Alpha HPA

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ASX Announcement
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CONTINUED PROCESS IMPROVEMENT ON 2nd SX MINI-RIG RUN
HPA PURITY TO 99.994%

Alpha HPA Limited, ('the Company', recently renamed from Collerina Cobalt Limited) here provides an update on the Company's second solvent extraction (SX) mini-rig test run to produce HPA using the HPA First Process. Highlights of this run include:

- **Continued HPA purity improvement, reaching high quality 4N purity of 99.994%**
- **Improved aluminium extractions reaching 87.4%**
- **Extended 6-day SX campaign demonstrates process stability**

The Company has now received all results from the second continuous SX mini-rig and HPA refining run using an industrial chemical feedstock (the 'HPA First' process) incorporating a number of process improvements identified from the first SX and HPA refining run (refer ASX: 6 August 2018).

The second run operated continuously for 6 days at the Company's dedicated laboratory in Brisbane. Outcomes from the second continuous SX mini-rig and HPA refining run include:

- Substantial improvement in process stability indicated by the extended 6 day continuous run.
- Substantially higher aluminium extractions achieved, reaching 87.4% recovery under steady state conditions.
- Continued HPA purity improvement, now reaching high quality 4N purity of 99.994%.

HPA Refining and Assay

Sub-samples of strip liquors for each day of the SX run have been refined into HPA (see Figure 1, below). Assay results indicate further improvements in rejection of impurities with HPA purity now reaching 99.994% purity (elemental basis) and 99.992% purity (oxide basis). These results are consistent with the existing market requirements for high quality 4N HPA, which attracts premium 4N HPA pricing. Preliminary offtaker feedback indicates that there are no impurities present which represents any concern for dis-colouration in sapphire glass, and so is immediately suitable for the LED market.

In addition, X-Ray Diffraction (XRD) analysis of the HPA samples returned as 100% alpha (α) crystal form, matching the requirements of producers of sapphire glass and lithium-ion battery separators.

Managing Director, Rimas Kairaitis, commented; *"The successful completion of an extended, higher volume solvent extraction run provides excellent validation of the quality and stability of our HPA First process and provides confidence of its scalability to commercial levels of production. Refinements implemented after the first mini-rig run have resulted in a very high quality HPA product, at 99.994% purity, samples of which have been delivered to prospective offtake parties. The Company looks forward to advancing our discussions with offtake and other strategic parties, as we move into the pilot plant and DFS stage."*

Figure 1: High Purity Alumina produced from the second SX mini-rig run

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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 20 November 2018, 6 September 2018, 31 August 2018, 6 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.

About the HPA First Process

The HPA First process is the application of the Company's proprietary licenced solvent extraction and refining technology to produce High Purity Alumina (HPA) from an industrial aluminium chemical feedstock.

HPA First is a major advance on the industry's existing processes for purifying alumina, which typically involves regrading aluminium metal, and oxidising it into HPA, or producing it from a kaolin clay which must be mined.

Through the HPA First process, industrial feedstock delivers an aluminium tenor at multiples higher than the Company's previous flowsheet and the simpler process flowsheet does not require the development of a mining operation or associated acid plant, leach vessels, filtration, neutralisation circuits or tailings facilities. The process also requires a significant reduction in process plant equipment and vessel sizing.

The simplification of the process flowsheet substantially de-risks the Company's HPA production project, providing a fast-track through Definitive Feasibility Study (DFS), permitting, financing, project implementation and operational cash flow. The Company retains the option to integrate PLS feed from its Collerina Project at a future date, to expand the revenue base into nickel, cobalt and scandium.

On 20 November 2018, the Company reported the outcomes of its Pre-Feasibility Study (PFS), presenting a compelling business case for the development of a HPA production facility leveraging the HPA First process.

The PFS highlights include:

- Production rate of 10,200tpa HPA.
- Unit cash costs of A$8,538 (US$6,403)/t HPA after by-product credits.
- Annual EBITDA of A$248M (US$186M).
- Project CapEx of A$215M (US$161M).
- Capital intensity of A$21,043 (US$15,783)/t HPA.
- Sensitivity analysis shows a highly resilient project that is strongly profitable at HPA prices as low as US$10,000/t.

The Company confirms that all material assumptions underpinning the PFS production target and the forecast financial information derived from the production target continue to apply and have not materially changed.

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 were taken as ~10g splits of homogonised, crystalline powder-form high purity alumina (HPA)
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
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*	• Samples were presented as a homogonised, crystalline powder generated from a calcining process at +1200^{o}C

Criteria	JORC Code explanation	Commentary
	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.*	
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 was determined by Glow Discharge Mass Spectroscopy (GDMS), completed by specialist high purity EAG laboratories in the USA as well as Acid digest + ICPMS determination, which each compared favourably. • The crystal form was confirmed by Qualitative X-Ray Diffraction (QXRD), conducted by Sietronics Pty Ltd • The Company relied on internal laboratory QA/QC checks
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.*	• Samples were shipped as 3 x separate shipments to protect sample security
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:* o *easting and northing of the drill hole collar* o *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* o *dip and azimuth of the hole* o *down hole length and interception depth* o *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
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	• *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*	• Not Applicable

Criteria	JORC Code explanation	Commentary
reporting	*reporting of Exploration Results.*	
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.*	• Further testwork is planned to refine the solvent Extraction (SX) and HPA refining process used to generate the samples