

Metallurgical Test Work Successfully Completed at La Paz

Highlights

- *Leach technology successfully demonstrated high levels of rare earth metals extraction and rapid dissolution times.*
- *Recovery rates of up to 66.4% TREO and 71.5% Scandium achieved.*
- *Capital and operating costs will be reduced with 75% of the gangue material removed through magnetic separation.*
- *Results confirm very low thorium and uranium penalty elements.*
- *The conceptual flowsheet developed maximises the recovery of rare earth metals, particularly high value magnet metals Neodymium and Praseodymium.*
- *Valuable insight gained into accelerating the technical development of the Halleck Creek project, given its similarities to La Paz.*

American Rare Earths (ASX: ARR, OTCQB: ARRNF, FSE: 1BHA) ('ARR' or 'the Company') is pleased to announce that the latest metallurgical testwork from its La Paz rare earths deposit, has continued to advance the project forward with a simplified concentrator flow sheet developed for mine planning and confirmation that the ore responds positively to conventional processing.

These results support the previous testwork completed in 2020 and April 2022, which provide opportunities to reduce operating and capital costs.

As part of the latest metallurgical testing campaign, the Company requested Wood Australia Pty Ltd (Wood) use the results to develop a conceptual flowsheet for the La Paz concentrator. The Company also sought guidance for its annual processing capacity based on a single processing line using the most capital-intensive equipment, which assists with mine planning.

Planned work will build upon these results to refine the processes undertaken throughout the flowsheet to maximise the recovery of rare earth metals, particularly high-value magnet metals Neodymium and Praseodymium which are the focus at La Paz.

CEO and Managing Director, Mr Chris Gibbs, commented, "These latest metallurgical results are extremely encouraging and continue to advance the La Paz Project in the right direction in its development.

"We acknowledge the great work industry leaders Wood Australia, Nagrom and Watts & Fisher have been conducting on our behalf.

“With its high levels of rare earth metals extraction and rapid dissolution times, Watts and Fisher's leaching technology could be a game-changer in developing La Paz and Halleck Creek, given the projects share similar mineralogy. They also have ongoing contracts with the US Department of Defense, with which we are linked through our collaboration with the Defense Advanced Research Projects Agency EMBER R&D program aiming to develop a clean rare earths supply chain for the US.

“Also very pleasing is the ongoing confirmation that La Paz has very low levels of penalty elements thorium and uranium. This is beneficial from an environmental and handling perspective and makes our Company more likely to be invited to be involved with additional US Government-supported supply chain R&D programs.

“I thank all our partners in this testwork for the significant progress that's been made, and we look forward to the next round of work to refine the learnings and take the flowsheet to the next stage of development.”

The “Executive Summary” below presents the primary results of the metallurgical testwork at La Paz prepared by Wood.

1 Executive Summary

1.1 Overview

American Rare Earths Limited (ARE) commissioned Wood Australia Pty Ltd (trading as Wood), to manage and interpret a testwork program on supplied composites of split diamond drill core produced in a drilling program conducted in early 2021 at the Paz Rare Earths Project in Arizona USA. This work follows on from testwork conducted on drill chip samples undertaken by Saskatchewan Research Council (SRC) in Canada during 2020 under Wood's direction, which provided preliminary guidance on processing routes to treat this ore.

The cores were subjected to the following testwork elements:

- Mineralogical characterisation
- Comminution
- Low intensity magnetic separation (LIMS)
- Wet high intensity magnetic separation (WHIMS)
- Flotation – sighter rougher tests (both direct allanite flotation and reverse silica flotation)
- Leaching – Watts & Fisher's proprietary modified phosphoric acid leaching process, testing WHIMS concentrate.

Four composites were supplied for testing – one master composite and three lithological variability samples.

1.2 Key Results

Mineralogy - XRD confirms that silica is the largest component of the ore at nearly 60% of total mass, present as free silica and feldspar minerals. QEMSCAN confirms that 85% of rare earth element (REE) mineralisation resides in the orthosilicate mineral allanite, the balance with monazite and other minerals. Allanite is fine grained and requires fine grinding to achieve a high degree of liberation from gangue minerals. **However, it is amenable to magnetic separation which serves as a primary upgrade mechanism.**

Comminution – testing confirms excellent amenability to SAG milling and HPGR processing, with lower than average abrasiveness tendencies.

Magnetic Separation - the ore responds to sequential grinding and magnetic separation steps, allowing rejection of significant gangue mass for low rare earth values loss. **LIMS for rejection of ferromagnetic minerals such as magnetite does not appear to be necessary, simplifying the flowsheet.** WHIMS testing has demonstrated excellent amenability to upgrading allanite content in the ore through rejection of non-magnetic silica and silicates. Further mineralogical testing is required to understand which gangue minerals are associated with allanite in magnetic concentrate. **Two stage WHIMS with intermediate magnetics regrind achieved 75.5% silica rejection and 66.4% TREOs recovery, with 71.5% scandium recovery.** This is considered an improvement over previous work undertaken at SRC in Canada which achieved a higher TREO grade but only 38.5% TREO recovery.

Flotation - collector screening identified two fatty acid-based products that were promising for further development. The best outcome achieved was 83.6% TREO stage recovery for a grade of 1824 ppm. This corresponds to an overall recovery relative to new feed of 55.6%. Flotation was also successful in further rejecting silica, with only 11.9% of original feed content reporting to rougher-scavenger flotation concentrates. Further investigations are planned to understand gangue speciation which will allow strategies for further gangue rejection to be developed.

Leaching - Watts & Fisher's proprietary technology has been successfully demonstrated to achieve high extraction of rare earth metals content from WHIMS concentrate, with rapid dissolution of rare earth values within 2 to 3 minutes at leaching temperatures above 225°C. Leaching at lower temperatures improves selectivity against gangue take-up into leach liquor but rare earth extraction is also lower. The technology shows good promise with further development, moving into piloting down the track.

1.3 Proposed Flowsheet

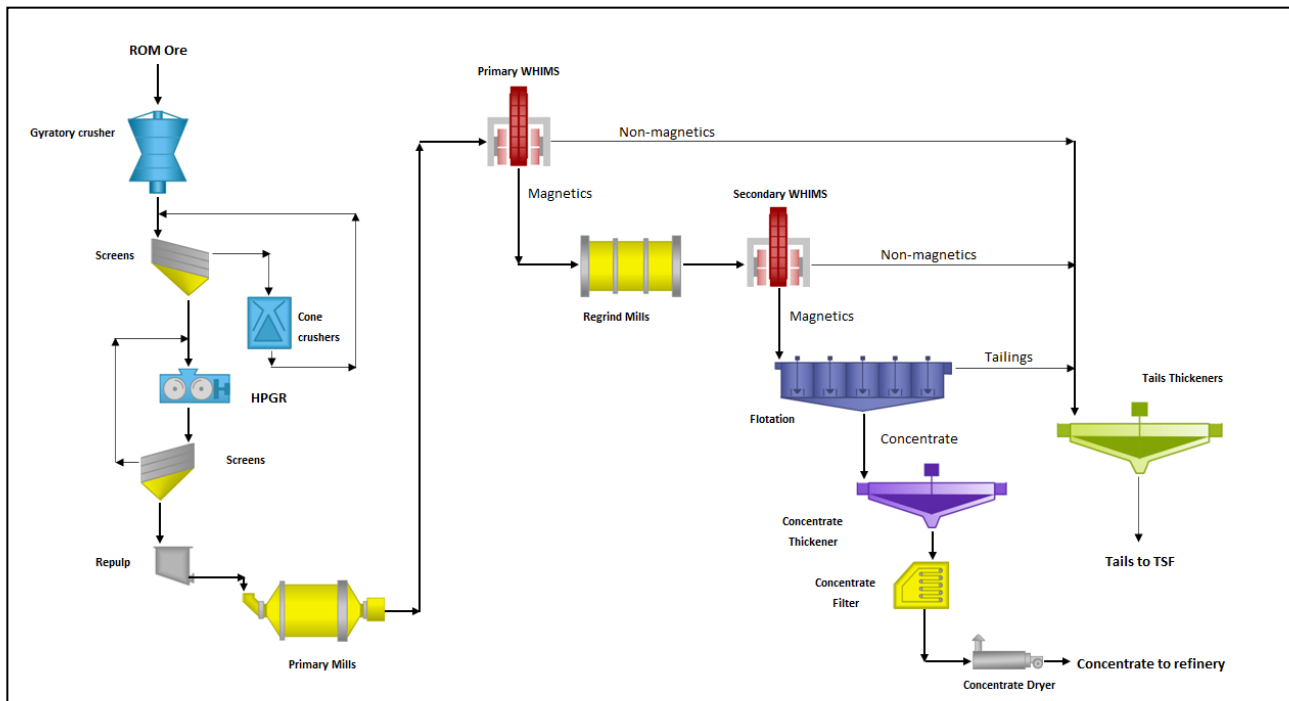
Sufficient testwork has been undertaken to develop a conceptual flowsheet for the La Paz concentrator, which comprises the following processing steps:

- Two stage ROM ore crushing to minus 50 mm
- Closed circuit HPGR producing minus 6 mm
- Primary grinding to a P_{80} of 150 μm
- Primary WHIMS (rougher and scavenger stages)
- Primary magnetics dewatering
- Primary magnetics regrinding to a P_{80} of 45 μm
- Secondary WHIMS (cleaner and cleaner-scavenger stages)
- Secondary magnetics dewatering
- Rougher/scavenger flotation
- Cleaner flotation
- Tailings dewatering
- Concentrate dewatering and drying.

ARE requested that Wood provide guidance on annual capacity based on a single processing line of the

most capital-intensive equipment, which was identified to be primary grinding. SAG milling and HPGR processing were proposed as the two most suitable modes of comminution. Modelling indicates that single line capacities of at least 25 Mt/a are possible with proven grinding equipment sizes. To provide indicative preliminary equipment sizes, summarised in **Error! Reference source not found.**, an annual capacity of 25 Mt/a was adopted, which will also assist ARE with resource pit shell modelling. A simplified schematic of the proposed concentrator flowsheet is included as Figure 1.1. Principal flow lines are indicated in bold.

Figure 1.1 : Proposed Simplified La Paz Concentrator Flowsheet



1.4 Recommended Further Work

Further work is recommended to optimize the process and build on the results from the first round of metallurgical test work. This includes the following:

- **Cleaner WHIMS** – additional work with increasing gauss levels to determine recovery by gangue mineral type using XRD and elemental analyses
- **Ro/Sc concentrate WHIMS** – similar treatment of flotation concentrate as an alternative to cleaner flotation should be explored as Ro/Sc flotation appears to have rejected a large proportion of silica/silicate
- **Mineralogy** - XRD and QEMSCAN analysis of WHIMS magnetics and rougher/scavenger concentrate to determine the extent of residual locking and also to allow estimation of recovery by mineral type relative to new feed. This is important from the perspective of understanding how the key gangue minerals behave. An understanding of this behaviour will assist in forming a strategy for the rejection of gangue.
- **Leaching** - it is recommended that the planned acid bake/water leach and HPAL testing be undertaken on available concentrate to provide comparative data with the Watts & Fisher leaching method. This would be performed on cleaner WHIMS concentrate produced by Nagrom
- **Confirmatory Watts & Fisher testing** is also recommended once they purchase appropriate mechanically stirred leaching equipment, but this is likely to be in early 2023.

It is important to acknowledge that all learnings from the La Paz program have direct bearing on upcoming Halleck Creek ore testing given the similarities in mineralogy and RE mineralisation in allanite, thus providing valuable insight into unlocking value and accelerating technical development.

Next Steps

Under the guidance of Wood, Nagrom has been engaged to conduct further test work over the coming months. We look forward to updating the market as these results become available.

Work continues at the La Paz SW project in Arizona. Exploration permit applications have been filed with the BLM and The Company is waiting for final approval. We plan to perform resource exploration drilling at La Paz SW to expand resource estimates at La Paz beyond the current 170MT JORC Resource estimate.

This market announcement has been authorised for release to the market by the Board of American Rare Earths Limited.

Mr Chris Gibbs
CEO & Managing Director

Competent Persons Statement:

The information in this document is based on information compiled by Mr Greg Henderson. Mr Henderson is a Senior Process Consultant at Wood Australia. Mr Henderson is a Fellow of the Australian Institute of Mining and Metallurgy (AUSIMM), number 109007, and 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 JORC Code. Mr Henderson consents to the inclusion in the report of the matters based upon the information in the form and context in which it appears.

About American Rare Earths:

American Rare Earths Limited (ASX: ARR, OTCQB: ARRNF, FSE: 1BHA) is an Australian company listed on the ASX with assets in the growing rare earth metals sector of the United States of America, emerging as an alternative international supply chain to China's market dominance of a global rare earth market expected to expand to US\$20 billion by the mid-2020s. The Company's mission is to supply Critical Materials for Renewable Energy, Green Tech, Electric Vehicles, National Security, and a Carbon-Reduced Future.

Western Rare Earths (WRE) is the wholly owned US subsidiary of the Company. The Company owns 100% of the La Paz Rare Earth Project, located 170km northwest of Phoenix, Arizona. As a large tonnage, bulk deposit, La Paz is potentially the one of the largest, rare-earth deposit in the USA and benefits from containing exceptionally low penalty elements such as radioactive thorium and uranium. Approximately 742 - 928 million tonnes of Rare Earths mineralised rocks are identified as an exploration target in the La Paz Rare Earths project's Southwest area with an average TREO Grade of 350 - 400ppm and Scandium Oxide grade of 20 - 24.5ppm. The new exploration Target is additive to the La Paz Rare Earth project recently upgraded 170MT Resource. (ASX Announcement, 29 September 2021). During the period from February to April 2022 the Company drilled nine holes for 821 metres and collected 677 samples in the La Paz southwest area. The assay results from the first 332 samples demonstrate rock type associated with higher rare earth grades. The enhanced grades and thickness of the mineralised zone have accelerated exploration planning. The Company is working on establishing a JORC resource for the southwest area (ASX Announcement, 14 June 2022). Preliminary metallurgical test work demonstrates that La Paz ore can be effectively concentrated using conventional magnetic separation, selective grinding and direct flotation. Under the guidance of Wood

Australia, advanced metallurgy and mineral processing test work is near completion with Nagrom Laboratories in Perth Western Australia (ASX Announcement, 7 April 2022).

In the first half of 2021, The Company acquired the USA REE asset, the Halleck Creek Project in Wyoming. Since acquiring the asset, the Company has increased the land holding to over 6,000+ acres. Approximately 1,015 to 1,268 million tonnes of rare earths mineralised rocks were identified as an exploration target for the Halleck Creek project area with an average Total Rare Earth Oxide (TREO) grade of 2,245 - 2,807 ppm (ASX Announcement, 1 September 2022). Initial surface sampling of the Overton Mountain area conducted in 2018 revealed average TREO values of 3,297 ppm, average Heavy Rare Earth Oxide (HREO) values of 244 ppm, and average Magnetic Rare Earth Oxide (MREO) values of 816 ppm. (ASX Announcement, 26 April 2022). The maiden exploration drilling program was completed in April 2022. Additional surface sampling over additional Halleck Creek claims showed average TREO values of 3051 ppm, and average MREO values of 812 ppm. (ASX announcement, 4 August 2022).

La Paz and Halleck Creek's mineral profiles are incorporated into emerging US advanced rare earth processing technologies in collaboration with US national laboratories, major universities and the US DOE innovation hub, the Critical Materials Institute.