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## SECOND PILOT PLANT STUDY EXCEEDS RECOVERY PERFORMANCE OF MAIDEN TESTING

- Head grade of 0.43%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$  upgraded 20 times to 8.6% producing 400kg of high-quality concentrate.
- Recoveries were 12% higher at 80.1% compared to maiden pilot plant testing in March 2017.
- Viability of commercial production reaffirmed with Hastings' proprietary designed process flow sheet equipment.
- Concentrate samples to be used with finalising detailed design of acid-concentrate mixing equipment.

### Introduction

**Hastings Technology** Metals Limited ("Hastings" or "the Company") has successfully taken another step in the process to develop the Yangibana Nd-Pr Rare Earths Project, with the successful completion of a second beneficiation pilot plant at ALS Metallurgy's laboratory facility in Balcatta, Western Australia.

The Yangibana Nd-Pr Rare Earths Project is located in the Gascoyne region of Western Australia. The Company plans to construct a processing plant to produce a Mixed Rare Earths Carbonate product, through the process of mining, beneficiation and hydrometallurgy. The beneficiation and hydrometallurgical circuits have previously been successfully tested at pilot scale. This second beneficiation pilot plant has further validated the beneficiation circuit as well as providing information and samples for detailed engineering design.

**"Confirming and exceeding the results of the first pilot study is another important milestone in the development of the Yangibana Project. These results provide us the confidence to push ahead with final financing leading to construction", said its Executive Chairman, Charles Lew.**

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### Board

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## **Pilot Plant Summary**

The simple and effective flowsheet developed in the laboratory test work program has translated into a 100kg/hr pilot processing circuit, operating 24 hours per day continuously over 8 days at ALS Metallurgy in Balcatta, Western Australia. ALS, with a specialist team dedicated to pilot plant operations, is a global leader in metallurgical testing and consulting services for minerals process flowsheet development and optimisation.

The flowsheet consisted of milling, rougher flotation, regrind and cleaner flotation stages. The flotation circuit selectively concentrates the rare earths-bearing mineral monazite into a final product whilst discarding 95% of the original rock waste mass.

Flotation process design was reconfirmed, as the performance output of the pilot plant improved over the course of the 8 days. A waste-diluted feed grade to the pilot plant of 1.02% TREO, simulated real mining effects of drilling and blasting, in the process testing the robustness of the process flow sheet equipment under less than ideal conditions.

Over 700kg of REO concentrate was produced of which 400kg of concentrate contained 8.6%  $\text{Nd}_2\text{O}_3+\text{Pr}_6\text{O}_{11}$  upgraded from 0.43% by 20 times. This concentrate will be used to validate the design of the acid concentrate mixer and selection of other critical equipment in the detailed design.

Results of 12-hour shift composites gave 80.1% TREO recovery at 19% TREO, including 7.8%  $\text{Nd}_2\text{O}_3+\text{Pr}_6\text{O}_{11}$ . Maximum concentrate grades of 25.9% TREO, including 10.6%  $\text{Nd}_2\text{O}_3+\text{Pr}_6\text{O}_{11}$  were achieved during the operation. The maiden pilot plant test achieved a maximum recovery of 70.8% at a concentrate grade of 23% TREO, including 9.8%  $\text{Nd}_2\text{O}_3+\text{Pr}_6\text{O}_{11}$ .

Key areas of the engineering design were tested during the pilot plant campaign, with lead engineers involved in the front-end engineering design phase visiting the operation. Vital data was obtained, including updated findings for slurry pulp, solid liquid separation steps and concentrate properties, all of which can be applied for engineering design optimisation.

## **Competent Person Statements**

The scientific and technical information in this announcement and that relates to process metallurgy is based on information reviewed by Ms. Narelle Marriott (Principal Engineer – Beneficiation) and Mr. Zhaobing (Robin) Zhang (Process Engineering Manager) of Hastings Technology Metals Limited. Both Ms. Marriott and Mr. Zhang are members of the AusIMM. Each has sufficient experience 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 by the JORC Code 2012. Ms. Marriott and Mr. Zhang consent to the inclusion in this announcement of the matters based on their information in the form and context in which it appears.



Pilot Plant feed ore, containing 1.02% TREO, including 0.43%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$



Rougher flotation cells



Pilot plant operation at ALS Metallurgy



Sample of filtered final concentrate, containing 20% TREO,  
including 8.6%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$

**TERMINOLOGY USED IN THIS REPORT**

**Total Rare Earths Oxides, TREO**, is the sum of the oxides of the light rare earth elements lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), and samarium (Sm) and the heavy rare earth elements europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), lutetium (Lu), and yttrium (Y).

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## **About Hastings Technology Metals**

### *Yangibana Project*

Hastings Technology Metals (ASX:HAS, the Company) is advancing the Yangibana Rare Earths Project towards production following the completion of a positive Definitive Feasibility Study in November 2017. The Yangibana Project hosts rare earths deposits rich in neodymium and praseodymium, elements vital to permanent magnets that provide many critical components of wide ranging high-tech products, including electric vehicles, renewable energy wind turbines, robotics, medical applications and others. The Company aims to be the next significant producer of neodymium and praseodymium outside of China.

The established Yangibana reserves and resources are predominantly within tenements held 100% by Hastings, with the majority in granted Mining Leases. Lesser resources are held in a joint venture in which Hastings holds a 70% interest and as the majority participant, has been appointed as the manager of the joint venture.

The November 2017 Yangibana Project DFS established JORC Probable Ore Reserves of 5.15 million tonnes at 1.12% total rare earths oxides (TREO) including 0.41% neodymium and praseodymium oxides ( $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ ). This Ore Reserve was the basis of the initial operation at a planned production rate of up to 15,000 tonnes per annum (tpa.) MREC including 3,400 tpa. of  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ . The July 2018 Yangibana Probable Ore Reserve increased to 7.74 million tonnes at 1.13% TREO including 0.43%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ . The January 2019 Probable Ore Reserve has increased this to 10.35 million tonnes at 1.22% TREO including 0.43%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ . The increase in Probable Ore Reserves is demonstrated by additional Pre-Feasibility Study work that supports extension of production over more than 10 years.

Including the above Ore Reserves, the Project has JORC Measured Mineral Resources of 4.7 million tonnes at 1.17% TREO including 0.42%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ , JORC Indicated Mineral Resources of 8.6 million tonnes at 1.24% TREO including 0.41%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ , and JORC Inferred Mineral Resources of 8.4 million tonnes at 1.09% TREO including 0.36%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ , providing total JORC Measured, Indicated and Inferred Mineral Resources of 21.7 million tonnes at 1.17% TREO including 0.39%  $\text{Nd}_2\text{O}_3 + \text{Pr}_6\text{O}_{11}$ .

Many more areas of the Company's deposits have the potential for additional resources and exploration programmes are in place to evaluate these areas in future plus the numerous other targets identified to date.

### *Brockman Project*

The Company is also progressing a Mining Lease application over the Brockman Rare Earths and Rare Metals Project.

The Brockman deposit, near Halls Creek in Western Australia, contains JORC Indicated and Inferred Mineral Resources, estimated using the guidelines of JORC Code (2012 Edition, totalling 41.4 million tonnes (comprising 32.3 million tonnes Indicated Mineral Resources and 9.1 million tonnes Inferred Mineral Resources) at 0.21% TREO, including 0.18% HREO, plus 0.36%  $\text{Nb}_2\text{O}_5$  and 0.90%  $\text{ZrO}_2$ .

The Company aims to capitalise on the strong demand for critical rare earths created by the expanding demand for new technology products.