

Abstract:

A radiological survey and assessment was carried out at selected sites (Osiri, Mikei, Masara and Macalder) in the Migori gold mines of southern Nyanza, Kenya to determine the levels of exposure of the artisanal miners to the naturally occurring radioactive materials (NORM) and dust. The activity concentrations of ^{40}K and the decay products of ^{232}Th and ^{226}Ra were obtained using an innovative method in single channel NaI(Tl) gamma-ray spectrometry. The counts for both the sample and the reference material in a specific window for a particular radionuclide were compared to arrive at the activity concentration of the radionuclide in the sample. Measurement of dust loading at various crushing sites was carried out by trapping the dust particles on a $0.45\ \mu\text{m}$ cellulose acetate filter paper (47 mm diameter) using a vacuum pump. The activity concentration levels range widely 80–413, 12–145 and 21–258 Bq/kg for ^{40}K , ^{232}Th and ^{226}Ra , respectively. The calculated absorbed dose in air range from 16 to 178 nGy/h (with a mean of 42 nGy/h). Dust loading was found to range from 1.3 to 3.7 mg/m³. Although the activity concentration of the radionuclides and the calculated annual absorbed dose is below the world's average, the dust level at the mines was relatively high. The results obtained show that the artisanal miners are exposed to various levels of radionuclides and dust and necessary precautions need to be taken.