Developing Australia's Ionic Clay and Clay Hosted Rare Earth Deposits

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ABSTRACT

The Rare Earth Elements (REE, defined here as the lanthanides and yttrium) are critical to many green technologies. In particular, the so-called magnet REE (Pr, Nd, Tb and Dy) are in high demand for applications in electric vehicles and wind turbines. These technologies are set for significant growth, supported by the global drive towards net zero emissions, demand for renewable energy, electrification of transport and the geopolitical push for diversification of supply chains.

The REE are conventionally mined from hard-rock deposits containing bastnaesite, monazite and xenotime, and "ion adsorbed" or "ionic clay" deposits (IAD). The IAD, while lower grade, are typically enriched in the more valuable heavy REE (Tb and Dy) and require less chemical/energy intensive processing conditions than hard rock deposits. The IAD are the predominant global source of the HREE, and mined mainly in China and Myanmar, which historically have operated under less stringent regulatory and environmental standards.

In recent years, there have been numerous discoveries in Australia of clay-hosted rare earth deposits (CHRED), with varying components of adsorbed rare earths together with primary/secondary rare earth mineralisation. The processing routes for the CHREDs with low adsorbed REE content are not currently well defined.

The ADARER Project (Accelerating Development of Australia's Rare Earth Resources), funded by the Commonwealth Government, is one of the projects operated under the umbrella of the recently established National Critical Minerals Research & Development Hub, which brings together the expertise of three science agencies, namely ANSTO, CSIRO and Geoscience Australia (GA). The project's objective is to accelerate the discovery, extraction and processing of REE from Australian, CHREDs and IADs type deposits.

This paper outlines ANSTO's contribution to the project, which seeks to develop simple, low-cost processes that cover the whole spectrum of the Australian clay deposits, and the integration with existing REE separation technologies.