

U-bearing quartz veins and related waters from Mondego Sul mine (Central Portugal)

C.A.F. ALMEIDA^{1,3}, A.M.R. NEIVA^{1,3}
AND I.M.H.R. ANTUNES^{2,3}

¹Department of Earth Sciences, University of Coimbra, Portugal (ca.almeida3@hotmail.com)

²Polytechnic Institute of Castelo Branco, Portugal.

³Center of Geosciences, University of Coimbra, Portugal.

About 61 uranium mine were exploited in central Portugal in the past. The Mondego Sul open pit mine is located in the Mondego river and produced about 75 t of uranium oxide (U₃O₈) between 1987 and 1991.

At Mondego Sul area, the Variscan coarse- to very coarse-grained porphyritic biotite granite intruded the Cambrian schist-metagraywacke complex, which consists of alternating phyllites and metagraywackes with marble intercalations. The uranium deposit consists of brecciated U-bearing quartz veins which intersect phyllites and are 400 m away from the granite. The U-bearing quartz veins fill faults showing N40-50°W alignment and are subparallel to phyllite cleavage and granite-country rock contact. The uranium mineralization occurs mainly in the interception of this fault system with late N-S faults, but is also disseminated in phyllite. The U-bearing quartz veins contain the U-bearing phases zircon, monazite and xenotime, which occur as inclusions in quartz, muscovite and chlorite. The U-bearing quartz veins also contain the secondary U-phosphates autunite, torbernite, saleeite and uranocircite surrounding Fe oxides-hydroxides along microfractures in several minerals. Pyrite has fractures filled by Fe oxides-hydroxides.

Autunite and torbernite were exploited at the Mondego Sul mine. Tailings and rejected materials (400000 t) were deposited on ground and form three dumps. There has not been any significant development in the area. A lake was formed in the open pit. Ten sampling points were selected, 4 in the pit lake and 6 in the Aguieira dam. Waters from the pit lake are acid (pH = 4.5), have the highest electrical conductivity value (240 µs/cm) and the highest contents of U (131 ppm), SO₄²⁻ (113 ppm) and Mn (0.2 ppm). These waters are of magnesian-sulphated type, whereas waters from Aguieira dam are of mixed type. The abandoned mine is about 10 m away from the reservoir of Aguieira dam. The acid water from the pit lake and dumps flows directly to this reservoir.