

ASX ANNOUNCEMENT

COMPLETION OF TEST WORK AND METALLURGICAL UPDATES

21 January 2021



- **Offtake and project funding activities continue to gain momentum with early engineering works and finalisation of metallurgical work running concurrently to ready the Nolans project for front end engineering and design (FEED).**
- **Metallurgical Test Work, analysis and reporting now complete for the Nolans phosphoric acid pre-leach flowsheet.**
- **Changes to Definitive Feasibility Study (DFS) process flowsheet identified and incorporated to improve commissioning, production ramp-up, NdPr recovery and reduce risk.**

Arafura Resources Limited (ASX:ARU) ("**Arafura**" or the "**Company**") is pleased to announce the completion of all metallurgical test work and associated analysis from the extensive 4-year metallurgical pilot program (see Figure 1) which was led by Arafura's Technology Manager, Dr Alex Elliot. The program was completed in mid-2020 with results and reporting received progressively through the second half of the year. Analysis of the results and incorporation of the findings into the final metallurgical design has also now been completed, resulting in several changes to the DFS process design which will improve commissioning, Neodymium Praseodymium (NdPr) oxide recovery and reduce risk allowing for a shorter commissioning and production ramp up to be targeted. Offtake and project funding activities continue to advance, and the process design improvements provide significant risk mitigation outcomes that are strongly aligned with the potential project finance partners objectives.

Pilot Program Completion

The completion of the final stages of metallurgical testing in 2020 included the piloting of the separation of the rare earth elements from the cerium depleted rare earth chloride and precipitation and calcining of rare earth oxide products. As reported (*refer ASX Announcement 18 September 2020*) these separated rare earth oxides were then validated with potential customers and demonstrated the required product purity.

In addition to this separation and product precipitation piloting, a program aimed at the purification of the cerium hydroxide product produced in the previous piloting was undertaken with the aim of recovering any lost NdPr in the cerium hydroxide product. This purification circuit consists of the dissolution of the low-grade cerium hydroxide in sulfuric acid followed by a small solvent extraction circuit to recover the cerium from the other rare earth elements leaving them for recycling back into the rare earth purification circuit.

All the results of the metallurgical test work have now been incorporated into the process model and metallurgical basis of design ready for the commencement of front-end engineering and design (FEED). The corrosion test program including coupon analysis is the only laboratory testing that is still underway and scheduled for completion in early 2021. Testing has been undertaken on a variety of materials to provide critical equipment and materials of construction selection and design information for FEED.

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NdPr

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Provisional patent applications to protect novel and inventive processes used in the Nolans flowsheet for rare earth sulphate precipitation and rare earth sulphate processing to produce a cerium hydroxide product and purified rare earth chloride were lodged some time ago. More recently the national patent process has now been completed with applications lodged in numerous jurisdictions in Australia, Europe, South Africa, North America, China, and other Asia based locations.

Arafura Technology Manager Dr Alex Elliot said: *"Completion of this and validation of the entire Nolans flowsheet has been a big achievement by the technology team at Arafura and all the laboratories and consultants involved. Bringing the wealth of performance and design information into the metallurgical basis of design sets us up for design followed by a successful commissioning and ramp up."*

Process Flowsheet Finalisation

Following on from the completion of the analysis of metallurgical test work the technology team at Arafura has worked to finalise the process flowsheet for the Nolans Project ahead of commencing FEED. This has incorporated various changes since the DFS aimed at optimising the performance (including recovery of NdPr oxide) as well as reducing the commissioning, ramp-up and operational risks.

The key changes from the DFS flowsheet include:

- Increase in concentrate processing capacity in the hydrometallurgical circuit as foreshadowed in the announcement of the updated Ore Reserve (*refer ASX announcement 11 March 2020*).
- Reduction in the operational risk in the rare earth hydroxide dissolution circuit, an additional stage of leaching and heat treatment has been added to improve filtration and washing performance in the cerium removal circuit prior to the separation plant.
- Improvement in NdPr recovery, a cerium hydroxide leaching and solvent extraction circuit has been included to recover NdPr from the cerium hydroxide product and enable the production of a high purity cerium oxide product if desired.
- Change to nano-filtration from ion-exchange for rejection of impurities in the phosphoric acid product. This change provides added assurance for production of on-specification phosphoric acid, a key by-product, as well as removing impurities from the recycled phosphoric acid feeding the pre-leach circuit which improves leaching efficiency and reduces the mass of material feeding the acid bake.
- Changes to various filtration equipment across the hydrometallurgical circuits from plate and frame filters to candle filters which improves washing efficiency and overall circuit performance.
- Increased confidence of final product purity by changing reagents for precipitation of final rare earth products.

The impact of these changes on the Project capital and operating costs are currently being evaluated and will be incorporated into a project update planned to be issued prior to commencement of FEED and once all work is completed.

Arafura Managing Director Gavin Lockyer said: *"I am very pleased to announce the completion of our extensive test program which commenced in 2015. Our patented Ore to separated NdPr Oxide process, which started with 12 tonnes of Nolans material from Central Australia and concluded with product being qualified by global customers with a focus on E-mobility and renewable sectors has now been demonstrated at scale."*

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The extensive piloting program clearly differentiates Nolans and together with all permitting being in place is a key factor in it being the only Australian NdPr focussed project that is shovel ready. These factors are significant positives in the Company's engagement with offtake and project funding partners.

The DFS, together with the changes made in the process flowsheet provide further confidence in the commissioning and execution risk of the Project and combined with a targeted faster ramp-up to full production, will add to the overall financial viability."

-ENDS-

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Figure 1: Stages of Nolans Pilot Program

