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Hastings Rare Metals Limited  
ABN 43 122 911 399

ASX Code: HAS

Level 25, 31 Market Street  
Sydney NSW 2000  
PO Box Q128 Queen Victoria Building  
NSW 1225 Australia

Telephone: +61 2 8268 8689  
Facsimile: +61 2 8268 8699  
admin@hastingsraremetals.com

**Board and Management**

Charles Lew (Chairman)  
Anthony Ho (Non Exec Director)  
Malcolm Mason (Non Exec Director)

[www.hastingsraremetals.com](http://www.hastingsraremetals.com)

## **BENEFICIATION TESTS CONTINUE TO IMPROVE YANGIBANA ECONOMICS**

### **HIGHLIGHTS**

- **Tests indicate that Yangibana North beneficiated concentrate contains around 4.25%Nd<sub>2</sub>O<sub>3</sub> (8.3%Nd<sub>2</sub>O<sub>3</sub>-Eq\*) and Bald Hill South around 8.1%Nd<sub>2</sub>O<sub>3</sub> (14.0%Nd<sub>2</sub>O<sub>3</sub>-Eq\*)**
- **At current commodity prices these Nd<sub>2</sub>O<sub>3</sub>-Eq\* figures equate to values of US\$4,900/t and US\$8,300/t of concentrate respectively**
- **Flotation tests are achieving 90% recovery of rare earths into 7% of original mass with a >13 times increase in rare earths grade to >20% TREO**
- **Results indicate potential to significantly reduce capital costs of the hydrometallurgical plant compared to the estimate used in the scoping study**
- **Hydrometallurgical plant now only required to treat around 70,000 tonnes per annum (tpa) compared to 200,000 tpa**

\*see Metal Equivalent Calculation explanation later in this release

### **Introduction**

Further to the announcement regarding preliminary beneficiation test results dated 28<sup>th</sup> November 2014, test work at Kyspymet's facility in Adelaide has continued to improve rare earth recoveries, under the guidance of Dr Kwan Wong.

The Directors of Hastings Rare Metals Limited (**ASX: HAS**) are pleased to announce that the results from samples from its two main deposits, Yangibana North and Bald Hill South, indicate the potential for a significant saving on capital costs compared to the figures used in the Scoping Study.

### **Metallurgical Test Work Completed To Date**

Mineralogical characterisation test results from samples from Yangibana North and Bald Hill South confirm the main rare earths-bearing mineral to be monazite, with minor florencite and rhabdophane identified in the Bald Hill South sample (Table 1).



These samples are considered to represent all styles likely to occur within the top 50m of the various deposits. As such they represent all mineralisation likely to be extracted during the first years of operation. Further mineralogical studies have confirmed that the monazite is well liberated at a relatively coarse grind size of 75 microns in all samples.

| Mineral                | Yangibana North<br>% | Bald Hill South<br>% |
|------------------------|----------------------|----------------------|
| Bastnaesite            | 0.14                 | 0.00                 |
| Florencite             | 0.00                 | 0.38                 |
| <b>Monazite</b>        | <b>2.25</b>          | <b>1.80</b>          |
| Rhabdophane            | 0.03                 | 0.35                 |
| Iron Oxides/Hydroxides | 35.24                | 49.77                |
| Manganese Oxides       | 3.65                 | 0.18                 |
| Carbonates             | 1.57                 | 0.68                 |
| Phyllosilicates        | 7.73                 | 13.45                |
| Silicates              | 46.68                | 32.33                |
| Other                  | 2.71                 | 1.06                 |
| <b>Total</b>           | <b>100.00</b>        | <b>100.00</b>        |

**Table 1: Mineralogy of the Yangibana Beneficiation Test Samples**

More than 50 batch flotation tests have now been completed, identifying optimal flotation conditions for the mineralisation. Results have shown that using a moderate grind size, common flotation reagents and a simple flotation flowsheet, a **90% recovery of the total rare earths oxides (TREO) to a >20% TREO concentrate can be achieved into 7% of the initial mass** at both deposits. This indicates that only 10% of the original contained rare earths are lost whilst reducing the waste material by 93%.

The optimised beneficiated concentrates contain approximately 32% monazite plus 3% other rare earths oxides from Yangibana North and approximately 41% monazite plus 9% other rare earths oxides from Bald Hill South.

Table 2 shows the assay data for the two mineralisations and the beneficiated concentrates.

|                                        | Yangibana<br>North Min % | Yangibana<br>North Conc % | Bald Hill South<br>Min % | Bald Hill South<br>Conc % |
|----------------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
| <b>Nd<sub>2</sub>O<sub>3</sub></b>     | <b>0.312</b>             | <b>4.260</b>              | <b>0.535</b>             | <b>8.12</b>               |
| Pr <sub>2</sub> O <sub>3</sub>         | 0.093                    | 1.230                     | 0.157                    | 1.71                      |
| Dy <sub>2</sub> O <sub>3</sub>         | 0.004                    | 0.040                     | 0.009                    | 0.11                      |
| Eu <sub>2</sub> O <sub>3</sub>         | 0.008                    | 0.110                     | 0.013                    | 0.15                      |
| <b>Nd<sub>2</sub>O<sub>3</sub>-Eq*</b> | <b>0.62</b>              | <b>8.29</b>               | <b>0.98</b>              | <b>13.99</b>              |
| Other<br>REO                           | 1.24                     | 15.61                     | 0.92                     | 12.99                     |
| Fe <sub>2</sub> O <sub>3</sub>         | 26.06                    | 13.22                     | 43.10                    | 26.79                     |
| SiO <sub>2</sub>                       | 47.30                    | 4.70                      | 31.60                    | 10.76                     |
| Al <sub>2</sub> O <sub>3</sub>         | 6.27                     | 0.80                      | 10.74                    | 5.65                      |
| CaO                                    | 1.74                     | 19.67                     | 0.57                     | 6.67                      |
| P <sub>2</sub> O <sub>5</sub>          | 1.63                     | 22.54                     | 1.40                     | 12.08                     |
| ThO <sub>2</sub>                       | 0.05                     | 0.57                      | 0.08                     | 0.85                      |
| U <sub>3</sub> O <sub>8</sub>          | 0.00                     | 0.00                      | 0.00                     | 0.01                      |
| Other                                  | 15.285                   | 17.24                     | 10.91                    | 14.09                     |
| Sum                                    | 99.99                    | 99.99                     | 100.03                   | 99.98                     |

**Table 2 – Yangibana North and Bald Hill South assay data for mineralisation and beneficiated concentrates**

The Yangibana North beneficiated concentrate contains around 4.25%Nd<sub>2</sub>O<sub>3</sub> and an Nd<sub>2</sub>O<sub>3</sub>-Eq\* of almost 8.3%. This represents an upgrade of around 13.5 times. At current commodity prices this beneficiated concentrate contains oxides of neodymium, praseodymium, dysprosium and europium worth approximately US\$4,900/tonne.

The Bald Hill South beneficiated concentrate contains around 8.1% Nd<sub>2</sub>O<sub>3</sub> and an Nd<sub>2</sub>O<sub>3</sub>-Eq\* of almost 14.0%. This represents an upgrade of around 14.5 times. At current commodity prices this beneficiated concentrate contains oxides of neodymium, praseodymium, dysprosium and europium worth approximately US\$8,300/tonne.

### Potential effect of these results on capital costs

The latest optimised beneficiation results will significantly enhance the economics of the Yangibana Project. The downstream hydrometallurgical plant would only need to treat around 70,000 tonnes per annum (tpa) of concentrate based on a 1.0 million tpa operation, thereby significantly decreasing capital requirements for this section of the processing plant compared to the 200,000tpa envisaged in the Project's Scoping Study (ASX Announcement of 3rd December 2014).

### Metal equivalent calculation

Hastings has applied the same metallurgical recoveries to praseodymium (Pr), dysprosium (Dy), and europium (Eu) as for neodymium, based on preliminary metallurgical studies of the ore. Calculations are based on the 31 January 2015 spot prices for these oxides (Source "HEFA Rare Earths") (Table 3).

| Metal oxide                    | Assumed commodity price (US\$/kg) |
|--------------------------------|-----------------------------------|
| Nd <sub>2</sub> O <sub>3</sub> | 59.00                             |
| Pr <sub>2</sub> O <sub>3</sub> | 105.00                            |
| Dy <sub>2</sub> O <sub>3</sub> | 340.00                            |
| Eu <sub>2</sub> O <sub>3</sub> | 680.00                            |

**Table 3 – Yangibana Project – Basis of Neodymium-Equivalents (Nd<sub>2</sub>O<sub>3</sub>-Eq)**

Since metallurgical recoveries are the same for all targets, the calculation of neodymium equivalent (Nd<sub>2</sub>O<sub>3</sub>-Eq) grade is therefore:-

$$\text{Nd}_2\text{O}_3\text{-Eq grade} = (((\text{Nd}_2\text{O}_3 \text{ grade} + ((\text{Pr}_2\text{O}_3 \text{ grade} * (\text{Pr}_2\text{O}_3 \text{ price} / \text{Nd}_2\text{O}_3 \text{ price})) + ((\text{Dy}_2\text{O}_3 \text{ grade} * (\text{Dy}_2\text{O}_3 \text{ price} / \text{Nd}_2\text{O}_3 \text{ price})) + ((\text{Eu}_2\text{O}_3 \text{ grade} * (\text{Eu}_2\text{O}_3 \text{ price} / \text{Nd}_2\text{O}_3 \text{ price}))))$$

### Alternative Beneficiation Techniques

Preliminary testing of alternative beneficiation techniques using magnetics and gravity methods at Nagrom's laboratories in Perth provided encouraging results but no further test work on these methods is planned due to the exceptional flotation results.

### Ongoing Test Work

A bulk flotation test programme to confirm flotation performance and produce concentrate nears completion allowing the first phase of hydrometallurgical test work to commence towards the end of the quarter.

### For further information please contact:

Andy Border, General Manager Exploration +61 2 9078 7674  
Guy Robertson, Company Secretary +61 2 9078 7674



## About Hastings Rare Metals

- Hastings Rare Metals is a leading Australian rare earths company, with two JORC compliant rare earths projects in Western Australia.
- The Yangibana Project hosts JORC Indicated and Inferred Resources totalling 6.79 million tonnes at 1.52% TREO, including 0.35% Nd<sub>2</sub>O<sub>3</sub> (comprising 3.96 million tonnes at 1.59% TREO Indicated Resources and 2.83 million tonnes at 1.43% TREO in Inferred Resources).
- The Brockmans (previously known as the Hastings) deposit contains JORC Indicated and Inferred Resources totalling 36.2 million tonnes (comprising 27.1mt Indicated Resources and 9.1mt Inferred Resources) at 0.21% TREO, including 0.18% HREO, plus 0.89% ZrO<sub>2</sub> and 0.35% Nb<sub>2</sub>O<sub>5</sub>.
- Rare earths are critical to a wide variety of current and new technologies, including smart phones, hybrid cars, wind turbines and energy efficient light bulbs.
- The Company aims to capitalise on the strong demand for critical rare earths created by expanding new technologies. It has completed a Scoping Study of the Yangibana Project to confirm the economic viability of the Project and has commenced work on the Pre-Feasibility Study.

## Competent Persons' Statement

*The information in this announcement that relates to Resources is based on information compiled by Simon Coxhell. Simon Coxhell is a consultant to the Company and a member of the Australasian Institute of Mining and Metallurgy. The information in this announcement that relates to Exploration Results is based on information compiled by Andy Border, an employee of the Company and a member of the Australasian Institute of Mining and Metallurgy.*

*Each has sufficient experience relevant to the styles of mineralisation and types of deposits which are covered in this announcement and to the activity which they are 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' ("JORC Code"). Each consents to the inclusion in this announcement of the matters based on his information in the form and context in which it appears.*