

## **Reuse and value recovery potential of mine drainage treatment residuals**

CARMEN M. NECULITA<sup>1</sup>, LUCIE COUDERT<sup>1</sup>

<sup>1</sup>Research Institute on Mines and Environment (RIME),  
University of Quebec in Abitibi-Temiscamingue (UQAT),  
445, Boul. Universite, Rouyn-Noranda, QC, Canada  
[Carmen-Mihaela.Neculita@uqat.ca](mailto:Carmen-Mihaela.Neculita@uqat.ca)  
[Lucie.Coudert@uqat.ca](mailto:Lucie.Coudert@uqat.ca)

Water treatment performance considers efficiency, water recovery, chemicals and energy consumption, regulatory criteria, residual contamination, and stability and potential reuse or value recovery from residuals generated. Treatment of mine water, characterized by high flows and contamination levels, generates large amounts of residuals, which raise concerns on storage, disposal, stability, as well as potential environmental and social impacts. These concerns can be greatly alleviated by the recovery and reuse of residuals.

A common type of mine water is mine drainage, which is contaminated by acidity, metals/metalloids, and sulfates, can be efficiently treated with active and passive technologies.

Active treatment of mine drainage, by operating mines, uses chemicals and generates mixed residuals rich in metals/metalloids, calcium and sulfur-based minerals. The generated residuals, often rich in Fe, can be reused for mine water pre-treatment (As, P, rare earth elements), mine waste reclamation (component of covers to control AMD generation or of technosols for mine site revegetalization), wind erosion limitation on active mine sites, and value recovery (ochre). Newer processes (biological or modified materials-based) focus on the recovery optimization from the residuals, with respect to a potential commercial value, and on volume reduction of residuals by treatment efficiency improvement.

Passive treatment of mine drainage uses natural and residual materials for a limited performance in contaminated water polishing on closed and abandoned mine sites. The main downside of these systems is the limited knowledge on the recovery, reuse or even handling of the residuals, which can potentially regenerate mine drainage over time.

Future research on mine drainage treatment residuals should focus on: 1) the use of modified materials, natural and residual, for their improved performance, reduced volume of generated residuals, and potential reuse and value recovery, and 2) additional reuse and value recovery avenues.