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## ASX Announcement

7 November 2019

# *Positive Razorback Scoping Study Results*

Magnetite Mines Limited (**Company**)(**ASX:MGT**) is pleased to announce it has concluded the previously announced Scoping Study<sup>1</sup> (Study) on the Razorback Iron Project (Project). The Study concluded that:

- a small scale, staged operation producing high grade concentrate from a lower capital initial operation is the preferred option (retaining potential for future expansion);
- low angle, outcropping mineralisation allows for open cut mining at low stripping ratios and limited pre-strip;
- this staged approach is mostly derived from within the previously defined geological resources (86% of the mined material is sourced within the Indicated JORC 2012 mineral resources);
- established transport related infrastructure is the preferred approach to deliver the Project's high grade iron product to the market;
- desktop study confirms applicability of NextOre's<sup>2</sup> Magnetic Resonance ore sorting system with further test work planned for the Pre-Feasibility stage.

The Study confirms the Board's view to now seek appropriate funding to progress the Project to Pre-Feasibility Study (PFS) that will refine and optimise the findings of the Study.

The current ASIC and ASX regulatory framework does not permit disclosure of production targets, forecast financial information and income-based valuations from scoping studies without evidence of reasonable grounds that funding for projects will be available as and when required and therefore the Company has not disclosed that information. The Company is however pleased to report that the Scoping Study has exceeded expectations, with the results demonstrating that razorback to be a competitive operation that can produce high grade concentrate from a smaller scale, lower capital initial operation.

## Scoping Study Parameters - Cautionary Statement

In accordance with the ASX Interim Guidance on reporting on scoping studies, the Scoping Study referred to in this announcement is a preliminary technical and economic study of the potential viability of the Razorback Iron Project required to reach a decision to proceed with a more definitive studies . It is based on low level technical and economic assessments that are not sufficient to support the estimation of Ore Reserves. Further exploration and evaluation work and appropriate studies are required before Magnetite Mines Limited will be in the position to estimate any Ore Reserves or to provide any assurance of an economic development case.

To achieve the range of proposed feasibility studies and potential mine development outcomes indicated in the Scoping Study, additional funding (beyond the Pre-Feasibility Study stage) will be required.

Investors should note that there is no certainty that Magnetite Mines Limited will be able to raise funding when needed. It is also likely that such funding may only be available on terms that may be dilutive or otherwise affect the value of Magnetite Mines Limited's existing shares.

It is possible that Magnetite Mines Limited could pursue other value realisation studies such as sale, partial sale or joint venture of the Project. If it does, this could materially reduce Magnetite Mines Limited proportionate ownership in the Project.

Magnetite Mines Limited has, concluded, that based on the results of the Scoping Study and strong market fundamentals there is sufficient degree of confidence to progress to the Pre-Feasibility stage, however, given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study.

The Scoping Study uses a a portion of Inferred Mineral Resources (~14%). There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the determination of Indicated Mineral Resources.

Chairman Peter Schubert commented: *“The Board aspires to deliver a high grade concentrate into the market based on a small scale start-up. We believe this this will allow the Company to find investors to support our vision.*

*The Scoping Study has confirmed the Board's view that the Razorback Iron Project is uniquely placed within the global high grade iron market as the infrastructure required to develop the Project is largely in place with spare capacity available and the project is amenable to staging. Therefore, unlike most pre-development and current Australian magnetite projects, the Project does not require large-scale capital investment and is not reliant on third parties for new infrastructure in order to develop a potentially economically viable project.*

*By using existing rail and port infrastructure and starting at a small scale, we can avoid the need for high upfront capital and associated long lead times that are typical for many iron ore start-ups. Together with the availability of grid power and water sources in close proximity to the mine site, the Project is ideally situated to exploit these advantages.*

*We see strong fundamentals in the iron ore market, with a more balanced market and a structural market shift towards quality. These factors support a low capital cost market entry. Should the Project commences operations, we have already identified a range of opportunities to improve*

*efficiency and reduce operating cost. The large resource gives us substantial expansion potential in later stage development of the Project, generating further scale economies. Based on the results of the Scoping Study and strong market fundamentals there is a sufficient degree of confidence to progress the Project to the Pre-Feasibility Study stage.*

*In parallel, we will be progressing the potentially game-changing application of ore sorting to the Project. Preliminary results of analysis by NextOre suggest a potential significant shift in capital and operating cost efficiency resulting from the increased concentrator head grade. We will develop, optimise and confirm this technology application as part of the PFS.”*



**Razorback Iron Project showing iron mineralisation outcropping**

## **Background**

The Company's 100% owned Razorback Iron Project is a large magnetite iron ore project located 240 NE of Adelaide, South Australia, near the regional town of Yunta (see Figure 1). The Project is situated approximately 40 km from open-user rail, 100 km from the power grid and 160 km to the Spencer Gulf.

The Company's large JORC 2012 compliant Mineral Resource of 3.9 billion tonnes<sup>3</sup> consists of two large magnetite iron ore deposits, Razorback Iron Project<sup>4</sup> and Ironback Hill Project<sup>4</sup> hosted in the Braemar Iron Formation. The very large resource base is able to produce premium concentrates of +68% Fe with very low deleterious elements (see Table 2).<sup>8</sup>

The purpose of the Study was to identify low capital start-up options for the Project utilising local, saline water sources and existing road, rail and port infrastructure as much as possible. Based on

knowledge obtained from previous studies, the Scoping Study represents a low cost evaluation of low capital intensity pathways to production.

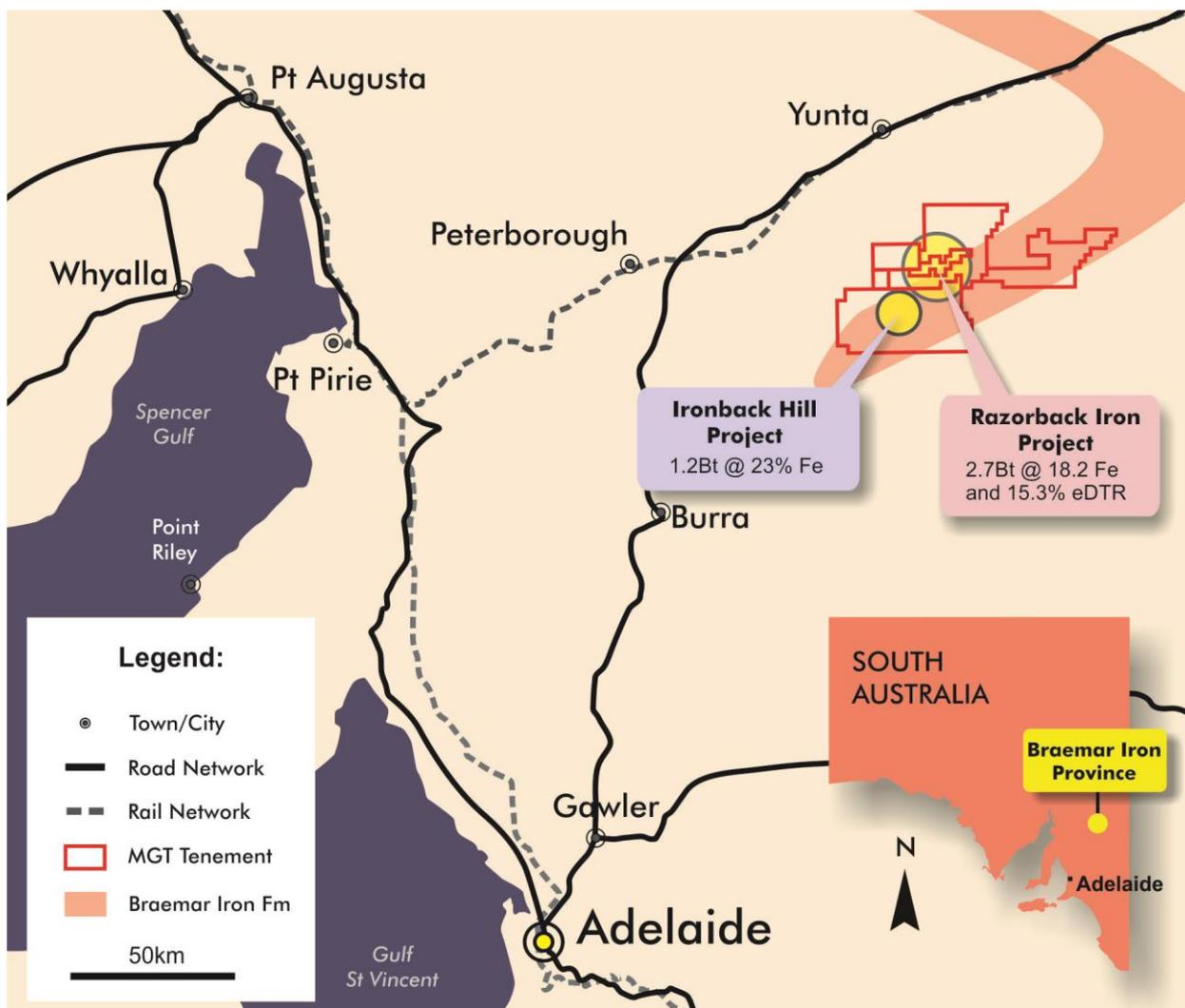


Figure 1. Razorback Iron Project conceptual location map

### Project Parameters

The Project scenarios that were considered were based on mining of the Razorback Ridge and Iron Peak deposits utilising 86% of the indicated mineral resources. Additional test work at PFS stage will be required to confirm the outcomes of the Study.

### Mining

The Study involved preliminary pit optimisation and scheduling completed by Widenbar and Associates using Micromine software. Proposed mining schedules were based on the current Project Resource Estimate, which has a strike extent in excess of 12 km, variable thickness of 300-500 metres and variable dips between 40 to 60 degrees.

The Study indicated that a significant portion of the resource would be potentially economic to mine at shallow depths of 0-100m by conventional drill and blast, truck and shovel open pit mining methods. The Micromine software package was used to assess a variety of pit shells and life-of-mine mining schedules to define a range of production cases. Nominal pit wall angles of 40-50 degrees were selected as appropriate for pit optimisation. Mining costs were selected for an open pit

contract mining scenario as defined in previous studies. A transitional/partial weathering zone was incorporated into the block modelling and was therefore accounted for in pit optimisation.

### **Processing and Mine Site Infrastructure**

Metallurgist and processing engineer Dr Richard Peck was engaged by the Company to develop performance and design criteria along with the process flow sheet for the Project. Dr Peck assessed the work completed during the previous studies as well as High Pressure Grinding Rolls (HPGR) and air separation test work undertaken in 2018.

The results of the work include capital and operational cost estimates, flow sheet and plant design based on results related to those previous studies. In accordance with industry practices, costing data was prepared to an accuracy of  $\pm 40\%$  and is inclusive of processing plant equipment and installation as well as operational costings related to crushing, concentrator, filtration and tailings disposal. Power and water requirements were estimated in accordance with the processing plant usage.

The processing plant for the Project includes primary and secondary crushing, grinding by HPGR, air separation, rougher magnetic separation, ball milling, low intensity magnetic separation and hydro separation to produce the final concentrate (see Table 2 for concentrate specifications).

Fe %	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P	FeO	LOI	Sizing
67.5 - 68.5	3.3	0.4	0.01	29.9	-2.9	P80 25 $\mu$

*Specification based on previous metallurgical test work*

**Table 2 – Indicative concentrate product specification<sup>7</sup>**

### **Power**

Power supply options were investigated for a nominal 40MW power load as defined by the processing and mine infrastructure studies. On-site diesel power generation and the installation of a transmission line to the mine site were considered.

The Study identified that the installation of a transmission line from near the Hallet power station located ~100km from the mine site as the most cost-effective power solution. Direct costs for construction of the transmission line were estimated based on information supplied by ElectraNet Pty Ltd (South Australia's electricity distributor), with long term power costs based on 10-year average National Electricity Market pricing

### **Water Supply**

Based on a review of previous local water studies, Water Technologies Pty Ltd identified alternatives for sourcing 5GL/a of local groundwater for the Project within 40 km of the project site.

It is assumed that the identified water supply source will produce a suitable volume of saline water over the LOM. Based on the expected water quality (6,000 mg/l salinity), the water is considered suitable for processing applications.<sup>5</sup> Small volumes of potable water supplies will be drawn from the bore field and will be treated in a dedicated treatment plant.

## ***Transport***

The Study considers the use of a containerised transport solution, using mostly public roads to the Yunta rail siding and rail transport on the existing rail network to the port. Existing roads would be upgraded and modified to suit road haulage operations from site to the rail siding.

The rail route from the rail siding to the port consists of a single track with passing loops accommodating a maximum train length of 1,800 metres. The cycle time for trains from the siding outside Yunta to Port Adelaide averages 24 hours and therefore, each train set put into operation would achieve around six cycles per week. Transport costings have been obtained from existing transport operators.

## ***Port***

The Study includes shipping from Port Adelaide using Panamax vessels. Operations at Port Adelaide are controlled by Flinders Ports (FP) and all infrastructure is owned, maintained and operated by FP. Port Adelaide has a proven pit-to-ship export pathway for containerised bulk mineral exports and has been providing the service since 2010. Integral to FP's solution is the containerised, tippler-style ship loading method. Shipping costs were based on estimated long-run freight rates from Port Adelaide to North China for Panamax vessels.

## ***Costs and Financial Analysis***

Financial modelling was conducted using concentrate pricing forecasts including the CFR China 62% Fe benchmark iron ore price. Grade premiums and foreign exchange rates have been determined using a range of market based sources. The assumptions used for financial analysis included a grade premium above the 62% benchmark and an AUD/USD exchange rate.

Financial modelling utilised several key additional assumptions with respect to the economic modelling of the Study. Royalties were aggregated to 6.25%, a corporate tax rate of 30% was used, capital contingency and EPCM selected at 20% and 15% respectively and sustaining CAPEX of 1.5%.

## ***Environmental and Social***

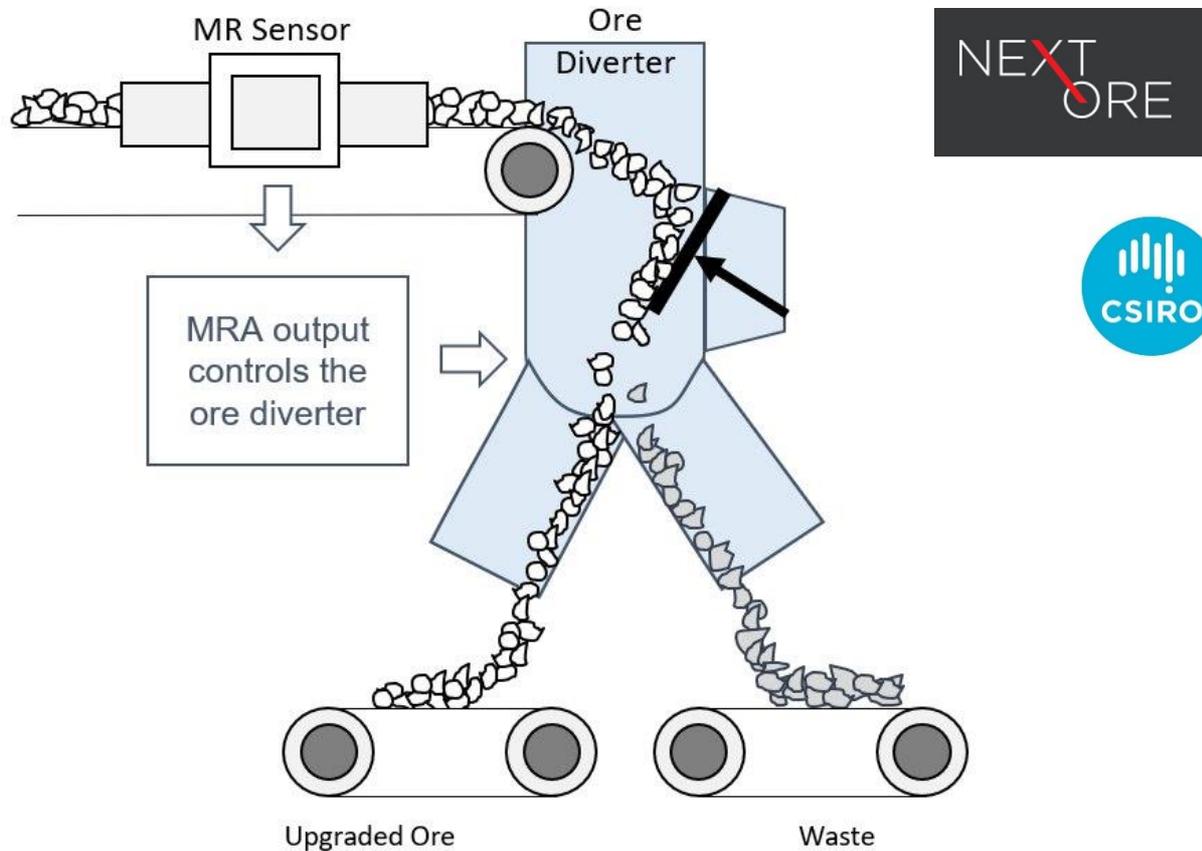
The Project is located on pastoral leasehold land used predominantly for sheep grazing. Baseline environmental survey work was undertaken in 2010 and 2011. No plant species, vegetation community or fauna species of conservation significance were observed during the survey work. The early completion of these surveys will facilitate timely preparation of required documentation for future approvals processes. The Company intends to further progress technical environmental studies during the PFS phase of the Project.

The Project will require the grant of a mining lease before any mining operation can commence. The mining lease application will be prepared in line with the Project's ongoing feasibility work, including consultation and discussions with stakeholders.

The Company has not yet commenced the extensive consultation with stakeholders that is a critical part of working cooperatively with the community and government, noting that this is no certainty that the Company will be able to source the funding for future work and that the Scoping Study work is preliminary in nature and subject to change. The Company accords a high priority to the views of stakeholders and the PFS will include provision for extensive stakeholder engagement before finalising a development pathway.

## Ore Sorting Technology

In addition to the processing flow sheet as described above, the use of early stage bulk ore sorting is currently being investigated. Bulk ore sorting is an automated sensor-based sorting method that aims to reject gangue material prior to processing.



**Figure 2: Schematic diagram of NextOre's ore sorting system.**

This has the effect of pre-concentrating the ore that will be subject to processing, whilst rejecting low grade material to tailings via a diversion method, traditionally air jets or diverter gates. The theorised result of ore sorting is a reduced volume of upgraded ore that performs better in the processing plant whilst reducing processing costs as nil-value material that would ordinarily be subject to downstream processing is rejected early on.

The Company is currently evaluating the exclusive use of leading-edge Magnetic Resonance analyser (MRA) ore sorting technology that was developed by the CSIRO and is being commercialised by NextOre Pty Ltd's<sup>2</sup>. This system utilises an on-belt MRA in conjunction with a physical diversion system, typically a chute flop gate or dead-box diverter. The system exploits the heterogeneity of the ore-body by identifying inherent grade variability and, owing to the speed of the system (down to 1 second intervals), selectively rejecting interbedded waste and low grade material. The technology allows for the grade of high throughput ore to be measured at industry-leading accuracies and speeds. To date, desktop studies of the ore-sorting system based on drilling data (as per the JORC 2012 Razorback Iron Project Resource Estimate) have been very promising.

### Project Upside Opportunities

While the Company is encouraged by the results of the Scoping Study in general and the results of the small scale start up scenario in particular, with a large resource base at the Razorback Iron Project of 2.7 billion tonnes (at 11% eDTR cut-off grade)<sup>3</sup>, there is considerable scope to potentially support much larger operations.

Improvements to the processing remain a high priority. To that end the use of NextOre’s Magnetic Resonance ore sorting technology is currently being investigated with test work to be expanded at the PFS stage.

Additional drilling to better define near surface resources is planned for the PFS. Optimisations expected include the improvement in definition of geological sub-domains that are currently categorised as Inferred Resources.

Alternative port options may improve shipping operational costs by transhipping to Capesize vessels. In addition, optimisations in rail costs dependant on distance to selected ports and the use of bulk haulage solutions such as bottom dump rail wagons may reduce costs.

### Next Steps

The outcomes generated by the Study support a decision to progress to PFS level pending finance. The PFS will be preceded by a ‘trade-off’ study, the outcomes of which will more clearly define the scope of work for the PFS.

### Indicative Development Timeline

The Project development schedule in Figure 3 indicates that the Project can be operational within 5 years from the commencement of the PFS. The schedule is subject to milestones that could impact on meeting the schedule including available Project funding, positive outcomes for the PFS and future feasibility studies and favourable timelines for permitting.

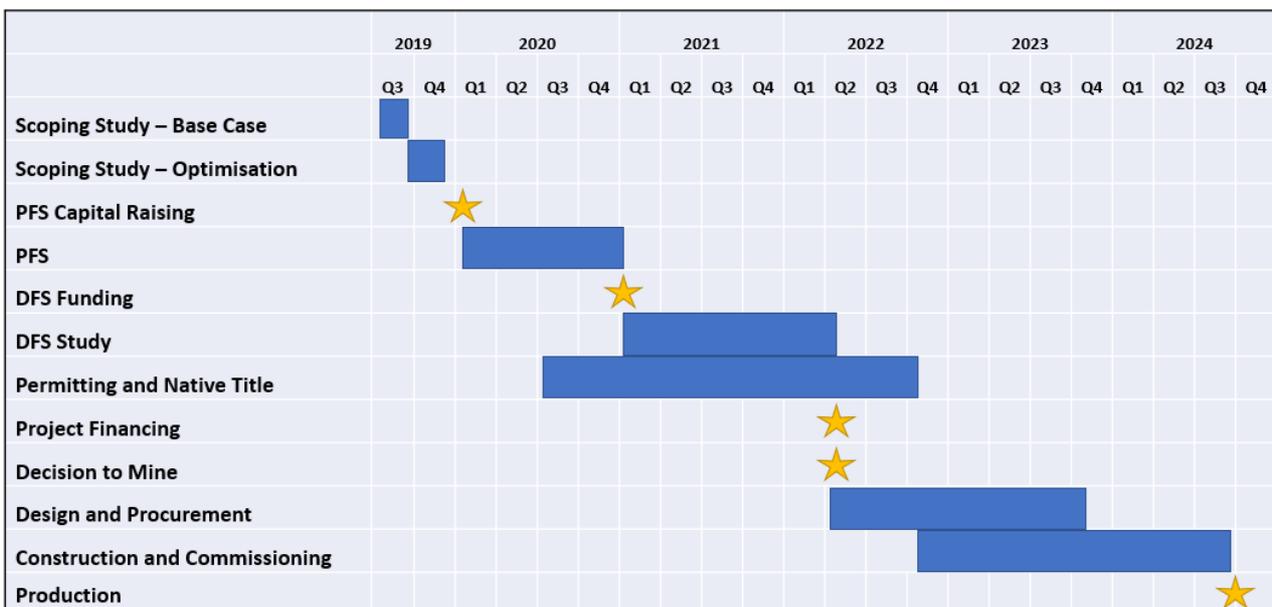


Figure 3. Preliminary Razorback Iron Project Schedule

### **Competent Persons Statement**

The details contained in this report that pertains to ore and mineralisation and the resource underpinning the production target is based upon and fairly represents information compiled by Mr Trevor Thomas MEarthSci – Geology (Hons) a full-time employee of the Magnetite Mines Limited and external independent consultant Mr Lynn Widenbar BSc (Hons), MSc, DIC, Principal Consultant Widenbar and Associates Pty Ltd. Mr. Thomas is a Member of the Australasian Institute of Mining and Metallurgy (AusIMM) and Australian Institute of Geoscientists (AIG). Mr Widenbar is a Member of the AusIMM. These two competent persons have sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are undertaking to qualify as a Competent Persons as defined in the December 2012 edition of the “Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves” (JORC Code 2012). Mr. Thomas and Mr Widenbar consent to the inclusion in this report of the matters based upon their information in the form and context in which it appears.

### **References:**

1. ASX Announcement – 31/07/19 – Fourth Quarter Activities & Cashflow Reports
2. ASX Announcement – 25/10/19 – Ore Sorting Technology Exclusively Secured
3. ASX announcement – 12/11/18 – Razorback Iron Project – JORC 2012 Update
4. ASX Announcement – 20/11/18 – Ironback Hill Deposit – JORC 2012 Update
5. ASX Announcement – 29/10/18 – First Quarter Activities & Cashflow Reports
6. ASX Announcement – 30/04/19 – Third Quarter Activities & Cashflow Reports
7. ASX Announcement – 11/08/11 – Native Title Agreement over Razorback Signed
8. ASX Announcement – 13/09/16 – Metallurgical Update – Positive Results

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