

# Short Course

<b>NAME OF WORKSHOP:</b>	<b>Mine Water Management for Closure</b>
<b>DATE:</b>	Sunday, September 18, 2011
<b>TIME:</b>	8:30 am – 4:30 pm
<b>LOCATION:</b>	<b>Fairmont Chateau Lake Louise / Pipestone Room</b>
<b>REGISTRATION FEE:</b>	\$350 (CDN)
<b># OF PARTICIPANTS:</b>	15-50
<b>FACILITATED BY:</b>	Please see bios below
<b>LANGUAGE:</b>	English

**Short Course Description:**

Successful mine closure involves minimizing mine-water management costs and activities in ways that meet or exceed environmental requirements. Cost-effective management requires accurate and reliable prediction of mine water quality and quantity as well as thoughtful design and implementation of mitigation measures, such as water treatment. Water treatment can add a costly, long-term burden to the mining company. As such, careful assessment and evaluation of the needs for mine water management are critical. Through the course, AMEC staff will provide strategies and methods for 1) assessing and predicting mine water quantities and quality, and 2) evaluating mitigation measures, including active and passive water treatment approaches. The course will include two half-day modules: 1) assessment and prediction of water quality and quantities at mine closure in the morning, 2) water treatment and management approaches for mine water management in the afternoon.

**Short Course Objectives:**

The objectives of this course will be to share information on the basics of mine water management associated with mine closure and provide specific case study experience of innovative approaches and methods. Mine water management approaches will include hydrologic and geochemical site assessment to enable prediction of conditions during and after mine closure as well as water and residuals treatment alternatives that include physical, chemical and biological methods, active and passive, to support mine closure.

**Target Audience:**

The target audience for the course will include mine managers and environmental staff involved in mine closure planning and regulators involved in mine closure decision making.

**About the Facilitators:**

The instructors for the workshop will include the following:

Morning session: Steve Sibbick, Dawn Kaback, Cam Stringer, David Bleiker, Emily Sportsman, and Bruce Wielinga.

Afternoon session: Bernard Aube, Andre Sobolewski, Bruce Wielinga, and Doug Lee.

David Bleiker, P.Eng., has 18 years of consulting engineering experience integrating geotechnical, waste management, water management, and geo-environmental expertise into engineered solutions. He has been involved in hydrological and geotechnical studies and has designed tailings dams, water retention dams, excavations, liners, and wet and dry covers. His responsibilities have included project review, technical coordination, project management, and liaison with multi-disciplinary project teams. He has also prepared specifications, provided design construction support, and developed closure plans. He has worked at sites with acid rock drainage and neutral mine drainage; his projects have involved operating, closed and abandoned mines.

Cam Stringer, P.G., is a senior hydrogeologist and project manager with more than 20 years of consulting experience in hydrogeology, mine permitting and hydrology, aquifer characterization, aquifer testing, water rights, remedial investigation, landfill permitting, mine permitting and remediation, corrective measure implementation, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Superfund, NEPA analysis, remedial investigation, and municipal water supply exploration, installation, and permitting. His work has involved mining projects across the U.S. and internationally where groundwater and surface water flow has been characterized to support mine permitting and dewatering projects. He specializes in conceptual model development, groundwater numerical flow modeling, groundwater-surface water interaction, contaminant fate and transport theory, and natural attenuation of organic contaminants.

Steve Sibbick is a geochemist with more than 20 years experience and specializes in acid rock drainage assessment and prediction, mine waste geochemistry, mine closure assessment and planning, and project management. He has conducted numerous ARD assessments of proposed, active and closed mine properties, and managed many multidisciplinary geoscience and engineering projects related to mine development, closure, and remediation. Mr. Sibbick has worked on a variety of mining and industrial projects in Canada and internationally involving geochemical characterisation of waste rock, tailings, paste backfill and sludges, prediction of discharge water quality, compliance and due diligence audits, and development of remediation strategies. Mr. Sibbick has also worked in mineral exploration and in government as a researcher and regulator. He has authored or co-authored more than 40 publications.

Dr. Bruce Wielinga has more than 17 years of experience as a research scientist and environmental consultant solving problems related to environmental biogeochemistry, site characterization, and remediation. His primary focus is on the biogeochemical processes consequential to contaminant transport, trace metal cycling, and the chemical and biological transformation and/or degradation of inorganic contaminants. His academic research and environmental consulting practice is geared to adapting and implementing innovative remedial technologies and treatment approaches that are consistent with the complex, site-specific biogeochemical environment. He has been involved in the design and testing of water treatment systems for transformation and removal of heavy metals and metalloids, radionuclides, inorganic anions, and organic contaminants. Bruce has diverse experience, which includes site investigations & assessments, remedial investigation, feasibility studies, bench-scale and pilot-scale testing, biogeochemical modeling, and design and implementation of treatment systems.

Emily Sportsman has 11 years of experience specializing in metal leaching and acid/alkaline rock drainage (AARD) characterization for mining, construction and pipeline projects, mine closure and reclamation planning, open pit water quality predictions, and environmental assessments. She has been involved in numerous projects throughout North America, South America and Europe. She has a strong background in exploration geochemistry and ore deposits.

Bernie Aubé, P.Eng., is a consulting engineer with considerable experience in mining and metallurgy. He has worked with the mining and smelter industry both as an expert consultant on all manners of water and wastewater management issues and directly in an operational context. He has specialized in troubleshooting and developing customized wastewater treatment solutions. Mr. Aubé has been involved in the design of numerous water management and treatment systems for all types of mines, both operating and closed, from tropical to polar climates. Treatment systems include pond treatment, pit treatment, and active treatment plants with an emphasis on high-density sludge systems. Activities include everything from the laboratory scale, pilot testing, full-scale design, start-up, and the optimisation of existing plants.

Doug Lee, P.Eng., has 25 years of experience in detailed design and study of effluent treatment plants, sludge dewatering, potable water and sanitary sewage treatment facilities in the mining, pulp and paper, and municipal fields. His experience has involved roles of increasing responsibility from mechanical/piping design lead to overall project manager for water treatment plant projects worth more than \$35 million capital cost. His process experience includes simple lime neutralization (SLN), high-density sludge (HDS), membrane treatment, and the anaerobic and aerobic biological treatment of wastewater.

Dr. Andre Sobolewski is a Biologist with more than 20 years of experience in evaluating and designing passive treatment systems. His wide-ranging experience includes developing passive bioreactors, wetlands, in-pond and in-pit treatment systems at mines located throughout North and South America, including in remote mountain locations and in the Arctic. He understands the advantages and limitations of passive treatment systems and can identify the circumstances that favor their use. He has made numerous presentations and has taught two well-received short-courses on this subject.

Dr. Dawn Kaback has more than 30 years of experience in the environmental field where she has applied her aqueous geochemistry expertise to solve groundwater and surface-water problems. She has worked as an industry research scientist, a consultant, a U.S. government researcher, and for a non-profit organization. Her relevant projects have involved geochemical assessments at mining sites, both in the U.S. and internationally, and characterization and remediation at government and industrial sites contaminated with metals, radionuclides, and organics. She holds three patents for innovative subsurface remediation technologies and has taught many workshops and given oral presentations at numerous international conferences. She has also served on numerous expert panels tasked with making recommendations related to environmental and water issues.

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AGENDA		
TIME	TOPIC	INSTRUCTOR
8:30–8:45 AM	Introduction/Overview	Dawn Kaback
8:45-9:15 AM	Mine Site Hydrology	David Bleiker
9:15-9:45 AM	Mine Site Hydrogeology	Cam Stringer
9:45-10:10 AM	Water Quantity Case Study	Bleiker and Stringer
10:10-10:20 AM	Break	
10:20-10:50 AM	Geochemistry: Tools for Closure	Steve Sibbick
10:50-11:20 AM	Predicting Water Quality	Bruce Wielinga
11:20-11:45 AM	Water Quality Case Study	Emily Sportsman
11:45-12:00 AM	Summary / Discussion	All
12:00-1:00	Lunch	
1:00-2:15 PM	Active Treatment, Design and Performance, Sludge Management	Bernie Aubé
2:15-2:40 PM	Case Studies: Active Treatment 1	Bernie Aubé
2:40-3:05 PM	Case Study: Active Treatment 2	Doug Lee
3:05-3:15 PM	Break	
3:15-3:45 PM	Passive Treatment	Andre Sobolewski
3:45-4:10 PM	Passive Treatment Case Study	Bruce Wielinga
4:10-4:30 PM	Summary/Discussion	All

**Equipment Required:** None

**Materials Provided:**

Course binder with presentation slides and other information.