

Measurement of Specific Activity of Natural Radionuclides (^{40}K , ^{226}Ra and ^{232}Th), Radiological Hazard Assessment and Radioactive Contour Maps in Surface Soil Samples Collected from Trang Province, Thailand

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Abstract

The specific activities of natural radionuclides (^{40}K , ^{226}Ra and ^{232}Th) in 88 surface soil samples collected from 10 districts in Trang provinces in the southern region of Thailand were measured and determined. Experimental results were obtained by using a high-purity germanium (HPGe) detector and gamma spectrometry analysis system. The KCL, IAEA/RGU-1 and IAEA/RGTh-1 radioactive standard sources were used to analyze the concentration of ^{40}K , ^{226}Ra and ^{232}Th in all samples. It was found that the specific activities of ^{40}K , ^{226}Ra and ^{232}Th ranged from 58.23–1425.73, 16.35 – 889.99 and 4.82 – 298.18 Bq/kg with mean values of 382.75 ± 23.45 , 69.86 ± 3.26 and 79.22 ± 4.36 Bq/kg, respectively. Furthermore, four radiological hazard indices which are gamma absorbed dose rate (D) radium equivalent activity (Ra_{eq}), external hazard index (H_{ex}), and annual effective dose rate (AED_{out}) in the area under consideration were also studied and calculated. The average values of D, Ra_{eq} , H_{ex} and AED_{out} were equal to 97.28 ± 5.19 nGy/h, 212.35 ± 11.30 Bq/kg, 0.57 ± 0.03 and 0.12 ± 0.01 mSv/y, respectively. The results were also compared with the Office of Atoms for Peace (OAP) annual report data, Thailand and global radioactivity measurement and evaluations. Moreover, the result can be used to create the radioactive contour maps of the investigated area.

Keywords: specific activity, natural radionuclide, high-purity germanium (HPGe) detector, radiological hazard index, radioactive contour map