Rare earth elements release potential from waste rocks of the Montviel carbonatite deposit

B. PLANTE[1*], M. EDAHBI[1], M. BENZAAZOUA[1], M. PELLETIER[2]

[1]Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, J9X 5E4, Canada (*correspondence : benoit.plante@uqat.ca)

[2]GeoMegA Resources, Boucherville, J4B 6Y4, Canada

Background and objective

Many carbonatite deposits show great potential for rare earth elements (REE) exploitation, as is the case for the Montviel project (Geomega Resources, Québec, Canada). However, there currently is limited data available about the geochemical behaviour of REE-bearing mine wastes and their mine drainage contamination potential. A research program was set up in partnership with Geomega Resources in order to investigate the REE release potential in mine drainage water from the future waste rocks of the Montviel project. This presentation will provide an overview of the main findings of this study.

Results and discussion

Representative samples from the main lithologies of the deposit were sampled from drill cores. The main REE-bearing phases identified are carbonates, fluorocarbonates, and Ba-Sr-carbonates, in addition to phosphates, in accordance with findings from a previous study [1]. In addition, the leaching potential of the materials was investigated using humidity cell tests in the laboratory [2] and barrel tests in the field. The leachate pH stabilizes around near-neutral values () for all materials at all scales. Results show that the REE and other associated elements (such as Ca, Ba, Sr, F) are released in the leachates partially in response to the oxidation of the trace sulphides found in the Montviel deposit. The REE concentrations in the leachates are controlled by secondary precipitation and sorption phenomena [2, 3]. The geochemical behavior of the Montviel materials show a significant scale effect, as the REE release rates are 3 to 4 orders of magnitude higher in field barrel tests than in humidity cell tests in the laboratory. Future studies should focus on REE mine waste management scenarios to minimize the environmental impacts of REE mining.

[1] Nadeau *et al.* (2015) Ore Geology Reviews **67**, 314-335. [2] Edahbi et al. (2018a) Environ. Sci. Pollut. Res., in press, DOI: 10.1007/s11356-018-1309-7. [3] Edahbi *et al.* (2018b) Chemosphere **199**, 647-654. [4]