Experience of Mine Water Quality Evolution at Abandoned Uranium Mines in Germany and the Czech Republic

Michael Paul[1], Nada Rapantova[2], Jiri Wlosok[3], Monika Licbinska[2], Ulf Jenk[1], Jürgen Meyer[1]

[1]Wismut GmbH, Jagdschänkenstraße 29, 09117 Chemnitz, Germany, M.Paul@wismut.de
[2]VSB – Technical University of Ostrava, 17. listopadu 15, 708 33 Ostrava - Poruba, Czech Republic, nada.rapantova@vsb.cz
[3]DIAMO s.p, , Máchova 201, 471 27 Stráž pod Ralskem, Czech Republic, wlosok@diamo.cz

Extended Abstract

From 1945 to the mid 1990's uranium mining was an important branch both in Germany and the Czech Republic. However, a marked phase-out of the industry in the 1990's led to the closure of all underground uranium mines except of Rozna in the Czech Republic. Recently, uranium mines were decommissioned by natural flooding and mine waters are either kept below their decant point by pumping (and water treatment) or the flooded mines have been abandoned with natural mine water discharges.

Wismut (Germany) and DIAMO (Czech Republic) are in charge of remediation and aftercare activities and regularly monitor the quality of the uranium mine waters.

The study presents analyses and the comparison of the experience from long-term mine water monitoring, being performed by WISMUT and DIAMO, in relation to the time since mine closure has commenced as well as the geological and mining conditions.

Principal component analysis and geochemical modeling represent the tools being used for the analyses performed. Similar study has been recently done by Rapantova et al. [1] only for Czech deposits. The paper will describe the validation of results on the common data set of Czech and German uranium mine water discharges. The mine water quality changes with a focus on uranium mobility will be described from recently dewatered mines to shafts with water level maintained in order to prevent outflows to surface water and finally to stagnating shafts and discharges of mine water from old adits. The results are in good agreement with published experience on mine water stratification, its disturbance by pumping or natural water decant and the "first flush" phenomenon after mine flooding.

Studying the natural processes that take place in mine waters of flooded deep mines is very difficult due to the inaccessibility of remote parts after flooding. However, predictions on the rate of the gradual decrease of pollution depending on the complexity of flow dynamics and natural attenuation processes are valuable for planning of remediation and aftercare measures. Although these processes are very complex and site-specific, comparison and analyses of acquired data from German and Czech uranium mines give a chance to improve the general understanding of the physicochemical processes that occur after mine closure.

Key words: uranium, mine water, abandoned mines, PCA

References

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