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## **Ruoutevare Iron Ore Deposit Metallurgical Update**

## **Highlights:**

- Final high grade product containing 97% iron and less than 0.5% titanium
- Study confirms full extract of iron, titanium and vanadium is possible

Beowulf (AIM: BEM; Aktietorget: BEO), the AIM and Aktietorget traded mineral exploration company which owns several exploration projects in Sweden, is pleased to announce details of metallurgical tests on material from its 100%-owned Ruoutevare iron deposit in Northern Sweden. These have confirmed that by using reduction techniques in a laboratory scale simulation of a mechanical oven it is possible to fully extract the iron, titanium and vanadium from the Ruoutevare titanium-magnetite ore.

The study was carried out by the MINPRO research laboratory at Strassa, Central Sweden.

The final product of high grade sponge iron powder contained 97% iron (Fe) and less than 0.5% titanium (TiO2), and 0.02% vanadium (V). These grades compare very favourably when compared with the grades of the initial mill concentrate produced from the Ruoutevare titanium-magnetite ore for the study carried out in the 1970s by the Swedish Geological Society showing Fe 53%, TiO2 12.3% and V 0.25%.

The initial tests show that subjecting the concentrate to sub-melting temperatures will reduce all of the iron which is not bonded to ilmenite, and by a subsequent magnetic separation technique, yield a sponge iron powder with high iron content and high metallisation level. By using petroleum coke as a reducing agent and adding soda, high metallisation levels have been achieved at 7750 C.

Further reduction tests show that, by adding a chloride (Na-, Cl-, and Fe- chloride respectively have been tested) a so-called segregation will be obtained with high selectivity against both ilmenite and vanadium. These tests produced very clean sponge iron powder with a grade of 95-97% Fe, 0.5% TiO2 and less than 0.02% V, with a metallisation level of 98% and the exchange of iron above 80%. The amount of iron sponge powder obtained is about 45% of the initial concentrate by weight. However, after extraction of Ti and V, the remaining iron can be recycled to the reduction process so that an even higher exchange of iron is obtained.

More than 97% of the Ti and V-content of the concentrate occurs together with ilmenitebonded iron and surplus coke in the non-magnetic product. After recovering the coke, this product is a very suitable source from which to obtain clean TiO2 from ilmenite by using the chlorination process traditionally used by titanium producers.

In addition, the vanadium can be leached from this product by HCl leaching through established processes. The end product will be V2O5 (vanadium pentoxide).

By using mainly closed systems, the exchanges for all products will be very high whilst atmospheric emissions and environmental impact will be minimized. For example, a large

part of the energy consumed in vaporizing the FeCl-solution can be obtained by burning the process gas from the mechanical oven.

Further laboratory studies on larger samples are needed to validate and further optimise this process. Results will provide the basis for a preliminary economic evaluation study of the project after which pilot plant studies can be planned.

Detailed metallurgical testing to obtain a marketable concentrate of the Ruoutevare deposit was initially carried out in the 1970s by the Swedish government-owned iron ore mining company LKAB with subsequent work by the Finnish steel company Rautaruukki. The present metallurgical work planned at MINPRO is a continuing study to improve these results and to obtain highly commercial end products.

Clive Sinclair-Poulton, Chairman of Beowulf commented:

"These metallurgical results confirm the potential of the Ruoutevare project - we have over 140m tonnes at 39% Fe inferred and we expect the new studies to show further positive results in due course that will demonstrate the commercial aspects of the project."

Dr Jan Ola Larsson (Fil. Kand, PhD, DIC), has reviewed and approved the technical information contained within this announcement in his capacity as a qualified person, as required under the AIM rules. Dr Larsson is Technical Director of the Company and has over 30 years relevant experience within the natural resources sector.

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