## **ASX Announcement**

## Quarterly Activities Report and Appendix 5B



30 June 2018

## Highlights

- Lead engineer Hatch advances process engineering and commences other key activities for Nolans NdPr Project Definitive Feasibility Study
- Mining, geotechnical, hydrology and logistics studies advance with the appointment of key consultants
- Pre-commissioning work underway for the Final Phase 4 Acid Bake continuous pilot plant
- Key project milestone completed with Australian Government environmental approval for the Nolans NdPr Project
- Groundwater monitoring activities expanded to 81 bores including the installation of data loggers in 22 locations
- Nolans Definitive Feasibility Study progressing to schedule, reporting of results for completion December 2018
- Cash position \$7.9 million at 30 June 2018

## Nolans NdPr Project

## **Engineering Update**

Following on from the appointment of Hatch, process engineering work has been advanced and nearing completion. More than 120 process flow diagrams have been completed, and discipline engineering has commenced on process plant layouts and non-process infrastructure design. Mechanical equipment lists have been issued for use in the Nolans definitive feasibility study (DFS) and tender documentation for mechanical equipment and non-process infrastructure has also been prepared.

Arafura has also appointed consultants for most remaining DFS tasks, including:

- Mining Plus Pty Ltd (mining engineering and ore reserves);
- Knight Piésold (tailings impoundment and geotechnical evaluation);





- GHD Pty Ltd and Ride Consulting (hydrogeology and water supply);
- Qube Holdings Limited (logistics); and
- Simulus Engineers (process modelling).

AMC Consultants has completed a pre-DFS mine planning study that produced an updated annual mine plan and an ore variability study which was used to define the process plant design envelope. This study will also be used as the starting point for DFS mine planning which will be undertaken by Mining Plus.

## **Technology Phase 4 Acid Bake Piloting**

The first stage batch trials of Phase 4 Acid Bake piloting using a paddle dryer were successfully concluded by the Company in 2017. The 2017 trial used NdPr-rich pre-leach residue (PLR) feedstock from the Phase 2 pilot plant and produced excellent results (refer to ASX announcement 13 December 2017). The Company now expects to confirm these results in the final Phase 4 Acid Bake continuous pilot plant.

Figure 1: Batch scale Phase 4 Acid Bake Pilot







Construction and set up of the Phase 4 Acid Bake pilot plant is complete. During June dry commissioning of the unit was completed along with two commissioning runs. Pre-commissioning was attended by a European equipment vendor to observe the paddle dryer in a continuous operation and provide advice on operating parameters.



Figure 3: Komline paddle dryer in operation



Figure 4: Komline paddle dryer discharge



Some commissioning modifications were made to improve materials handling and optimise operating parameters. Key activities included re-calibrating dry feeder and acid lines, and modifications to discharge chutes to address flowability of materials.

Subject to the availability of staff at the hosting facility, the Phase 4 pilot schedule will see ongoing commissioning work with operation of the pilot to commence in late-July. As with all previous phases of piloting the plant will be monitored to acquire process performance and mechanical engineering design data for the DFS. A feature of Arafura's Phase 4 pilot is the adoption of paddle dryer technology for both baking and subsequent cooling of the sulphated material. Paddle dryers are used extensively in applications such as soil remediation and offers substantial operational advantages over rotary kilns.

Arafura has taken care to ensure that efficient feeding and mixing of sulphuric acid with the PLR is operating smoothly to optimise recoveries. To this end, key components of the plant including Komline paddle dryer (acid bake) and Gouda paddle dryer (cooling) have performed well with optimisation focused on ensuring materials are being mixed correctly and flowing well between the respective units of operation.

## Planning Advances on Phases 5, 6 and 7 Piloting

Scoping and vendor quotes for Phases 5 and 6 of the pilot program (collectively termed Rare Earth Processing; see Figure 5) have been completed and mobilisation is underway for the pilot set up. The operation of the Rare Earth Processing pilot is scheduled to commence immediately after the Phase 4 Acid Bake pilot.

The delay in completion of Phase 4 and the knock-on effect for Phases 5 and 6 is not expected to delay reporting the results of the Nolans DFS which is scheduled for the end of 2018 (Figure 12).

The Company previously identified the flow-on effect from the delay to Phase 4. Data from the Phase 7 pilot (Rare Earth Separation; see Figure 5) will not be available for the Nolans DFS. This will not impact the delivery of the DFS as the Company already has operational and process data from previous separation work completed on Nolans feedstock during 2011 and 2012 (refer to ASX announcements 17 January 2012, 6 June 2012 and 24 January 2013), and feasibility study level-of-accuracy engineering



design from the Separation Plant study completed by Lycopodium in 2013. This area of the project remains unchanged and the Company has decided to incorporate and update this data for use in the DFS. The design of the Separation Plant has already been advanced and vendor equipment enquiries have also commenced.

**Figure 5: Nolans Pilot Program Phases** 



## Regulatory Approvals - Environmental Impact Assessment

In May the Company received environmental approval from the Australian Government for development at Nolans in the Northern Territory. This is a key milestone in the project's advancement and represents the final step in the project's environmental approvals process (Figure 6). It follows receipt by Arafura in December of the Northern Territory Environment Protection Authority's (NT EPA) environmental impact assessment report which also recommends the project can proceed.

The Australian Government's assessment, which was completed under the Environment Protection and Biodiversity Conservation (EPBC) Act, recommends a number of conditions, some of which relate to important project environmental aspects such as biodiversity, groundwater and radiation management. Arafura will incorporate these and the NT EPA's conditions in the final Mining Management Plan (MMP) for the project which the Company will prepare in the second half of 2018. Final project construction and operating approvals will be obtained when the Northern Territory Department of Primary Industry and Resources approves the activities in the MMP and issues a mining authorisation.



Environmental Impact Statement (EIS)
Terms of Reference

Environmental Studies and
Stakeholder Consultation

Draft EIS Report

Public Review

Supplementary EIS Report

Northern Territory EPA Assessment and Recommendations

Australian Government Assessment and Environmental Approval

**Figure 6: Nolans Environmental Approval Process** 

#### **Groundwater Monitoring and Environmental Approvals**

The Company has stepped up its groundwater monitoring activities to acquire additional data in support of the recent environmental approval conditions. The water programs include the monitoring of up to 81 bores and includes 22 bores with dataloggers installed. In addition to bore monitoring the Company has also expanded the number of hydrographic stations in local surface water courses, installed data loggers to provide continuous groundwater data, and increased the frequency of sampling to assess water quality.

Arafura has invested more than \$3 million to delineate and define the Southern Basin groundwater resource and establish bore infrastructure for its exploration and project development activities. The groundwater monitoring undertaken by the Company will provide critical baseline groundwater data. This data will also be used in the project's Water Management Plan and be an integral part of the MMP required for the grant of the Nolans mineral leases.









**Figure 8: Monitoring Standing Water Level Variations** 





## **Geotechnical Site Evaluation**

Geotechnical site evaluation for processing plant and infrastructure at Nolans is scheduled to take place in the September quarter. Knight Piésold is in the final stages of planning the program (shallow drilling and test pits) which included a site visit in July. Preliminary design of the tailings and residues storage facilities has also commenced.

The geotechnical site evaluation is the first substantial disturbance exploration activity to take place at the Nolans site since 2016. In 2017 the Northern Territory Government (NTG) introduced a "Shared Land Use" policy which encourages continued consultation between the holder of an exploration licence and a pastoral lease. NTG approval of substantial disturbance exploration activity requires evidence of a land access agreement between an explorer and pastoral lessee. Arafura and the pastoral lease holder have, to date, been unable to reach such agreement.

The Company believed it was not going to be possible to negotiate a land access agreement with the pastoral lease holder and referred the matter to the DPIR and the NTG's Land Access Assessment Panel (LAAP). DPIR issued the conditions of access for the Company's exploration activities at Nolans in April



based on the final determination of the LAAP which was "unanimous in agreeing that the policy requirement for a land access agreement to be evidenced prior to approving Arafura Resources Limited 2018 Mine Management Plan has been satisfied".

On completion of the LAAP determination DPIR authorised the Company's planned substantial disturbance exploration activities detailed in its MMP, which includes the upcoming geotechnical site evaluation. Fortunately, the timing of the LAAP determination has enabled the geotechnical program to be scheduled without impacting the DFS target completion date. The Company is hopeful its current engagement with the pastoral lease holder through the geotechnical and groundwater monitoring programs will assist in agreeing future access requirements but notes continued engagement with the LAAP may need to be considered for access arrangements beyond 2018.

## **Exploration**

## Bonya Joint Venture (Base and Precious Metals; Tungsten; Iron-Vanadium)

EL 29701 (aka the Bonya project) is located 280 kilometres north-east of Alice Springs. Arafura holds a 60% interest in the Bonya project with the remaining 40% currently held by Rox Resources Limited (Rox). As previously reported Rox has agreed to sell its 40% interest to Thor Mining Plc (Thor). The consideration for the purchase of the interest is \$550,000 of Thor shares but the transaction also includes the adjacent EL 29599 which is owned 100% by Rox and is not part of the Bonya JV (refer to Thor ASX announcement 28 March 2018).

The transaction between Rox and Thor for the sale of the 40% interest in Bonya provided Arafura with a reference point to determine the fair value for its interest in EL 29701. In assessing the fair value and the capitalised exploration expenditure the Company has decided to recognise a non-cash impairment of \$1.2 million for EL 29701. This adjustment will be reflected in the financial period ending 30 June 2018.

Settlement and completion of the acquisition by Thor from Rox is now underway. When completed Thor will assume Rox's rights and obligations under the existing JV agreement which requires the parties to contribute to exploration activities in accordance with their relevant interests. In the event one party elects not to contribute to the agreed exploration program, dilution provisions will apply.

## Corporate

#### **NdPr Price Performance**

In the period from April to June, the Neodymium Praseodymium (NdPr) oxide price (FOB China) traded in the range of US\$50.00 to US\$55.50/kg. The NdPr market lacked direction in the June quarter. There were several significant policy developments during the period but even these events did not appear to provide the NdPr price with any concise direction.



In April, China's Ministry of Industry and Information Technology (MIIT) announced a 40% increase in China's rare earth mining quotas for the first half of 2018. NdPr and other rare earth prices remained unchanged after the release of this announcement. Industry consensus was the impact on supply may not be significant, some concluding the quota increase will allow some existing supply to become legitimate production under the increased quota. Further industry analysis also indicates in the period from 2015 to 2017 China has increased its reliance on imported rare earth concentrate. The net impact of the quota increase may be for imported concentrate to be substituted with domestic feed stock that becomes available through the increased quota.

It appears MIIT remains committed to improving the sustainability of the rare earth supply chain and in June the state owned Chinalco group ordered a shutdown of the Guangxi rare earth unit in southern China after inspectors identified environmental breaches and water contamination. In addition to the Guangxi shut down, environmental issues at Chinalco's Lanxhou unit in north western China resulted in officials being disciplined.

In early-July the US Trade Representative applied a 10% tariff on a range of imported goods including rare earth compounds, metals and alloys. The introduction of tariffs traditionally targets increased consumption for locally produced material in substitution of imported products. The US is currently largely reliant on China for the supply of all rare earth materials and it would require considerable time and investment before the tariff would achieve the objective of developing a local rare earth supply chain.

The change to the rare earth quota in China and the introduction of the US tariffs appeared to be significant policy changes but neither initiative appeared to have any immediate impact on NdPr prices.

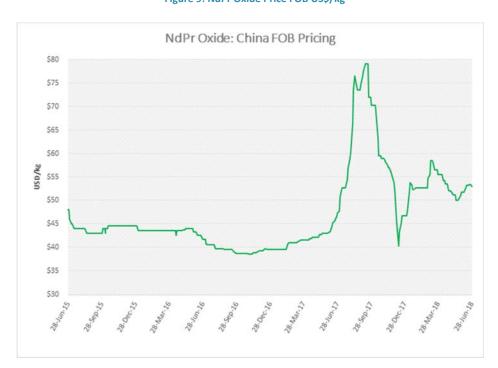


Figure 9: NdPr Oxide Price FOB US\$/kg



## China EV Procurement Strategy NdFeB Magnets & Lithium- ion Batteries

China has been the global trendsetter in establishing its procurement capacity to achieve its objective of being a world leader in the electric vehicle (EV) manufacturing space. According to *Fortune*, China accounts for 55% of the world's lithium-ion battery production and is expected to increase to 65% of all production by 2021. China's domestic lithium production is a modest 3,000 tonnes per annum but *Lithium Today* estimates in 2017 China consumed almost 50% of the world's lithium output. Neodymium-iron-boron (NdFeB) permanent magnets are also a key component for EV manufacturing but in stark contrast to lithium, China's supply chain procurement status is already well developed to produce NdFeB. China already accounts for 90% of the world's magnet manufacturing capacity and up to 85% of the world's NdPr production.

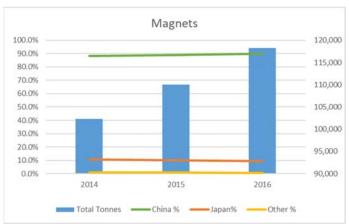


Figure 10: Magnet manufacturing by country

Source: ACREI, Argus Metals and industry sources

China has been the leader in the global race for the procurement of critical materials for the manufacture of EVs. Urged on by policy within China its EV manufacturers have aggressively sought to acquire physical assets to ensure material procurement is not the bottleneck to China achieving its goal of being a world leader in the EV space. In addition to maintaining a dominant position in the magnet supply chain, China has also invested heavily in the battery materials supply chain as evidenced by its control of key lithium battery components including cathode materials, anode materials, electrolyte solutions and separators.



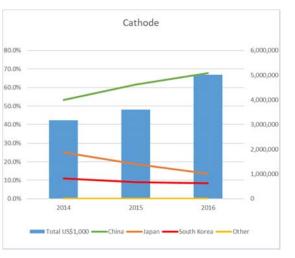
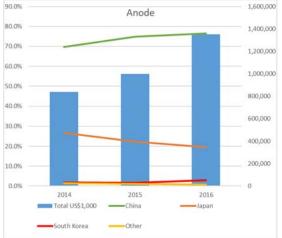
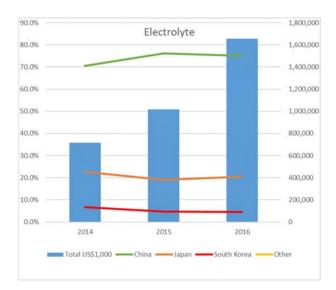


Figure 11: Battery Components Market Share by Country





Source: Yano Research Institute

The proactive investment stance by China in the battery materials space has been a catalyst for EV manufacturers in Japan, Korea and Europe to assess their own procurement requirements as the race escalates to acquire physical assets in the lithium space. China does not have the same pressing need for materials in the NdFeB magnet supply chain. Without China leading the investment charge in the NdFeB supply chain, have the other major automotive economies missed this procurement challenge or are they betting on China meeting China's and the rest of the world's NdFeB requirements?



#### **Cash Position and Timetable**

The Company had \$7.9 million in cash reserves at 30 June 2018 and continues to be in a strong position to advance the Nolans NdPr Project. For the quarter ended 30 June 2018 average monthly cash expenditure was \$930,000 compared with \$670,000 for the March 2018 quarter. The Company expects the expenditure profile for the September 2018 quarter to be elevated as flowsheet piloting and engineering activities continue to run concurrently. Flowsheet piloting and engineering are both key work streams and the Company's 2018 targets include:

- Finalising flowsheet piloting;
- Advancing NdPr offtake arrangements;
- Completing the DFS and definition stage engineering; and
- Engaging with strategic partners for capital equipment procurement and project funding.



Figure 12: Pilot & DFS Program Timeline



## **Nameplate Production**

Measured and Indicated Mineral Resources at Nolans support the project's nameplate production target of 14,000 tonnes per annum of TREO equivalent. The Mineral Resources were estimated and reported by the Company (refer to ARU announcement 7 June 2017) following the guidelines of the JORC Code 2012. Classification of Total Mineral Resources at Nolans into Measured, Indicated and Inferred, using a 1.0% TREO cut-off grade, is shown below.

Mineral Resources	Tonnes (Millions)	Rare Earths (% TREO)	Phosphate (% P₂O₅)	NdPr Enrichment (%)
Measured	4.9	3.2	13	26.1
Indicated	30	2.7	12	26.4
Inferred	21	2.3	10	26.5
Total	56	2.6	11	26.4

Note: Numbers may not compute due to rounding. "NdPr Enrichment" is the proportion of TREO comprising Nd<sub>2</sub>O<sub>3</sub> and Pr<sub>6</sub>O<sub>11</sub>.

#### **Competent Persons Statement**

The information in this report that relates to Exploration Results and Mineral Resources is based on information compiled by Mr Kelvin Hussey, a Competent Person who is a Member of the Australian Institute of Geoscientists. Mr Hussey is a full-time employee of Arafura Resources Limited. Mr Hussey has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code 2012). Mr Hussey consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.



## Appendix 5B

# Mining exploration entity and oil and gas exploration entity quarterly report

Introduced 01/07/96 Origin Appendix 8 Amended 01/07/97, 01/07/98, 30/09/01, 01/06/10, 17/12/10, 01/05/13, 01/09/16

## Name of entity

Arafura Resources Ltd	
ABN	Quarter ended ("current quarter")
22 080 933 455	30 June 2018

Consolidated statement of cash flows		Current quarter \$A'000	Year to date (12 months) \$A'000
1.	Cash flows from operating activities		
1.1	Receipts from customers	<u>-</u>	-
1.2	Payments for		
	(a) exploration & evaluation	(1,918)	(6,031)
	(b) development	-	-
	(c) production	-	-
	(d) staff costs	(386)	(1,525)
	(e) administration and corporate costs	(461)	(1,713)
1.3	Dividends received (see note 3)	-	-
1.4	Interest received	68	266
1.5	Interest and other costs of finance paid	(1)	(5)
1.6	Income taxes paid	-	-
1.7	R&D refund - Non Capitalised Portion	-	660
1.8	Other (provide details if material)	_	_
1.9	Net cash from / (used in) operating activities	(2,698)	(8,348)

2.	Cash flows from investing activities		
2.1	Payments to acquire:		
	(a) property, plant and equipment	(95)	(408)
	(b) tenements (see item 10)	-	<u>-</u>
	(c) investments	-	<del>-</del>
	(d) other non-current assets	-	-



Consolidated statement of cash flows		Current quarter \$A'000	Year to date (12 months) \$A'000
2.2	Proceeds from the disposal of:		
	(a) property, plant and equipment	-	-
	(b) security deposits on tenements (see item 10)	(21)	9
	(c) investments	(1)	(1)
	(d) other non-current assets	-	-
2.3	Cash flows from loans to other entities	-	-
2.4	Dividends received (see note 3)	-	-
2.5	Other (R&D Refund – Capitalised Portion)	-	1,174
2.6	Net cash from / (used in) investing activities	(117)	774
3.	Cash flows from financing activities		
3.1	Proceeds from issues of shares	-	3,174
3.2	Proceeds from issue of convertible notes	-	-
3.3	Proceeds from exercise of share options	-	_
3.4	Transaction costs related to issues of shares, convertible notes or options	-	(198)
3.5	Proceeds from borrowings	-	-
3.6	Repayment of borrowings	-	-
3.7	Transaction costs related to loans and borrowings	-	-
3.8	Dividends paid	-	-
3.9	Other (provide details if material)	-	-
3.10	Net cash from / (used in) financing activities	-	2,976
4.	Net increase / (decrease) in cash and cash equivalents for the period		
4.1	Cash and cash equivalents at beginning of period	10,691	12,472
4.2	Net cash from / (used in) operating activities (item 1.9 above)	(2,698)	(8,348)
4.3	Net cash from / (used in) investing activities (item 2.6 above)	(117)	774
4.4	Net cash from / (used in) financing activities (item 3.10 above)	-	2,976



Cons	colidated statement of cash flows	Current quarter \$A'000	Year to date (12 months) \$A'000
4.5	Effect of movement in exchange rates on cash held	-	-
4.6	Cash and cash equivalents at end of period	7,874	7,874

5.	Reconciliation of cash and cash equivalents at the end of the quarter (as shown in the consolidated statement of cash flows) to the related items in the accounts	Current quarter \$A'000	Previous quarter \$A'000
5.1	Bank balances	1,224	8,150
5.2	Call deposits	6,650	2,541
5.3	Bank overdrafts	-	-
5.4	Other (provide details)	-	<u>-</u>
5.5	Cash and cash equivalents at end of quarter (should equal item 4.6 above)	7,874	10,691

6.	Payments to directors of the entity and their associates	Current quarter \$A'000
6.1	Aggregate amount of payments to these parties included in item 1.2	(223)
6.2	Aggregate amount of cash flow from loans to these parties included in item 2.3	-

6.3 Include below any explanation necessary to understand the transactions included in items 6.1 and 6.2

Salaries, fees and superannuation of Directors of the Company.

7.	Payments to related entities of the entity and their associates	Current quarter \$A'000
7.1	Aggregate amount of payments to these parties included in item 1.2	-
7.2	Aggregate amount of cash flow from loans to these parties included in item 2.3	-

7.3 Include below any explanation necessary to understand the transactions included in items 7.1 and 7.2

N/A.



8.	Financing facilities available Add notes as necessary for an understanding of the position	Total facility amount at quarter end \$A'000	Amount drawn at quarter end \$A'000
8.1	Loan facilities	-	-
8.2	Credit standby arrangements	-	<u>-</u>
8.3	Other (please specify)	_	
8.4	Include below a description of each faci		

whether it is secured or unsecured. If any additional facilities have been entered into or are proposed to be entered into after quarter end, include details of those facilities as well.

N/A

9.	Estimated cash outflows for next quarter	\$A'000
9.1	Exploration and evaluation	4,370
9.2	Development	-
9.3	Production	-
9.4	Staff costs	300
9.5	Administration and corporate costs	500
9.6	Other (provide details if material)	-
9.7	Total estimated cash outflows	5,170

10.	Changes in tenements (items 2.1(b) and 2.2(b) above)	Tenement reference and location	Nature of interest	Interest at beginning of quarter	Interest at end of quarter
10.1	Interests in mining tenements and petroleum tenements lapsed, relinquished or reduced	See Appendix A below.			
10.2	Interests in mining tenements and petroleum tenements acquired or increased	See Appendix A Below.			

## Compliance statement

This statement has been prepared in accordance with accounting standards and policies which comply with Listing Rule 19.11A.

2 This statement gives a true and fair view of the matters disclosed.

Sign here: Date: 30 July 2018.

(Company secretary)

Print name: Peter Sherrington



#### **Notes**

- 1. The quarterly report provides a basis for informing the market how the entity's activities have been financed for the past quarter and the effect on its cash position. An entity that wishes to disclose additional information is encouraged to do so, in a note or notes included in or attached to this report.
- 2. If this quarterly report has been prepared in accordance with Australian Accounting Standards, the definitions in, and provisions of, AASB 6: Exploration for and Evaluation of Mineral Resources and AASB 107: Statement of Cash Flows apply to this report. If this quarterly report has been prepared in accordance with other accounting standards agreed by ASX pursuant to Listing Rule 19.11A, the corresponding equivalent standards apply to this report.
- 3. Dividends received may be classified either as cash flows from operating activities or cash flows from investing activities, depending on the accounting policy of the entity.

Appendix A - Mining Tenements Held as at 30 June 2018

Tenement reference	Project	Holder	Nature of interest (note (2))	Interest at beginning of quarter	Interest at end of quarter	Notes
ML 26659	Nolans, NT	Arafura Rare Earths Pty	Mineral Lease	100%	100%	Application Lodged
ML 30702		Ltd		100%	100%	Application Lodged
ML 30703				100%	100%	Application Lodged
ML 30704				100%	100%	Application Lodged
EL 28473 EL 28498 EL 29509 EL 31096 EL 31097 EL 31224 EL 31284	Aileron- Reynolds, NT	Arafura Resources Ltd	Exploration Licence	100% 100% 100% 100% 100% 100% 100%	100% 100% 100% 100% 100% 100% 100%	
EL 29701	Bonya JV, NT	Arafura Resources Ltd	Exploration Licence	60%	60%	Joint venture with Rox Resources Ltd - 60% ARU, 40% RXL (1)

<sup>&</sup>lt;sup>(1)</sup> Thor Mining Plc has subsequently purchased Rox Resources' 40% interest; however transfer is still pending as at 30 June 2018.