

STATIC & KINETIC TESTING SERVICES IN CANADA

Trusted Acid Rock Drainage Expertise in Canada



SGS acid rock drainage (ARD) services in Canada can help you to minimize your environmental liabilities by predicting and mitigating the outflow of acidic water from mining operations. We are at the forefront of testing and method development for this technology. Our facilities in Lakefield, ON and Vancouver, BC offer static and kinetic ARD testwork.

Our ARD services analyze the acid-producing potential of tailings, ores and waste rock on your site, predicting the problem and preventing long-term environmental liabilities. Our complete ARD testing service provides you with preventative strategies and practical solutions to reduce the environmental impact of your operation. In addition to ARD testing services, we can also facilitate the implementation of cost-effective waste management practices.

We have a trusted reputation for delivering quality solutions to environmental challenges, providing technical support and offering guidance on regulatory and compliance issues.

Performed using state-of-the-art instrumentation, our ARD services include:

- Site investigation before, during, or after operations to ensure the scope of your ARD situation is completely understood
- Comprehensive laboratory analysis of effluent for the prediction and characterization of ARD
- Extensive analysis, including the standard static and kinetic ARD tests
- Complete design and pilot scale testing of ARD treatment processes
- Construction management, commissioning, and start-up of water treatment solutions



STATIC ARD TESTING

Our scope of static ARD tests includes:

- Modified Acid Base Accounting
 - o Quebec MA.110 ACISOL 1.0 (CEAEQ)
 - o EN 15875 (European Norm ABA test))
- EPA Standard Acid Base Accounting
- Net Acid Generation (NAG) test
- Diagnostic mineralogy to identify
 - o Sulphur mineral speciation
 - o Non-iron bearing sulphides
 - o The reactivity of sulphide minerals using X-Ray diffraction (XRD)

Modified Acid Base Accounting

Modified acid-base accounting (ABA) testing is completed to assist in determining the propensity of the tailings/waste rock to generate acidic conditions and provide input parameters for kinetics tests. The ABA test provides

quantification of the total sulphur, sulphide sulphur, and sulphate concentrations present, and the potential acid generation (AP) related to the oxidation of the sulphide sulphur concentration. The test method determines the neutralization potential (NP) of the sample by initiating a reaction with excess acid, then back titrating to pH 8.3 with NaOH.

Net Acid Generation Testing

Net acid generation (NAG) testing is completed to determine the balance between the acid producing and acid consuming components of the tailings/waste rock samples. The NAG results provide a confirmation of the acid rock drainage characteristics based on the complete oxidation of the samples sulphide content (as well as

ferrous iron from siderite dissolution). The NAG test uses hydrogen peroxide to react with the sulphides contained in the sample. Acid that is produced by oxidation is consumed by carbonates and/or other acid consuming components of the material. The pH of the solution is measured (NAG pH), and the acid remaining, after the reaction is complete, is titrated with standardized NaOH to determine the net acid generated by the reaction.

Diagnostic Mineralogy

QEMSCAN mineralogy can identify, quantify and predict contamination potentials and assist with remediation activities including mine waste, acid rock drainage potential, heavy metal contamination potential and airborne dust pollutants. Based on a carbonate mineral distribution, it is possible to determine which the main carbonate minerals are. QEMSCAN data can be used to determine for example the carbonate mineral species calcite and dolomite which can help to identify the highest neutralization potential (NP), which can also be applied to the sulphide mineral species within the samples. Exposure calculations can be used to determine the percentage readily available to neutralize (degree of carbonate exposure). This can also be applied to the sulphide minerals present within the samples, in particular the Fe Sulphides such as pyrite and pyrrhotite, to determine the acid generating potential. The degree of exposure can also be seen visually using Image Grids produced within the QEMSCAN software and the particles within the grids can also be reported, to give a visual sense of the location of the carbonates or sulphides.

KINETIC ARD TESTING

Our scope of kinetic ARD tests includes:

- Standard humidity cell testing
- Column testing (subaerial, subaqueous, packed upflow)

Standard Humidity Cell Testing

A humidity cell test is used to predict the potential for acidic leachate generation and indicate the primary rates of reaction under aerobic weathering conditions. The standard humidity cell test is conducted at the bench scale. The sample is subjected to alternating cycles of dry and moist air to simulate precipitation cycles. The sample is soaked for a specific length of time with deionized water. The water percolates through the sample and is then collected. This leachate is analyzed for a number of parameters including pH, sulfate, acidity, alkalinity, conductivity and metals (including Ca and Mg). The test design can be customized to better account for sample matrix effects by increasing or reducing the particle grain size or altering the shape of the cell and changing the flow rate.

Larger scale cells can test several parameters. The response of coarser samples more typical of waste rock can be assessed. Various cover design options can be tested and the effectiveness of cover systems in reducing ARD can be assessed. Humidity cells test results are reviewed monthly to check progress and determine if extended leaching is required. Tests typically run from 16 to 24 weeks. Tests of longer duration are run to evaluate ARD control options. Such tests are designed to provide data for mitigation strategies, thus lessening the effects of ARD. ARD reactions are complex and SGS has the technical expertise to help you with the interpretation of your results.

Subaerial Columns (Lysimeters)

While similar to humidity cell-based analyses, leach column tests simulate site waste disposal conditions more closely. Lysimeters are field operated "columns" under natural conditions (or sometimes in greenhouses). Water is usually added in a trickle process but can also include periodic flushing to simulate field conditions.

Subaqueous Columns

Subaqueous columns simulate underwater disposal of tails or wasterock and the overall impacts involved. Acrylic or clear PVC column type cells are commonly used. These have a series of ports, which enable sampling of surface water and pore water within the waste material. An in-line sampling port can be installed for in-situ analysis of selected parameters such as pH, Eh and dissolved oxygen.

Packed Upflow Columns

Packed upflow columns simulate movement of water through soil under saturated conditions such as seepage through tailings dam or into the surrounding soil. They are run up flow to ensure saturation is maintained and leachate samples are taken as a function of liquid/solid ratio, pore volumes. Results may be expressed in terms of both mg of the constituents released per litre of leachate, and mg of the constituents released cumulatively per kg of waste material (dry matter). The European Norm EN 14405 and EPA 1314 are standard examples.

We offer you controls and constraints, maintaining a consistent, high quality, analytical environment. With a focus on environmental testing, our response and methods for ARD have adopted global standards. Contact us to find out more.

CONTACT INFORMATION



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WHEN YOU NEED TO BE SURE