RNS Number : 9428C
Beowulf Mining PLC
05 September 2024

5 September 2024

Beowulf Mining Plc

("Beowulf" or the "Company")

High grade, low impurity product confirmed from Kallak Iron Ore Project Metallurgical Test-work

Beowulf (AIM: BEM; Spotlight: BEO) and its wholly owned Swedish subsidiary Jokkmokk Iron Mines AB ("Jokkmokk Iron") are pleased to provide an update on the metallurgical test-work programme completed for the Kallak or Gállok Iron Ore project ("Kallak" or "the Project").

Highlights

The 2024 metallurgical test-work programme:

- Has demonstrated the ability to produce an exceptionally high-grade, low impurity iron ore concentrate grading over 68% iron content ("Fe") and containing less than 3.7% silica ("SiO_2") and <0.23% alumina ("Al_2O_3"), which in turn can be further upgraded to over 70% Fe containing ~2% SiO_2;
- Was completed in preparation for the Kallak Pre-Feasibility Study ("PFS") building on previous extensive programmes completed between 2013 and 2021;
- Included comminution testing, mineralogical studies, Davis tube, magnetic separation and further upgrading test-work;
- Supports the prior assumption that Kallak can produce a highly desirable concentrate suitable for the Green Steel sector; and
- Defines the preliminary processing flowsheet for the Project.

Ed Bowie, Chief Executive Officer of Beowulf, commented:

"The metallurgical test-work has confirmed that Kallak can produce an exceptionally high grade, low impurity concentrate. Furthermore, this concentrate can be upgraded to a grade of over 70% Fe with low levels of silica, a product that would be well suited for use as feedstock for modern, lower-carbon emitting steelmaking practices including the direct reduced iron - electric arc furnace route. The indicative process flowsheet also has a number of significant advantages: utilising conventional technology and only physical separation with no flotation; and producing a single product.

"The results of this test-work have now been passed to our Process Engineers who will design the full Industrial Flowsheet with appropriate equipment sizing. We look forward to providing the market with further updates."

Historical Metallurgical Test-work

In 2013, following a trial mining programme at Kallak where near-surface mineralised material was excavated from a series of trenches, a composite sample of over 60 tonnes was tested by the Finnish Geological Survey (GTK) at their facility in Outokumpu (Finland). The composite sample contained an average of 29.5% Fe and a mix of magnetite to hematite ore in an approximate ratio of 3.4:1.

A conventional magnetite process route was followed consisting of milling and low-intensity magnetic separation ("LIMS")

pre-concentration, followed by ball mill re-grinding together with six cleaner LIMS stages to achieve the final magnetite product. This final product had a grade of 69.4% Fe with average silica content of 3.9% and insignificant levels of sulphur and phosphorous, being below 0.01%. Recovery of the magnetite was calculated to be 95%.

Several different flow sheet options were tested for the recovery of hematite with an ultimate product grading 66.6% Fe and containing 3.3% silica, 0.08% phosphorous and less than 0.02% sulphur being generated. The best beneficiation result was achieved using a combination of spiral separators, supported by High-Gradient Magnetic Separators (HGMS), although recovery remained at below 30%.

In 2015 a further test-work programme was initiated to explore the potential of further upgrading Kallak concentrate to produce a product suitable for use in a Direct Reduction Iron ("DRI") facility. Reverse flotation was used and demonstrated the potential to upgrade the magnetite concentrate to best results of up to 71.5% Fe with low silica and alumina at 0.62% SiO_2 at 0.10% Al_2O_3 respectively. Detrimental elements were also demonstrated to be extremely low with <0.02% sulphur, and <0.1% phosphate from all concentrates.

During 2020 and 2021, further analysis of the orebody identified three distinct iron oxide mineralogies: magnetite and hematite as previously identified and a transitional mineral, maghemite. Maghemite has the same chemical formula as hematite (Fe_2O_3) but retains the same crystal structure as magnetite and is therefore more strongly magnetic than hematite. In addition, further test-work was undertaken on the upgrading of concentrate using a physical process, high frequency oscillating electromagnetism ("LJC Technology"), rather than the chemical reverse flotation described above. This technology has the benefit of not using chemicals and produced an overall product that was comparable with the reverse flotation test-work at a grade of 69.9% Fe.

Following the identification of maghemite, further Davis Tube test-work was undertaken on 106 representative samples during 2021. The Davis Tube methodology is considered an industry-standard technique for assessing the magnetite proportion of a sample. Material is passed through the 'tube' and the strongly magnetic fraction is held by the magnetic field while the weakly magnetic material is washed down the tube. Results for Kallak North indicated a 71% recovery producing a concentrate with 68% Fe which is therefore broadly consistent with previous test-work.

2024 Metallurgical Test-work

The 2024 metallurgical test-work programme comprised mineralogical analysis using TESCAN TIMA to assess particle-by-particle measurement of mineralogy, grind size, liberation, and separation. This mineralogical study supplemented prior QUEMSCAN studies, which do not distinguish iron oxide minerals, and was supported by microscopic investigations. The TIMA liberation data confirmed previous measurements suggesting magnetite and maghemite may be liberated at P(80) 40 microns.

Comminution test-work on representative samples indicated that the crushing characteristics of the ore are relatively soft whilst it is generally relatively hard from an abrasion/ attrition perspective. This suggests that Fully Autogenous Grinding (FAG) or Semi-Autogenous Grinding (SAG) will be appropriate with the data being used to model likely equipment sizing.

Samples from the comminution testing were then combined to form a composite sample with proportions designed to be representative of the Kallak orebody, particularly in the early years of mine life. Wet Low-Intensity Magnetic Separation ("WLIMS") of this composite sample produce a product with a grade of 68.82% Fe, 3.41 % SiO_2 and 0.22 % Al_2O_3, whilst results from the maghemite sample generated a product grading 68.61% Fe, 3.63 % SiO_2 and 0.23 % Al_2O_3.

Both samples could then be further upgraded using the LJC technology to over 70% Fe with close to 2% SiO_2, a product deemed to be a suitable DRI feedstock.

Indicative Process Flowsheet

Based on the results of the metallurgical test-work, a conventional magnetite flowsheet is envisaged with a crushing and grinding circuit and series of WLIMS units working in sequence to recover the magnetic magnetite and maghemite fractions. A single concentrate would be produced with a grade of 68.8% Fe which in turn could be further upgraded with the non-chemical LJC Technology to over 70% Fe. Based on the mining rate of 9 million tonnes per year ("Mtpa") of ore as envisaged in the Scoping Study, the preliminary metallurgical modelling suggests that approximately 2.7 Mtpa of 68.8% Fe containing less than 3.7% SiO_2 and less than 0.23% Al_2O_3 would be produced. Further upgrading is anticipated to still produce approximately 2.7 Mtpa of the >70% Fe concentrate containing approximately 2% SiO_2.

The LJC Technology has the potential to upgrade this concentrate, although recoveries marginally decline, and there are capital and operating costs associated with its implementation. A trade-off study is therefore being conducted to determine whether the additional price premium for the higher grade material justifies the inclusion of the LJC Technology. This study will be completed within the coming weeks and determine the base case process flowsheet for the forthcoming PFS.

Recoveries from the processing of the hematite ore have historically been low and economically marginal. Further test-work will be required to determine whether this portion of the orebody should be stockpiled for processing at the end of the mine life.

Qualified Person Review:

Dr. B. Arvidson, MSc Mining/Mineral Processing, PhD Mineral Processing (equivalent), both read at the Royal Institute of Technology, Stockholm, has reviewed and approved the technical information contained within this announcement in his capacity as a qualified person, as required under the NI-43-101 rules. Dr. Arvidson has over 50 years relevant experience in the minerals industry, and he has developed over 80 new applications within the industrial minerals and iron ore areas. Dr. Arvidson has visited the Kallak site and supervised laboratory and pilot plant testing of samples extracted from trenches and drill cores on the site.

Enquiries:

Beowulf Mining plc
Ed Bowie, Chief Executive Officer ed.bowie@beowulfmining.com

SP Angel
(Nominated Adviser & Joint Broker)
Ewan Leggat / Stuart Gledhill / Adam Cowl Tel: +44 (0) 20 3470 0470

Alternative Resource Capital
(Joint Broker)
Alex Wood Tel: +44 (0) 20 7186 9004

BlytheRay
Tim Blythe / Megan Ray Tel: +44 (0) 20 7138 3204

About Beowulf Mining plc

Beowulf Mining is a mining company with main activities in exploration and development in Sweden, Finland, and Kosovo. Beowulf's portfolio is diversified by commodity, geography, and stage of development of the projects, and consists primarily of iron ore, graphite, gold, and base metals. Beowulf Mining is headquartered in London, England.

Cautionary Statement

Statements and assumptions made in this document with respect to the Company's current plans, estimates, strategies and beliefs, and other statements that are not historical facts, are forward-looking statements about the future performance of Beowulf. Forward-looking statements include, but are not limited to, those using words such as "may", "might", "seeks", "expects", "anticipates", "estimates", "believes", "projects", "plans", strategy", "forecast" and similar expressions. These statements reflect management's expectations and assumptions in light of currently available information. They are subject to a number of risks and uncertainties, including, but not limited to , (i) changes in the economic, regulatory and political environments in the countries where Beowulf operates; (ii) changes relating to the geological information available in respect of the various projects undertaken; (iii) Beowulf's continued ability to secure enough financing to carry on its operations as a going concern; (iv) the success of its potential joint ventures and alliances, if any; (v) metal prices, particularly as regards iron ore. In the light of the many risks and uncertainties surrounding any mineral project at an early stage of its development, the actual results could differ materially from those presented and forecast in this document. Beowulf assumes no unconditional obligation to immediately update any such statements and/or forecast.

END

MSCEZLFBZKLXBBD