KEY ELEMENTS IN THE USE OF IN-SITU RECOVERY TECHNOLOGY FOR DEEP AND COMPLEX ORE DEPOSITS

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The in-situ recovery (ISR) method involves injection and producer wells between which a leach solution circulates and recovers the targeted commodity directly within the ore body. Pregnant solution is then brougth back to the surface, hydrometallurgically processed and renewed into fresh leach solution. This process is already well known in the uranium production (Beverley, Honeymoon (Aus), Nine Mile Lake (US), Tortkuduk (Kaz), etc.) and represents 51% of the total uranium production in 2014 [1].

The feasability study of an extension of ISR to other commodities is an aim of the European H2020 BioMOre project. BioMOre current case study is the copper deposit of Rudna, Poland, where bacteria are used for the regeneration of the ferric-acid leach solution. In this contribution, we highligth the importance of the ore characterization and how it affects the whole process of ISR and its feasability.

The ore characterization lies on a qualitative and quantitative mineralogical description, a petrographical study as well as a petrophysical assesment. In the Rudna test site, the ore contains copper-bearing sulfides but also halite, carbonates and copper-bearing chloride-hydroxide. This mineralogy impacts the leaching on different points. Firstly, halite has to be removed to get a bio-compatible environment as well as carbonates for pH buffer issues. Finally, the nature of copper-bearing minerals directly impacts the kinetic of copper recovery. Petrophysical and petrographical properties are also needed to correctly model the leaching process.

The extension of the in-situ recovery study area to other commodities, especially to critical commodities for European supplies (Mo, Sn, REE, PGE, etc.), is also stongly dependant on the deposit mineralogy. The European ProMine database is used to select potential ISL-compatible deposits, according to their geological context and mineral assemblage.

[1] Seredkin *et al.* (2015) Ore Geology Reviews 79, 500-514.