



Contribution ID: 219

Type: **Poster**

Uranium in ground water samples from Anthemountas Basin, Northern Greece

Wednesday, 19 September 2012 18:00 (1h 50m)

The activity concentrations of ^{238}U and ^{234}U have been determined in groundwater samples of deep wells in Anthemountas river basin, Northern Greece. The analysis was performed by alpha spectroscopy after pre-concentration and separation of uranium by cation exchange and finally its electro-deposition on stainless steel discs. Analysis by gamma spectroscopy was also performed. The uranium concentrations in the region of study and during winter period varied strongly between 9 and 42.6 ppb. These variations in concentrations of uranium are correlated with the different geological formations and water flow paths in the study area. In the case of Anthemountas river basin the available data revealed a very complex system of aquifers with significant extent in both lateral and vertical sense. The study area is covered with sediments deposits consisting of: i) Valley deposits: sandy clay, ii) Lower terrace system: gravels and sand under a clayey cover, iii) Upper terrace system: grits and pebbles with loam or sandy clay, iv) Fans of different age, v) Red clay series: red to brick red, silty clays with mica and calcareous concretionary bodies, while the area to the north and south are covered by vi) Limestones recrystallised, Granodiorite, viii) Gabbro and ix) Dunites and peridotites. The hydrogeology varies significantly for the area of interest due to the anisotropy of the sediments of the basin. Their behaviour is driven mainly by their primary porosity and the secondary porosity caused from the faulting tectonics making it easier for water flow in certain areas. From the radiological point of view, using ground waters for human consumption would result in significantly increased radiation doses and their utilization for irrigation purposes would imply an excessive radiation exposure to population, in cases of high uranium concentrations.

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Session Classification: Poster Session

Track Classification: Radioactive elements in the environment, radiation archeometry and Health Physics