

MINECLOSURE | 2007

COURSE 1: CHARACTERIZATION OF MINE WASTES

October 15-16, Sheraton Hotel & Convention Center, Santiago, Chile

Course Objective

Even though the concepts are relatively simple, the conventional tests tend to be complex and contradictory. The course aims to provide students with the necessary tools to master the art of geochemical characterization of mine wastes.

Program

DAY 1, Monday October 15

- 07:30-08:30 Registration
 - 08:30-10:00 Overview and Purposes of Solid Mine Waste Characterization.
Fundamentals of Weathering and Acid Rock Drainage Production
 - 2a. Oxidation of iron sulfide minerals
 - 2b Involvement of bacteria
 - 2c Effect of acid conditions on mineral dissolution and metal solubility
 - 10:00-10:20 Coffee break
 - 10:20-12:30 Static Acid-Base Accounting (Part 1)
 - 3a Objectives
 - 3b Sulfur speciation and prediction of acid-producing potential
 - 3c Measurements of total sulfur and sulfur speciation
 - 12:30-13:45 Lunch
 - 13:45-15:10 Static Acid-Base Accounting (Part 2)
 - 3d Complications to interpretation of acid-producing potential
 - 3e Estimation of acid-neutralization potential
 - 3f Complications to measurement of acid
 - 3g Calculation of net acid-neutralizing Potential
 - 15:10-15:30 Coffee break
 - 15:30-17:30 Static ABA Case Studies (to be determined)
 - 4a Cu-Au Porphyry involving alunite
 - 4b Tailings containing siderite
 - 4c Primary anhydrite and secondary gypsumKinetic Testing (Part 1)
 - 5a Principals, objectives and expectations of kinetic testing
- End of Day 1.

DAY 2, Tuesday, October 16

- 08:30-10:00 Kinetic Testing (Part 2)

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| | 5b Conventional bench-top humidity cells |
| | 5c Large-scale humidity cells |
| 10:00-10:20 | Coffee break |
| 10:20-12:30 | Kinetic Testing (Part 3) |
| | 5d Field-scale weathering experiments |
| | 5e In-situ analog weathering experiments |
| | 5f Customized humidity cells for fine-grained materials |
| | 5g Interpretation of humidity cell data |
| | 5h Extrapolation of humidity cell rates to the field |
| 12:30-13:45 | Lunch |
| 13:45-15:10 | Kinetic Testing Case Studies |
| 15:10-15:30 | Coffee break |
| 15:30-17:10 | 7a Regulatory vs. Predictive purposes for leachability prediction |
| | 7b TCLP method |
| | 7c SPLP and MWMP methods |
| | 7d Custom leachability and column testing |
| | 7e Batch methods for estimating leachability and attenuation |
| 17:10-17:30 | Course Evaluations. Provision of course diplomas. |



Instructor: Dr. Ronald Schmiermund, Associate Professor, Colorado School of Mines, USA.

Dr. Schmiermund has 25+ years of experience in the application of geochemistry to the mining and mineral-processing industries, chemical manufacturing, petroleum extraction and refining, hazardous/ radiochemical and mixed waste storage and contamination, and various methods of remediation. These applications have involved field mapping and sampling, laboratory analysis and experimental design, geochemical and hydrologic modeling, and research and development directed at sampling and in-situ measurements as well as data analysis and reporting. In the mining and mineral-processing sector, Dr. Schmiermund's expertise is waste characterization based on his combined backgrounds in general geology, economic geology of ore deposits, aqueous environmental geochemistry, and his familiarity with modern and historic mining techniques. His approach is to combine these backgrounds with elements of the scientific method to provide defensible and holistic baseline surveys and environmental impact analyses. In addition, an intimate familiarity with sampling and analytical practices is used to increase data reliability and reproducibility. In addition to the analysis of existing conditions at mining facilities, he has applied geochemical methods to tailings disposal and stabilization issues, process waste treatment and management, and mine site remediation. He has considerable experience in performing predictions of long-term waste rock performance for a wide variety of ore deposit types and has established a laboratory in Denver to reduce uncertainty associated with those predictions. Dr. Schmiermund has provided expert opinions in matters involving groundwater sampling and sampling design and chemical alteration of mineral processing wastes. In addition, he has prepared litigation support for matters involving environmental contamination by co-produced brines associated with oil production, arsenic speciation in groundwaters affected by industrial processes, and the appellation of lead in lead-based paint. As a graduate-level professor, he taught courses in environmental aqueous chemistry which included group projects based on actual data from industrial or environmental enforcement scenarios.