

## Cobra Resources

### Progress indicates first quartile potential

Cobra Resources is an exploration company focused on developing a rare earths deposit in South Australia, with a potentially low-cost method of production through in situ recovery (ISR). The company has recently raised £1.7m in equity funding and released metallurgical results with implications for extraction costs, indicating the potential for a bottom quartile position on the industry cash cost curve. This is important as ISR is also likely to be scalable and have a low capital cost, which will make Cobra's Boland project an interesting rare earths play as it progresses towards establishing a maiden resource and completing a scoping study.

### Bench testing indicates good recoveries

At Cobra's Boland Project, rare earth elements are ionically bound within permeable sands, not impermeable clays. This unique geology enables use of ISR and eliminates challenges associated with handling and processing clay ores. Work by Cobra in recent months has focused on bench tests optimising recovery rates at different levels of acidity. The recent results indicated recoveries of 56% total rare earth oxides (TREO), 57% magnet rare earth oxides (MREO) and 50% heavy rare earth elements (HREE), with sulfuric acid consumption of 15.0kg/t of ore. A permeation rate of 0.14 pore volumes per day was achieved, which is comparable to operational ISR uranium mines. Optimisation tests suggested further recovery upside, with a pH 2 lixiviant indicating recoveries of 78% praseodymium (Pr), 86% neodymium (Nd), 86% dysprosium (Dy) and 87% terbium (Tb). The potential for improved recoveries was supported by the second bench scale test results released on 26 November demonstrating impressive permeability of up to 24 metres per day.

### Potential implications for low costs

These recoveries are in the same order as scoping studies for ionic clay resources in non-ISR conditions. This positions Cobra in the lowest quartile of the cash cost curve, which suggests that costs below US\$10/kg of rare earth oxide (REO) for a mixed rare earth carbonate (MREC) product are possible. These are no precedents yet for ISR in rare earth projects outside China, but in the uranium industry it dominates the bottom third of the cash cost curve. ISR is a low-capex method of extraction, which means it has the potential for attractive economics, an important factor in a high-inflationary environment for capex and volatile commodity prices.

### Equity raise to further advance project

Cobra has several key upcoming milestones, including declaring a maiden resource and moving promising bench testing through to scoping study-level economics, with important newsflow expected in the next 6–12 months. On 26 November, the company announced it has raised £1.7m through an oversubscribed two tranche equity placement. These funds will be used to further advance the project, with near-term catalysts including a maiden mineral resource estimate (expected around mid-2025) and the completion of a scoping study (by end-2025).

#### Metals and mining

3 December 2024

**Price** 1.2p  
**Market cap** £9m  
 AS\$1.95/£

#### Share price graph



#### Share details

Code	COBR
Listing	LSE
Shares in issue, excluding the recent equity raise	727m
Net cash at 30 June 2024, excluding the recent equity raise	£0.5m

#### Business description

Cobra Resources is an LSE-listed minerals explorer with gold and rare earth deposits in the Gawler Craton in South Australia. It is developing flowsheet options for its Boland deposit, which appears to have the potential for in situ recovery, generally associated with lower capital and operating costs.

#### Bull

- Breakthrough approach to rare earth extraction.
- Low-capex rare earth extraction method, with significantly lower funding needs and shorter time to market.
- Early in the development process, with steady newsflow possible from processing and drilling results.

#### Bear

- No guarantee of success in moving to a maiden resource for in situ recovery.
- Potential long development pipeline; in need of additional capital.
- Rare earth commodity price volatility.

#### Analysts

Andrew Keen	+44 (0)20 3077 5700
Harry Kilby	+44 (0)20 3077 5724

[mining@edisongroup.com](mailto:mining@edisongroup.com)

[Edison profile page](#)

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## The metallurgical results

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Cobra has recently released a series of metallurgical test results relating to its Boland project in the Gawler Craton in South Australia. Testing for recoveries of rare earths under various acidity conditions matter, as Cobra is seeking to develop Boland using ISR and factors such as recovery rates and acid consumption are likely to be key to the economics of the deposit. The testing was completed by the Australian Nuclear Science and Technology Organisation (ANSTO). The results of the first bench scale ISR study, released by Cobra on 1 October, include the following highlights:

- Recoveries of 56% TREO, 57% MREO and 50% HREE from high-grade drill core grading 4,506ppm TREO. These results released on 4 November were an improvement on the preliminary results released on 1 October (recoveries of 50% TREO, 48% MREO and 43% HREE from high-grade drill core grading 4,506ppm TREO).
- These recoveries were achieved with sulfuric acid consumption of 15.0kg/t of ore treated in column ISR conditions.
- MREO was recovered by lowering the sample pH from 7.1 to 3.0, a relatively benign adjustment in acidity.
- Further extraction upside includes recoveries of up to 84% neodymium and praseodymium (NdPr) and 88% dysprosium and terbium (DyTb) achieved in optimisation tests, with adjustments to lixiviant with minimal impact on impurities and processing costs.
- Low levels of impurities (deleterious elements) and low levels of acid consumption.
- A permeation rate of 0.14 pore volumes per day, which is comparable to operational ISR uranium mines.
- Optimisation tests indicate further recovery upside, with a pH 2.0 lixiviant, indicating recoveries of 78% Pr, 86% Nd, 86% Dy and 87% Tb.

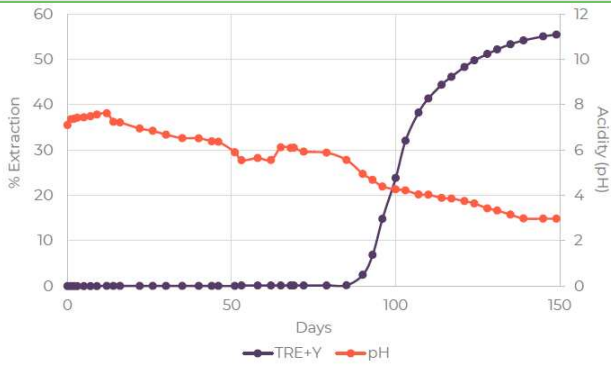
## Permeability and recovery optimisation

The bench scale testing by ANSTO is a process commonly used to test uranium ores for the potential of ISR. The ISR process has two phases. In the preconditioning phase, acid is injected into the orebody and aquifer to lower its acidity. The first bench scale tests indicated 10 pore volumes (c 80 days) to lower the pH from 7.1 to 5.2, the point at which rare earth extraction began from the ore and reporting to the pregnant leach solution (PLS). The second phase is extraction, where acidity is maintained below 5.2 and rare earths report to the PLS over five pore volumes (and an additional c 34 days).

Initial optimisation tests indicated that should a more acidic lixiviant be used (ie pH2) the extraction phases could be shortened and recoveries increased. These tests at low pH indicated maximum recoveries of 84% Nd, 78% Pr, 86% Dy and 87% Tb from high-grade samples at pH 2 (see chart below).

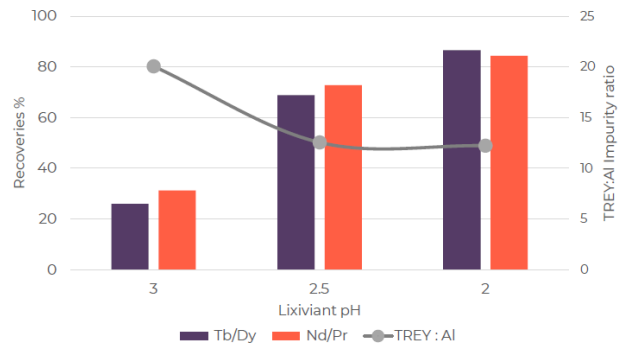
The potential to increase recoveries was clearly demonstrated by the second ISR bench scale study released on 26 November. The key highlights of the results were the impressive permeability rates of 24.3 and 8.6 metres per day at a bar pressure of 5.5 and 2.5, respectively. As a result, the second study was completed in just 24 hours compared to c 150 days for the first bench scale tests. The company expects to announce recovery results from the second study within the next two weeks.

**Exhibit 1: Pore volume, PLS pH and % extraction**



Source: Cobra Resources

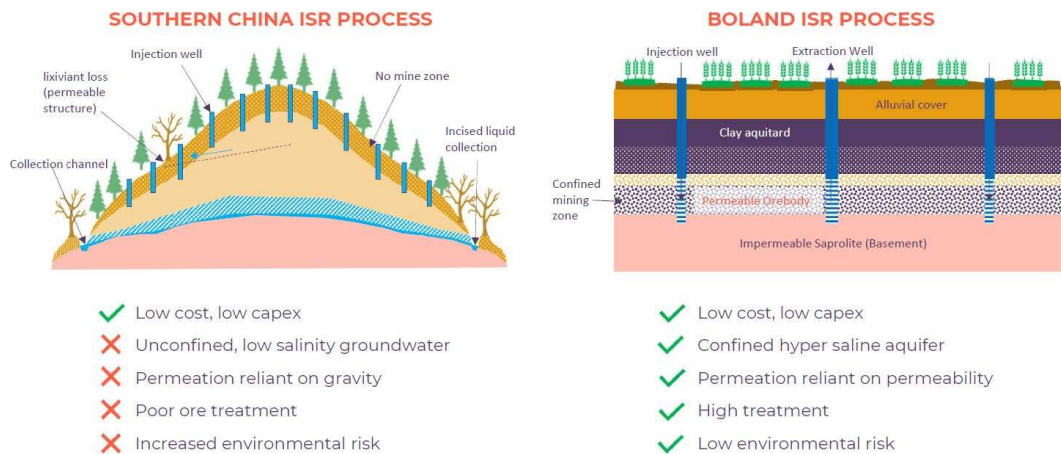
**Exhibit 2: Recoveries versus lixiviant pH**



Source: Cobra Resources

The process planned at Boland is a controlled operation similar to that used in uranium extraction, where an acid is injected into the permeable zone, the right extraction conditions are reached and then the PLS is pumped to the surface for rare earth removal. This is different to the process used by Chinese ionic clay deposits that use ISR, where the extraction is targeted in unconfined low-salinity groundwater (see Exhibit 3).

**Exhibit 3: Boland potential ISR methodology versus China ionic clays**



Source: Cobra Resources

### Potential implications for processing costs

Cobra’s test works are ongoing, but preliminary results suggest future operating costs that could position Boland in the lowest quartile of the cash operating costs for rare earth miners globally. More work is needed but some sense checking of this potential can be made.

Rare earths are difficult to place on a conventional industry cost curve for a variety of reasons, including the co-production of a wide range of elements and the opacity of the industry (notably in China). As in lithium extraction, there are a variety of deposit types and extraction and processing methods that can be difficult to compare.

An important differentiator of the Boland project is that its mineralisation occurs within permeable sands in an aquifer that is confined by impermeable clays. We nevertheless believe that some comparisons can be made to ionic clay projects that are further along the development curve. Major ionic clay developers outside China include Aclara Resources, Meteoric Resources (the Caldeira project in the Brazilian state of Minas Gerais) and Serra Verde (see our previous [note](#) for further details on each of these), although all three of these companies use conventional mining methods, rather than ISR.

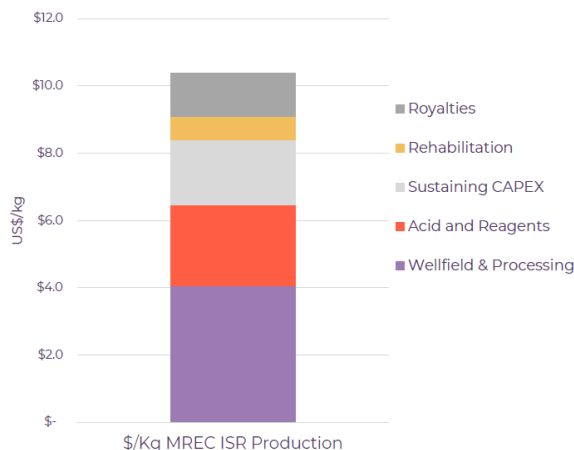
In its September 2024 investor presentation, Meteoric Resources indicated that Caldeira’s scoping study supported a first quartile cash cost position, with a life-of-mine (LOM) average C1 operating cost of US\$7.04/kg TREO and all-in sustaining capital costs of US\$9.00/kg TREO, with an NdPr only C1 operating cost of US\$21.30/kg. Meteoric’s scoping study presentation indicates that the middle of the cost curve is dominated by production with a cash cost of around US\$10/kg REO equivalent. Meteoric has a measured, indicated and inferred resource of 740m tonnes, grading 2,572ppm (LOM scoping study grades for the above costs were 3,500ppm), with MREO/TREO of 23%. In its scoping study, recoveries of MREO were indicated at 54%. Meteoric’s capex was reported at US\$297m for processing and mine equipment (excluding contingency of 35%), with a 9kt/year LOM average production of REO. The scoping study indicated a net present value (using a discount rate of 8%) of US\$699m.

Cobra’s cost make-up is likely to be different as it will not be extracting, moving or stockpiling but instead extracting the rare earths through in situ recovery. Cobra’s total grades are lower than Meteoric’s, as its targeted Zone 3 for ISR at Boland averages 0.8m at 2,099ppm TREO (where Nd<sub>2</sub>O<sub>3</sub> + Pr<sub>6</sub>O<sub>11</sub> totals 414ppm and Dy<sub>2</sub>O<sub>3</sub> + Tb<sub>2</sub>O<sub>3</sub> totals 63ppm (although these heavy REE grades are higher than at Meteoric project, where comparable grades are 29ppm), making 22.7% TREO and 28% HREO from ~26m). However, the intersection used in the bench-scale ISR studies graded 4,506ppm TREO.

Initial testing for recoveries is in a similar ballpark (56% at Cobra vs 54% at Meteoric), although recoveries at both are likely to continue to be optimised for acid consumption. However, Cobra’s operating costs are likely to mirror the make-up of uranium ISR, where wellfield drilling and recoveries, together with acid and reagent consumption, make up most of the operating costs.

Cobra appears confident that these costs, as is the case in the uranium industry, are likely to be very competitive (ISR dominates the bottom third of the uranium cost curve), with an indication of first quartile potential pointing to costs under US\$10/kg TREO equivalent. This could translate to cash operating costs in the region of US\$6–8/kg MREC, which is the intermediate product that Cobra is likely to produce and which trades at a c 30% discount to REO equivalent. It should be noted that REO baskets (ie the particular mix of rare earth elements produced by a mine) are unequal as REO prices vary significantly by element, so this is a broad indication of cost competitiveness. Importantly, this relatively low cash cost does not come as a trade-off with capital costs. In fact, capital intensity for ISR is typically far lower than for traditional mines.

**Exhibit 4: Boland target all-in cost with ISR US\$/kg MREC**



Source: Cobra Resources

Cobra will need to continue to advance this testing as it progresses towards a maiden resource and scoping study. However, the indication for potential cash operating costs in the first quartile is very encouraging. If Cobra can demonstrate that ISR in rare earths can be structurally lower cost (as it is in the uranium industry), it will be a significant step forward. ISR holds the potential to recover rare

earths from clays, without the costs and difficulties of mining and handling clay material through processing operations. This negates the need to handle and process clay, which is challenging and can require significant volumes of water and desliming reagents. ISR also holds the potential for a far more easily scalable production method.

Although Cobra's stock price has improved from a low of 0.73p/share to 1.2p/share currently, its market capitalisation remains at just c £9m, well below some of the projects that are at a more advanced stage. For example, Meteoric Resources, which is at the scoping study stage, has a market capitalisation of A\$225m (£115m) and was valued as high as A\$660m (£336m) in late 2023, before REO prices retreated. Cobra is not yet at the equivalent stage of development. It will need to release a maiden resource and progress to a scoping study to confirm the bench-scale economics.

## Equity placing and upcoming catalysts

On 26 November Cobra announced it has raised £1.7m in an oversubscribed two tranche equity placing. The company plans to use proceeds from the raise to further advance the Boland project. Approximately £0.6m is expected to be spent on resource drilling, which should result in establishing a maiden mineral resource estimate (expected around mid-2025). An additional c £0.4m will be used on in field permeability testing to replicate the rates achieved at bench scale and on additional metallurgical tests to further optimise the project. This work should support the completion of a scoping study, which is expected by the end of 2025. With the initial ISR testing now complete, Cobra's near-term focus is on resource definition and production flowsheet development. We understand that the company is several weeks away from releasing its maiden MREC product results.

**Exhibit 5: Proposed use of funds and workflow timeline**

Use of Funds	Allocated Capital	Dec 24	Jan 25	Feb 25	Mar 25	Apr 25	May 25	Jun 25	Jul 25	Aug 25	Sep 25	Oct 25	Nov 25	Dec 25
Boland resource drilling	£480,000		✓	✓	✓		✓							
Regional drilling	£140,000						✓	✓		✓				
Mineral resource estimate	£30,000								✓					
In field permeability study	£100,000							✓	✓	✓				
Metallurgy - Optimisation	£200,000	✓	✓			✓								
Scoping study	£50,000												✓	
Marketing	£50,000													
ASX listing strategy	£50,000													
Working capital	£600,000													
<b>Total</b>	<b>£1,700,000</b>													

Source: Cobra Resources

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