ARK MINES LTD.

**24 NOVEMBER 2023**

# BENEFICIATION TEST WORK PRODUCES A HIGH-GRADE RARE EARTH CONCENTRATE AT SANDY MITCHELL

## HIGHLIGHTS

- **First pass water-based beneficiation test work of the Sandy Mitchell Rare Earth sands has produced a high commercial grade rare earth concentrate with excellent recoveries.**
- **The test work has shown the greatest upgrade is by simple gravity separation, confirming the material is amenable to straightforward beneficiation by water-only, low-cost gravity processing.**
- **The final concentrate assays returned 51.9% TREO (519,000ppm), and contained mostly La, Ce, Pr and Nd, plus Heavy Rare Earths Dy and Tb, which collectively represents a very high value saleable product.**
- **Direct cerium oxide ($CeO_2$) recovery from gravity feed to REM concentrate is estimated to be 71.7%, however testwork calculated that in a normal recirculating gravity plant, overall recovery of 83.8% may be achieved.**
- **In cerium oxide recovery, the $CeO_2$ content is used as a tracer for the rare-earth bearing mineral monazite which was subsequently upgraded from 0.04% in the as-received feed, to 23.6% in the cleanest product.**
- **Similar upgrade trends are observed for zirconium dioxide ($ZrO_2$).**
- **Further metallurgical test work is in planning and the final mineral product is set to be evaluated for multiple potential commercial markets and build initial business case**.
- **Metallurgical test work with expert independent processing firm, Mineral Technologies, remains ongoing with final results to be incorporated into a Scoping Study at Sandy Mitchell ahead of a planned Pre-Feasibility Study.**
- **More assays from Phase 1 drill program are pending.**
- **Extensive drill campaign advancing with two rigs operating to extend drilling depths to ~24m beyond the average current hole depth of ~10 metres and to confirm further rare earths mineralisation in new areas across the 145km$^2$ permit area.**

**Ark Mines Limited (ASX:AHK)** is pleased to provide the first phase beneficiation results carried out by Mineral Technologies, on materials taken from the Company's 100% owned Sandy Mitchell Rare Earth and Heavy Mineral Project in North Queensland (see Table 1).

**Executive Director Ben Emery said:** *"This really raises the excitement on what is already a very encouraging project, given that these excellent first stage beneficiation results were achieved with directly recovered air core samples. The samples had no mechanical or chemical preparation processing before the initial pre-screen to reject oversize +2mm material, and the results achieved are well beyond our expectations. Importantly, the first-pass beneficiation test work showed that the highest REE extraction grades were achieved by simple gravity separation – thus confirming a key value-add of this project."*

*"As well as the lowest-cost option from a capex perspective, beneficiation by gravity processing also has the lowest environmental impact and doesn't involve the use of any chemicals. We look forward to providing more updates as the metallurgy program advances, the results of which will be incorporated into a Scoping Study ahead of a planned Pre-Feasibility Study for the Sandy Mitchell project."*

*"Concurrently, our two-rig drill program continues to advance very well. This program is helping us to rapidly define Sandy Mitchell as a rare earths project of considerable scale, and with the combination of more assays from step out drilling and additional metallurgical test work results, we expect to soon be able to further communicate the project's commercial benefits – not just for rare earths but also for heavy minerals that also have considerable value."*

***Table 1: Progressive characterisation mass and rare earth oxide assays by laser ablation ICP-MS.***

| Product Description | Mass % | $La_2O_3$ | $CeO_2$ | $Pr_6O_{11}$ | $Nd_2O_3$ | $Tb_4O_7$ | $Dy_2O_3$ | $Y_2O_3$ | TREO |
|---|---|---|---|---|---|---|---|---|---|
| | to Grav. Fd | ppm | ppm | ppm | ppm | ppm | ppm | ppm | % |
| **Gravity Feed** | 100 | 216 | 462 | 55 | 204 | 3 | 11 | 45 | **0.11** |
| **Gravity Concentrate** | 1.13 | 12,784 | 27,516 | 3,153 | 11,407 | 139 | 512 | 1,880 | **6** |
| **REM concentrate** | 0.08 | 109,891 | 235,853 | 26,942 | 97,393 | 1,176 | 4,109 | 13,843 | **52** |

*REM: Rare earth mineral concentrate.*
*TREO: Total rare earth oxides, see Appendix A for standard calculation method.*

Ark Mines Ltd is executing on a detailed roadmap to move from exploration to development at the Sandy Mitchell Rare Earth Project, located 300km west of Cairns, in North Queensland, Australia (see Figure 3).

The next stage of development following the Phase 1 drill program was to commence metallurgical characterisation and recovery testing at Downer Mineral Technologies' Carrara Laboratory, Queensland (*refer ASX Announcement 31 October 2023*) and metallurgical analysis exploration samples provided extremely encouraging results.

The metallurgical characterisation was performed using approximately 55kg of feed material sourced from medium grade Sandy Mitchell drill cuttings (see Figure 2). Bench scale equipment was used to assess the response of the sample to conventional beneficiation techniques and show product purity after each stage of separation. This simulated industrial process plant stages with aims:

- Size classification to remove slimes, trash oversize and prepare sand suitable for beneficiation,
- Gravity separation and dense media separation to recover the valuable heavy mineral components to concentrate,
- Mechanical attrition to clean mineral surfaces, followed by froth flotation to extract rare earth minerals,
- Magnetic separation to perform a final upgrade of the flotation rare-earth concentrate.

Cerium Oxide ($CeO_2$) is used throughout testing as a rapidly assessable marker for monazite, the mineral which carries the majority of rare earth elements. Since $CeO_2$ can be measured instantaneously by pXRF and a response overlap in the result means that such measurements capture several rare earth elements, allowing a reasonable representation of the mineral itself.

$CeO_2$ grades were used for initial sample selection by Ark, as well as throughout testing by Downer Mineral Technologies.

The $CeO_2$ recovery of gravity feed reporting to the rare earth mineral concentrate was 71.7%. However, Mineral Technologies measured that 16.9% of $CeO_2$ was trapped within intermediate material streams, and calculated that in a normal recirculating gravity plant, overall recovery of **83.8%** may be achieved.

The majority of this upgrade was achieved on the two stages of Wilfley table processing (see Figure 1), simulating rougher and cleaner stages of a gravity plant, with a 52:1 upgrade (0.05% $CeO_2$ to 2.61% $CeO_2$) and 50% mass rejection. The accessory zirconium oxide upgrade was similarly encouraging at 0.03% upgrading to 2.36%.

Subsequent froth floatation stages produced only minor upgrades, with the final magnetic separation stage yielding a low impurity 23.6% $CeO_2$ product, which equated to 52% total rare earth oxides as measured by laser ablation ICP-MS at Bureau Veritas (see Table 1).

Impurities, dominated by aluminium bearing minerals, were progressively rejected throughout processing, but again the largest effect was through the gravity processing.

Ark Mines Ltd is currently in the completion stages of the phase 2 drill programme at Sandy Mitchell, which will yield further sample for larger bulk metallurgical testing. This will include further proof of mineralogy and beneficiation by conventional techniques such as gravity separation and electrostatic magnetic separation.

These studies can be utilised in a class 5 FEL1AACE engineering design study and will assist commercial market evaluation of final products to inform Ark's business case and will be conducted in parallel with Ark's resource estimation at the Sandy Mitchell Project.

Final results from the metallurgical test work are expected to be incorporated into a Scoping Study at Sandy Mitchell ahead of a planned Pre-Feasibility Study.

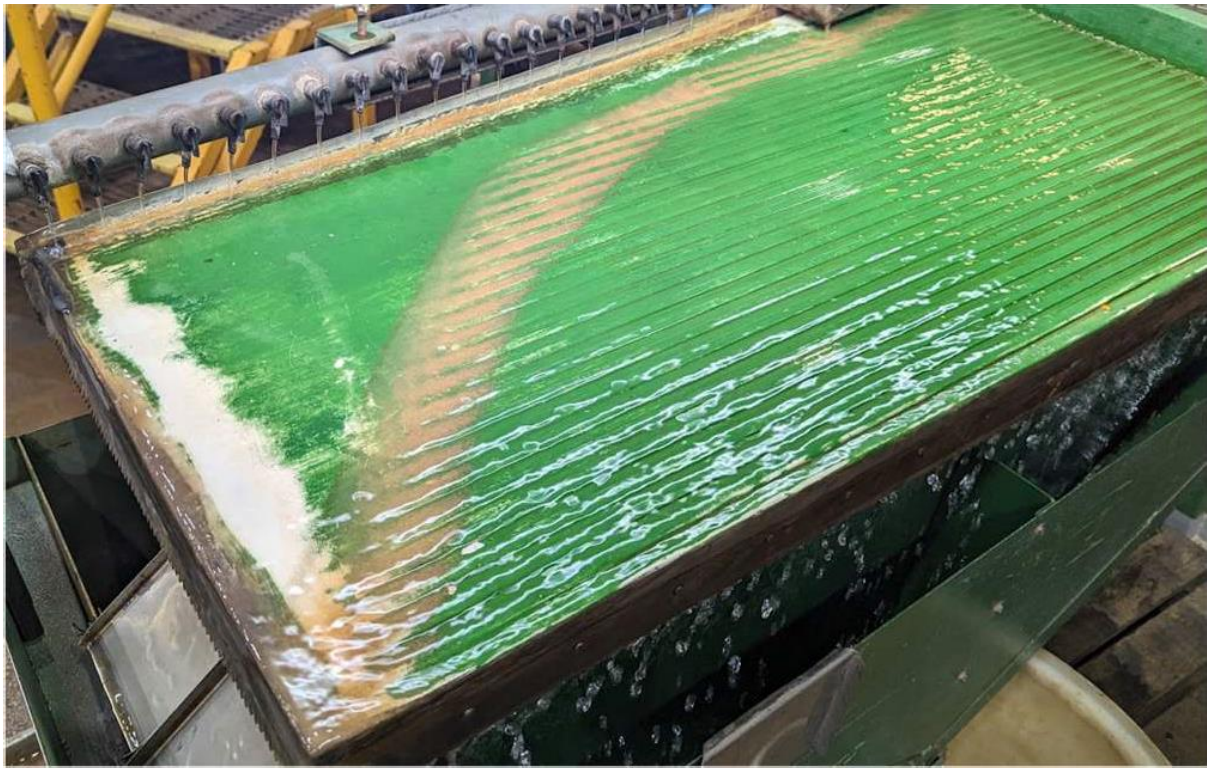

***Figure 1: Wet shaker table separation simulating a plant cleaner stage.***

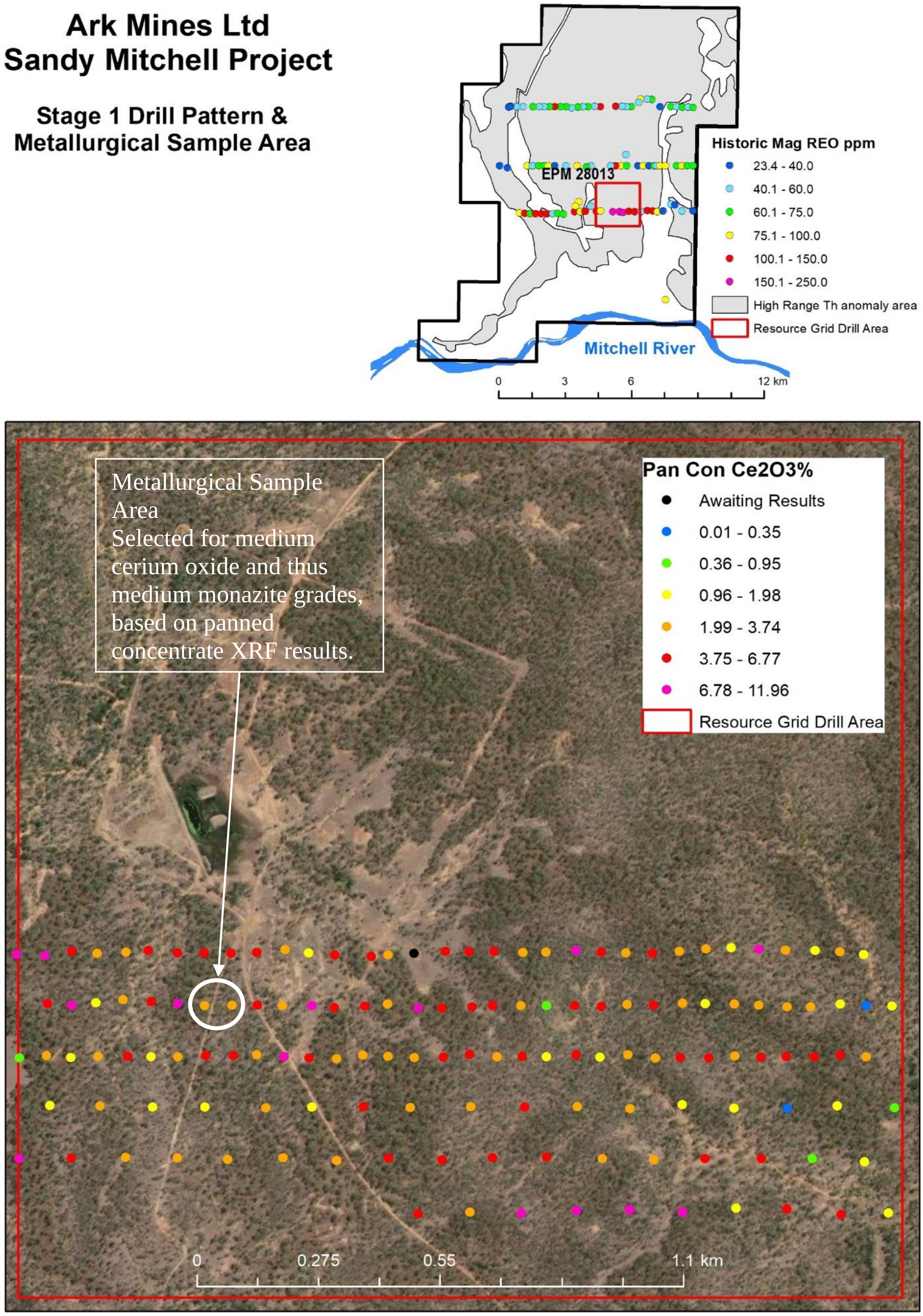


*Figure 2: Initial metallurgical sample source drill hole location, showing Ark's Stage 1 drilling coloured by pan concentrate cerium oxide results which were used to select a medium grade sample for testing by Downer Mineral Technologies.*

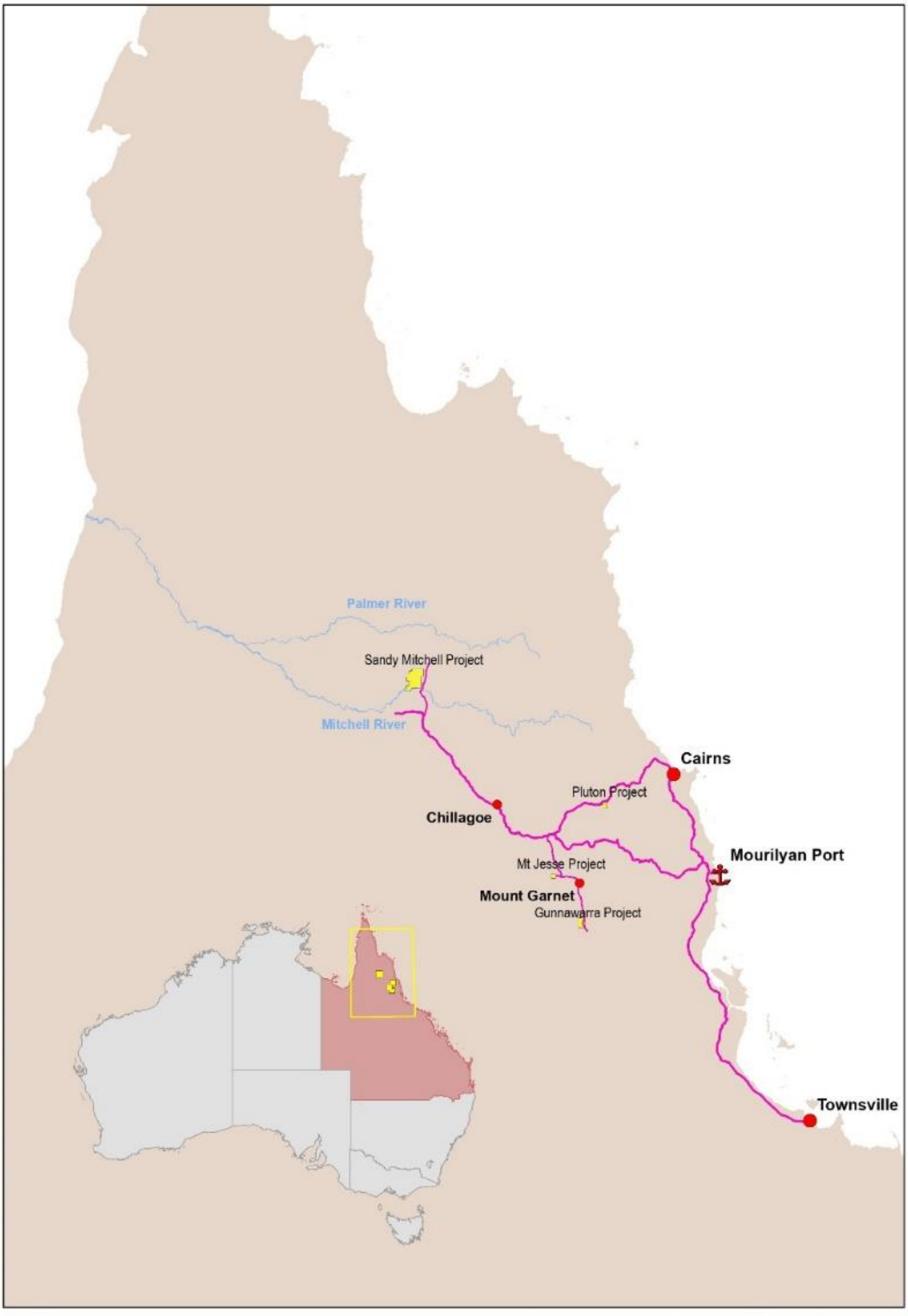


*Figure 3: Sandy Mitchell Rare Earth and Heavy Mineral project location.*

**This announcement has been approved by the Board of Ark Mines Ltd.**

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## About Ark Mines Limited

Ark Mines is an ASX listed Australian mineral exploration company focused on developing its 100% owned projects located in the prolific Mt Garnet and Greenvale mineral fields of Northern Queensland and includes:

**The Sandy Mitchell Rare Earth and Heavy Mineral Project**

- Ark is rapidly advancing the 147km$^2$ EPM 28013 'Sandy Mitchell' tenement – an advanced Rare Earths Project in North Queensland with additional 138km2 of sub blocks under application
- Very high historical TREO grades including high grade pan concentrates of all critical Light Rare Earths including dysprosium (Dy), terbium (Tb), holmium (Ho), erbium (Er), thulium (Tm) ytterbium (Yb), yttrium (Y) and excluding only Lutetium
- Up to 25% of the TREO is Nd and Pr (magnet metals)
- Rare Earths at 'Sandy Mitchell' are amenable to panning a concentrate
- Planned low-cost, fast start up, straightforward beneficiation by gravity processing

Ark's exploration portfolio also consists of three high quality projects covering 200km$^2$ of tenure that are prospective for copper, iron ore, nickel-cobalt and porphyry gold:

**Gunnawarra Nickel-Cobalt Project**

- Comprised of 11 sub-blocks covering 36km$^2$
- Borders Australian Mines Limited Sconi Project - most advanced Co-Ni-Sc project in Australia
- Potential synergies with local processing facilities with export DSO Nickel/Cobalt partnership options

**Mt Jesse Copper-Iron Project**

- Project covers a tenure area of 12.4km$^2$ located ~25km west of Mt Garnet
- Centred on a copper rich magnetite skarn associated with porphyry style mineralization
- Three exposed historic iron formations
- Potential for near term production via toll treat and potential to direct ship

**Pluton Porphyry Gold Project**

- Located ~90km SW of Cairns near Mareeba, QLD covering 18km$^2$
- Prospective for gold and associated base metals (Ag, Cu, Mo)

- Porphyry outcrop discovered during initial field inspection coincides with regional scale geophysical interpretation.

**Reliance on historic data**

All sample data reported in this release, as disclosed in the body of the release, in the tables in the Appendix and in the JORC table is based on data compiled by the Competent Person from other sources and quoted in their original context. These sources have been referenced in the text and the original Competent Persons statements may be found with the relevant documents. Some of this information is publicly available but has not been reported in accordance with the provisions of the JORC Code and a completed Table 1 of the JORC Code and Competent Persons statement is attached to this Release. Whilst every effort has been made to validate and check the data, these results should be considered in the context in which they appear and are subject to field verification by the Company.

**Competent Persons Statement**

The Information in this report that relates to exploration results, mineral resources or ore reserves is based on information compiled by Mr Roger Jackson, who is a Fellow of the Australian Institute of Mining and Metallurgy and a Fellow of the Australasian Institute of Geoscientists. Mr Jackson is a shareholder and director of the Company. Mr Jackson has sufficient experience which is relevant to the style of mineralisation and type of deposits under consideration and to the activity that he is undertaking to qualify as a Competent Person as defined in the 2012 edition of the `Australian Code for Reporting Exploration Results, Mineral Resources and Ore Reserves '(the JORC Code). Mr Jackson consents to the inclusion of this information in the form and context in which it appears in this report. Mr Jackson confirms information in this market announcement is an accurate representation of the available data for the exploration areas being acquired.

**Forward Looking Statements and Important Notice**

This report contains forecasts, projections and forward-looking information. Although the Company believes that its expectations, estimates and forecast outcomes are based on reasonable assumptions it can give no assurance that these will be achieved. Expectations and estimates and projections and information provided by the Company are not a guarantee of future performance and involve unknown risks and uncertainties, many of which are out of the Company's control.

Actual results and developments will almost certainly differ materially from those expressed or implied. The Company has not audited or investigated the accuracy or completeness of the information, statements and opinions contained in this announcement. To the maximum extent permitted by applicable laws, Ark Mines makes no representation and can give no assurance, guarantee or warranty, express or implied, as to, and takes no responsibility and assumes no liability for the authenticity, validity, accuracy, suitability or completeness of, or any errors in or omission from, any information, statement or opinion contained in this report and without prejudice, to the generality of the foregoing, the achievement or accuracy of any forecasts, projections or other forward looking information contained or referred to in this report.

Investors should make and rely upon their own enquiries before deciding to acquire or deal in the Company's securities.

## Appendix A: JORC Code, 2012 Edition – Table 1

(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.*<br>• *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.*<br>• *Aspects of the determination of mineralisation that are Material to the Public Report.*<br>• *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.* | Ark Mines May to June 2023 Sandy Mitchell programme sampling techniques:<br>• Samples are rock chips and accompanying bulk fines collected on 1m intervals by air core drill using 100mm bit.<br>• Sample was passed through an 82.5: 12.5 riffle splitter to yield a representative aliquot of approx. 1.5 kg collected in prenumbered calico bag, and a remainder retained in a numbered plastic bag, with recoveries volumetrically estimated with periodic checks by mass using digital scale, compared against laboratory loose bulk density measurements.<br>• Historic works by SGS (SGS Oretest Job No: S0580, 2010 for JOGMEC) shows mineralisation to have grainsize < = 125µm (very fine sand) and thus the sample mass is adequate for representivity.<br>• Sample for total digest assay was sent to North Australian Laboratories for Assay.<br>• Sample for pan concentration was sub-sampled by spade channel through the remainder sample to a mass of approx. 1kg per metre as determined by digital scales. These were then panned to a concentrate and the subsequent concentrates composited per hole.<br>• Pan Con composite samples were sent to IHC Mining where samples were screened to -1mm, heavy minerals were further separated by heavy liquid separation with yields weighed at each stage.<br>• The final heavy mineral concentrate was subject to Portable XRF analysis for a limited indicative assay.<br>• Samples for preliminary metallurgical testing were sent to Downer Mineral Technologies and comprised the entire bulk metre remainder after riffle splitting the representative aliquot and removal of the 1kg pan concentrate aliquot. |
| *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).* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Drill was by Comacchio track mounted air core rig using 100mm air core bit.<br>• All holes were vertical and drilled to refusal or 17.5m, whichever came first. |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| *Drill sample recovery* | • *Method of recording and assessing core and chip sample recoveries and results assessed.*<br>• *Measures taken to maximise sample recovery and ensure representative nature of the samples.*<br>• *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.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Recoveries were assessed by volumetric estimation by the metre based on total sample weights using a digital scale with comparison made via laboratory loose bulk density measurements.<br>• Sample was passed through a cyclone with a gated chute to allow fines to fall out of the air stream. The chute was kept closed until the end of each metre had been drilled, then opened to collect sample, and closed prior to recommencement of drilling.<br>• No relationship between recovery and grade has yet been identified. |
| *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.*<br>• *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.*<br>• *The total length and percentage of the relevant intersections logged.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Sample was logged by the metre for all drilling, by the site geology team for both qualitative and quantitative criteria.<br>• Drill logs for 100% of drilling are available with overall length of 1488.3m.<br>• Logging is sufficient to support resource estimation, mining and metallurgical studies. |
| *Sub-sampling techniques and sample preparation* | • *If core, whether cut or sawn and whether quarter, half or all core taken.*<br>• *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.*<br>• *For all sample types, the nature, quality and appropriateness of the sample preparation technique.*<br>• *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.*<br>• *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.*<br>• *Whether sample sizes are appropriate to the grain size of the material being sampled.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• All sample passed through the drill cyclone dry.<br>• Sub-sampling for laboratory assay was by 87.5:12.5 riffle splitter: the bulk sample was passed evenly through the riffles with the assay aliquot collected in a pre-numbered calico bag, and the reject collected in a numbered plastic bag.<br>• Field duplicates were taken at 1:40 by 50:50 riffle splitter.<br>• Historic works by SGS (SGS Oretest Job No: S0580, 2010 for JOGMEC) shows mineralisation to have grainsize < 125µm (very fine sand) and thus the sample mass is representative.<br>• Sample for pan concentration was sub-sampled by spade channel through the reject to a mass of approx. 1kg per metre as determined by digital scales.<br>• Sample for preliminary metallurgical testing was selected from the 11m twinned hole SMDH 00014b and comprised the entire 87.5% bulk metre sample after riffle splitting to yield the representative sample and removal of the 1kg pan concentrate aliquot. |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| *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.*<br>• *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.*<br>• *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.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Metre samples were sent to North Australian Laboratories (NAL) for total digest assay:<br>• Samples were weighed then kiln dried and re-weighed.<br>• 1 in 5 samples was tested for moisture content.<br>• 1 in 3 samples was tested for dry loose bulk density.<br>• Sample was then pulverization in an LM-5 to 90% passing 75 µm with assay aliquot selected by laboratory splitter.<br>• Al, Ca, Cr, Fe, Mg, P, S, and Ti were assayed by 4 acid digest with ICP-OES finish.<br>• Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, U, Zr, Hf, Nb, Ta, Si, Sr, Pb were assayed by sodium peroxide fusion in nickel crucibles with ICP-MS finish.<br>• Field duplicates were taken at 1:40 by 50:50 riffle split of the assay aliquot.<br>• For total digest samples:<br>    • Laboratory repeats were requested at no less than 1 in 40 but carried out by the laboratory at 1 in 10.<br>    • Standard insertion was carried out by the laboratory at 1 in 12.<br>    • Assay of blank quartz flushes was requested at 1 in 40.<br>• For pan concentrate samples<br>    • Laboratory repeats were requested at no less than 1 in 40.<br>    • Standard insertion was requested of the laboratory at no less than 1 in 40.<br>    • Assay of blank quartz flushes was requested at 1 in 40.<br>• Total radiometric count was measured on all assay samples using a SAIC Exploranium GR-110G hand held scintillometer, hired from Terra Search Townsville, pre-calibrated.<br>• Reading times were 10 second accumulations, which was the machine maximum, with 100x10 second background accumulations taken per day, per measuring station.<br>• IHC Mining Laboratory procedures for pan concentrate composite samples was:<br>    • Creation of duplicates by split at a rate of 1 in 24<br>    • Screen to -1mm and weigh<br>    • Heavy liquid separation and weigh<br>    • Pulverization of the heavy mineral fines by extended grind<br>    • Portable XRF analysis of the pulp<br>• QAQC implemented is believed sufficient to establish accuracy and precision.<br>• Mineral Technologies preliminary met' samples were processed at bench scale by:<br>    • 55.2kg of individual samples were combined by rotary homogenisation then split to yield a representative aliquot of 38.3 kg for process testing.<br>    • The composite sample was screened to 2000 µm, 500 µm and wet screened at 20 µm with the 500 to 20 µm fraction then passed through 2 stages of gravity separation using Wilfley table (rougher stage). |

| Criteria | JORC Code explanation | Commentary |
| --- | --- | --- |
| | | • The Wilfley concentrate was passed through a bromoform heavy liquid separation flask (cleaner stage).<br>• The HLS sinks were attrition cleaned for 5 minutes at a 65% wet weight density and deslimed, then passed through a Geoteknica FM3 froth floatation cell using starch depressant and sodium silicate surfactant.<br>• Both sinks and floats were separately processed through a dry induced Reading magnetic separator.<br>• This yielded 4 final streams of mag and non-mag floats (containing the bulk of REE) and mag and non-mag sinks, containing the bulk of zircon, as well as various tails from each previous stage.<br>• Percentages of material passing or rejecting at each stage were determined by mass.<br>• The float magnetic fraction was further refined by semi-lift magnetic separator to determine feasibility of individual mineral species separation, but the yields of this process were not assayed due to volumetric limits from this round of processing.<br>• Mineral Technologies sent samples of the tails and product concentrates, excluding SLM stage products, to Bureau Veritas Brisbane for assay:<br>  • Samples were dried and pulverised using tungsten carbide bowls in a vibrating pulveriser to 90% passing 75 µm with a BQF before each sample.<br>  • Sample was fused to a glass bead to determine Fe, Si, Al, Cr, Mg, Mn, P, U, Th, V, Nb, S, Ca, K, Ce, Sn, Ti, and Zr oxides by XRF.<br>  • LOI was determined by mass after heating to 105°C (drying temp) and 1000°C (fusing temp).<br>  • Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Tm, Y and Yb were determined by laser ablation of fused bead with ICP-MS finish.<br>  • Standards were assayed at 1 in 3 to cover all elements in the suite for both assay methods.<br>  • Laboratory repeats were carried out at 1 in 4. |
| *Verification of sampling and assaying* | • *The verification of significant intersections by either independent or alternative company personnel.*<br>• *The use of twinned holes.*<br>• *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.*<br>• *Discuss any adjustment to assay data.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Significant intersections have not yet been determined.<br>• Hole SMDH 00014b is twinned by SMDH 00014bt for QAQC purposes. Further twinning is planned for second stage drilling.<br>• Data was entered into MS excel then verified against hard copy data, followed by import into Datamine Studio RM for validation.<br>• Primary data is stored as hard copy, electronic tables in CSV format and Datamine format.<br>• Assay data yielding elemental concentrations for rare earths (REE) within the sample are converted to their stoichiometric oxides (REO) in a calculation performed using the conversion factors in the table below.<br>• Rare Earth oxide is the industry accepted form for reporting rare earths. The following calculations have been used for reporting:<br>  • **TREO** = La2O3 + Ce02 + Pr6O11 + Nd2O3 + Sm2O3 + Eu2O3 + Gd2O3 + Tb4O7 + Dy2O3 + Ho2O3 + |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| | | Er2O3 + Tm2O3 + Yb2O3 + Lu2O3+ Y2O3<br>• **CREO** = Nd2O3 + Eu2O3 + Tb4O7 + Dy2O3 + Yb2O3<br>• **LREO** = La2O3 + Ce02 + Pr6O11<br>• **HREO** = Sm2O3 + Eu2O3 + Gd2O3 + Tb4O7 + Dy2O3 + Ho2O3 + Er2O3 + Tm2O3 + Yb2O3 + Lu2O3+ Y2O3<br>• ND/Pr = Nd2O3 + Pr6O11<br>• TREO – Ce = TREO – CeO2<br>• %NdPr + NdPr/TREO |

| Element Name | Element Oxide | Oxide Factor |
|---|---|---|
| Ce | CeO2 | 1.2284 |
| Dy | Dy2O3 | 1.1477 |
| Er | Er2O3 | 1.1435 |
| Eu | Eu2O3 | 1.1579 |
| Gd | Gd2O3 | 1.1526 |
| Ho | Ho2O3 | 1.1455 |
| La | La2O3 | 1.1728 |
| Lu | Lu2O3 | 1.1371 |
| Nd | Nd2O3 | 1.1664 |
| Pr | Pr6O11 | 1.2081 |
| Sc | Sc2O3 | 1.5338 |
| Sm | Sm2O3 | 1.1596 |
| Tb | Tb4O7 | 1.1762 |
| Th | ThO2 | 1.1379 |
| Tm | Tm2O3 | 1.1421 |
| U | U3O8 | 1.1793 |
| Y | Y2O3 | 1.2699 |
| Yb | Yb2O3 | 1.1387 |

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| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| *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.*<br>• *Specification of the grid system used.*<br>• *Quality and adequacy of topographic control.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• An initial collar survey by hand held GPS was conducted as a failsafe, with expected accuracy of ±5000mm in x and y, and ±50000mm in z.<br>• Full survey by Twine Surveys was subsequently carried out using RTKdGPS with accuracy of ±20mm in x and y, and ±200mm in z<br>• Twine's professional RTK survey was implemented between drill collars and used to generate a digital terrain model for high quality topographic control.<br>• All survey data is recorded in MGA 2020 zone 54 and AHD. |
| *Data spacing and distribution* | • *Data spacing for reporting of Exploration Results.*<br>• *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.*<br>• *Whether sample compositing has been applied.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Data spacing for the northern 3 lines of drilling is 60m x 120m.<br>• Data spacing for the southern 3 lines is 120m x 120m<br>• No compositing has been applied to 1m samples for total digest assay.<br>• Pan concentrates were composited per drill hole.<br>• Preliminary metallurgical sample was composited as discussed under *Laboratory Tests.*<br>• Representative metre samples for total digest assay were no composited, residual sub-metre hole ends were similarly assayed separately to preserve geometric representation. |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| *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.*<br>• *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.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Deposit type is fluvial channel placer with channels believed oriented north to north-east and meso scale structure oriented sub-horizontal arcuate. The applied vertical sampling is the optimal orientation for the deposit type.<br>• No bias by orientation or spatial relationships has been identified. |
| *Sample security* | • *The measures taken to ensure sample security.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Samples were collected after logging and transported at the end of each day to the company locked storage in Chillagoe.<br>• Samples were boxed in closed pumpkin crates, wrapped in plastic for shipping by courier to the laboratory in Pine Creek, NT.<br>• Samples for IHC Mining and Downer Mineral Technologies were similarly boxed, wrapped and couriered to the laboratories, but prior to shipping were stored on site at the Ark fenced bulk bag farm. |
| *Audits or reviews* | • *The results of any audits or reviews of sampling techniques and data.* | Ark Mines May to June 2023 Sandy Mitchell programme:<br>• Full audit of sampling techniques and data available to date was carried out by geological consultants, Empirical Earth Science.<br>• EES notes that the composited concentrate samples results in assay representing diluted material with no internal separation possible.<br>• EES noted that the hand panning process of such fine material is prone to heavy mineral loss, with the possibility that concentrates underrepresent the total heavy mineral fraction.<br>• ESS noted that the pXRF technique used in initial concentrate assays is not suited to yield full REE data, but that the results can inform approximate proxy calculations for the full REE suite.<br>• EES noted that none of these factors apply to the representative metre samples and total digest assays, which meet best practice.<br>• EES noted that the preliminary metallurgy was of insufficient volume and source dispersion to represent the entire eventual resource, but was well suited to its stated purpose of proof of concept, testing recovery technique, and process to inform the next stage of bulk metallurgy. |