

An example of Integrated Safety Operation Management in the Pontgibaud Lead-Silver former Mine district (France)

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Abstract

The Pontgibaud lead-silver mining district, which was one of the largest in Europe, has been mined extensively since ancient times but especially during the second half of 19th century, in three mines that were legally abandoned in 1939. The mines were located on quartz veins mineralized in silver-bearing galena and hosted by gneissic rocks (They produced 50,000 tons of lead metal and 100 tons of silver). Almost 60 open accesses, hazardous shafts and galleries remain a century after the mines were closed. These sites were inventoried in 2005 as part of post-mining activity so that suitable safety measures that would not harm protected fauna could be proposed.

In addition, four ore beneficiation plants were associated with these sites and fed the large Pontgibaud foundry with 90% lead enriched concentrates. Tailings were also produced by the beneficiation plants. These beneficiation plants also generated as much tailings disposals through the following operations: milling-grinding, washing, gravimetric separation and decantation of fines. The total volume was about 300,000 m³. Tailings disposals impact the surface water owing to high concentrations of lead, arsenic, cadmium, and zinc. Absence of organic substances, high slopes of disposals and residual contaminants hampered vegetation from re-growing for more than a century. Now the deposits are highly eroded from run-off, gully erosion and wind. This greatly impacts waterways (the Sioule River) and surrounding land.

All these sites are located in Auvergne, a very touristic region with a remarkable faunistic interest. As a consequence, an environmental impact assessment had to be performed in order to integrate recommendations into the site safety engineering rehabilitation program.

The work consisted essentially in backfilling 20 unsafe shafts and closing the entry of almost 40 remaining adits or crosscuts with concrete plugs allowing bats to pass.

Regarding tailings disposals, safety work was designed to limit the impact on water and soil with:

- Tailings heaps reshaping;*
- Grass-seeded earth covering in view of stabilizing the new facility while respecting the local landscape;*
- managing surface water with a peripheral drain to limit transport during heavy rains.*

The first disposal site has been rehabilitated in 2014; remodeling work on the other sites has been planned for 2015-2016. The rehabilitation programme for the whole district is likely to last more than 10 years.