

The reprocessing of NORM residues from tin mining and smelting, to extract further valuable metal content of tantalum, niobium and tin, and to reduce waste

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Most tin is produced in China, Indonesia, Myanmar, Bolivia, and Peru. Tin is also produced in Brazil, Malaysia, Thailand, the DRC and Rwanda, and in these latter countries tin often co-occurs with tantalum and niobium, and small quantities of naturally occurring uranium and thorium in their crystal lattices, making these Naturally Occurring Radioactive Materials (NORM). The processing steps in the tin supply chain produce two types of residues, which can be re-exploited to extract further valuable elements.

The first type of residue arises from the basic physical processing in upgrading the mineral content in the ore, and has existed since the earliest days of tin mining, when what was considered waste material or gangue was simply disposed of and in some cases accumulated for over one hundred years. Improved separation techniques have encouraged the re-mining of these residues to extract and separate further valuable mineral content and reduce waste volumes.

A second type of residue is produced from tin smelting, a pyrometallurgical process that has a tin slag by-product. The slag includes nearly all the unwanted non-tin elements, including any valuable tantalum and niobium, as well as the thorium and uranium and their decay products. This tin slag may be reprocessed to extract the tantalum and niobium content, to produce a synthetic Ta-Nb concentrate and again reduce the quantity of waste.