

## Seepage water quality and prediction of waste rock effluents

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The wastes and waste facilities are usually the most prominent sources of pollution at a mine site. To predict the long term behaviour of disposed waste material and to successfully close a waste facility, a proper characterisation is needed.

The objective of this study was to review ore deposit geology and to determine waste rock geochemistry and mineralogy to study their relation to the actual seepage water quality. For the prediction of the acid production potential (APP) of the waste rocks, suitability of the most commonly used tests (modified acid base accounting (ABA), net acid generation (NAG), calculated ABA) was evaluated. Dissolution of metals and metalloids during *Aqua Regia* extraction, NAG test and two-stage shake-flask test was investigated to assess mobility of contaminants during the long term waste rock storage, and to evaluate performance of the different prediction methods.

Differences were observed between the various methods predicting APP and the actual acidity of the seepage waters. The study indicated that the laboratory tests were principally too pessimistic compared with the real situation at the mine sites. For the APP prediction, the use of several different methods, as well as mineralogical data, is recommended.

According to the leachability results, the *Aqua Regia* extraction had the best correspondence with the actual seepage water quality in predicting which elements will be present in the effluents, although it overestimated the presence of some individual elements, such as Cu and Cr. In general, performance of the NAG test leachate was reasonable, but it underestimated the metals in some cases. The shake flask test was observed to be the most unsuitable for the effluent quality prediction, because of the weak solvent used in the test (water) and the too short reaction time for the crystalline waste rock material.

The results obtained from the *Aqua Regia* extraction and NAG test leachate can be used to predict the elements that will appear as elevated concentrations in the effluents, considering that the concentrations are only approximate, not exact. Elevated concentrations in any of the evaluated leaching tests indicate a possibility of increased element loads in the seepages.