57-71 RE Rare Earths

15 P Phosphorus

RAREX Phosphate Enabled Rare Earths

ASX Release
18 October 2023

Rare Earths beneficiation testwork delivers strong TREO upgrades, providing further confidence in Cummins Range product strategy

Test work delivers 20x TREO upgrade to concentrate, with favourable flotation characteristics which extrapolate well to the upgrade of leach residue.

Highlights

- Cummins Range product strategy is focused on achieving the sale of a **combined mineral concentrate** to an off-taker for treatment via a **dilute acid leach to extract LFP battery-grade phosphate and EV magnet-grade rare earths**[1].
- Design of the proposed treatment process has focused on the ability to **leach a clean apatite** from the combined mineral concentrate, and the subsequent beneficiation of the leach residue to deliver a **rare earth concentrate**.
- Recent tests at Baotou Mengrong Fine Materials (BTMR) have demonstrated a **20x upgrade of total rare earth oxides (TREO) from 1% head-grade material with flotation recoveries of up to 49%.** The upgrade factor achieved is in line with other developing RE deposits of similar head grades.
- RareX believes that these results **demonstrate the potential to further upgrade the leach residue** (which is expected to have a 6% TREO grade) to even higher TREO concentrations.
- Ore feed material, containing apatite, was used in the testing to determine the flotation configuration and reagent selection. Leach residue, which will be stripped of apatite, is **expected to perform well with this flotation regime**. Residue samples will be sent for confirmation testing once bulk flotation and leach trials are complete.
- Recent apatite leach testwork[2] points toward the suitability of the Cummins Range combined **mineral concentrate to produce a high purity phosphoric acid as a feedstock for the growing LFP battery sector**.

Investor Hub Link: https://investors.rarex.com.au/link/lejYQy

RareX Limited (ASX: REE) (**RareX** or **the Company**) is pleased to advise that recent beneficiation testwork has returned promising results for the beneficiation of rare earths (**RE**) from its 100%-owned Cummins Range Rare Earths & Phosphate Project, located in the Kimberley region of Western Australia.

The current testwork program is focused on producing product and product derivative samples for offtake negotiations, as well as building data for the processing pathway for Cummins Range ore to deliver both high-grade phosphoric acid suitable for use in lithium-iron-phosphate (**LFP**) batteries and RE concentrates suitable for use in EV magnets.

[1] ASX announcement 12 October 2023: Cummins Range Product Strategy Update
[2] ASX announcement 11 July 2023: Phosphoric Acid Leach Test Supports RareX Stage-3 Operations

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RareX CEO James Durrant commented: "*We consider these results to be very encouraging.*

*"While these tests were undertaken on run-of-mine ore – which is not our proposed development pathway for Cummins Range – the run-of-mine (**ROM**) results will directly inform the flotation regime requirements for the RE leach residue after we've stripped away the pure apatite and fed it into the LFP supply chain.*

"The fact that the tested processing regime can concentrate rare earths in ROM material by 20-fold has exceeded the expectations of our metallurgists. Importantly, this metallurgical approach is also directly applicable to the leach residue material, which has already been chemically upgraded to six times the original TREO head grade and has less mineralogical complexity – meaning it should deliver even better float performance with higher recoveries.

"The results provide continued support to the proposed Cummins Range product strategy[3] for the processing of the Stage 2 combined monazite-apatite phosphate concentrate.

"Our met team is now assembling product samples, both to ensure that we understand process performance for our and our offtakers' facilities and also to provide real product sample and derivative product materials in support of ongoing offtake negotiations."

RareX is proposing to use dilute phosphoric acid leaching to extract phosphate from the ore, leaving RE contained within a leach residue. This process step is proposed at the offtaker's phosphoric acid facility as described in the recently released product strategy update[3] and the proposed installation is shown in Figure 1.

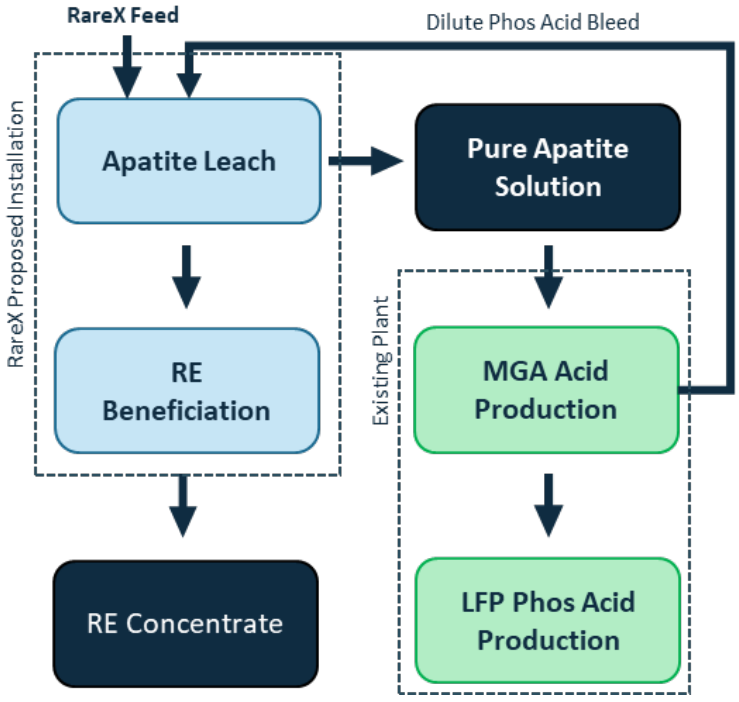

Figure 1: RareX Proposed Installation

These latest tests were designed to help define the flotation regime requirements for RE beneficiation, with these initial tests undertaken on typical ROM ore samples from Cummins Range.

[3] ASX announcement 12 October 2023: Cummins Range Product Strategy Update

BTMR RE Beneficiation

RareX has initiated a beneficiation program at Baotou Mengrong Fine Materials (**BTMR**) in China to test RE beneficiation from both whole ore and the leach residue from the phosphoric acid production. BTMR is a highly experienced Chinese research institute and is a preeminent testing laboratory for rare earths beneficiation, particularly flotation.

This testwork is being undertaken on samples, which is expected to be typical of run-of-mine material from the Cummins Range deposit, in order to provide the required volume of material needed to test alternative float regimes. The composite tested in this program was prepared using ore intervals from both the Rare Dyke and Phos Dyke of the Cummins Range deposit, which were crushed and homogenised by Auralia Metallurgy before splitting the 50kg sample for BTMR tests.

A range of tests have been performed on this sample to determine the flotation configuration and reagent selection for the beneficiation of RE minerals. A summary of several of the recent flotation results is shown in Table 1.

Table 1: RE Flotation Results Summary

Test No.	Calculated Head %	Final Concentrate		
		TREO Grade %	TREO Recovery %	Mass Yield %
Test 23	1.14	22.04	32.81	1.69
Test 25	1.06	21.57	44.73	2.19
Test 43	1.01	22.50	48.74	2.20

Note: Test results were validated at the Analysis Centre of Baotou Institute of Rare Earth which is an accredited laboratory in China and the results showed good alignments for the final concentrate confirming accuracy of the results.

In the best result, a RE concentrate of 22.5% TREO grade was achieved from a feed grade of 1% at a remarkable recovery of 48.74%. To be able to achieve an upgrade of over 20x into concentrate from the ROM feed is considered to be very encouraging. These results are far better than results obtained in earlier testwork and the upgrade factor is also in line with other developing rare earth deposits of similar head grades.

Although the tests were not performed on the leach residue, the results provide further confidence in the viability of the proposed RE beneficiation process for the leach residue. Further tests will be undertaken with BTMR once the leach residue, currently being prepared at Perth laboratories, is ready to be dispatched.

According to previous testwork results[2], it is believed that the leach residue (i.e., post apatite leach) will be enriched with monazite and therefore will contain residual apatite. REE metallurgists consider that it's possible that this could provide further upside to the RE beneficiation process. Given the positive BTMR results, it is believed that the leach residue (which is expected to grade 6% TREO), could be upgraded materially to grades suitable for a typical RE refinery.

Next Steps

Further testwork is to be undertaken to replicate and improve on these results following these positive results with results expected within the coming months. The Company is also working toward the production of mineral concentrate and product derivatives (leach liquor and RE residue) samples to advance offtake discussions and refine process design criteria.

In addition to the upcoming testwork, results of the 2023 drill program are expected to be available soon which will be used support another update of the Mineral Resource Estimate for Cummins Range.

This announcement has been authorised for release by the Board of RareX Limited.

Competent Person's Statements

The information in this release that relates to metallurgical testwork is based on information compiled and / or reviewed by Mr Gavin Beer who is a Member of The Australasian Institute of Mining and Metallurgy (AusIMM) and a Chartered Professional. Mr Beer is a consulting metallurgist with sufficient experience relevant to the activity which he is undertaking to be recognised as competent to compile and report such information. Mr Beer consents to the inclusion in the report of the matters based on his information in the form and context in which it appears. Mr Beer does not hold securities in RareX.

About RareX Limited – ASX: REE

RareX Limited (ASX: REE), a Perth based project development and exploration Company, was founded on the fundamental belief of the electronics revolution and the electric vehicle mega-trend. Our focus is rare earths and associated battery and electronic metals.

Cummins Range, in the East Kimberley region of Western Australia, is our flagship project which aims to produce a sustainable, ethical, transparent and secure low carbon rare earth and phosphate supply chain solution for its products which satisfy the two global mega-trends of population growth and electrification.

RareX maintains exploration upside programs in the immediate vicinity of the Cummins Range Project and also more broadly to identify targets and progress projects complementary to the founding beliefs and expertise of the core team.

Rare earths and in particular, NdPr, are core enablers of decarbonisation and electrification of our society. NdPr supports high strength magnets which enables low carbon technologies, especially in the electric mobility sector, robotics solutions and renewable energy, particularly the wind energy sector.

Phosphate is the feedstock for the emerging dominant battery technology; lithium-ferro-phosphate (LFP). The global LFP battery market is projected to grow from $10 billion in 2021 to $50 billion by 2028 as more EVs adopt the safer and longer life technology and grid stabilization batteries expand to balance intermittent renewable generation.

RareX maintains material investments in Kincora Copper (ASX:KCC), Cosmos Exploration (ASX:C1X) and Canada Rare Earth Corporation (LL.V).

For further information on the Company and its projects visit www.rarex.com.au

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APPENDIX A

Table 1: Drill Collar Information

Hole ID	East MGA	North MGA	RLUTM	End Depth	Azimuth	Dip	Type
CDX0008	307240	7866470	391	218	53	60	Diamond
CDX0011	307073	7866694	392	227	50	59	Diamond
CDX0015	307374	7866770	392	205	48	58	Diamond
CRX0060	307140	7866752	392	120	50	61	RC
CRX0063	307107	7866722	392	144	49	60	RC
CRX0068	307429	7866762	391	96	53	60	RC

Appendix B

JORC Code, 2012 Edition – Table 1

Section 1: Sampling techniques and data - Metallurgy

Criteria	JORC Code explanation	Commentary
Sampling techniques	• Nature and quality of sampling (e.g., cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.	• Diamond drill cores and RC chips were sampled for the metallurgical testwork. Samples were selected based on drill assays, drill hole location and intervals, geological and mineralogical data. Samples were riffle split from bulk samples and sent to BV Perth and/or ALS Perth and/or Nagrom Perth for drill assays.
	• Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	• For RC chips, the entire bulk samples were riffle split to ensure a representative sample from the selected interval. Quarter diamond drill cores were sent to laboratories to conduct crushing, sampling and assaying. All laboratories used in the assaying of the Cummins Range material were checked for sampling and assaying equipment and equipment calibrations / accuracy.

Criteria	JORC Code explanation	Commentary
	• Aspects of the determination of mineralisation that are Material to the Public Report. In cases where 'industry standard' work has been done this would be relatively simple (e.g., 'reverse circulation drilling was used to obtain 1m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g., submarine nodules) may warrant disclosure of detailed information.	• Sample interval selection for the metallurgical testwork was based on geological controls and mineralisation of the deposit, the samples were considered representative of the mineralisation that were intended to be tested.
Drilling techniques	• Drill type (e.g., core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (e.g., core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).	• Drilling techniques used for the Cummins Range samples used for the metallurgical testwork were: ○ Reverse Circulation (RC) drilling in 2020-2021, 2022 using 5 ½ inch diameter hammer. ○ Diamond drilling in 2021- 2022 using HQ and PQ sized rods.
Drill sample recovery	• Method of recording and assessing core and chip sample recoveries and results assessed.	• Samples used for the metallurgical testwork were collected by riffle split. Additional laboratory assays were undertaken on the samples submitted for the testwork and showed good alignments to the drill assays.
	• Measures taken to maximise sample recovery and ensure representative nature of the samples.	• Larger and more capable rigs were used for collection of the metallurgical samples which allowed for good recoveries of samples. During each drill program, all drill rigs were checked by professional geologists, and all drill holes were logged and monitored for recoveries and accuracy prior to sample splitting and logging.
	• Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	• Holes used for the metallurgical testwork had good sample recovery hence minor sample bias. There is no distinctive relationship exist between sample recovery and grade.
Logging	• Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.	• All samples used for the metallurgical testwork were geologically logged to a detail level that supported the metallurgical studies.

Criteria	JORC Code explanation	Commentary
	• Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.	• The logging is qualitative and quantitative in nature for the metallurgy samples. The recorded details included: lithology, grain size, weathering, colour, alteration, sulphide quantity and type, structure and veining. Photos were taken for all core samples.
	• The total length and percentage of the relevant intersections logged.	• Logging of all metallurgical samples were carried out on geological intervals.
Sub-sampling techniques and sample preparation	• If core, whether cut or sawn and whether quarter, half or all core taken.	• Cores were cut in half and quarter, quarter cores from each selected interval were used for metallurgical testwork.
	• If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.	• RC chips were riffle split from the bulk bags. Samples were dry when riffle split.
	• For all sample types, the nature, quality and appropriateness of the sample preparation technique.	• Samples used for the metallurgical testwork were diamond drill cores and RC chips which were split and prepared with appropriate equipment. Where required, the samples were crushed and ground to ensure the samples were properly prepared for the required testwork.
	• Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	• All sample preparation and sampling equipment was cleaned with adequate procedures before taking of each sample to ensure there is no cross-contamination between samples.
	• Measures taken to ensure that the sampling is representative of the in-situ material collected, including for instance results for field duplicate/second-half sampling.	• Drill assays, mineralogical and geological information were reviewed for selection testwork samples. Additional assays on the samples showed high repeatability of drill assays suggesting good representivity of the in-situ material hence no further sampling was required.
	• Whether sample sizes are appropriate to the grain size of the material being sampled.	• The metallurgical sample sizes were appropriate to the grain size of the material being sampled. Where necessary, material was crushed and/or pulverised before riffle / rotary split to ensure good consistency of sampling representivity.
Quality of assay data and laboratory tests	• The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.	• The assay analyses of all samples were conducted by registered laboratories (i.e., ALS, BV and Nagrom etc.) with suitable equipment and well-known quality assurance accreditation to ensure the accuracy of the assay results. Samples were assayed by X-ray fluorescence (XRF) and Inductively Coupled

Criteria	JORC Code explanation	Commentary
		Plasma (ICP).
	• For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.	• There was no reliance upon geophysical tools, spectrometers, or any other techniques for the required metallurgical testwork. All assays were undertaken with appropriate XRF and ICP equipment at registered laboratories.
	• Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	• The metallurgical samples were tested against the standards and the good alignments to drill assays confirmed the accuracy of the results. • External checks, at both Australian and Chinese accredited laboratories, were also performed on this sample to ensure accuracy of the results.
Verification of sampling and assaying	• The verification of significant intersections by either independent or alternative company personnel.	• There are no significant intercepts mentioned in this announcement.
	• The use of twinned holes.	• Twin holes were not used for collection of metallurgical samples.
	• Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	• An electronic geological database was used for data storage. For metallurgical testwork, all raw data from laboratories, results analysis and summary reports were documented in a metallurgy database.
	• Discuss any adjustment to assay data.	• No adjustment was made to the assay data.
Location of data points	• Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.	• Drill hole collar locations for the metallurgical testwork have been surveyed using a differential GPS with accuracy to 0.1 m.
	• Specification of the grid system used.	• MGA2020 Zone 52
	• Quality and adequacy of topographic control.	• Topographic control of the metallurgical testwork has been established from surveyed drill collars and are within 0.1 m. The Cummins Range deposit is located on flat terrain.
Data spacing and distribution	• Data spacing for reporting of Exploration Results.	• All the samples tested were selected from 6 holes from Rare Dyke and Phos Dyke from a range of depth and weathering profiles with varying TREO and P_2O_5 grades.

Criteria	JORC Code explanation	Commentary
	• Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.	• The data spacing is considered appropriate for the metallurgical testwork at this study level.
	• Whether sample compositing has been applied.	• Samples were composited for the metallurgical testwork. Representative portion of each selected intervals were sent to the designated laboratories to undergo staged crushing and grinding before being composited and homogenised with suitable equipment. Where drill cores were used for the testwork, quarter cores were crushed into suitable sizes before splitting the representative samples used for composition.
Orientation of data in relation to geological structure	• Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	• The orientation of the metallurgical sampling is not considered to be biased towards any geological characteristics.
	• If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	• N/A
Sample security	• The measures taken to ensure sample security.	• All metallurgical samples were secured with appropriate labelling system. Samples were labelled with standard designations and were stored in locked shed. Samples were transported to Perth from site by reputable transport companies. Individual bags are cable tied and the pallets are wrapped in plastic with detailed logging sheet included.
Audits or reviews	• The results of any audits or reviews of sampling techniques and data.	• No audits were undertaken however the Competent Person was involved in all stages of the metallurgical sampling and tests. In-house reviews were also completed on the sampling techniques and testwork results.

Section 2: Exploration Results - Metallurgy

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.	• The Cummins Range deposit is located on tenement E80/5092 and is 100% owned by Cummins Range Pty Ltd which is a wholly owned subsidiary of RareX Ltd. Cummins Range Pty Ltd purchased the tenement from Element 25 with a potential capped royalty payment of AU$1m should a positive PFS be completed within 36 months of purchase finalisation.
	• The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	• No security or impediments with tenement E80/5092.
Exploration done by other parties	• Acknowledgment and appraisal of exploration by other parties.	• CRA Exploration defined REO mineralisation at Cummins Range in 1978 using predominantly aircore drilling. Navigator Resources progressed this discovery with additional drilling after purchasing the tenement in 2006. Navigator announced a resource estimate in 2008. Kimberly Rare Earths drilled additional holes and upgraded the resource estimate in 2012.

Criteria	JORC Code explanation	Commentary
Geology	• Deposit type, geological setting and style of mineralisation.	• The Cummins Range REO deposit occurs within the Cummins Range carbonatite complex which is a 2.0 km diameter near-vertical diatreme pipe that has been deeply weathered but essentially outcropping with only thin aeolian sand cover in places. The diatreme pipe consists of various mafic to ultramafic rocks with later carbonatite intrusions. The primary ultramafic and carbonatite rocks host low to high-grade rare-earth elements with background levels of 1000-2000 ppm TREO and high-grade zones up to 20% TREO. Disseminated apatite is through all rock types and is also contained in phoscorite. Above the carbonatite dykes is a well-developed regolith profile that extends to 100 m below the surface where a combination of residual, or eluvial and chemical weathering have redistributed and upgraded rare earths and phosphate. • QEMSCAN and MicroXRF results have showed that all the phosphate is contained in Apatite and Monazite. The Apatite contains low UTh, no cadmium and chlorine, and elevated levels of Fl that are well below acceptable limits. • QEMSCAN and MicoXRF have showed the REO in the Regolith are deporting mostly to monazite, with lesser amounts deporting to bastnaesite, crandallite, and REE intergrowths. • QEMSCAN and MicoXRF indicate the REO in the fresh rock are deporting to monazite, bastnaesite, parisite and REE intergrowths.
Drillhole Information	• A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes: ○ easting and northing of the drill hole collar ○ elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar ○ dip and azimuth of the hole ○ down hole length and interception depth ○ hole length.	• All drill hole details used in this metallurgical testwork have been previously announced on the ASX between 2019 and 2023.

Criteria	JORC Code explanation	Commentary
	• If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	• N/A
Data aggregation methods	• In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g., cutting of high grades) and cut-off grades are usually Material and should be stated.	• No maximum or minimum cut-off grades are used in this announcement.
	• Where aggregate intercepts incorporate short lengths of high-grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.	• N/A
	• The assumptions used for any reporting of metal equivalent values should be clearly stated.	• No metal equivalent values are used in this report.
Relationship between mineralisation widths and intercept lengths	• These relationships are particularly important in the reporting of Exploration Results. • If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.	• N/A
	• If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').	• N/A
Diagrams	• Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported. These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.	• The report is relating to metallurgical beneficiation testwork and no significant discovery is being reported.

Criteria	JORC Code explanation	Commentary
Balanced reporting	• Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced avoiding misleading reporting of Exploration Results.	• N/A
Other substantive exploration data	• Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	• This report includes meaningful metallurgical results where rare earth flotation tests was performed on a regolith composite containing 1% TREO and showed: ○ Test 23 ▪ 22.04% TREO grade ▪ 32.81% TREO recovery ○ Test 25 ▪ 21.57% TREO grade ▪ 44.73% TREO recovery ○ Test 43 ▪ 22.50% TREO grade ▪ 48.74% TREO recovery
Further work	• The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling). • Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	• Scoping Study for the Stage 1 DSO and Stage 2 operations is in progress, with completion expected end of July 2023. • Baseline Environmental studies have commenced with the instalment of 14 water monitoring bores in 2022.