

## WORLD-CLASS EXPANDABILITY CHARACTERISTICS FOR MALINGUNDE GRAPHITE CONCENTRATES

Sovereign Metals Limited (“the Company” or “Sovereign”) is pleased to present results from recent expandability test-work conducted on Malingunde flake graphite concentrates by a renowned German industrial minerals laboratory. The **results show world-class expandability characteristics** across a number of different size fractions.

The excellent results enhance Sovereign’s ability to **target entry into existing, traditional markets for its flake graphite products** as the base case to underpin Malingunde development. Developing markets relying on new and evolving technologies (such as Li-ion batteries) remain as attractive future upside potential.

### HIGHLIGHTS:

- Expansion ratios of **480 ml/g for +300µm jumbo flake** and **450 ml/g for +500µm super-jumbo flake** were achieved, well exceeding those of typical Chinese and Western concentrates currently available on the market.
- High expansion ratios** such as those achieved from the +500µm super-jumbo and +300µm jumbo flake products are required for the production of high value graphite foils, paper and knitted tape.
- The concentrates were **free of quartz grains** and hence represent a good base material for the preparation of expandable graphite and production of graphite foils.
- Expandable graphite is used in various applications such as fuel cells, seals and gaskets, fire retardants and for thermal management in consumer electronics.

*Dr Julian Stephens, Sovereign’s Managing Director commented, “The world-class expandability results for the Malingunde graphite concentrates will assist our ability to target existing, traditional markets for our products. The Company’s strategy involves very low-cost production of very high quality graphite concentrates that can be sold to existing industrial markets including refractory and expandable applications. In this way, we avoid any risks associated with slower than expected growth in the Li-Ion battery market, and avoid the technical and economic risks associated with constructing complex, downstream value-add facilities such as spherical graphite plants.”*

**Enquiries:**

**Dr Julian Stephens – Managing Director**

**+618 9322 6322**



**Figure 1 Expanded graphite and graphite foils produced from expanded graphite**

## Background

Natural flake graphite is expanded via intercalation. This is a process whereby an expansion agent is inserted between the graphene layers of a graphite crystal or particle. Application of high temperature causes the expansion agent to gasify, producing enough pressure to push adjacent graphite layers apart. This results in large overall decreases in bulk density and increases in surface area. The resultant material is known as expanded flake graphite.

Expanded flake graphite has a wide variety of uses in fuel cells, seals and gaskets, fire retardants, flow batteries, thermal management for consumer electronics, and many other products.

High expansion ratios such as those achieved from Malingunde +500µm super-jumbo and +300µm jumbo flake products for Malingunde are required for the production of high value graphite foils, paper and knitted tape. Concentrates with lower expansion ratios are used in fire retardant applications.

## Malingunde expandability results

MALINGUNDE 2017 EXPANDABILITY RESULTS	
PARTICLE SIZE (µm)	ml/g
+ 500	450
+ 300	480
+180	340
+106	210
+75	160
- 75	105

### 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 forward-looking statements made in this release, to reflect the circumstances or events after the date of that release.*