

Bioleaching pond technology upscaling for the reprocessing of a sulfidic polymetallic mining residue

Douglas Pino-Herrera^{1*}, Agathe Hubau¹, Catherine Joulian¹, Anne-Gwenaëlle Guezennec¹

¹ *Water, Environment, Process Development and Analysis Division, BRGM, Orleans, France*

*Corresponding author(s): d.pinoherrera@brgm.fr (D. Pino-Herrera)

Summary

A new concept of a bioleaching reactor - the bioleaching pond – was recently developed by BRGM. It will allow applying the bioleaching process on primary or secondary ores and mining residues, with a lower CAPEX than a classical bioleaching reactor and more efficiently than heap bioleaching. Pulp suspension and gas-liquid mass transfer are achieved in the pond using floating agitators^[1]. In the frame of H2020 NEMO project^[2], the technology upscaling was studied from lab to pilot scale on a complex secondary material provided by Sotkamo mine (Finland)^[3]. Lab-scale experiments were performed to select a microbial consortium, to study the leaching mechanisms and to select the operating parameters^[4]. A 114-L continuous pilot was run to study the effect of the residence time and the increase in pulp density on the microbial activity. Finally, a 1.8-m³ pilot reactor was used to test the concept of the floating agitator, particularly in terms of hydrodynamics. Results showed that the bioleaching process was successfully scaled up at TRL 6-7 maintaining high metal recovery yields and satisfactory kinetics despite some technical issues regarding the application of the floating agitator. These results were used to feed a CFD model and to design a full-scale industrial reactor.

Keywords: Bioleaching pond, floating agitator, upscaling, innovative bioleaching, residue reprocessing.

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