# **ASX RELEASE**

19 JULY 2018



## 99.9995% PURITY GRAPHITE CONFIRMS SUITABILITY FOR MULTIPLE DOWNSTREAM APPLICATIONS

Sovereign Metals Limited ("**the Company**" or "**Sovereign**") is very pleased to announce that downstream application test work has produced ultra-high purity levels of 99.9995 weight % C from its Malingunde natural crystalline flake graphite. The purification process utilises a simple high temperature process, which as a result of inherent uniqueness of the Malingunde flake graphite, requires low energy input to efficiently achieve some of the highest purity graphite in the world.

Sovereign has demonstrated the ability to produce a range of premium-quality products providing the potential to generate **revenues from sales of premium priced flake graphite products to end-users in both traditional and emerging markets.** 

Ultra-high purity graphite is used in downstream applications which require strict control over impurities in the material, such as the production of semiconductors and photovoltaics for industries which include lithium-ion batteries, aerospace, electronics and nuclear energy.

## HIGHLIGHTS:

- Ultra-high purity "5-Nines" **99.9995 weight % C** graphite (by LOI analysis) produced via non-acid leach technique.
- Test work undertaken using proprietary **thermal purification process conducted at reduced temperature**, requiring lower energy input and therefore having a significantly reduced CO<sub>2</sub> footprint compared to other thermal technologies.
- **Extremely low content of total impurities of less than 5 ppm** against generally accepted maximum of 490 ppm for most advanced battery applications.
  - Thermal purification is far more environmentally friendly than the incumbent commercial method which uses hydrofluoric acid.



Figure 1. Graphite market sectors and Malingunde product types and market suitability.





The Company is undertaking further downstream test work to demonstrate the suitability of Malingunde concentrates for a range of end-user applications, including the optimisation of spherical graphite production, with results to be released to the market in the coming weeks.

Sovereign's Managing Director Dr Julian Stephens commented, "Achieving 5-Nines purity in a simple and cost-efficient manner is a very important milestone in enabling entry into the emerging Li-ion battery sector and other value-add markets. Entry to emerging markets, combined with sales to high-volume, high-value, traditional markets such as refractories, foundries and other industrial applications provides Sovereign with unique product marketing optionality and the potential to sell Malingunde concentrates to a wide range of customers."

Initial weight –	Final weight –	C lost as CO <sub>2</sub>	Ash	LOI
concentrate (g)	ash (g)	(g)	(wt %)	(wt %C)
20.0774	0.00010	20.0773	0.000498	99.999502

Table 1. LOI950-Platinum crucible data with thermally purified graphite from Malingunde.



Figure 2. SEM images of super jumbo +700µm Malingunde natural flake graphite.



Figure 3. SEM images of jumbo +300µm Malingunde natural flake graphite.

ENQUIRIES +618 9322 6322 Dr Julian Stephens – Managing Director Dominic Allen – Business Development Manager

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## INTRODUCTION

Sovereign is undertaking a comprehensive test-work program at a renowned, North American ISOcompliant private graphite technology laboratory ("GTL") to assess the suitability of mine gate graphite concentrates from its Malingunde saprolite-hosted graphite project to various high-end industries and applications. The test-work program covered in this announcement involves the following work streams:

- 1. Assessment of the raw flake concentrate in terms of flake size, thickness, overall chemistry and other important physical properties.
- 2. Purification of the raw concentrate using proprietary, lower temperature thermal techniques with addition of low levels of halogen gas.
- 3. Assessment of the various physico-chemical properties of the resultant purified graphite product.

## **RAW CONCENTRATE PROPERTIES**

The raw graphite concentrate used in this downstream testwork program was generated from scrubber and flotation metallurgical testwork previously reported on 29<sup>th</sup> May 2018. The prior testwork had confirmed the very robust metallurgical characteristics of the Malingunde saprolitic material (saprolite and saprock) and very good amenability to produce high grade, coarse flake graphite products with standard mineral processing technologies. Final concentrates from the prior metallurgical testwork averaged approximately 60% weight in the +150 µm fractions with graphitic carbon content in the 96 wt% to 98 wt% range. LOI tests conducted at GTL in the United States have independently confirmed these findings by reporting the concentrate purity in the range from 97.72 to 98.04 and the average of 97.94 wt%C.

Various physical properties of the raw concentrate were tested by GTL as a baseline measurement for later comparison with the purified samples. This highlights that Sovereign's raw concentrate has a very significant percentage of large and jumbo flake; a prerequisite for segmenting Sovereign's targeted graphite output and serving a variety of value-added markets from refractories to crucibles and expandable to advanced battery systems.

Importantly, scanning electron micrograph ("SEM") imagery shows significant flake thickness, with some flakes in the +700µm category as thick as 50µm, which alone identifies them as a very unique source. The SEM data also revealed that the flakes are not intercalated with gangue minerals and any impurities appear to sit on the surfaces as opposed to being intercalated within the flake structure. This is very important for value-added processing because impurities that "pepper" the surface are typically much easier to remove than those appearing as gangue embedded into the flake structure.

It was also noted that stacks of graphene layers are somewhat primed open whilst remaining parallel to each other. Such particle deportment is rare and assists the thermal purification process.

## THERMAL PURIFICATION

A sample of Malingunde raw graphite concentrate (mine gate product) was purified using a GTL proprietary low temperature thermal purification process. "Low temperature" is defined as a process that runs at less than 2,100°C and is facilitated with very mild addition of chlorine gas. The majority of thermal purification processes in the graphite industry sector are performed at temperatures of 2,700°C to 3,000°C, which require very high energy input and add significant costs, as well as generate a notably higher CO<sub>2</sub> footprint.

The dwell time and the flow rate of chlorine gas used were designed to purify the graphite to "3-Nines" 99.98 wt%C. However, when flake was removed from the furnace and recharacterized it showed a purity level of 99.9995 wt%C, equating to just ~5 ppm of total impurities (Table 1), highlighting the ease in purification of Malingunde flake due to the suite of unique material properties characteristic to Malingunde graphite deposit.





## PHYSICO-CHEMICAL PROPERTIES OF PURIFIED GRAPHITE

After purification, the impurity concentration in the concentrate was reduced to less than 5 ppm (Table 1). The generally accepted maximum impurity concentration for advanced batteries is 490 ppm total and 170 ppm for the sum of critical element concentration (Nardi 1998).

As this material has under 5 ppm total impurities, and even lower levels of critical battery system impurities, it exceeds the referred standards by orders of magnitude in purity.

Additionally, the Malingunde ultra-high purity graphite surpasses the 2 ppm maximum boron concentration and 99.995 wt % C ("4-Nines") thresholds which define nuclear-grade graphite purity standard (D7219-08, Standard Specification for Isotropic and Near-isotropic Nuclear Graphites') of ASTM International.

## **POTENTIAL MARKETS**

The exceptionally high carbon purity and very low levels of critical impurities indicate that this material meets prerequisites for commercialization in the value-added marketspace. One of the targeted market uses of the flake is the advanced Li-ion battery sector. Standard Li-ion battery anodes are currently >99.95 wt%C, so Sovereign's purified material could lead to superior electrochemical performance.

Another major market for ultra-high purity graphite is in nuclear science, namely for pebble bed modular reactors.

### **CONCLUSION AND NEXT STEPS**

Sovereign has been able to achieve a 5-Nines graphite product via a relatively simple process. This is a very important milestone as it highlights the potential for Sovereign to enter the high-end Li-ion battery sector as well as high-tech and specialty markets including the nuclear sector. Entry to emerging markets, combined with sales to high-volume, high-value, traditional markets such as refractories, foundries and other industrial applications, provides Sovereign with unique product marketing optionality and the potential to sell Malingunde concentrates to a wide range of customers in a variety of industrial sectors.

The next steps in the downstream processing will focus on milling and classification of the purified flake into spheronised graphite products for Li-ion battery anodes and other high-end electrical and electrochemical applications. This will be followed by electrochemical cell testing to examine the purified, spheronised material's performance (i.e. reversible, irreversible capacity and irreversible capacity loss, etc.).







#### **Competent Person Statements**

The information in this announcement that relates to previous Exploration Results is extracted from announcements 26 October 2016 and 15 March 2017. These announcements are available to view on www.sovereignmetals.com.au. The information in the original announcements that related to Exploration Results were based on, and fairly represents, information compiled by Dr Julian Stephens, a Competent Person who is a member of the Australasian Institute of Geoscientists (AIG). Dr Stephens is the Managing Director of Sovereign Metals Limited and a holder of shares, options and performance rights in Sovereign Metals Limited. Dr Stephens has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken, to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcements.

The information that relates to previous Metallurgical Testwork Results is extracted from an announcement on 29 May 2018. This announcement is available to view on www.sovereignmetals.com.au. The information in the original announcement that related to Metallurgical Testwork Results was based on, and fairly represents, information compiled by Mr Kelvin Fiedler, a Competent Person who is a member of the Australasian Institute of Mining and Metallurgy. Mr Fiedler is a consultant of Mineral Processing Consultants Pty Ltd. Mineral Processing Consultants Pty Ltd is engaged as a consultant by Sovereign Metals Limited. Mr Fiedler has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken, to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcements.

The information in this report that relates to Downstream Testwork Results is based on information provided to Mr Oliver Peters, M.Sc., P.Eng., MBA, who is a Member of the Professional Engineers of Ontario (PEO), a 'Recognised Professional Organisation' (RPO) included in a list promulgated by the ASX from time to time. Mr Peters is the President of Metpro Management Inc and a consultant of SGS Canada Inc. ("SGS"). SGS is engaged as a consultant by Sovereign Metals Limited. Mr Peters has sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking, to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Peters consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

#### Forward Looking Statement

This release may include forward-looking statements, which may be identified by words such as "expects", "anticipates", "believes", "projects", "plans", and similar expressions. These forward-looking statements are based on Sovereign's expectations and beliefs concerning future events. Forward looking statements are necessarily subject to risks, uncertainties and other factors, many of which are outside the control of Sovereign, which could cause actual results to differ materially from such statements. There can be no assurance that forward-looking statements will prove to be correct. Sovereign makes no undertaking to subsequently update or revise the forwardlooking statements made in this release, to reflect the circumstances or events after the date of that release.

### References

Nardi, J.C., 1998. Alkaline cell having a cathode incorporating enhanced graphite. Patent number: 6828064. Filed: December 17, 1998. Date of Patent: December 7, 2004. Assignee: Eveready Battery Company, Inc





## Appendix 1: JORC Code, 2012 Edition – Table 1

#### Section 1 Sampling Techniques and Data

ſ	Criteria	JORC Code explanation	Commentary
	Sampling Techniques	Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.	Exploration results: Samples used in the Downstream test-work reported in this announcement were originally sourced from samples taken from PQ core drilling undertaken in late 2016. Exploration results in respect of this drilling were previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Metallurgical samples were subsequently selected from the PQ drill-core and the graphite concentrate used in the Downstream test-work reported in this announcement was produced from scrubbing and flotation test-work completed at ALS Perth and SGS Lakefield, Canada, the results of which were previously reported on 29 <sup>th</sup> May 2018 Downstream test-work results: 1.95kg of unscreened graphite concentrate was split using a rotary splitter from a master concentrate sample produced from scrubbing and flotation test-work.
$\bigcirc$		Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018
		Aspects of the determination of mineralisation that are Material to the Public Report. In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018
0	Drilling Techniques	Drill type (e.g. core, reverse circulation, open- hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
	Drill Sample Recovery	Method of recording and assessing core and chin sample recoveries and results assessed	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
$\mathcal{D}$		Measures taken to maximise sample recovery and ensure representative nature of the samples. Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
15	Logging	Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation mining studies and metallurgical studies. Whether logging is qualitative or quantitative	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
		in nature. Core (or costean, channel, etc.) photography.	
		The total length and percentage of the relevant intersection logged	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
	Sub-sampling	If core, whether cut or sawn and whether	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 26 <sup>th</sup> May 2018
$\bigcirc$	and sample preparation	If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018. The samples were rotary split after the material was dried in the oven.
		For all sample types, the nature, quality and appropriateness of the sample preparation technique.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018. Downstream test-work results: The sample was homogenized and dried at a temperature of 180 degrees Celsius in accordance with the standard operating procedure (SOP) number ISO9000_0124 "Material Preparation for Thermal Purification".
		Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018. Downstream test-work results: Not relevant for this type of test-work on small overall sample sizes.
		Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.

## **ASX RELEASE**

JORC Code explanation

Whether sample sizes are appropriate to the

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Criteria



Commentary

Exploration results: Previously reported on 26<sup>th</sup> October 2016 and 15<sup>th</sup> March 2017.

		grain size of the material being samplea.	Downstream test-work results: The sample sizes used of 1,950 g for the heat purification and ~20g for the platinum crucible LOI test are considered representative and appropriate for these tests and analyses.
	Quality of assay data and laboratory tests	The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.	<ul> <li>Exploration results: Previously reported on 26<sup>th</sup> October 2016 and 15<sup>th</sup> March 2017.</li> <li>Metallurgical results: Previously reported on 29<sup>th</sup> May 2018.</li> <li>Downstream test-work results: The platinum crucible testing procedure may be found in its relevant SOP (ISO9000_127). Before Pt crucible LOI testing, materials underwent moisture testing and thermal purification. Quality control is ensured for heat purification and platinum crucible testing as follows. For the former, an LOI test was performed before and after purification (SOP ISO9000_101) to ensure that purity increases. Additionally, Scott Volume (ISO9000_104), Tap Density (ISO9000_103), Screen Analysis (ISO9000_128), Microtrac Particle Size Analysis (ISO9000_115), and Platinum Crucible LOI testing is used to compare the characteristics of the materials pre- and post-purification.</li> <li>Heat purification has been completed at a high temperature with the addition of mild amounts of chlorine gas. This procedure is defined as carbochlorination. This is the leading industry-accepted practice in the production of ultra-high purity graphite. Loss on Ignition was performed in accordance with the LOI 950 platinum crucible test. The latter represents an ASTM-referenced, highest accuracy test on carbon content within the graphite industry.</li> <li>Thermal purification was accomplished in a proprietary commercial reactor model. The LOI test necessitated the following equipment by model: Thermo Scientific Thermolyne Muffle Furnace and XRF GCL15 Platinum Crucible.</li> </ul>
リアリ		For geophysical tools, spectrometers, handheld XRF instruments, etc., the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.	Exploration results: Previously reported on 26th October 2016 and 15th March 2017. Metallurgical results: Previously reported on 29th May 2018. Downstream test-work results: See cell above.
271		Nature of quality control procedures adopted (e.g. standards, blanks, duplicate, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018. Downstream test-work results: In platinum crucible testing, the test itself serves as quality control for other tests. However, at least three randomly selected samples per material are also run to ensure consistent results.
ソコ	Verification of sampling & assaying	The verification of significant intersections by either independent or alternative company personnel.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
		The use of twinned holes.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
		Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29th May 2018. Downstream test-work: Data documentation and related procedures are outlined in follows the ISO- compliant QMSP NT009, Control of Records. Samples are labelled in accordance with HCS 2012 and kept for 5 years. They are kept in accordance to QMSP NT005 Handling, Storage, Packaging, Preservation, and Delivery.
		Discuss any adjustment to assay data.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018. Downstream test-work: No adjustment has been made to assay data
	Location of data points	Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
		Specification of the grid system used.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
	Data spacina	Data spacing for reporting of Exploration	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
	& distribution	Results. Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. The Company reported an updated Mineral Resource Estimate for Malingunde on 12 <sup>th</sup> June 2018.
		Whether sample compositing has been applied.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
	Orientation of data in	Whether the orientation of sampling achieves unbiased sampling of possible structures and	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.

relation to

the extent to which this is known considering

the deposit type





Criteria	JORC Code explanation	Commentary
eological	If the relationship between the drilling	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
structure	orientation and the orientation of key	
	mineralised structures is considered to have	
	introduced a sampling bias, this should be	
	assessed and reported if material.	
Sample	The measures taken to ensure sample	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
security	security	Metallurgical results: Previously reported on 29th May 2018.
D C		Downstream test-work results: Samples are labelled in accordance with HCS 2012 and kept for 5 years.
Audits or	The results of any audits or reviews of	It is considered by the Company that industry best practice methods have been employed at all stages of
reviews	sampling techniques and data	work. Reviews of metallurgical and downstream test-work are undertaken by appropriately qualified
		independent consultants on a regular basis.
Audits or reviews	The results of any audits or reviews of sampling techniques and data	It is considered by the Company that industry best practice methods have been employed at all st: work. Reviews of metallurgical and downstream test-work are undertaken by appropriately qualifi independent consultants on a regular basis.
Criteria	JORC Code explanation	Commentary
	Type, reference name/number, location and	The Company owns 100% of 4 Exclusive Prospecting Licences (EPLs) in Malawi. EPL0355 renewed in 201
	ownership including gareements or material	for 2 years, EPL0372 renewed in 2018 for 2 years and EPL0413 renewed in 2017 for 2 years, EPL0492 was

Mineral tenement & land tenure status	lype, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environment settings.	The Company owns 100% of 4 Exclusive Prospecting Licences (EPLS) in Malawi. EPL0355 renewed in 2017 for 2 years, EPL0372 renewed in 2018 for 2 years and EPL0413 renewed in 2017 for 2 years. EPL0492 was granted in 2018 for an initial period of three years (renewable).
Status	The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	The tenements are in good standing and no known impediments to exploration or mining exist.
Exploration done by other parties	Acknowledgement and appraisal of exploration by other parties.	No other parties were involved in exploration.
Geology	Deposit type, geological setting and style of mineralisation	The graphite mineralisation occurs as multiple bands of graphite gneisses, hosted within a broader Proterozoic paragneiss package. In the Malingunde area specifically, a deep topical weathering profile is preserved, resulting in significant vertical thicknesses from near surface of saprolite-hosted graphite mineralisation.
Drill hole information	A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes: easting and northings of the drill hole collar; elevation or RL (Reduced Level-elevation above sea level in metres of the drill hole collar); dip and azimuth of the hole; down hole length and interception depth; and hole length	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018
	If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
	In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high-grades) and cut-off grades are usually Material and should be stated.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
Data aggregation methods	Where aggregate intercepts incorporate short lengths of high-grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.
	The assumptions used for any reporting of metal equivalent values should be clearly stated.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
Relationship	I hese relationships are particularly important in the reporting of Exploration Results.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
between mineralisation widths &	If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
intercept lengths	If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known'.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
Diagrams	Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017.





Criteria	JORC Code explanation	Commentary
	reported. These should include, but not be limited to a plan view of the drill collar locations and appropriate sectional views.	
Balanced reporting	Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high-grades and/or widths should be practiced to avoid misleading reporting of exploration results.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
Other substantive exploration data	Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples - size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.
Further work	The nature and scale of planned further work (e.g. test for lateral extensions or depth extensions or large-scale step-out drilling).	The company is currently completing a pre-feasibility study. The next phase of work is planned to be a definitive feasibility study. The next steps in the downstream processing will focus on milling and classification of the purified flake into spheronised graphite products for Li-ion battery anodes and other high-end electrical and electrochemical applications. This will be followed by electrochemical cell testing to examine the purified, spheronised material's performance (i.e. reversible, irreversible capacity and irreversible capacity loss, etc.).
	Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	Exploration results: Previously reported on 26 <sup>th</sup> October 2016 and 15 <sup>th</sup> March 2017. Metallurgical results: Previously reported on 29 <sup>th</sup> May 2018.