

البحث الثامن (8)

Title: “Behavior of uranium series in groundwater of Wajid Formation, Wadi AdDawasir, Saudi Arabia”

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المخلص باللغة الإنجليزية

The inventories and the possible mechanisms behind the relative deficiency of both radium and uranium release processes within an elevated gamma anomalous rock were investigated. A field survey was performed on the highest radioactive anomalous zone that was recorded at Jabal Al Alam (20° 13' 10.06" N and 44° 14' 32.13"), with the ferruginous sandstone, iron oxide band, and iron concretions (with uranium content and reaching up to 1500 ppm). The chemical analyses and the laboratory's gamma-ray spectrometric measurements demonstrated high uranium levels in the analyzed rock samples of the Wajid Sandstone (up to 1000 ppm). The borehole geophysical logs further confirmed that the radioactive anomalies are attributed to the sandstone sequence of the Wajid Formation that is often found associated with elevated concentrations of uranium. The groundwater samples taken from the wells tapping the Wajid aquifer showed uranium concentrations ranging from 0.01 to 5.5 ppb ($\mu\text{g/L}$). The average ^{226}Ra in groundwater samples was 0.2 Bq L^{-1} . The majority of the ^{226}Ra and ^{228}Ra activities were below the lower limit of detection (LLD). The radiochemical analyses of water samples from the Wajid aquifer display low concentrations of both uranium and ^{226}Ra , with relation to uranium content in host rocks. This was attributed to the fact that uranium is susceptible to form iron oxide complexes, causing them to precipitate in a more stable form. Furthermore, iron oxides coat the sand grains of the

Wajid Formation and accordingly might act as a foundation for re-adsorption for both uranium and radium, resulting in their relative deficiency in the surrounding water. The coating might also act as a physical barrier resulting in hindrance of the recoil nuclei due to its significant thickness (several orders of magnitude) compared with that of the average (120 nm) whole alpha-recoil track (ART). The coating layer thickness was determined via scanning electron microscopy (SEM) and was found to be up to 180 μm .