

Northwest Field School 2004

Introduction to Metal Leaching and Acid Rock Drainage

Course Information

Instructors:

Dr. Bill Price
Dr. Kevin Morin
Mike Aziz
Steven Keenan
Glenda Ferris

Dates: September 13-17, 2004

Fee: \$950

Location: Smithers, British Columbia

Northwest Field School

Introduction

The Northwest Field School is based in Smithers BC, a regional centre for government resource agencies, wilderness tourism and the natural science community. The school is a collaborative venture between Northwest Community College and the Northwest Institute for Bioregional Studies.

Northwestern British Columbia provides an unparalleled natural classroom for field-based learning activities. It is home to some of the world's remaining wild spaces, and it is a place where new and traditional residents interact with a rich diversity of ecosystems that sustain local economies from the interior to the coast. It is an area of challenge and opportunity, an area where there is much to be learned about natural systems and appropriate resource use.

The Northwest Field School provides a forum where the area's unique blend of human and natural resources is made available through credit and non-credit field courses appropriate for professional, academic and general interests.

Contact Information

Northwest Community College
PO Box 3606
Smithers, BC
VOJ 2N0

Ph 250-847-4461
Fax 250-847-4568
E-mail smithersinfo@nwcc.bc.ca
Web

The goal of this course is to provide a practical understanding of metal leaching and acid rock drainage (ML/ARD), the major environmental and reclamation challenges faced by the mining industry. The course will provide a basic understanding of both the contributing factors and the range of procedures used to assess and prevent potential impacts.

ML/ARD is a multi-disciplinary subject, involving a large number of processes, each with demanding information requirements. It is also an applied science, with much of the current knowledge residing in company reports and with leading industry practitioners and regulators. The course will bridge the gap between the basic science and practical application of the technology using case studies drawn from the instructors' experience with mines in Canada and throughout the world.

Much of the time will be spent on mine tours, which illustrate generic requirements, site-specific issues and their management implications. Tours of mines in the area (Placer Dome's Equity Silver, Imperial's Huckleberry mine, Noranda's Bell and Silver Standard's Duthie mine) will allow participants to observe state of the art ML/ARD practices at a range of different sites. Simulated planning exercises will be used to provide participants with additional experience in how a ML/ARD assessment is conducted and mitigation plans are developed.

Target Audience

The course is recommended to professional and technical personnel working for mining companies, First Nations, community groups, government or consulting companies.

Instructors

Dr. Bill Price, one of Canada's foremost experts on ML/ARD, is the course organizer. Bill has spent the last fifteen years reviewing mines and is author of ML/ARD Guidelines used in British Columbia and Ontario and a Manual of Prediction Methods, documents used world-wide.



Mike Aziz will lead the Equity Silver tour. Equity Silver has been an industry leader in ARD mitigation with its research on soil covers, underwater disposal and drainage collection. Mike has published widely on that work and on methods to minimize ML/ARD risks.

Steven Keenan will lead the tour of the Huckleberry Mine and its facilities. Huckleberry is a state-of-the-art modern mine site where ARD prediction and prevention are an integral part of the mine plan. Steven is environmental coordinator at the site and has worked at a number of mines with ARD concerns.

Glenda Ferris will share her experiences as a community member active in ARD review since 1986, assisting industry, government, community and First Nations groups. Glenda is in high demand because of her knowledge and experience. Her contributions include work on the recent MMSD review.

Dr. Kevin Morin along with Brian Rosendale will lead the tour of the Bell Mine. Kevin has worked as a consultant for many major mines and mining companies and published widely on ML/ARD, including a compendium of case studies. The ML/ARD program at Bell includes some of the best prediction work in the province.

Introduction to Metal Leaching and Acid Rock Drainage

Course Outline

Basic Processes and Contributing Factors

- Geological Conditions (key minerals and rock types)
- Geochemical Processes (oxidation, dissolution, reduction and microbial processes)
- Hydrological Processes (contaminant transport, leaching and loadings)
- Potential Environmental Impacts
- A Brief History of ML/ARD
- Regulatory Requirements

Material Characterization and Assessment

- Key Parameters and Concepts
- How to Characterize Exposed Materials
- Sampling and Sample Preparation
- Sample Analysis
- Kinetic Test Procedures
- Data Analysis and the Interpretation and Use of Results
- Monitoring Drainage
- Techniques for Different Materials - waste rock, road cuts, tailings, soil materials

Measures to Prevent Impacts

- Review of Current Practices - general considerations, information and design requirements
- Underwater Disposal - constructed impoundments, flooded workings, bulkheads and deposition in natural water bodies
- Blending - past practices, neutralization mechanisms and constraints
- Measures to Reduce Drainage - selecting the best disposal location, ditches, soil covers and liners
- Measures to Reduce the Oxygen Supply
- Drainage Treatment - chemical and passive treatment options and concerns
- Mineral Processing
- How to Develop a Mitigation Plan - selecting the best mitigation strategy, risk assessment, contingency planning, monitoring and maintenance, and geotechnical and hydrological considerations

How to Conduct an Assessment

- What Questions Must Be Answered and What Data is Required to Answer Them?
- How to Conduct a Field Inspection

Equity Silver Mine

- History of ARD Management at the Site
- Drainage Collection, Lime Treatment and Sludge Disposal
- Soil Covers and Hydrogeology of the Rock Dumps
- Underwater Disposal of the Tailings
- Flooding of the Pits
- Drainage Discharge and Effluent Monitoring
- Consultation with the Community

Huckleberry Mine

- Mine History, Geology and Environment
- Material Characterization and the Separation of Different Waste Types
- Mitigation Options including the Present Strategy for Flooding ARD Generating Wastes
- Development of the Mine Plan
- Use of ARD and non-ARD Generating Wastes for Construction
- Tour of the Mill and Lab Facilities

Bell Mine

- Overview of Site and History of ARD Management
- Rock Types, Mineralogy and ABA and Kinetic Test Work Results
- Modeling and Predictions of Future Drainage Chemistry at Closure
- Post-Closure Weathering and Resulting Drainage Chemistry
- Collection of Drainage at a Remote Site
- Drainage Assessment and Mitigation Plan for the Load-Out Facilities

Duthie Mine

- Mine History, ML/ARD Potential and Environmental Requirements
- Drainage Monitoring Results
- Proposed Mitigation Strategy and Maintenance Requirements

Case Studies

Examples of work in this province and other parts of the world including Eskay Creek, Kemess, Red Mountain, Snip and Sulphurets Mines.

Registration Information

Early registration is recommended as we operate on a first-come-first served basis. Minimum class size is usually 10 participants; maximum is often 15. Classes will be cancelled if we do not have the minimum number two weeks before a class.

Corporate Sponsorship

The Northwest Field School is also soliciting funds to defray costs for students or community groups wishing to participate. All courses in the Northwest Field School are run on a cost recovery basis and the high tuition reflects the true cost of course delivery. In an effort to defray costs for students, we are asking corporations and government organizations to provide sponsorship or grants. Please contact us directly if you have any questions regarding the above or would like to make a donation.

Cancellations

Any cancellations received 15 days or more before the start of a class will receive a refund (minus a \$25 processing fee). We are sorry, but we cannot provide a refund or credit for cancellations received less than 15 days before a class.

Academic Credit

Some of the field school courses may, by prior arrangement only, qualify for credit to a number of college/university degrees or diplomas, typically at a senior undergraduate or graduate level. For those seeking credit please contact us and we will direct you on how to proceed.

Accommodation

The course is based in Smithers, B.C. and mines in the surrounding area. Accommodation will be in Smithers and is the responsibility of the participant. Contact numbers for a range of hotel, motel, lodge and B&B accommodation can be forwarded with course materials on request. Travel to field sites will be by Northwest Community College vans, and is included in the course fee. Meals are not provided.



Take a closer look.