

## **Geochemical mine waste characterization and revalorization of Palabora Igneous Complex**

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Waste rock dumps (WRDs) and tailings have always been a major economic and environmental concern for mining industry. In the Palabora Igneous Complex (PIC), South Africa, several mining projects have been operating and accumulating their wastes for the last 6 decades. The present study addresses, for the first time, the characterization of those WRDs and tailings going beyond the environmental risk assessment to their revalorization potential.

In order to characterize the wastes, sequential extractions, total digestion and four different leaching tests were carried out on 14 samples, including tailing composites and differentiable rock dumps (banded carbonatite, transgressive carbonatite, foshkorite, feldespatic pyroxenite, mica-pyroxenite and syenite) (more details in Díaz et al., in this issue).

Despite some discrepancies with feldespatic pyroxenite, all samples were classified as non-acid producing and according to standardized protocols, no further analysis was required for them. However, sequential extractions showed that pollutants such as sulphate, phosphate, Ba, Cr, Cu, Ni, Se and Hg might be released to the environment, through natural weathering of the WRDs and tailings, at concentrations above national and international thresholds (GNR 635, 2013; US EPA, 1998; EC Decision, 2003).

High concentration of critical raw materials (CRMs), such as rare earth, Y and Sc (REYSc) (up to 2320 mg/Kg; mean of 1220mg/Kg) indicate that PIC wastes are a feasible source of CRMs. The revalorization of those mine wastes could lead to their reprocessing for REYSc beneficiation, which would have a positive economic and environmental impact for Ba-Phalaborwa Municipality.