

Investigation of Uranium Migration on Gold Tailings Dams Using Natural Gamma Spectrometry

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Introduction

The geochemical nature of uranium allows for high mobility and transportation in oxidised gold tailings dams. This is a major environmental hazard and needs to be studied further for both the quantification and mitigation of potential pollution resulting from gold tailings dams. As the mobility of uranium is dependent on a number of environmental parameters including pH, eH, anions and cations, this study compares concentration relationships between individual radionuclides as an alternative to geochemical investigations in order to quantify and visualise the change in uranium concentration (mobility).

Discussion of Results

It was found that concentration data of radionuclides, measured using natural gamma spectrometry, could be used to quantify uranium migration as a ratio which is dependent on various factors, either measured or statistically inferred. This ratio was then used to construct geostatistical models indicating the movement of uranium within a gold tailings dam.

Geostatistical models can be used to locate pathways for the transport of mobilised uranium. These pathways can then be rehabilitated or transformed into receptors of uranium to prevent further environmental contamination.