Alpha HPA

ASX: **A4N**
ASX Announcement
31 July 2019

The Manager Companies
ASX Limited
20 Bridge Street
Sydney NSW 2000

(4 pages by email)

REPORT ON ACTIVITIES FOR THE QUARTER ENDED 30 JUNE 2019

HIGHLIGHTS

COMMENCEMENT OF HPA FIRST PILOT PLANT OPERATIONS

- **Pilot plant commenced operating at an implied process rate of approximately 4kg HPA per day**
- **The Pilot Plant will run as two complete end-to-end phases, with Phase 1 completing early-August, and Phase 2 completing mid-September**

HPA ASSAYS CONFIRM HIGH PURITY

- **HPA assays from the April 2019 mini-rig process run confirmed >99.99% (4N) purity**
- **Results confirm the ability of the modified feed to deliver more consistent and higher purity alumina**

HPA MARKETING

- **The HPA marketing program was substantially advanced in the quarter**
- **Marketing has included including key conferences, battery research centres and meetings with HPA end-users, including lithium-ion battery separator manufacturers**
- **A number of key end-users identified with commercial qualification samples of HPA to be provided from the HPA First pilot plant**

PROCESS BY-PRODUCTS AND PROJECT SITE SELECTION

- **Project site selection process being run in parallel with discussions with potential reagent supply and by-product off take counterparties**
- **By-product samples generated from the April and June testwork have been supplied to potential offtake counter-parties for evaluation**
- **Larger volume by-product samples will be generated from the pilot and also supplied to potential offtake counter-parties**

COMMENCEMENT OF HPA FIRST PILOT PLANT OPERATIONS

On 2 July 2019 the Company announced the commencement of operations at its HPA First pilot plant. Equipment for the pilot plant has been sequentially installed and commissioned since February with feedstock (PLS) having been prepared in the two weeks leading up to the commencement of operations.

The pilot plant has been designed and commissioned by the Company's technology partner and by Prudentia Process Consultants, each of which will provide the personnel for the pilot plant operation.

The pilot plant has been designed at a production rate of approximately 4kg per day of HPA and will operate as two complete end-to end phases with intervals replicating the natural breaks in the commercial process:

PHASE 1:

SX and Al-salt crystallisation:	2 July to mid-July
HPA pre-cursor production and HPA calcination:	mid-July to early-August

PHASE 2:

SX and Al-salt crystallisation:	mid-August to early-September
HPA pre-cursor production and HPA calcination:	late-August to mid-September

Alpha HPA expects to start distributing commercial scale HPA samples (2-5kg) generated from the pilot plant for end-user qualification testwork by August 2019.

The HPA First pilot plant operations team

HPA ASSAYS CONFIRM >99.99% (4N) PURITY

During the quarter, the Company received assays from HPA generated from the April 2019 SX mini-rig process using the modified feedstock (ASX: 17 April 2019).

As expected, the assays repeatedly confirmed >99.99% (>4N) purity. Importantly the assays confirmed very low to levels of the battery deleterious impurities of Fe, Na and Cl.

XRD analysis (X-Ray Diffraction) also confirmed the HPA as 100% alpha form, as required for the battery applications.

Assays also confirmed most impurities identified were inherited from materials handling between the crystallisation and calcination stages. With these impurity sources now identified, they can be readily removed from the process during pilot plant operation.

PROCESS BY-PRODUCTS AND PROJECT SITE SELECTION

As reported in the previous quarter, Alpha HPA is evaluating project sites within the industrial port precincts of Newcastle NSW, Gladstone QLD and Kwinana WA. The final site selection is substantially dependent on reaching agreements with suppliers of process reagents and offtake customers for the process by-product. Those counterparties are considered strategic in nature owing to the volumes and value of reagent and process by-product.

By-product samples generated the April and June testwork have now been provided to potential offtake counterparties for evaluation. It is expected that larger volume by-product samples generated from the pilot will also supplied to potential offtake counter-parties.

HPA END-USER MARKETING

Following a marketing visit to China in the March 2019 quarter, in May 2019 the Company undertook a marketing visit to Germany. The trip included visits to HPA end-users (battery separator manufacturers), vehicle manufacturers and the MEET battery research centre in Münster, as well as attendance at the Stuttgart Battery conference. The trip provided valuable insights into the role of HPA within both the lithium-ion cell as well as within the EV battery pack.

Key findings of the trip include:

- The absolute focus on battery safety and integrity driven by EV vehicle manufacturers. This is considered strongly favourable to HPA demand, given its role in thermal stability and control of battery thermal runaway.
- The focus on extending battery charge-recycle cycles (i.e. battery life) to match EV battery pack life to internal combustion engine (ICE) vehicle equivalents. Battery ageing is substantially influenced by impurities within the cell, so the increased focus on battery life is considered strongly favourable for all high-purity cell components, and in particular HPA.
- To offset the high-cost and ethical sourcing issues of cobalt in the lithium-ion battery cathode, the trend toward cobalt reduction in the battery cathode (i.e. the move toward 8:1:1 nickel-manganese cobalt (NMC) ratio) appears well entrenched. A consequence of this trend is the requirement to stabilise the 8:1:1 cathode via either chemical doping or direct alumina coating which is further constructive for HPA demand.

As a result of the trip, Alpha HPA has commenced a technical exchange, with a number of parties requesting to receive multi-kg HPA samples from the Company's pilot plant program.

In June the Company conducted a further marketing trip to the US engaging with several separator manufactures, OEMs and specialist battery materials investors.

COO APPOINTMENT

During the quarter Alpha HPA was pleased to announce the appointment of Mr Martin Kaderavek as Chief Operating Officer. Mr Kaderavek is a chemical engineer with over 25 years industry experience including senior management roles within Schenck Process, a large integrated engineering and manufacturing firm, consulting roles with PWC, and direct experience with design, construction and commissioning of integrated chemical processing facilities with BOC gases. Martin will take Company oversight for the successful delivery of the HPA First pilot plant and DFS, as well as preparing to build a commercial project delivery team.

R&D GRANT LODGEMENT

The Company has completed its FY18 R&D lodgement process, with an estimated rebate of $252K, due in July 2019.

The FY18 R&D program provides the basis for a significantly larger FY19 R&D claim, expected in November 2019.

COLLERINA PROJECT
(100% Alpha HPA and subject to commodity split agreement)

No exploration activities were completed during the quarter.

WONOGIRI PROJECT – INDONESIA
(45% Alpha HPA)

Work on advancement of the AMDAL study (environmental impact study) for the Randu Kuning gold-copper deposit and associated aggregate deposit continued with a short hiatus prior to the Indonesian elections.

The Company successfully had its request to suspend its licence until January 2020 approved to allow it to complete the AMDAL.

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About the HPA First Project

The Company's HPA First Project represents the evaluation and intended commercialisation of the production of ~10,000tpa of high purity alumina (HPA) using the Company's proprietary licenced solvent extraction and HPA refining technology. The technology provides for the extraction and purification of aluminium from an industrial feedstock to produce 4N (>99.99% purity) alumina for the intended use within the lithium ion battery and LED lighting industry. Following a successful testwork program and Pre-Feasibility Study (PFS), updated in March 2019, Alpha HPA is now completing a pilot plant program at its dedicated laboratory facility in Brisbane, as part of a full definitive Feasibility Study (DFS) due for delivery in CY2019.

Key highlights of the PFS (ASX: 7 March 2019):

- Unit production costs of **US$5,123** per tonne of HPA (after by-product credits)
- Annual Free Cash Flow (FCF) at full production rate, of **US$199 million** (assuming US$25,000/t HPA)
- Capital Expenditure of US$149 million

Competent Persons Statement (Process Development Testwork)

Information in this announcement that relates to metallurgical results is based on information compiled by or under the supervision of Dr Stuart Leary, an Independent Consultant trading as Delta Consulting Group. Dr Leary is a Member of The Australasian Institute of Mining and Metallurgy (AusIMM). Dr Leary has sufficient experience to the activity which he is 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'. Dr Leary consents to the inclusion of the technical data in the form and context in which it appears.

For further information on testwork results and processes see ASX announcements dated: 2 July 2019, 1 July 2019, 3 June 2019, 17 April 2019, 7 March 2019, 4 December 2018, 20 November 2018, 6 September 2018, 31 August 2018, 9 July 2018, 30 April 2018, 26 April 2018, 21 March 2018, 6 March 2018, 21 February 2018, 8 December 2017, 30 November 2017, 29 November 2017, 24 November 2017 and 13 November 2017.

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