

ASX Announcement

Nolans Acid Bake Pilot Plant Outcomes

31 August 2018



- **Demonstrated suitability of paddle dryer technology for Acid Bake process**
- **Vision of Acid Bake pilot operation now available**

Arafura Resources Limited (ASX: ARU) (Arafura or the Company) is pleased to provide an update on the flowsheet piloting program for its 100 per cent-owned Nolans Neodymium-Praseodymium (NdPr) project in the Northern Territory, and outcomes from the recently completed Acid Bake (sulphation) pilot plant. Key objectives of the piloting program are to acquire process performance, materials handling and mechanical engineering design data for the Nolans Definitive Feasibility Study (DFS), as well as to generate sufficient quantities of final NdPr product to allow for a comprehensive program of pre-qualification testing by Arafura's key customers in the rare earth magnet manufacturing sector.

Drawing on the successful application of paddle dryer technology to sulphuric acid bake in the small-scale trials conducted in late 2017 (*refer to ASX announcements 19 October and 13 December 2017*), Arafura proceeded to design, build, test, commission and operate a larger-scale pilot to replicate the sulphation area of Arafura's flowsheet. This area of the flowsheet uses concentrated sulphuric acid to convert rare earth minerals in pre-leach residue (PLR) to water-soluble rare earth sulphate material. It includes an acid mix, acid bake, and cooling stage in series.

In advance of operating the pilot, the Company, in partnership with Bossong Engineering, SGS Australia, ANDRITZ Gouda and Curtin University, undertook an extensive program of equipment testing using synthetic analogues of process material and phosphate-rich material types from Nolans (*refer to ASX announcement 19 April 2018*). This program helped drive optimisations of the pilot setup ahead of its construction, including but not limited to the relative positioning of feed points, angles of inclination, and paddle shaft rotation speeds. Once equipment parameters had been optimised, commissioning of the pilot plant was conducted, allowing the evaluation of residence time distribution across each of the pilot's unit operations.

The pilot ran over a four-day period at SGS Australia's metallurgical facility in Perth (*refer to ASX announcement 7 August 2018*), processing a total of 2.0 tonnes of five different NdPr-enriched feeds which together cover a broad range of potential feed characteristics. Most of the material was processed at a feed rate of 40 and 50 kilograms per hour during continuous operation to produce 4.1 tonnes of sulphated material. Corrosion coupons were inserted to allow an assessment of corrosivity of materials of construction. Samples of off-gas were collected and numerous operating parameters were logged at regular intervals over the duration of the program.

Vision of the pilot plant has been uploaded to [Arafura's YouTube channel](#).



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An important feature of Arafura's Acid Bake pilot has been the adoption of paddle dryer technology for both baking and subsequent cooling of the sulphated material. Paddle dryers are used in a variety of applications in the chemical, environmental and food industries, and offer substantial operational advantages over rotary kilns, including efficient heat transfer and mixing which facilitates continuous processing of high viscosity material.

A representative of processing solutions specialist ANDRITZ Gouda, who attended the duration of the pilot, observed that "the continuous baking and cooling tests in the paddle dryer and paddle cooler units, respectively, demonstrated good flowability of (sulphuric) acid-PLR product, with good contact with paddles, good heat transfer, no fouling, and normal power consumption".

Arafura's Managing Director Gavin Lockyer said, "*Acid bake is widely regarded both internally and in external feedback as the most significant execution risk item for the Nolans flowsheet. We and our partners in this pilot are comfortable in concluding that paddle dryer technology is highly suitable for processing Nolans NdPr-rich pre-leach residue material.*"

The Company is now directing its immediate efforts to water leach processing of the sulphated material and to completing Phases 5 and 6 of the flowsheet piloting program, collectively termed Rare Earth Processing.

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