



## 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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### INAP Members



[Andrew Copeland](#) (Marshalltown, SA)



[Jim Robertson](#) (Toronto)



[Linda Broughton](#) (Tucson)



[Edward Cocchiarella](#) (Toronto)



[John Mudge](#) (Reno)  
[Ken Ramsey](#) (Denver)  
[Charles Bucknam](#) (Denver)



[Dan Ramey](#) (Phoenix)  
[Larry Todd](#) (Phoenix)  
[Tom Claridge](#) (Safford)



[Bruce Kelley](#) (Melbourne)  
[Rich Borden](#) (Salt Lake City)  
[Steve Slater](#) (Buenos Aires)  
[Paul Brown](#) (Melbourne)



[Denis Kemp](#) (Toronto)  
[Paul Deveau](#)  
[Joe Fyfe](#) Toronto  
[Jacques Moulins](#)

#### Contact INAP at:

Technical Manager – Terrence Chatwin [terrence.chatwin@inap.com.au](mailto:terrence.chatwin@inap.com.au) + 1 (801) 243-5759  
 Administrative Assistant – Andrea Chatwin [andrea.chatwin@gmail.com](mailto:andrea.chatwin@gmail.com) + 1 (801) 485-2279

## 1. INAP OpCom Chair Report: Jim Robertson

INAP has been actively involved globally during 2008. A Strategic Planning session was held in Salt Lake City, Utah in February in conjunction with the annual SME meeting. The April ACMER conference in Tasmania was supported and attended by INAP personnel. The Diavik mine in Yellowknife, NT hosted a research project tour in August to share information with sponsoring members. The GARD Guide has progressed well during the year with reviews and contributions by INAP members (see details in the GARD Guide section of this newsletter). Several papers and technical information on INAP and the GARD Guide were presented at a number of conferences including sites in China and Indonesia. Workshops were held in Denver and Johannesburg focusing on specific chapters of the GARD Guide. The "Rev A" of the Guide will be ready for review at the Vancouver meeting in December.

During the year, INAP had several replacements in the operating staff. In July, Andrea Chatwin accepted the role of administration assistant as Amber Turner retired to full time motherhood. In September Graeme Dunn, an accounting consultant in Melbourne, was retained to cover the accounting and financial reporting roles as Franca Tomaras has passed these duties over after tending dutifully to them for the past decade. INAP would like to thank Amber and Franca for a job well done in establishing a solid foundation of procedures and records for others to follow.

INAP celebrated its first decade of existence this year. The consolidation of companies globally during the past three years has had a major change in the personnel comprising the INAP Board of Directors as well as in the Operations Committee. In the past three years, INAP has lost Noranda, Inc., Placer Dome, Inc., Phelps Dodge, Inc. and International Nickel (INCO). These companies were replaced by Freeport McMoran Mining Co., Vale Inco, Xstrata Mining Corporation from these mega mergers. In late 2008, INAP gained Kinross Gold as a new member. As a result of these changes, INAP has grown with new ideas and through the energy of these new members.

## 2. INAP Technical Manager's Report: Terrence Chatwin

This has been a banner year for INAP. Our main focus has been on producing the GARD Guide. But during 2008, we have achieved a number of other accomplishments as well. The progress on the GARD Guide has been outstanding, and much of the credit for this success is due to Keith Ferguson, the GARD Guide Champion and the great team organized by Golder and lead by Rens Verburg and Nico Bezuidenhout. This has been an international effort with review and support from all of INAP and the Global Alliance including Clive Bell and Les Hulett, ACMER; Denis Kemp, Xstrata and Gilles Tremblay and Charlene Hoggan, MEND. The Rev A version of the GARD Guide will be ready for review on the INAP website at the end of February 2009.

Many presentations on the GARD Guide and INAP have been given during the year by David Williams, ADTI; Terry Chatwin, INAP; Gilles Tremblay, MEND; Joe Fyfe, Xstrata, Keith Ferguson, INAP and others. We also had four articles on the GARD Guide published in mining magazines and journals.

In February 2008, INAP held a very successful strategic planning meeting in Salt Lake City that was lead by Jim Robertson, Barrick with Jim Eddy and Adam MacMillan, Vale INCO as facilitators. Dave Salmon, Anglo American; Linda Broughton, BHP Billiton and Rich Borden, Rio Tinto added their strong support as we organized endeavours and teams to guide INAP into its second decade. Younger

representatives of INAP member companies, Ron Clarke, Newmont and Kristy Chow, Vale INCO added their energy and perspective to this meeting.

The INAP OpCom and Board Meeting in Burnie, Tasmania solidified the ideas, directions and plans made in the Salt Lake City strategic planning meeting. Denis Kemp, Xstrata; and Steve Slater, Rio Tinto added their experience and support to this great meeting. Tom Claridge, FMI suggested that INAP have a Water Treatment Workshop in Tucson in October 2009, and he offered to host the meeting. After hearing of INAP's plans Linda Broughton, BHP Billiton offered to co-host the meeting.

In August, six representatives of INAP and the Global Alliance travelled to Diavik where they met with the research team for technical discussions and toured the Country Rock test facility. Steve Slater, Rio Tinto; Gilles Tremblay, MEND and Suzie Belanger, Xstrata Nickel were pleased with the discussions and insights gained from the technical team headed by David Blowes and Leslie Smith.

In October 2008, excellent GARD Guide workshops were held in Denver, CO and Johannesburg, SA. These workshops were sponsored by Global Alliance members ADTI and WRC. Thanks goes to Charles Bucknam, Newmont and Carol Russell of ADTI and USEPA, who co-hosted the workshop in Denver. Meiring du Plessis, WRC and Nico Bezuidenhout of Golder organized and facilitated the workshop in Johannesburg.

Throughout the year, the ICARD Planning Committee has had meetings followed up by conference calls with INAP and the Global Alliance, including Denis Kemp, Xstrata and Charles Bucknam, Newmont. The planning for the 8<sup>th</sup> ICARD is going well. The Planning Committee has received abstracts for over 300 proposed papers. Of note to INAP, a special session is planned for the Roll Out of the GARD Guide during the June, 23-26, 2009 meeting of the 8<sup>th</sup> ICARD in Skelleftea, Sweden.

In November, Kinross Gold joined INAP. We thank Dean Williams, Kinross, for his support in facilitating this coupling.

As you can see, INAP has had a great 2008!

### **3. GARD Guide Progress Report: Keith Ferguson**

INAP's Global Acid Rock Drainage (GARD) Guide project continues to advance. The Golder Associates team delivered the "initial beta" version of the Guide to INAP in June 2008. The INAP OpCom and GARD Guide Steering and Advisory Committees and selected external consultants reviewed the document and provided comments and contributions. INAP also sponsored workshops in partnership with ADTI/US EPA in Denver, Colorado and the South Africa Water Resources Commission in Johannesburg, South Africa to review selected chapters. The workshops were very well attended and excellent input was obtained on the Guide.

All of the comments received on the initial beta version are currently being reviewed and consolidated with seven of the ten chapters of the Guide forwarded to Golder for revisions. Golder will produce a revised version (Rev A) of the Guide by the end of November 2008.

INAP in partnership with the Global Alliance will hold a half-day workshop on December 2 in Vancouver, BC to review key aspects of Rev A focusing in particular on further "how to" guidance for managing ARD.

A technical editor from Golder will review the Guide in January 2009 and format the document for porting to the internet in a "Wiki" style. The Guide should be available for broad stakeholder review via the internet on INAP's website in early February 2009.

INAP plans to hold additional workshops on the Guide in Europe, Australia and South America in 2009. An updated version of the GARD Guide will be produced in May 2009 and formally launched at the 8<sup>th</sup> ICARD conference to be held June 23-26 in Skelleftea, Sweden.

INAP would like to thank all of those who have contributed to the development of the GARD Guide to date and is very pleased with the level of interest in the project.

#### **4. Global Alliance Members News**

##### **ACMER News**

###### **Presentation on INAP and GARD Guide (China)**

Emeritus Prof L Clive Bell, ACMER representative for the INAP Global Alliance, presented a paper on INAP and the Global Acid Rock Drainage Guide at the 6th International Conference on Acid Sulfate Soils and Acid Rock Drainage Symposium (16-20 September 2008) in Guangzhou, China. At the conference, he also met with representatives of groups in China, which have an interest in ARD, with a view to initiating the formation of an ARD network that could become a member of the INAP Global Alliance. It is hoped that this network will be established by the end of 2008. ACMER staff members are also facilitating the establishment of an ARD network in Indonesia that may become part of the Global Alliance.

###### **GARD Guide Presentation (Brisbane)**

On 27 October 2008, Clive Bell gave a presentation on the GARD Guide, on behalf of INAP, at a Seminar on Mine Waste Management organised by Golder Associates in Brisbane.

###### **Forthcoming ACMER Activities**

The following ACMER courses and workshops in late 2008 and the first half of 2009 may be of interest:

- 25-26 November 2008 Perth, Workshop on 'Life of Mine Planning – From Impact Assessment to Mine Completion'. This workshop, intended for both personnel for government agencies and industry will include assessing AMD risk at the planning and approval stage of a mining project in a Western Australian context.
- 16-20 February 2009 Perth, Workshop on 'Life of Mine Planning – Technical Aspects of Operation and Closure'. This workshop will include one module on potential impacts, prediction, prevention and control of AMD and acid sulphate soils in a Western Australian context.
- 11-12 March 2009 Brisbane - Short Course on 'The Fundamentals of Acid and Metalliferous Drainage'. - This short course will look at the basics of AMD, how we measure it, what the results mean and what are the early warning indicators of AMD, both visual and chemical, on mine sites. Delegates will also learn about the environmental impacts of AMD and waste

dump/TSF design and construction. Case studies involving both problems and successes will be highlighted.

- ACMER is presently in discussions with INAP and Keith Ferguson (the GARD Guide Champion) on the possibility of hosting a half day workshop in Brisbane on 13<sup>th</sup> March on the Global Acid Rock Drainage Guide.
- 22-26 June 2009 Perth – Short Course on ‘Practical Monitoring for Improved Environmental Performance’. This course will highlight the need for an effective site-specific monitoring program to provide information to facilitate leading practice AMD management in both the short and long-term.

### **ADTI News**

In February 2008, SME published ADTI-MMS’ first in a series of workbooks about acid drainage from metal mines, “Basics of Metal Mining Influenced Water” (Introduction and Glossary). This series and the INAP GARD Guide strongly supplement one another, and many series authors are reviewing GARD Guide Chapters. The next two workbooks in the series, “Prevention and Treatment of Water Influenced by Metal Mining” and “Mine Pit Lakes: Characteristics, Predictive Modelling, and Sustainability” are planned to be published in 2009.

ADTI has entered into a memorandum of understanding with the Interstate Technology Research Council (ITRC) to collaborate on issues relating to the prevention of acid rock drainage.

During the annual SME Meeting in February 2008, David Williams, ADTI presented a paper on the progress of the GARD Guide. ADTI member, Linda Figueroa also presented a GARD Guide update at the ITRC Mine Waste Task Force Meeting.

An ADTI – USEPA workshop was held in Denver October 1<sup>st</sup> to review and discuss the mitigation and prediction chapters from the INAP GARD Guide. The participants felt that the workshop was very valuable in addressing technical and programmatic issues of the Guide and broadening stakeholder awareness of the GARD Guide.

In February 2009, the upcoming Annual Meeting of the SME in Denver will have a session on the GARD Guide addressing its progress and application to the international mining community.

Members of ADTI are supporting a USEPA initiative, “Mining and Mineral Processing Compliance Assistance Dialogue.” Its purpose is to engage the copper mining industry in developing a process-by-process approach to evaluate the environmental impacts and good waste management practices of copper production. ADTI participants include representatives from copper producers, state environmental regulators and consultants.

### **MEND News**

#### **Completed MEND Reports for 2008**

- MEND Report 2.21.5 Macro-scale Cover Design and Performance Monitoring Manual (released January 2008) – O’Kane Consultants
  - The manual introduces design and monitoring guidelines for mine waste soil cover systems on a macro-scale, and discusses challenges that arise due to increased size and complexity as compared to

evaluating cover systems on a micro-scale. Background and general guidelines for landform design are presented, which also largely apply for evaluating cover systems on a macro-scale. In addition, watershed is put forth as the ideal unit size for evaluating performance of a cover system on a macro-scale.

- MEND 10.1.1 A Review of Environmental Management Criteria for Selenium and Molybdenum (February 2008) – EcoMetrix
  - This review addressed the gaps for *aquatic* and *terrestrial* toxicity issues related to molybdenum and selenium. General characteristics of selenium and molybdenum, including typical source characteristics, environmental fate and transport, key toxicity effects, select strategies for remediation of soil with plants, and reported thresholds for animals of interest were examined.
- MEND Report 1.70.1 Investigation of Predictions for Acidic Drainage at the Vangorda Plateau, Faro Mine Complex – Faro, YT (May 2008) - CCSG Associates and Bill Slater Environmental Consulting.
  - This report compares pre-approval acidic mine drainage modelling predictions, actual monitoring data and post-development modelling predictions at the Vangorda Plateau. The results of the comparison provide insight into the effectiveness of prediction methodologies and guidance for general application of these methodologies for future mine planning.
- MEND Report 3.15.1 Application of Membrane Separation Technology to Mitigation of Mine Effluent and Acidic Drainage (October 2008) – Natural Resources Canada
  - The report provides an overview of membrane separation technology and its application to the treatment and management of mining effluents, including acidic drainage. Membrane separation processes, such as reverse osmosis and nanofiltration have been successfully applied for the treatment of acidic drainage and the removal of contaminants and metal species from mining and industrial effluents.
- MEND W019 Proceedings of the MEND Manitoba Workshop – (September 2008).
  - MEND and Manitoba Science, Technology, Energy and Mines (STEM) presented a workshop on “Challenges in Acidic Drainage for Operating, Closed or Abandoned Mines” on June 4 and 5 in Winnipeg, Manitoba.

MEND reports can be purchased by contacting the MEND Secretariat in Ottawa at the following e-mail address [mend\\_nedem@nrcan.gc.ca](mailto:mend_nedem@nrcan.gc.ca).

MEND also participated Symposium 2008 on Mines and the Environment in Rouyn-Noranda held in Rouyn-Noranda on November 2 to 5, 2008. A total of 240 delegates attended the international conference and trade exhibit. A post-conference field tour to Bouchard-Hébert and Agnico-Eagle’s Laronde and Goldex-Manitou sites was completed. The proceedings will be available in the near future.

#### **Current MEND Projects under Review**

The following projects have been completed in draft and are in review:

- Prediction Manual
- Literature Review on Northern Soil Covers

- Literature Review on Assessing the Potential Biological Impacts of Submerged Tailings
- Mine Poirier and East Kemptville Mine Case Studies.

### **News from South Africa**

#### **GARD Guide Workshop**

INAP in association with the South African Water Research Commission hosted a successful Workshop with invited specialists in ARD and mine water management to discuss aspects of the Global Acid Rock Drainage Guide. This Workshop was held on 13 October 2008 and formed part of the Mine Closure 2008 International Conference. The Workshop served to share information regarding the development of the GARD Guide and to consult with role-players in order to obtain further regional input on specifically Chapters 6 (Prevention and Mitigation) and 10 (Performance Management) of the Guide. The feedback received from the participants will be used to improve the Guide. Nico Bezuidenhout who is also the GARD Guide Project Manager at Golder and Associates acted as the Workshop facilitator and was the main presenter.

#### **Mine Closure 2008**

Mine Closure 2008 – the 3rd International Seminar on Mine Closure and associated Training Courses and Workshops took place from 7 to 17 Oct 2008 in Johannesburg. Almost 400 participants from 28 countries attended the Seminar to hear how 90 speakers from around the world describe challenges of how to remediate and close mines in an environmentally responsible fashion whilst minimising socioeconomic impacts. The Seminar topics ranged from acid mine drainage to heritage sites, and the 905-page Mine Closure 2008 Book of Proceedings contains 81 peer-reviewed papers. A unique feature of the Seminar was that the excellent response by paying delegates, industry partners and the Department of Trade and Industry enabled the organisers to offer 100 free seats to participants from Government and Municipalities.

#### **Second Symposium on Best Practice Guidelines**

On 11 and 12 February 2009, the Water Institute of Southern Africa's Mine Water Division in collaboration with the Department of Water Affairs and Forestry are hosting a second two day Symposium focused on the content, requirements and application of the recently completed Best Practice Guidelines (BPG) for water resource protection in the South African Mining Industry. This Symposium is a follow-up to the successful first 2 day BPG Symposium organised by the WISA Mine Water Division in October 2007. This Symposium covered the first six completed guidelines while the planned Symposium will cover the remaining eight. They are entitled: Integrated mine water management, Pollution prevention and minimisation of impacts, Water monitoring systems, Impact prediction, Water management aspects for mine closure, Water management for mine residue deposits, Water management for surface mines and water management for underground mines.

#### **Mine Water 2009**

The Water Institute of Southern Africa's Mine Water Division and the International Mine Water Association will jointly host this Conference from 19 to 23 October 2009 in Pretoria. South Africa has a long history of mining and has limited natural water resources; leading to a situation where it also has a number of significant mine water related challenges. With over 10 000 km<sup>2</sup> of hydraulically interlinked coal mines and over 300 km of interlinked gold mines, mine water challenges manifest not only at local mine level but at regional level too. This Conference will enable attendees to learn firsthand how these 21<sup>st</sup> century challenges are tackled. Further information is available on the Conference website at [www.wisa.org.za/minewater2009.htm](http://www.wisa.org.za/minewater2009.htm). A

distinctive aspect of the Conference will be the awarding of a cash prize of R15,000 (about \$1,500) to the best technical paper written and presented by a bona fide student

## 5. Up-Coming Events

25-26 November 2008 Perth, Workshop on 'Life of Mine Planning – From Impact Assessment to Mine Completion'. – Contact: Ron McLean 61-7-3346-4503, [R.McLean@acmer.uq.edu.au](mailto:R.McLean@acmer.uq.edu.au)

15<sup>th</sup> Annual BC/MEND Metal Leaching/Acid Rock Drainage Workshop - The Management of Tailings and Tailings Impoundments, Vancouver, BC, December 3-4, 2008. Contact: Gilles Tremblay 613-992-0968; [gtrembla@nrcan.gc.ca](mailto:gtrembla@nrcan.gc.ca)

Northwest Mining Association 114<sup>th</sup> Annual Meeting, Exposition and Short Courses, Reno, Nevada, December 1-5, 2008. Contact: 509-604-1158, Web: [www.nwma.org](http://www.nwma.org).

16-20 February 2009 Perth, Workshop on 'Life of Mine Planning – Technical Aspects of Operation and Closure'. – Contact: Ron McLean 61-7-3346-4503, [R.McLean@acmer.uq.edu.au](mailto:R.McLean@acmer.uq.edu.au)

On 11 and 12 February 2009, Second Symposium on Best Practice Guidelines - Water Institute of Southern Africa's Mine Water Division in collaboration with the Department of Water Affairs and Forestry – Contact: Meiring du Plessis, [meiringd@wrc.org.za](mailto:meiringd@wrc.org.za)

Society of Mining, Metallurgy and Exploration (SME), Denver, Colorado, February 25-28, 2009. Contact: SME 303-973-9550, Web: [www.smenet.org](http://www.smenet.org)

ACMER Course, March 11 – 12, 2009, Including GARD Guide Workshop. Contact: Ron McLean 61-7-3346-4503, [R.McLean@acmer.uq.edu.au](mailto:R.McLean@acmer.uq.edu.au)

30th Annual West Virginia Mine Drainage Task Force Symposium, Morgantown, West Virginia, March 31 - April 1, 2009, Ramada Inn. Including GARD Guide Workshop

CIM Canadian Institute of Mining Conference and Exhibit, Toronto, Canada, May 10-13, 2009. Contact: 514-939-2710, Web: [www.cim.org](http://www.cim.org).

ASMR 26<sup>th</sup> Annual Meetings and the 11th Billings Land Reclamation Symposium May 30 – June 5, 2009, Crowne Plaza Hotel, Billings, MT. Dennis Neuman is the host, [dneuman@reclamationresearch.net](mailto:dneuman@reclamationresearch.net) and additional information will be added here when it is nearer the meetings.

8<sup>th</sup> International Conference on Acid Rock Drainage, Skelleftea, Sweden, June 22-28, 2009. Contact: Lars-Ake Lindahl <mailto:Lars-Ake.Lindahl@metallgruppen.se>

22-26 June 2009 Perth – Short Course on 'Practical Monitoring for Improved Environmental Performance'. – Contact: Ron McLean 61-7-3346-4503, [R.McLean@acmer.uq.edu.au](mailto:R.McLean@acmer.uq.edu.au)

3<sup>rd</sup> National Conference on Ecosystem Restoration (NCER) 2009, Los Angeles, California, July 20-24, 2009. Contact: Tom St. Clair at 904-232-1774 or by email at: [GSTClair@pbsj.com](mailto:GSTClair@pbsj.com).

IMWA Symposium 2009 and Water Institute of Southern Africa's Mine Water Division: Pretoria (South Africa), 19 - 23 October, 2009, CSIR Conference Centre, Pretoria - [www.wisa.org.za/minewater2009.htm](http://www.wisa.org.za/minewater2009.htm).

11th International Symposium on Environmental Issues and Waste Management in Energy and Mineral Production, November 16-19, 2009, Banff, Alberta, Canada. Contact: Dr. Raj K. Singhal Email: [singhal@shaw.ca](mailto:singhal@shaw.ca), Official Websites: <http://www.mpes-cami-swemp.com/>

ASMR 27<sup>th</sup> Annual Meeting will likely be in Pittsburgh with Margaret Dunn (Stream Restoration, Inc.) and Lois Uranowski (OSM) as co-hosts. The dates and hotel have not been established.

ASMR 28<sup>th</sup> Annual Meeting will be in Bismarck, ND at the Ramkoda Hotel with Steve Schroeder the host. Additional information will be added here when it is nearer the meetings. The date has been set for June 12-16, 2011