

Post Mining Environmental Management within an International Pluralist Expertise Group
– Focus on the Hydrogeology of the Bellezane Site (Limousin, France)

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In the year 2006, the French safety authority board has created a pluralist expert group (GEP) that allow experts, stake holders, government representatives, to improve the environment protection within the process of uranium mines closure and rehabilitation operations such as on the Bellezane site, still through the responsibility of the former operator.

Bellezane is one of the 24 sites in the Limousin region where exploitation ended in the 90's. The site is composed of underground mine workings and open pits partially filled with mine tailings. Due to water circulation, it constitutes a potential source of radioactive contamination to the environment. According to the regulation rules, site waters must be collected, and when necessary treated, before being released into the environment.

Because of the industrial design and the geometry of the site, the collected waters can result from the leaching of extracted barren rocks disseminated at surface; and others from the leaching of mine tailings and are collected through the network of underground galleries. One of the challenges is to ensure that the whole water entering the system is well controlled and, secondary, to check the water collection efficiency.

A special attention has to be paid to the water flowing through the mine tailings, and the connected underground galleries. This water, which is naturally collected by gravity, represents the main part of the total water budget and assumption is made that the

galleries are the unique groundwater outflow. However, in this geological context consisting of fractured granite containing lamprophyre dykes, short-circuits cannot be excluded, which might generate leakage of water escaping to control by identified outlets. Unfortunately for the demonstration, fortunately for the environment, this leakage might be so small that there is no chance to characterize it by the mean of observations neither in the surrounded fractures nor in the river system at surface. That natural leakage has been estimated, using simple models, to a few percent of the total budget.

The demonstration of the system efficiency has been proposed by the operator arguing that the discharge effect by the network of galleries is sufficient to drain all the granite massif water. But, there are no evidences of the total efficiency that can be based on a set of hydrogeological data showing clearly how the system works. For instance, there are no data available on the water head, neither into the galleries nor into the mine tailing and the origin of the collected water is not well known.

In order to improve the understanding, some additional characterizations have been decided through a panel of experts and stake holders (GEP). The first action consists of realizing additional piezometers through the mine tailings, to better define their inside hydraulic head and the boundary conditions. The second consists in using some old technical boreholes fortunately recovered during the expert group investigations. This will be associated with the characterization of the chemistry of various waters and solid phases to better understand the groundwater circuits and to help estimating the water budget.