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Modelling of Radiological Risks from Gold Mine Tailings in Gauteng Province, South Africa

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**Abstract content (Max 300 words)-Formatting &-
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Mining is one of the major causes of elevation of Naturally Occurring Radionuclide Materials (NORMs) concentrations on the earth's surface. The aim of this study was to evaluate the human risk associated with exposure to NORMs in soils from mine tailings around a gold mine. A broad energy germanium detector was used to measure activity concentrations of these NORMs in 56 soil samples from 5 mine tailings. RESidual RADioactivity (RESRAD) OFFSITE modeling program (version 3.1) was then used to estimate the radiation doses and the cancer morbidity risk for a hypothetical resident scenario. The average activity concentrations in Bq.kg⁻¹ for Uranium-238 (238U), Thorium-232 (232Th), and Potassium-40 (40K) were found to be 785.3±13.7, 43.9±1.0 and 427.0±13.1, respectively. According to RESRAD prediction, the maximum Total Effective Dose Equivalent (TEDE) during 1,000 years was found to be 0.0315 mSv/yr at year 28, while the maximum total excess cancer morbidity risk for all the pathways was 5.76 × 10⁻⁵ at year 20. South Africa considers the individual cancer risk limit for members of the public to be 5 × 10⁻⁶. This means that total excess cancer morbidity risk was higher than the acceptable limit rendering gold mine tailings unsafe.

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 PhD, N/A)?**

PhD

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

Prof Manny Mathuthu, email: Manny.Mathuthu@nwu.ac.za, North West University (Mafikeng)

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Yes

Primary author: Mr KAMUNDA, Caspah (North West University (Mafikeng))

Co-authors: Prof. MATHUTHU, Manny (North West University (Mafikeng)); Dr MADHUKU, Morgan (iThemba LABS)

Presenter: Mr KAMUNDA, Caspah (North West University (Mafikeng))

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