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Rainbow Rare Earths Limited
("Rainbow" or "the Company")
LSE: RBW

Phalaborwa Development and Resource Update

Rainbow Rare Earths is pleased to announce the following update on the development of the Phalaborwa rare earths project in South Africa.

Highlights

- Key workstreams have commenced to advance Phalaborwa to the definitive feasibility study ("DFS") stage.
- The pilot plant design and setup are progressing in line with expectations, with commissioning to commence in Q2 2023. Work has started with Mintek (South Africa's national, ISO-accredited mineral research organisation) in Johannesburg to design and fabricate the front end of the plant, which will produce a high-value mixed rare earth sulphate. The required back-end separation process continuous ion-exchange ("CIx")/continuous ion chromatography ("CIC") units have been delivered to K-Technologies Inc.'s ("K-Tech") Lakeland facility for setup and testing.
- The Company is today announcing an updated JORC compliant Mineral Resource Estimate ("MRE") for the project, increasing confidence from the previous Inferred Resource to deliver 24% Measured and 53% Indicated Resource.
- The overall size of the MRE is confirmed at 30.4 Mt, comprising 0.44% total rare earth oxides ("TREO"). High-value magnet rare earths Neodymium ("Nd") and Praseodymium ("Pr") represent 29% of the TREO in the rare earths basket, with economic quantities of Dysprosium ("Dy") and Terbium ("Tb"), in line with the previous Inferred Resource.
- As part of the DFS, the Company will undertake additional drilling to upgrade the MRE further. Rainbow expects that more accurate density measurements below the water table of the gypsum stacks at Phalaborwa will provide an opportunity to increase the total tonnage contained in the resource.
- The project remains on track to reach production in 2026 - five years after initial work commenced on site in 2021.
- Continued progress in ongoing discussions with global strategic funding partners.

George Bennett, CEO, commented: "Workstreams for Phalaborwa's DFS have commenced according to plan and the pilot plant is on track to commence operations this year, producing separated rare earth oxides, as part of the overall project timetable which envisages commercial production from 2026. This is a remarkable fast-track for any rare earths development project globally, considering we commenced work at Phalaborwa in 2021.

Successful operation of the pilot plant will give further confidence to our plans to leverage our proprietary technology, with the aim of targeting opportunities to produce rare earths from historic phosphogypsum stacks, or as a by-product of phosphoric acid production, on a global scale.

Today's resource upgrade is the result of infill drilling which has confirmed our expectations that the project's two phosphogypsum stacks are homogenous and consistent in grade.

The potential for Rainbow to provide an environmentally responsible, near-term source of the magnet minerals critical for global decarbonisation has attracted interest from strategic global investors and discussions with funding partners are progressing well."

Development update

The Phalaborwa preliminary economic assessment ("PEA") released in October 2022 confirmed the strong economics of the project, which has a base case NPV₁₀ of US\$627 million^[1], an average EBITDA operating margin of 75% and a payback period of less than two years.

Rainbow is currently working to advance the project to DFS and a key part of this is the implementation of a pilot plant operation, which will commence commissioning in Q2 2023. It will produce sufficient quantities of separated permanent magnet rare earth oxides for testing and marketing purposes in off-take discussions with potential partners.

The Company continues to make good progress in discussions with strategic global funding partners to finance the balance of the pilot plant operation at Phalaborwa and further progress the DFS.

Pilot plant

The unique and innovative rare earths processing flowsheet designed for the Phalaborwa project, which will use CIX/CIC technology to deliver separated magnet rare earth oxides, has been developed in collaboration with Rainbow's partner K-Tech. This proprietary CIX/CIC process replaces traditional solvent extraction technology for the separation of rare earth oxides, which can be a convoluted process and also associated with environmental risks. The CIX/CIC method is therefore safer and more environmentally responsible, as well as coming at a significantly reduced capital and operating cost due to a simplified flowsheet, which can be accommodated by a single hydrometallurgical processing plant.

The key workstreams for the DFS and pilot plant have commenced and are progressing well:

Work has started on the front end of the pilot plant, which will comprise the main phosphogypsum handling circuit that will produce a mixed rare earth sulphate intermediate solid material. An initial bench-scale programme is in progress to confirm the pilot testing parameters. The front end of the plant will be executed at Mintek in Johannesburg, which is one of the world's leading technology organisations specialising in mineral processing and extractive metallurgy.

The back-end CIX/CIC separation circuit, which will be piloted at the K-Tech facility in Lakeland, will produce marketable separated rare earth oxides.

By separating the pilot process between two different centres of minerals processing excellence, we expect to benefit from:

- cost and time efficiencies as a result of removing the logistics involved in transporting pilot-scale equipment from the USA, where it is designed, fabricated, and tested, to South Africa, where it would have to be reassembled and commissioned. It will be more efficient to transport the mixed rare earth sulphate intermediate solid material produced by the front end, which is a low-volume but high-value product that is readily transportable; and
- key K-Tech personnel being present throughout the running of the pilot, with the ability to oversee and optimise the CIX/CIC process in real time.

The metallurgical testing for the CIX/CIC processes required in the back end of the plant has already been undertaken by K-tech and the required CIX/CIC pilot units have been delivered to its Lakeland facility for setup and testing.

Progress with DFS

METC Engineering, the minerals processing engineering firm and one of the key authors of Phalaborwa's PEA, has been engaged to work alongside the Rainbow team to fully define the required engineering scope for the DFS.

US-based global gypsum experts Ardaman and Associates, Inc., a Tetra Tech Company ("Ardaman") have been engaged to conduct test and initial design work for the new stacks upon which the benign gypsum will be deposited.

Resource update

The Company is today announcing an updated JORC compliant MRE for Phalaborwa. An updated technical resource report will be published on Rainbow's website within 30 days. This MRE has confirmed a Measured and Indicated ("M&I") Resource of 30.4 Mt at 0.44% TREO, with the high-value, permanent magnet elements Nd and Pr representing 29% of the TREO in the rare earths basket, as well as economic quantities of Dy and Tb. The MRE is reported at a 0.2% TREO cut-off grade.

Today's MRE update demonstrates increased confidence by upgrading the Inferred Resource to M&I, which is a key requirement for the DFS [\[2\]](#).

23% of the MRE is Inferred as a result of surface water ponds in the centre of the gypsum stacks. This material requires a specialised drilling campaign to confirm the continuity of the grade below the water table. This work will be completed to convert the MRE to Reserves as part of the DFS.

The technical team is currently focused on evaluation of the density at depth of the stacks and the Company has sought advice on this matter from Ardaman. It is probable, based on the Ardaman techniques used to evaluate the resource of similar phosphogypsum stacks, that the in-situ dry density for the stacks below the water table is higher than that for the upper dry material. This may result in an increase in the MRE.

MRE overview

	Tonnes Mt	TREO %	Contribution of TREO by oxide %					Grade ppm	
			Nd	Pr	Dy	Tb	Other	Th	U
Stack A	20.2	0.43	23.4	5.6	1.0	0.3	69.7	50	2
Stack B	10.2	0.45	23.3	5.8	1.0	0.3	69.6	43	2
Total	30.4	0.44	23.4	5.6	1.0	0.3	69.7	48	2

	Tonnes Mt	TREO %	Contribution of TREO by oxide %					Grade ppm	
			Nd	Pr	Dy	Tb	Other	Th	U
Measured	7.3	0.47	23.5	5.9	1.0	0.3	69.3	47	2
Indicated	16.1	0.44	23.5	5.6	1.0	0.3	69.6	49	2
Inferred	7.0	0.42	23.1	5.5	1.0	0.3	70.1	45	2
Total	30.4	0.44	23.4	5.6	1.0	0.3	69.7	48	2
October 2022 PEA resource	30.7	0.43	23.4	5.7	1.0	0.3	69.6	48	2
Variance %	(0.3)	0.01	0.0	(0.1)	0.0	0.0	0.1	0	0

1. The MRE is reported at a 0.2% TREO cut-off grade.
2. The MRE has been estimated by independent consultant Malcolm Titley of Maja Mining Limited.
3. Mineral resources are not mineral reserves and do not have demonstrated economic viability.

Using our unique rare earths processing technology developed in collaboration with K-Tech, a viable process flowsheet has been designed for economic extraction and purification leading to an unoptimised recovery of >65% of the rare earth elements.

Competent Persons Statement

The Mineral Resource Statement presented herein has been compiled by Malcolm Titley, a Competent Person who is a Member of The Australasian Institute of Mining and Metallurgy and the Australian Institute of Geoscientists. Mr Titley is employed by Maja Mining Limited, an independent consulting company. Mr Titley has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is 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'. Mr Titley is responsible for the preparation of the Mineral Resource Estimate and takes overall responsibility for the resource estimation work and resulting Mineral Resource Statement and consents to the inclusion in this announcement of the matters based on their information in the form and context in which it appears.

Appendix

"Indicated Mineral Resource" is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a probable mineral reserve.

"Inferred Mineral Resource" is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a mineral reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration. An Inferred Mineral Resource is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

"JORC Code" means the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves prepared by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia. The JORC Code is an acceptable foreign code for purposes of NI 43-101.

"Mt" means million tonnes

"Dy" means Dysprosium

"TREO" means Total Rare Earth Oxides

"TB" means Terbium

"Nd" means Neodymium

"Pr" means Praseodymium

Market Abuse Regulation ("MAR") Disclosure

This announcement contains inside information for the purposes of Article 7 of the Market Abuse Regulation (EU) 596/2014 as it forms part of UK domestic law by virtue of the European Union (Withdrawal) Act 2018 ("MAR"), and is disclosed in accordance with the Company's obligations under Article 17 of MAR.

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Notes to Editors:

Rainbow's strategy is to identify near-term, secondary rare earths production opportunities. Meeting escalating demand for critical minerals needed for global decarbonisation, we are focused on producing the magnet rare earth metals neodymium and praseodymium ("NdPr"), dysprosium and terbium. With our strong operating experience, proven project development experience, unique intellectual property and diversified portfolio, Rainbow will develop a responsible rare earths supply chain to drive the green energy transition.

The Phalaborwa Rare Earths Project, located in South Africa, comprises a Measured and Indicated Mineral Resource Estimate of 30.4 Mt at 0.44% TREO contained within unconsolidated gypsum stacks derived from historic phosphate hard rock mining. High value NdPr oxide represents 29.0% of the total contained rare earth oxides, with economic Dysprosium and Terbium oxide credits enhancing the overall value of the rare earth basket in the stacks. The rare earths are contained in chemical form in the gypsum stacks, which allows high value separated rare earth oxides to be produced in a single processing plant at site with lower operating costs than a typical rare earth mineral project.

The Phalaborwa Preliminary Economic Assessment has confirmed strong base line economics for the project, which has a base case NPV₁₀ of US\$627 million^[3], an average EBITDA operating margin of 75% and a payback period of < two years. Pilot plant operations will commence in 2023, with the project expected to reach commercial production in 2026, just five years after work began on the project by Rainbow.

[1] Net present value using a 10% forward discount rate

[2] See Appendix for JORC classifications

[3] Net present value using a 10% forward discount rate

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