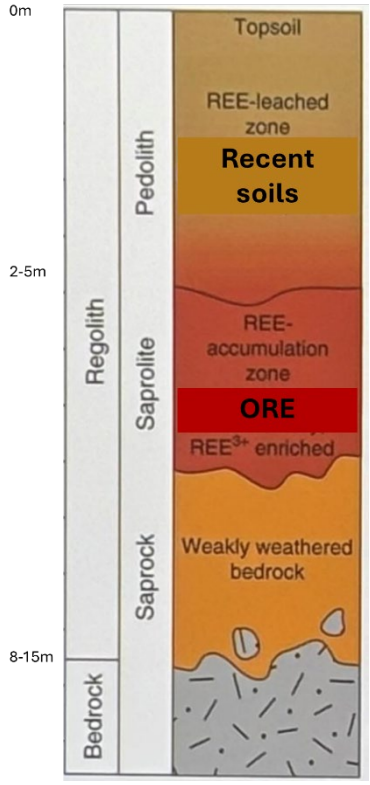
Geological Setting of ABx's genuine Ionic Rare Earth Deposit in Tasmania. Australia-wide lessons to be learnt



Geology

Rare earth elements (REE) are not rare but in very rare locations, REE can be weakly adsorbed onto clays in soils by electrostatic attraction, thus forming Ionic Adsorption Clay REE (IAC REE) deposits. The geology of ABx's deposit is summarised in the diagram (left).

ABx is finding REE over a wide area in northern Tasmania in poorer quality, non-cropping soils that have developed on Tasmania's dolerite. ABx's REE are concealed by the "recent soils" horizon that is usually REE-poor. The REE mineralised horizon ("ORE" in the diagram) occurs at depth, usually at the dolerite contact. Drilling is very difficult due to boulders and damp/wet ground. Is this why the REE are ionic?

Uses of REE

REE are used for permanent magnets which are essential in electronics, mobile phones, wind turbines, electric vehicles and military applications. Many modern technologies depend on REE.

Processing metallurgy – the challenge for most Australian REE

True ionic IAC REE are easily leached by benign ionic exchange solutions (eg. ammonium sulphate) at pH 4 at relatively low-cost. However most mainland Australian clay-hosted REE deposits do not leach well at pH4.

ABx's ionic REE achieves high leach extraction rates at pH4 of 50% to 89% of the REE extracted into the pregnant liquor solution (PLS). In production, the PLS is filtered, purified, and ammonium carbonate is added to precipitate a mixed rare earth carbonate (MREC) product for sale to downstream REE processors. ABx has conducted large-scale column leach tests on bulk samples at the Australian Nuclear Science Technology Organisation (ANSTO) and produced a high purity, high quality MREC that has tested very well with several potential customers. ABx's MREC is the highest value of all its peers.

Tasmanian IAC REE are especially enriched in the 4 permanent magnet REE species, namely Neodymium Nd, Praseodymium Pr, Terbium Tb and Dysprosium Dy. They differ from all other Australian REE mineralisation in that they are genuine IAC REE type and exceptionally enriched in Dy & Tb – the two REE species in greatest short supply and highest-priced.

REE discovery:

During the Covid-19 lockdown period in 2020, ABx's Ian Levy and Nathan Towns collaborated via emails to create a geochemical index using ABx's older bauxite assay suite, which did not include REE, to highlight drillholes that may be prospective for Rare Earth Elements (REE). This identified ABx's old DL130 bauxite deposit located within pine plantations north of Exton in northern Tasmania.

Resampling and re-assaying in December 2020 of clay zones in drill samples stored at the ABx bauxite laboratory near Launceston airport led to a batch of REE assays being received from ALS Laboratories on 12 February 2021 which included several high-grade REE assay results. Subsequent drilling confirmed that the REE mineralisation extends well beyond the DL130 bauxite. Consequently, ABx named the REE exploration area "DEEP LEADS" so that new drillholes would continue to have the DL prefix. ABx has established a JORC-compliant REE resource of 89 million tonnes averaging 844 ppm (g/t) total rare earth oxides (TREO) that are highly enriched in Dy, Tb, Nd & Pr. More details are available on ABx's website: www.abxgroup.com.au

Ian's talk investigates how and why clay-hosted ionic REE formed in Tasmania and discusses how Australia could become a major producer of REE from its large mainland clay-hosted REE deposits.