Measurement of Natural Radioactivity and Health Hazard Index Evaluation in Major Soils of Tin Mining Areas of Perak

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Abstract : Natural radionuclides in the environment can significantly contribute to human exposure to ionizing radiation. The knowledge of their levels in an environment can help the radiological protection agencies in policymaking. Measurement of natural radioactivity in major soils in the tin mining state of Perak Malaysia has been conducted using an HPGe detector. Seventy (70) soil samples were collected at widely distributed locations in the state. Six major soil types were sampled, and thirteen districts around the state were covered. The following were the results of the 226Ra (238U), 228Ra (232Th), and 40K activity in the soil samples: 226Ra (238U) has a mean activity concentration of 191.83 Bq kg⁻¹, more than five times the UNSCEAR reference limits of 35 Bq kg⁻¹. The mean activity concentration of 228Ra (232Th) with a value of 232.41 Bq kg⁻¹ is over seven times the UNSCEAR reference values of 30 Bq kg⁻¹. The average concentration of 40K activity was 275.24 Bq kg⁻¹, which was less than the UNSCEAR reference limit of 400 Bq Kg⁻¹. The range of external hazards index (H_{ex}) values was from 1.03 to 2.05, while the internal hazards index (Hin) was from 1.48 to 3.08. The Hex and Hin should be less than one for minimal external and internal radiation threats as well as secure use of soil material for building construction. The H_{ex} and Hin results generally indicate that while using the soil types and their derivatives as building materials in the study area, care must be taken.

Keywords : activity concentration, hazard index, soil samples, tin mining

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