METAL LEACHING (ML/ARD) ANALYSIS

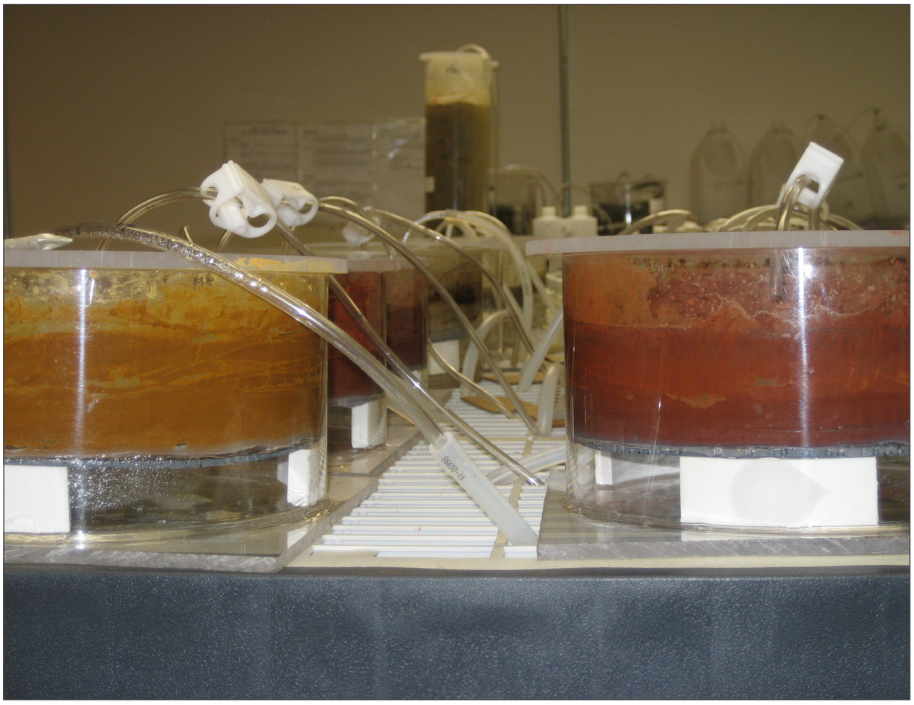
ML/ARD TESTING

Metal leaching (ML) and acid generation can have devastating effects on our environment. Acid generation occurs when waste rock that contains sulfide minerals, such as pyrite or pyrrhotite, is exposed to oxygen and water in the absence of acid neutralizing carbonate minerals. The oxidation of these sulfides results in the precipitation of ferric iron and the release of hydrogen ions. When this product is then entrained by water, the result is acid rock drainage (ARD) and metal leaching.

The extent to which the surrounding environment is effected is dependent upon several factors. These include:

- The degree of oxidation and acid generation
- The availability of neutralizing minerals
- The flow of and the amount of water present

More rapid weathering of the metal-containing minerals and high flow rates of water increase the negative effects of ML/ARD. Also, an increasing acidity level is correlated to the increased solubility of metals and an increased rate of sulfide weathering. While ARD receives the most attention the metals are the primary source of toxicity.



WHY SGS

SGS assists you with the determination of potential environmental liabilities associated with ARD and metal leaching. SGS's environmental services can complete specific standardized tests, such as those listed below, or we can develop comprehensive analytical programs tailored to your needs. From the results of these tests, information can be provided on the prediction and control of ARD and metal leaching as well as how to implement cost-effective waste management practices. Our team of technical staff and chemists are able to offer you guidance on regulatory and compliance issues and provide the level of technical support required to meet your objectives.

Metal leaching tests available at SGS include:

- EPA 1312 Synthetic Precipitation Leaching Procedure (SPLP)
- EPA 1311 Toxicity Characteristic Leaching Procedure (TCLP)
- Shake flask or short-term leach (de-ionized water)
- Meteoric Water Mobility Procedure (MWMP)
- ASTM D3987 (method for shake extraction of solid waste with water)
- EN 12457 (European test protocol)
- MA100-Lix.Com.1.1 (Quebec)
- Sequential leach extraction (Tessier et al.,1979)
- Project-specific leach tests

**Leachate or extraction analysis can include trace metals, mercury major cation/anions as well as other specific parameters such as cyanide and organics.*

Mineralogical characterization of waste solids can also help predict long term effects of AMD/ML based on the type and relative proportion of sulphides, carbonates and other minerals present. This information can complement geochemical leach extraction data to give a better overview of a waste mine site.

Mineralogical services available to characterize solids include:

- Mineralogical bulk solids characterization by:
  - Quantitative methods (QEMSCAN)
  - Quantitative evaluation of material (scanning electron microscopy, X-ray diffraction, electron microprobe analysis)
- Characterization of mineral constituents of waste solids including:
  - Contaminated soils
  - Tailings
  - Waste rock
  - Slag
  - Industrial products, etc.
- Deportment studies of heavy metal contaminants to determine the form and nature of metals present in the waste such as sulphides, sulphates, oxides, silicates, carbonates, phosphates, etc.
- Determine the associations among the metal contaminants and predict their availability to oxidize and leach.

SGS understands that the key to a successful testing program is proper sampling techniques. Samples should be representative and the data reproducible. All SGS sampling and laboratory analysis is performed in accordance with recognized global standards such as American Society for Testing and Materials (ASTM) and International Standards Organization (ISO).

SGS has an unsurpassed reputation for delivering quality analysis of environmental challenges. We want to work with you to ensure the minimisation of present and future environmental liabilities. Whether you are in the early characterisation and prevention stage or a more advanced remediation stage, SGS is your independent technical partner.

CONTACT INFORMATION

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