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VIRTUAL EVENT

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Radiological Assessment of NORM in Tantalum Mining in Zimbabwe

In Zimbabwe, Regulatory control of radiation has mainly focused on radioactive sources. Since 2018, regulatory control has also been extended to the potential exposure to workers and members of the public from natural radionuclide's resulting from mining and mineral processing. A radiological assessment was undertaken to verify the potential risk due to the elevation of natural radionuclide's at a tantalum mine in Bikita, Masvingo Province that processes coltan-tantalite concentrate for export. Ambient dose rate assessments and activity concentration analysis for Uranium-Thorium series radionuclides and 40K using gamma spectrometry was undertaken through out the production process from ore stockpiles, crushing, screening and washing, gravitational and magnetic separation, drying, packaging, storage and loading of ore concentrate for transport. Processing and separation of tantalum ore was found to be associated with elevated levels of uranium radionuclides that require protective actions. Surface ambient dose rates varied from 0.3 μ Sv/h in ore screening and washing, 1.8 μ Sv/h in separation plant, 3.8 μ Sv/h for the wet concentrate, a high dose rate of 19.6 μ Sv/h in ISO container and vault housing coltan drums ready for transport. Activity concentrations for 238U, 232Th and 40K were low in ores with an average of 53.24 \pm 1.09, 23.21 \pm 0.45 and 625.23 \pm 57.08 Bqkg⁻¹ respectively and high of 25 653.24 \pm 1343.09, 23.21 \pm 0.45 238U and 232Th for coltan concentrate. The average value for the effective dose to workers due to activity concentrations in the soil for the study site of 0.973mSv/y is greater than the world average of 0.07mSv/y, it is however lower than the recommended limit of 1mSv/y. Radiation protection measures were recommended and are discussed.

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