Introducing a flow-through technique to aid predict drainage quality from mine waste: a case study

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Kinetic tests are routinely used to quantify metal release rates from Acid Rock Drainage (ARD) prone rock[1]. Such work was undertaken for a proposed copper, gold and molybdenum mine in west central Yukon. Since the secondary phase jarosite was identified in future mine waste rock, the effect of drainage quality needs to be predicted.

A lenghty kinetic test experiment (~ 3 years) was carried out on waste rock, however elevated leaching rates were sustained for several metals making it difficult to extrapolate test results to predict futurre leaching rates and duration.

In order to help predict drainage quality, we have developed an automated technique involving a 50 ml flow-through cell which is continuously being supplied by new eluent at a well-defined flow rate. pH is constantly monitored using an in-line pH probe. An automated fraction collector continuously collects samples at pre-determined time intervals, which are later analyzed for dissolved constituents. Using a subsample of crushed waste rock (5 g), we have carried out a 6 month experiment using DIW eluent, and are currently carrying out additional experiments under different pH conditions.

Results obtained so far indicate a stabilizing of metal release rates after 2 - 3 months. However, in the DIW experiment, Fe concentrations are lower than expected, which can be attributed to the deposition of ferrihydrite which is stable under the pH conditions measured in the flow-through cell. Ongoing flow-through experiments under lower pH conditions will quantify the metal release rates without the possibility of ferrihydrite deposition.

Although the methodology introduced here does not represent an alternative to traditional kinetic test experiments, it does provide the means to relatively quickly quantify metal release rates under a range of laboratory controlled conditions.

[1] Sapsford, D.J., Bowell, R.J., Williams, K.P. (2009) *Minerals Engineering* **22**, 25-36