
RAINBOW RARE EARTHS



A STRATEGIC SOURCE OF NdPr FOR A GROWING MARKET

**FINALISED PHALABORWA FLOW SHEET UNLOCKS A
UNIQUE NEW SOURCE OF RARE EARTH OXIDES**

JULY 2022



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**"THE MIDDLE EAST HAS OIL;
CHINA HAS RARE EARTHS."**

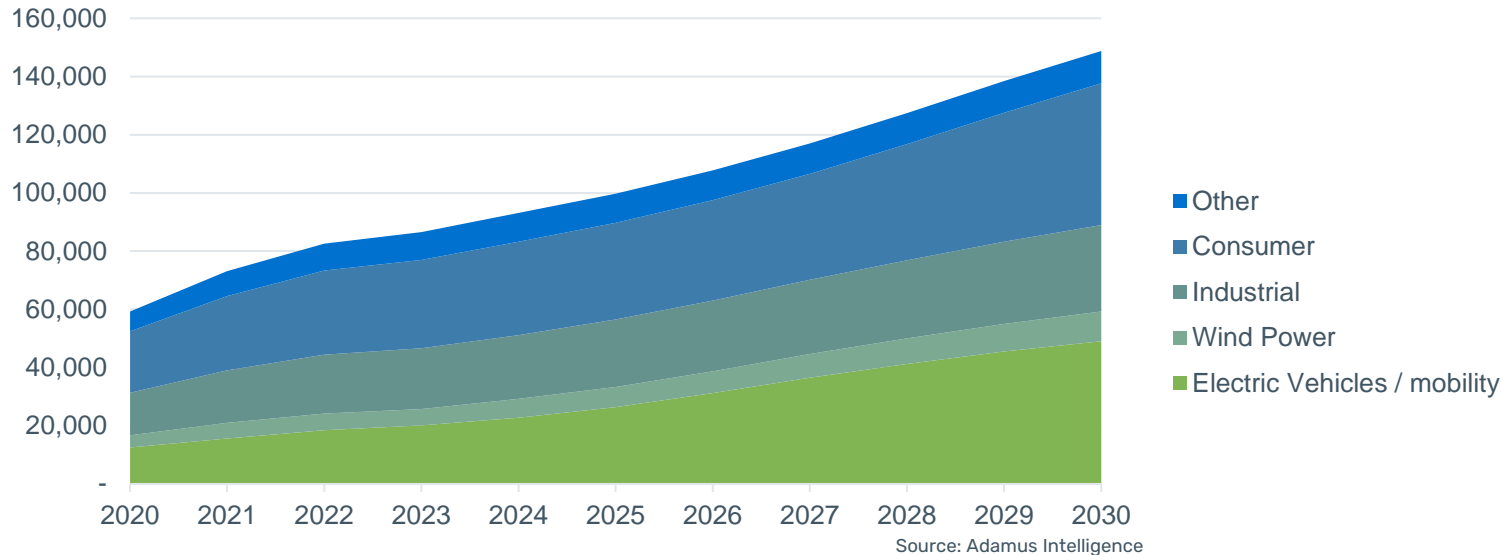
Deng Xiaoping, credited as
the father of modern-day China,
1992

MEETING MOUNTING GLOBAL DEMAND FOR RARE EARTHS AT OUR NEAR-TERM DEVELOPMENT OPPORTUNITY

ROBUST SUPPLY/DEMAND FUNDAMENTALS

- Magnet rare earth elements are critical building blocks for the global green revolution
- Demand is forecast to grow strongly, driven by increased adoption of electric vehicles and off-shore wind power generation
- Global rare earth supply unlikely to match growing demand
- China dominates rare earth elements production, producing c. 90% of all global refined rare earth products - western governments, including US, UK and EU, are increasingly looking for a responsible, independent supply chain

ANTICIPATED GLOBAL REO MAGNET DEMAND GROWTH



OUR STRENGTHS

LONG TERM SOURCES OF RARE EARTHS UNDERPINNED BY IP AND THE RIGHT LEADERSHIP TEAM

STRONG PORTFOLIO OF GROWTH ASSETS TO BUILD A UNIQUE BUSINESS

- Phalaborwa, South Africa, recovery of separated rare earth oxides from historic gypsum stacks
- Gakara, Burundi, a large high-grade mineralised system which can deliver a high-grade rare earth concentrate via simple gravity separation
- Rainbow is patenting intellectual property rights relating to the recovery of rare earths from phosphogypsum, which is helping to unlock further global opportunities

RAINBOW HAS AN EXPERIENCED MANAGEMENT TEAM

- George Bennett and Dave Dodd established MDM Engineering where they delivered 40+ feasibility studies and 22 mine developments
- Adonis Pouroulis is a mining entrepreneur with extensive experience across Africa
- Pete Gardner is a Chartered Accountant with a breadth of experience in natural resources



GEORGE BENNETT
CEO



ADONIS POUROULIS
CHAIRMAN



DAVE DODD
TECHNICAL DIRECTOR



PETE GARDNER
CFO



PHALABORWA: EXCITING, NEAR-TERM GROWTH OPPORTUNITY

DELIVERY OF SEPARATED MAGNET RARE EARTH OXIDES ON SITE



38.3MT OF GYPSUM IN TWO STACKS FROM 50+ YEARS PHOSPHATE HARD ROCK MINING IN SOUTH AFRICA

- JORC Compliant Inferred Mineral Resource Estimate at 0.43% TREO announced 17 June 2021 of which 29.1% represents high value NdPr with economic dysprosium and terbium credits
- Process flow sheet confirmed to produce separated magnet rare earth oxides on site
- Processing of Phalaborwa gypsum stacks will remove existing environmental liability whilst redepositing clean, benign gypsum on a new stack in line with IFC Standards / Equator Principles
- Project is largely permitted and positioned in an established mining town, with:
 - associated skilled labour availability
 - supporting industry (i.e. local production of sulphuric acid, a key reagent in the processing circuit)
- Rainbow will own 70% in the Phalaborwa project via an agreement signed with Bosveld Phosphates in 2020 for total consideration of US\$750k

JORC COMPLIANT INFERRED MINERAL RESOURCE ESTIMATE

	Tonnes Mt	TREO %	Contribution of TREO by oxide					Grade	
			Nd %	Pr %	Dy %	Tb %	Other %	Th ppm	U ppm
Stack A	27.4	0.42	23.3	5.7	1.0	0.4	69.6	49.0	1.8
Stack B	10.9	0.46	23.6	5.7	1.0	0.3	69.4	44.1	2.0
TOTAL	38.3	0.43	23.4	5.7	1.0	0.3	69.6	47.6	1.8

1. The Inferred Mineral Resource Estimate is reported above a cut-off grade of 0.2% TREO.
2. No constraining pit shell is required for the Inferred Mineral Resource Estimate due to the gypsum stacks being entirely above ground level.
3. Mineral resources are not mineral reserves and do not have demonstrated economic viability.



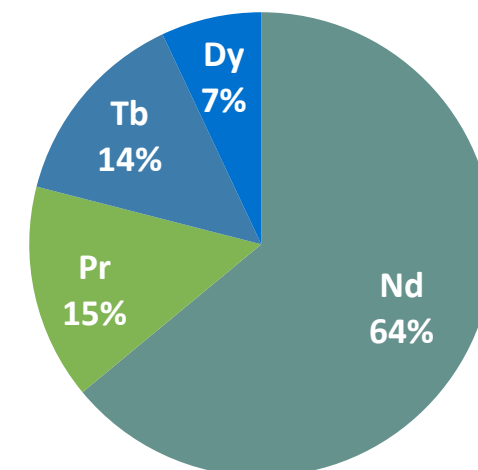
ASSAY RESULTS CONFIRM HIGH VALUE PROJECT

MUCH HIGHER GRADE THAN TYPICAL IONIC CLAY RARE EARTH PROJECTS



Project	Style	Owner	TREO ³ %	NdPr ⁴ ppm	Uranium ⁵ ppm	Thorium ⁶ ppm
Phalaborwa ¹	Gypsum stacks	Rainbow Rare Earths	0.431%	1,257	2	48
Round Top ²	Ionic Clay	US Rare Earths/TMRC	0.063%	39	45	179
La Paz ²	Ionic Clay	American rare Earths	0.04%	80	1	7
Makuutu ²	Ionic Clay	Ionic Rare Earths	0.08%	232	10	30
Mount Weld ²	Hard rock	Lynas Rare Earths	7.90%	18,833	30	750
Bear Lodge ²	Hard rock	Rare Element Resources	3.08%	7,059	113	472
Longonjo ²	Hard rock	Pensana plc	1.43%	3,170	29	967
Nolan's Bore ²	Hard rock	Arafura Resources	2.60%	6,859	191	2,700
Norra Karr ²	Hard rock	Leading Edge Materials	0.55%	758	15	8
Lofdal ²	Hard rock	Namibia Critical Metals	0.32%	181	18	350

PHALABORWA IN-SITU METAL VALUE:
US\$/t Gypsum¹



Total value:
US\$146/t of gypsum¹

PHALABORWA BENEFITS FROM:

- 5 – 10x higher grade, with higher NdPr weighting than a typical low-cost ionic clay rare earth project – closer to grade of traditional hard rock style deposits, which typically have a much higher cost base for mining, crushing/grinding and metallurgical recovery
- Considerable high-value Dy and Tb credits
- Phalaborwa has low levels of radioactive elements: typical rare earth development projects require complex processing to remove these

RARE EARTHS DEPOSITS TRADITIONALLY ASSOCIATED WITH CHALLENGES

PHALABORWA IS DIFFERENT, ALLOWING A LOW COST DEVELOPMENT

TRADITIONAL BARRIERS TO RARE EARTHS DEVELOPMENT

Typical unit processes	Typical rare earths project	Phalaborwa
Hard rock mining and hauling	✓	
Hydraulic transport to plant		✓
ROM stockpile	✓	
Crushing and milling (energy)	✓	
Multi-stage flotation (energy and reagents)	✓	
Concentrate filtration	✓	
Gangue acid leaching at some projects (reagents)	✓	
Cracking (energy and reagents)	✓	
Rare earth dissolution (leaching)	✓	✓
Thorium and uranium removal	✓	
Impurity removal and intermediate products	✓	✓

- Historical processing, including initial flotation and concentration by Foskor followed by processing in Sasol's PhosAcid plant, has deposited concentrated rare earth elements from underlying carbonatite in gypsum stacks
- No need for hard rock mining, crushing and milling, which comprise a significant element of capex and opex for standard hard rock mining projects
- Rare earth elements contained in a chemical form in the gypsum, eliminating the need for an energy and reagent intensive cracking process



PHALABORWA FLOW SHEET DEVELOPMENT

OVERCOMING HISTORICAL CHALLENGES RELATED TO RARE EARTHS SEPARATION



Pre-
1940's

- Crystallisation to separate small quantities of rare earths
- Process depends on slight differences in solubilities
- Multiple stages of dissolution and crystallisation required to produce small amounts of high purity rare earths

1940's

- Manhattan Project to develop the atomic bomb included effort to improve separation techniques
- Rare earths initially used as a proxy for radioactive elements due to ease of handling in research phase leading to development of ion exchange as a batch separation technology
- Multiple steps required to separate 16 different elements in a complex and uneconomic process

1950's

- Continuous solvent extraction ("**SX**") replaced batch ion exchange
- Water-based solution mixed with oil-based, organic solution
- Rare earths transfer to the organic solution in a slightly different ratio
- Due to ratio differences, 100's of mixers and settlers are needed to isolate a single rare earth element

1980's

- Fully continuous ion exchange ("**CIX**") developed by K-Tech founders; subsequent refinements led to development of continuous ion chromatography ("**CIC**") separation techniques
- SX had already been established as preferred separation method for rare earths by this stage; CIC and CIX commercialised in other industries

PHALABORWA FLOW SHEET DEVELOPMENT

UNLOCKING A UNIQUE SOURCE OF RARE EARTHS WITH PROVEN TECHNOLOGY



RECOVERING RARE EARTHS FROM HISTORIC GYPSUM STACKS

Rainbow has successfully developed a process flow sheet to allow rare earths to be recovered as a by-product from phosphoric acid production used for the global fertiliser industry

This is expected to unlock value through:

- the recovery of separated rare earth oxides from the gypsum stacks at Phalaborwa
- the recovery of separated rare earth oxides from live phosphoric acid streams and other historic waste streams, such as our recently announced opportunity with a major South African chemicals business

SUCCESSFUL FLOW SHEET DEVELOPMENT

- Patented process of continuous ion exchange ("CIX") and continuous ion chromatography ("CIC") developed by Rainbow's partner, K-Technologies Inc. ("K-Tech")
- Process will produce separated rare earth oxides with substantially fewer steps than traditional solvent exchange methods, without the economic challenges of the batch process and in a closed circuit
- CIX and CIC processes have been applied commercially at capacities up to 700m³ per hour in a number of:
 - industries (including food, biotech, mining and chemical industries)
 - locations (including South Africa)



Commercial CIX unit

EFFICIENT AND PATENTED TECHNOLOGY REDUCING CAPITAL AND OPERATING COSTS

K-TECH CIX AND CIC TECHNOLOGY ENJOYS THE FOLLOWING BENEFITS

- Patented, proven technology
- Developed at a commercial scale
- Fast, efficient, and precise extraction of trace quantities of target materials from high volume streams
- Safe, simple to run, and can operate at a range of temperatures
- Major reduction in capital and operating costs vs. traditional pyro-metallurgical or chemical digestion/mixer settler technology

K-TECH LABORATORY IN FLORIDA INCLUDES A CIX PILOT PLANT WHICH WILL BE USED TO TEST THE NEW PROCESS ON A CONTINUOUS BASIS



Pilot Plant System for Hydrometallurgical Application

GAKARA: HIGH-GRADE RARE EARTH MINERAL CONCENTRATE FROM LARGE MINERALISED SYSTEM IN BURUNDI

- 39km² mining permit hosting large scale mineralised system
- Exploration target provides opportunity for 262,000 -375,000t of high-grade vein hosted mineralisation grading 7.0% - 12.0% TREO plus 252,000 - 342,000t of breccia hosted mineralisation grading 1.0% - 1.5% TREO
- Trial mining and processing since 2017 has demonstrated amenability for simple, low-cost gravity separation from ore
- Trial mining has progressed from small-scale manual focused operations pre 2020 to bulk mechanical waste mining and selective mechanical ore mining to deliver an average mine feed grading 13.5% TREO between September 2020 and March 2021
- High value rare earth concentrate (52-56% TREO) with low levels of radioactive elements weighted towards magnet rare earths: NdPr represent ~90% of value (19.5% of mass)
- Expanded mining fleet and de-bottle necking of process plant in 2020-21 delivered growing production profile until operation placed on care and maintenance in June 2021 at request of Burundi Government
- Primary concerns of Burundi Government are understood to relate to pricing of mineral concentrate - this was independently adjudged to represent a fair, arms length price by an independent report commissioned by the World Bank, compiled by SRK Consulting and signed off by the Burundi Government in June 2020

PRE-2020



LATEST OPERATIONS



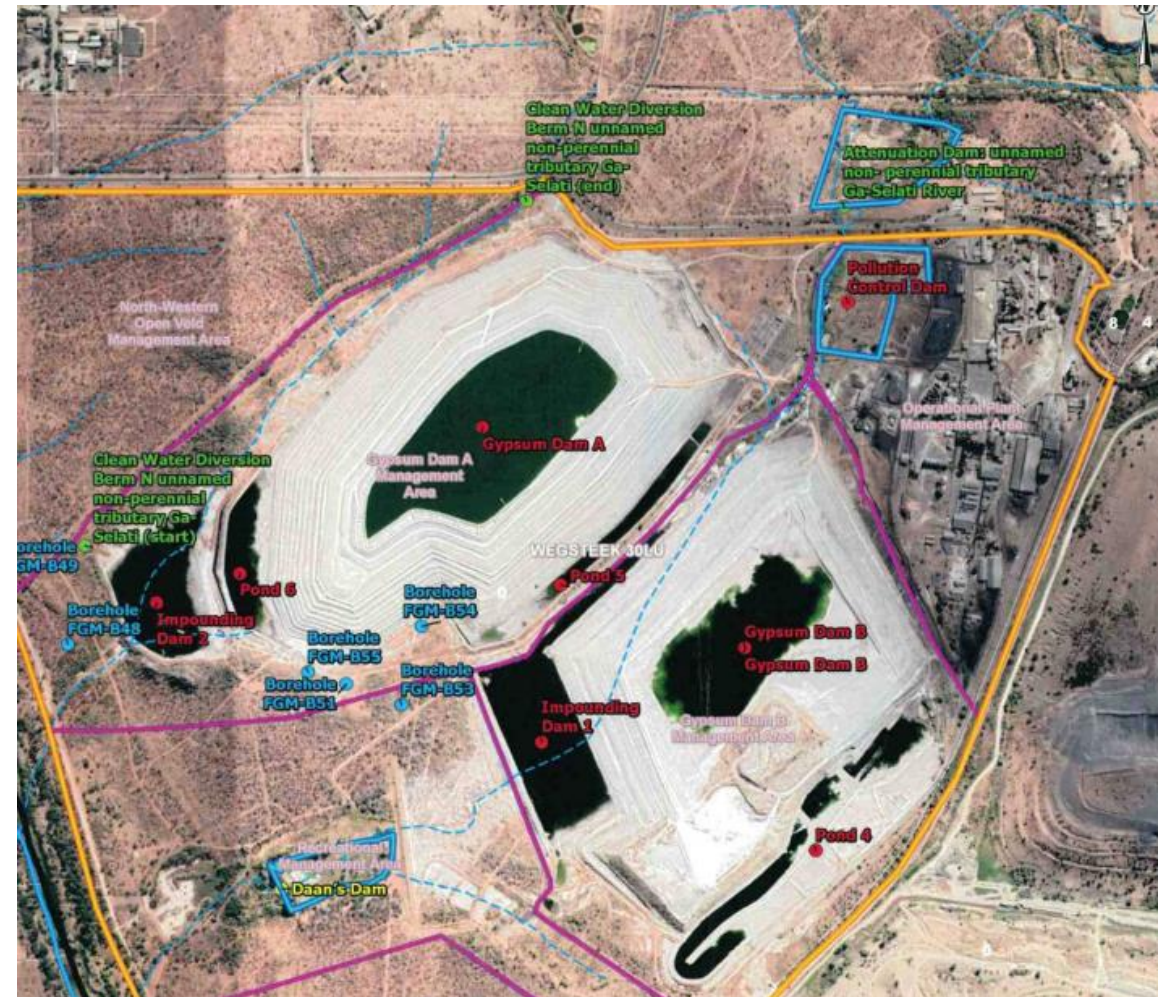
RAINBOW RARE EARTHS

A STRATEGIC SOURCE OF RARE EARTH MINERALS FOR A GROWING MARKET



Uniquely positioned to benefit from expected demand growth for rare earths to power the green revolution

- Two potentially world-class, scalable projects in South Africa and Burundi plus unique IP to unlock new opportunities
- Project and country risk diversification
- Strong weightings to high-value NdPr
- Exclusive rights to rare earths separation technology and confirmed flow sheet at Phalaborwa
- Simple mining and processing with low levels of radioactivity; expected low capital intensity development opportunities
- Strong institutional investor support



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THANK YOU

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