

VIRIDIS ENTERS JOINT VENTURE FOR SEPARATION, REFINING AND RECYCLING OF RARE EARTHS

Viridis and Ionic Rare Earths Execute Transformational Agreement for the Downstream Production of Rare Earth Oxides

ASX Release: 3 April 2024

Highlights

- ▶ **Colossus positioned to become the first producer of refined Rare Earth Oxides ('REO') in Brazil, through a Joint Venture ('JV') signed with Ionic Rare Earths Limited (ASX: IXR).**
- ▶ **The JV has exclusive global (excluding Asia and Uganda) rights to commercialise Selective Separation Technology ('SST') for downstream processing, and exclusive rights to commercialise IXR's Rare Earth Recycling Technology ('RRT') in Brazil.**
- ▶ **The new JV company formed will be 50/50 owned by both Viridis and Ionic Rare Earths respectively. All Intellectual Property ('IP') developed, including flow sheets and test work data, will be exclusively owned by the JV in order to scale the technology across numerous Ionic Clay projects in Brazil and Rare Earth Elements ('REE') projects globally.**
- ▶ **Ionic Technologies International Ltd ('IonicTech'), a wholly owned subsidiary of Ionic Rare Earths, is a leader in Rare Earth Recycling Technology which has presented a unique opportunity for Viridis to introduce RRT into Brazil while simultaneously developing and commercialising SST:**
 - **Utilises ionic liquids and extractants to selectively separate individual rare earths from carbonate into refined, high purity oxides.**
 - **Technology is fully tuneable allowing separation of any pair of rare earths across the spectrum of lanthanides, rather than a typical separation plant which is limited to only producing one set of oxides.**
 - **Solvent separation has proven to be effective and selective across key REOs – Nd, Pr, Dy, Tb.**
 - **Feedstock from the Colossus project to be tested and scaled towards demonstration plant in Poços De Caldas. The Joint Venture arrangement does not constitute an offtake agreement and allows for Viridis to market 100% of the product developed from the Colossus Project to any future offtake agreements and/or partner(s).**
- ▶ **The commercialisation of this technology will be disruptive for the entire downstream supply chain. Current downstream chain for Rare Earths only allows for REE chemical product to be sent to a specific Solvent Extraction ('SX') plant with circuits designed to separate only one pair of REOs. SST allows for separation of all 17 REOs through a tuneable solvent from a single feedstock.**
- ▶ **IonicTech has already demonstrated its ability to extract >99.8% Nd-Pr Oxide and Dy Oxide from recycled magnets, with the new JV owning exclusive rights to scale this technology in Brazil.**
- ▶ **A separate scoping study utilising SST will be conducted in parallel with current development activities at Colossus which will assess the economic implications of integrating this technology within the JV owned downstream plant to produce the entire portfolio of refined Rare Earth Oxides.**
- ▶ **The JV provides optionality to Colossus to produce both a Mixed Rare Earth Carbonate and refined Oxides based on future offtake agreements and customer requirements.**

Chief Executive Officer, Rafael Moreno commented:

“This Joint Venture now places Viridis at the forefront of Rare Earth companies outside of China, as we look to capitalise on our first mover advantage with this mature downstream technology and support the current discussions being held with the burgeoning supply chain that is developing in Brazil, as evident with the recent announcements made by Toyota, Volkswagen, Stellantis, Hyundai, BYD and General Motors.

Furthermore, this provides Viridis an accelerated and de-risked pathway to generating significant IP around the scaling of selective separation technology for mixed REE carbonates and concentrates, which can be licensed/commercialised for other REE projects globally.

The Joint Venture also aims to be the first company to bring commercially ready REE recycling into Brazil (on an exclusive basis), using a technology which has been developed following years of R&D at IonicTech’s Belfast facility, with the goal of enabling Brazil to become a major player in the downstream supply of REOs.

The Selective Separation Technology itself is unique, as it allows separation of all 17 Rare Earths into their Oxide form directly from a REE carbonate. This is disruptive for the entire REE supply chain as current leading separation plants can only separate a pair of Rare Earths, either Nd-Pr or Dy-Tb. Once scaled up successfully, this technology has the potential to capture the full value from a projects REE basket, providing enormous value for Colossus and many other REE projects.

With this JV, Viridis is continuing to work towards the development of a globally significant Ionic Adsorption Clay project, whilst also sitting at the forefront of REE separation and recycling technology in Brazil. We are excited to leverage the incredible geology present in Brazil alongside our strategic partnership with Ionic Rare Earths to create a circular mine to magnet supply chain.”

Viridis and Ionic Rare Earths Joint Venture

Viridis Mining and Minerals Limited (‘Viridis’ or ‘Company’) is pleased to report it has executed a binding terms sheet with Ionic Rare Earths Limited, **for the commercialisation of Selective Separation Technology to recover the full suite of Rare Earth Oxides from concentrates and carbonates feed, within its downstream plant in Brazil.**

The JV between Viridis and Ionic Rare Earths aims to commercialise and implement the SST and RRT within a separation plant in Brazil and is positioned to become **the first major producer of the full suite of refined REOs in South America.**

Both Viridis and Ionic Rare Earths will form a new company (‘JV Co’) which will hold exclusive global rights (excluding Asia and Uganda) to IonicTech’s SST to produce REE Oxides from Mixed Rare Earth Carbonate (‘MREC’) or equivalent intermediate feed streams, and own any new IP developed from the commercialisation process. Furthermore, this JV Co will hold exclusive rights in Brazil to monetise, implement and commercialise IonicTech’s RRT (Recycling) to a full-scale plant. This will also grant the JV Co **rights to exclusively commercialise SST for other Rare Earth producers**, with an initial focus on partnering with existing Brazilian Rare Earth Projects before expanding the technology globally.

Viridis and Ionic have commenced discussions with both potential licensing partners with Rare Earth assets and OEMs seeking refined Rare Earth Oxides to spearhead the JV Co initiative.

The patented Selective Separation Technology uses ionic liquids and extractants, which is fully recyclable and can be integrated and retrofitted into existing plant infrastructure. Viridis aims to utilise this technology within its own downstream separation plant which will take MREC feed generated from the Colossus Ionic Adsorption Clay (‘IAC’) Project and **produce any specific set of high purity REE Oxides desired by end-users within a single plant, using a single feed.**

SST and RRT Value Add

IonicTech's SST provides a disruptive opportunity for Viridis within the Rare Earth supply chain, not only through the Company looking to be one of few companies in the world able to produce both light and heavy rare earth oxides outside of China but also placing Brazil as a fully integrated miner, producer, and end-user of Rare Earth permanent magnets materials.

Furthermore, the JV will also grant Viridis exclusive rights within Brazil to implement IonicTech's commercially ready RRT. The combination of SST and RRT will place Brazil, and more specifically Poços De Caldas, as the central hub for the entire Rare Earths value chain. During the recent Memorandum of Understanding ('MoU') signing ceremony¹, the Minas Gerais Governor and Mayor of Poços De Caldas shared similar ambitions for this Alkaline Complex, which is to become a vertically integrated frontier of Rare Earths for western markets. This initiative will place Viridis as the leading REE developer and refiner.

The Current Problem

Current downstream flowsheets in Rare Earths only allow separation plants and refineries to be rigidly designed, capable of producing only a specific set of Rare Earth Oxides.

For example, Lynas Rare Earths' ('Lynas') (ASX:LYC) integrated refinery in Malaysia is capable of taking REE-carbonate feed (Mt Weld) to produce separated Nd-Pr Oxide and La-Ce Oxide. Lynas is in the process of constructing a separate US \$258M refinery in Texas which aim to take the same carbonate feed to produce Heavy Rare Earth Oxides.

Similarly, the Mountain Pass separation plant is only capable of producing Nd-Pr and La-Ce Oxide irrespective of the carbonate feed being concentrated in Heavy Rare Earths or not.

The Solution

SST allows great flexibility and customisation on separating any targeted pair of Rare Earth oxides, whereas traditional refineries are limited to constructing circuits, which is restricted in separating a small set of Rare Earth Oxides.

SST acts as a 'drop in' solution using separation technology which can be retrofitted into an existing plant and target any pair of Rare Earth Oxides. Allowing for a MREC feed to extract the full suite of Rare Earth Oxides contained, rather than being limited to just a single REE pair.

The commercialisation of technologies by the JV Co will play a critical role in maximising the economics at the world-class Colossus IAC Project:

- **Will allow Colossus to move further downstream** in a highly efficient OPEX/CAPEX and sustainable manner to capture maximum value from its deposit. This will allow for a single integrated circuit within a downstream plant in Brazil which is capable of producing both Nd-Pr and Dy-Tb from the same Colossus MREC.
- **Separation and refining of the full spectrum of Rare Earths Oxides from a carbonate product**, allowing Colossus to capture value from all 15 REEs rather than being limited to producing only a pair of Rare Earth Oxides from the MREC produced at Colossus while rest of contained oxides are essentially wasted.
- **Ability to commercialise the technology within other IAC projects** or REE chemical plants, as a "drop-in" technology which can be retro-actively fitted and adds a secondary revenue stream for Viridis.
- **Reduction in downstream reagent consumption using a fully recyclable ligand, no toxic waste and significant reduction in separation steps to achieve a high purity refined Rare Earth Oxide** at low cost.

Furthermore, the JV grants Viridis exclusive rights to use IonicTech's commercially ready RRT within Brazil. IonicTech is one of the global leaders in this space and one of few companies able to produce high-purity (>99.5%) Dy-Tb Oxide from recycled magnets. In turn, this places Brazil in the forefront for a circular mine to magnet supply chain. Poços De Caldas will now sit as the premier destination hosting the highest grades of Ionic Clays seen in the globe, alongside utilising the technology to leverage this geology to develop a robust circular mine to magnet economy.

Downstream Flowsheet

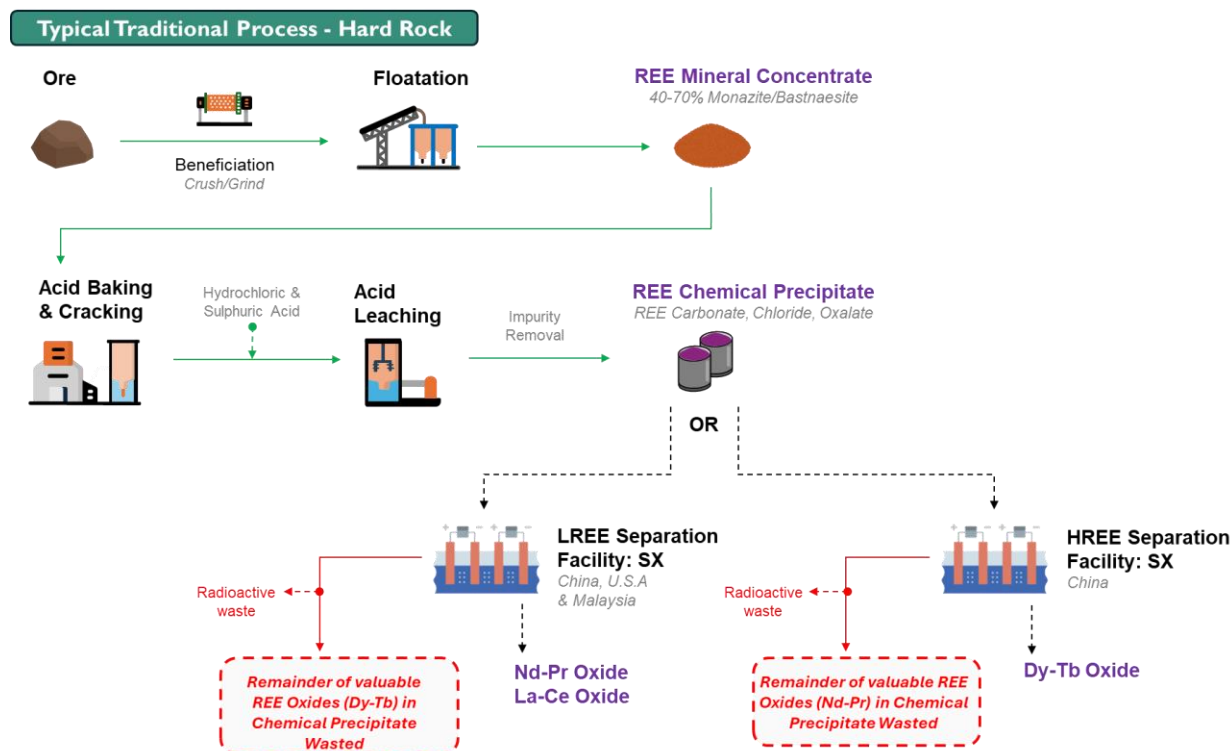


Figure 1: Simplified and conceptual flowsheet for a typical hard-rock rare earth project which exemplifies current downstream challenges. Figure 1 shows the challenging transition of hard-rock from ore -> concentrate -> carbonate -> oxide requiring a beneficiation plant, hydromet plant and separation plant to take it through each respective stage.

Figure 1 above shows the complicated multi-step process required for a standard hard-rock rare earth project, where separation and liberation of rare earths comprises a CAPEX and OPEX intensive, highly acidic, environmentally hazardous and complex process. Most importantly, upon production of a “REE Chemical Precipitate” (which itself is challenging for a hard-rock REE project), going further downstream requires the precipitate to be sold to either a light REE (‘LREE’) separation facility or a heavy REE (‘HREE’) separation facility, with circuits designed to produce either LREE or HREE Oxides respectively.

This traditional flowsheet limits the value which can be extracted from the MREC, and in most cases companies will only receive payable value for the Nd-Pr Oxide contained within the MREC while remainder of REO is given little to no value by a LREE separation plant. This in itself becomes a marginal business for most hard-rock assets once the operating costs to produce an MREC are considered.

Lynas’ Malaysia LREE facility is limited to only separating out Nd-Pr & La-Ce Oxides, with an additional US \$258M now being expended on a plant in Texas simply to separate out HREE (incl. Dy-Tb Oxides) from the Mt Weld REE carbonate and other potential feeds.

IonicTech’s SST is disruptive in this sense, as it acts as a drop-in solution to allow a single plant to separate out both LREEs and HREEs. This is lucrative for both carbonate producers looking to extrapolate more value from their chemical product, and also for refineries allowing them to use a singular plant for both LREE and HREEs instead of expending hundreds of millions in constructing a plant specifically targeting another pair of Rare Earth Oxides.

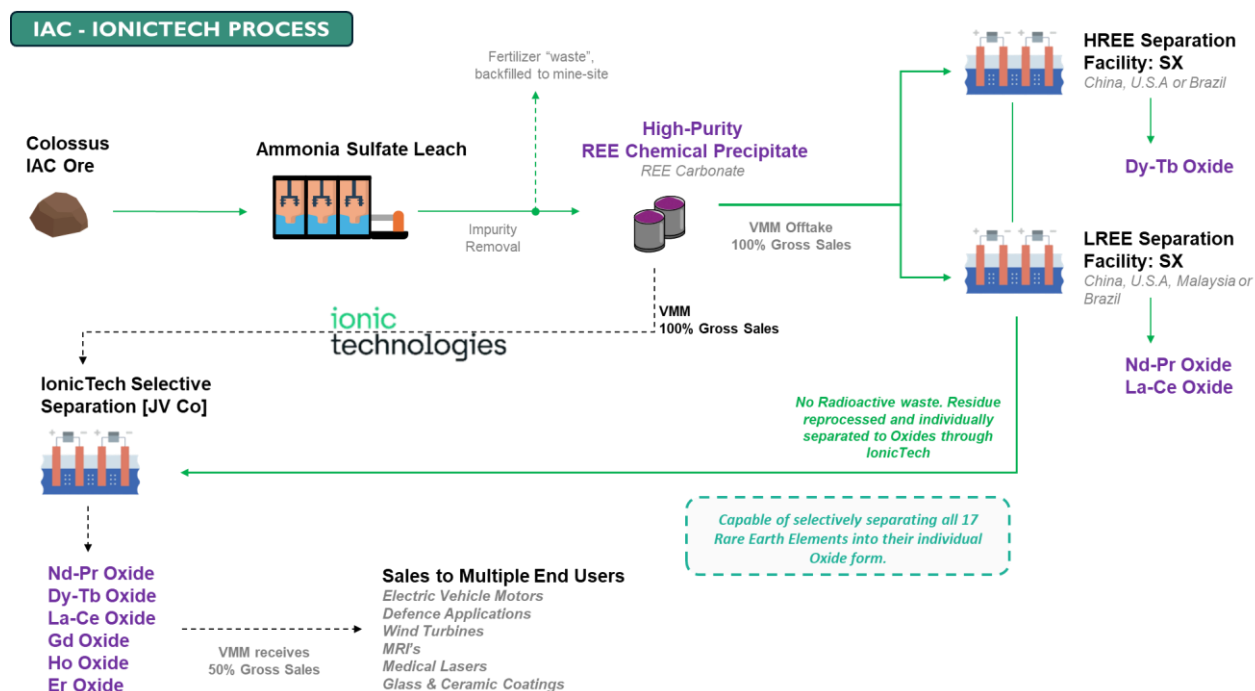


Figure 2: Simplified and conceptual flowsheet for Colossus integrating IonicTech into its downstream plant.

Figure 2 above exemplifies the simplicity of processing an Ionic Clay Project and developing a MREC through a single leaching agent. As seen by the recently announced maiden Australian Nuclear Science and Technology Organisation ('ANSTO') test result at Colossus which achieved **17.9m @ 71% Total Rare Earth Recovery (-Ce)** across CS-DDH-001 (24m @ 4,573ppm TREO) simply through washing with Ammonia Sulphate (salt solution) at room temperature over 30 minutes². Given the soft clay and ionic mineralisation, there is no need for blasting, crushing, floatation, corrosive acids, high temperature cracking and leaching to develop a MREC as seen in hard-rock projects (Figure 1). The simplicity in Ionic Clay processing to produce a high-purity and high-value MREC in contrast to hard-rock assets yields a robust economic model which is low in CAPEX intensity and sits in the lowest quartile of the cost-curve. The already robust unit economics are accentuated when considering the potential commercial implementation of the SST into a downstream facility within Brazil.

With this transformational JV, the MREC anticipated to be produced from Colossus has full optionality to be sold to an external separation plant OR directly process all the MREC out of Colossus into the JV-owned downstream plant to produce a full suite of critical Rare Earth Oxides (using SST) for end customers.

Furthermore, there is no radioactive or hazardous waste in both upstream and downstream procedures using SST. Combined with the exclusive rights to use IonicTech's recycling IP and capabilities in Brazil, this will allow Viridis to become one of the premier Rare Earth developers in the globe, having access to both a world class resource which will continue to progress aggressively alongside commercially disruptive technology in downstream processing.

This initiative places Brazil at the forefront of global REE separation outside of China, capable of producing both LREE and HREE oxides for multiple end users within a unified separation plant.

Viridis, in partnership with Ionic Rare Earths, will form an independent team for this JV with specific skillset and experience in REE separation and refining to begin testing the full mine to magnet process using Colossus ore. Viridis has also commenced discussions with leading global producers of Rare Metals to spearhead this technology at scale within both Poços De Caldas and Brazil.

Licensing and Partnership – SST Scalability Potential

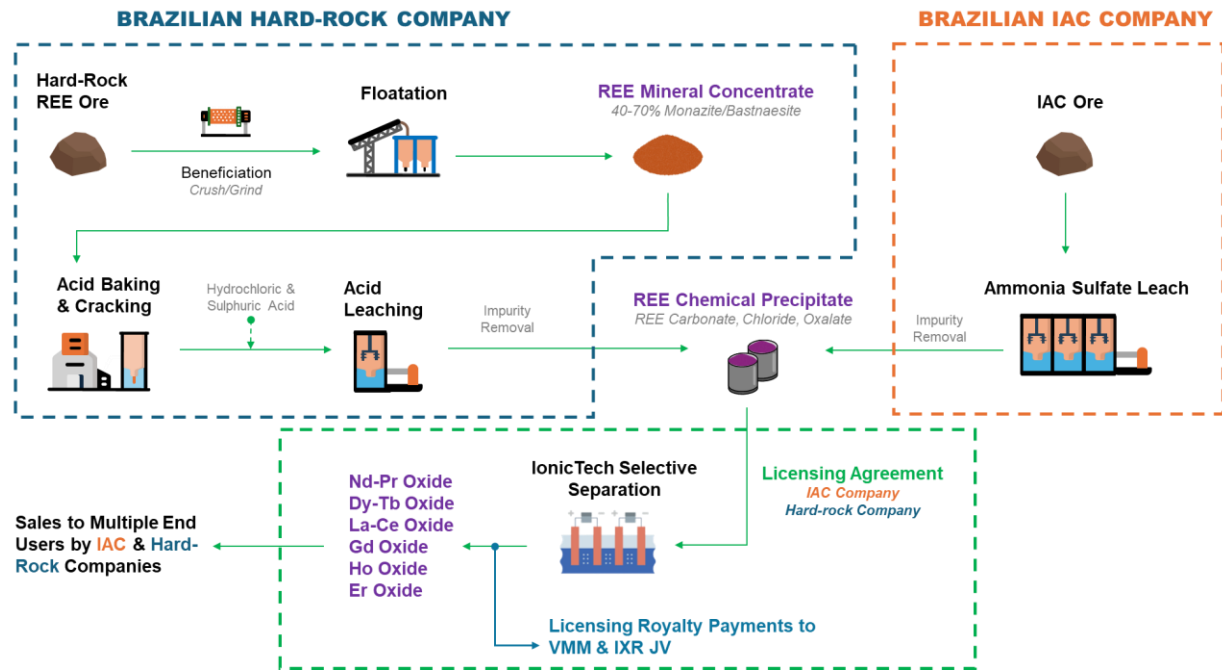


Figure 3: Shows an even more simplified and conceptual flowsheet for both IAC and hard-rock REE deposits and potential structure of a Licensing and/or Partnership agreement to use IonicTech's SST.

Figure 3 shows the lucrative scalability potential of this transformational JV. As Colossus progresses through development phases and proving itself to be a world-class asset, this technology aims to be commercialised in parallel providing early cashflow and partnership opportunities with key industry players.

The first stage will be showing commercial potential of utilising Colossus IAC ore to develop an MREC which can be separated using SST into the full suite of oxides within a straightforward single solvent circuit. Once commercial viability has been exhibited, SST will begin licensing the technology to both upstream and downstream Rare Earth customers. This will grant users of the technology through a licensing and/or partnership agreement with the JV Co to gain full payability out of all the REO contained within their MREC product (upstream client) or using the IP to be integrated into their own separation facilities (downstream client).

Furthermore, upon commercial viability being demonstrated with Colossus IAC ore, the JV Co will conduct a separate downstream scoping study which will substantiate the commercial implications of this technology for the Colossus asset. This scoping study will be done separately to Viridis' current development plans and will have no timing implications on the natural progression of Colossus.

Key Terms

The key terms of the binding terms sheet are as follows:

- VMM and Ionic Rare Earths (the 'Parties') intend, either directly or through wholly owned subsidiaries, to incorporate a joint venture company that will operate as the vehicle for the Joint Venture (JV Co).
- The Parties agree that the JV Co is a global arrangement between the parties for MREC, or equivalent agreed intermediate feed streams, for rare earth separation and refining into individual REOs at target specification to be agreed.
- JV Co shall be a profit-sharing vehicle based on the equal equity stakes in the proportions of 50%:50% held by each party in JV Co (Equity Proportion).
- The Parties acknowledge and agree that on and from the Commencement Date (being the date the JV Co is incorporated), each Venturer (being a Party but not including a Party in its capacity as JV Manager) will contribute to the funding of the Joint Venture on a 50:50 basis. Budgets and work programs will be developed to inform future funding requirements, which must be agreed by both Parties.

- The Parties agree to form the Joint Venture for the purposes of constructing a refinery facility and implementing Ionic Rare Earth's extraction technology or alternative based upon optimal financial metrics.
- VMM undertakes to:
 - sell rare earth carbonates or rare earth chemical precipitates recovered from the Colossus Project to the JV Co on terms considered standard with regard to market prices at the time of sale. This undertaking does not constitute an offtake agreement for the Colossus REE Project.
- Ionic Rare Earths undertakes to:
 - Provide access to separation technology and know-how to define the optimal process to separate rare earth chemical precipitates using its 100% owned UK subsidiary, Ionic Technologies International Limited (**IonicTech**) or alternative should it be identified.
- New IP and process design package developed through investment in the JV Co vehicle will be wholly owned by the JV Co and, for the avoidance of doubt, will be for the exclusive use of JV Co worldwide. This exclusive use does not extend to intellectual property developed by a Party outside of the JV Co in relation to downstream rare earth refining. For the avoidance of doubt, the process design package shall include process design criteria, process flowsheet and supporting test work data, process models, capital and operating cost estimates and location analysis reports.
- The Joint Venture will have exclusive rights to use Ionic Rare Earths' magnet recycling technology in Brazil. Ionic Rare Earths will retain the IP for magnet recycling which is not included in the JV excluding Brazil.
- On and from incorporation of JV Co, each Venturer is entitled to appoint two directors to the Board with equal voting rights and with neither Party having a casting vote.

Approved for release by the Board of Viridis Mining and Minerals Ltd.

Contacts

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About Viridis Mining and Minerals

Viridis Mining and Minerals Limited is a resource exploration and development company with assets in Brazil, Canada and Australia. The Company's Projects comprise:

- The Colossus Project, which the Company considers to be prospective for Rare Earth Elements;
- The South Kitikmeot Project, which the Company considers to be prospective for gold;
- The Boddington West Project, which the Company considers to be prospective for gold;
- The Bindoon Project, which the Company considers to be prospective for nickel, copper and platinum group elements; and
- The Poochera and Smoky Projects, which the Company considers to be prospective for kaolin-halloysite; and
- The Ytterby and Star Lake Projects, which the Company considers prospective for Rare Earth Elements.

Forward-Looking Statements

This announcement contains 'forward-looking information' based on the Company's expectations, estimates and projections as of the date the statements were made. This forward-looking information includes, among other things, statements concerning the Company's business strategy, plans, development, objectives, performance, outlook, growth, cash flow, projections, targets and expectations, mineral reserves and resources,

results of exploration and related expenses. Generally, this forward-looking information can be identified by the use of forward-looking terminology such as 'outlook', 'anticipate', 'project', 'target', 'potential', 'likely', 'believe', 'estimate', 'expect', 'intend', 'may', 'would', 'could', 'should', 'scheduled', 'will', 'plan', 'forecast', 'evolve' and similar expressions. Persons reading this announcement are cautioned that such statements are only predictions and that the Company's results or performance may differ materially. Forward-looking information is subject to known and unknown risks, uncertainties, and other factors that may cause the Company's actual results, level of activity, performance or achievements to materially differ from those expressed or implied by such forward-looking information.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the market announcements referred to in this release and that all material assumptions and technical information referenced in the market announcement continue to apply and have not materially changed.

All announcements referred to throughout can be found on the Company's website – viridismining.com.au.

References

1. VMM ASX announcement dated 4 March 2024 "Key MOUs Signed With State and Local Governments"
2. VMM ASX announcement dated 20 March 2023 "80% Average Ionic Recoveries from First Colossus Hole"