

## **Mg-carbonate Cements Trap Potentially Toxic Trace Metals and CO<sub>2</sub> at Woodsreef Mine, New South Wales**

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Although carbon mineralisation has been recognised as a safe and long term means of trapping and storing CO<sub>2</sub> within minerals, it poses a potential risk for release of hazardous metals into the biosphere. The stockpiles of reactive, finely pulverised mine tailings produced by ultramafic-hosted mines are ideal settings in which to observe and promote carbonation of Mg-rich waste minerals via reaction with atmospheric or industrial CO<sub>2</sub>. However, mine tailings commonly contain significant concentrations of toxic metals (e.g., Cr, Co, Cu, Ni), which may be found within the crystal structures of Mg-silicates, sulfides and oxides. Proposed strategies for accelerating carbon mineralisation require leaching with acidic solutions, which may enhance metal mobility.

We have examined the mobility of first row transition metals (i.e., Cr, Ni, Mn, Co, Cu) during weathering and carbonation of ultramafic mine tailings from the Woodsreef Chrysotile Mine, New South Wales. Synchrotron X-ray fluorescence mapping shows that recently precipitated (since 1983) carbonate minerals are taking up these trace metals, likely via substitution for Mg<sup>2+</sup> in their crystal structure. This indicates that if carbonation of metal-rich industrial wastes or mine tailings were to be accelerated, metalliferous drainage is unlikely to pose an environmental risk.