



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.

1. SUMMARY

Welcome to the first issue of the INAP Newsletter for 2018. Congratulations to Kinross' Paracatu mining site in Brazil and Rio Tinto's Iron Ore Pilbara operations who were recently recognized as the first winners of the International Best Management Practice Award. Join us at ICARD 2018 for their presentations on their winning approaches.

Reviews of the GARD Guide chapters are completed and comments are being consolidated to identify priority chapters that will be updated. INAP's Global Cover Design Guidance Document is now available from the INAP web site and was officially launched at the 9th AMD 2017 Workshop in Burnie, Tasmania in November. Read about the Cover Design report as well as other recent releases in this Newsletter.

Tiered membership was adopted by INAP in 2017 and two mining companies are finalizing details to join INAP as tiered members. And several other companies have made inquiries. An excellent sign as membership continues to grow.

In this issue, you will find an innovative technique that reduces ARD from abandoned mines by lowering the air supply into the mine, information on the successful 9th AMD Workshop, and reference to the Leading Practice handbooks, produced by the Australian Government.

Happy reading to all. Comments and suggestions are welcomed!

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Gilles Tremblay
INAP Technical Manager
gilles.tremblay@inap.com.au
www.inap.com.au

2. Kinross and Rio Tinto Recipients of INAP's ARD Best Practice Awards

The first recipients of INAP's international ARD Best Practice Award are Kinross Brasil for their operation in Paracatu, Brazil and Rio Tinto's Iron Ore Pilbara operations. The awards are presented in recognition of the implementation of best practice in the identification, planning and management of potentially reactive geologic materials at a mining site and at the corporate level. Both operations were found to exemplify global best practice and deserve international recognition. These awards will be formally presented to Kinross Brazil and Rio Tinto Iron Ore at the 11th International Conference on Acid Rock Drainage (ICARD) in Pretoria, South Africa in September 2018. Congratulations to both.

3. 11th ICARD / IMWA 2018 / MWD - Pretoria, South Africa

The **Eleventh International Conference on Acid Rock Drainage** (11th ICARD) and the **2018 International Mine Water Association** (IMWA) Conference is planned for September 10-14, 2018 in Pretoria, South Africa. The conference program includes 8 plenary lectures and close to 200 technical presentations over the four-day event. Six short-courses are planned, along with pre- and post-conference field trips. Please visit www.ICARD2018.org and www.IMWA2018.info for additional information including registration for the event.

Sponsorship opportunities are still available and the brochure is available at <http://www.IMWA2018.info/download-sponsorship-brochure>

On behalf of INAP, IMWA and the WISA Mine Water Division, and the Organizing Committee for the 11th ICARD and 2018 IMWA, we are looking forward to seeing you in South Africa in September.



4. 9th AMD Workshop a Success

The 9th Australian Workshop on Acid and Metalliferous Drainage was held in Burnie, Tasmania in November 2017. The workshop was hosted by the University of Queensland's Sustainable Minerals Institute (SMI), the Australian partner of INAP. The AMD Workshop is strategically positioned to take place between ICARDs. Originally, the focus was on Australia, but now it increasingly attracts international participants and has a more global focus. Over 100 delegates attended this workshop, which was preceded by two short courses - Fundamentals of Acid and Metalliferous Drainage and an Introduction to INAP's Global Cover System Design Technical Guidance Document. The location in Burnie provided good access to two interesting field trips, MMG's Rosebery Mine and to the Zeehan mining heritage area.

In summary, INAP enjoyed a high profile through short course participation, a key note address, facilitation of the closing session and targeted sponsorship. The AMD Workshop proceedings and information on future events can be found at <https://amdworkshop.com.au/>.



Congratulations to SMI and the organizing committee for a successful workshop.

5. New ARD / AMD Prevention Technology

In the battle to manage ARD/AMD, significant technological breakthroughs are few and far between. At the 9th Australian AMD Workshop in Burnie (November, 2017), Earth Systems announced a major advance in the prevention of ARD/AMD (acid and metalliferous drainage) from underground mines. The strategy involves a two-stage process to remove oxygen from mine void atmospheres and replace it with inert gas phase. In the absence of oxygen, sulphide oxidation and acidity generation cannot proceed.

Stage 1 involves the identification and isolation of all significant air entry points into the mine void. Lowering air resupply into mine voids to levels that are below sulphide oxidation rates results in decreases in significant pollution production. Stage 2 is applied if complete pollution prevention is required and involves the installation of inert gas injection systems to overcome the effects of barometric pumping.

Stage 1 inert atmosphere installations have been completed at two decommissioned metal mines in New South Wales (NSW), Australia, and monitoring is ongoing. After less than 12 months, pollution from one site has been lowered by 50% and a 75% reduction has been recorded at the other site. The case studies have provided unambiguous proof of concept, and the improvement at one site has far exceeded expectations.

For additional information on this method, please contact Dr. Jeff Taylor at Earth Systems (jeff.taylor@earthsystems.com.au).

6. Australia's Leading Practice Handbook Series

The Leading Practice Sustainable Development Program (LPSD) handbooks, produced by the Australian Government, document best practices in mining and provide guidance for the mining industry on sustainable development issues. There are 14 handbooks in the series, many of which have been translated to increase their global outreach.

The latest edition of the handbook devoted to mine drainage issues is titled: "Prevention of Acid and Metalliferous Drainage (AMD)". The new handbook has roughly doubled in size since the previous edition. This is the result of an increase in coverage to include more extensive risk assessment of AMD issues, pit lakes, specific issues for brownfields (i.e. already oxidized) sites, methods for initial placement of sulphidic waste to minimise inception of AMD, communication of AMD issues to both management and external parties, and a request from industry to include more specific guidance on how to address and handle AMD issues. The technical content of the handbook is complemented by 12 extended (4-5) page case studies sourced from sites located in Australia and overseas to highlight the application of leading practice across the spectrum of AMD prevention, control and treatment.

The handbooks, including the AMD handbook, are available for download from: www.industry.gov.au/resource/Programs/LPSD/Pages/default.aspx

7. Recently Released Reports

INAP Releases the Global Cover System Design Guidance Document

The Global Cover System Design - Technical Guidance Document is intended as a best practice summary to assist mine operators, designers, and regulators to address issues where cover systems can be employed. A holistic framework, at both high and conceptual levels is presented for management of reactive materials during operations and at closure. Application of the holistic framework is achieved through the use of a cover system design tool that walks users through relevant climatic factors to optimize cover system design alternatives for a desired performance design criteria (e.g. control of net percolation or oxygen ingress). This allows users to understand what a realistic objective is when developing cover system design alternatives based on site-specific climate conditions.

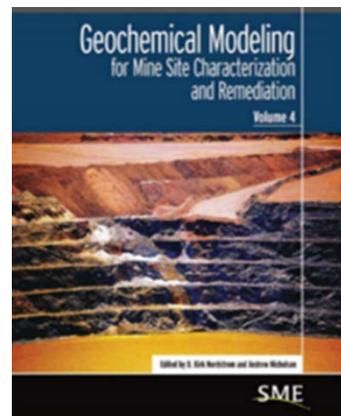
The information provided within the tool is not a replacement for site-specific classification and engineering required for cover system design. However, the tool is a means of beginning early conceptualization to help focus further investigation at a site level and to begin to form realistic expectations for cover system performance at an early stage of a project. The report is available from the INAP website at <http://www.inap.com.au/research/#globalCoverSystem>

ADTI Releases New Handbook on Geochemical Modelling

Geochemical Modelling for Mine Site Characterization and Remediation is the fourth of six volumes in the Management Technologies for Metal Mining Influenced Water series. The handbook describes the important components of hydrogeochemical modelling for mine environments, primarily those mines where sulphide minerals are present – metal mines and coal mines.

It provides general guidelines on the strength and limitations of geochemical modelling and an overview of its application to the hydrogeochemistry of both unmined mineralized sites and those contaminated from mineral extraction and mineral processing.

Copies of the Geochemical Modelling handbook and the other five handbooks from this series can be purchased from the SME online bookstore at <http://www.sme.org/books/>



MEND Releases Report on Study of Tailings Management Technologies

MEND recently released a report that examines and compares alternatives to conventional slurry for the management of tailings. This report presents a snapshot of the current state-of-practice in the mining industry in Canada, and other countries with similar climatic conditions. It looks at the technologies used to dewater tailings, how tailings are placed and managed, and evaluates their relative efficacy in addressing physical and geochemical risks. The reader will gain an understanding of the strengths and limitations of tailings dewatering technologies,

deposition practices, and how these choices apply to specific sites and mining projects compared to conventional practices. The report should help guide which technologies and strategies should be considered for a project, taking into account site conditions, project constraints (e.g. production schedule), tailings' physical properties (e.g. grain-size, and plasticity), and geochemical properties (e.g. the potential for tailings to generate metal leaching and/or acid rock drainage). The report, MEND 2.50.1, can be downloaded from the MEND-NEDEM website at <http://www.mend-nedem.org>

Mining Association of Canada (MAC) Released Tailings Guide

In November 2017, MAC released the third edition of its *Guide to the Management of Tailings Facilities*. This edition of the Tailings Guide is another step in the continual improvement process for tailings management, moving towards the goal of minimizing harm: zero catastrophic failures of tailings facilities, and no significant adverse effects on the environment and human health. It contains new technical components, including those critical to the physical and chemical stability of tailings facilities. It also strengthens key management components throughout the tailings facility's life cycle, such as change management, critical controls for risk management, and performance evaluation. The management systems approach that underpins the Tailings Guide is not specific to Canadian conditions and is applicable to tailings facilities anywhere in the world. The Tailings Guide and other information related to tailings management can be downloaded from the MAC website at <http://www.mining.ca/our-focus/tailings-management>

For more information, please contact Charles Dumaresq (cdumaresq@mining.ca) of the Mining Association of Canada.

8. Up-Coming Events

Don't miss the following upcoming events:

- **Water Congress 2018**
May 9-11, 2018. Santiago, Chile
- **Symposium 2018 - Mines and the Environment**
June 17-20, 2018. Rouyn-Noranda, Québec. Canada
- **The Mine Waste & Tailings Conference 2018**
July 23-24, 2018. Brisbane, Australia
- **11th ICARD/IMWA 2018/MWD**
September 10-14, 2018. Pretoria, South Africa
- **Northern Latitudes Mining Reclamation Workshop**
September 10-13, 2018, Whitehorse, Yukon. Canada



- **41st Annual BC Reclamation Symposium**
September 17-20, 2018. Williams Lake, BC. Canada
- **Tailings and Mine Waste 2018**
September 30 – October 2, 2018. Keystone, Colorado. USA
- **25th Annual BC/MEND Workshop**
November 28-29, 2018. Vancouver, BC, Canada

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

INAP MEMBERS



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