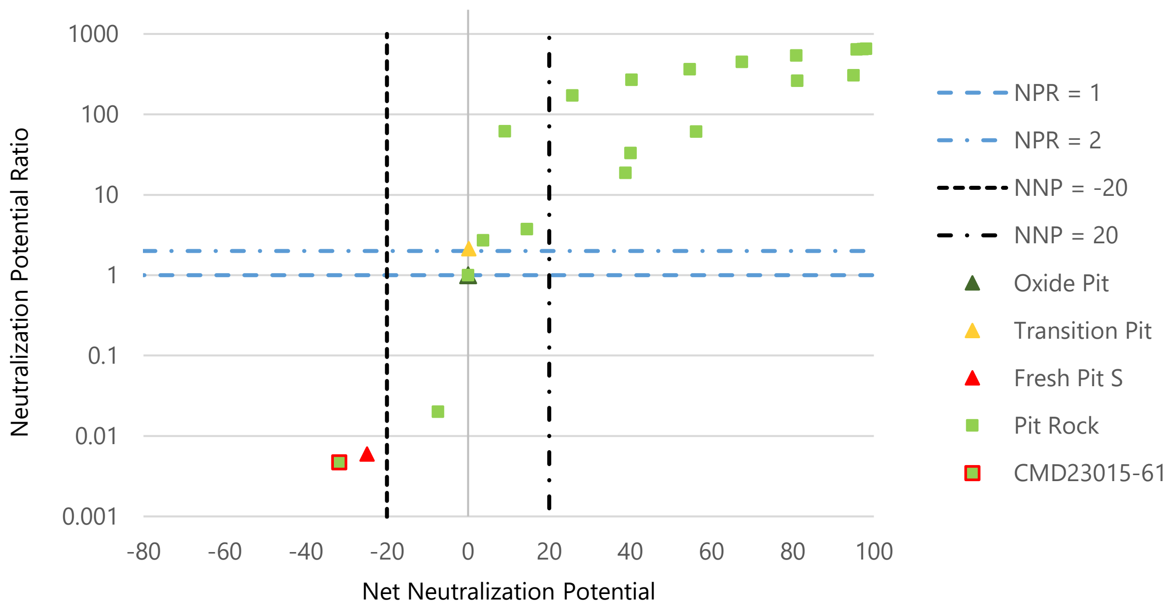
In ABA tests, the acid generating potential ("AP"), and neutralization potential ("NP") values can be combined to derive a quantitative screening-level estimate of a material's overall acid-generating or neutralizing potential. Subtracting AP from NP ("NP-AP"), gives the Net Neutralization Potential ("NNP"), while dividing NP by AP ("NP/AP") gives the Neutralization Potential Ratio ("NPR"). Based on the resulting values of NNP and NPR, the samples are classified as "potentially acid-generating" ("PAG"), "potentially acid-neutralizing" ("PAC") or "uncertain" according to the criteria given by the GARD Guide, (INAP, 2009), presented in Table 20.1.

Table 20.1 Screening Guidelines for Acid Generation Potential Prediction

Material Designation	NNP $TCaCO_3/kT$	NPR
Potentially Acid-Generating (PAG)	< -20	< 1
Uncertain	-20 < NNP < 20	1 < NPR < 2
Potentially Acid-Consuming (PAC)	> 20	> 2

Figure 20.1 shows that 84% of waste rock samples are PAC or non-acid-generating (NPR >2). The exception is waste rock sample CMD23015-61, and Fresh Pit S sample collected from the 1940s open pit which are both PAG. The 'Fresh Pit S' sample may be from future mineralized (plant feed) material, which results in its high AP.

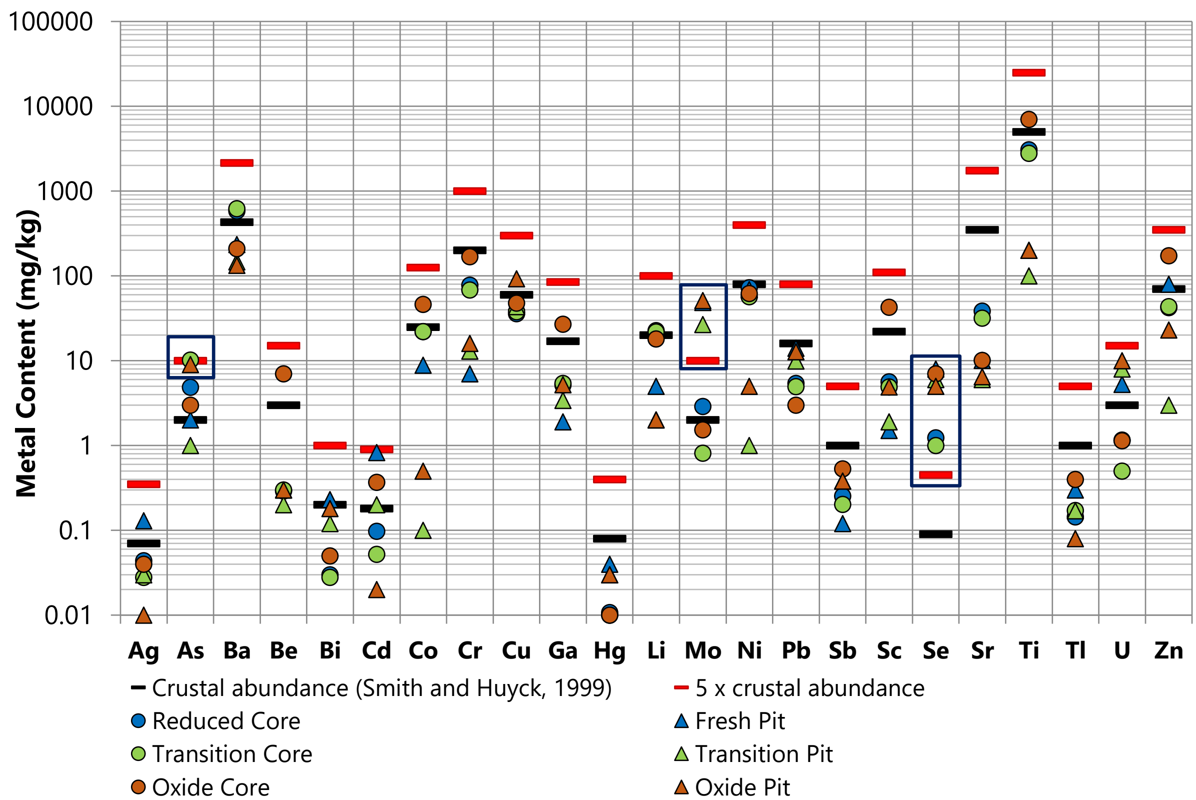
Figure 20.1 ABA of Waste Rock Samples



Metal Content

Quantitative assessment rock mass for metals and metalloids can be used to screen out metals for consideration in future water quality analysis. This is done by comparing the concentration of metals in a rock sample, as determined by digestion, followed by ICP-MS analysis, with the abundance of that metal in the earth's crust. In general, if a rock type has a concentration of a metal greater than five times the crustal average, it is considered enriched for that metal. A rock enriched with a metal is at higher risk for leaching that metal under ML conditions. However, if rock has a metal concentration near or below crustal averages, it can reasonably be removed from consideration as a Constituent of Concern ("COC"). Figure 20.2 shows the comparison of the average concentration of metals in each oxidation state of waste rock in reference to the crustal average.

Figure 20.2 Metal Content in Waste Rock Samples



The analysis shows that arsenic, molybdenum, and selenium may be COCs. The following additional metals, frequently problematic in mine leachate water quality, appear to be near crustal averages and are therefore unlikely to be problematic: cadmium, cobalt, copper, titanium, uranium, and zinc.

Leachate

Twenty-six short-term tests were conducted on exploration rock and tails to estimate the site-specific concentration of contaminant that may leach from soil and impact water quality. The results were compared against the EPA National Recommended Aquatic Life Criteria Table (NRWQC) (US EPA). These results are displayed in Table 20.2.

The detection limits for antimony and mercury in the SPLP test were over water quality standards, so no definitive conclusion can be drawn about those elements in the leachate. Any metals not mentioned in Table 20.2 are either not regulated by the NRWQC or have tested levels below standard water quality limits.

Table 20.2 SPLP Metal Concentrations in Waste Rock

Metal, Total	EPA Maximum Aquatic Life Standard (for Total Dissolved Metals) µg/L	Fresh Pit S µg/L	CMD23015-61 µg/L	Waste Rock Average µg/L
Aluminium	1,300	5,350	185	682
Copper	1,300*	619	1	0.95
Iron	1,000	50,200	160	83.45
Nickel	52	714	3.1	1.35
Selenium	71	6.14	0.18	0.067
Uranium	30*	86.5	0.017	0.013
Zinc	120	407	2	1.89

indicates a reference value from US EPA Drinking Water Standards (US EPA)

The sample Fresh Pit S showed moderate metal leaching concerns for select metals, whereas the remainder of the waste rock samples had minimal metal concentrations in leachate. Based on the currently available data, the majority of mine waste appears to meet regulatory standards for ML.

pXRF Analysis

pXRF analysis was performed to provide a large number of screening-level samples of total sulphur and metals. It is hypothesized that total sulphur is a reasonable analog for sulphide minerals in the transition rock and fresh rock, with even greater accuracy in the fresh rock, where sulphide is the only form of sulphur minerals. Results from the pXRF for sulphur showed a close correlation between graphite grade and sulphur content; sulphur is present around deposits of graphite, and negligible in graphite-poor rock. This dataset, with 1882 total readings, supported the other testing data and further confirmed the theory that the sulphide minerals are contained only within the mineralized zone. As a result, the pXRF testing shows that mine waste rock (without graphite and without pyrite) is less likely to be an ARD risk.

20.1.2 Kinetic Sampling of Waste Rock

Kinetic cell tests are performed to determine whether any potential acid generation is realized. Kinetic on-site testing involves filling 20 L buckets with sample rock, subjecting them to ambient climate conditions, and collecting and analyzing the resulting leachate. The BamaStar project commenced this testing for ten selected waste rock samples on 05/08/2024 at the Analytical Chemical Testing Laboratory, Inc. (“ACT Labs”) in Mobile, Alabama. Collection of data is ongoing and is scheduled to continue for another three to nine months, depending on the results.

The kinetic samples are analysed weekly for pH, electrical conductivity, dissolved oxygen, temperature, oxidation-reduction potential, sulphates, sulphides, chlorides, and hardness (as $CaCO_3$) ACT staff. Monthly, samples of leachate are also analysed for metals, salts and basic wet chemistry.

Preliminary results indicate that six of the ten samples add alkalinity to the leachate, resulting in an increase in leachate pH above natural rainfall pH. This is consistent with PAC waste rock. Three of the samples consistently test in the range of natural rainfall pH. This is consistent with NAG samples, or inert samples (such as oxide waste). Sample Fresh Pit S, material from the 1940s pit that was selected as a demonstration of acid-generating rock, consistently generates leachate with acidic pH. This acidic sample leaches sulphates at a maximum of 400 ppm. The remainder of samples, other than one that leaches sulphate at about 100 ppm, leach sulphate below 30 ppm. Table 20.3 shows the average dissolved metal and sulphate concentrations in leachate over all testing events in comparison to the water quality standards of NRWQC (US EPA). Metals not shown in Table 20.3 are either not regulated as part of NRWQC (US EPA) or have tested levels below water quality limits.

Table 20.3 Kinetic Cell: Waste Rock Metal Leachate Concentrations

Metal, Total	EPA Maximum Aquatic Life Standard (for Total Dissolved Metals) µg/L	Fresh Pit S µg/L	Waste Rock Average µg/L
Aluminium	1,300	2,510	366
Cadmium	1.8	43.9	2**
Copper	1,300*	1,662	11.1
Iron	1,000	92,067	882
Nickel	52	2,472	29.9
Selenium	71	17.9	10**
Silver	3.2	5**	5**
Sulphate	250,000*	154,600	6,420
Zinc	120	4610	24.8

indicates a reference value from US EPA Drinking Water Standard (US EPA)
***** indicates value at detection limit***

This result supports the results of SPLP testing (see Section 20.1.1 above) that the waste rock will not create a metal leaching concern for most metals. Of the analysed metals, aluminium, cadmium, copper, iron, nickel, selenium, and zinc are continuously elevated above water quality standards in leachate from sample Fresh Pit S. The average of other waste rock samples shows no exceedances above water quality limits in their leachate. The detection limits for silver, thallium, and cadmium in leachate are above water quality standards, so no definitive conclusion can be drawn from those results.

20.1.3 Tailings Sampling

It was assumed that the sulphides present in the mineralizedzone, which are evident from visual inspection and from the pXRF data, could create an ARD or ML issue. As a result, GRE recommended that BamaStar employ a pyrite flotation circuit. This would concentrate the ARD risk into a low-volume stream of pyrite concentrate tailings, while leaving most of the mine tailings without appreciable sulphide minerals. As a result of this recommendation, the testing program focused on two different material types: a transition material and a fresh rock material (both in excess of cutoff grade), each with two samples – a depyritzed tailings sample, and a pyrite concentrate tailings sample. Under the flotation circuit, the mass split between depyritized tailings and pyrite-concentrate tails was 84.4% and 13.36% of feed mass, respectively. Samples included (and were named) as follows:

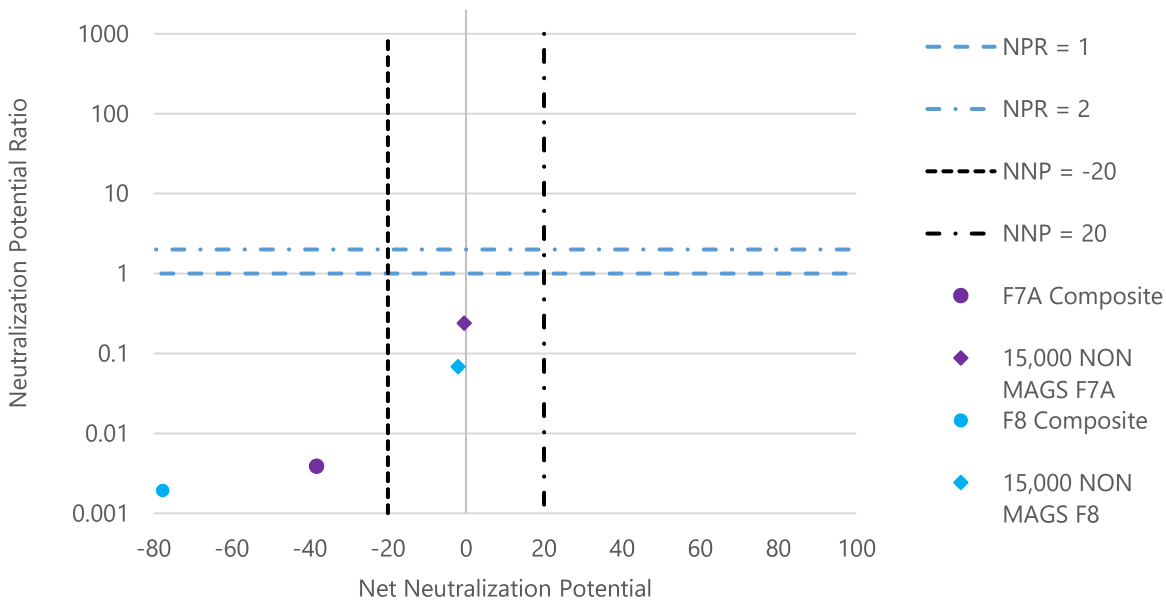
- a depyritized fresh sample, (15,000 NON MAGS F8).
- a depyritized transitional sample, (15,000 NON MAGS F7A).
- a pyrite-concentrate fresh sample, (F8 Composite).
- a pyrite-concentrate transitional sample (F7A Composite).

Each of these samples was tested for ARD and ML behaviour using the same methods and testing protocols as utilized for waste rock (see Section 20.1.1).

ABA of Mine Tailings

Figure 20.3 shows that both the F7A Composite (high sulphide from transitional mineralized material) and F8 Composite (high sulphide tails from fresh mineralized material) are PAG, whereas the F7A and F8 NON-MAGS (low sulphide tails from transitional and fresh mineralized material, respectively) appear to be non-reactive – with insignificant concentrations of both acid-generating sulphide minerals and acid-neutralizing carbonates.

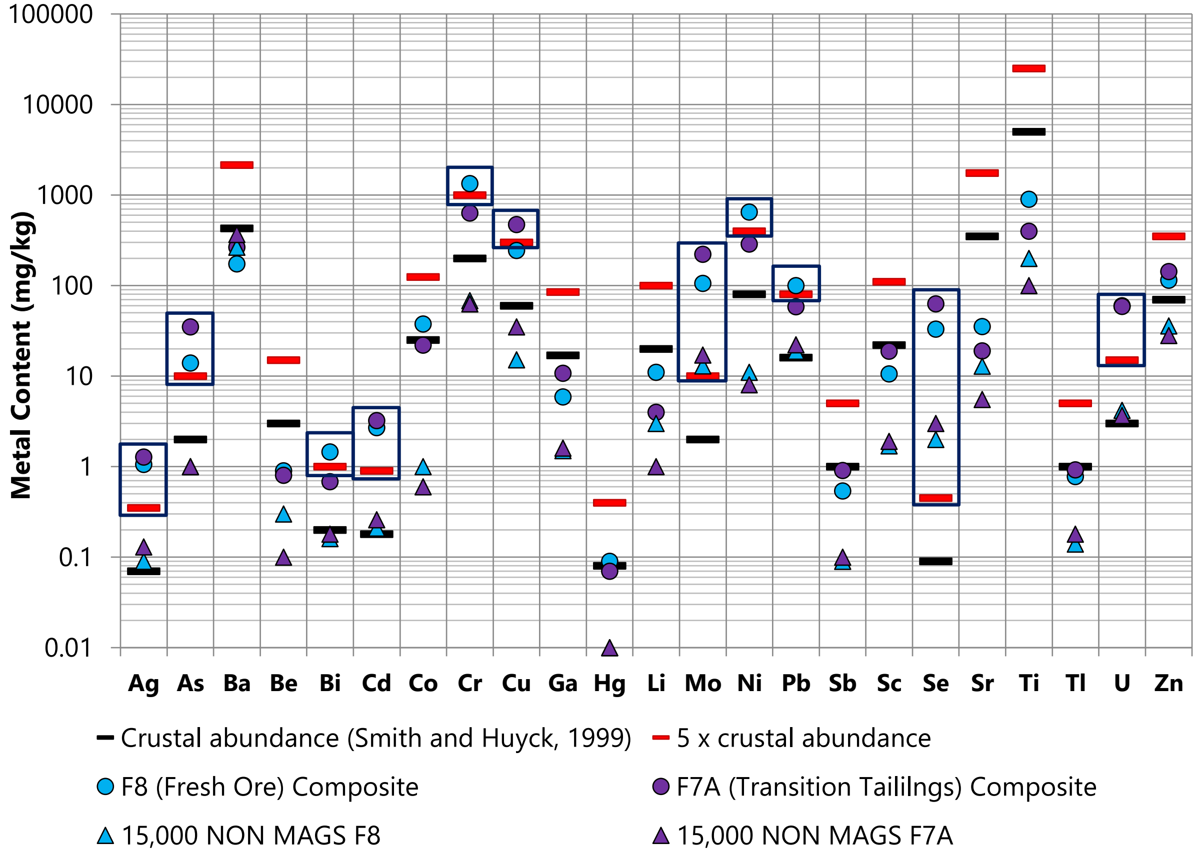
Figure 20.3 ABA of Tailings Samples



Metal Content of Mine Tailings

Figure 20.4 presents the average concentration of metals in tailings in reference to the crustal average (Abundance in Earth's Crust, 2007). The analysis shows that silver, arsenic, bismuth, cadmium, chromium, copper, molybdenum, nickel, lead, selenium, and uranium may be COCs due to their enrichment above 5x crustal abundance. The following additional metals, frequently problematic in mine leachate water quality, appear to be near crustal averages and may also be problematic: cobalt, antimony, mercury, and zinc.

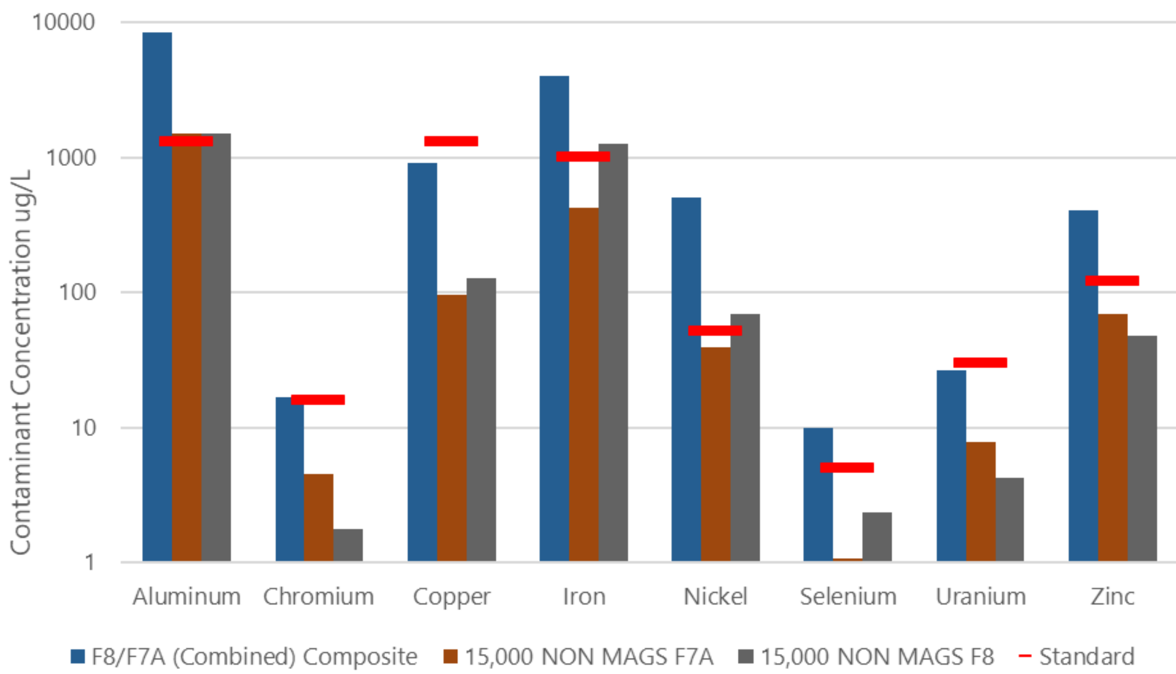
Figure 20.4 Metal Content in Tails Samples



Leachate in Mine Tailings

All tailings samples showed some metal leaching concerns. The detection limits for mercury in the SPLP test were over the water quality standards (US EPA) for those elements, so no definitive conclusion can be drawn about mercury concentrations. Any metals not mentioned in Table 20.2 are either not regulated by the NRWQC or have tested levels below standard water quality limits (the Aquatic life standards, see Section 20.1.1) (US EPA).

Figure 20.5 Tailings SPLP Metal Leachate



The SPLP leaching tests show that aluminium, iron, nickel, selenium, and zinc have a potential for leaching above water quality standards for the concentrate tailings. There is additionally potential of aluminium, iron, and nickel leaching from the depyritized tailings.

20.1.4 Summary of Preliminary Geochemical Characterization

Geochemical tests confirm that the majority (84%) of the waste rock onsite is PAC or NAG with few realized metal leaching concerns. In particular:

- Oxide waste has no sulphide minerals (by definition) and is non-acid-generating.
- Transition and fresh rock samples often have trace sulphide concentrations, and an excess of acid-consuming minerals.

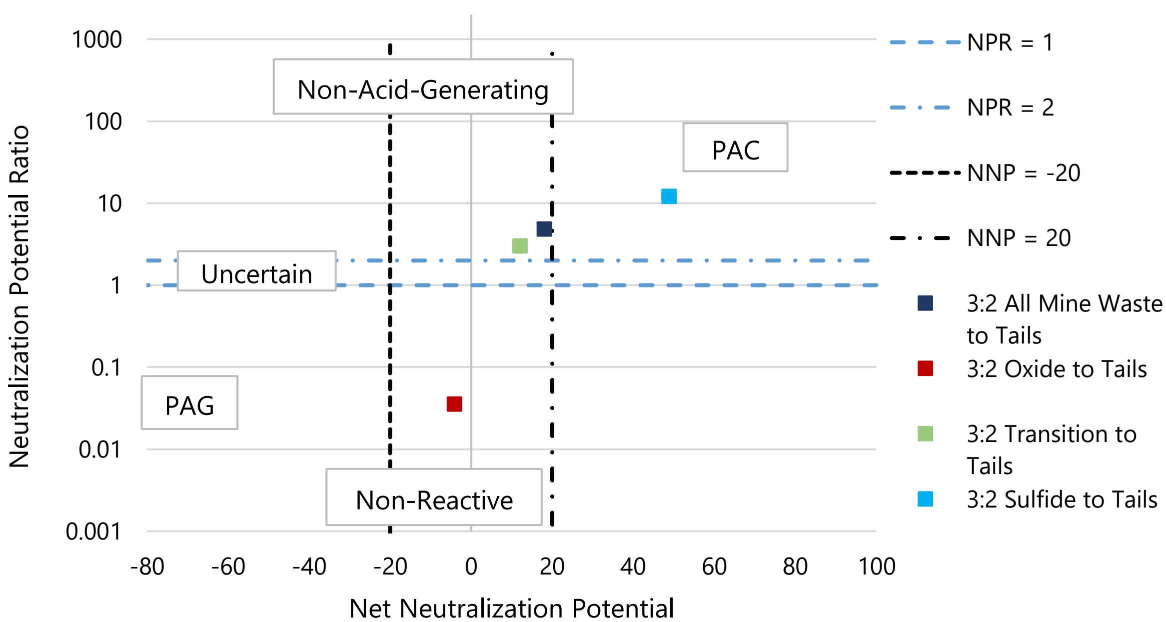
Only two waste rock samples were PAG, and one of these samples -- the 'Fresh Pit S' sample from the bottom of the 1940s pit, is likely mineralized graphite rock which contains sulphides and has produced ARD over decades of exposure (without mitigation). As a result, based on the current data, it is possible to characterize waste rock as non-acid generating or potentially acid consuming. Although SPLP predicted minimal ML for waste rock, kinetic leaching tests showed some metal leaching risk is possible especially for more oxidized, acid-generating rock.

Mixing the high-sulphur and low-sulphur tails together at the existing mass ratio that they are produced onsite will produce a tails mixture that has an AP of around 10.4 and an NP of 0.15. These mine tailings are potentially acid generating and require mitigation to meet project water quality objectives. SPLP tests show that mixed tailings may have some metal leaching risk. Testing recommendations for the Feasibility Study are presented in Section 26.

20.1.5 Geochemical Impact of Co-disposal

Based on the geochemical results of the waste rock and tailings, a co-disposal strategy, called 'Waste Blending' as discussed in Section 6.6.3.6 of the GARD guide, would be appropriate for the Project (INAP, 2009). This would involve the mixing of PAG dry-stack mine tailings with PAC/NAG waste rock. GRE conducted a waste blending calculation using the 1.5:1 stripping ratio for the project (i.e. 1.5 tonnes of waste rock per every ton of mine tailings (dry weight of solids)). When mixed in the ratios that will be produced by operations, the resulting waste will be non-reactive in the oxide phase, non-acid generating in the transition phase, and acid-consuming in the sulphide phase. Figure 20.6 presents the waste-blending result (calculated from previous testing as a weighted average) in an ABA plot.

Figure 20.6 Weighted Average ABA Plot of Co-Disposed Tails and Waste Rock



Based on the existing data set, it appears that co-disposal is a cost-effective and viable solution to mitigate the risk of ARD and ML. This plan has therefore been adopted as the waste management strategy for this PEA. It is important to note that PEA-level geochemistry is preliminary, and additional test work is required for the next phases of project development.

20.2 Permitting Considerations

The project is located on private property in the state of Alabama. It is subject to a variety of different permitting requirements, some administered by the State of Alabama, and some by federal entities. Table 20.4 shows the permitting requirements for the project, with estimated time frames towards acquisition.

Table 20.4 Potential Permitting Requirements and Permitting Timeframe

Agency	Permit*	Comment	Timeframe
Unted States Army Corps of Engineers (USACOE)	404 Individual Permit for impacts to Waters of the State or impacts to Wetlands	Mine Waste Facilities, Pits, Ingress and Egress	Six months
USACOE	Plan of Operations (PoO) – Record of Decision (ROD)	All Mining Operations	Six Months
Alabama Department of Environmental Management (ADEM)	National Pollutant Discharge Elimination System (NPDES)	All contact water discharge	Up to 180 Days
ADEM	Multi-Sector General Permit (MSGP) – Stormwater	All contact water discharge locations	Up to 180 Days
ADEM	Air Quality Permit	Fugitive Dust and Emissions	One year prior to construction
Alabama Department of Economic and Community Affairs (ADECA)	Certificate of Beneficial Use for groundwater or surface withdrawal	All Surface water or groundwater use areas	30-45 days
Alabama Department of Labor	Surface Mining of Non-fuel Minerals Permit and Plan of Reclamation	All Mining Operations	Up to 180 days
Bureau of Alcohol, Tobacco, Firearms and Explosives	Explosives Permit	Blasting	Uncertain, out of Authors area of knowledge
United States Environmental Protection Agency (EPA)	Hazardous Waste Generator	All Mining Operations	12 to 24 months

The project is not on U.S. Federal Government land and is therefore not immediately subject to the National Environmental Policy Act ("NEPA"); NEPA permits require an Environmental Assessment ("EA") or an Environmental Impact Statement ("EIS"). The NEPA process takes years, not months, to work through, and avoiding this permitting requirement will be important to project success.

20.2.2 Baseline Studies

The site must conduct the following baseline environmental studies of the following:

- Wetlands delineation.
- Biological studies including Threatened and Endangered Species.
- Air Quality.
- Climate.
- Land Use.
- Soils.
- Cultural and archaeological resources.
- Hydrology (including floodplain delineation.
- Groundwater.
- Socioeconomic resources.
- Archaeological surveys.
- Additional environmental geochemistry studies.
- Sedimentology sampling.
- Site wide water balance.

20.2.3 Studies in Support of Permitting

Many of the permits presented in Table 20.4 require an assessment of environmental impacts and mitigation measures. Therefore, additional studies are required including:

- Water quality modelling of site discharges and post-closure pit lakes (in support of NPDES permits).
- Air quality modelling.
- Surface water flow modelling (for the SWMP) – In Alabama, this is called a Best Management Practices Plan (BMP Plan).
- Groundwater models (if necessary).
- Noise and vibration modelling.

These studies will be part of the upcoming FS (see Section 26).

20.3 Closure Plan, Closure Costing, and Closure Bond

A comprehensive closure plan and Reclamation Cost Estimate ("RCE") will be required for the Surface Mining of Non-fuel Minerals Permit and Plan of Reclamation issued by the Alabama Department of Labor. The closure bond is $2,500 per acre to be disturbed under the conditions that the BamaStar project meets rigorous guidelines for revegetation and site reclamation as described in the supporting materials to the 1969 mining reclamation law (Alabama Department of Labor).

The post-closure land use will be forestry, grazing, or wildlife habitat. There will be a post-closure pit lake in the north pit with a spillway to natural waters. Waste rock dumps will be graded according to state requirements for a 3:1 maximum slope (Alabama Department of Labor).

GRE estimated closure cost based on unit rates acquired in the PEA economic model and using the existing mining fleet either as concurrent closure with mining or post-closure. The following closure cost estimates have been applied:

- Closure bond of $2,500 per acre, for 928 acres. ($2.3M due in preproduction)
- Earthmoving and regrading at $3.80 per ton, ~$6.50 per cubic meter.
- Revegetation at $6,600 per acre including hydroseeding, seedlings, and topsoil placement.
- Post closure monitoring costs for five years at $312,265 per year.
- No water treatment is required for the north pit lake due to the lack of ARD or ML conditions (see Section 20.1).
- Plant demolition estimated at ~$452,000.
- The rate-of-return on the closure bond is estimated at 5% per year.
- The Net Present Value (NPV) on the closure cost timeline is estimated at 3%
- Bond release will occur after five years of post-closure monitoring.

Based on these assumptions, the PEA-level closure cost estimate has an NPV (3%) of $9.7M. The closure cost cash-flow, including the reclamation bond, reclamation bond interest earned, and the reclamation bond release, has been incorporated into the economic model.

20.4 Social and Community Impact

This section is outside of the scope of this PEA study, which focuses on the economic implications of the project.

21.0 CAPITAL AND OPERATING COSTS

21.1 Introduction

This chapter provides an overview of the capital and operating cost estimates for open pit mining of the BamaStar deposits, as well as the construction of a process plant, waste storage facility ("WSF") which includes co-disposal, and associated infrastructure. According to the PEA design, it is expected that the process plant would have an average capacity of 1.3 M tpy for Phase 1, producing 25,000 tpy of graphite concentrate, and 2.6M tpy for Phase 2, producing 50,000 tpy, and the mine will have a life of 19 years.

The Capex is based on the Project obtaining all relevant permits in a timely manner to meet the Project Schedule. The Capex reflects Engineering, Procurement, and Construction Management ("EPCM") type execution. Unless otherwise stated, all costs presented in this chapter are in Q3 2024 United States Dollars ("USD of US$"). An exchange rate of 1USD = C$1.36 was utilized when applicable.

This capital cost estimate reflects the joint efforts of Lycopodium, South Star and specialty consultants retained by South Star – AGP and GRE. Lycopodium was responsible for compiling the submitted data into the overall estimate but did not review or validate the inputs from South Star or its other consultants.

Table 21.1 outlines the responsibilities of each company for input of information into the capital cost estimate.

Table 21.1 Capital Cost Estimate Responsibilities

Company	Responsibility
Lycopodium	Process plant, on-site infrastructure
AGP	Mining, Waste Storage Facility
Global Resource Engineering (GRE)	Environmental geochemistry, water balance, site water management, and closure costs
South Star	Owner's costs, salvage values and taxes (included in the financial model)
Anzaplan	CSPG plant, on-site infrastructure

21.1.2 Capital Cost Estimate Summary

The mine, process plant and associated infrastructure capital cost estimate are based on the Association for the Advancement of Cost Estimation ("AACE") Class 5 estimate, with an accuracy range of +50/-35%. Table 21.2 summarizes the mine and processing plant CAPEX..

Table 21.2 Mine and Processing Plant CAPEX Summary

Mine and Processing Plant	Phase 1 Initial Capital Costs $M	Phase 2 Initial Capital Costs $M
Mining – Open Pit Capital	14.5	-
Process Plant	44.2	36.5
Infrastructure – Process Plant	7.3	-
Direct cost	**66.0**	**36.5**
Project Delivery Costs	7.8	5.5
Owners Costs	6.6	3.7
Indirect Cost	**14.4**	**9.2**
Contingency	**16.5**	**11.4**
Total Capital Costs (initial)	**96.9**	**57.2**

Table 21.3 presents a summary of the sustaining CAPEX for the Project. In addition, a US$2.3M closure bond would need to be secured prior to start of construction and would be carried as a financial instrument. The bond purchase price is assumed to be returned after successful closure of the facilities.

Table 21.3 Mine and Processing Plant Sustaining Capital Cost Summary

Mine and Processing Plant	Sustaining Capital Costs $M
Mining – Open Pit Capital	29.0
Process Plant	3.7
Total Sustaining Costs	**32.7**

Table 21.4 presents a summary of the total capital costs from Table 24.9 for the 'Capital Cost Summary for Graphite Purification, Spheroidization and Coating per Expansion Phase'.

The capital costs estimate for the Value-Add Plant are based on an Association for the Advancement of Cost Estimation ("AACE") Class 5 estimate, with an accuracy range of -20 % to -50 % (low) and +30 % to +100 % (high).

Table 21.4 Value-Add Anode Plant Initial Capital Cost Summary

Value-Add Plant	Initial Capital Cost $M
Purification	32.9
Spheroidization	98.1
Coating	138.0
Total Capital Costs (initial)	**269.0**

The capital costs estimated for the Value-Add Plant has two expansion phases, each $269.0M, for a total estimated capital expansion cost of $538.0M.

Table 2.15 presents a summary of the total CAPEX and sustaining capital costs for the Project.

Table 21.5 Total Project Capital Cost Estimate Summary

Area	Phase 1 Capex US$ M	Phase 2 CAPEX US$ M	Phase 3 CAPEX US$ M	Sustaining Capital US$ M	Total US$ M
Mining & Processing Plant	96.9	57.2	-	32.7	186.8
Value Add Plant	269	269	269	84.7	891.7
Total Capital Costs	**365.9**	**326.2**	**269**	**117.4**	**1,078.5**

21.1.3 Operating Cost Estimate Summary

The summary of the total processing costs per tonne are shown in Table 21.6 as follows over the Life of Mine (Year 1-19):

Table 21.6 Operating Cost Summary for the Mine and Processing Plant

Mine and Processing Plant	Unit	Value
Mining – Open Pit Operating ($/t moved)	[USD$/t moved]	4.07
Mining – Open Pit Operating ($/t mill feed)	[USD$/t mill feed]	10.46
Process Plant	[USD$/t mill feed]	9.78
General and Administration (G&A)	[USD$/t mill feed]	2.19
Concentrate Trucking, Port, Shipping	[USD$/t mill feed]	1.41
Total Operating Cost	**[USD$/t mill feed]**	**23.84**
Mining – Operating Cost	[USD$/t concentrate]	555.7
Process Plant – Operating Cost	[USD$/t concentrate]	519.3
General and Administration (G&A)	[USD$/t concentrate]	116.3
Concentrate Trucking, Port, Shipping	[USD$/t concentrate]	55.0
Total Operating Cost	**[USD$/t concentrate]**	**1,246.4**
Mining – Operating Cost	[USD$M/a]	23.29
Process Plant – Operating Cost	[USD$M/a]	21.77
General and Administration (G&A)	[USD$M/a]	4.88
Concentrate Trucking, Port, Shipping	[USD$M/a]	3.14
Total Operating Costs	**[USD$M/a]**	**53.08**

See Section 24 ‘Other Relevant Data’ Section 24.12 for complete reporting. See Table 21.7 for summary of Value-Add Anode Plant operating costs.

Table 21.7 Operating Costs Summary for Graphite Purification, Spheroidization and Coating

Description	Unit	Value
Purification	[USD$M/a]	11.92
Spheroidization (including uncoated SPG fines by-product)	[USD$M /a]	5.26
Coating	[USD$M /a]	9.32
Total (cSPG)	**[USD$M /a]**	**26.49**
SG&A	[USD$M /a]	2.88
Contingency	[USD$M /a]	2.65
Total (including contingency) USD$M	**[USD$M /a]**	**32.03**
Total USD/Tonne	**[USD/ t_{sales}**	**1,555**

21.2 Mine Capital Costs

Open Pit Mining

The mining equipment capital costs were developed with the use of financing of the fleet. Base capital costs were obtained and developed with options, then finance parameters are applied. For the PEA a downpayment of 20% was applied. The remaining finance costs are then distributed over the operating costs discussed later in Section 21.2.2.

Equipment pricing as shown in Table 21.8 was based on quotations from local vendors predominantly with some smaller equipment information from AGP's database of recent projects. The base costs provided by the vendors are included in the calculation for each unit cost and options were added to that as shown in Table 21.8 with the full finance cost.

Table 21.8 Equipment Pricing

Equipment	Unit	Capacity	Capital Cost	Full Finance Cost
Production Drill	mm	140	1,155,400	1,339,800
Production Loader	m^3	5.7	640,000	742,400
Hydraulic Excavator	m^3	6.5	1,315,000	1,530,800
Haulage Truck	t	55	1,115,000	1,293,400
Crusher Loader	m^3	5.7	640,000	742,400
Track Dozer	kW	363	1,495,000	1,734,200
Grader	kW	178	740,000	858,400

Some items such as spare loader buckets were capitalized and purchased at the same time as the mine equipment. For the loader, the estimate is that one spare bucket per two loading units will be required.

The distribution of the capital cost is completed using the units required within a period. If new or replacement units are needed, that number of units, by unit cost, determines the capital cost for that period. There is no allowance for escalation in any of these costs. Timing of major capital equipment costs is one year in advance of the need for that piece of equipment. Therefore, if the equipment is required in Year 1, the cost is charged in Year -1. The finance calculation adjusts that, so the cost of the financing is in the year the equipment arrives on site. The finance cost less the downpayment is an operating cost.

The number of units are determined by the mine schedule and the operating cost estimate for required operating hours. These were balanced over periods of time so if there are fluctuations in the hours from period to period, or year to year, they are distributed for the entire equipment fleet to balance the hours.

Replacement times for the equipment are average values from AGP's experience. Options around rebuilds and recertification of equipment like track dozers is not considered, nor is used equipment, although that should be considered during the purchase of the mine fleet.

The balancing of equipment units based on operating hours is completed for each major piece of mine equipment. The smaller equipment was based on number of units required, based on operational experience. This includes such things as pickup trucks (dependent on the field crews), lighting plants, mechanics trucks, etc.

The most significant piece of major mine equipment is the haulage trucks. At the peak of mining in Year 8 the haulage fleet is 9 units of 55 t size which are necessary to maintain mine production. The maximum hours per truck / per year are set at 6,000. There are periods where the maximum hours per unit are below 6,000. In those cases, the hours required are distributed evenly across the number of trucks within the fleet.

The other major mine equipment is determined in the same manner. Therefore, in some instances the smaller equipment has a longer period of life (same number of hours between replacements) due to the sharing of hours with the other units in the fleet.

The support equipment is usually replaced on a number of year's basis. For example, pickup trucks are replaced every four years, with the older units possibly being passed down to other departments on the mine site, but for capital cost estimating new units are considered for mine operations, engineering, and geology.

The timing of equipment purchases, initial and sustaining, are shown in Table 21.9. If the Project were to advance without financing, the quantity of units would remain the same. The forecast operating life by unit is also shown in the table. Table 21.10 shows the total number of units on site by year.

Table 21.9 Equipment Purchases – Initial and Sustaining

Equipment	Unit Life (hrs)	Yr -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15	Yr 16	Yr 17	Yr 18	Yr 19
Drill (140 mm)	25,000				1						1			1		1		1			
Loader (5.7 m3)	25,000	1						1	1				1	1			1	1	1		
Excavator (6.5m^3)	25,000	1						1		1				1	1				1		
Truck (55t)	45,000	2	1			2			2		1	2	1	2	1		1				
Crusher Loader	25,000	1								1					1						
Tracked Dozer	35,000	1			1												1	1			
Grader	25,000	1											1								

Table 21.10 Equipment Fleet Size

Equipment	Unit Life (hrs)	Yr -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15	Yr 16	Yr 17	Yr 18	Yr 19
Drill (140 mm)	25,000	-	-	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	-
Loader (5.7 m3)	25,000	-	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Excavator (6.5m^3)	25,000	-	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Truck (55t)	45,000	-	2	3	3	3	5	5	5	7	7	7	7	8	9	9	9	8	7	6	5
Crusher Loader	25,000	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tracked Dozer	35,000	-	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Grader	25,000	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

The portion of the mining capital that is not financed is tabulated in Table 21.11.

Table 21.11 Mining Capital Costs Estimate ($USD)

Equipment	Preproduction Year -1	Sustaining	Total
Mining Equipment and Pre-Production Stripping			
Pre-Production Stripping	2,609,900	-	2,609,900
Mining Equipment	6,342,000	10,998,000	17,340,000
Subtotal - Pre-Production Stripping and Mining Equipment	**8,951,900**	**10,998,000**	**19,949,900**
Miscellaneous Mine Capital			
Engineering Office Equipment	375,000	125,000	500,000
Pit Communications	400,000	-	400,000
Mine Maintenance Shop	1,500,000	-	1,500,000
Dewatering System	-	13,999,000	13,999,000
Waste Storage Area Preparation – Clear / Grub	750,000	750,000	1,500,000
Pit Area – Clear / Grub	750,000	750,000	1,500,000
Initial Mine Road Development	750,000	-	750,000
Initial Settling Ponds and Ditching	1,000,000	-	1,000,000
Settling Pond and Ditching Upgrade	-	1,000,000	1,000,000
Subtotal – Miscellaneous Mine Capital	**5,525,000**	**16,624,000**	**22,149,000**
Contingency	**-**	**1,381,000**	**1,381,000**
Total Mine Capital	**14,476,900**	**29,003,100**	**43,480,000**

Mining Equipment

The initial downpayments of the mining equipment are included here. As well, various pieces of mining equipment were not financed including items such as spare loader or excavator buckets. It also includes the blasting truck, and pump truck, as well as the ambulance, fire truck and associated rescue equipment, a 35-t rough terrain crane and a 100-t lowboy and tractor for moving drills and dozers between the various pit areas.

Miscellaneous Mine Capital

This category covers the engineering office equipment which includes mining software, computers, plotters, GPS equipment, etc. It also covers the mine maintenance shop and mine site communications.

The dewatering system is also included in this category. It includes all necessary pumps, pipes, and cabling to keep the pits dry for mining operations.

Site preparation in the form of initial roads, waste storage area preparation and pit area preparation are included in this capital cost category. The initial settling pond development and ditching is part of this category. Upgrading of the system to include the South Pit area and expansion of the mine is included in the mine capital costs.

21.3 Process Plant Capital Costs

The estimate was developed using Lycopodium's in-house database of projects and studies, as well as experience from similar operations. The capital cost estimate conforms to the AACE Class 5 guidelines for a preliminary economic assessment with a ±50%/-35% accuracy.

Table 21.12 provides a summary of the estimate for overall capital cost. The estimate includes costs for mining, on-site infrastructure, process plant, project delivery, owners' costs and contingency. The total initial capital cost is estimated to be US$96.9 million for Phase 1 and US$57.1 million for Phase 2.

Table 21.12 Overall Mine and Process Plant CAPEX

Mine and Processing Plant	PHASE 1 M$	PHASE 2 M$
Mining – Open Pit Capital	14.5	-
Process Plant	44.2	36.5
Infrastructure – Process Plant	7.3	-
Direct Costs:	**66.0**	**36.5**
Project Delivery Costs	7.8	5.5
Owners Costs	6.6	3.7
Contingency	16.5	11.4
Total Capital Costs (initial)	**96.9**	**57.1**

21.3.2 Basis of Estimate

Table 21.13 provides an overview of the basis of estimate to develop the Process Plant capital cost estimate for the interim report PEA.

Table 21.13 Process Plant Basis of Estimate

Capital Cost Estimate	Description
Infrastructure Costs: Power, Water, Roads	Investigated
Vendor Selection	None
Mechanical Equipment	Factored pricing based on recent and historical budget quotes
Electrical Equipment	Benchmark project factored
Electrical Bulks	Benchmark project factored
Civil Work	Benchmark project factored
Structural Work	Benchmark project factored
Piping and Instrumentation	Benchmark project factored
Installation Labour	Benchmark project factored
Project Delivery (includes EPCM)	Factored off total direct cost
Owner's Costs	Factored off total direct cost
Contingency	Factored off total direct cost
Inflation/Escalation	None

21.3.3 Direct Costs

The definition of process equipment requirements was based on conceptual process flowsheets and process design criteria (refer to Chapter 17). Each major process area has been developed with costs by separately addressing the following disciplines.

- Concrete.
- Structural steel.
- Architectural and unit building.
- Mechanical platework and tanks.
- Mechanical equipment.
- Piping.
- Electrical equipment & Instrumentation.

Mechanical equipment supply costs were based on recent budgetary quotes and historical budget quotes from similar projects, adjusted to reflect the BamaStar project sizing. The materials and equipment total direct costs for other disciplines were developed based on a combination of preliminary material take-offs and by applying benchmarked factors (percentages) to the total direct cost (supply and install) of the mechanical equipment. The factors are based on Lycopodium's historical data and similar projects for similar type work and are specific to both discipline and area.

21.3.4 Process Plant

The overall process plant area costs by commodity are presented in Table 21.14.

Table 21.14 Phase 1 and Phase 2 Process Plant Direct Costs by Discipline

Process Plant by Discipline	Phase 1 $M	Phase 2 $M
Concrete	2.42	2.08
Structural Steel	5.14	4.54
Architectural and Unit Building	1.50	1.20
Mechanical Platework and Tanks	1.84	1.59
Mechanical Equipment	14.60	12.58
Mechanical Install	2.87	3.05
Piping	1.75	1.51
Electrical & Instrumentation	2.79	2.39
Total Process Plant	**32.90**	**28.92**

Given the climate at the project site, full enclosure buildings are not required for the Process Plant buildings. The design includes a fully enclosed pre-engineered building for the Graphite Sizing and Bagging area. The reagent area will have no walls but include a metal roof. Buildings are inclusive of HVAC and lighting supply costs were based on preliminary MTOs and on recent and historical budget quotes from similar projects and scaled to reflect the BamaStar project sizing.

21.3.5 Process Plant - Reagent and Plant Services

The reagent and plant services were develop based on past similar projects. Reagent and plant services costs were developed based on an in-house database of costs and include the following:

Reagent and Plant Services costs were developed based on an in-house database of costs and include the following:

- Reagent services.
- Potable water treatment and sewage treatment systems.

- Fire water management systems.
- Air Services.
- Waste disposal facilities.
- An allowance for high-voltage powerline tie-in and substation.
- The outdoor high-voltage substations.

Table 21.15 Phase 1 and Phase 2 Reagent and Plant Services Cost Breakdown by Area

Reagent and Plant Services	Phase 1 $M	Phase 2 $M
Reagents	3.49	1.33
Water Services	1.28	0.05
Air Services	0.62	0.34
Outdoor HV Substation	5.86	5.86
Total Reagent and Plant Services	**11.25**	**7.58**

21.3.6 Project Infrastructure

Bulk earthworks for the plant site were developed based on conceptual cut and fill volumes based on site layout and site topographical information, no detailed surveying or geotechnical work was conducted.

On-site infrastructure costs were developed based on an in-house database of costs and include the following:

- Process plant buildings including workshop and laboratory.
- Ancillary buildings including warehousing, administration and gatehouse.

In total, infrastructure capital costs are estimated at $7.3 million all in Phase 1.

21.3.7 Project Delivery

Project delivery costs include the following:

- Engineering, procurement and construction management services (“EPCM”).
- commissioning services.

The project delivery costs have been based on Lycopodium's similar past project costs and have been included at a rate of 15% of the total direct cost.

In total, project delivery costs are estimated at $7.8 million and $5.5 million for Phase 1 and Phase 2 respectively.

21.3.8 Owner Capital Costs

Owner's costs have been estimated as 10% of the total direct costs based on Lycopodium's historical project costs of similar nature. These costs include the following:

- Project staffing and expenses.
- Pre-production labour.
- Home office project management.
- Home office financial, legal, and insurance.
- Temporary construction facilities and services.
- Commissioning reps and assistance.
- Spares (commissioning and insurance).
- First fills and initial charges.

In total, Owner capital costs are estimated at $6.6 million and $3.7 million for Phase 1 and Phase 2 respectively.

21.4 Value-Add Anode Plant Capital Costs

See Section 24 'Other Relevant Data' Section 24.12 for complete reporting. See Table 21.16 for summary of Value-Add Anode Plant capital costs.

Table 21.16 Value-Add Anode Plant Capital Costs Summary

CAPEX Summary (including contingency)	Equipment	Direct	Indirect	Contingencies	Total
Purification	6.3	12.1	7.9	6.6	32.9
Spheroidization	19.5	34.0	25.0	19.6	98.1
Coating	32.4	64.7	19.7	21.1	138.0
Total CAPEX	**58.2**	**110.8**	**52.6**	**47.3**	**269.0**

The capital costs estimated for the Value-Add Plant has two expansion phases, each $269.0M for a total estimated capital expansion cost of $538M for Phase 2 and Phase 3.

21.5 Mine Operating Costs

21.5.1 Summary

The estimated Project operating costs are shown in Table 21.17. All costs are reported in USD.

Table 21.17 BamaStar Mine Operating Costs

Area	Units	Life of Mine Year 1-19
Open Pit Mining	$/t moved	4.07
Open Pit Mining	$/t mill feed	10.46

General data sources and assumptions used as the basis for estimating the mine operating costs include:

- Process design criteria in Section 17.
- Manpower requirements as developed by AGP and Lycopodium with input from South Star.
- Unit cost of electrical energy of $0.107/kWh.
- Unit cost of diesel fuel of $0.785/L.
- Taxes are excluded from the G&A but are applied to the financial model.
- Upgrading costs and royalties are excluded from the operating costs but are applied to the financial model.
- Mobile equipment carried in the process operating cost estimate is assumed to be leased; lease costs are included in the capital cost estimate and mobile equipment costs include fuel and maintenance only.

21.5.2 Mine Operating Costs

Mine operating costs are estimated from base principles. Key inputs to the mine costs are fuel and labour. The fuel cost is estimated using local vendor quotations for fuel delivered to site. A value of $0.785/L is used in this estimate.

Open Pit Mine Operating Cost Estimate

Labour cost estimates were based on other operations in Alabama in recent salary surveys. Shift schedules are 12-hour shifts with a 4 days on / 4 days off schedule. A burden rate of 35% was applied to all rates. Mine positions and salaries are shown in Table 21.8.

Table 21.18 Open Pit Mine Staffing Requirements and Annual Salaries (Year 5)

Staff Position	Employees	Full Load Annual Salary $/a
Mine Maintenance		
Maintenance Shift Foremen	1	151,200
Maintenance Planner / Contract Admin	1	122,000
Subtotal	**2**	
Mine Operations		
Mine Ops/Technical Superintendent	1	188,100
Mine Shift Foreman	4	149,300
Operations Clerk	1	54,700
Subtotal	**6**	
Mine Engineering		
Open Pit Planning Engineer	1	121,800
Surveyor / Mining Technician	1	101,900
Surveyor / Mine Technician Helper	1	86,700
Subtotal	**3**	
Geology		
Senior Geologist	1	141,800
Sampling / Geology Technician	1	101,900
Subtotal	**2**	
Total Mine Staff	**13**	

The mine staff labour remains consistent for the mine life.

Hourly employee labour force levels in the mine operations and maintenance departments fluctuate with production requirements. A snapshot of the labour makeup for Year 5 is shown in Table 21.19.

Table 21.19 Hourly Manpower Requirements and Annual Salary (Year 5)

Hourly Position	Employees	Full Load Annual Salary $/a
Mine General		
General Equipment Operator	4	82,700
Road / Pump Crew	2	79,500
Tire Technician	1	103,300
Lube Truck Driver	4	79,500
Subtotal	**11**	
Mine Operations		
Driller	1	90,700
Blaster	1	103,300
Blaster's Helper	1	82,600
Loader Operator	8	90,700
Excavator Operator	8	90,700
Haul Truck Driver	20	80,500
Dozer Operator	3	90,700
Grader Operator	2	90,700
Transfer Loader	3	90,700
Water Truck	2	78,000
Subtotal	**49**	
Mine Maintenance		
Heavy Duty Mechanic	12	122,200
Welder	9	122,200
Electrician	1	129,800
Apprentice	2	89,000
Subtotal	**24**	
Total Hourly	**84**	

Labour costs are based on an owner operated scenario. South Star is responsible for the maintenance of the equipment with its own employees.

Overseeing all of the mine operations, mine maintenance, engineering, and geology functions is a Technical Superintendent. This person would have the entire mine team reporting to them. The Technical Superintendent would report to the Mine General Manager.

The mine has four mine operations crews, each with a Shift Foremen. The shift foreman is also responsible for roads, drainage, and pumping around the mine.

The engineering department is a planning engineer and a survey team. They are responsible for all mine planning, quantities and blasting designs. The survey team will assist in the field with staking, surveying, and sample collection with the geology group.

In the Geology department, there is one Senior Geologist and a Sampling Technician. They are responsible for all geology functions.

The Mine Maintenance department has one Shift foreman and one planner who assists in the maintenance planning.

The hourly labour force includes positions for the tire technician and lube truck drivers. These positions all report to Maintenance.

The drilling labour force is based on one operator per drill, per crew while operating. This on average is 2 drillers per crew.

Excavator and loader operators peak at 20 in Year 8 and will start to tail off after that. Haulage truck drivers peak at 36 in Year 8 and then taper off to the end of the mine life.

Maintenance factors are used to determine the number of heavy-duty mechanics, welders and electricians are required and are based on the number of drill operators. Heavy duty mechanics work out to 0.25 mechanics required for each drill operator. Welders are 0.25 per drill operator and electricians are 0.05 per drill operator. This method of estimating maintenance requirements is used for each category of the mine operating cost and is summarized in Table 21.20.

Table 21.20 Maintenance Labour Factors (Maintenance per Operator)

Maintenance Job Class	Drilling	Loading	Hauling	Mine Operations Support
Heavy Duty Mechanic	0.25	0.25	0.25	0.25
Welder	0.250	0.25	0.25	0.25
Electrician	0.05	0.01	-	-
Apprentice	-	-	-	0.25

The number of loader, truck, and support equipment operators is estimated using the projected equipment operating hours. The maximum number of employees is four per unit to match the mine crews.

The vendors provided repair and maintenance ("R&M") costs for each piece of equipment. These came in the quotations for the capital cost. Fuel consumption rates are also estimated for the conditions expected at BamaStar and are used in the detail costs for the mine equipment. The costs for the R&M are expressed in a $/h form.

The various suppliers provided the costs for different tire sizes that will be used during the project. Estimates of the tire life are based on AGP's experience and conversations with mine operators. The operating cost of the tires is expressed in a $/h form. The life of the haulage truck tires is estimated at 5,000 hours per tire with proper rotation from front to back. On the haulage trucks each tire costs $11,900 so the cost per hour for tires is $14.24/h for the truck using six tires in the calculation.

Ground Engaging Tool (GET) costing is estimated from other projects and conversations with personnel at other operations. This is an area of cost that is expected to be fine-tuned during mine operations.

Drill consumables were estimated as a complete drill string using the parts list and component lives provided by the vendor. Drill productivity for the 140 mm drill is estimated at 25.8 m/h. Equipment costs used in the estimate are shown in Table 21.21.

Table 21.21 Major Equipment Operating Costs – No Labour ($/h)

Equipment	Fuel / Power	Lube / Oil	Tires	Under-Carriage	Repair & Maintenance	GET / Consumables	Total
Production Drill (140 mm)	47.08	4.71	-	3.00	42.00	82.84	179.63
Production Loader (5.7 m^3)	18.05	1.80	7.77	-	22.50	8.00	58.13
Excavator (6.5 m^3)	43.16	6.47	-	15.00	37.51	10.00	112.14
Haulage Truck – 55t	27.46	2.75	14.24	-	22.35	4.00	70.80
Crusher Loader	18.05	1.80	7.77	-	22.50	8.00	58.13
Track Dozer	32.17	3.22	-	15.00	26.23	7.00	83.62
Grader	14.12	1.41	8.44	-	24.00	2.00	49.97

Drilling in the open pit will be performed using conventional down the hole (DTH) blasthole rigs with 140 mm bits. The pattern size was the same for mill feed and waste and are blasted with recognition that the rock is competent, and finer material improves productivity and reduces maintenance costs as well as improved plant performance. The drill pattern parameters are shown in Table 21.22

Table 21.22 Drill Pattern Specification

Specification	Unit	Mill Feed/Waste 140 mm
Bench Height	m	10
Sub-Drill	m	1.1
Blasthole Diameter	mm	140
Pattern Spacing – Staggered	m	4.1
Pattern Burden – Staggered	m	3.6
Hole Depth	m	11.1

The sub-drill was included to allow for caving of the holes in the weaker zones, avoiding re-drilling of the holes or short holes that would affect bench floor conditions and thereby increasing tire and overall maintenance costs.

Below in Table 21.23 are the parameters used for estimating drill productivity. The drill is configured for single pass drilling of the 11.1 m deep hole.

Table 21.23 Drill Productivity Criteria

Drill Activity	Unit	Mill Feed/Waste 140 mm
Pure Penetration Rate	m/min	0.55
Hole Depth	m	11.1
Drill Time	min	20.18
Move, Spot, and Collar Blasthole	min	3.00
Level Drill	min	0.50
Add Steel	min	1.00
Pull Drill Rods	min	2.00
Total Setup / Breakdown Time	**min**	**6.50**
Total Drill Time per Hole	**min**	**26.7**
Drill Productivity	m/h	25.0

ANFO will be used for 80% of the blasting and an emulsion product for the remainder when water is an issue. The powder factors used in the explosive calculation are shown in Table 21.24.

Table 21.24 Design Powder Factors

	Unit	Mill Feed/Waste 140 mm
Powder Factor	kg/m^3	0.82
Powder Factor	kg/t	0.30

The blasting cost is estimated using quotations from a local vendor. The ANFO price is $62.28/100 kg. The mine is responsible for guiding the loading process, including placement of boosters / Nonels, and stemming and firing the shot.

Total monthly cost in the service of delivering the explosives to the hole is $30,000/month for the vendor's pickup trucks, pumps, and labour is also applied. The vendor also leases the explosives and accessories magazines to South Star.

Mill feed and waste loading costs were estimated using the front-end loaders and hydraulic excavators as the only loading units. The loaders are the primary diggers for mill feed and waste, with the excavators assisting. The average percentage of each material type that the various loading units are responsible for is shown in Table 21.25.

Table 21.25 Loading Parameters – Year 5

	Unit	Front-End Loader	Hydraulic Excavator
Bucket Capacity	m^3	5.7	6.5
Waste Tonnage Loaded	%	50	50
Mill Feed Tonnage Mined	%	50	50
Bucket Fill Factor	%	85	86
Cycle Time	sec	40	35
Trucks Present at the Loading Unit	%	85	85
Loading Time	min	4.0	3.0

The trucks present at the loading unit refers to the percentage of time a truck is available to be loaded. To maximize truck productivity and reduce operating costs, it is more efficient to slightly under-truck the loader or excavator. The single largest operating cost item is haulage and minimizing this cost by maximizing truck productivity is crucial to lower operating costs. The value of 85% comes from the standby time typically encountered due to a lack of trucks.

Haulage profiles were determined for each pit phase for the primary crusher or the waste rock management facility destinations. Cycle times were generated for the appropriate period tonnage by destination and phase to estimate the haulage costs. Maximum speed on trucks is limited to 50 km/h for tire life and safety reasons. Calculation speeds for various segments are shown in Table 21.26.

Table 21.26 Haulage Cycle Speeds

	Flat (0%) on surface	Flat (0%) Inpit, Crusher, Dump	Slope Up 8%	Slope Up 10%	Slope Down 8%	Slope Down 10%	Acceleration or Deceleration
Loaded (km/h)	50	40	14	12	28	23	20
Empty (km/h)	50	40	35	25	35	35	20

Support equipment hours and costs are determined using the percentages shown in Table 21 27.

Table 21.27 Support Equipment Operating Factors

Mine Equipment	Factor	Factor Units
Track Dozer	15%	Of haulage hours to a maximum of 2 dozers
Grader	10%	Of haulage hours to a maximum of 1 grader
Crusher Loader	40%	Of loading hours to maximum of 1 loader
Water Truck	12%	Of haulage hours to a maximum of 2 trucks
Lube/Fuel Truck	8	h/d
Mechanic's Truck	8	h/d
Welding Truck	6	h/d
Blasting Loader	8	h/d
Blaster's Truck	4	h/d
Integrated Tool Carrier	2	h/d
Compactor	10	h/d
Lighting Plants	12	h/d
Pickup Trucks	8	h/d
Dump Truck – 20 ton	2	h/d

These percentages resulted in the need for two track dozers, and one grader. Part of this is due to the spread-out nature of the various pit areas which landlocks some of the equipment for periods of time. Their tasks include cleanup of the loader faces, roads, dumps, and blast patterns. The graders will maintain the mill feed and waste haul routes. In addition, water trucks have the responsibility for patrolling the haul roads and controlling fugitive dust for safety and environmental reasons. A small backhoe will be responsible for cleaning out sedimentation ponds and water ditch repairs together with the two small dump trucks.

These hours are applied to the individual operating costs for each piece of equipment. Many of these units are support equipment so no direct labour force is allocated to them due to their function.

Grade Control

Grade control will be completed with blasthole samples or grab samples prior to drilling being present on site.

In areas of low-grade mineralization or waste the material will be sampled 25% of the time. This information will be used to find undiscovered veinlets or pockets of mineralization.

A total of 19,100 samples will be assayed from that program at a cost of $15.0/sample. Samples collected will be sent to the assay laboratory and assayed for use in the short-range mining model.

Costs associated with this program are tracked as a distinct line item for the mining cost. The cost of the sampling is expected to be $0.3 million over the mine life.

Finance Cost

Financing of the mine fleet was investigated with the major vendors and is considered a viable option to reduce initial capital. Various vendors offer this as an option to help select their equipment. Caterpillar, Komatsu and Liebherr have the ability, and desire, to allow financing of their product lines.

Indicative terms for leasing provided by the vendors are:

- Down payment = 20% of equipment cost – if the entire fleet selection was one vendor.
- Term Length = variable between two and five years depending on equipment type.
- Interest Rate = SOFR plus a percentage.
- Residual = $0.

The proposed interest rate is used to calculate interest on the amount being leased. It does not consider a declining balance on the interest but rather the full amount of interest paid over finance period, equally distributed over the equipment finance years.

As a 20% downpayment was required, the downpayment was allocated to capital. The remainder of the financing cost is being borne as an operating cost.

All of the major mine equipment, and the large majority of the support equipment where it was considered reasonable, was financed. If the equipment has a life greater than the finance period, then the following years onwards of the equipment does not have a finance payment applied. In the case of the mine trucks, with an approximate 10 year working life, the finance period would be complete in 5 years and the trucks would simply incur operating costs after that time. For this reason, the operating cost would vary annually depending on the equipment replacement schedule and timing of the financing.

Utilizing the financing option adds $ 0.45/t to the mine operating cost over the life of the mine. On a cost per tonne of mill feed basis, it was $ 1.16/t mill feed.

Dewatering

Pit dewatering is an important part of mining at BamaStar. Dewatered slopes may allow a reduction in the strip ratio by permitting steeper inter-ramp angles that would also be inherently safer.

It is estimated that 4.7 Mm^3/year on average will need to be pumped from within the pits. From there, it will need to be pumped to the required discharge point near the settling ponds. Storm events have the potential to impact mining operations, and an estimate of 34,000 m^3/d of pumping may be required for a short period of time to recover from one of these storm events. The capital cost estimate has considered this in the calculation for the number of pumps required on site to handle such an event.

The dewatering system includes the pumps, sumps, and pipelines responsible for moving water from the pit to the discharge points. Labour for this is already included in the General and Mine Engineering category of the mine operating cost. The mine has the road and pump crew.

Additional dewatering in the form of horizontal drain holes is also part of the dewatering operating costs. These holes will be drilled in annual campaigns starting in Year 3. The design concept is a series of holes 50 m in length, angled up slightly and drilled into the highwalls. They will allow the water behind the wall to drain freely and prevent pore water pressure buildup.

The horizontal drill holes are considered as a capital cost for a total of $2.1 million over the life of the mine.

The dewatering operating cost is estimated at $29 million over the mine life or $1.6 million/a.

Total Open Pit Mine Costs

The total life of mine operating costs per tonne of material moved and per tonne of mill feed processed are shown in Table 21.28 and Table 21.29.

Table 21.28 Open Pit Mine Operating Costs – with Finance Cost ($/t Total Material)

Open Pit Operating Category	Unit	Year 1	Year 3	Year 5	LOM Average Cost
General Mine and Engineering	$/t	2.31	1.41	0.88	0.58
Drilling	$/t	-	0.09	0.06	0.30
Blasting	$/t	-	0.27	0.15	0.29
Loading	$/t	1.23	0.83	0.75	0.62
Hauling	$/t	1.14	1.06	0.89	0.90
Support	$/t	1.58	1.11	0.88	0.64
Grade Control	$/t	0.00	0.00	0.00	0.00
Finance Costs	$/t	2.11	1.44	0.36	0.45
Dewatering	$/t	0.24	0.36	0.31	0.29
Total	$/t	8.63	6.59	4.29	4.07

Table 21.29 Open Pit Mine Operating Costs – with Finance Cost ($/t Mill Feed)

Open Pit Operating Category	Unit	Year 1	Year 3	Year 5	LOM Average Cost
General Mine and Engineering	$/t mill feed	3.17	2.47	1.41	1.50
Drilling	$/t mill feed	-	0.17	0.09	0.76
Blasting	$/t mill feed	-	0.48	0.25	0.74
Loading	$/t mill feed	1.68	1.45	1.21	1.58
Hauling	$/t mill feed	1.56	1.86	1.43	2.33
Support	$/t mill feed	2.17	1.95	1.41	1.65
Grade Control	$/t mill feed	0.01	0.01	0.01	0.01
Finance Costs	$/t mill feed	2.88	2.53	0.58	1.16
Dewatering	$/t mill feed	0.33	0.63	0.50	0.73
Total	$/t mill feed	11.80	11.54	6.89	10.46

21.6 Process Plant Operating Costs

The process operating cost (OPEX) for Life of Mine (LOM) is based on a throughput rate of 2.22 Mtpa of dry ROM mineralized material. The crushing plant will operate 6,132 h/y at 70% availability and the process plant will operate 8,059 h/y at 92% availability. The filtration plant will operate 7,008 h/y at 80% availability.

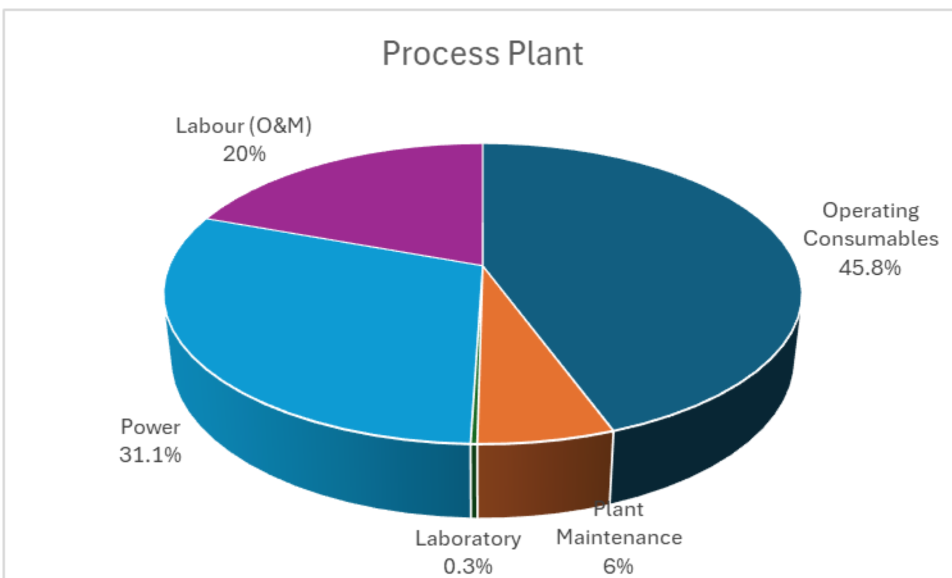
The operating cost for the LOM mineralized material processing is $ 21,770,000/year or $9.78/tonne. The operating cost is summarized in Table 21.30 and presented in Figure 21.1.

The G&A for the overall project was estimated at $ 4,875,600 or $ 2.19/tonne.

Table 21.30 Summary of Operating Costs – LOM

Process Plant Cost Center	Total $M/yr	Fixed $M/yr	Variable $M/yr	Total $/t	Fixed $/t	Variable $/t	Proportion of Operating Cost		
							Tot (%)	Fixed (%)	Var. (%)
Operating Consumables	9.98	0	9.98	4.48	0	4.48	45.8	0.0	45.8
Plant Maintenance	1.31	1.31	0	0.59	0.59	0	6.0	6.0	0
Laboratory	0.06	0.06	0	0.03	0.03	0.00	0.3	0.3	0
Power	6.77	0	6.77	3.04	0.00	3.04	31.1	0	31.1
Labour (O&M)	4.36	4.36	0	1.96	1.96	0.	20.0	20.0	0
Total Process Plant	**21.77**	**5.74**	**16.75**	**9.78**	**2.58**	**7.52**	**100%**	**25.5%**	**74.5%**
Labour	2.34	2.34	0	1.05	1.05	0	47.9%	47.9%	0
Other	2.54	2.54	0	1.14	1.14	0	52.1%	52.1%	0
G & A (Project)	4.88	4.88	0	2.19	2.19	0.00	100%	100%	0.00%

Figure 21.1 Pie Chart Showing the Distributions of Operating Costs



The operating cost estimate was compiled from a variety of sources, including metallurgical test work results, supplier pricing for other projects, Lycopodium database, input from South Star, and first-principle calculations.

Operating consumables include reagents, fuel and operating consumables such as mineral sizer teeth, dust collector bags, SAG mill lifters and liners, concentrate filter press cloth and tailings press cloth. Cost estimates exclude maintenance consumables such as lubricants, equipment spare parts and pump wear parts. The total annual consumable costs amount to $9.98 million or $4.48/t.

Preliminary economics assessment capital cost estimate has been used for factoring in the maintenance cost. Maintenance cost includes provision for plant and mobile equipment maintenance, reagents and services. The annual maintenance cost amounted to $1.31 million or $ 0.59/t.

The process energy consumption was estimated based on the installed motor size of individual pieces of equipment, excluding standby equipment. The installed power was adjusted by load and utilization factors to calculate the annual energy consumption in the load list. A unit energy cost of $0.107/kWh for industrial energy with Alabama Power was applied to the annual energy consumption to estimate the total annual energy cost. The annual energy costs amounted to $6.77 million or $ 3.04/t.

The labour cost was estimated from a similar project study. Labour rates are based on similar projects. The estimate assumes a 3-Shift rotation working 3, 8-hour shifts per day. The annual labour costs amounted to $4.36 million or $ 1.96/t.

The laboratory / assay cost is based on undertaking complete sample preparation, solution assays, titrations, solids and solutions for chemical analyses on-site, however, a minimum of 2% and a maximum 25% of solutions collected for metallurgical testing could be sent to an off-site commercial laboratory for verification. The annual laboratory cost amounted to $62,390 or $ 0.03/t.

The annual G&A cost amounted to $4.88 million, or $ 2.19/t. The annual labour cost amounted to $2.34 million, or $ 1.05/t and annual other costs amounted to $2.54 million, or $ 1.14/t.

21.7 Value-Add Plant Operating Costs

See Section 24 ‘Other Relevant Data’ Section 24.12 for complete reporting. See Table 21.31 for summary of Value-Add Anode Plant operating costs per year.

Table 21.31 Operating Costs Summary for Graphite Purification, Spheroidization and Coating for Value-add Products

Desription	Unit	Value
Purification	[USD$M/a]	11.92
Spheroidization (including uncoated SPG fines by-product)	[USD$M /a]	5.26
Coating	[USD$M /a]	9.32
Total (cSPG)	[USD$M /a]	26.49
SG&A	[USD$M /a]	2.88
Contingency	[USD$M /a]	2.65
Total (including contingency) USD$M	**[USD$M /a]**	**32.03**
Average Total USD/Tonne	**[USD/ t_{sales}**	**1,555**

21.8 Closure Plan, Closure Costing, and Closure Bond

A comprehensive closure plan and Reclamation Cost Estimate ("RCE") will be required for the Surface Mining of Non-fuel Minerals Permit and Plan of Reclamation issued by the Alabama Department of Labor. The closure bond is $2,500 per acre to be disturbed under the conditions that the BamaStar project meets rigorous guidelines for revegetation and site reclamation as described in the supporting materials to the 1969 mining reclamation law (Alabama Department of Labor).

The post-closure land use will be forestry, grazing, or wildlife habitat. There will be a post-closure pit lake in the north pit with a spillway to natural waters. Waste rock dumps will be graded according to state requirements for a 3:1 maximum slope (Alabama Department of Labor).

GRE estimated closure cost based on unit rates acquired in the PEA economic model and using the existing mining fleet either as concurrent closure with mining or post-closure. The following closure cost estimates have been applied:

- Closure bond of $2,500 per acre, for 928 acres.
- Earthmoving and regrading at $3.80 per ton, ~$6.50 per cubic meter.
- Revegetation at $6,600 per acre including hydroseeding, seedlings, and topsoil placement.
- Post closure monitoring costs for five years at $312,265 per year.
- No water treatment is required for the north pit lake due to the lack of ARD or ML conditions (see Section 20.1).
- Plant demolition estimated at ~$452,000.

Based on these assumptions, the PEA-level closure cost estimate is $9.7M with a 3% discount factor, including upfront closure bond and 5% interest on the closure bond. The closure cost cash-flow, including the reclamation bond and the reclamation bond release, has been incorporated into the economic model.

22.0 ECONOMIC ANALYSIS

22.1 Introduction

The economic assessment of the vertically integrated BamaStar Project was prepared using a discounted cash flow (”DCF”) model both on a pre-tax and post-tax basis. The CAPEX and OPEX estimates for both the mine and concentrator as well as the Value-Add Plant are presented in Sections 21.

The economic analyses of the PEA report represent forward-looking information that is subject to known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here. Forward-looking statements include, but are not limited to, the following:

- Timing and conditions of permits required to initiate project construction, sustain operations, and perform mine closure.
- Assumptions regarding geotechnical and hydrogeological factors.
- Time required to develop the project.
- Estimation and realization of the mineral resource estimates within the Study mine plans.
- Proposed mine production plan.
- Assumptions regarding mine dilution and losses along with the associated grade and quantity of mineralized material delivered to the mill.
- Projected mining and metallurgical recovery rates.
- Forecast production rates and amounts of payable metal produced.
- Operating costs associated with the mine, mill, tailings and water management, and G&A.
- Initial, expansion, and sustaining capital costs.
- Costs associated with closure, including decommissioning, reclamation, and monitoring.
- Changes in the estimated timing and quantity of production.
- Expected future prices of Graphite (+100 /-100 Mesh), CSPG18, CSPG8, and PMG.

All the above will impact the timing and amount of future cash flows.

Readers are cautioned that the PEA is preliminary in nature. It includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves and there is no certainty that the PEA will be realized. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

22.2 Economic Model Parameters

The project has been evaluated using a DCF analysis based on an 8% discount rate. The financial analysis was made with the following assumptions and/or methodologies:

- Construction schedule:
  - Phase 1 Concentrator and Mine built and commissioned in 18-months
  - Phase 2 Concentrator and Mine built and commissioned in 12-months
  - Phases 1, 2 and 3 Value-Add Plants ("VAP") built and commissioned in 24-months.
- All values are expressed in US Dollars.
- An exchange rate of 1.00 USD = 1.36 Canadian Dollar was utilized, when applicable.
- CAPEX and OPEX are based on Q3 2024 US dollars with no escalation or inflation applied.
- 19-year mine life.
- Graphite concentrate price with 94.4% Cg for +100 Mesh (> 150 Micron) or average of Medium, Coarse and Jumbo flakes is $1200/t. All +100 Mesh concentrate will be sold to the market as bulk graphite concentrate.
- Graphite concentrate price with 94.4% Cg for -100 Mesh (< 150 Micron) or fine and very fine flakes is $800/t. However, none of the -100 Mesh graphite concentrate produced from BamaStar is sold to the market.
- All the -100 Mesh graphite concentrate produced from South Star BamaStar Concentrator will be purchased by the South Star VAP at a price of $650/t.
- If there is insufficient -100 Mesh graphite concentrate obtained from BamaStar to meet the feed capacity of the VAP then the balance will be purchased from South Star's Santa Cruz operation in Brazil at a price of $825/t.
- The VAP will produce three graphite products: CSPG18, CSPG8 and PMG.

- The sale price for the graphite products are as follows: CSPG18 at $9,750/t, CSPG8 at $10,500/t and PMG at $9,300/t.
- 100% ownership with 2.0% Net Smelter Return ("NSR"); NSR is only on BamaStar concentrates and not on value-add products.
- Capital costs funded with 100% equity (no financing costs assumed).
- Graphite concentrate is assumed to be sold in the same year it is produced.
- No contractual arrangements for concentrate sales are in place.
- Tax model assumptions:
  - Federal Income Tax: 21%
  - Alabama State Tax: 6.5%
  - Coosa County Graphite Tax: US$5.51/t concentrate.

22.3 Economic Analysis Results

The pretax model was prepared by Lycopodium while South Star provided applicable taxation guidance for federal, state and local jurisdictions, which were incorporated into cash flow model by South Star to also provide after-tax results. The results of the economic analysis are listed in Table 22.1, while Figure 22.1 graphically illustrates the Pre-Tax Cashflow.

Table 22.1 Economic Analysis Results

Description	Unit	LOM
Preproduction Capex + Contingency	US$M	365.9
Subsequent Capex + Contingency	US$M	595.2
Sustaining and Closure + Contingency	US$M	117.3
Average Gross Revenue	US$M/yr	518.8
Total Gross Revenue	US$M	9,857.2
Total Operating Costs	US$M	2,471.7
Average LOM Operating Margin	%	72.3
Pretax Total Cashflow	US$M	5,985.8
Total Taxes	US$M	1,657.9
After-Tax Total Cashflow	US$M	4,276.9
Average LOM Cashflow Margin	%	43.4
Pre-tax NPV 8%	US$M	2,368.8
Pre-tax IRR	%	34.8
Pre-tax Payback Period	yr	4.4
After-tax NPV 8%	US$M	1.598.3
After-tax IRR	%	27.4
After-tax Payback Period	yr	5.1

Figure 22.1 Pre-Tax Cash Flow (Source Lycopodium 2024)

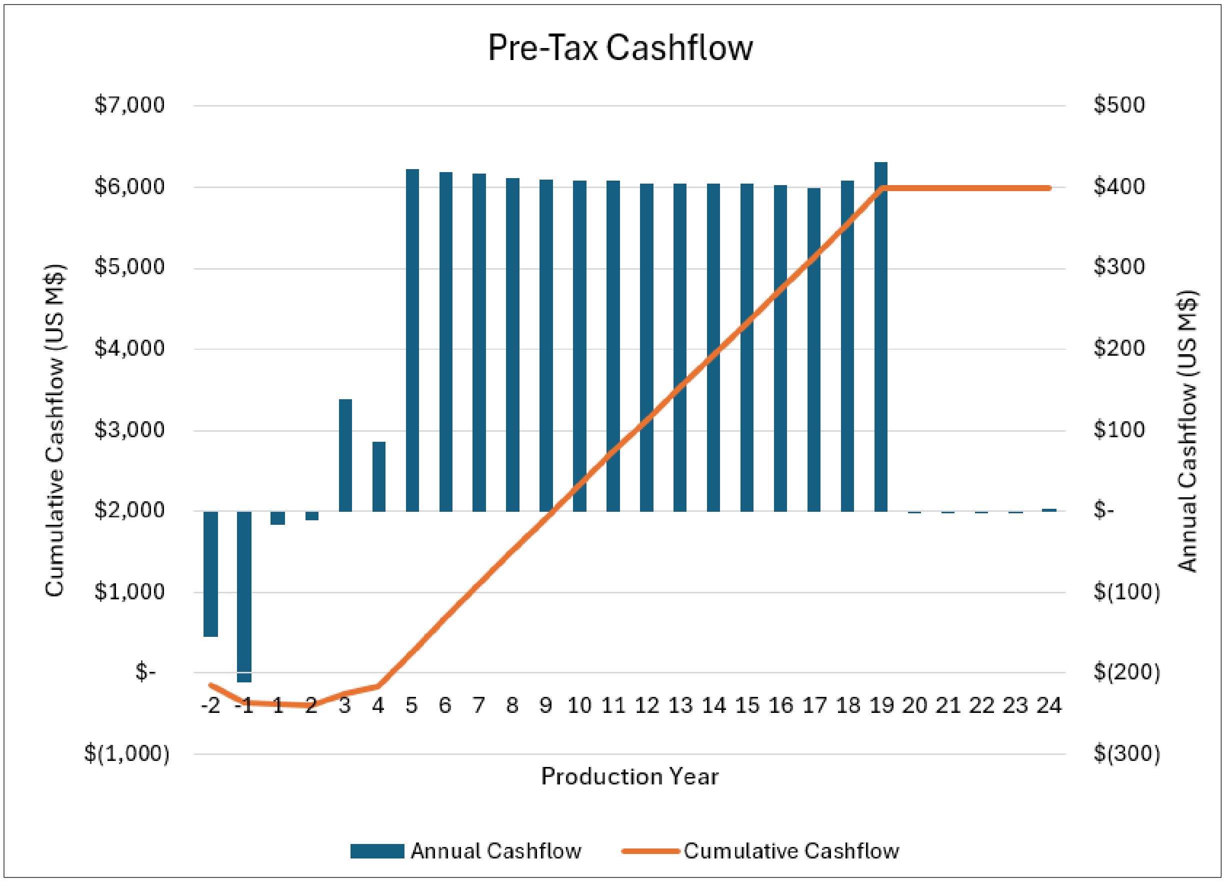


Table 22.2 Cash Flow Model

Production Plan & Grades	Totals	-2	-1	1	2	3	4	5	6	7	8	9	10
Total Mined (tonnes)	108,831,028	-	-	1,341,246	2,200,000	2,200,000	2,196,180	3,899,510	4,198,618	4,755,665	9,498,475	6,498,298	7,507,660
Ore Processed (tonnes)	42,299,147	-	-	979,960	1,268,701	1,256,497	1,259,597	2,429,097	2,501,893	2,517,057	2,464,766	2,545,498	2,483,613
Milled Ore Grade (%Cg)	2.11%	0.00%	0.00%	2.22%	2.17%	2.22%	2.24%	2.34%	2.24%	2.15%	2.17%	2.16%	2.14%
Concentrate Production Dry (tonnes)	796,302	-	-	18,844	23,916	24,228	24,542	51,043	50,126	48,498	47,966	49,283	47,661
Value-Add Product (tonnes)	1,085,000	-	-	20,000	21,300	42,600	42,600	63,900	63,900	63,900	63,900	63,900	63,900
Product Sales & Revenue													
Gross Revenue (MM US$)	9,857	-	-	176	197	385	385	582	582	582	581	582	581
Transportation Fees (MM US$)	(60)	-	-	(1)	(1)	(2)	(2)	(4)	(4)	(4)	(4)	(4)	(4)
Net Revenue (MM US$)	**9,798**	-	-	**175.37**	**195.54**	**382.35**	**382.46**	**578.96**	**578.62**	**578.02**	**577.82**	**578.31**	**577.71**
Net Realized Price (US$/tonne conc)	*12,304*	-	-	*9,306*	*8,176*	*15,781*	*15,584*	*11,343*	*11,543*	*11,918*	*12,046*	*11,734*	*12,121*
Net Realized Price (US$/tonne VAP)	*9,030*	-	-	*8,768*	*9,180*	*8,975*	*8,978*	*9,060*	*9,055*	*9,046*	*9,043*	*9,050*	*9,041*
Royalty													
Coosa County (MM US$)	(233)	-	-	(5)	(7)	(7)	(7)	(13)	(14)	(14)	(14)	(14)	(14)
Private Royalty (MM US$)	(12)	-	-	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)
Net Revenue after Royalties (MM US$)	**9,552**	-	-	**170**	**188**	**375**	**375**	**565**	**564**	**563**	**564**	**564**	**563**
Net Revenue after Royalties (US$/tonne conc)	*11,996*	-	-	*9,005*	*7,869*	*15,480*	*15,286*	*11,065*	*11,253*	*11,617*	*11,748*	*11,435*	*11,819*
Net Revenue after Royalties (US$/tonne VAP)	*8,804*	-	-	*8,484*	*8,835*	*8,804*	*8,806*	*8,839*	*8,827*	*8,817*	*8,819*	*8,819*	*8,815*
Operating Costs													
Mining & Waste Deposition (MM US$)	(443)	-	-	(12)	(12)	(15)	(14)	(17)	(19)	(21)	(27)	(27)	(29)
Processing (MM US$)	(414)	-	-	(11)	(13)	(13)	(13)	(24)	(24)	(24)	(24)	(25)	(24)
G&A (MM US$)	(93)	-	-	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Total Conc Costs (MM US$)	**(949)**	-	-	**(28)**	**(30)**	**(32)**	**(32)**	**(45)**	**(48)**	**(50)**	**(56)**	**(56)**	**(58)**
VAP Costs (MM US$)	(1,523)	-	-	(21)	(32)	(62)	(62)	(90)	(90)	(90)	(90)	(90)	(90)
Total Opex (VAP + Conc; MM US$)	**(2,472)**	-	-	**(48)**	**(62)**	**(94)**	**(94)**	**(135)**	**(138)**	**(140)**	**(145)**	**(146)**	**(148)**
Total Opex (VAP + Conc; US$/tonne conc)	*3,104*	-	-	*2,566*	*2,612*	*3,885*	*3,819*	*2,646*	*2,749*	*2,880*	*3,029*	*2,967*	*3,102*
Total Opex (VAP + Conc; US$/tonne VAP)	*2,278*	-	-	*2,418*	*2,933*	*2,209*	*2,200*	*2,113*	*2,156*	*2,186*	*2,274*	*2,289*	*2,314*
EBITDA Margin													
EBITDA MM US$)	7,081	-	-	121	126	281	281	430	426	424	418	417	415
EBITDA (US$/tonne conc)	8,892	-	-	*6,438*	*5,257*	*11,595*	*11,467*	*8,420*	*8,504*	*8,737*	*8,719*	*8,467*	*8,717*
EBITDA (US$/tonne VAP)	6,526	-	-	*6,066*	*5,902*	*6,595*	*6,606*	*6,726*	*6,671*	*6,631*	*6,545*	*6,530*	*6,501*
% EBITDA on Net Rev (%)	74%	-	-	*71%*	*67%*	*75%*	*75%*	*76%*	*76%*	*75%*	*74%*	*74%*	*74%*
Capital Costs													
Mine (MM US$)	(44)	(12)	(3)	(2)	(2)	(1)	(2)	(2)	(1)	(1)	(1)	(2)	(3)
Crushing & Processing Plant P1 (MM US$)	(85)	(65)	(16)	-	-	(4)	-	-	-	-	-	-	-
Crushing & Processing Plant P2 (MM US$)	(57)	-	-	-	-	-	(57)	-	-	-	-	-	-
Total Crushing & Processing Plant (MM US$)	**(143)**	**(65)**	**(16)**	-	-	**(4)**	**(57)**	-	-	-	-	-	-
VAP P1 (MM US$)	(301)	(135)	(135)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
VAP P2 (MM US$)	(297)	-	-	(135)	(135)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)
VAP P3 (MM US$)	(294)	-	-	-	-	(135)	(135)	(1)	(1)	(2)	(2)	(2)	(2)
Total VAP (MM US$)	(892)	(135)	(135)	(136)	(136)	(137)	(138)	(5)	(5)	(6)	(6)	(6)	(6)
Total Capex (MM US$)	**(1,078)**	**(212)**	**(154)**	**(137)**	**(138)**	**(142)**	**(197)**	**(7)**	**(7)**	**(6)**	**(7)**	**(8)**	**(8)**
Other Costs													
Closure Costs (MM US$)	(17)	(2.32)	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Overall Financials													
Pre-Tax Cash Flow (MM US$)	**5,986**	**(214)**	**(154)**	**(16)**	**(12)**	**139**	**85**	**423**	**420**	**417**	**411**	**410**	**407**
Cumulative Pre-Tax Cash Flow (MM US$)		(214)	(368)	(384)	(396)	(257)	(172)	251	670	1,088	1,499	1,909	2,316
Total Corporate Income & Taxes (MM US$)	(1,710)	-	-	(57)	(17)	(56)	(50)	(91)	(90)	(89)	(87)	(91)	(96)
Post-Tax Cash Flow (MM US$)	**4,276**	**(214)**	**(154)**	**(73)**	**(29)**	**83**	**34**	**332**	**330**	**328**	**324**	**318**	**311**
Cumulative Post-Tax Cash Flow (MM US$)		(214)	(368)	(441)	(470)	(387)	(352)	(21)	309	637	961	1,280	1,591

Production Plan & Grades	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Total Mined (tonnes)	8,882,591	8,000,000	8,107,102	8,304,034	8,088,585	8,887,073	9,605,149	4,660,840	-	-	-	-	-	-
Ore Processed (tonnes)	2,514,069	2,453,125	2,483,473	2,516,725	2,485,494	2,603,899	2,635,373	2,639,449	2,260,862	-	-	-	-	-
Milled Ore Grade (%Cg)	2.10%	2.11%	2.09%	2.08%	2.12%	2.00%	1.96%	1.95%	1.81%	0.00%	0.00%	0.00%	0.00%	0.00%
Concentrate Production Dry (tonnes)	47,376	46,279	46,433	47,002	47,163	46,780	46,341	46,229	36,592	-	-	-	-	-
Value-Add Product (tonnes)	63,900	63,900	63,900	63,900	63,900	63,900	63,900	63,900	63,900	-	-	-	-	-
Product Sales & Revenue														
Gross Revenue (MM US$)	581	581	581	581	581	581	581	581	577	-	-	-	-	-
Transportation Fees (MM US$)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	-	-	-	-	-
Net Revenue (MM US$)	**577.60**	**577.20**	**577.25**	**577.46**	**577.52**	**577.38**	**577.22**	**577.18**	**573.61**	-	-	-	-	-
Net Realized Price (US$/tonne conc)	*12,192*	*12,472*	*12,432*	*12,286*	*12,245*	*12,342*	*12,456*	*12,485*	*15,676*	-	-	-	-	-
Net Realized Price (US$/tonne VAP)	*9,039*	*9,033*	*9,034*	*9,037*	*9,038*	*9,036*	*9,033*	*9,033*	*8,977*	-	-	-	-	-
Royalty														
Coosa County (MM US$)	(14)	(14)	(14)	(14)	(14)	(14)	(15)	(15)	(12)	-	-	-	-	-
Private Royalty (MM US$)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	-	-
Net Revenue after Royalties (MM US$)	**563**	**563**	**563**	**563**	**563**	**562**	**562**	**562**	**561**	-	-	-	-	-
Net Revenue after Royalties (US$/tonne conc)	*11,884*	*12,165*	*12,122*	*11,976*	*11,940*	*12,021*	*12,127*	*12,155*	*15,320*	-	-	-	-	-
Net Revenue after Royalties (US$/tonne VAP)	*8,811*	*8,810*	*8,809*	*8,809*	*8,812*	*8,800*	*8,795*	*8,794*	*8,773*	-	-	-	-	-
Operating Costs														
Mining & Waste Deposition (MM US$)	(30)	(31)	(32)	(33)	(33)	(32)	(30)	(22)	(7)	-	-	-	-	-
Processing (MM US$)	(24)	(24)	(24)	(24)	(24)	(25)	(25)	(25)	(22)	-	-	-	-	-
G&A (MM US$)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	-	-	-	-	-
Total Conc Costs (MM US$)	**(59)**	**(60)**	**(61)**	**(62)**	**(62)**	**(62)**	**(60)**	**(52)**	**(35)**	-	-	-	-	-
VAP Costs (MM US$)	(90)	(90)	(90)	(90)	(90)	(90)	(90)	(90)	(90)	-	-	-	-	-
Total Opex (VAP + Conc; MM US$)	**(149)**	**(150)**	**(151)**	**(152)**	**(152)**	**(152)**	**(150)**	**(142)**	**(124)**	-	-	-	-	-
Total Opex (VAP + Conc; US$/tonne conc)	*3,143*	*3,239*	*3,242*	*3,226*	*3,226*	*3,245*	*3,238*	*3,065*	*3,402*	-	-	-	-	-
Total Opex (VAP + Conc; US$/tonne VAP)	*2,330*	*2,346*	*2,356*	*2,373*	*2,381*	*2,376*	*2,348*	*2,218*	*1,948*	-	-	-	-	-
EBITDA Margin														
EBITDA MM US$)	414	413	412	411	411	411	412	420	436	-	-	-	-	-
EBITDA (US$/tonne conc)	*8,741*	*8,926*	*8,880*	*8,750*	*8,714*	*8,775*	*8,889*	*9,090*	*11,919*	-	-	-	-	-
EBITDA (US$/tonne VAP)	*6,481*	*6,464*	*6,453*	*6,436*	*6,432*	*6,424*	*6,447*	*6,576*	*6,825*	-	-	-	-	-
% EBITDA on Net Rev (%)	*74%*	*73%*	*73%*	*73%*	*73%*	*73%*	*73%*	*75%*	*78%*	-	-	-	-	-
Capital Costs														
Mine (MM US$)	(1)	(3)	(2)	(1)	(1)	(2)	(2)	-	-	-	-	-	-	-
Crushing & Processing Plant P1 (MM US$)	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Crushing & Processing Plant P2 (MM US$)	-	-	-	-	-	-	-	-	-	-	-			
Total Crushing & Processing Plant (MM US$)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAP P1 (MM US$)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(1)	(1)	-	-	-	-	-
VAP P2 (MM US$)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(1)	(1)	-	-	-	-	-
VAP P3 (MM US$)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(1)	(1)	-	-	-	-	-
Total VAP (MM US$)	(6)	(6)	(6)	(6)	(6)	(6)	(4)	(3)	(2)	-	-	-	-	-
Total Capex (MM US$)	**(6)**	**(8)**	**(8)**	**(7)**	**(7)**	**(7)**	**(6)**	**(3)**	**(2)**	-	-	-	-	-
Other Costs														
Closure Costs (MM US$)	0.12	0.12	0.12	0.12	0.12	0.12	(6.10)	(8.75)	(2.89)	(0.20)	(0.20)	(0.20)	(0.20)	2.32
Overall Financials														
Pre-Tax Cash Flow (MM US$)	**408**	**405**	**405**	**404**	**404**	**403**	**400**	**408**	**431**	**(0)**	**(0)**	**(0)**	**(0)**	**2**
Cumulative Pre-Tax Cash Flow (MM US$)	2,724	3,129	3,533	3,938	4,342	4,745	5,145	5,553	5,984	5,984	5,984	5,984	5,983	5,986
Total Corporate Income & Taxes (MM US$)	(99)	(103)	(106)	(111)	(111)	(111)	(111)	(114)	(118)	-	-	-	(0)	-
Post-Tax Cash Flow (MM US$)	**308**	**302**	**299**	**293**	**293**	**292**	**288**	**294**	**313**	**(0)**	**(0)**	**(0)**	**(0)**	**2**
Cumulative Post-Tax Cash Flow (MM US$)	1,899	2,201	2,500	2,793	3,086	3,379	3,667	3,962	4,274	4,274	4,274	4,274	4,274	4,276

22.4 Sensitivity Analysis

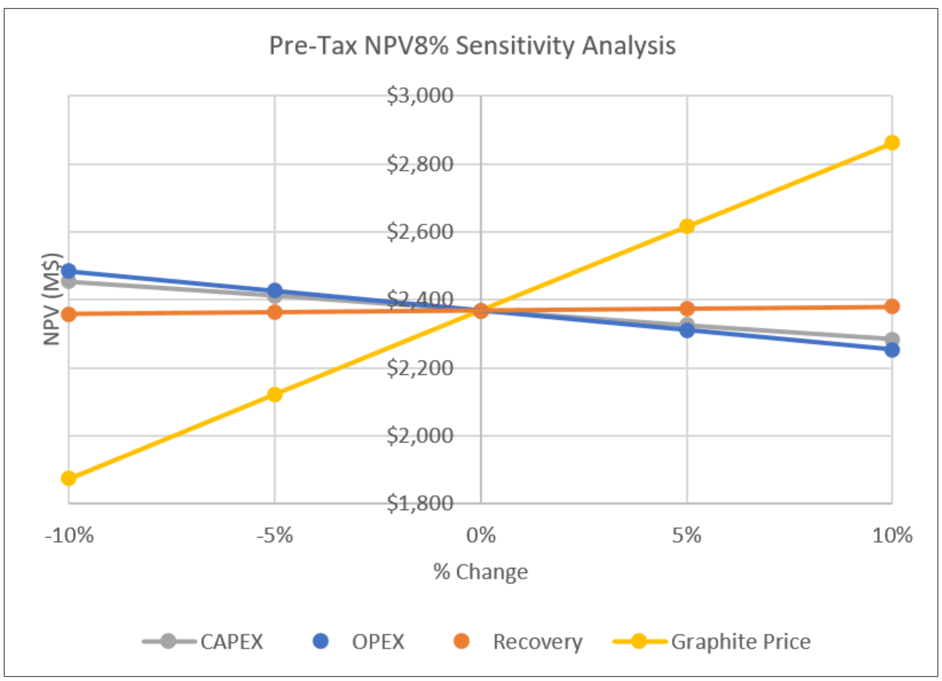
A sensitivity analysis was conducted on the pre-tax NPV and pre-tax IRR at an 8% discount rate.

The Pre-Tax NPV sensitivities are shown in Table 22.3 and Figure 22.2.

Table 22.3 Pre-Tax NPV (8%) Sensitivity Analysis

Pre-Tax NPV (8%) Sensitivity Analysis					
	-10%	**-5%**	**0%**	**5%**	**10%**
CAPEX	$2,454	$2,411	$2,369	$2,326	$2,283
OPEX	$2,484	$2,426	$2,369	$2,311	$2,254
Recovery	$2,358	$2,363	$2,369	$2,374	$2,379
Graphite Price	$1,875	$2,122	$2,369	$2,616	$2,863

Figure 22.2 Pre-Tax NPV (8%) Sensitivity Analysis Chart



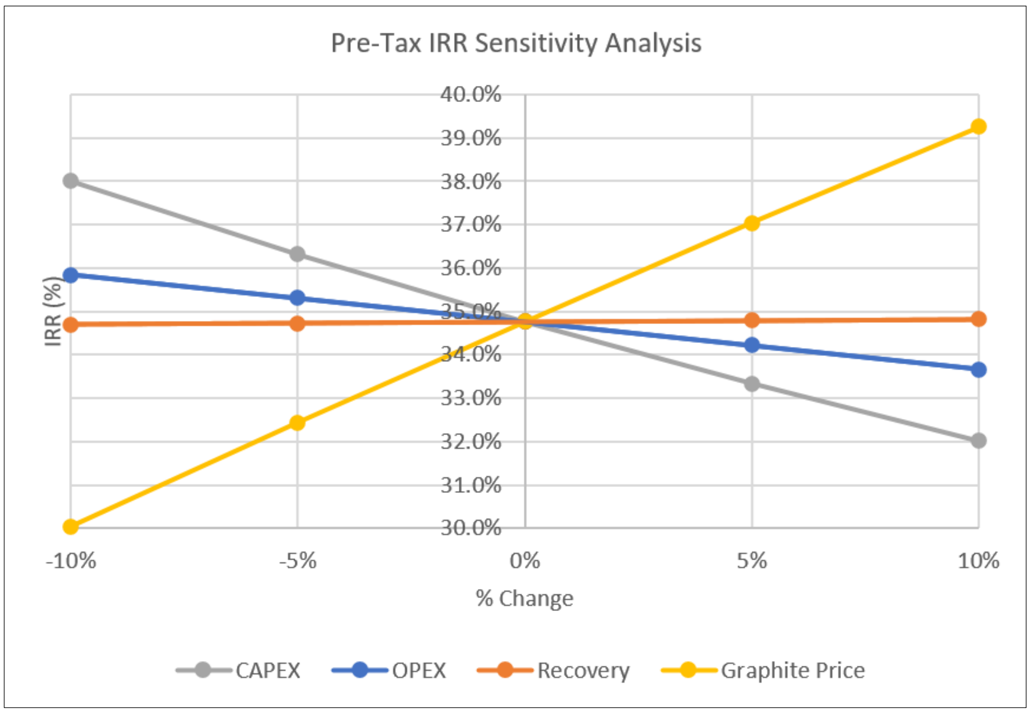
Source Lycopodium 2024

The Pre-Tax IRR sensitivities are shown in Table 22.4 and Figure 22.3.

Table 22.4 Pre-Tax IRR Sensitivity Analysis

IRR Sensitivity Analysis					
	-10%	**-5%**	**0%**	**5%**	**10%**
CAPEX	38.0%	36.3%	34.8%	33.3%	32.0%
OPEX	35.8%	35.3%	34.8%	34.2%	33.7%
Recovery	34.7%	34.7%	34.8%	34.8%	34.8%
Graphite Price	30.0%	32.4%	34.8%	37.0%	39.3%

Figure 22.3 Pre-Tax IRR Sensitivity Analysis Chart



Source Lycopodium 2024

The NPV sensitivities by discount rate are listed Table 22.5 as follows:

Table 22.5 Pre- & Post-Tax NPV Discount Rate Sensitivity Analysis

Discount Rate	8%	10%	12%
NPV Pre-Tax (US$M)	2,369	1,909	1,545
NPV After-Tax (US$M)	1,598	1,257	987

23.0 ADJACENT PROPERTIES

There are no adjacent properties that would materially affect the Authors understanding of the Project

24.0 OTHER RELEVANT DATA - GRAPHITE SPHEROIDIZATION, PURIFICATION AND COATING VALUE-ADD ANODE PLANT

24.1 Introduction

Dorfner Anzaplan GmbH ("ANZAPLAN") has been engaged by South Star Battery Metals Corp. ("South Star" or "the Client") to perform a preliminary economic assessment ("PEA") on a value-add graphite active anode manufacturing facility ("the Value-Add Anode Plant" or "the Anode Plant") in the USA.

The subject matter of Section 24.0 is a battery material plant for value addition transformation of natural flake graphite ("NFG") concentrates from South Star's flagship Santa Cruz Graphite Mine in northeastern Brazil's Bahia state, currently being developed ("Santa Cruz Mine" or "Santa Cruz"), and the Pre-Development Graphite Project in the USA state of Alabama ("the BamaStar Graphite Project", or "BamaStar").

24.1.1 Issuer

South Star is listed on the TSX Venture Exchange with ticker symbol, STS. The Company is focused on industrial minerals and battery metals for the clean energy revolution. South Star is developing a vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery and fuel cell markets. This strategy includes NFG concentrator plants at Santa Cruz and BamaStar.

The value addition transformation of NFG concentrates from Santa Cruz and BamaStar into high-purity, battery-grade, active anode material, will be performed by a centrally located, Value-Add Anode Plant. It is planned to locate the Value-Add Anode Plant on a vacant, zoned 1-2 Heavy Industrial site, in Happy Hill, Mobile, Alabama ("AL"). This site will be distinct from the graphite properties and will upgrade and refine NFG concentrate from the Santa Cruz and BamaStar.

The Anode Plant will include graphite micronization, spheroidization, hydrofluoric ("HF") and hydrochloric ("HCl") acid purification and conventional pitch tar coating, to produce active anode spherical purified graphite ("SPG") that is coated ("CSPG"), suitable for Li-ion battery applications. The Value-Add Anode Plant entails a phased approach to increase production. Phase 1 will process at the nominal design rate, 21,300 tpa NFG from Santa Cruz. Phase 2 and Phase 3 will each process at the nominal design rate, 21,300 tpa NFG from BamaStar.

24.1.2 Background

ANZAPLAN was retained by South Star to (a) purify NFG concentrate of a sample from BamaStar to produce battery-grade (≥99.95 percentage by weight ("wt.-%") fixed carbon ("FC")) purified NFG for performance testing by others, and (b) provide independent expert engineering design and cost estimation of the Value-Add Anode Plant as part of the PEA on the BamaStar Graphite Project.

The PEA presents a scenario with concentrates from both BamaStar and Santa Cruz providing feedstock for the Value-Add Anode Plant [2]. – the technical and economic (“techno-economic”) basis of this scenario is outlined in Section 24.0.

24.1.3 Purpose

The subject matter of Section 24.0 is a battery material plant for value addition transformation of NFG concentrate from Santa Crux and BamaStar, into high-purity, battery-grade, active anode material. Section 24.0 present the techno-economic outputs of the Value-Add Anode Plant.

Purification performed by ANZAPLAN did not include material from the Santa Cruz. The supplied BamaStar NFG concentrate sample for purification was produced during a 2022 pilot metallurgical testing program at the North Carolina State University Mineral Research Laboratory (“MRL”) [3].

One kilogram of the purified BamaStar NFG was shipped to the USA to prepare for performance testing (i.e. micronization, spheroidization and pitch coating), and to carry out laboratory performance tests (electrochemical, rheological aspects of slurries, cell power testing, and others). The USA sample preparation and performance tests were performed by independent service providers and laboratories, under the supervision of South Star.

To generate the process design criteria (“PDC”), mass balance and process flow, as well as to specify major process equipment, it was assumed the key characteristics of the flake graphite (contained impurities, concentrate grades, flake sizes, electrical conductivity, and others) are the same for Santa Cruz and BamaStar.

A dedicated economic model on a discounted cash flow (“DCF”) basis was prepared for the Value-Add Anode Plant but integrated into the mine-to anode strategy since the economic potential of the Value-Add Anode Plant in isolation is not of interest. A DCF model for the entire integrated strategy was prepared and summarized in section 22.0. Consequently, Section 24.0 does not present an Economic Analysis.

ANZAPLAN was not involved in the MRL pilot program. Consequently, the authors responsible for Section 24.0, cannot comment on the representativeness of the BamaStar sample that was used to produce the NFG concentrate and formed the basis of purification to battery-grade NFG and subsequent performance testing.

The laboratory performance tests performed in the USA by others, were done to confirm suitability of the graphite from BamaStar to achieve general battery specifications.

24.1.4 Principal sources of information

All engineering and cost estimations outlined in Section 24.0 are based on standard industry, assumed design criteria, for similar type and size anode manufacturing facilities and thus are illustrative, of the value addition transformation potential of Santa Cruz and BamaStar.

24.1.5 Site visit

The authors of Section 24.0 did not visit the site currently proposed to locate the Anode Plant in Mobile, AL. This is since the Anode Plant is akin to a factory, and as such it will be located distinct from the Mineral Resources and Mineral Reserves of either Santa Cruz or BamaStar. The planned site is vacant, has been clear, zoned 1-2 Heavy Industrial, and is of sufficient size (~28 acres) not to constrain layout or design. Considering the aforesaid and the current preliminary development stage of the Value Addition Plant, the authors have sufficient understanding of the salient factors capable of influencing the outcome of Section 24.0 and as such did not believe visiting the proposed vacant and cleared site will meaningfully contribute to enhance their understanding or provide additional information that will materially influence their findings.

24.2 Reliance on Other Experts

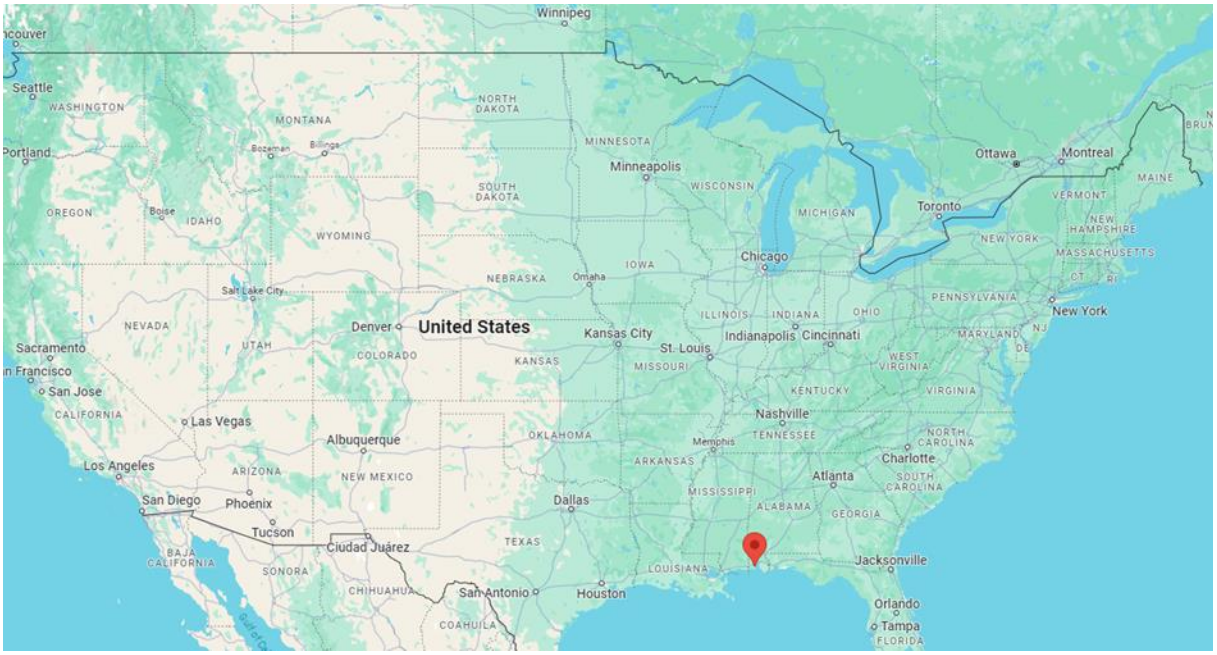
South Star engaged ANZAPLAN during May 2024 to purify NFG concentrate from BamaStar for downstream preparatory and performance testing in the USA by others. ANZAPLAN successfully produced 2 kg battery-grade (≥99.95 wt.-% FC) purified NFG. On July 11, 2024, 1 kg of the purified BamaStar NFG was shipped to the USA. The USA sample preparation and performance tests, as presented in Section 24.6.2 and Section 24.6.3, were performed by independent service providers and laboratories under the supervision of South Star. ANZAPLAN rely on the expert responsible for Section 24.6.2 and Section 24.6.3, confirming suitability of the graphite from BamaStar to achieve general battery specifications.

24.3 Property Description and Location

The Anode Plant is akin to a factory and as such it will be located distinct from the Mineral Resources and Mineral Reserves of either Santa Cruz or BamaStar. It is planned to locate the Value-Add Anode plant on a vacant site, containing all industrial utilities, in Happy Hill, Mobile, AL. According to the marketing brochure for the proposed site by property agents CRE Mobile, that can be downloaded from 28 AC Stimrad Rd.pdf. The site has been zoned 1-2 Heavy Industrial, has been stabilized and is services with all industrial utilities [7].

The city of Mobile, AL, is located on the east coast of the USA and centrally located on the USA Gulf Coast as presented in Figure 24.1

Figure 24.1 Country Location of Value-Add Anode Plant, Mobile, AL



Google Maps

The address of the proposed site is Stimrad Road, Mobile, AL 36610. It is located east of the Interstate 165 (“I-I65”) Highway, west of Telegraph Road, and directly south of Stimrad Road, as presented in Figure 24.2.

The site is located ~140 miles (220 km) from New Orleans and within ~500 miles (800 km) of Houston, Orlando, and Atlanta. Thus, allowing South Star to sell to key target markets within the optimum road-haul transportation radius of 500 miles (800 km) as presented in Figure 24.3. Further transportation can be achieved by rail infrastructure that are located close to the proposed site.

The proposed site is approximately 28 acres that is sufficient in size to locate all three modules plus associated infrastructure and services. The site is located very close to rail, I-165 and I-65 Highways and the Port of Mobile.

The site is strategically located between Port of Mobile and Biloxi, Gulfport, MS Industrial Corridor and is located halfway between Houston and Jacksonville.

Figure 24.2 Site Location Between Telegraph Road, Stimrad Road and I-165 Highway, Looking South [7]

Figure 24.3 Mobile Optimum Road Transportation Radius [8]

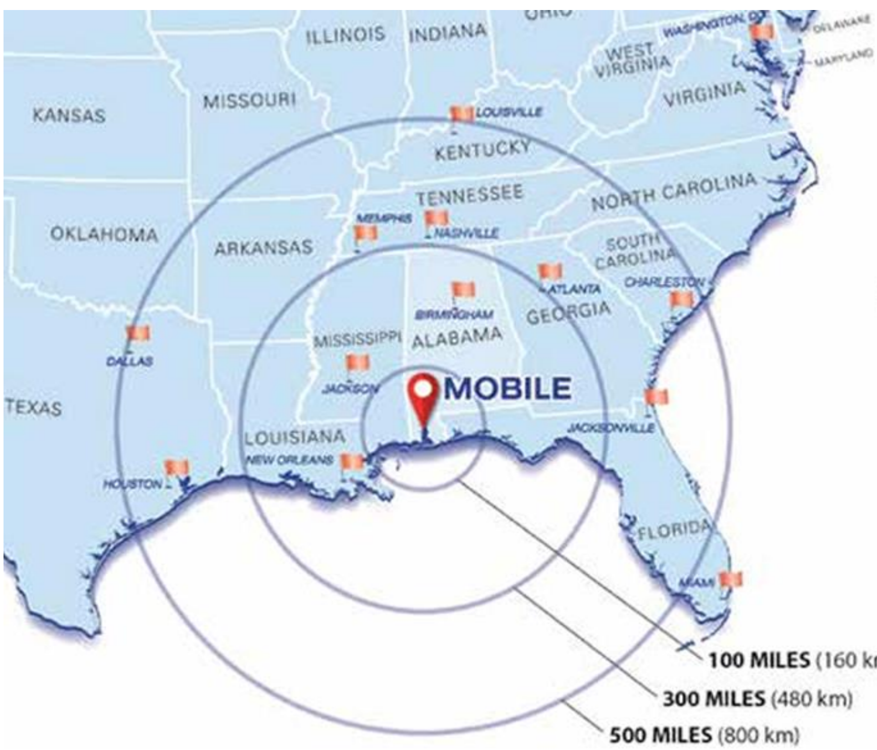


Figure 24.4 presents the process cleared, flat, vacant site in Mobile, planned to locate the Anode Plant.

Figure 24.4 Proposed Cleared, Flat, Vacant Site for the Anode Plant in Happy Hill, Mobile, AL (CRE Mobile) [7]

24.4 Accessibility, Climate, Local Resources and Infrastructure

24.4.1 Accessibility

The site is connected via Stimrad Road and U.S. 43 (Telegraph Road) that runs directly to the Port of Mobile, less than five minutes' drive. It is located directly next to I-165 Highway, less than 4 miles (6 km) southeast of I-65 Highway and less than 5 miles (8 km) north of I-10 Highway.

I-10 extending east to Jacksonville, Florida, and west to Los Angeles, California, while I-65 extends from Mobile north to Chicago, Illinois. Major metropolitan areas such as Atlanta, Charlotte, Houston, Memphis, Nashville, Tampa, Jacksonville, and Orlando, are all within 600 miles (1,000 km) of Mobile.

The CSX Transportation ("CSXT") rail passes directly next to the adjoining property to the east and the Norfolk Southern Railway ("NS Rail") runs along the western side of the I-165 Highway as presented in Figure 5.

CSXT is a Class I freight railroad company operating in the Eastern United States and the Canadian provinces of Ontario and Quebec. NS Rail is also a Class I freight railroad company that operate in the Eastern United States. They operate in 22 eastern states, the District of Columbia, and has rights in Canada over the Albany to Montreal route of the Canadian Pacific Kansas City.

Figure 24.5 Accessibility or Proposed Anode Plant to Rail and I-165 Highway (CRE Mobile) [7]

The Mobile area is served by the following five Class-I railroads, converging at the Port of Mobile, including intermodal service for importing and exporting [9]:

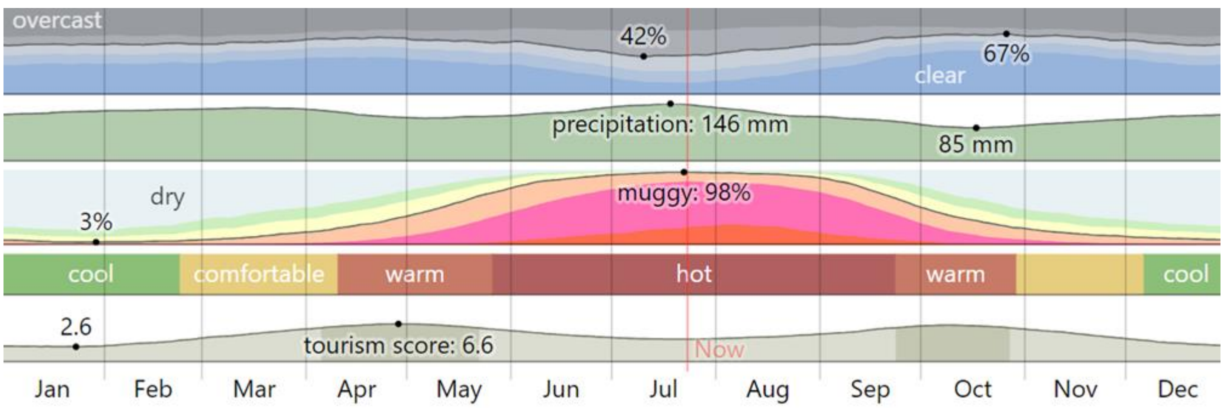
- Burlington Northern, Norfolk Southern, and short line Alabama and Gulf Railroad serve major industrial Alabama State Port Authority.
- CSX serves the Theodore Industrial Park and the Mobile Aeroplex at Brookley.
- Canadian National Railroad serves the western areas of Mobile and Prichard as the tracks head east toward downtown Mobile.
- Central Gulf Railroad, a rail ship service to Coatzacoalcos, Mexico, provides shippers with unparalleled service to southern Mexico and Mexico City; and
- Kansas City Southern is the only Class 1 railroad to own track both inside and outside Mexico's boundaries.

24.4.2 Climate

According to Weather Spark [10], Mobile has a humid subtropical climate typical of the Gulf Coast region. Summers are long, hot, and humid with short, cold, and windy winters. Year-round the weather is partly cloudy and wet. Over the year the temperature typically varies between 6°C and 32°C and seldom exceeds 35°C or lower than -2°C. Rain precipitation is fairly common throughout the year, especially during the summer months when thunderstorms are frequent. Mobile averages less than 3 mm of snow per year. The average hourly wind speed in Mobile experiences mild seasonal variation over the course of the year and ranges between 8 km/h (July and August) and 12.5 km/h (December and January).

The weather of Mobile per month is presented in Figure 24.6.

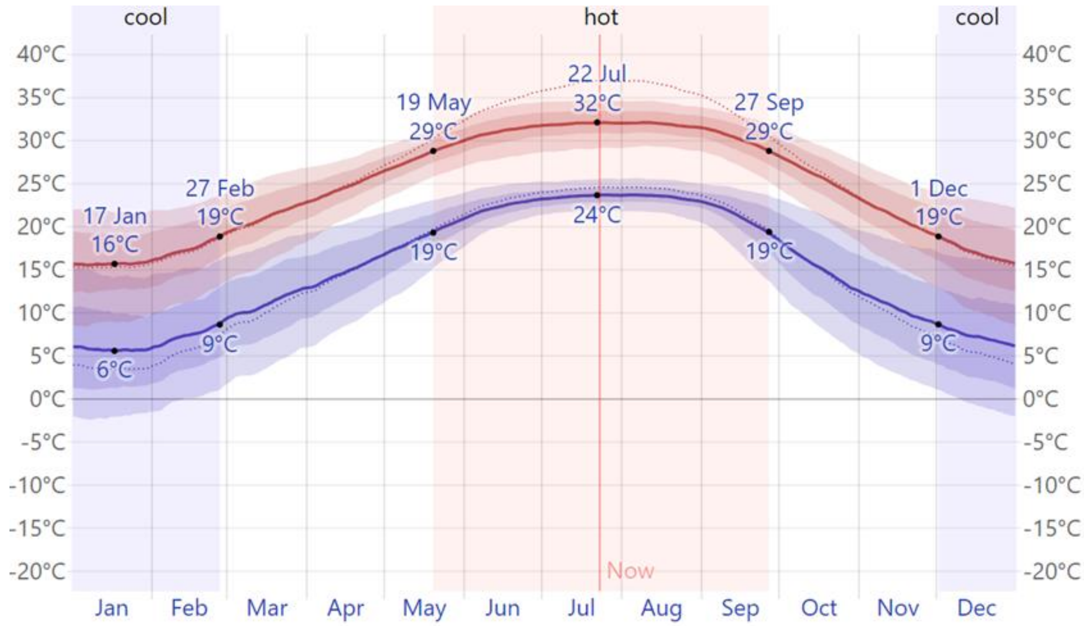
Figure 24.6 Mobile Weather by Month (www.weatherspark.com) [10]



The hot season in Mobile lasts around 4 months between end of May and end of September, with a daily average high temperature above 28°C. The hottest month of the year is July, with an average high and low of 31°C and 24°C, respectively. The cool season lasts for about three months between beginning of December and end of February, with a daily average high temperature below 19°C. The coldest month of the year is January, with an average low and high of 6°C and 16°C, respectively.

The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th and 90th percentile bands is presented in Figure 24.7. The thin dotted lines are the corresponding average perceived temperatures.

Figure 24.7 Average High and Low Temperatures in Mobile (www.weatherspark.com) [10]



The wet season in Mobile lasts approximately three months, from early June to early September, with a >40% chance of 1mm precipitation on any given day. The wettest month is July, with an average of 17.9 days with at least 1 mm precipitation. The dry season lasts approximately nine months, between early September and early June. The dry month is October, with an average of 6.7 days with at least 1 mm precipitation.

The month with the most days of rain alone is July with 17.4 days. The most common form of precipitation during the year is rain alone. Rain falls throughout the year with the highest rainfall in July (average of 150 mm) and the dryest month is October (average of 86 mm).

The windiest period lasts about 8 months from end of September to mid-May, with an average wind speed of over 10.3 km/h. The windiest month is January, with an average speed of about 12.4 km/h. The calmer time of year lasts about four months from mid-May to end of September. August is the calmest month with an average speed of just over 8.4 km/h.

The predominant wind direction is from the south between end of February and end of August. The wind is most often from the east between the end of August to end of October. The wind is most often from the north from end of October to end of February.

Mobile has an extreme wind risk rating based on the projected likelihood and speed of hurricane, tornado, or severe storm winds impacting it. It is most at risk from hurricanes.

24.4.3 Local Resources and Infrastructure

Mobile is the largest Gulf Coast city between New Orleans and Tampa. The Mobile-Tensaw River Delta is the second largest in the USA. Mobile Bay is the fourth largest estuary in the USA and holds the second largest natural gas reserve in the world. Major rail, ship and highway transportation systems converge along the Mobile River at the Port of Mobile to link Mobile businesses with the nation and the world.

Figure 24.8 present the local resources and infrastructure located near the site which includes:

- Port of Mobile is the only deep-water port in AL, USA.
- Mobile Regional airport is a public and military airport 13 miles (21 km) west of Mobil.
- Mobile Aeroplex at Brookley is an industrial complex and airport. It is owned and operated by the Mobile Airport Authority.
- Theodore Industrial canal is a commercial complex that offers a variety of spaces for manufacturing, storage, and other industrial activities.
- Port Pascagoula is located on the southeastern coast of Mississippi. It is a full-service deep-water port with modern facilities for handling cargo from around the world. The Port’s two harbors include a combination of public and private terminals.
- I-10 Highway travels across Mobile and Baldwin Counties as part of its route across the upper Gulf Coast between Biloxi / Gulfport, Mississippi and Pensacola [11].
- I-65 Highway connects mid-town Mobile to the city of Prichard. North through Prichard, I-65 connects with I-165, leading southeast to the Port of Mobile and Downtown Mobile [11].
- I-165 Highway constitutes a 5 mile (8 km) freeway spur joining Downtown Mobile with I-65 north to Saraland and Satsuma and south to U.S. 98 (Moffett Road) for West Mobile. The route crosses several arterials through the city of Prichard, the Port of Mobile railroads; and,
- U.S. 98 and U.S.90 roads.

Figure 24.8 Areial Map of Local Resources and Infrastructure Map [7]

Summary transportation infrastructure and services available in Mobile are as follows [8]:

- Over the past decade, the Alabama State Port Authority has invested more than USD 700 million at the Port of Mobile, including a container terminal, a steel terminal, expansion at McDuffie Coal Terminal, a rail ferry terminal, new warehouses and a turning basin.
- Four 100-gauge post-Panamax and super post-Panamax ship-to-shore cranes.
- Weekly container carrier services shipping to destinations worldwide.
- An intermodal container transfer facility provides an intermodal rail option to shippers in North Alabama, Tennessee and surrounding states.
- Five class 1 railroads: CSX, Canadian National, Alabama Gulf Coast Railroad - BNSF, Norfolk Southern and Kansas City Southern with piggyback and containerized freight service.
- Two interstate systems (I-10 and I-65 Highways) and five federal highways (USA 31, 43, 45, 90 and 98.).
- The Mobile Airport Authority owns and operates Mobile's two airports, Mobile Regional Airport and the Mobile Downtown Airport at Mobile Aeroplex at Brookley. Both airports are Federal Aviation Administration Part 139 Certification.

- Air cargo is provided by FedEx from the Mobile Downtown Airport, near the port and downtown.
- Port's public terminals have direct access to 1,500 miles (2,400 km) of inland waterways, as well as the Intercoastal Canal, providing water connectivity to the northern USA; and,
- Mobile is served by The Wave Transit System, offering bus service throughout the city. The Wave also operates Moda!, a free bus route in downtown Mobile. Baldwin Rural Area Transportation System operates BayLinc, a daily commuter bus connecting Baldwin and Mobile counties.

Other local infrastructure includes:

- Five major hospitals with more than 1,900 beds.
- Mobile is home to several colleges and universities. The largest is the University of South Alabama, with more than 16,000 students.
- Public and private schools.
- Various museums and attractions, performing arts, libraries, parks and recreation, sports and entertainment facilities.

Alabama Power Company has an abundant electric production capacity of more than 6,000 MW with an expansive grid of 230 KV and 115 KV transmission lines in the Gulf Coast area.

Spire (formerly Mobile Gas) has an extensive natural gas infrastructure network spanning 100+ miles (160 km) of large-diameter pipelines with interconnections to multiple interstate pipelines and a local distribution company that has reliably served the region for more than 150 years.

Mobile Area Water and Sewer System ("MAWSS") provides safe drinking water and sanitary sewer service for more than 200,000 people in the Mobile metropolitan area. Water is supplied from a 3,600-acre (1,460 ha) reservoir, continually fed by groundwater, streams, and rainfall. MAWSS has an alternative source of water to provide raw water for industrial use. Many area industries draw and treat water directly from the Tombigbee or Mobile rivers for industrial use.

24.5 Associated activities to Mineral Resource Estimation (Item 6 to Item 12)

Section 24.0 only present Other Relevant Data and Information relating to the Value-Add Anode Plant. As such, the reader is referred to Section 6.0 to Section 12.0 of this reports relating to History (Section 6), Geological Setting and Mineralization (Section 7), Deposit Types (Section 8), Exploration (Section 9), Drilling (Section 10), Sample Preparation, Analyses and Security (Section 11) and Data Verification (Section 12).

24.6 Mineral Processing and Metallurgical Testing

ANZAPLAN was retained by South Star to purify NFG concentrate of a float concentrate sample from BamaStar to produce battery-grade (≥99.95% wt.-% FC) purified NFG for performance testing, by others.

One kilogram of the purified BamaStar NFG was shipped to the USA to prepare for performance testing (i.e. micronization, spheroidization and pitch coating), and to carry out laboratory performance tests (electrochemical, rheological aspects of slurries, cell power testing, and others). The USA sample preparation and performance tests were performed by independent service providers and laboratories, under the supervision of South Star.

24.6.1 Purification

On 5 June 2024, ANZPLAN received a sample of NFG concentrate from BamaStar for purification to battery-grade, active anode material. HF and HCl was selected as the purification method. The BamaStar NFG concentrate sample was produced during a 2022 pilot metallurgical testing program at MRL and had a FC content of 93.47 wt.-%. ANZAPLAN was not involved in the MRL pilot program, and as such, the authors responsible for Section 24.0, cannot comment on the representativeness of this sample.

The laboratory performance tests performed in the USA by others, were done to confirm suitability of the graphite from BamaStar to achieve general battery specifications. Purification performed by ANZAPLAN did not include material from the Santa Cruz.

ANZAPLAN could successfully produce approximately 2 kg purified NFG with a FC content of ≥99.95 wt.-% from the NFG concentrate with a FC content of 93.47 wt.-%, thereby confirming the suitability of the graphite from BamaStar to achieve battery-grade anode purity.

Outlined below are the indicative steps applied to purify the NFG concentrate to battery-grade anode purity:

- XRF analysis to determine chemical composition.
- Loss on ignition analysis to determine fixed carbon content.
- Initial lab purification sighter tests to determine optimum HF and HCl addition and retention time.
- Application of HF and HCl purification to produce 2 kg of purified NFG.
- Washing and solid liquid separation to remove dissolved impurities.
- Drying at 105°C over night.
- Determine chemical composition of purified material.

24.6.2 Value-Add Transformation

One kilogram of the purified BamaStar NFG was shipped to the US to prepare for performance testing (i.e. micronization, spheronization and pitch coating), and to carry out laboratory performance tests (electrochemical, rheological aspects of slurries, cell power testing, and others). The USA sample preparation and performance tests were performed by independent service providers and laboratories, under the supervision of South Star.

The battery-ready CSPG characteristics are presented in Table 24.1.

Table 24.1 BamaStar CSPG Characteristics

Detail	CSPG
Fixed Carbon (%)	>99.95
Tap Density (g/cm^3)	259.6
Scott Volume (g/cm^3)	0.75
BET Surface Area (m^2/g)	2.6
Particle Size Distribution:	
D10 (µm)	6.8
D50 (µm)	17.2
D90 (µm)	33.7

As detailed above, the purified BamaStar NFG was successfully transformed into a battery-ready BamaStar CSPG, engineered to demonstrate the BamaStar NFG's ability to achieve the exacting Tier-1 OEM CSPG specification similar to the technical specification of Contemporary Amperex Technology Co., Limited ("CATL") — the world's largest LIB manufacturer — specifically for the USA's largest EV manufacturer, Tesla, Inc. ("Tesla").

In most instances, the equipment and technologies utilized to transform the purified BamaStar NFG into finished CSPG at US Process Lab is either lab-scale or pilot-scale in terms of the equipment's throughput and/or production capacity; however, all equipment, processes and associated technologies utilized for this technical program have commercial-scale counterparts / equivalents which are commonplace in commercial CSPG manufacturing.

The following outlines the industry-indicative process workflow utilized to transform the purified BamaStar NFG into battery-ready coated SPG ("CSPG"):

Micronization: sizing of the purified BamaStar NFG was achieved via an industry-standard conventional air-milling process;

Screening: The micronized, purified material was then screened, via industry-standard sieve screening, to achieve the targeted particle sizes for subsequent spheronization (shaping);

Shaping: The screened material was then fed into a commercial spheronizer, in order to shape the material into potato shaped ovoids resulting in SPG as well as a purified, micronized byproduct that did not shape.

Coating: The BamaStar SPG was then pitch (carbon) coated (or surface treated) to produce the finished, battery-ready CSPG. The thin layer of pitch coating was achieved through the application of soft-carbon precursor, resulting in the curing and polymerization of the exterior coating on the surface of the SPG. This CSPG is the battery-ready anode material suitable for electrochemical performance testing in Li-ion battery cells.

24.6.3 Battery Electrochemical Performance Testing

The battery-ready BamaStar CSPG produced at the US Process Lab was delivered to US Battery Labs, an independent laboratory located in the US, which specializes in battery materials characterization, building Li-ion battery cells (both coin and pouch-cell formats) and battery testing to assess battery electrochemical performance. The BamaStar CSPG was subject to rheological studies and electrochemical performance test work in both coin-cell and pouch-cell Li-ion battery formats.

The initial characterization of the BamaStar CSPG included the mixing and casting of graphite anode slurries to produce electrodes (specifically, anodes) in order to commence half-cell testing in order to determine basic material electrochemical performance metrics, e.g., irreversible capacity loss (ICL or first-cycle loss), reversible capacity, resistance, and Coulombic efficiency. Ultimately the purpose of building and testing Li-ion batteries with BamaStar CSPG is to determine the CSPG's initial electrochemical performance, in comparison to a commercial reference material.

In terms of rheology, the BamaStar CSPG mixed perfectly in a conventional commercial anode slurry recipe, using industry-standard conductive additives, binders and solvents. The initial electrochemical performance test results of BamaStar CSPG demonstrate capacity and first-cycle loss that meets or exceeds the performance of Tier-1 commercial NFG-based comparable battery-ready CSPG products.

The BamaStar CSPG experienced a first-cycle loss of 7% and reversible gravimetric capacity of 361 mAh/g (approaching the theoretical maximum of 372 mAh/g for natural graphite). In pouch-cell testing, the BamaStar CSPG also showed significant potential capabilities for fast-charging Li-ion battery applications, with stable cycling up to 3C.

As with the equipment, technologies and processes utilized to produce BamaStar CSPG, including all associated equipment and consumables (including reagents) for the proposed for the BamaStar Value-Add Plant are state-of-the-art, conventional, well established, and are the industry standards utilized by global leaders in commercial graphite-processing and active-anode materials manufacturing.

No aspect of the BamaStar materials characterization, rheological studies, battery construction and electrochemical performance testing is proprietary or confidential. Further, all technical work conducted on the BamaStar CSPG is indicative of the evaluation and qualification test work that any potential commercial Li-ion battery customer would undertake to assess a CSPG.

24.7 Recovery Methods

All units of measurement are metric, unless otherwise stated. Tonnage ("t") are metric of 1,000 kg and all weights are on a dry basis, unless stated otherwise. Outlined below are the nominal design production and throughput rates per expansion phase. Phase 1 will process 21,300 tpa NFG from Santa Cruz. Phase 2 and Phase 3 will each process 21,300 tpa NFG from BamaStar.

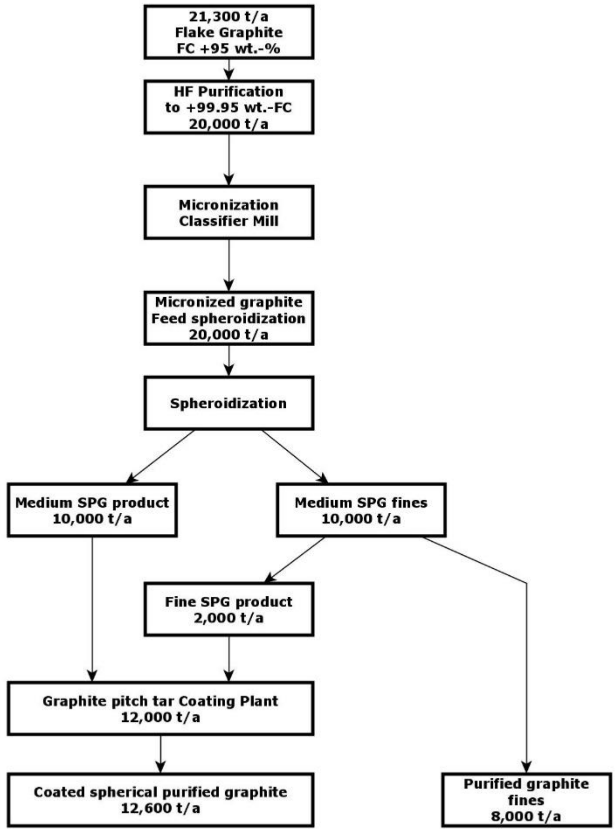
24.7.1 Introduction

The Value-Add Anode Plant is designed to produce 12,600 tpa of CSPG, comprising Medium CSPG and Fine CSPG products, with a FC content of ≥99.95 wt.-%. In addition, the Anode Plant will produce an uncoated SPG fines by-product at 8,000 tpa. The nominal design of the Anode Plant is based on a NFG feed rate of 21,300 tpa per expansion phase, containing an FC content of ≥95.0 wt.-%. The NFG is purified using HF and HCl in the Purification Plant to produce 20,000 tpa of purified NFG with a FC content of ≥99.95 wt.-%. This is fed to the Spheroidization Plant where the NFG is first micronized followed by spheroidization. The spheroidization consists of two stages to yield 10,000 tpa of Medium SPG and 2,000 tpa of Fine SPG. The purified spheroidized products is fed to the coating plant, which after adding pitch tar, yield 12,600 tpa of battery-grade, active anode, CSPG product with a FC content of ≥99.95 wt.- %.

All nominal design throughputs are based on operating hours of 7,500 hours per year.

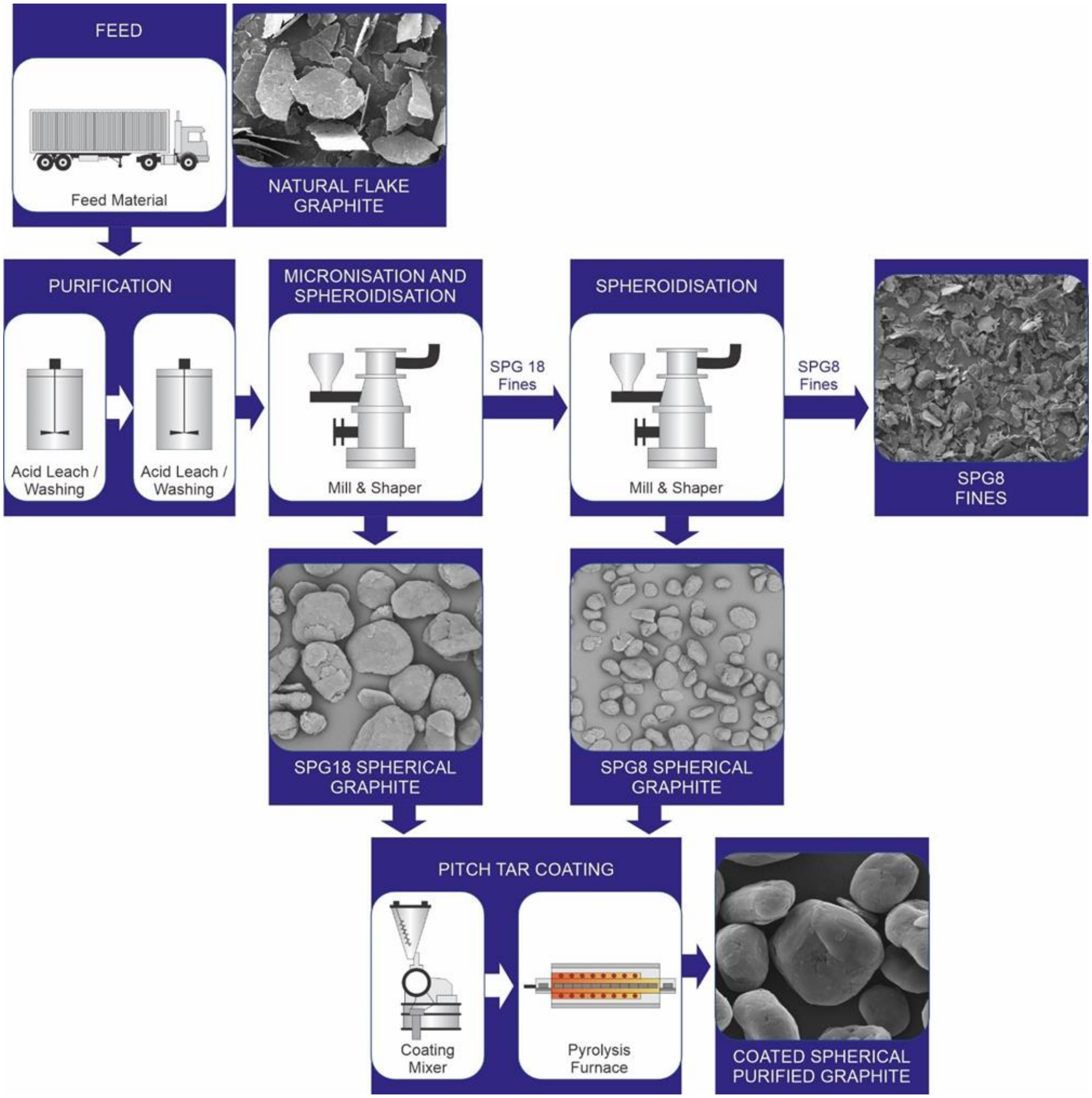
The indicative nominal design mass flow of the Value-Add Anode Plant is graphically presented in Figure 24.9.

Figure 24.9 Indicative Nominal Design Mass Flow of the Value-Add Anode Plant



The overall process flow is graphically presented in Figure 24.10.

Figure 24.10 Overall Process Flow of Value-Add Anode Plant



24.7.2 Process Description

Purification Plant

Purification will be achieved through the following steps:

- First leaching stage utilizing HF and HCl.

- Second leaching stage utilizing HF and HCl.
- Product drying.
- Vent treatment.
- Wastewater treatment.

During the first leach stage, NFG concentrate is disposed into a tank, where the graphite is suspended and continuously agitated, in a mixture of HF and HCl. During agitation, impurities are dissolved and removed from the graphite matrix. During the next step, the leach slurry is filtrated through a belt filter, to separate the graphite from the leach liquor. Within the filter, vacuum chambers allow separation of the different filtrate streams. The filter cake wash is performed in multiple stages. Each wash occurs with deionized water. The mother liquor and the wash filtrates are collected and transferred to the wastewater treatment section.

The second leaching stage is performed similar to the first leach stage to remove the remaining impurities.

After purification, the refined graphite is fed from the belt filter to a drying stage. As the filter cake from the belt filter is very sticky and as a result not suited for conveying, it is mixed with dried material, recirculated from after the dryer, to improve material handling properties. The back-mixed filter cake is collected in the filter cake storage bin and conveyed to the dryer. In the pneumatic dryer, a hot air stream is generated. The airflow is disposed into the dryer, where it enters from below and carries the graphite up towards the outlet. The dryer is designed such that the airflow, loaded with the graphite, flows in a spiral motion whilst drying occurs.

The dried graphite enters the dispersion dryer cyclone where separation of the graphite occurs. The residual fine graphite particles (cyclone overflow) are disposed to the dust collector, where graphite and air are separated. The air is discharged to the stack by a fan. The collected material in the dust collector is fed through a rotary valve into the purified graphite product bin from which the material is transported to the Spheroidization Plant.

The different exhaust gases from the various sections of the purification plant are cleaned through a venturi scrubber system for air pollution control. The treated air after cleaning by the venturi scrubber are discharged to the atmosphere through a ventilation exhaust stack.

All the wastewaters of the various purification stages are collected and treated prior to disposal to publicly owned treatment works.

Spheroidization Plant

For shaping the purified NFG into spherical graphite, the material is processed through the Spheroidization Plant. This plant is designed at a nominal design capacity of 20,000 tpa of purified NFG. The process consists of various steps consisting of size reduction for spheroidization, first spheroidization to produce a Medium SPG product, and second spheroidization to produce a Fine SPG product.

Figure 24.11 illustrates a simplified block flow diagram ("BFD") of the Spheroidization Plant.

Figure 24.11 Simplified Process Flow for the Spheroidization Plant

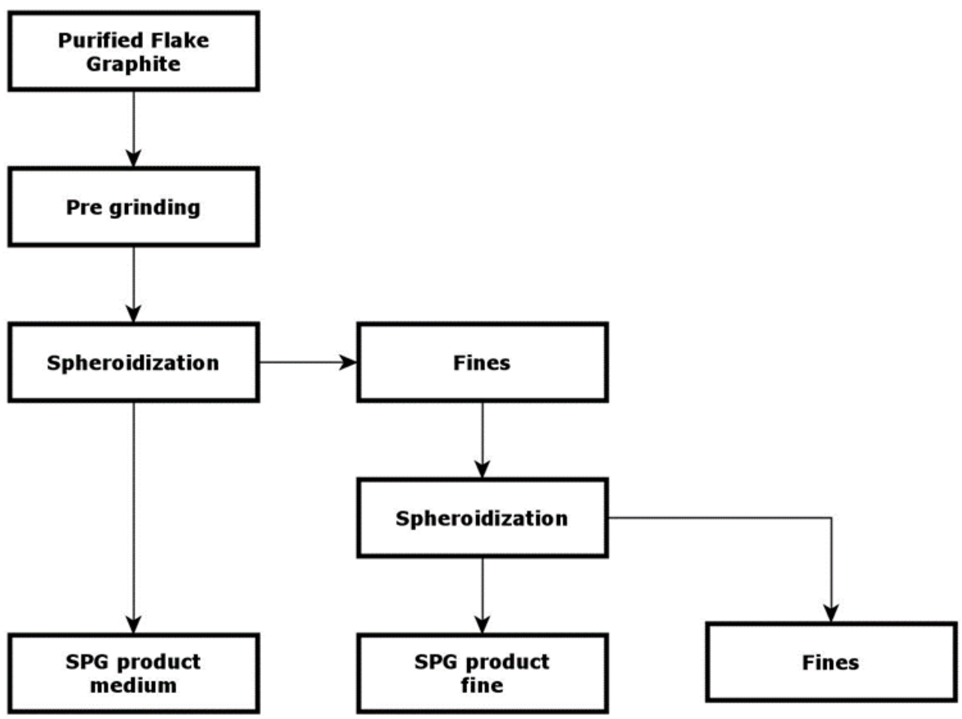


Figure 24.12 (https://grinding.netzsch.com/en/application-literature/new-developments-and-optimization-in-the-process-of-graphite-spheroidization) present an overall layout of a graphite Spheroidization Plant with two lines each consisting of a pre-grinding (micronization) and independently working spheroidization units. The overall 3-dimensional layout and 2-dimensional plan view of the proposed Spheroidization Plant and Purification Plant is presented in Figure 24.12 and Figure 24.13, respectively.

Overall plot plan of Spheroidization and Purification Plants are presented in Figure 24.14.

Figure 24.12 Overall 3D Drawing of Spheroidization Plant (Netzsch) [12]

Figure 24.13 Overall 3D Drawing of Spheroidization and Purification Plants

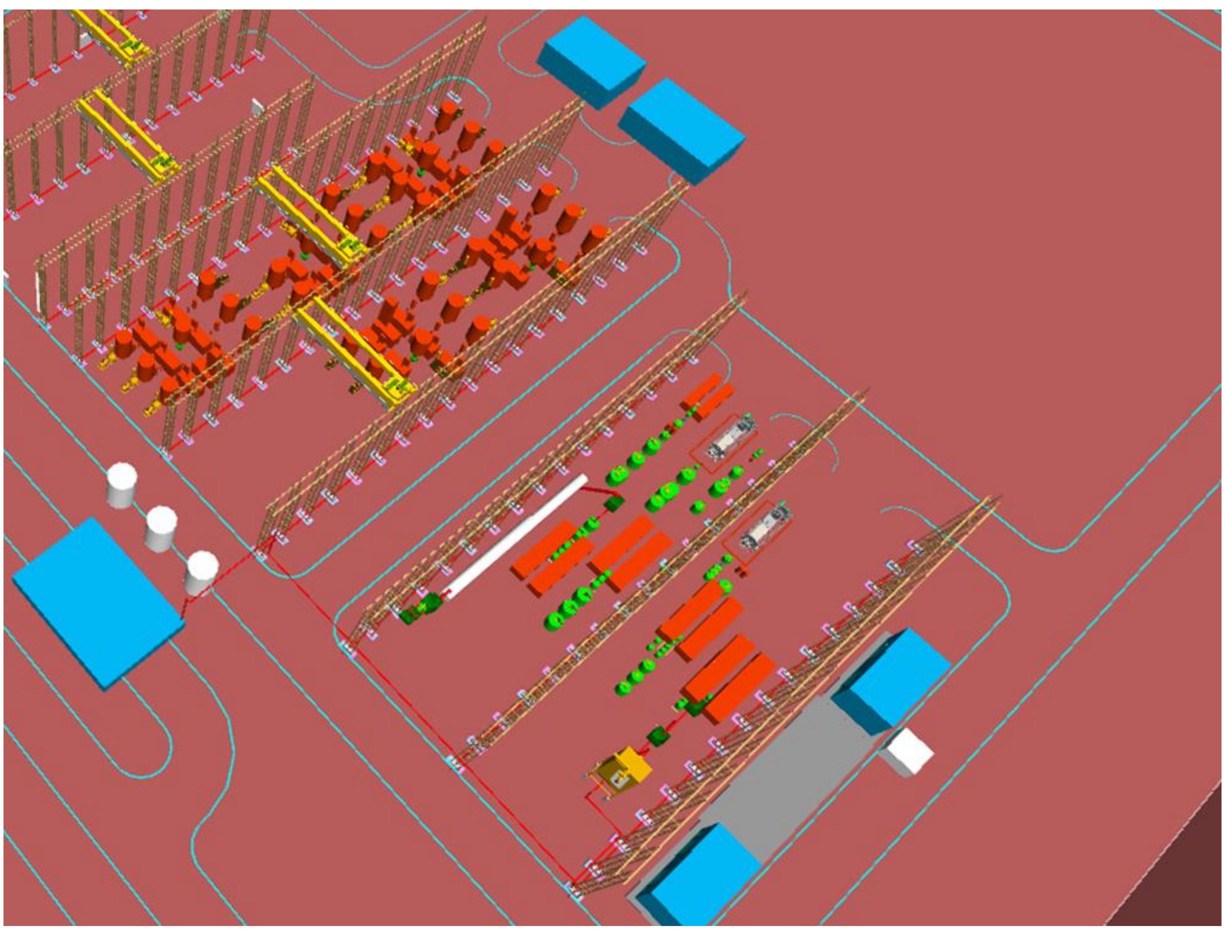
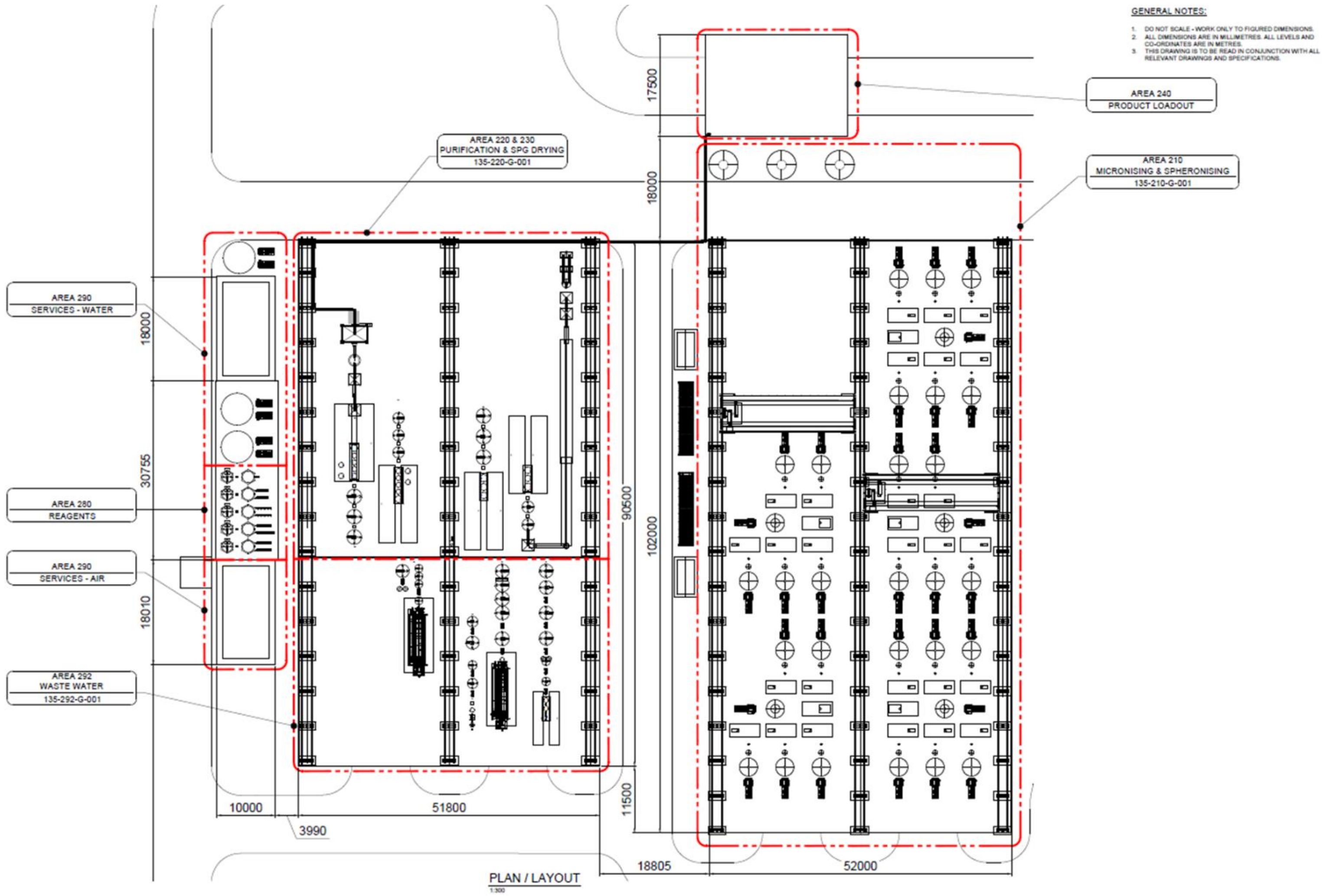


Figure 24.14 Overall Plot Plan of Spheroidization and Purification Plants



Coating Plant

After the purification the 12,000 tpa SPG is coated with pitch tar to produce the final 12,600 tpa CSPG product.

The coating process is the final step in upgrading graphite to active anode material. The Value-Add Anode Plant is based on traditional dry pitch tar coating technology as it presents the industry standard for coating SPG.

The pitch tar coating process starts with milling (micronization to obtain the desired particle size and distribution) of pitch tar followed by mixing of the milled tar with the SPG. The mixture is then heated in a furnace to approximately 1000 °C to thermally decompose the tar into carbon (pyrolysis). This is followed by calcining to create an amorphous carbon layer on the surface of the SPG. The final step is deagglomeration (breaking up of clusters) and sieving to obtain the required particle size distribution ("PSD").

24.7.3 Design Criteria

For each of the Purification Plant, Spheroidization Plant and Coating Plant, individual PDC and mass balances have been generated. All PDCs and mass balances are based on unqualified, standard industry, assumed design criteria, for similar type and size anode manufacturing facilities.

Purification Plant

The nominal design of the Purification Plant is based on a NFG feed rate of 21,300 tpa per expansion phase, containing an FC content of ≥95.0 wt.-%. The nominal design throughputs are based on operating hours of 7,500 hours per year.

The Purification Plant has a nominal production rate of 20,000 t/a producing purified NFG at a FC content of ≥99.95 wt.-%. The losses of mass occur due to the impurities being remove and through losses that occurs in the mother liquor, the wash filtrates and the cloth wash water of the two solid liquid separations.

A summary of the main design criteria for the Purification Plant is outlined in Table 24.3.

Table 24.1 Assumed PDC of the Purificaiton Plant

Description	Units	Criteria
General data		
Annual graphite concentrate feed	[t/a]	21,300
Annual production hours	[h/a]	7,500
Product after purification	[t/a]	20,000
Graphite concentrate feed rate (dry)	[t/h]	2.84
Plant availability	[%]	86%
Graphite feed FC	[wt.-%]	≥95.00%
Acid leaching 1		
HCl required	[$t/t_{graphite\ feed}$]	0.070
HCl concentration	[wt.-%]	37%
HF required	[$t/t_{graphite\ feed}$]	0.049
HF concentration	[wt.-%]	40%
Solid content acid leaching	[wt.-%]	30%
solid content filter cake	[wt.-%]	75%
Wash ratio	[$t/t_{graphite\ feed}$]	2.0
Acid leaching 2		
HCl required	[$t/t_{graphite\ feed}$]	0.070
HCl concentration	[wt.-%]	37%
HF required	[$t/t_{graphite\ feed}$]	0.049
HF concentration	[wt.-%]	40%
Solid content acid leaching	[wt.-%]	30%
solid content filter cake	[wt.-%]	75%
Wash ratio	[$t/t_{graphite\ feed}$]	2.0
Graphite product FC	[wt.-%]	≥99.95%
Wastewater treatment		
Solids content lime slurry	[wt.-%]	40%
Residual moisture filter cake	[wt.-%]	40%
Solubility of gypsum	[wt.-%]	0.2%
Al_2O_3 concentration in feed	[wt.-%]	0.70%
SiO_2 concentration in feed	[wt.-%]	1.41%
Fe_2O_3 concentration in feed	[wt.-%]	0.71%
Solids content after thickening	[wt.-%]	15%

Spheroidization Plant

Based on experience in graphite spheroidization, a primary and secondary spheroidization approach producing two spherical graphite products were assumed for the Spheroidization Plant. Based on this, a medium sized SPG product is generated, and the fines generated during the primary spheroidization undergoes secondary spheroidized to produce a Fine SPG product. The primary spheroidization yield of 50 wt.-% is based on the preliminary USA sample preparation test performed under the supervision of South Star (see Section 24.2). No secondary spheroidization test of the Medium SPG fines have been performed. It is assumed that secondary spheroidization can produce the Fine SPG product at a yield of 20 wt.-%. The SPG fines produced during secondary spheroidization will be sold as an uncoated SPG fines by-product.

A summary of the main design criteria for the Spheroidization Plant is outlined in Table 24.4.

Table 24.2 Assumed PDC of the Spheroidization Plant

Item	Unit	Criteria
General		
Annual NFG feed	[t/a]	21,300
Annual production hours	[h/a]	7,500
Graphite concentrate feed rate (dry)	[t/h]	2.7
Spherical Purified Graphite - Pre-grinding		
Feed PSD, D50	[µm]	20-25
Feed rate pre-grinding	[kg/h]	2,667
Spherical Purified Graphite - SPG		
Annual feed SPG production	[t/a]	20,000
Feed FC	[wt.-%]	99.95%
Product FC	[wt.-%]	99.95%
Medium SPG product		
Min-max range d50	[µm]	16-19
Ratio d90/d10	[-]	<3.5
Tap density	[g/cm^3]	>0.95
Product yield	[wt.-%]	50%
Fine SPG product		
Min-max range d50	[µm]	7 to 8
Ratio d90/d10	[-]	<3
Tap density	[g/cm^3]	>0.85
Product yield	[wt.-%]	20%

Coating Plant

The PDC for the dry pitch tar Coating Plant were based on engineering database. Pitch addition of 10 wt.-% was assumed for the design of the Value-Add Anode Plant.

A summary of the main design criteria for the Coating Plant is outlined in Table 24.5.

Table 24.3 Assumed PDC of the Coating Plant

Item	Unit	Criteria
General		
Annual graphite feed	[t/a]	12,000
Annual production hours	[h/a]	7,500
Graphite (SPG) feed rate (dry)	[t/h]	1.6
Plant availability	[%]	85.6%
Graphite Coating		
Pitch Tar addition (ton per ton graphite feed)	[t/t]	0.1
Coaterd spherical purified graphite		
Feed (FC content)	[wt.-%]	99.95%
Product (FC content)	[wt.-%]	99.95%

24.7.4 Mass Balance

Purification Plant

The Purification Plant mass balance is summarized in Table 24.6 and was developed from the assumed PDC outlined in Table 24.3.

Table 24.4 Mass Balance of the Purification Plant

Description	Mass	
	t/h	t/a
Step 1		
Acid leach		
Graphite Feed	2.8	21,300
HF (40 wt.-%)	0.35	2,606
HCl (37 wt.-%)	0.54	4,025
Leach slurry	9.46	70,923
Filtration		
Feed	9.46	70,923
Wash water	5.67	42,554
Filter cake	3.78	28,369
Step 2		
Acid leach		
Filter cake from 1.step	3.8	28,369
HF (40 wt.-%)	0.35	2,606
HCl (37 wt.-%)	0.54	4,025
Leach slurry	9.36	70,200

Description	Mass	
	t/h	t/a
Filtration		
Feed	9.36	70,200
Wash water	5.7	42,554
Filter cake	3.6	26,668
Dryer Product		
Feed	3.6	26,668
Steam	0.9	6,667
Dry Product	2.7	20,001
Wastewater treatment		
Neutralisation		
Feed	22.7	169,929
Lime slurry (40 wt.-%)	2.30	17,227
CaF_2	0.54	4,071
$Al(OH)_3$	0.03	229
$Fe(OH)_3$	0.03	203
Gypsum Precipitation		
Feed	24.95	187,157
$CaCl_2$		
Na_2SO_4	0.77	5,804
CaF_2/Gypsum Slurry	25.73	192,961
Gypsum	0.73	5,439
Thickening Gypsum		
Feed	31.25	234,385
Overflow	22.41	168,106
Thickened Slurry	8.84	66,278
Filtration Gypsum		
Feed Slurry	8.84	66,278
Filter cake	3.31	24,854
Wastewater	5.52	41,424

Spheroidization Plant

The Spheroidization Plant mass balance is summarized in Table 24.7 and was developed from the assumed PDC outlined Table 24.4.

Table 24.5 Mass Balance of the Spheroidization Plant

Description	Mass	
	t/a	t/h
Feed	20,000	2.7
Total production	12,000	1.6
Medium SPG product	10,000	1.3
Fines SPG product	2,000	0.3
Uncoated SPG fines by-product	8,000	1.1

Coating Plant

The Coating Plant mass is summarized in Table 24.8 and was developed from the assumed PDC in Table 24.5.

Table 24.6 Mass Balance of the Coating Plant

Equipment	Mass	
	t/a	t/h
Feed	12,000	1.6
Pitch tar addition	1,200	
CSPG production	12,600	1.7

24.8 Project Infrastructure

The Value-Add Anode Plant is a self-contained chemical factory. It is planned to be located on a vacant, flat, Heavy Industrial site in Happy Hill, Mobile, AL. The site is very close to international containerized harbor, urban nodes, rail and air transport infrastructure, and Interstate (I-65, I-165 and I-10) Highways. The site is connected by tar road (Stimrad Road) and U.S. 43 (Telegraph Road) to the Port of Mobile where Class I freight can be loaded and offloaded. From Interstate I-65 other international ports, rail and air transportation are available for local USA and international transportation of raw material, reagents and finished products.

The site contains major industrial utilities. During the next phase EIA disposal and processing for HF-treatment wastewater will be assessed.

Bulk power will be supplied by Alabama Power Company from their expansive grid of 230 KV and 115 KV transmission lines. Bulk gas will be supplied by Spire either directly or through an established local distribution company. Water and sanitary services are foreseen to be provided by MAWSS. Extraction and treatment of water directly from the Tombigbee or Mobile rivers for industrial use, as performed by many industries in the area, will be considered as an alternative option.

The supporting infrastructure requirements for the Anode Plant includes internet, electricity, water, natural gas, access road, storm water industrial effluent removal, waste management, and communication / internet connectivity. Necessary infrastructure to be established, not normally provided as part of industrial utilities, are vehicle (motor and truck) parking bays, internal roads, stepdown transformers from bulk power supply, power distribution, water distribution, water purification, compressed air, steam generation, effluent treatment, as well as specific HF handling and storage systems.

24.9 Market Studies and Contracts

24.9.1 Market Studies

Section 24.0 only present Other Relevant Data and Information relating to the Value-Add Anode Plant. The economic potential of the Value-Add Anode Plant in isolation is not of interest, but rather the economic assessment of the entire integrated mine-to anode strategy. Consequently, Market Studies are not applicable to Section 24.0. The Market Studies of the integrated project is outlined in Section 19.0.

24.9.2 Contracts

Industry contract terms for anode material

Contract responsibilities are more significant for suppliers targeting battery purities and active anode material, due to the stringent specifications and quality controls around specialty chemicals.

The schedule for qualifying new refined battery materials can extend anywhere between six to 18 months depending on the integration and coordination of downstream partners.

International market intelligence firm has suggested that commercial contracts for active anode materials streams can favour periods of three to five years. Tight market conditions and forecasted long-term deficits are extending, with typical contract lengths being a minimum of five years with the option to extend for a further five years.

Value-Add Anode Plant Contracts

It is not unusual, given the preliminary assessment stage of the Value-Add Anode Plant, that no contracts required for development, production, or marketing and sales are currently in place or under negotiations, relating to the following: development; acquisition or rental of land; supply of services; operations; maintenance; transportation; handling; sales; hedging; and forward sales contracts or arrangements.

Since the Value-Add Anode Plant is akin to a factory, contracts required for development and production have available time for negotiations during subsequent development stages.

24.10 Environmental Studies, Permitting and Social or Community Impact

An Environmental Impact Assessment ("EIA") and Social Impact Assessment ("SIA"), jointly referred to as Environmental and Social Impact Assessment ("ESIA"), is a key step to evaluate, predict and address potential environmental and social impacts, and the provision of a regulatory framework, of a proposed development, at an early stage.

Performing of an ESIA is critical to minimize or avoid adverse environmental and social effects.

Given the preliminary assessment stage of the Value-Add Anode Plant, no ESIA has been performed, permitting applications submitted or consultations with local communities performed.

The authors of Section 24.0 are not aware of any known environmental or social issues considering that the site has been cleared, is vacant and has been zoned 1-2 Heavy Industrial.

The Anode Plant does not produce radioactive or Class 1 explosives. Hazardous waste generated by the Anode Plan will be aligned with that found generally at many businesses, industrial and chemical facilities. All waste associated office, automotive, maintenance, chemical and liquid, non-hazardous regulated material disposal, recyclable, used oil, laboratory, hazardous, and industrial will be handled in accordance with local, state, and federal laws and will only be disposed of at fully licensed and insured waste processing facilities.

24.11 Other Relevant Data and Information

The authors of Section 24.0 are not aware of any other relevant data or additional information that will make this Section understandable and not misleading.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The Project comprises two MLAs, termed the Celyon Mine Prospect and the Rushing Prospect, that are contiguous, cover approximately 660 acres (267 ha), and are covered under associated SUAs. Current agreements have been negotiated until February 28, 2026. South Star provided information pertaining to the mineral tenure and property agreements that supports the assumptions used in this Technical Report.

25.2 Geology and Mineralization

The Project is part of the AGB within the Coosa structural block of the Northern Piedmont geological province, which is formed of Neoproterozoic to early Paleozoic metamorphic rocks. The AGB extends for approximately 60 miles (~100 km) along a northeast strike (~N30E) from eastern Chilton County, across Coosa County, and into southwestern Clay County.

The Project area is characterized by metamorphosed rocks that include pelitic sediments (without graphite), quartz-bearing sediment with variable graphite content, sillimanite-graphite-rich sediments, and amphibolite gneiss (without quartz or graphite). Graphite lode mineralization (bedrock hosted) has been identified across the Property. The dominant lithologies that contain graphite are, in decreasing grade, friable quartzite, quartzite, quartz-sillimanite gneiss, and sillimanite gneiss.

25.3 Exploration

South Star has completed two drilling programs totalling 27 diamond drill holes for 2,391 m. Drilling completed by South Star has confirmed and defined graphitic sediments throughout the Property area.

South Star drill program procedures are consistent with industry standards. Sampling, logging, core recovery and collar and downhole survey data collected are consistent with industry standards. Independent, accredited laboratories prepared samples and conducted analytical methods for graphitic carbon. The author reviewed the results of the QAQC program and did not identify any systematic issues within the analytical dataset. As part of the site visit completed, the author confirmed the presence of graphite in drill core and that it is accurately reflected in drill logs, that proper QAQC and security procedures are implemented at the core logging facility and collected IW samples for check sampling.

25.4 Metallurgy

While GIRCU completed a thorough rougher optimization program, cleaner circuit development was limited. Also, the origin of the samples within the deposit in not fully understood. Most samples produced concentrate grades over 96% FC with a simple primary cleaning circuit consisting of a single regrind stage and cleaner flotation.

The recent test program at SGS build on the original work and also incorporated the past experience with similar projects. Limited cleaner flotation tests were conducted on three mineralized material type samples and all three mineralized material types produced concentrate grades above the minimum grade target of 92-94% C(t). The oxide mineralization, which will be mined for the first few years of operation, yielded the highest grade of over 99% C(t).

None withstanding the limited systematic development work, both test programs demonstrated that the BamaStar mineralization can be upgraded to a saleable graphite concentrate with relative ease. It is expected that a systematic process development program will produce further improvements in terms of concentrate grade and/or flake size distribution. Also, the fact that the oxide mineralization produced concentrate grades of over 99% C(t) derisks the ramp up of the operation since even sub-optimal operating conditions should still produce a concentrate that meets the minimum grade requirement of 92-94% C(t).

25.5 Mineral Resource Estimates

The MRE for the BamaStar Graphite Deposit was prepared by Mr. Matthew Harrington of Mercator. The effective date for the MRE is 24 July 2024.

Mineral Resources were estimated in conformity with CIM MRMR Best Practice Guidelines. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

The following summarizes the estimation methodology:

- Drill hole database validation.
- 3D modelling of geology, mineralization, weathering intensity, and redox state.
- Assay sample and geostatistical analysis including sample frequency, grade, density assignment, capping, compositing and variography.
- Block modelling and grade estimation.
- Block model validation.
- Assessment of reasonable prospects for eventual economic extraction.
- Mineral Resource classification.
- Mineral Resource reporting.

Mineralization modelling is based on the stratigraphic sequence and graphite occurrence, which can, in general, be well corelated between drill hole sections. Mineral Resource classification is based on drill hole spacing, interpolation pass and confidence in the geological model (stratigraphy, redox state, weathering, and mineralization).

The BamaStar Graphite Deposit MRE is presented in Table 25.1.

Table 25.1 BamaStar Graphite Deposit Mineral Resource Estimate Effective Date: July 24, 2024*

Type	Redox State	Cut-off Cg %	Category	Tonnes Mt	Cg %	Contained Graphite t
Open Pit	Oxide	0.90	Inferred	15.1	2.24	338,240
	Transition	0.90	Inferred	8.3	2.16	179,280
	Fresh	1.37	Inferred	28.8	1.96	564,480
	Combined	0.90 / 0.90 / 1.37	Inferred	52.2	2.07	1,080,000

Mineral Resource Estimate Notes:*

1. ***Mineral Resources were prepared in accordance with the CIM Definition Standards (2014) and the CIM MRMR Best Practice Guidelines (2019).***
2. ***Graphitic carbon (Cg %) grade was estimated from 1.5 m downhole assay composites using Inverse Distance Squared. No grade capping was applied. Model block size is 15 m (x) by 15 m (y) by 5 m (z). Block volume was assigned on a partial percentage basis.***
3. ***A redox state geological model was developed from verified drill hole and trenching data and used to estimate oxide, transition, and fresh material in the block model.***
4. ***A weathering intensity geological model was developed from verified drill hole and trenching data and used to estimate weathering intensity as strong, moderate, weak, and unweathered in the block model.***
5. ***Bulk density was applied based on weathering intensity and reflects average bulk density determinations of 2.52 g/cm^3, 2.57 g/cm^3, 2.73 g/cm^3, and 2.81 g/cm^3 for strong, moderate, weak, and unweathered respectively. The average bulk density for the Mineral Resource is 2.72 g/cm^3.***
6. ***Open Pit Mineral Resources are defined within an optimized pit shell with a pit slope angle of 46^0 and includes a 100 m offset from the highway for mining and 500 m offsets from the highway for oxide and transition-fresh zones respectively where blasting may be required. The pit has an overall 1:1.5 strip ratio (waste: mineralized material).***
7. ***All prices are in US$ currency.***
8. ***Graphite product pricing parameters used in pit optimization include: $980/t bulk concentrate (94.4% to 98.4% total carbon), $3,500/t purified flake/99.95% (micronized, 8 um), $9,500/t CSPG (18 um), and $11,500/t CSPG (8 um). Revenue assumptions are based on assumed sales of 3% bulk concentrate, 19% purified flake (micronized, 8 um), 63% CSPG (18 um), and 15% CSPG (8 um).***
9. ***Costs used in pit optimization vary based on redox state and location and include: waste mining at $2.23/t to $3.10/t moved plus an incremental mining cost of $0.06/t to $0.07/t below the base elevation (250 or 270 masl) and $2.20/t to $3.25/t for mineralized material processing plus an incremental mining costs of $0.03/t to $0.07/t below the base elevation (250 or 270 masl). The processing cost varied by redox state with processing at $11/t to $18.15/t processed, and G&A at $1.74/t processed.***
10. ***Combined graphite recoveries (mill feed to final product) of 84.98% oxide, 84.98% transition, and 86.10% fresh material. Upgrading of the bulk concentrate to finished products used a 94% recovery.***
11. ***Open Pit Mineral Resources are reported at a cut-off grade of 0.90 % Cg for oxide and transition material and 1.37 % Cg for fresh material within the optimized pit shell. The cut-off grade reflects the marginal cut-off grade to define reasonable prospects for eventual economic extraction by open pit mining methods.***

12. ***Mineral resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.***
13. ***Mineral resources are not Mineral Reserves and do not have demonstrated economic viability. Mineral resource tonnages are rounded to the nearest 100,000.***

25.6 Mine Plan

AGP's opinion is that with current graphite pricing levels and knowledge of the mineralization and previous mining activities, open pit mining offers the most reasonable approach for development of the BamaStar Project. This is based on the size of the resource, tenor of the grade, grade distribution and proximity to topography for the deposits.

The there are three distinct pit areas as part of the plan within the project boundaries. These are the North Pit, South Pit and Small South Pit. All the pits were designed with 10 m bench heights and 46-degree overall angles. The pit ramps are sized to accommodate a 55-tonne truck with ramp gradients of 10% and widths of 21.6 m.

The North Pit is divided into two main phases and contains 29.9 Mt of mill feed grading 2.1% Cg with 48.9 Mt of waste for an overall strip ratio of 1.6:1 (waste:feed). The South Pit also has two phases with a total mill feed tonnage of 8.9 Mt grading 2.09% Cg with 13.4 Mt of waste for a strip ratio of 1.4:1 (w:f). The Small South Pit has 3.5 Mt grading 2.25% Cg with 4.2 Mt of waste and strip ratio of 1.57:1 (w:f).

The mine schedule for open pit mining consists of 42.3 Mt of mill feed grading 2.11 Cg% (diluted) over a processing life of 19 years. Open pit waste tonnage totals 66.5 Mt and will be placed into various waste storage areas together with filtered tailings. The overall open pit strip ratio is 1.6:1 of waste: mill feed. The mine schedule utilizes open pit mining areas to supply mill feed up to a maximum of 2.6 Mtpa to the mill facility.

The deposit outcrops and therefore no pre-stripping is required although some site preparation is necessary with the establishment of access and sediment ponds. Mill feed is stockpiled over the mine life to assist in grade management with a peak capacity of 3.5 Mt in Year 11 then declines to zero with stockpile reclaim over the remainder of the mine life.

Oxide mill feed material is the focus of the early mine schedule for the first six years with any transition or fresh material stockpiled awaiting a plant upgrade. Year 6 onwards all material types are processed as encountered. With the focus on oxide material, drilling and blasting is not required until Year 3 and beyond.

25.7 Recovery Methods

The process flowsheet is based on preliminary testwork information and has been tested for proof of concept. Further metallurgical testing including Locked cycle tests, pilot scale tests and variability tests are recommended to validate the selection of the process flowsheet.

25.8 Infrastructure – Water Supply Conclusion

Section 18.5 discusses the project water supply. Due to the fact that the site is located at the top of several small watersheds, it is sensitive to water supply shortfalls. This risk is offset by an 80% water recycling rate. However, the site may require off-site water supply and/or expanded water storage to meet processing needs, particularly at the higher production rate. Climate change is expected to increase rainfall (EPA 2016) and decrease water supply risk, but more-extreme weather patterns also augment the risk for long-term drought. Based on currently available data, it appears that 500,000m^3 of water storage and/or an offsite water source of ~64 m^3/hour (~280 gpm) is sufficient to maintain operations during drought conditions.

25.9 Environmental, Permitting and Social Considerations

Section 20 presents the environmental studies performed on the site. Because of the presence of sulphide minerals (pyrite in particular) which is co-hosted with the graphite, SSBM conducted a geochemical characterization study to assess the risk of Acid Rock Drainage ("ARD") and Metal Leaching ("ML"). This study determined that the waste rock is potentially acid consuming ("PAC") or non-acid generating ("NAG"). It also determined that the whole tailings product is potentially acid generating ("PAG"). These studies determined that the best solution to mitigate ARD and ML risk is to co-dispose AC waste rock with PAG tailings. This 'waste blending' mitigation strategy is a widely applied best practice for mitigating geochemical risk (INAP 2009).

The status of future permitting is discussed in Section 20.2. In summary, the site will need various state and federal permits. The most challenging of which will be the National Pollution Discharge Elimination ("NPDES") permit for site-wide excess water discharge, the US Army Corp of Engineers 404 permits for impacts to waters of the state and/or wetlands. However, Alabama is a business-friendly jurisdiction, and all permits can be acquired within the project development timeline.

25.10 Other Relevant Data – Value-Add Anode Plant

The interpretations and conclusions by the authors responsible for Section 24.0 are as follows:

- South Star is developing a fully vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery and fuel cell markets.

- South Star's strategy includes NFG concentrator plants at Santa Cruz and BamaStar. Value addition transformation of NFG concentrates from the two graphite properties into high-purity, battery-grade, active anode material will be performed by a centrally located, Value-Add Anode Plant in the USA.

- The Value-Add Anode Plant entails a phased approach to increase production. Phase 1 will process 21,300 tpa NFG from Santa Cruz. Phase 2 and Phase 3 will each process 21,300 tpa NFG from BamaStar.

- Each expansion phase of the Value-Add Anode Plant will consist of the following:
  - Purification Plant that will refine 21,300 tpa of NFG (FC content of ≥ 95.0 wt.- %) by two-stage HF and HCl to produce 20,000 tpa purified NFG (FC content of ≥99.95 wt.-%)
  - Spheroidization Plant consisting of micronization and two-stage spheroidization to produce 10,000 tpa Medium SPG and 2,000 tpa Fines SPG product and 8000 tpa uncoated SPG fines by-product
  - Dry pitch tar Coating Plant producing 12,600 tpa of CSPG.
- All technologies proposed for the Value-Add Anode Plant are conventional, known, and well established and standard within the graphite processing industry and active anode manufacturing, with no new technology or processes proposed.
- The proposed location in Mobile, Alabama is well suited to locate the Value-Add Anode Plant since:
  - the site is flat, vacant, and has been stabilized, thereby reducing development time and cost
  - has been cleared, is zoned 1-2 Heavy Industrial, with no known environmental issues that may materially impact the development of the Value-Add Anode Plant
  - is of sufficient size (~28 acres) which should not constrain layout or design
  - is well positioned since it is located close to international containerized harbor, urban nodes, rail and air transport infrastructure, and Interstate Highways
  - contain all industrial utilities, thereby reducing development time and cost.
- ANZAPLAN was retained by South Star to purify NFG concentrate of a sample from BamaStar produced during a 2022 pilot metallurgical testing program at MRL. The FC content of the sample is 93.47 wt.-%. Purification confirms suitability of:
  - HF and HCl two-stage leaching to purify NFG from BamaStar to achieve battery-grade anode purity using the most common flake graphite purification method
  - NFG concentrate from BamaStar to achieve ≥99.95 wt.-% battery-grade anode purity, thereby conforming suitability of BamaStar to achieve battery-grade anode purity.
- Preliminary preparatory tests performed by independent service provider in the USA confirmed:

 - graphite from BamaStar can be successfully micronized and spheroidized

 - first spheroidization yield of 50 wt.-%.

- Initial performance tests by independent laboratories in the USA confirms suitability of BamaStar graphite to meet general battery specifications.

- Given the current preliminary assessment stage of developing the Value-Add Anode Plant, no contracts for development, production, or marketing and sales are currently in place or under negotiations. Since the Anode Plan is akin to a factory, these contracts have available time for negotiations during subsequent development stages.

It is generally known in the industry that new refined battery supplier qualifications can take six to 18 months. International market intelligence firm has suggested that commercial contracts favour three to five years, with typical length of five years.

- Given the preliminary assessment stage of the Value-Add Anode Plant, the ESIA of the proposed Value-Add Anode Plant has not commence. However, the authors of Section 24.0 are not aware of any known environmental or social issues considering:

 - the site has been cleared, is vacant and has been zoned 1-2 Heavy Industrial

 - the Anode Plant does not produce radioactive or Class 1 explosives

 - hazardous waste generated will be aligned with that found generally at many businesses, industrial and chemical facilities

 - all waste will be handled in accordance with local, state, and federal laws and will only be disposed of at fully licensed and insured waste processing facilities.

- The total CAPEX to develop each of the three expansion phases of the Value-Add Anode Plant, including direct and indirect costs and contingency, amounts to $269.0 million. The CAPEX contingency of 25% is reasonable, considering optimisation of equipment costs will be achieved by sourcing certain non-critical equipment from non-western sources.

- The overall OPEX per year, including direct costs, SG&A and 10% contingency, amounts to $32.0M. This excludes costs relating to producing of the NFG concentrate by BamaStar and Santa Cruz. Based on a nominal NFG concentrate feed rate of 21,300 tpa and nominal sales of CSPG and by-product of 20,000 tpa the OPEX equates to $1,504/t feed and $1,555/t of sales; and,

- Given the positive site location and initial purification and performance tests and within the constraints and assumptions as outline in Section 24.0, the authors of Section 24.0 concludes:

- initial tests have demonstrated that the value of the graphite resource can be upgraded to take advantage of the new markets that are emerging as the result of electrification as the world moves away from the use of fossil fuels

- the Value-Add Anode Plant has reasonable prospects for techno-economic viability

- excluding other material factors, the proposed Value-Add Anode Plant can proceed to the next stage of development.

25.11 Markets and Contracts

Graphite is a laminar, crystalline, naturally occurring form of carbon indispensable to many critical military and commercial platforms. It has unique physical and chemical characteristics such as chemical inertness, thermal stability, high electrical conductivity, thermodynamics and lubricity that make it suitable for a variety of industrial and emerging value-add applications, with end-uses ranging from armour plating to electrodes. The proliferation of value-add applications, particularly for electric vehicle (EV) batteries, drives substantial demand increase globally. For many of these uses, no suitable substitutes are currently available.

In 2023, global supply for NFG concentrates was approximately 1.55 Mt and China accounted for nearly 78% of the production. China, a Foreign Entity of Concern (or "FEOC"), also is responsible for the production of 98% of the CSPG and dominates the synthetic graphite markets globally with 1.4 Mt of production in 2023. The United States currently produces no NFG, has operational no midstream or downstream processing facilities and is 100% dependent on graphite imports, with most coming from a FEOC. The U.S. imported approximately 110,000t of graphite in 2023, with materials mainly coming from China, Madagascar, Brazil and Canada.

Globally, graphite has been classified as a "critical mineral" by governments of countries such as the Unites States, Canada, the European Union, and Australia among others. The US Department of Energy ("DOE") classifies graphite as high risk / high importance in both the short-term and medium-term because of its importance in LiB, energy storage and defence applications. Increasingly, geopolitical tensions, supply-chain disruptions and a drive for more diverse production alternatives is driving production back on-shore or near-shore in the West. Geopolitics is highly relevant for the graphite markets.

It is estimated that there is currently a projected demand of approximately 7.2Mt of NFG required by 2035 or a current supply shortfall of approximately 5.65Mt, based on 2023 supply. It's estimated that this is the equivalent to a shortfall of approximately 95 new average size graphite mines required by 2035. Graphite demand is estimated to exceed creating a deficit beginning in 2025 / 2026.

South Star is developing a vertically integrated USA battery anode material strategy to supply the expanding worldwide lithium-ion battery, fuel cell and industrial graphite markets. The project consists of a graphite mine and concentrate processing facility in Coosa County, AL, as well as a stand-alone Value-Add Plant in Mobile, AL for value addition transformation. First production is planned by 2027. The combined phases of the Value-Add Plant would produce sufficient CSPG for approximately 1 million electric vehicles ("EVs"), assuming 75kg of CSPG per vehicle and a 50% / 50% blend of synthetic and NFG CSPG.

25.12 Capital and Operating Cost Estimates

25.12.1 Mine and Process Plant

The total capital cost to develop the BamaStar Mine and Concentrator including direct and indirect costs and contingency, amounts to $186.8 million.

The overall operating cost per year, including mining and processing direct costs, G&A and concentrate transport, amounts to $53.08M. Based on a nominal concentrate production of 800,000 tonnes over the life of mine (19 years) the OPEX equates to $1246.4/t concentrate. As per the marketing section, the price of +100mesh/95% graphite concentrate, and -100mesh/95% graphite concentrate are approximately $1,100/t and $880/t respectively. Therefore, we can conclude that additional future strategies should be investigated, including building a Value-Add Anode Plant to improve the project economics and further studies to optimize cost.

25.12.2 Value-Add Anode Plant

The total capital cost to develop each of the three expansion phases of the Value-Add Anode Plant, including direct and indirect costs and contingency, amounts to $269.0M.

The overall operating Cost per year, including direct costs, SG&A and 10% contingency, amounts to $32.03M. This excludes costs relating to producing of the NFG concentrate by BamaStar and Santa Cruz. Based on a nominal NFG concentrate feed rate of 21,300 tpa and nominal sales of CSPG and by-product of 20,000 tpa the OPEX equates to $1,555/t of sales.

Given the positive site location and initial purification and performance tests and within the constraints and assumptions as outline in Section 24.0, the authors of Section 24.0 conclude:

- The Value-Add Anode Plant has reasonable prospects for techno-economic viability.

25.13 Economic Analysis

We can conclude from the results of the economic analysis that building and commissioning of the South Star graphite concentrator and mine with downstream Value-Add Anode Plant could provide favourable economic benefits with a Pre-Tax NPV of US$2,369 Million and Pre-Tax IRR of 34.8%. We can also conclude that the economics of the Project are most sensitive to pricing of graphite, then other factors.

25.14 Conclusion

Based on the deposit characteristics, strategic location, potential favourable economics, and performance characteristics of the products, the BamaStar Graphite Project is an important resource in the heart of one of the most important, EV, defense and stationary storage belts in the contiguous US. At the time of this report, the US currently produces no graphite and is 100% import dependent. There is a coming imbalance between supply and demand of graphite globally and potential supply chain disruptions highlight the current danger for the US and its allies for a mission critical input to industrial, energy, and defense sectors, amongst others.

BamaStar has significant potential advantages including:

- Start of mining operations in oxide material, which allows for less expensive initial CAPEX and OPEX for the Project when compared to hard rock deposits during the critical payback period.

- Location in the contiguous US with excellent access to existing infrastructure and logistics, which could result in a much lower capital intensity, when compared to viable alternatives.

- Project installations reside on private mining claims and private property; as a result, licensing and permitting could be secured in as little as 18-24 months, based on preliminary consultations with local consultants.

- The Project potentially has further benefits when combined with production from South Star's Santa Cruz Graphite Mine in Brazil. Some of the production from the Santa Cruz Graphite Mine is planned to supplement feed stock to the Project's VAP. In addition, in case of any shortfall or production interruption from the BamaStar Concentrator, the Santa Cruz mine could provide some redundancy for the Project to meet production targets if economically beneficial. First concentrate production is planned for Q4 2024 at Santa Cruz and integrated value-add production in the US is planned for 2027.

- The proposed Value-Add Plant built on a vacant, zoned Heavy Industrial property near the Port of Mobile with existing utilities, logistics and other infrastructures available. This allows for potentially much lower capital intensity as existing infrastructure, logistics and supply chains are utilized and require less investment.

- Ability to potentially scale in a phased, modular approach to control risks and deal effectively with market conditions, financing requirements, permitting, and licensing schedules and commercial realities.

The results of the PEA demonstrate that the Project is financially viable with potentially favourable economics, products with strong performance characteristics, relatively modest capital intensities and in a strategic location. The authors of the PEA recommend that the BamaStar Graphite Project be advanced to the Feasibility Study which can be completed in approximately 18 months after the start of drilling and all required permits have been secured.

25.15 Risk and Opportunities

25.15.1 Risks

25.15.1.1 Geology & Resource

Factors that may materially impact the Project Mineral Resource include, but are not limited to, the following:

- Changes to the long-term graphite price assumptions including unforeseen long-term negative market pricing trends.
- Changes to the deposit scale interpretations of mineralization geometry and continuity including:
  - Thickness and distribution of redox state
  - Thickness and distribution of weathering intensity
  - The stratigraphic sequence is not fully understood for both the Ceylon Mine and Rushing Prospects as well as the continuity between the two
  - Faults present may locally shift mineralization, and these are not well defined.
- Inaccuracies of deposit modelling and grade estimation programs with respect to actual metal grades and tonnages contained within the deposit.
- Variography was completed on the full deposit dataset based on limited sample pairs and could not be resolved for the individual units. As such, grade trends may not be fully understood.
- The relationship between poor core recovery and graphitic carbon grade is not well understood at this time.
- Mineral Resource density is assigned based on average values for weathering intensity and has limitations with respect to local variability and precision.
- Changes to the input values for mining, processing, and G&A costs to constrain the Mineral Resource.
- Changes to metallurgical recovery assumptions including metallurgical recoveries that fall outside economically acceptable ranges.
- Variations in geotechnical, hydrological, and mining assumptions.

- Changes in the assumptions of marketability of the final product.
- Issues with respect to mineral tenure, land access, land ownership, environmental conditions, permitting, and social license.
- Interpretation of the property agreements may differ to what has been assumed for the purpose of the Technical Report.

25.15.1.2 Mining

Risks associated with mining include but are not limited to the following:

- Wall slope instability due to the dip slope nature of the deposit. This could result in additional waste stripping in the footwall to stabilize the slope for mining.
- Stronger rock than anticipated – while aiding wall slope stability this could require drilling and blasting sooner to provide sufficient small material for the mining equipment.
- Material handling across the highway – this represents a risk if the system is unavailable for a time unless sufficient stockpiles are located near the plant facility.
- Larger swell percentages then estimated which reduces storage capacity on site.

25.15.1.3 Metallurgy

Several risks have been identified regarding metallurgy:

- The samples tested may not fully represent the average mineralized material types for the entire resource.
- The flake size distribution may vary from area to area.
- Overall recovery may be overstated for the average resource.
- Scale-up of polishing and stirred media mills since few graphite operations are in place could serve as a technical reference.
- Start-up and ramp-up period may be longer than expected.
- Lower grades and/or recoveries during ramp-up period.

25.15.1.4 Recovery Methods

The selected process equipment may not be able to reproduce the lab testwork results. To reduce the risk, further metallurgical testing and vendor testing of critical process operations is recommended during the next phases of project development.

25.15.1.5 Infrastructure – Water Supply Risks

The project requires additional storage and/or an offsite water supply when the higher production rate commences. The PEA considers that the site must create additional storage or acquire additional water sources approximately after five years of production. Additional storage would likely require the creation of a jurisdictional dam. Future water supply is therefore a low-level risk factor.

Water management may be a site-wide challenge. Climate change is expected to increase storm intensity (EPA 2016), and the surface water management infrastructure will require continual monitoring, management, and improvement over time. However, unlike many sites, the BamaStar project is located near major infrastructure this makes road wash-outs or other common extreme storm impacts will be a nuisance rather than a serious economic impact.

25.15.1.6 Environmental and Geochemistry

Site Water Management:

The project has a low-risk for metal leaching impacts to surface water quality. This risk will be evaluated in subsequent study stages. Because of the site’s makeup water requirement (see Section 18.5), this risk would be mitigated by preferentially utilizing problematic contact water sources.

Environmental Permitting:

The project has a permitting risk. Permitting a project in the U.S. is always challenging, but the site has a significant advantage because the National Environmental Policy Act (NEPA) will likely not be required.

25.15.2 Opportunities

25.15.2.1 Geology & Resource

Opportunities have been identified for Mineral Resources.

- The deposit is open along strike and at depth and opportunities are present to define new Mineral Resources with extension drilling.
- Opportunities are present to define new Mineral Resources through exploration drilling in the southern part of the Ceylon Mine Prospect and to the northeast of the Rushing Prospect in the Potential Option Agreement area.

- Opportunities are present to increase Mineral Resource categorization through infill drilling.

25.15.2.2 Mining

Improved productivity associated with softer than anticipated rock resulting in lower drilling and blasting and improved loading / hauling efficiency.

Greater compaction in the waste storage areas of waste rock and tailings. This results in less land disturbance due to more compact storage facilities.

25.15.2.3 Metallurgy

Metallurgical testing has been limited to-date and a comprehensive flowsheet optimization program will be carried out during the next study phase. Several opportunities have been identified and will be investigated during the next study

- Simplify the flowsheet for the initial phase of operation because of the superior response of the oxide mineralization. This would reduce CAPEX and OPEX for the first several years of operation.

- Maximize grade of the -150 microns material that will be directed to the value-add process to lower the operating cost of the integrated process. Increasing the concentrate grade using traditional flotation is significantly cheaper compared to the chemical purification process.

- Incorporate a split flowsheet to optimize the revenue of the graphite concentrate. The coarser size fraction could be upgraded to only 95% C(t), which is the standard for most applications, while the -150 microns material would be upgraded to the highest grade possible by traditional mineral processing.

- Investigate coarsening of the primary feed size to the flotation circuit, thus reducing CAPEX and OPEX.

26.0 RECOMMENDATIONS

26.1 Summary

Considering the positive outcome to this report, it is recommended to continue developing the project through additional studies, as outlined below. Table 26.1 summarizes the proposed budget to advance the project through the next study stage, i.e Feasibility Study.

Table 26.1 Summary of Recommended Budget for Feasibility Study

Description	Cost (US$)
Exploration & Mineral Resources / Reserves Estimates	2,000,000
Mining & Mining Geotechnical	1,550,000
Metallurgy (Concentrator)	320,000
Metallurgy (CSPG Plant)	500,000
Infrastructure Geotechnical	250,000
Power	50,000
Highway Crossing / Highway Relocation	150,000
Water Management	200,000
Waste Storage Facility	100,000
Environmental and Permitting	1,000,000
CSPG Plant Design	1,650,000
Concentrator Process Plant	1,000,000
Recommended Study Budget Subtotal:	**8,770,000**
NEPA Study / Permitting (if required)	500,000
Small Commercial Pilot Plant (Alternative)	4,500,000
Recommended Study Budget Total with Alternatives:	**13,770,000**

26.2 Mineral Resources

The following activities are recommended to improve Mineral Resource confidence and definition:

- A 2,250 m (7,382 ft) reverse circulation drilling program directed at characterizing the depth of oxide and transition material across the deposit.
- A 3,500 m (11,483 ft) infill diamond drill hole program directed at increasing confidence in Inferred Mineral Resources to the Indicated and Measured Mineral Resource categories.
- A 1,500 m (4,921 ft) exploration and stratigraphic drill program directed at better understanding Property stratigraphy and defining new areas of graphite mineralization.

- A comprehensive specific gravity determination program.
- Continued assessment of the relationship between core recovery and graphite grade.
- An updated MRE based on results of the recommended exploration programs

The estimated cost of the recommended work program is approximately $2,000,000.

26.3 Mining and Mining Geotechnical

To date no work has been completed on the geotechnical aspects of the mine plan. Geotechnical mine investigations should be carried out to develop the hydrogeology and geotechnical parameters for the open pits. This program includes a drilling campaign and laboratory program to develop pit slope, waste storage area and pit dewatering design parameters. The cost of the geotechnical field and laboratory program is approximately $1,000,000.

Additional study is required with respect to mine using the updated parameters to sequence and manage material. This will include equipment selection and detailed discussions with vendors on equipment pricing. This portion of the next stage of study is expected to cost $400,000. Groundwater testing in the geotechnical holes is estimated to cost $150,000.

The estimated cost of the recommended program is approximately US$1,550,000.

26.4 Metallurgical Testwork - Concentrator

In order to develop a flowsheet, mass & water balance, and process design criteria at the feasibility level, a full project development program is recommended. This program will develop the process flowsheet from the initial grinding stage, through rougher circuit, and full cleaner circuit. Also, vendor testing of certain processing units such as solid liquid separation, drying, or dry screening are highly recommended to ensure proper equipment sizing.

Careful attention should be given to the selection of the samples submitted for testing to ensure that they are fully representative of certain phases of the proposed mine plan.

A high-level budget for the FS level metallurgical program is provided in Table 26.1. The total program is expected to cost up to $320,000.

Table 26.2 Proposed Metallurgical Testwork Budget for FS

Item	Detail	Subtotal
1	Sample Preparation	$15,000
2	Chemical & Mineralogical Characterization	$20,000
3	Comminution Testing	$60,000
4	Flowsheet Development Testing	$75,000
5	Variability Flotation Testing	$90,000
6	Vendor Testing	$60,000
	Total - Testwork	**$320,000**

26.5 Metallurgical Testwork – Value-Add Anode Plant

The recommendations by the authors responsible for Section 24.0 are as follows:

- Test outlined in Section 24.0 excludes Santa Cruz. As such, it is proposed to perform bench metallurgical test work on NFG from Santa Cruz to assess:
  - purification potential through applying HF and HCl two-stage leaching
  - if Santa Cruz NFG concentrate can be purified to achieve ≥99.95 wt.-% battery-grade anode purity
  - determine spheroidization yield and other performance, engineering, equipment sizing and specification and OPEX input criteria
  - suitability of Santa Cruz graphite to meet general battery specifications.
- Further test work relating to the Purification, Spheroidization and Coating Plants are required as follows:
  - evaluate the impact of NFG concentrate variability on performance, quality, and costs
  - perform locked cycle tests to confirm the grade, yield and recovery. Additionally, the test work will determine the influence of recycling streams and potential impurity build up
  - perform test work to optimize reagent usage, yield and recovery of all major unit processes

 - perform wastewater treatment test work as the Purification Plant produces large amounts of acidic and other wastewater streams

 - filtration and drying test-work

 - spheroidization test work should be performed to assess if fines from the Medium spheroidization can produce a Fine SPG product that meets battery-grade anode specifications.

- A bulk pilot plant campaign should be performed on each of the major process steps (purification, micronization, spheroidization, purification and coating) - for both BamaStar and Santa Cruz. This is required to generate metallurgical upscaling parameters that will be required for basic and detail engineering and design, equipment sizing and vendor test work.

 - test work during the pilot plant campaign is required to specify and size the primary equipment including the micronizer, spheroinizer, kiln, dryer, filters and coating equipment

 - samples from the test work campaign should be taken and sent to suppliers for them to do their internal tests to confirm that the equipment recommended is suitable for the process. Failure to provide sufficient samples may affect the warranties from suppliers

 - the energy balance within the Spheroidization, Purification and Coating Plant is assessed to minimize waste and reduce operating costs

 - produce enough purified material for enhance and pilot coating test work to supply CSPG material for initial qualification and customer assessment

 - the pilot campaign should focus on targeting SPG product of battery-grade purity having the following typical market values for spheroidize graphite:

 a FC content of 99.95 wt.-%

 Brunauer-Emmett-Teller (“BET”) surface area ≤ 8.0

 tap density of ≥ 0.95 g/cm^3

 D50 particle size between 16 µm and 19 µm

 D90/D10 of less than ~3.5 to ensure narrow PSD.

- Perform geotechnical and detail topographical surveys on the proposed site in Mobile, AL, to determine the ground conditions for the next stage engineering and design.

- Power, gas and raw water supply needs to be finalized. The interfaces with the supply companies needs to be confirmed.

- Due to the uncertainty of future prices and the potential markets for the intended products and by-product, it is proposed to contract an independent market research company to develop a Graphite Market Report specifically for the needs and requirements of the Value-Add Anode Plant and its intended products and by-products.

- In order to ensure appropriate engineering and design and implementation of adequate mitigating measures for the proposed Value-Add Anode Plant that are in accordance with Alabama Environmental Regulations and Laws, and to have the necessary permits to commence construction and operation of the Value-Add Anode Plant, the ESIA process in accordance with Alabama Environmental Regulations and Laws needs to commence.

- Within the constraints and assumptions as outlined in Section 24.0, the Value-Add Anode Plant is technically viable, and as such, it is recommended to proceed assessing the Anode Plant at the next development stage. The resultant of the next development stage should be a single development option, in accordance with the cost estimation methodology outlined in AACE International Recommended Practice No. 47R-11, 2012, Cost Estimate Classification System, As Applied in the Mining and Mineral Processing Industries.

26.6 Infrastructure Geotechnical

The following activities are recommended to support the design of the site infrastructure into the next phase of the project:

Geotechnical site investigations should be carried out at the most optimal surface infrastructure site location to characterize the foundation requirements associated with the proposed surface infrastructure facilities. This program includes a field campaign and laboratory program. The field program should include surface mapping, a drilling program and a test pit program. Samples taken from the field program will be tested in a laboratory to develop design geotechnical parameters. In addition, samples of waste rock (core) and tailings will also be tested in a laboratory to develop geotechnical design parameters. The cost of the geotechnical field and laboratory program is approximately $250,000.

26.7 Power

The final routing of the incoming high-voltage power lines should be studied further in terms of both design and community acceptance. The cost of this is approximately $50,000.

26.8 Highway Crossing / Highway Relocation

The current routing of the conveyor crossing highway 280 should be studied further in terms of both design and community acceptance. Whether the conveyor will pass beneath the highway or above needs further investigation. The cost of this is approximately $50,000.

The mine pits are divided between the North and South side of the highway 280, and as such further studies should be conducted to investigate the economical and safety impact of keeping the highway in its current location or relocating the highway. This needs to be studied further in terms of design, cost, schedule, permitting, regulatory and community acceptance. The cost of this is approximately $100,000.

26.9 Water Management

Site wide water management will require detailed design of the surface water management plan infrastructure and a re-assessment of the water balance. As mentioned in Section 18.5, it is necessary to find either an off-site water source or increase the on-site water storage, both of which will require study and evaluation. Furthermore, ponds must be designed to manage the sediment discharge requirements, and a sedimentology study will be necessary. GRE estimates $200,00 is required to advance water studies to FS.

Groundwater characterization has been included in the Environmental and Permitting section below. Groundwater characterization is also an essential element of all onsite geotechnical investigations of the mine waste structures, the pit slopes, and the site infrastructure. The cost of groundwater studies has been integrated into the geotechnical programs discussed in other subsections.

26.10 Waste Storage Facility (WSF)

A more detailed evaluation of Waste Storage Facility development needs to be carried out in the next project phase. This should include optimization of waste rock and tailings placement (stacking plan), foundation design, surface and seepage water management, and physical and geochemical stability. The cost to detail the sequencing and operating procedures as part of the next level of study is expected to be $100,000.

26.11 Environmental and Permitting

The project requires various State and Federal permits discussed in Section 20.2. These permits are not easy to acquire. The following will be necessary:

A full-scale baseline environmental data collection network must be created including:

- Water flow measurement.
- Surface water quality monitoring.

- Groundwater quality monitoring (including the drilling and installation of groundwater wells).
- Air quality monitoring.
- Noise and vibration monitoring.
- Biological and biodiversity monitoring.
- Social baseline assessment.

The following water studies are required:

- Complete geochemical characterization of tailings and mine waste including long-duration kinetic cell tests, and greatly expanded static testing programs as seen in Section 20.1.
- Water quality predictive modelling of excess mine water discharge to streams including:
  - ARD and ML
  - Sediments, sedimentology and flocculant use
  - Salts and other regulated parameters including nitrates (from blasting residue), oil and grease, and surfactants (from processing chemicals).
- A full predictive water quality model of the post-mining pit lake.
- A full predictive water quality model of seepage and runoff from the post-mining co-disposed waste and tailings structures.

Environmental impact studies (apart from water) including the following:

- Air quality modelling.
- Noise modelling.
- Vibration impact modelling.
- Traffic study modelling.
- Biological impact modelling.
- Social impact assessment.

The studies and data above will be compiled into permit applications for the permits described in Section 20.2.

GRE estimates that $1M will be required for the permits with baseline data collection.

26.12 Other Relevant Data – Value-Add Anode Plant

The recommendations by the authors responsible for Section 24.0 are as follows:

- Test outlined in Section 24.0 excludes Santa Cruz. As such, it is proposed to perform bench metallurgical test work on NFG from Santa Cruz to assess:
  - purification potential through applying HF and HCl two-stage leaching
  - if Santa Cruz NFG concentrate can be purified to achieve ≥99.95 wt.-% battery-grade anode purity
  - determine spheroidization yield and other performance, engineering, equipment sizing and specification and OPEX input criteria
  - suitability of Santa Cruz graphite to meet general battery specifications.
- Further test work relating to the Purification, Spheroidization and Coating Plants are required as follows:
  - evaluate the impact of NFG concentrate variability on performance, quality, and costs
  - perform locked cycle tests to confirm the grade, yield and recovery. Additionally, the test work will determine the influence of recycling streams and potential impurity build up
  - perform test work to optimize reagent usage, yield and recovery of all major unit processes
  - perform wastewater treatment test work as the Purification Plant produces large amounts of acidic and other wastewater streams
  - filtration and drying test-work
  - spheroidization test work should be performed to assess if fines from the Medium spheroidization can produce a Fine SPG product that meets battery-grade anode specifications.

- A bulk pilot plant campaign should be performed on each of the major process steps (purification, micronization, spheroidization, purification and coating) - for both BamaStar and Santa Cruz. This is required to generate metallurgical upscaling parameters that will be required for basic and detail engineering and design, equipment sizing and vendor test work.

  - test work during the pilot plant campaign is required to specify and size the primary equipment including the micronizer, spheroinizer, kiln, dryer, filters and coating equipment

  - samples from the test work campaign should be taken and sent to suppliers for them to do their internal tests to confirm that the equipment recommended is suitable for the process. Failure to provide sufficient samples may affect the warranties from suppliers

  - the energy balance within the Spheroidization, Purification and Coating Plant is assessed to minimize waste and reduce operating costs

  - produce enough purified material for enhance and pilot coating test work to supply CSPG material for initial qualification and customer assessment

  - the pilot campaign should focus on targeting SPG product of battery-grade purity having the following typical market values for spheroidize graphite:

    a FC content of 99.95 wt.-%

    Brunauer-Emmett-Teller (“BET”) surface area ≤ 8.0

    tap density of ≥ 0.95 g/cm^3

    D50 particle size between 16 µm and 19 µm

    D90/D10 of less than ~3.5 to ensure narrow PSD.

- Perform geotechnical and detail topographical surveys on the proposed site in Mobile, AL, to determine the ground conditions for the next stage engineering and design.

- Power, gas and raw water supply needs to be finalised. The interfaces with the supply companies needs to be confirmed.

- Due to the uncertainty of future prices and the potential markets for the intended products and by-product, it is proposed to contract an independent market research company to develop a Graphite Market Report specifically for the needs and requirements of the Value-Add Anode Plant and its intended products and by-products.

- In order to ensure appropriate engineering and design and implementation of adequate mitigating measures for the proposed Value-Add Anode Plant that are in accordance with Alabama Environmental Regulations and Laws, and to have the necessary permits to commence construction and operation of the Value-Add Anode Plant, the ESIA process in accordance with Alabama Environmental Regulations and Laws needs to commence.

- Within the constraints and assumptions as outlined in Section 24.0, the Value-Add Anode Plant is technically viable, and as such, it is recommended to proceed assessing the Anode Plant at the next development stage. The resultant of the next development stage should be a single development option, in accordance with the cost estimation methodology outlined in AACE International Recommended Practice No. 47R-11, 2012, Cost Estimate Classification System, As Applied in the Mining and Mineral Processing Industries.

27.0 REFERENCES

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28.0 QP CERTIFICATES

CERTIFICATE OF QUALIFIED PERSON

I, Jacob Makil, P. Eng., as an author of this report entitled "BamaStar Graphite Project, Preliminary Economic Assessment National Instrument 43-101 Technical Report", prepared for South Star Battery Metals Corp. and dated 12 November 2024, do hereby certify that:

1) I am a Study Manager with Lycopodium Minerals Canada Ltd., with a business address at 5090 Explorer Dr, Suite 700, Mississauga, ON, L4W 4T9.

2) I am a graduate of Concordia University, located in Montreal, Quebec, with a Bachelors of Mechanical Engineering, 2005.

3) I am a Member of Professional Engineers and Geoscientists Newfoundland and Labrador (PEGNL) and registered as a Professional Engineer in the province of Newfoundland and Labrador (Member Number 06383). I have practiced my profession in the mining and metals industry continuously since 2005.

4) My relevant experience for the purpose of the Technical Report includes:

   - 20 years combined experience of enginneering and project management in the mining and metals industry, five years of which were located on the mine site.
   - Study manager for several preliminary economic assessment studies including one other graphite projects.
   - Have either lead or been apart of four other graphite studies from PEA to feasibility.
   - Development of capital cost estimate in previous studies.

5) I have read the definition of 'qualified person' set out in National Instrument 43-101 ('NI 43-101') and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a 'qualified person' for the purposes of NI 43-101.

6) I have not visited the Bamastar project site.

7) I am responsible for Sections 1.1, 1.14.1, 1.17, 1.17.1, 1.17.3, 1.20, 1.21.1, 2.1, 2.2, 2.5, 2.8, 3.1, 18.1, 18.2, 18.3, 18.4, 18.5, 21.1, 21.3, 25.12.1, 25.13 26.1, 26.7, 26.8. of the Technical Report.

8) I have not been involved in the previous Technical Report on the Bamastar Project's preliminary economic assessment.

9) I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10) To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 12th day of November 2024

"Signed and Sealed"

Jacob Makil, P. Eng.

CERTIFICATE OF QUALIFIED PERSON

I, Matthew D. Harrigton, P. Geo., as an author of this report ("the Technical Report") entitled "BamaStar Graphite Project Preliminary Economic Assessment National Instrument 43-101 Technical Report", prepared for South Star Battery Metals Corp. and dated 12 November 2024, do hereby certify that:

1) I am employed as President and Senior Resource Geologist with Mercator Geological Services Limited, with a business address 65 Queen Street, Dartmouth, Nova Scotia, Canada B2Y 1GA.

2) I am a graduate of Dalhousie University, located in Halifax, Nova Scotia, with a Bachelor of Science (Honours, Geology), 2004.

3) I am a member in good standing with the Association of Professional Geoscientists of Nova Scotia (Registration Number 0254) and the Association of Professional Engineers and Geoscientists of Newfoundland and Labrador (Member Number 09541), and the Ordre des Géologues du Québec (Registration Number 2345).

4) I have practiced my profession for 20 years. My relevant experience with respect to this Technical Report includes extensive professional experience with respect to geology, mineral deposits, mineral resource estimation, mineral deposit evaluation and exploration activities in Canada and internationally. I have specific experience in assessment of base metal, precious metal, manganese-iron and volcanogenic massive sulphide deposits. I have contributed to one other graphite project. I have authored and co-authored numerous related NI 43-101 Technical Reports and other technical documents addressing such topics.

5) I have read the definition of 'qualified person' set out in National Instrument 43-101 ('NI 43-101') and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a 'qualified person' for the purposes of NI 43-101.

6) I visited the Bamastar project site on April 17 and April 18 of 2024.

7) I am responsible for Sections 1.2.1, 1.2.2, 1.2.5, 1.2.6, 1.3.1, 1.3.2, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.21.1, 2.3, 2.4, 2.5, 2.7.1, 3.2, 4 except 4.7 and 4.8, 5 except 5.5, 6, 7, 8, 9, 10, 11, 12, 14 except 14.5, 23, 25.1, 25.2, 25.3, 25.5, 25.15.1.1, 25.15.2.1, 26.1, and 26.2 of the Technical Report.

8) I am independent of South Star Battery Metals Corp. as independence is described by Section 1.5 of NI 43–101.

9) I have not been previously involved with the Bamastar Project.

10) I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

11) As of the date of this certificate, to the best of my knowledge, information and belief, the parts of the Technical Report that I am responsible for preparing contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 12 day of November 2024

"Signed and Sealed"

Matthew Harrington, P. Geo.

CERTIFICATE OF QUALIFIED PERSON

Gordon Zurowski, P.Eng.

To accompany the technical report entitled: "BamaStar Graphite Project Preliminary Economic Assessment National Instrument 43-101 Technical Report" prepare for South Star Battery Metals Corp. and dated 12 November 2024.

I, Gordon Zurowski, P.Eng., do hereby certify that:

- I am a Principal Mine Engineer with AGP Mining Consultants Inc., with a business address at #246-132K Commerce Park Dr., Barrie, Ontario L4N 0Z7, Canada.
- I am a graduate of the University of Saskatchewan with a degree in B.Sc. Geological Engineering, 1989.
- I am a member in good standing of the Professional Engineers of Ontario (membership #100077750).
- I have practiced my profession in the mining industry continuously since graduation.
- My relevant experience includes over 30 years in mineral resource and reserve estimations and feasibility studies for over 30 years in Canada, the United States, Central and South America, Europe, Asia, Africa, and Australia. As a result of my experience and qualifications, I am a Qualified Person as defined in NI 43–101.
- I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
- I am independent of the issuer, South Star Battery Metals Corp. as defined in Section 1.5 of NI 43-101.
- I am responsible for Sections 1.13, 1.21.1.2, 1.21.2.2, 1.22.1, 1.22.3, 1.22.10, 2.7.2, 15, 16, 21.2, 21.5, 25.6, 25.14.1.2, 25.14.2.1, 26.1, 26.3 and 26.10 of this report and accept professional responsibility for those sections of the Technical Report.
- I have not had any previous involvement with the Project as independent Qualified Person.
- My most recent site visit to the Project was April 17th, 2024, for one day.
- As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.
- I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in accordance with NI 43-101 and Form 43-101F1.

Dated this 12th day of November 2024, in Stouffville, Ontario, Canada.

"Signed and Sealed"

____

Gordon Zurowski, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

I, Oliver Peters, P. Eng., as an author of this report entitled "BamaStar Graphite Project, Preliminary Economic Assessment National Instrument 43-101 Technical Report", prepared for South Star Battery Metals Corp. and dated 12 November 2024, do hereby certify that:

1) I am the Principal Metallurgist with Metpro Management Inc., with a business address at 102 Milroy Drive, Peterborough, Ontario, K9H 7T2

2) I graduated from Technical University of Aachen, Germany in 1998 with a Master's degree in Mineral Processing.

3) I am a Professional Engineer of Ontario (Membership No. 100078050). I have practiced my profession for 25 years.

4) My relevant experience in the graphite field includes the process development for over 40 graphite projects in the past 13 years.

5) I have read the definition of 'qualified person' set out in National Instrument 43-101 ('NI 43-101') and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a 'qualified person' for the purposes of NI 43-101.

6) I have not visited the BamaStar project site.

7) I am responsible for Sections 1.10, 1.21.1, 13, 25.4, and 26.4 of the Technical Report.

8) I have not been involved in the previous Technical Report on the Bamastar Project's preliminary economic assessment.

9) I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10) To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 12th day of November 2024

"Signed and Sealed"

Oliver Peters P. Eng.

CERTIFICATE OF QUALIFIED PERSON

I, Sunil Koppalkar, P. Eng., as an author of this report entitled "BamaStar Graphite Project, Preliminary Economic Assessment National Instrument 43-101 Technical Report", prepared for South Star Battery Metals Corp. and dated 12 November 2024, do hereby certify that:

1) I am a Principal Process Engineer with Lycopodium Minerals Canada Ltd., with a business address at 5090 Explorer Dr, Suite 700, Mississauga, ON, L4W 4T9.

2) I am a graduate of McGill University with a Ph.D. Degree in Mining and Materials Engineering, 2010. I am a graduate of the Indian Institute of Technology, India with a Master of Technology Degree in Mineral Engineering, 1986 and a graduate of Gulbarga University Karnataka, India with a Master of Applied Science Degree in Mineral Processing, 1983 and a Bachelor of Science Degree in Geology from Karnatak University, India,1980.

3) I am a Member of Professional Engineers Ontario and registered as a Professional Engineer in the province of Ontario (License Number 100190343). I have practiced my profession in the mining and metals industry continuously since graduation.

4) My relevant experience for the purpose of the Technical Report includes:

   - Experienced in the development of several graphite project sudies in North America.
   - Process Engineer for several preliminary economic assessment studies, PFS and Feasibility Stidues on various minerals.
   - Experienced in Copper concentrator operations and management.

5) I have read the definition of 'qualified person' set out in National Instrument 43-101 ('NI 43-101') and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a 'qualified person' for the purposes of NI 43-101.

6) I have not visited the Bamastar project site.

7) I am responsible for Sections 1.13, 1.17.4, 1.21.1, 17, 21.6, 25.7, 25.15.1.4 of the Technical Report.

8) I have not been involved in the previous Technical Report on the Bamastar Project's preliminary economic assessment.

9) I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10) To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 12th day of November 2024

"Signed and Sealed"

Sunil Koppalkar, P. Eng.

Certificate of Qualified Person

J. Larry Breckenridge, P.E.

To accompany the technical report entitled: "BamaStar Graphite Project Preliminary Economic Assessment National Instrument 43-101 Technical Report" prepare for South Star Battery Metals Corp. and dated 12 November 2024.

I, J. Larry Breckenridge, P.E. , do hereby certify that:

- I am a Principal Environmental Engineer with Global Resource Engineering Ltd., with a business address at 17301 W. Colfax Ave, Suite 400, Golden, CO, USA.
- I am a graduate of the Dartmouth College with a B.A. in Environmental Engineering (1995), and the Colorado School of Mines with an M.S. In Environmental Engineering (1997).
- I am a member in good standing of the Professional Engineers of Colorado (No. 38048) and New Hampshire (No. 12694).
- I have practiced my profession in the mining industry continuously since graduation.
- My relevant experience includes over 25 years in mine water and environmental geochemistry studies in support of feasibility studies in the United States, Asia, Central and South America. As a result of my experience and qualifications, I am a Qualified Person as defined in NI 43–101.
- I have read the definition of "qualified person" set out in National Instrument 43-101 *Standards of Disclosure for Mineral Projects* ("NI 43-101") and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
- I am independent of the issuer, South Star Battery Metals Corp. as defined in Section 1.5 of NI 43-101.
- I am responsible for Sections 1.2.3, 1.2.4, 1.14.2, 1.16, 1.21.1, 2.7.3, 4.7, 4.8, 5.5, 16.3.10, 18.6, 20, 21.7, 25.8, 25.9, 25.15.1.5, 25.15.1.6, 26.6, 26.9, 26.11. of this report and accept professional responsibility for those sections of the Technical Report.
- I have not had any previous involvement with the Project as independent Qualified Person.
- My most recent site visit to the Project was April 17th and April 18th 2024.
- As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.
- I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in accordance with NI 43-101 and Form 43-101F1.

Dated this 12th day of November 2024, in Golden CO, USA.

"Signed and Sealed"

____

J. Larry Breckenridge, P.E.

CERTIFICATE OF DERICK, R. DE WIT

To accompany the technical report entitled: "BamaStar Preliminary Economic Assessment" prepared for South Star Battery Metals Corp. (the "Issuer"), dated November 12 2024, with an effective date of October 10, 2024 (the "Technical Report").

I, Derick Ryk de Wit, do hereby certify that:

a) I am Principal Chemical Engineer with Dorfner Anzaplan GmbH with an office at Scharhof 1, 92242 Hirschau, Germany.

b) I hold the following academic qualifications: MBA, B. Tech (Chem. Eng.) and PMP (PMI®).

   I am a Fellow of the Australasian Institute of Mining and Metallurgy under membership number 301519. I am a Fellow of the Southern African Institute of Mining and Metallurgy under membership number 704185.

   I have worked as a Chemical Engineer continuously within the mineral resources and chemical industries since 1998. My relevant experience includes engineering and design of mineral and chemical processes and development of projects worldwide in accordance with the major reporting codes, including this Instrument, from geological exploration, through the different feasibility phases, receipt of legislative permits and licenses and implementation, including graphite process flow development, overseeing of metallurgical test work, engineering, design and cost estimation.

   I have read the definition of "qualified person" set out in National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

c) I have not performed a personal inspection of the property in intended to locate the Project that is the subject of the Technical Report.

d) I am a co-author of the Technical Report, responsible for Sections 1.15, 1.17.2, 1.17.5, 1.21.1, 3.5, 21.4, 24, 25.10, 25.11, 25.12.2, 26.5, and I accept professional responsibility for those sections of this Technical Report.

e) As a Qualified Person, I am independent of the Issuer as defined in Section 1.5 of NI 43-101.

f) I have had no prior involvement with this Project that is the subject of the Technical Report.

g) I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

h) As of the date of this certificate, to the best of my knowledge, information and belief, the portion of the Technical Report for which I am responsible contains all scientific and technical information that is required to be disclosed to make the portion of the Technical Report for which I am responsible not misleading.

Dated this 12th day of November 2024

“Signed and Sealed”

____

Derick, R. de Wit
MBA, B. Tech (Chem. Eng.), PMP (PMI ®), FAusIMM, FSAIMM
Principal Chemical Engineer
Dorfner Anzaplan GmbH

Lycopodium

CERTIFICATE OF QUALIFIED PERSON

I, Preetham Nayak, P. Eng., as an author of this report entitled "BamaStar Graphite Project, Preliminary Economic Assessment National Instrument 43-101 Technical Report", prepared for South Star Battery Metals Corp. and dated 12 November 2024, do hereby certify that:

1) I am a Study Manager with Lycopodium Minerals Canada Ltd., with a business address at 5090 Explorer Dr, Suite 700, Mississauga, ON, L4W 4T9.

2) I am a graduate of the University of British Columbia with a Masters of Applied Science degree, honours Mining Engineering, 2015 and a graduate of the National Institute of Technology Karnataka, India with a Bachelors of Technology degree in Mining Engineering, 2010.

3) I am a Member of Engineers and Geoscientists British Columbia and registered as a Professional Engineer in the province of British Columbia (Licence Number 47553). I have practiced my profession in the mining and metals industry continuously since graduation.

4) My relevant experience for the purpose of the Technical Report includes:

   - Over 8 years of experience with management of PEA level projects and development of cashflow models

   - Study manager for several preliminary economic assessment studies

   - Development, execution and interpretation of capital cost estimate and cashflow modelling in gold and copper projects.

5) I have read the definition of 'qualified person' set out in National Instrument 43-101 ('NI 43-101') and certify that by virtue of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a 'qualified person' for the purposes of NI 43-101.

6) I have not visited the Bamastar project site.

7) I am responsible for Sections 1.18, 3.3, 3.4, 22, 25.13. of the Technical Report.

8) I have not been involved in the previous Technical Report on the Bamastar Project's preliminary economic assessment.

9) I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10) To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 12th day of November 2024

"Signed and Sealed"

Preetham Nayak, P. Eng.