

SUMMARY REPORT
9th Annual British Columbia ML/ARD Workshop
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The primary focus of the 9th Annual BC MEM - MEND Metal Leaching and Acid Rock Drainage (ML/ARD) Workshop was on drainage treatment. There were also two papers on the new Canadian Light Source, a promising new tool for characterizing mine wastes and drainage. The sessions on drainage treatment began with five papers describing various aspects of the planning for drainage collection and treatment at the Britannia Mine. These papers illustrated the depth and breadth of information required to design a drainage collection and treatment system, and the challenges in obtaining this information at a large historic mine site. People interested in the Britannia Mine may also want to consult the CERM3 presentation on the upper bulkhead in last year's workshop notes.

The presentations on the challenges at Britannia provided a good introduction to the remainder of the workshop, which was devoted to field results from biological treatment and other potentially less expensive treatment methods. Mines throughout the world are devoting considerable effort to finding cheaper, more effective ways to prevent impacts from ML/ARD. In British Columbia, this work includes limiting drainage inputs, removing sulphides from tailings, other waste depositional strategies to create non-PAG composites, and drainage treatment.

As the workshop illustrated, there are a large variety of alternatives to traditional chemical treatment with lime or ferric sulphate. Notably however, none of these methods are walk-away solutions. As a minimum, all require monitoring and maintenance. Their long-term effectiveness may also depend on process control, water management and secondary waste disposal. Possible process controls include measures to modify temperature, flow rate, contact with reactants and amendment additions. Depending on the process, significant drainage storage may be required to moderate or normalize flows during extreme precipitation events and/or snow melt in the spring. Other challenges include seasonal variability in reactivity, predicting maintenance requirements and the potential effects from/or impacts to fauna using the site. Studies conducted on flow-through treatment systems highlighted the importance of maintaining hydrologic conductivity through measures that prevent plugging or coating by precipitates and limit the physical deterioration of materials within the treatment facility.

Like other forms of mitigation, mining companies in BC that are proposing treatment must address the information and design requirements outlined in the BC MEM Guidelines (Price and Errington, 1998) and commit to implementing all necessary management and maintenance requirements. Financial security should be commensurate with the liability and risks involved. Monitoring is required to demonstrate effectiveness and sustainability through time, and guide future management decisions. Monitoring should therefore include measurements that show the mechanisms of contaminant attenuation and whether they are sustainable. Potential advantages of biological treatment systems include reduced costs and decreased problems with

secondary waste management. While the operating requirements with alternative treatment methods may be greatly reduced, the term passive treatment is a misnomer.

Three key themes at this and other Annual ML/ARD workshops, and for improving existing tools and developing new tools in general, are the importance of case studies, research and sharing information.

As in the past, the emphasis of this year's workshop was on field-scale results and experiences. There is limited long-term operating experience with most ML/ARD mitigation strategies. Consequently, the mining industry is on a learning curve in terms of long-term performance, maintenance requirements and the evolution of drainage chemistry. Even where mitigation measures have been implemented, the full requirements and potential costs of mitigation may not be known. Since much of our understanding of ML/ARD is commonly a simplification of a complex reality, it is very important to check and confirm design assumptions with field results. The information provided in case studies improves our ability to prevent future impacts and reduce costs. Consequently, case studies were ranked as a major priority at a recent MEND workshop on resource allocation in Eastern Canada.

The emphasis on research is also timely given the decision this year by MEND to re-start its research program (Stratos Inc., 2002). In our roles as regulators, we often find that a request for additional research draws a negative response. Some potential reasons for this include:

- the concern that research will merely raise further questions and not result in a defensible mitigation or materials handling plan,
- past research did not address practical concerns, such as the cost or when information will be available, and,
- research findings were promoted without adequate consideration of limitations in the way measurements were made or the failure to measure all the influential factors.

However, like it or not, research studies are an integral part of any mine's ML/ARD program, especially if there is a desire to reduce costs. Uncertainty with mitigation requirements is a reality for one or more site components at more than 40 mines in British Columbia. For these sites, monitoring and research studies are needed to determine whether mitigation is necessary and if so, what mitigation measures are required. Where mitigation measures are already selected, research into the causes of failure and the testing of corrective measures, helps to ensure that mitigation measures remain effective.

Information sharing, through the presentation of research results and case studies, is a key part of cost-effective ML/ARD work. To minimize errors and omissions, practitioners need to willingly share their experiences and hear differing viewpoints. Fortunately in BC, there has been a critical mass of well-informed individuals who have been willing to share their results and participate in open, cooperative dialogue aimed at improving our understanding and practices. Over the past 10 years, British Columbia has maintained its place as one of the leaders in ML/ARD, with relatively little expenditure of public resources. This is a testimonial to the constructive, cooperative approach of the majority of people working here. Presenters at this workshop from abroad have often expressed amazement at the wide range of participants, the degree to which information is shared,

and the constructive, technical dialogue between people from differing communities of interest. This constructive approach has resulted in technical guidelines for ML/ARD, which are supported by all communities of interest in BC.

Clearly there are always things that can be done better. However, unbalanced, confrontational critiques, whether of government, companies or other organizations, are not the solution. While confrontational assessments may make good press, it gives fuel to extreme views on all sides and undercuts the efforts of those working to find solutions. This will result in less disclosure, less efficient use of resources, more work, less knowledge and more legal battles. The constructive alternative is to present a balanced view of the pros and cons, and outline possible solutions. It is important to recognize challenges and note benefits as well as problems. An important component of this is to ask questions and to be as precise and accurate as possible. Inaccurate or overly general criticism often results in the wrong changes being made. The noting of successes, regardless of how limited they are, is important because it indicates procedures or information that may be useful in resolving issues or avoiding problems.

The next workshop will be our tenth, a milestone of sorts. Our objective as always will be to focus on field-scale results, on research developments and to conduct our discussions of ML/ARD challenges in an open and constructive manner.

- Price, W.A. and J. Errington. 1998. Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia. British Columbia Ministry of Energy and Mines. p. 86.
- Stratos Inc. 2002. Proceedings of MEND3 Strategy Session. MEND Report 8.2. Ottawa. April 11-12.

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Most importantly, thanks to the speakers, who volunteered their time and to the audience who contributed much to the enlightening discussion that followed each presentation. In addition to the many Canadian presenters at this years workshop, we were very fortunate to have the participation of a number of our neighbours to the south; Joe Harrington of ARCADIS in Montana, Rory Tibbals of the Golden Sunlight Mine in Montana, Tim Tsukamoto and Glenn Miller of the University of Nevada, Thomas Wildeman of the Colorado School of Mines, James Gusek of Golder Associates in Colorado, Jack Adams of Applied Biosciences in Utah and Paul Ziemkiewicz of the University of West Virginia.

Presenters and audience are thanked for making this workshop a success.