Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04920, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04920
EGU General Assembly 2008

Epithermal Neutron Activation Analysis and Radiometric Investigation of Slanic Prahova (Romania) salt mine evaporites

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Epithermal Neutrons Activation Analysis (ENAA) performed at the Joint Institute of Nuclear Researchs – Dubna (Russia) and Natural Radionuclides Gamma-ray Spectroscopy (NRGrS) performed at the National Institute of Research and Development for Physics and Nuclear Engineering – Bucharest (Romania) were used to investigate more samples of pure halite and interbedding sediments collected in the vicinity of the Ultra-Low Background Radiation Laboratory (ULBRL) located in the Slanic Prahova (Romania) salt mine.

Halite samples showed a remarkable purity, ENAA irrespective of its ppm accuracy could evidence, excepting sodium chloride, the presence of only few trace elements such as Ca (21.9 g/kg), Fe (0.33 g/kg), Ti (2.26 g/kg), Al (0.15 g/kg), V (14.9 mg/kg), Mn (61.7 mg/kg), Cu (7.79 mg/kg), Br (1.26 mg/kg) and U (3.53 g/kg). No traces of potassium could be detected.

At the same time, interbedding sediments material whose average concentration, as impurities by respect to salt, is about 1.16 % showed a multielemental composition very close to those of the Upper Continental Crust (UCC), but slightly enriched in Cr, Ni, As and W and a little depleted in V, Cu, Sr, Zr, Ba and Th by respect to it.

Radiometric determinations of ^{40}K, ^{226}Ra (descending from ^{238}U) and ^{228}Ra (descending from ^{232}Th) were in concordance with the previous ENAA analysis.

In this way, both ENAA and NRGrS were in good agreement with previous global radioactivity measurements that showed a global reduction of the absorbed dose within the ULBRL of about 75 times by respect to surface conditions.