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Radiometric Survey at A Heavy Mineral Separation plant near Koekenaap

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**Abstract content (Max 300 words)
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Operations at the West Coast open-pit mines and mineral separation plants include mining of heavy minerals to produce titanium dioxide feedstock, zircon, rutile and high purity iron products. These products are used in various applications which include the production of metals ceramics and foundries. Mine operations require a carefully structured environmental management and radiation monitoring processes. One of the devices used in these processes are hand held gamma-ray spectrometers and dose meters. These devices are used to monitor radiation levels in and around the plant as per requirements of the National Nuclear Regulator.

This study focuses on the comparison of activity concentration results obtained with the use of a hand-held gamma-ray detector (RS-230 BGO Super-SPEC) and a MEDUSA (Multi-Element Detector for Underwater Sediment Activity) system at a mineral separation plant. The RS-230RS-230 gamma-ray spectrometer and MEDUSA system comprises of bismuth germanate (BGO) crystal scintillator and a CsI scintillator, respectively. Both detectors can be linked to a GPS device for mapping radioactivity concentrations of ^{40}K , ^{232}Th and ^{238}U -series as function of position. Measurements were made on ten locations of which four were on the reject piles and one close to reject piles.

Preliminary results show a good correlation for uranium and thorium concentrations between the BGO and CsI, while the correlation was not clear on the potassium concentration.

References

Newman, R.T. et al. (2008). Determination of soil, sand and ore primordial radionuclide concentrations by full-spectrum analyses of high-purity germanium detector spectra. *Applied Radiation and Isotopes*, 66 (2008): 677–1066.

Hlatshwayo, I.N. 2007. In-situ gamma ray mapping of environmental radioactivity at iThemba labs and associated risk assessment. Unpublished Master's thesis. University of Zululand.

Dawid de Villiers. 2011. Characterisation of heavy mineral sands and soils by radiometry and its use in mineral beneficiation and agriculture. PhD thesis. Stellenbosch University.

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**Level for award
& (Hons, MSc,
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MSc

**Main supervisor (name and email)
and his / her institution**

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**Would you like to
 submit a short paper
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No

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