Preliminary study of geogenic arsenic in thermal waters of Northern Calabria (Italy)

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As is one of the most dangerous inorganic pollutants for the environment and human health [1]. The release of arsenic from geothermal systems into surface and groundwater can compromises the use of these waters as drinking water resources. In this regard, the thermal springs of Northern Calabria were investigated and this study show the data on the distribution of As in a significant number of springs and wells. The thermal waters analyzed, show different chemical composition due to the interaction of meteoric waters with a distinct types of rocks and different time of water-rock interaction.

Results show that significant As concentration with range of 1.8 to 40.4 µg/l occur in thermal fluids of the study area. Six of the samples from hot springs exceed the WHO drinking water guideline for As (10 µg/l) [2]. Most reservoir fluids are undersaturated with respect to arsenopyrite and other arsenic minerals therefore the concentration of As in this thermal fluids may depends on leaching of As-minerals at depth and on subsequent hydro-chemical evolution of water chemistry along its pathway up to the surface. Data show that the As concentration tends to be increased with increasing of water outlet temperature. Increasing temperature will lead to increasing of rock dissolution and leaching As from host rock in the fluid. However, totally As concentration in studied thermal waters is almost in range or rather lower than levels reported in geothermal waters from other parts of the world.

Mixing of thermal waters with cold water can increase the As concentration in the cold water due to flooding during rain season, therefore monitoring of river water is recommended.

[1] Smedley P. L., and Kinniburgh, D. G. (2002) A Review of the Source, Behaviour and Distribution of Arsenic in Natural Waters. Appl. Geochem., 17, 517-568.

[2] WHO (1993) Guidelines for drinking-water quality, Volume 1: Recommendations, 2nd ed. World Health Organization, Geneva