Alpha **HPA**

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ASX: **A4N**
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(11 pages by email)

The Manager Companies - ASX Limited
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COMPANY ACTIVITIES UPDATE

- **High purity boehmite production confirmed – reaching 99.997% purity**
- **Boehmite samples despatched to end-users in Japan and South Korea**
- **Orica Engineering Co-operation Group (ECG) underway**
- **German research lab confirms benefits of Alpha's HPA in Li-electrolyte dosing**
- **HPA First Project permitting activities advanced**

The Board of Alpha HPA Limited ('Alpha HPA' or 'the Company') is pleased to provide an update on activities for its HPA First Project, representing 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.

High Purity Boehmite Confirmed

Purity assays have confirmed the HPA First Process can be readily adapted to produce crystalline, high-purity boehmite. Boehmite is a hydrated aluminium oxide (Al-O-OH), and is the alternative coating material used in ceramic coated separators (CCS) for lithium-ion batteries (LIB's). High purity boehmite represents a potential additional revenue product for the HPA First Project.

Four x 1kg boehmite samples were produced in February at the Company's HPA First Pilot Plant in Brisbane. Purity assays, by the GDMS assay method (Appendix 1), have now been received and confirm:

- an average boehmite purity of 99.995%, and
- peak boehmite purity of 99.997%.

Based on the Company's market research, Alpha HPA is not aware of any commercial boehmite products of equivalent purity. X-ray diffraction (XRD) analysis and scanning electron microscope (SEM) analysis confirmed 100% crystalline boehmite.

Boehmite spray dryer

High purity boehmite in production

High Purity Boehmite Samples Despatched to End Users

Alpha HPA has despatched two x 2kg samples of high-purity boehmite to Japan and South Korea following requests from end-users. The Company has worked closely with the Japanese end-user in the boehmite development.

Orica Engineering Co-Operation Group (ECG)

As a key component of the Orica MOU (ASX: 10 February 2020), Alpha HPA and Orica, have progressed the engineering tasks associated with the Orica-Alpha Project interface in the Gladstone State Development Area. Key activities include:

- Gladstone site visit –To inspect key reagent take-off and by-product delivery points between each site, and site utilities
- Piping and electrical specifications for Orica-Alpha interface
- Reagent and by-product quality specifications and concentrations
- Engineering scope for by-product concentration

German electrolyte company confirms Alpha HPA benefits in electrolyte formulation process

Alpha HPA has achieved success in improving lithium-ion batteries with a German electrolyte developer and manufacturer (E-Lyte innovations GmbH). Together they have completed a study on battery performance on the dosing of Li-based electrolyte with HPA generated from the Alpha HPA Pilot Plant. The study conclusively determined that electrolyte for lithium-ion batteries dosed with Alpha's HPA delivered:

- Markedly increased battery rate performance, and;
- Markedly improved cycle life of batteries operated at low temperatures

Alpha HPA now plans to leverage this research and extend its market outreach work to include electrolyte manufacturers as potentially significant HPA end-users.

HPA First Project permitting activities advanced

Alpha HPA has now submitted its pre-lodgement documentation with the Queensland Office of the Co-ordinator General (OCG). Working with consultants AECOM, the Company is now preparing its Application for Material Change of Use (MCU) with respect to the Gladstone State Development Area.

Managing Director, Rimas Kairaitis, commented; "*Following the DFS, the Company is maintaining momentum in advancing the HPA First Project. The ability for the HPA First Process to manufacture both HPA and high-purity boehmite provides excellent process flexibility for Alpha HPA who can now potentially provide end-users in the lithium-ion battery supply chain with each of the two most widely used coating materials for ceramic coated separators*"

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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 completion of a Pre-Feasibility Study (PFS), updated in March 2019, Alpha HPA has now completed Definitive Feasibility Study (DFS) based on the successful completion of its Pilot Plant program at its dedicated laboratory facility in Brisbane.

The Company has commenced full permitting, market outreach and project financing processes, with the expectation of positioning the HPA First Project to Final investment Decision.

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 17 March 2020, 10 December 2019, 21 November 2019, 10 October 2019, 23 September 2019, 28 August 2019, 5 August 2019, 25 July 2019, 2 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.

Cautionary Statement

The Definitive Feasibility Study (DFS) referred to in this announcement has been undertaken to assess the technical and financial viability of the HPA First project. The DFS is based on the material assumptions about the availability of funding and the pricing received for HPA. While the Company considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the outcomes indicated by this DFS will be achieved. To achieve the range of outcomes indicated in the DFS, additional funding will be required. Investors should note that there is no certainty that the Company will be able to raise the amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of the Company's existing shares. It is also possible that the Company could pursue other 'value realisation' strategies such as a sale, partial sale or joint venture of the HPA First project. If it does, this could materially reduce the Company's proportionate ownership of the HPA First project. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the DFS.

Forward Looking Statements

This PFS contains certain forward-looking statements with respect to the financial condition, results of operations, business of the Company and certain plans and objectives of the management of the Company. These forward-looking statements involve known and unknown risks, uncertainties and other factors which are subject to change without notice and may involve significant elements of subjective judgement and assumptions as to future events which may or may not occur. Forward-looking statements are provided as a general guide only and there can be no assurance that actual outcomes will not differ materially from these statements. Neither the Company nor any other person give any representation, warranty, assurance or guarantee that the occurrence of the events expressed or implied in any forward-looking statement will actually occur. In particular, those forward-looking statements are subject to significant uncertainties and contingencies, many of which are outside the control of the Company. A number of important factors could cause actual results or performance to differ materially from the forward looking statements. Investors should consider the forward looking statements contained in this PFS in light of those disclosures.

Appendix 1: Boehmite Purity Assays (Method: GDMS)

SAMPLE: BMB1							
Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)
Ag	< 0.5	Fe	4.3	Nd	< 0.1	Sn	< 0.5
As	< 0.5	Ga	< 0.1	Ni	< 0.5	Sr	< 0.05
B	0.48	Gd	< 0.1	Os	< 0.05	Ta	Electrode
Ba	0.4	Ge	< 1	O	Matrix	Tb	< 0.1
Be	< 0.05	Hf	< 0.5	P	2	Te	< 0.1
Bi	< 0.1	Hg	< 0.5	Pb	< 0.1	Th	< 0.05
Br	< 0.5	Ho	< 0.1	Pd	< 0.5	Ti	0.22
Ca	3.7	I	< 0.1	Pr	< 0.1	Tl	< 0.1
Cd	< 0.5	In	< 0.5	Pt	< 0.1	Tm	< 0.1
Ce	< 0.1	Ir	< 0.05	Rb	< 0.05	U	< 0.05
Cl	6	K	1	Re	< 0.1	V	< 0.05
Co	< 0.05	La	0.42	Rh	< 0.5	W	< 20
Cr	2.8	Li	< 0.05	Ru	< 0.5	Y	< 0.05
Cs	< 0.1	Lu	< 0.1	S	14	Yb	< 0.1
Cu	< 1	Mg	3.7	Sb	< 0.1	Zn	15
Dy	< 0.1	Mn	0.26	Sc	< 0.05	Zr	< 0.1
Er	< 0.1	Mo	< 5	Se	< 0.5	TOTAL	72.78
Eu	< 0.1	Na	2.5	Si	16	PURITY	99.993%
F	< 5	Nb	< 50	Sm	< 0.1		

SAMPLE: BMB2							
Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)
Ag	1.1	Fe	2.2	Nd	< 0.1	Sn	< 0.5
As	< 0.5	Ga	0.45	Ni	< 0.5	Sr	< 0.05
B	0.29	Gd	< 0.1	Os	< 0.05	Ta	Electrode
Ba	0.38	Ge	< 1	O	Matrix	Tb	< 0.1
Be	< 0.05	Hf	< 0.5	P	< 0.1	Te	< 0.1
Bi	< 0.1	Hg	< 0.5	Pb	< 0.1	Th	< 0.05
Br	< 0.5	Ho	< 0.1	Pd	< 0.5	Ti	< 0.05
Ca	4.4	I	< 0.1	Pr	< 0.1	Tl	< 0.1
Cd	< 0.5	In	< 0.5	Pt	< 0.1	Tm	< 0.1
Ce	< 0.1	Ir	< 0.05	Rb	< 0.05	U	< 0.05
Cl	6.4	K	1.7	Re	< 0.1	V	< 0.05
Co	< 0.05	La	0.24	Rh	< 0.5	W	< 20
Cr	2.4	Li	< 0.05	Ru	< 0.5	Y	< 0.05
Cs	< 0.1	Lu	< 0.1	S	4	Yb	< 0.1
Cu	< 1	Mg	2	Sb	< 0.1	Zn	14
Dy	< 0.1	Mn	0.22	Sc	< 0.05	Zr	< 0.1
Er	< 0.1	Mo	< 5	Se	< 0.5	TOTAL	50.28
Eu	< 0.1	Na	2.5	Si	8	PURITY	99.995%
F	< 5	Nb	< 50	Sm	< 0.1		

SAMPLE: BMB3							
Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)
Ag	< 0.5	Fe	1.3	Nd	< 0.1	Sn	< 0.5
As	< 0.5	Ga	0.84	Ni	< 0.5	Sr	< 0.05
B	0.3	Gd	< 0.1	Os	< 0.05	Ta	Electrode
Ba	0.29	Ge	< 1	O	Matrix	Tb	< 0.1
Be	0.15	Hf	< 0.5	P	3.6	Te	< 0.1
Bi	< 0.1	Hg	< 0.5	Pb	< 0.1	Th	< 0.05
Br	< 0.5	Ho	< 0.1	Pd	< 0.5	Ti	< 0.05
Ca	3.3	I	< 0.1	Pr	< 0.1	Tl	< 0.1
Cd	< 0.5	In	< 0.5	Pt	< 0.1	Tm	< 0.1
Ce	< 0.1	Ir	< 0.05	Rb	< 0.05	U	< 0.05
Cl	4.4	K	2.8	Re	0.68	V	< 0.05
Co	< 0.05	La	< 0.1	Rh	< 0.5	W	< 20
Cr	1.9	Li	< 0.05	Ru	< 0.5	Y	< 0.05
Cs	< 0.1	Lu	< 0.1	S	3	Yb	< 0.1
Cu	< 1	Mg	1.9	Sb	< 0.1	Zn	7.9
Dy	< 0.1	Mn	0.15	Sc	< 0.05	Zr	< 0.1
Er	< 0.1	Mo	< 5	Se	< 0.5	TOTAL	47.11
Eu	< 0.1	Na	2.5	Si	9.8	PURITY	99.995%
F	< 5	Nb	< 50	Sm	< 0.1		

SAMPLE: BMB4							
Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)	Element	Concentration (ppm)
Ag	< 0.5	Fe	< 1	Nd	< 0.1	Sn	< 0.5
As	< 0.5	Ga	< 0.1	Ni	< 0.5	Sr	< 0.05
B	0.3	Gd	< 0.1	Os	< 0.05	Ta	Electrode
Ba	0.29	Ge	< 1	O	Matrix	Tb	< 0.1
Be	0.15	Hf	< 0.5	P	1.1	Te	< 0.1
Bi	< 0.1	Hg	< 0.5	Pb	< 0.1	Th	< 0.05
Br	< 0.5	Ho	< 0.1	Pd	< 0.5	Ti	0.08
Ca	3.3	I	< 0.1	Pr	< 0.1	Tl	< 0.1
Cd	< 0.5	In	< 0.5	Pt	< 0.1	Tm	< 0.1
Ce	< 0.1	Ir	< 0.05	Rb	< 0.05	U	< 0.05
Cl	4.4	K	0.75	Re	< 0.1	V	< 0.05
Co	< 0.05	La	< 0.1	Rh	< 0.5	W	< 20
Cr	1.9	Li	< 0.05	Ru	< 0.5	Y	< 0.05
Cs	< 0.1	Lu	< 0.1	S	2.6	Yb	< 0.1
Cu	< 1	Mg	2.7	Sb	< 0.1	Zn	3
Dy	< 0.1	Mn	< 0.05	Sc	< 0.05	Zr	< 0.1
Er	< 0.1	Mo	< 5	Se	< 0.5	TOTAL	34.07
Eu	< 0.1	Na	2.5	Si	11	PURITY	99.997%
F	< 5	Nb	< 50	Sm	< 0.1		

1. JORC CODE, 2012 EDITION – TABLE 1

1.1 Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• Samples of high purity boehmite were taken as ~20g splits of homogonised, crystalline powder
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• Not Applicable. The samples were generated from a feedstock of industrial chemicals.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Not Applicable
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• Not Applicable

Criteria	JORC Code explanation	Commentary
Sub-sampling techniques and Sample Preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• Samples were presented as a homogonised, crystalline aluminium salt generated from a crystallisation and centrifuge process
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• The purity analysis of the high-purity alumina (HPA) was determined by EAG Eurofins USA by glow discharge mass spectroscopy
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• Not Applicable
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• Not Applicable
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• Not Applicable
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• Not Applicable
Sample security	• *The measures taken to ensure sample security.*	• Duplicates of all samples submitted were retained at the Company's Brisbane laboratories to insure against any sample

Criteria	JORC Code explanation	Commentary
		loss
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• Not applicable

1.2 Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• Not Applicable
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Not Applicable
Geology	• *Deposit type, geological setting and style of mineralisation.*	• Not Applicable

Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:*
	  ○ *easting and northing of the drill hole collar*
	  ○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar*
	  ○ *dip and azimuth of the hole*
	  ○ *down hole length and interception depth*
	  ○ *hole length.*
	• *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*
		• Not Applicable

Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• Not Applicable

Criteria	JORC Code explanation	Commentary
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	• Not Applicable
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• Not Applicable
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• Not Applicable
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• Not Applicable
Further work	• *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• From July-December 2019 the Company completed pilot plant operations validating the process flow sheet on a semi-continuous, end-to-end basis • Minor additional testwork is planned during CY2020 to refine the process flow sheet