

Development of Smart(er) Flowsheet for Beneficiating Rare Earth Minerals Bearing Heavy Mineral Sand Ores

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ABSTRACT

The industrial, economic, and political importance of rare earth elements continue to increase globally, since the set of these seventeen chemical elements are vital for many important electronic products and critical to support transition to green energy technologies. A common source of the rare earth elements includes the minerals monazite and xenotime, which are frequently found in detrital heavy mineral sand resources.

This paper presents the results of the mineralogical and metallurgical test work of two distinct REE-bearing heavy minerals sand ores originating from Australia. The diverse range of characteristics affects their amenability to beneficiation techniques and the impact of the unique properties of each ore type on the resultant beneficiation flowsheets developed considering these differences are examined.

In addition, whilst the metallurgical, operational, and economic advantages of using gravity spiral separators for beneficiating Heavy Mineral Sands, and therefore monazite and xenotime, are well recognized (Burt, 1999), smarter techniques are necessary for the continued success of mineral processing operations, due to the dwindling of easy-to-process ore sources and hazards associated with concentrating radioactive monazite. This paper will therefore concentrate on recent work completed to expand the applicable size ranges that can be successfully treated by gravity separators as well as explore the synergic advantages of utilizing other complementary wet processing techniques.