



# Update on MEND, including the 9<sup>TH</sup> ICARD, and NOAMI



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**MEND and NOAMI Secretariat**  
**Natural Resources Canada**



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OTTAWA CANADA

# Presentation Highlights

- Mine Environment Neutral Drainage (MEND)
- 9<sup>th</sup> ICARD
- National Orphaned and Abandoned Mines Initiative (NOAMI)



# MEND Program

- 1989 – 2012
- Extensive national and international Network
- ~\$21M in 23 yrs
- Focused research work plan
- Technology transfer



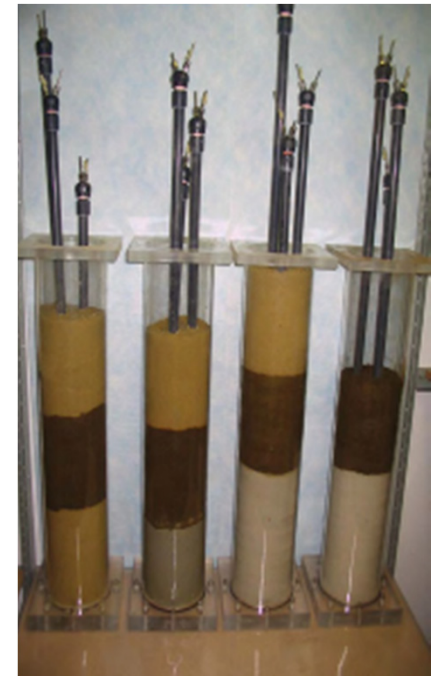
# Recent Publications

## **MEND 1.61.7 Climate Change and Acid Rock Drainage: Risks for the Canadian Mining Sector (October 2011) (*Stratos Inc*)**

Develop scenarios to highlight potential impacts of climate change on the mining sector

## **MEND 1.61.5c Cold Regions Cover Design Technical Guidance Document (July 2012) (*OKC*)**

Information on key physical, chemical and biological processes affecting long-term risk to covers in the North.



# Projects on the Go

## **In-Pit Disposal of Tailings and Waste Rock (SENES)**

- 12 case studies detailed - based on available information

## **Diavik Diamond Mine Waste Rock Study**

- Scale-up study in cold climates
- To evaluate and prevent the possible generation of ML/AD from waste rock

## **Vegetative Covers in Canada (OKC)**

- Enhance predictive modelling capability to predict the influence vegetation on cover system performance

## **Neutralization Sludge Characterization and Stability (Lorax)**

- Investigate the geochemical composition and environmental stability of mine water treatment plant neutralization sludge



# Projects on the Go

## Lime Treatment Plant Survey (NRCan)

- Review of AD treatment and sludge management operations

## Nitrate and Remobilization/Attenuation of Selenium in Coal Mine Waste (Lorax)

- Literature review on interaction of nitrate with Se and other possible Se-bearing minerals (e.g. pyrite).



# X-Cutting – Technology Transfer

## The MEND Monitor Guidance Documents

## Workshops (>30)

- Annual BC-MEND ML/ARD Workshops
- Biannual regional workshops
- MEND Technology Transfer Workshops to Community Groups

MEND Website at: [www.mend-nedem.org](http://www.mend-nedem.org)

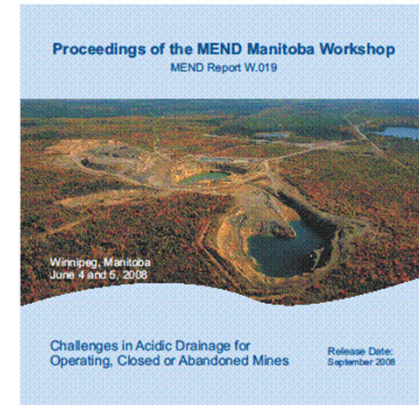
## MEND Reports:

- 210 on paper and CD
- Most on website

## Global Alliance

- GARD Guide: [www.gardguide.com](http://www.gardguide.com)

## 9<sup>th</sup> ICARD in Ottawa (May 2012)



June 2007

### The MEND Monitor

#### The Mining Association of Canada (MAC)

The Mining Association of Canada (MAC) is the national organization of the Canadian mining industry. It comprises companies engaged in mineral exploration, mining, smelting, refining and semi-fabrication.

MAC's mission is to promote, through the collective action of its members, the growth and development of Canada's mining and mineral-processing industry, for the benefit of all Canadians. The Association works to promote the interests of the industry nationally and internationally, to work with governments on policies affecting minerals, to inform the public, and to promote cooperation among members to solve common problems.

Canada is among the world's largest producers of minerals and metals. The industry contributes \$42 billion to Canada's annual gross domestic product and employs approximately 350,000 people in mineral extraction and in the value-added smelting, fabrication and manufacturing sectors. MAC members understand that their license to operate must be earned through a demonstrated commitment to sustainable development. Accordingly, through the Association's Towards Sustainable Mining (TSM) initiative, MAC places a high priority on activities that promote excellence in environmental performance and protect employees, customers, communities of interest and the natural environment.

The Globe Foundation recently named MAC winner of 2005 Industry Association Award for Environmental Performance. In many important ways, Canada is regarded as a global leader in collaborative environmental research and innovative approaches to best practices. Multi-stakeholder initiatives such as MEND, the National Orphaned/Abandoned Mines Initiative (NOAMI) and the Metals in the Human Environment Research Network (MITHE-RN) are just a few of the programs in which MAC and its members are active participants.

For more information, please consult MAC's web site, [www.mining.ca](http://www.mining.ca).

#### New! MEND Publications

MEND Report 1.61.6 - Update on Cold Temperature Effects on Geochimical Weathering: Effects of cold temperatures on mine wastes are examined, along with opportunities to mitigate mine drainage issues. Relevant case histories are reviewed and evaluated to better understand geochemical mechanisms. Information gaps are discussed, and recommendations made for future work. Contractors: SRK Consulting/Miniking Environmental Management Inc.

13<sup>th</sup> BC MEND ML/ARD Workshop Proceedings The workshop was held November 29-30, 2006 in Vancouver. The focus of the presentations was on the challenges with open pits and underground workings. CD-ROM of the Proceedings can be ordered at: [www.btech.ca](http://www.btech.ca) or [books@btech.ca](mailto:books@btech.ca)

#### Upcoming Events

31<sup>st</sup> British Columbia Mine Reclamation Symposium, September 17-20, 2007, Squamish, BC. The themes are Rejuvenation through Reclamation and Operating for Closure. The symposium will include a full day tour of the Britannia Mine. Visit [www.btm.ca](http://www.btm.ca) for additional information on the technical program, fieldtrip and registration.

Sudbury 2007 Mining and the Environment Conference, October 20-27, 2007, Sudbury, ON. The conference will address mine rehabilitation and environmental protection issues with a focus on sustainability. ([www.sudbury2007.ca](http://www.sudbury2007.ca))

14<sup>th</sup> BC MEND Workshop, November 28-29, 2007, Vancouver, BC. To be held in conjunction with the International Mine Water Association. This year's theme is Challenges in Collection and Treatment of Mine Drainage.

Symposium on Water, Air and Land: Sustainability Issues in Mineral and Metal Extraction, August 24-27, 2008, Winnipeg, MB. For additional information, visit [www.metsoc.org/comm2008](http://www.metsoc.org/comm2008)

To obtain information on MEND or its publications, please visit the web site at: [http://mend\\_nedem@nrcan.gc.ca](http://mend_nedem@nrcan.gc.ca) or send an e-mail to: [mend\\_nedem@nrcan.gc.ca](mailto:mend_nedem@nrcan.gc.ca)



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# MEND Website

Website: [www.mend-nedem.org](http://www.mend-nedem.org)

MEND / NEDEM

ABOUT US PUBLICATIONS NEWS/STAFF CONTACT US FRANÇAIS

Acidic drainage is the largest environmental liability facing the Canadian and international mining industry. Since 1999, the Mine Environment Neutral Drainage (MEND) program has worked to develop technologies to prevent and control acidic drainage. The program is directed by a multi-stakeholder committee, with members from the mining industry, federal and provincial governments, and non-government organizations. Tremendous technical progress has been made in the areas of prediction and modeling, prevention and control, disposal technologies, liner treatment, passive treatment and monitoring and verification of technologies.

In 2002, a renewed MEND initiative was created that focused on Canadian national and/or regional information needs. A network of Canadian experts helped to identify the top priorities that included verification of full-scale mitigation technologies, closure management, early prediction, neutral and alkaline pH drainage, sludge management, passive treatment, and cold temperature effects. Strong emphasis was placed on the need for case studies, guidance documents and technology transfer initiatives.

The priorities provided the framework for a multi-year research plan, and serves as the basis for the annual work plan. While the earlier MEND work related to control and limitation of liabilities, there has been a broadening of the program's mandate to include other environmental and sustainable development issues.

Strong linkages were forged among MEND and international industry and government programs. MEND is the Canadian partner in the Global Alliance (GA), an international partnership among organizations involved in acidic drainage research that is led by the International Network for Acid Prevention.

Much progress has been made in reducing the liability: initially with acidic drainage and later expanded to cover the entire range of drainage pH. Environmentally sound technologies are now available to open, operate and decommission mines for the short and the long term. Mining companies and consultants have acquired a great deal more capability to deal with water contamination from mine wastes, including acid generation. However, many challenges remain, and the success of the MEND program in Canada is demonstrating significant progress in addressing them.

2012 9th IAGARD SYMPOSIUM  
New! MEND Report  
Upcoming EVENTS  
The GARD Guide

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# The Global Alliance



[www.inap.com.au](http://www.inap.com.au)

## Acid Drainage Technology Initiative



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# GARD Guide Updated – ICARD

## [www.gardguide.com](http://www.gardguide.com)

- Most recent update: 9<sup>th</sup> ICARD, Ottawa
  - Characterization: Dr. Stuart Miller (EGi); Jeff Taylor (Earth Systems)
  - Prediction: Dr. Bill Price (NRCan)
  - Prevention: Dr. Ron Nicholson (Ecometrix)
  - Treatment: Ms. Janice Zinck (NRCan)
- Spanish and French translation Executive Summary
- Broaden global nature of GARD Guide
- Functionality upgrades
- More tool boxes (case studies)



# 9<sup>th</sup> ICARD - May 20-26, 2012

- 🍁 May 20 and May 21 – Short Courses
- 🍁 May 22 to 24 – Technical Program
- 🍁 May 25 and 26 – Field Trip
- 🍁 Held at the Westin Hotel, Downtown Ottawa



# 9<sup>th</sup> ICARD Organizing Committee

- Conference Chair - Elizabeth Gardiner
- Technical Co-Chairs - Gilles Tremblay, Craig Ford
- Technical Program Chair - Bill Price
- Short Courses Chair - Janice Zinck
- Sponsorship/Exhibits Chair - Jim Robertson
- Field Trips Chair - Lisa Lanteigne
- Social Program - Marilyn Fortin
- Conference Secretariat
  - Anne Chartrand
  - Ellyn Holzman
  - Dianne Comeau



UNCONVENTIONAL  
*Planning*



# Conference

- 8 pre-conference short courses
  - About 250 participants
- 526 delegates from 19 different countries
- 3-day technical program
  - Plenary session
  - 127 presentations
  - 43 posters
- Trade show with 25 exhibitors
- Two-day field trip to Northwest Quebec



# Short Courses

- Closure of Mine Waste Storage Facilities\*\*
- Guidance on How to Characterize Sulphidic Geological Materials and Predict Future Drainage Chemistry\*
- Mine Water Management\*
- Mine Drainage Treatment: A Detailed Review of Active Treatment Options, Advantages and Challenges
- Sustainable Treatment Technologies for Treatment of Acid Rock Drainage
- Effective Integrated Management of Mining-Impacted River Basins
- Membrane Separation Technology – Overview and Applications in Mining
- Passive Treatment of Mine Drainage

\*\* two-day course

\* full-day course



# Welcome and Opening Plenary

- Elizabeth Gardiner, MAC
- Bruce Kelly, INAP
- Michel Filion,  
Teck - Moderator
- Kim Bellefontaine,  
Province of BC
- David Chambers, CSPP
- Glenda Ferris, Environmental Activist
- Craig Ford, Inmet
- Pierre Gratton, MAC



# Opening Plenary



**Key participants  
from BC**

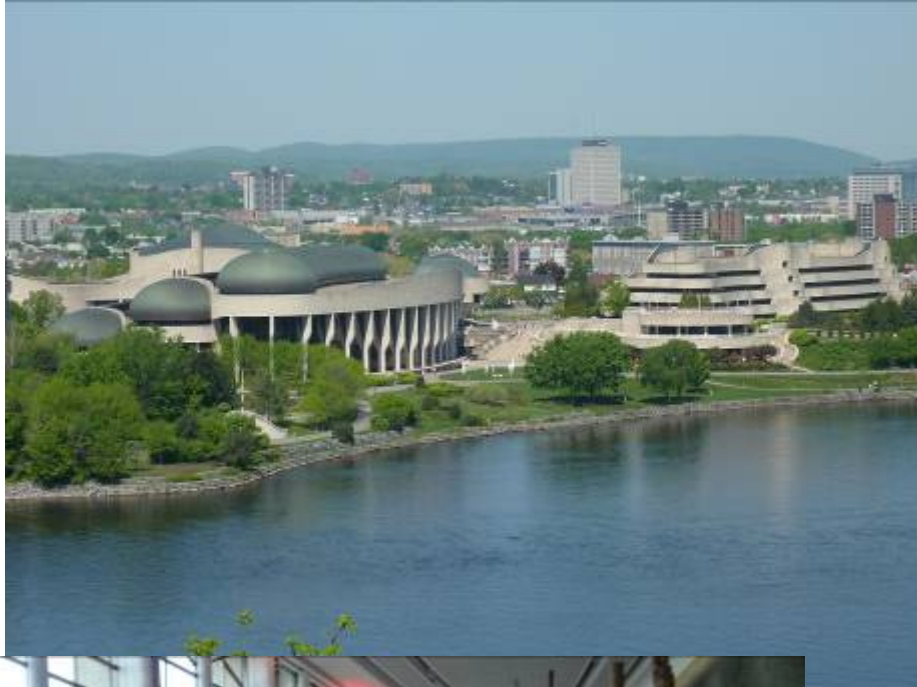


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# BANQUET



# BANQUET



# Field Trip – Northwest Quebec



Louvicourt, Teck



Mine Doyon, IAMGOLD



LaRonde, Agnico-Eagle



Malartic, Osisko

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Teck



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# Budget (preliminary final)

- Total Expenses ~\$550,000
  - Web version of the proceedings
  - Conference secretariat / Westin
- Sponsorship Income ~\$270,000
- Profit generated
  - Committee to discuss next steps



# ICARD Survey

■ Overall Conference	91.1%
■ General Session	86%
■ Paper Presentations	85.9%
■ Poster Presentations	62.5%
■ Perceived Learning	69.6%
■ Overall Program Content	86.7%
■ Exhibit Area (Time to visit)	83.3%
■ Exhibit Area (Displays)	81.6%
■ Welcome Reception	92%
■ Taste of Canada Dinner	95.6%

Score of 4 or 5 on a scale of 5



# What did you like most about the Conference?

- Networking, networking, networking.
- Great location, great host and balanced technical presentation
- Program content – presentations. Scope of topics covered.
- Extremely well organized, great availability of event planning group and absolutely amazing Taste of Canada Dinner
- Technical program
- Well organized, good selection of program, overall superb.
- International aspects
- The exhibition. Quality of the technical presentations.
- Concurrent sessions. There was always a good paper to attend.
- Technical field trip.
- Relevant topics of presentations.
- Punctuality of the presentation timing to allow movement between sessions
- Excellent food.
- Affordable.





# Conference Web Site

[www.ICARD2012.ca](http://www.ICARD2012.ca)



- Web site to be closed at end of 2012
- Proceedings, with presentations on MEND and INAP sites shortly



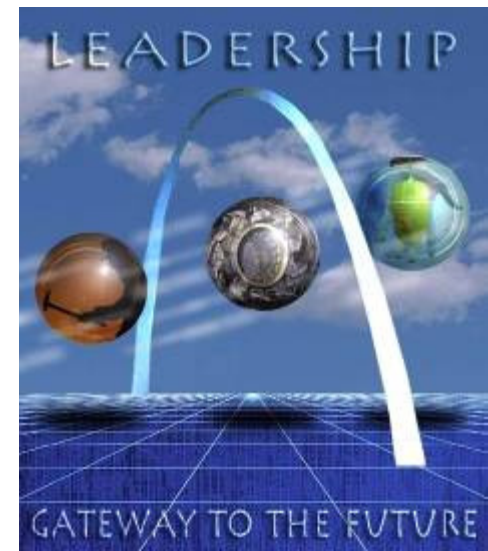
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# NEXT ICARD

- 1988 Norway
- 🍁 1991 Montréal
- 1994 Pittsburgh (USA)
- 🍁 1997 Vancouver
- 2000 Denver (USA)
- 2003 Australia
- 2006 St. Louis (USA)
- 2009 Sweden
- 🍁 2012 Ottawa
- 2015 Santiago, Chile



# National Orphaned / Abandoned Mines Initiative - (NOAMI)



**North Coldstream Mine - Burchell Lake, ON**



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- Multistakeholder partnership
- Six task groups overseeing prioritized projects:
  - Information Gathering (Inventory)
  - Community Involvement
  - Legislative Barriers to Collaboration
  - Funding Approaches
  - Jurisdictional Legislative Review
  - Mine Closure/Return of Mining Lands



# NOAMI Highlights

Working model of web-based National Inventory of OAMs

## Guidelines and Toolkits:

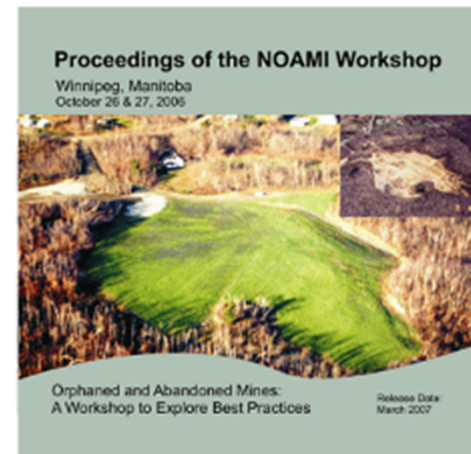
- Pamphlet on Guiding Principles in Community Involvement
- A Toolkit of Funding Options for Abandoned Mine Rehabilitation
- Guidance Document: Mine Closure and Management of Long-Term Liabilities

## ■ Published Reports

- Reviews of national and international inventories, funding models, and barriers to collaboration
- Community case studies
- Jurisdictional legislative review relating to OAMs.

## ■ Information Sharing

- Five workshops
- NOAMI website [www.abandoned-mines.org](http://www.abandoned-mines.org)
- Newsletters



# Return of Mining Lands - 2012

- Reference document to examine 5 case studies of closed Canadian mine sites returned, or in process of being returned, to the Crown
- Decision Process will be constructed based on sum of information. Process will outline key factors that need to be assessed to determine if a site could be returned or should remain responsibility of the operator
- Starting point for jurisdictions to develop policy and regulatory program





## Mine Environment Neutral Drainage (MEND)

[www.mend-nedem.org](http://www.mend-nedem.org)

National Orphaned/ Abandoned  
Mines Initiative (NOAMI)

[www.abandoned-mines.org](http://www.abandoned-mines.org)



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Thank You  
Merci



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