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Retreatment of metallic tailings: a review and a technico-economic case study

In the context of a circular economy, contents of metals and matter in mining residues are pinpoint to recover value from secondary resources and, at the same time manage environmental issues. Numerous case studies of the reprocessing of stockpiles and mining wastes from metal mines all over the world demonstrate the possibility to extract metals of interest, to rehabilitate sites and still keeping the operation economically profitable.

There are currently large tailings reprocessing operations outside Europe, including gold and copper mining (Australia, South Africa, Chile). In Uganda cobalt was produced for more than 10 years from an old pyritic tailings which generates acid mine drainage. Some industrial operations are very large-scale with significant tonnages of residues, ranging from several million tons to several hundred million tons, or even billions of tons to treat. Added value is high, especially for gold, since investments are lower than for traditional mine operations. Environmental problems often associated with the waste storage on more or less old exploitations are taken into consideration to reduce global impacts.

In Europe, in relation to the mining past, many countries have historic tailings deposits (that can be seen as a stock of secondary material); residues are also produced annually (flows) in some EU-28 countries. Reprocessing experiences are much more limited than in the world and are related to smaller sites, fairly scattered stocks and lower economic value. However, projects are emerging, sometimes in connection with European research funding.

Following a pilot operation of retreatment of Pb/Ag tailings (4t) the results of a technico-economic study is also proposed to discuss the issue of retreatment compare to standard rehabilitation.