

## 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  $^{226}\text{Ra}$  ( $^{238}\text{U}$ ),  $^{228}\text{Ra}$  ( $^{232}\text{Th}$ ), and  $^{40}\text{K}$  activity in the soil samples:  $^{226}\text{Ra}$  ( $^{238}\text{U}$ ) has a mean activity concentration of  $191.83 \text{ Bq kg}^{-1}$ , more than five times the UNSCEAR reference limits of  $35 \text{ Bq kg}^{-1}$ . The mean activity concentration of  $^{228}\text{Ra}$  ( $^{232}\text{Th}$ ) with a value of  $232.41 \text{ Bq kg}^{-1}$  is over seven times the UNSCEAR reference values of  $30 \text{ Bq kg}^{-1}$ . The average concentration of  $^{40}\text{K}$  activity was  $275.24 \text{ Bq kg}^{-1}$ , which was less than the UNSCEAR reference limit of  $400 \text{ Bq kg}^{-1}$ . The range of external hazards index ( $H_{\text{ex}}$ ) values was from 1.03 to 2.05, while the internal hazards index ( $H_{\text{in}}$ ) was from 1.48 to 3.08. The  $H_{\text{ex}}$  and  $H_{\text{in}}$  should be less than one for minimal external and internal radiation threats as well as secure use of soil material for building construction. The  $H_{\text{ex}}$  and  $H_{\text{in}}$  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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