



The International Network for Acid Prevention

An organization of international mining companies that seeks the prevention of acid rock drainage (ARD) and metal leaching in support of responsible mineral development.

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1. Summary

Gilles Tremblay from National Resources Canada and MEND has been selected to replace Dr. Terrence Chatwin as the INAP Technical Manager. After a decade of advancing INAP's objectives through major accomplishments such as the GARD Guide, Dr. Chatwin has decided to retire. INAP appreciates Dr. Chatwin's many years of fine service and is looking forward to a continuation of dynamic leadership and support from Gilles Tremblay.

INAP continues to promote projects relating to mine waste, mine-impacted water and the mitigation of acid rock drainage (ARD). As well as being a major sponsor of the 10th International Conference on Acid Rock Drainage (ICARD) in Santiago, INAP sponsored a Sulfate Treatment Short Course at the 10th ICARD. INAP is also funding a Global Cover System Design Guidance Document, which INAP believes will add significant value to the mining industry. With the assistance of the Global Alliance, INAP is involved in promoting the GARD Guide (Global ARD Best Practice Guide) with short courses, presentations and workshops on the Guide and other related topics.

INAP is pleased to see the expansion of ARD efforts across the globe. With the help of INAP and Global Alliance members, Bruce Kelley spearheaded a successful ARD meeting in Perth, Australia where representatives from INAP companies, ARD consultants, regulators and other stakeholders were invited. The objective was to encourage an ongoing interaction among the ARD community members. Outcomes from the meeting included preliminary organization of the 9th Australian Workshop on Acid and Metalliferous Drainage Workshop, which will be held in 2017 and the publication of an introductory article on INAP and ARD in the AusIMM Bulletin.

A major upcoming INAP activity is the selection of the Global ARD Best Practice Award. This new award, described in Item 2 below, was recently approved by the INAP Board. A committee of three senior ARD practitioners have been chosen to select the first awardee. The awards committee is comprised of Dean Williams, Bruce Kelley and Bob Kleinmann.

2. International ARD Best Practice Award

The International Network for Acid Prevention (INAP) is sponsoring an international award for the implementation of best practice in the identification, planning and management of potentially reactive geologic materials at a mining site. The award will be presented at the 11th International Conference on Acid Rock Drainage to be held in South Africa in September 2018. Applicants are not required to be members of INAP.

Formal applications should be submitted to INAP at gilles.tremblay@inap.com.au no later than 1 May 2017. Questions concerning application requirements should be directed to Dean Williams at dwilltahoe@gmail.com or gilles.tremblay@inap.com.au. A copy of the ARD Best Practice Award application is attached to this newsletter.

Following receipt of applications all applicants will be contacted by the Technical Review Team regarding follow-up questions, etc. A decision regarding the award winner will be made by June 2018.

Indications of intent to submit an application will be appreciated. Please send indications to Gilles Tremblay or Dean Williams at any time.

In addition to being recognized globally as a best practice leader in the management of reactive geologic materials, one representative from the winning company will be reimbursed for travel, lodging, and registration to the 11th ICARD in South Africa.

3. New INAP Technical Manager

As many of you know I will soon assume the role as INAP's Technical Manager replacing Terry who has been doing a great job of supporting the INAP program for the past 10 years. I have over thirty years of experience in coordinating large multi-stakeholder R&D consortia related to environmental issues affecting the mining industry and this places me in an excellent position for this role. My hands-on involvement with the Mine Environment Neutral Drainage (MEND) program since 1989 and as a member of INAP's Global Alliance since 2003 makes it a natural fit for this job. The success achieved by the MEND program is a direct result of the collaborative efforts of the partners, the sharing of experiences and the thorough evaluation of technologies and practices and I plan on applying the same approach with the INAP member companies and with the Global Alliance (GA) partners to meet the programs' objectives - the advancement of best practices to prevent acid rock drainage (ARD) in mining.

An integral part of collaborative partnership is technology transfer. It is my intention to enhance communication and awareness among INAP and the Global Alliance, to encourage collaboration and to emphasize the complementarity of each other's strengths. In an effort to benefit INAP and the alliance is to include a feature article in each edition of the INAP Newsletter on the activities of a GA member or on a university doing research in ARD. In this edition, the Sustainable Mining Institute (SMI) at the University of Queensland in Brisbane, Australia, the newest member of the GA, is featured below in Item 5.

4. 11th ICARD/IMWA 2018

During the 10th ICARD in Santiago, Chile it was announced that the 11th ICARD will be held in Pretoria, South Africa in September 2018. INAP has agreed that the 11th ICARD will be held in conjunction with the International Mine Water Association (IMWA) 2018 annual meeting. It will be hosted by the Tshwane University of Technology, the Water Institute of South Africa, and the South African Water Research Commission with support from IMWA and INAP.

5. Global Alliance Members

Acid and Metalliferous Drainage research at Sustainable Minerals Institute, Australia

Australia is a country with vast mineral resources, which are located in diverse climatic zones, and Acid and Metalliferous Drainage (AMD) occurs in many operational as well as legacy and abandoned mine sites.

Sustainable Minerals Institute (www.smi.uq.edu.au) is the largest and most diverse research and education group in Australia for sustainability in the resources industry. The seven centres of SMI bring together experts in mining, processing, water, environment, safety and risk management, energy and social performance. The institute is well positioned for AMD research by covering a wide range of disciplines studying the entire value chain and crossing the life of mine, from exploration to rehabilitation.

SMI has a broad range of research work being undertaken in the area of Environmental Geochemistry. Accurate geochemical characterisation of mine and mineral processing waste and mine water is key to successful AMD management. Through field monitoring, laboratory experiments and modelling, research in Environmental Geochemistry at SMI follows the geochemical cycles of heavy metals, acids, metalloids (e.g. arsenic) and salts. SMI researchers also investigate the natural processes that may degrade the quality of surface and ground waters, natural soils and stream sediments. It is important to quantify the extent of the potential effects of these processes, for optimum rehabilitation and closure outcomes.

Current research at SMI in the area of landform stability includes the optimisation of cover design under various climatic conditions for mine closure planning. Ecohydrological concepts for revegetation are built-in, to improve the level of certainty for the successful establishment of the desired vegetation community. This work is closely linked to [Environmental Geochemistry](#) and [Soil-Plant Systems](#) research. In addition, advanced cover monitoring technologies utilised by SMI enable the quantification of these landform processes in space and time.

Mine rehabilitation research at SMI provides opportunities to create stable, safe and productive systems ranging from agricultural uses to wildlife habitats, with the consequential environmental and social benefits. Many critical ecological factors and processes influence the reconstruction and development of soil systems in mining landscapes. Engineering soils from mine wastes such as tailings requires investigating root-mineral interactions in terms of bio-weathering and metal and/or metalloid uptake by plants.

Our research using sensor technologies is developing spatial analysis methods for environmental mapping and monitoring of mine sites. Areas of specialisation include using thermal, near-infrared and true colour sensors on a UAV platform.

SMI's International Centre of Excellence (SMI-ICE) in Chile, sponsored by the Chilean government, fosters research collaboration for tackling challenges of mining industry in Chile. A major focus area of research at SMI-ICE Chile is integrated tailings and water management.

SMI is also the host organisation for the biennial "Life of Mine" and "Water in Mining" conferences, and the "Australian AMD Workshop" which is convened every three years.

6. Global Cover Design Guidance Document

Over the past three years, INAP has been working with O'Kane Consulting (OKC) to prepare a global guidance document for soil-cover systems covering the full range climatic conditions. On January 12-13, 2016, Terrence Chatwin and Rens Verburg, Golder Associates met with OKC to discuss the most recent draft document and a cover design tool that was proposed to be included with the guidance document. This meeting was very successful and resulted in a conference call on February 3, 2016 with Dean Williams, Claudio Andrade, Rens Verburg and Terrence Chatwin to update the INAP Board and OpCom Chairs on the guidance document, cover design tool and to discuss a path forward to project completion. Michael O'Kane, Bonnie Dobchuk and Andrew Baisley presented to the INAP OpCom on the May 12, 2016 meeting/conference call. INAP anticipates the Global Cover Guidance Document and tool will be completed in 2016 and will be available to INAP members before the end of the year.

7. Technical Director's Report – Terrence Chatwin

Since this will be my last Technical Director's Report, I decided to expand some of my thoughts on the future of INAP and its overarching focus since it was founded in 1998. While INAP's singular objective of preventing or mitigating Acid Rock Drainage (ARD)

and its resulting metal leaching (ML) are significant to the mining industry and its stakeholders, INAP's team and resources are limited. Hence, it is important to periodically review our efforts to address how we can be more effective in meeting our objectives.

Let's take a look at our most ambitious project, the GARD Guide, a best practice Guide for the prevention of ARD. The GARD Guide has been recognized and used by many mining stakeholder organizations across the globe. Short courses, workshops and papers have been presented, in North and South America, Europe, the Middle East, Asia, Australia and Africa by INAP and Global Alliance (GA) members. Regulatory bodies such as U.S. Environmental Protection Agency (EPA) and other stakeholders have recognized its value. The EPA translated to Spanish and attached the GARD Guide Executive Summary to the mining guidance document they prepared for Central America under CAFTA.

There is strong awareness of the GARD Guide in North America, but its global reach is limited. How can we enhance the global awareness and application of the GARD Guide? Twice since its original publication, INAP has updated the GARD Guide. Perhaps the next update can focus on mining operations and ARD issues in other parts of the world such as Australia, Africa, South America and Asia. In line with this possibility, INAP has requested and received approval from the Australian Government, to use Australian case studies that were prepared for the update of the Leading Practice Handbook for Managing Acid and Metalliferous Drainage in future GARD Guides editions. We also have requested ARD case studies from our GA members. I believe that using case studies that illustrate how principles from the GARD Guide can effectively mitigate ARD world-wide is one of the most effective tools to teach applications from the GARD Guide.

I also believe that the use of Webinars is a very cost effective way to promote and educate stakeholders on the GARD Guide. INAP and its partner organizations have presented GARD Guide short courses in many parts of the Globe. However this can be expensive, when the courses require substantial travel thus limiting the number of courses. I propose that we develop and record a GARD Guide short course, which then could be distributed to INAP members and to the Global Alliance. To make this short course more effective for non-English attendees the audio portion could be translated to their native language. I believe there are regulators and stakeholder groups that would be willing to help finance this effort if they also were able to use the recorded short course.

I have found that the web pages of many international mining companies have limited their discussion of ARD related case studies and refocused on describing their water-

related efforts on concrete positive results such as increases of potable water resources available for communities and stakeholders and satisfactorily closing mining sites with viable future land use.

This approach raises a question for INAP. Should INAP also broaden its objectives as mining companies have done on their web-pages? Much of the work INAP has accomplished on ARD prevention relate to mine closure and expanding clean-water resources.

INAP needs to continue its position of promoting ARD prevention best practice industry-wide to all stakeholders. INAP needs to tell the story of what we are doing right to mitigate ARD. Certainly, the proposed ARD Best Practice Award to be presented at the ICARD is an excellent effort to promote ARD Best Practice and excellence in mine closure on a Global scale.

With the success of Bruce Kelley in Australia promoting INAP and its objectives, I believe that INAP should consider similar efforts in other mining regions beyond North America. Two that come to mind are Africa and South America. I believe that there are very experienced ARD practitioners, who would be open to supporting INAP and its goals in these regions. The reduction of INAP membership makes this approach more risky, but this effort also has the potential of promoting INAP to new member companies and expanding and strengthening the Global Alliance in these regions. I believe that this option should be pursued on a limited basis.

Another thought that I have pondered is, "how does INAP broaden the disciplines to which INAP resonates?" Certainly, the GARD Guide has value for environmental and geochemical scientist and engineers and water-treatment practitioners. Earlier, I raised the issue of mine closure. I believe mine-closure practitioners have similar concerns and objectives as INAP members. Two other disciplines that I believe are key to INAP's success in mitigating ARD are mine planners and mine managers. Presently, a common perception is that actions taken to mitigate ARD from mine wastes result in increased mine-waste handling resulting in higher mining costs. I believe that early and accurate waste characterization can give experienced mine planners sufficient information to contain reactive waste with a minimum of additional cost. An excellent example of this approach occurred at Barney's Canyon Gold mine just west of Salt Lake City, Utah.

In summary, I believe that INAP has been doing an excellent job of creating value for the mining industry and its stakeholders through technology and knowledge transfer, but we need to be more effective in identifying what the industry is doing right. We need illustrate our successes in concrete, measurable ways that relate to members of local

communities and other stakeholders such as cubic meters of recycled potable water or closed mine sites with innovative potential uses of mined land.

8. Up-Coming Events

Don't miss the following upcoming meetings that relate to acid drainage:

- **Tailings and Mine Waste '16**
October 2-5, 2016. Keystone, Colorado, USA
- **23rd Annual BC/MEND Workshop**
November 30 – December 1, 2016. Vancouver, BC, Canada
- **IMWA 2017 Conference**
June 12 – 16 2017. Mikkeli, Finland
- **Australian AMD Workshop 2017**
October 23-26, 2017. Devonport, Tasmania
- **24th Annual BC/MEND Workshop**
December 2017. Vancouver, BC, Canada
- **11th ICARD/IMWA 2018**
September 3-9, 2018. Johannesburg (Midrand), South Africa

Please let us know of other events not listed that INAP and GA members would be interested in participating.