

## ASX Announcement

4 February 2019



**Andromeda Metals Limited**  
ABN: 75 061 503 375

### Corporate details:

ASX Code: ADN

Cash: \$1.006 million  
(as at 31 December 2018)

Issued Capital:

1,084,422,288 ordinary shares  
486,280,451 ADNOB options  
22,476,507 unlisted options

### Directors:

#### Rhod Grivas

Non-Executive Chairman

#### James Marsh

Managing Director

#### Nick Harding

Executive Director and  
Company Secretary

#### Andrew Shearer

Non-Executive Director

### Contact details:

69 King William Road,  
Unley, South Australia 5061

PO Box 1210  
Unley BC SA 5061

Tel: +61 8 8271 0600

Fax: +61 8 8271 0033

admin@andromet.com.au

[www.andromet.com.au](http://www.andromet.com.au)

## High Purity Alumina (HPA) Testing Confirms Premium Grade Feed Potential at Poochera

### Summary

- **Additional Third Round of HPA testing on Poochera halloysite-kaolin has confirmed that 4N (99.99%) purity is achievable with only a single purification stage. This compares favourably to peer companies which require multiple purification stages to reach 4N purity.**
- **The result represents the potential to significantly reduce capital requirements and operating costs for any HPA processing plant.**
- **Achieving a 5N (99.999%) purity test result has proved to be impractical at this point in time due to equipment and laboratory limitations.**
- **Discussions are in progress with a Chinese company regarding the use of halloysite-kaolin for HPA production in China.**
- **In addition to the HPA testing, ADN continues to advance the Poochera Halloysite-Kaolin Project following the successful dry processing of a bulk sample in Australia.**
- **A shipment of 140 tonnes of raw ore has now arrived in China to be processed through a wet-processing plant with results expected during March. Final processed product is then to be provided to potential end-use ceramic customers for commercial evaluation.**
- **Scoping Study work is progressing with mine design and logistic studies well underway.**

### Discussion

Andromeda Metals (ASX: ADN) is pleased to announce the results of enhanced HPA metallurgical testing of Carey's Well halloysite-kaolin from the Poochera Project after the previous Second Round showed that 4N purity could be achieved with only one stage of purification.

Round One preliminary testing carried out by Bureau Veritas, UniSA and the University of Newcastle achieved a purity of 99.9855% from an over-refined sample where impurities had been introduced. An industry standard HCL (Hydrochloric Acid) two-stage dissolution/precipitation purification process was used for this work (refer ADN ASX Release 30<sup>th</sup> May 2018).

The Second-Round testing conducted by Perth based BHM Process Consultants used a more suitable halloysite-kaolin sample and gave an  $\text{Al}_2\text{O}_3$  purity of 99.9946% with only a single stage of purification (refer ADN ASX Release 29<sup>th</sup> August 2018).

A Third Round of testing was recommended to confirm that the single stage purification result was repeatable, and to also determine if even higher levels of purity were possible. This has now been completed and proved that producing 4N HPA from a single stage purification process is fully achievable and repeatable, when using Carey's Well halloysite-kaolin as a feed.

Some extensive investigations resulted in the conclusion that measurement of a 5N (99.999%) product was not practicably possible without the use of highly specialised and fully HPA dedicated testing equipment being used as the detection limits for all elements needs to be below 1ppm as a minimum, without any risk of contamination.

### **Third Stage HPA Product Analysis**

BHM undertook three passes on different samples through a standard set of conditions relating to a chloride leach and purification system. These samples were halloysite-kaolin ore with the coarse sand content removed by wet screening. In all instances the material responded with excellent metallurgical response achieving > 90 % aluminium dissolution, and only 1 pass of precipitation purification required to meet the target purity specification.



**Figure 1 - 4N High Purity Alumina Crystals Produced from Carey's Well Halloysite-Kaolin**

There are a number of positives that can be ascertained from the testwork conducted. Primarily the generation of a 4N HPA product was achieved in both Phase 1 & Phase 2 of testing. In addition, this has been achieved in one stage of re-dissolution and re-precipitation and has been proven to be reproducible.

**Table 1 - Comparison of HPA Purity Generation During Testing Phases**

Testing Phase	Total Impurities (ppm)	Al <sub>2</sub> O <sub>3</sub> (%)
Round 1 Testing	165.0	99.9835
Round 2 Testing	53.6	99.9946
Round 3 Testing	47.5	99.9952

As with all high purity processes, a higher starting head grade greatly attributes to a materials upgrade potential, and ease of processing to reach high purity markers. The metallurgical performance displayed by the Carey's Well halloysite-kaolin shows excellent characteristics in its elevated head grade of Al<sub>2</sub>O<sub>3</sub>, limited levels of deleterious elements that impact on the purification process used, and fast process kinetics.

In conclusion, the metallurgical response from the Carey's Well deposit is excellent and appears to be a high purity, low contaminant feedstock for the basis of HPA production based on testwork supervised by BHM on ADN's behalf. The use of a single stage of purification could be expected to result in a notably simpler flowsheet giving significant reductions in both capital and operating expenditures compared to processes developed and announced by other prospective HPA producers. The replication of this result by the Round Three testing established a high level of confidence by proving up the reproducibility.

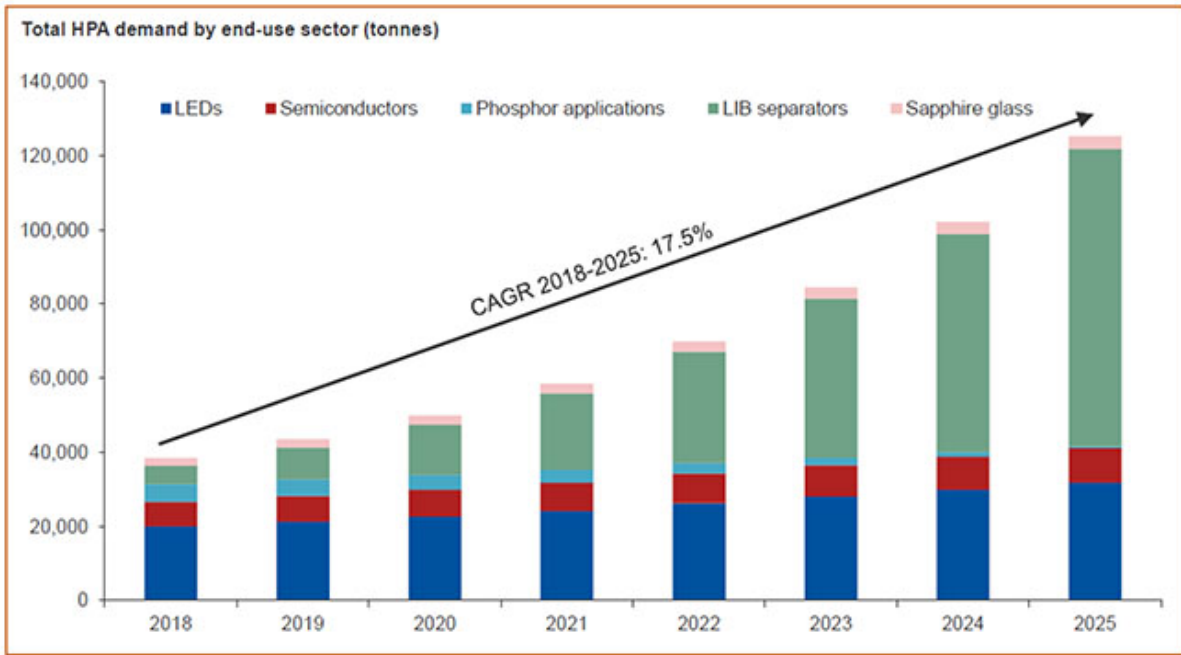
This outstanding result has led to discussions with a Chinese company that currently supplies material to LG for battery manufacturing who are interested in utilising the halloysite-kaolin as a premium feedstock for HPA production.

### **HPA Market Expected to Grow**

HPA is a high-value, high margin and highly demanded product as it is the critical ingredient required for the production of synthetic sapphire. Synthetic sapphire is used in the manufacture of substrates for LED lights, semiconductor wafers used in the electronics industry, and scratch-resistant sapphire glass used for wristwatch faces, optical windows and smartphone components. There is no substitute for HPA in the manufacture of synthetic sapphire.

Global HPA demand is over 25,000tpa (2016) and demand is growing at a compound annual growth rate (CAGR) of 16.7% (2016-2024), primarily driven by the growth in worldwide adoption of LEDs. As an energy efficient, longer lasting and lower operating cost form of lighting, LED lighting is replacing the traditional incandescent bulbs.

The value of 99.99% (4N) purity HPA is between US\$25,000 - US\$40,000 per tonne with upwards pressure from increasing demand and an evolving market.



Source: CRU, Perth Tech Metals Briefing June 2018

Figure 2 – Total HPA demand by end use sector

- HPA joins lithium, cobalt, nickel and copper as a recognised key input to lithium-ion batteries
- Higher battery energy density is driving migration to HPA coated battery separators
- Adoption of nickel-based battery cathodes underpinning transition to HPA coated separators
- Significant increase in forecast HPA powder demand to 2025

## The Poochera Project

The Poochera Kaolin-Halloysite Project covers two main geographic areas of interest, both situated in the western province of South Australia (Figure 3). The main area of focus, the Poochera Kaolin-Halloysite Project on the Eyre Peninsula comprises three tenements and is located approximately 635kms west by road from Adelaide and 130kms east from Ceduna (Figure 4).



Figure 3 -Project location plan

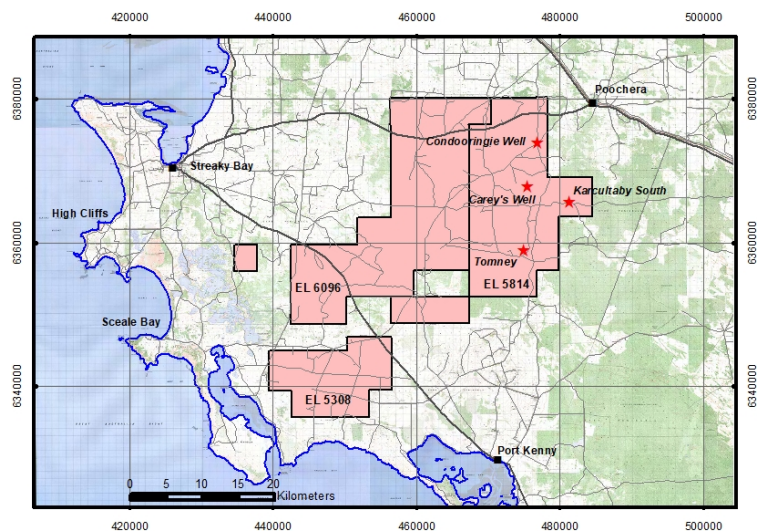


Figure 4 - Poochera Tenements

High quality kaolin-halloysite deposits occur extensively across the Poochera Project area making this a region of global significance for the mineral and capable of supporting a considerable long-life mining operation should final feasibility studies determine the project to be economically viable. Halloysite is a rare derivative of kaolin where the mineral occurs as nanotubes. Halloysite has a wide variety of industrial uses beyond simple kaolin and commands a significant premium above the average kaolin price. The Poochera kaolin deposits contains a variable natural halloysite-kaolin blend that is in demand for the ceramic and petrochemical refining markets, as well as developments in new high-tech and nanotechnology applications.

The northern project area includes the near pure halloysite Camel Lake deposit on EL6128 (Figure 3) that could potentially be processed to provide a very high value pure product for the development of halloysite nanotubes technology in the areas of energy storage and carbon-hydrogen capture and storage.

Extensive test work has been completed on the Carey's Well deposit, including resource drilling, bulk sampling, pilot test trials and marketing, and ADN is working towards a Mining Lease application as part of feasibility evaluations.

Under the terms of the Poochera Halloysite-Kaolin Project Joint Venture, ADN can acquire up to 75% of the project by either sole funding \$6.0M over 5 years or alternatively a decision to mine is made by the Joint Venture partners, with an initial 51% interest earned by the Company through the expenditure of \$3.0M on advancing the project within the first 2 years.

**Contact:**

**James Marsh**

Managing Director

Email: james.marsh@andromet.com.au

**Peter Taylor**

Investor Relations

Ph: 0412 036 231

Email: peter@nwrcommunications.com.au

***Competent Person's Statement***

*Information in this announcement relating to the Process Development Test Work is based on test work results completed by BHM Process Independent Consultants and compiled by Mr James Marsh, a member of The Australasian Institute of Mining and Metallurgy (AusIMM). Mr Marsh an employee of the Andromeda Metals Limited has sufficient experience, which is relevant to metal recovery from the style of mineralisation and type of deposits under consideration and to the activity being undertaking to qualify as a Competent Persons under the 2012 Edition of the 'Australasian Code for reporting of Exploration Results, Mineral Resources and Ore Reserves'. This includes over 29 years of experience in kaolin processing and applications. Mr Marsh consents to the inclusion of the technical data in the form and context in which it appears.*