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Assessment of the impacts of mine tailings from a South African Gold Mine: An example from Blesbokspruit Conservation Trust, Springs, Ekurhuleni

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South Africa remains one of the world's leading mining countries, hosting remarkable reserves of chrome, gold, vanadium, manganese and Platinum group metals. Mining is one of the driving forces of the economy of South Africa, contributing significantly to the country's gross domestic product (GDP). However, the costs to the environment are not insignificant, which includes water, air and soil pollution, and generation of domestic and hazardous wastes associated with it.

Tailings are mineral waste streams derived from the concentration of ore bearing minerals. Johannesburg holds a vast majority of mine tailing sites which were created by the transportation of tailings in the form of slurry. There is little or no report on the environmental impacts of these tailings storage facilities from their time of creation till date. Over time, the water content of the tailings seeps deep into the ground while some portions are evaporated leaving fine sand particles. Since uranium is usually mined as a by-product of gold mining, it is often brought to the surface, thus causing pollution of air, water and soil due to the release of radon. Some of the fine dust particles from these tailings are blown as far as 20km on a windy day, to agricultural land in surrounding areas resulting in radiation exposures.

Results of the XRF analysis on soil samples (mine tailings) showed average values of major elements such as Na2O (0.18%), MgO (0.63%), $Al2O_3$ (6.51%), SiO_2 (81.83%), P2O5 (0.04%), SO_3 (3.40%), K2O (1.98%), CaO (0.45%), TiO_2 (0.51%), $Cr2O_3$ (0.17%), MnO (0.04%), $Fe2O_3$ (3.59%), NiO (0.04%), $As2O_3$ (0.02%), with Rb2O and SrO falling below 0.01%. There is a likelihood of heavy metal toxicity due to the presence of Titanium as a major component. In humans this could result in slight changes in the lungs. Dust inhalation may cause tightness and pain in chest, coughing, and difficulty in breathing. Contact with skin or eyes may cause irritation.

Key words: Health, Gold, Minerals, Mine tailings, Uranium