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Natural Radioactivity and its Hazards of Infracambrian Rocks at Jabal Sanam Structure, Southern Iraq

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Abstract

The Jabal Sanam, a piercement salt plug, represents a unique geological phenomenon in southern Iraq. It is a remarkable geological landmark that rises about 141 m above sea level and covers approximately 2 km², surrounded by flat areas on all sides. A radiological survey was conducted on the Jabal Sanam structure to determine the natural radioactivity levels and related radiation hazard indices. Eleven different rock types from several locations at Jabal Sanam were collected. An optical microscope and X-ray diffraction (XRD) were used to examine and identify the variable rock types in this structure. Natural radioactivity using field and laboratory equipment for these rocks was measured. The findings indicated that the average activity concentrations of the ²²⁶Ra, ²³²Th, and ⁴⁰K radionuclides of the Jabal Sanam rocks are 6.5 Bq kg⁻¹, below the minimum detectable activity (MDA), and 83.3 Bq kg⁻¹, respectively. The average radium equivalent (Raeq) activity value of the investigated rocks is 12.87 Bq kg⁻¹, below the world recommended rate of 370 Bq kg⁻¹. Moreover, the average absorbed dose rate (D_r) is 6.51 nGy h⁻¹, less than 60 nGy h⁻¹. Furthermore, the average values of the external (H_{ex}) and internal (H_{in}) hazard indices are 0.035 and 0.052, respectively, which are also lower than the allowed limit value of 1.0 set by the international agencies. Overall, the findings of this investigation conclude that Jabal Sanam rocks do not have a radioactive health hazard.

Keywords: Natural radioactivity, radiation hazard, Infracambrian rocks, Jabal Sanam, Iraq.

تقييم مستويات النشاط الإشعاعي الطبيعي ومعايير المخاطر الإشعاعية لصخور تركيب جبل سنام ذات
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