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Investigation, characterisation, and evaluation of thorium deposits in South Africa

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In South Africa, one of the prime sources of thorium and rare earth's has been from the processing of monazite. This rare earth phosphate mineral occurs widely in the heavy mineral deposits around the coasts of South Africa due to its high specific gravity and resistant nature. Thorium resources in South Africa are mainly associated with 1) recent and palaeobeach placer deposits, which are Richard's Bay and Namakwa Sands (heavy mineral deposits); 2) vein deposits, are Steenkamskraal (Rare earth elements deposits); 3) alkaline complexes, are Zandkopsdrift Frontier (Rare earth elements deposit), Palaborwa (Copper, uranium & phosphate deposits), and Salpeterkop Complex; and Pilanesberg Complex. Thorium has not been extensively explored compared to other commodities.

Presently, due to renewed interest in REE and other critical materials, thorium resources are also being evaluated and reported in many projects. However, thorium geology and mineralogical associations are presently not widely studied. This is because there is no demand of thorium at the moment, and that future use of thorium as a nuclear fuel, even though viable, has a long way to go to be fully commercialised. But, with the increased interest shown by several countries in the development of Fast Breeder Reactors using thorium, it is expected that the demand will increase considerably in the near future. Considering that the demand for thorium is likely to increase by the turn of this century, it is necessary that more research on thorium should be done

A desktop study or literature review of all thorium hosting deposits has been conducted to establish both current and past research approaches to this problem and also to identify deposits that are far less studied in the past. Data collected during this desktop study indicate that more work still need to be done on several deposits. The Steenkamskraal monazite deposit is the only well studied thorium deposit in South Africa. Placer deposits and Alkaline complexes deposits were studied for either REE, heavy minerals or other minerals. Karoo Supergroup and Dominion Reef deposits are the top deposits with less data; other deposits are listed according to data availability on table 3. The research to be undertaken will focus on the main three aspects: 1) Mineralisation, 2) genetic models, and 3) ore characterisation for each deposit on all deposits with less information as shown in the table.

