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RARE EARTHS PROCESSING IN AUSTRALIA

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ABSTRACT

In November 2019, the Australian Government established a $4.5 million *Advancing Research and Development for Critical Minerals program* to undertake research and development to advance the Government's critical minerals strategy. The Program's objectives included:

- Increase the downstream processing capacity within Australia, in order to move further along the value chain, including through the development, piloting and commercialisation of processing methods and technologies, and the commissioning of feasibility studies.
- Enhancing environmental outcomes of critical minerals mining and processing, in order to demonstrate Australia' credentials as an ethically responsible supplier of critical minerals.

The rare earth supply chain is long and complicated and a number of processes are involved including mining, ore beneficiation to produce a mineral concentrate, metallurgical processing to produce a mixed rare earth chemical intermediate or concentrate, separation of individual rare earth elements, reduction and refining of the oxide to metal and alloys. The separated rare earths in chemical or metal form feed a wide range of industries. The oxides can be used directly in areas such as the manufacture of polishing powder and LiNiH batteries while the manufacture of rare earths magnets used in wind turbines and electric cars requires the oxides to be turned into metal and alloys.

Australia has a strategic interest in developing expertise in rare earths processing and hosts a number of rare earth deposits with projects at various stages of development with no current domestic production of purified rare earth oxides or metals.

ANSTO is undertaking a series for projects in accordance with the *Advancing Research and Development for Critical Minerals program* including:

i) Rare Earth Separation Phase 1

ii) Membrane Assisted Rare Earth Separation

iii) Continuous Ion Exchange for Rare Earth Separation

iv) NORM (Naturally occurring radioactive waste material) Waste Management in Rare Earth Processing

The first project addresses the potential for rare earth separation as part of the downstream processing capacity in Australia. Phase 1 of this project will review applicable technologies through an options study, utilising ANSTO's proprietary modelling techniques to define the required circuits and optimum outcome.

The other three projects are research based. Two explore the potential of alternative technologies to solvent extraction for rare earth separation.

The fourth project examines the challenges associated with the presence of naturally occurring radioactivity in the processing of some types of rare earths ores such as those derived from heavy mineral sands deposits and the need for a standardised approach to evaluation, reflecting good environmental practice.

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