Sampling technology of deep groundwater with Diffusive Gradient in Thin Film (DGT)

L. ALAKANGAS[1]*, M. ÅSTRÖM[2] AND B. KALINOWSKI[3]

[1]Swedish Nuclear Fuel and Waste Management Co, Box 929, SE-57229 Oskarshamn, Sweden (linda.alakangas@skb.se)
[2]Geochemistry Research Group, Linnaeus Univ., SE-39182 Kalmar, Sweden
[3]Swedish Nuclear Fuel and Waste Management Co, Box 250, SE-10124 Stockholm, Sweden

The Äspö Hard Rock Laboratory (HRL), SE Sweden, is a unique underground facility where the Swedish concept for storage of nuclear fuel waste is tested at natural repository conditions [1]. It also offers an environment for researchers interested in conducting experiments as well as testing equipment in situ at the deep subsurface.

In order to obtain as little disturbance of the sample as possible during sampling, a special designed container where the conditions in the bedrock is mimicked has been developed to be able to collect deep groundwater maintaining the pressure and the reduced state in cored boreholes. This is crucial for pH which is one of the main parameters in reaction modelling, but also for volatile species and redox sensitive elements.

In addition, the container makes it possible to sample trace elements by the new in-situ technique called Diffusive Gradients in Thin films (DGT) [2]. In the deep groundwaters at the Swedish canditate sites most trace elements such as lanthanides and actinides generally occur at concentrations below the detection limit using standard sampling methods. The DGT technique makes it possible to determine dissolved labile trace elements in-situ by trapping species in binding agents for a longer period of time, accumulating the trace elements. The container in which the DGT samplers are established is constructed in stainless steel and can maintain a high pressure of 50 bar. The PEEK material inside prevents the water to have contact with the metal. During the sampling period a constant agiation and flow through the container will be regulated.

The outcome will contribute to a better understanding the trace metal dynamics in deep groundwaters. Measurements of sensitive parameters at in situ conditions will increase the quality of the hydrogeochemical models that will be used in the safety assessment for the final respository.

[1] SKB (2009) Annual Report 2009. SKB TR-10-10 [2] Garmo *et al* (2006) *Environ Sci. Technol.* **40**: 4754-4760

Distribution of potentially toxic elements around Dolly Au-Cu Mine, Central Iran

FATEMEH ALAVI TABAEE[1], DR SOROUSH MODABBERI[2] AND DR HOOSHANG ASADI HAROONI[3]

[1]School of Geology, University of Tehran, Enghelab St. Tehran, Iran, (n.alavi63@yahoo.com)
[2]School of Geology, University of Tehran,,Enghelab St. Tehran, Iran, (modabberi@ut.ac.ir)
[3]School of Mining Engineering, Technical University of Isfahan, (hooshang_asadi@yahoo.com)

"Dolly Deposit" is the first porphyry Au-Cu deposit recognized in the Urmia-Dokhtar volcanic arc of Iran with an extent of about 9 km^2 in 40 km northwest of Delijan city in Central Iran.

Mineralization in the Dolly region is associated with a set of altered porphyry Quartzdiorite stocks and dikes intruded within a fault zone of 1-2km width at the center of a stratovolcano consisting of andesite lava and pyroclastics. Intrusive and locally volcanic rocks have been altered to potassic, fillic, argilic, propylitic and silica alteration assemblages by hydrothermal solutions. It is estimated that approximately 10 percent of Dolly deposit has an oxide and 90 percent sulfide ore mineralogy.

Copper ores are composed of chalcopyrite, bornite, chalcosite and malachite.

In order to study trace element distribution around the Dolly deposit from en environmental point of view, soil and rock samples have been taken from the areas affected by mineralization.

Concentration of As, Sb and Bi show higher values than the mean standard values, i.e. 7.2-328 ppm for As, 1.7-160 ppm for Sb, and 0.5-13.9 ppm for Bi.

Calculation of enrichment factor and also geoaccumulation index indicate that the area is naturally contaminated with these elements, for some parts it is considered to be highly contaminated requiring remediation. Noting that the deposit is supposed to be extracted in the coming years it is suggested that geochemical environmental considerations should be considered in order to delineate or restrict the contamination. On the other hand, the data obtained is a valuable piece of information from forensic geochemical views against or for possible future claims.