

MEND AND NOAMI UPDATE

Gilles Tremblay and Charlene Hogan

22nd BC-MEND ML/ARD Workshop
December 2, 2015



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MEND Program



...to provide leadership and guidance on priority acidic drainage issues in Canada

- 1989 – 2015
- Extensive national and international multi-stakeholder network
- ~\$21M
- Current research budget ~ \$150K/a
- Focused research work plan
- Technology transfer



Recent Publications

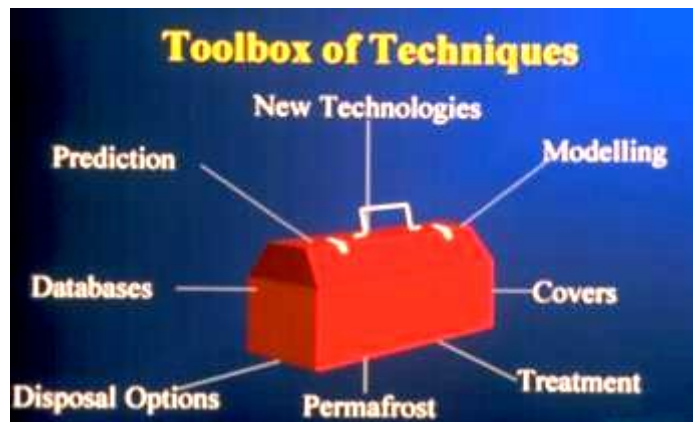
MEND Report 10.3 - Role of Nitrate in the Remobilization and Attenuation of Selenium in Coal Mine Waste (*Lorax and SRK*)

- Assess the potential links between explosive-derived nitrogen compounds and the remobilization and attenuation of selenium associated with coal mine waste materials

MEND Report 4.7.2b - Re-Analysis of Data from Metal Mining Effluent Regulations Environmental Effects Monitoring Program (*R2 Resource Consultants Endeavour Scientific Inc.*)

MEND Report 2.36.1b - In-Pit Disposal of Reactive Mine Wastes: Approaches, Updates and Case Study Results (*Arcadis*)

- An update of the 1995 MEND Report 2.36.1 and provides a summary of 12 case studies of in-pit disposal of mine waste at locations around the world.



Projects on the Go

Diavik Diamond Mine Waste Rock Study

Phase II: 2010 – 2014 (UBC, U of Alberta, U of Waterloo)

- Scale-up study in cold climates

Seasonal Biogeochemical Thiosalts Characterization of the Glencore Oxidation Reservoir and Input Water Sources: Towards Bacterially Informed Management Strategies (*L. Warren, McMaster U*)

- Objective is to increase the understanding of the degradation of thiosalts in treatment systems at the microbial level.

Study of Tailings Management (*Klohn Crippen Berger*)

- Objective is to conduct a detailed examination of alternatives to conventional slurry for the management of tailings (i.e. thickened, paste and filtered tailings); and to document the strengths, limitations, and physical and chemical risks of these alternative technologies, as compared to conventional slurry.



Projects on the Go

Study of Tailings Management (*Klohn Crippen Berger*)

- Preliminary list of mine sites and a questionnaire prepared to send to operators of tailings facilities, particularly, but not exclusively, those that use alternatives to slurry as well as those that have applied other tailings management technologies such as desulphurization.
- Information e-mails sent to MAC Members and provincial mining associations seeking their support to identify sites for the projects. Provincial governments also to be contacted.
- Questionnaire distributed.



MEND Steering Committee Meeting and Field Trip

September 22 – 24, Rouyn-Noranda to Val d'Or

Special thanks to:

- **Université du Québec en Abitibi-Témiscamingue (UQAT)**
- **Glencore – Fonderie Horne**
- **IAMGOLD**
- **Agnico-Eagle Division LaRonde**
- **Canadian Malartic**
- **Agnico-Eagle Division Goldex**
- **Aur Resources (Teck – Glencore)**



Abitibi-Temiscamingue Region

Don Rouyn Pit, Millenbach, Waite Amulet and Old Waite sites are in this general area

Amos

Mine Doyon

LaRonde Mine

Louvicourt Site

Sigma Mines

Goldex Mine

Rouyn-Noranda

Malartic

Canadian Malartic Mine

Lamaque Tailings

Norbec- Manitou Tailings

Image Landsat

Google earth



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MEND Website

MEND Website

Advanced Search Functionality

Enhance accessibility of MEND reports to civil society via plain language summary of reports and increased search capacity. French search site under development.

Website: www.mend-nedem.org

10th ICARD
IMWA 2015

Santiago, Chile

April 21-24, 2015

**“The Canadian MEND Program –
The First Twenty-Five Years”**

11th ICARD (IMWA)

Johannesburg (Midrand) South Africa

September 3 – 9, 2018



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Future Project Areas for MEND

Summary of discussions from September 22 Rouyn-Noranda meeting

- Further work based on gaps or needs identified by the Tailings Management Study
- Economic analysis in tailings management and design, including full cost accounting of potential failure costs
 - an important topic but outside the scope and expertise of MEND
- Plain language documents on tailings and tailings management to help build community capacity
- Challenges associated with reprocessing existing tailings
- Climate change adaptation
- Use of biosolids (e.g., sewage sludge) as covers



National Orphaned / Abandoned Mines Initiative - (NOAMI)



North Coldstream Mine - Burchell Lake, ON



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The Action Plan

The goals of NOAMI are to provide tools to remediate existing orphaned and abandoned properties and to prevent the occurrence of new orphaned and abandoned mines in the future.

Task groups created to address key issues:

- Web-based National Inventory
- Community Engagement
- Legislative and Institutional Barriers to Collaboration
- Funding Approaches
- Jurisdictional Legislative Review
- **Mine Closure and Return of Mining Lands to the Crown**
- Communication – Overarching

Contact Lake, SK



Return of Mining Lands Project

NOAMI's RML Project has produced several important tools and guidance documents that contribute to the prevention of orphaned and abandoned mines.

Need for clear policy framework for mine closure, long-term liabilities and return of mining lands to the Crown

- *Policy Framework in Canada for Mine Closure and Management of Long-term Liabilities: A Guidance Document* (Cowan Minerals 2010)
- 2011 Workshop - *Exploring the Management of Long-term Liabilities and the Return of Mining Lands to the Crown in Canada*
- *Case Studies and Decision-making Process for the Relinquishment of Closed Mine Sites* (Cowan Minerals 2013)
- *Key Criteria for the Effective Long-term Stewardship of Closed, Orphaned/ Abandoned Mine and Mineral Exploration Sites* (Kingsmere Resource 2015)
- *Mine Closure and Long-Term Management – Cost Estimation (New Project)*

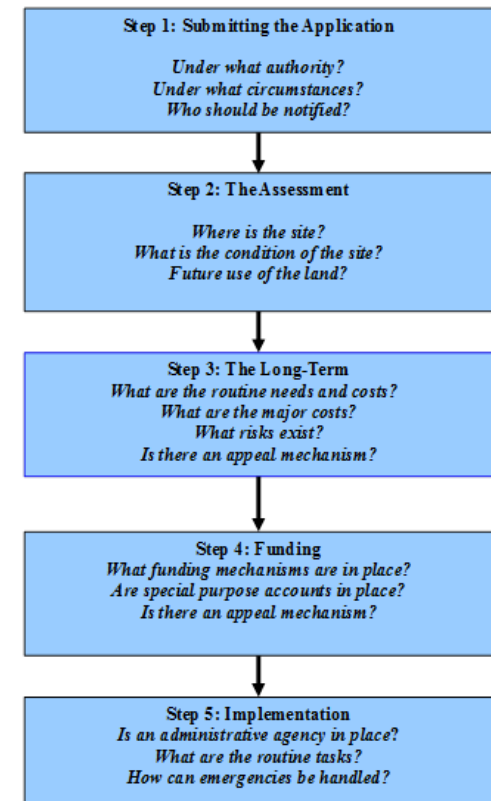


Case studies and decision making process

Outlines key factors that need to be assessed to determine if a site is eligible to be relinquished, or should remain responsibility of the operator.

Follows a natural progression through decommissioning and reclamation to relinquishment.

1. Authority under which application may be made
2. Assessment of state and eligibility of the site
3. Determination of long-term needs and risks
4. Determination of costs and funding
5. Implementation



Key Criteria for the Effective Long-term Stewardship of Closed, Orphaned/ Abandoned Mine and Mineral Exploration Sites

Key criteria to be used as a tool by a range of “Users” to assess the condition of closed, orphaned/abandoned mine and exploration sites in Canada

Evaluates for:

- Chemical/physical stability
- Public health and safety risk
- Ecological risks
- Risks to ecosystem services

To provide the foundation of information to plan for the effective long-term stewardship of such sites. Report completed in 2015.



Focus for 2016

Mine Closure and Long-Term Management – Cost Estimation (New Project)

- Considers various requirements for long-term monitoring, maintenance and capital replacement of rehabilitation works, and cost estimates for this work

Promotion of public education tools for mine hazard

- Link to existing resources on dangers of abandoned mines, particularly the excellent resources developed in the US

Jurisdictional Processes for Rehabilitation Contracts – Series of case studies

- Examines the different processes used by jurisdiction to undertake a rehabilitation project
- Provides information to jurisdictions, contractors and the public.

Dominion (Gurney) tailings, MB - Before



After



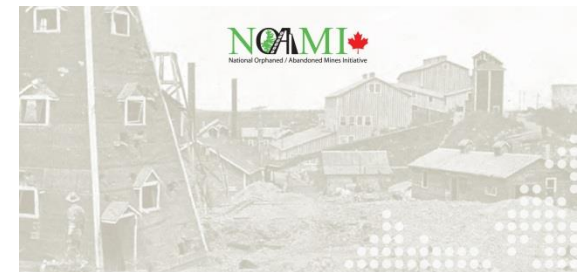
NOAMI in 2015

Performance Report 2002-2008

- Summarized the work of NOAMI and its jurisdictional partners towards remediation of orphaned/abandoned mine sites
- Widely distributed nationally and internationally

Performance Update 2009-2015

- Brochure - Tighter format
- Highlights NOAMI's major achievements, and the efforts of Canadian jurisdictions to address the potential legacy issues associated with orphaned and abandoned mines across the country
- Released in July



NOAMI Highlights

Information Sharing

- Six NOAMI workshops and Proceedings
- Sponsored Quebec First Nation Workshop
- Newsletters
 - NOAMI Nugget
 - Lingot d'INMOA
- Presentations/publications at conferences
 - Mine Closure 2015
 - NL Mineral Resources Conference
 - Panamanian Government
- Performance Reports
- Journals and Review
 - Manitoba Mining Review 2014/2015

www.abandoned-mines.org



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May 2015

Manitoba Orphaned/Abandoned Mine Site Rehabilitation Program

Background:

Manitoba began acting on orphaned and abandoned (O/A) mine site remediation in 1999 by introducing mine closure regulations. The regulations required that environmental liabilities incurred during mining operations be financially secured to cover future remediation costs. Mine closure plans and financial security must now be filed and approved prior to a permit being granted for a new mine operation.

In 2000, Manitoba established the Orphaned/Abandoned Mine Site Rehabilitation Program to address the public safety and environmental health concerns associated with orphaned/abandoned mine sites.

The program was initiated by the Manitoba Mines Branch in 2001-2002 to identify location, ownership, previous inspectors, availability of historical documents, and site conditions for the mine sites, which were scattered throughout the Province. A priority-based rehabilitation program was needed, and a hazard-based framework model was developed, implemented and completed from 2005 to 2007, to rank the Manitoba sites and prioritize work in a consistent way.

Before: Dominion (Surrey) site tailings area



Under the program, 149 former mine sites were identified as orphaned or abandoned, for which ownership had reverted back to the Crown, as former mining companies no longer existed or did not have the financial capacity to carry out rehabilitation work. Long-term rehabilitation plans were completed for all 149 sites, which were inspected for safety and environmental hazards and prioritized for rehabilitation. Out of the 149 sites, there were five high-priority sites (Lynn Lake, Sherridon, Gods Lake, Snow Lake and Baker Patton), 31 high-hazard sites and the remaining were low to moderate-risk sites.

In 2006, Manitoba established an Environmental Liability Account with a dedicated budget earmarked for the rehabilitation of orphaned/abandoned mine sites.

An aggressive schedule was developed to remediate the high-priority and high-hazard sites by the end of 2012 and various consultants were retained to undertake the work within this schedule. Tender packages were developed for the rehabilitation work and the Province entered into contracts to begin rehabilitation.

National Orphaned/Abandoned Mine Sites

NOAMI

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About NOAMI

Orphaned or abandoned mines are those mines for which the owner cannot be found or for which the owner is financially unable or unwilling to carry out cleanup. They pose environmental, health, safety and economic problems to communities, the mining industry and governments in many countries, including Canada.

Abandoned mines exist within all mining jurisdictions in Canada. These sites, however, are not well documented with respect to either their numbers or their associated physical health and environmental impacts and liabilities. Further research and compilation of information on abandoned mines is necessary to enable sound decision-making, cost-efficient planning and sustainable rehabilitation. Such information is also necessary to ensure transparency of decision-making and access to information by governments, civil society, industry and other stakeholders.

Background

In 1999 and 2000, a number of stakeholders put forth requests to Mines Ministers in Canada to establish a joint industry-government working group, assisted by other stakeholders, to review the issue of abandoned mines. The Ministers supported this initiative and requested that a multi-stakeholder workshop be organized to identify key issues and priorities.

The Workshop on Orphaned/Abandoned Mines in Canada, held in June 2001 in Winnipeg, reviewed the issues of orphaned/abandoned mine sites in Canada and identified processes to move forward. Five major themes were discussed:

- Building a National Inventory;
- Common Perspectives;
- Setting Standards and Rational Expectations - Links to Workshop Proceedings;
- Ownership and Liability Issues; and
- Identification of Funding Models.



**To download reports,
newsletters,
or workshop proceedings
please visit:**

**Mine Environment Neutral Drainage
(MEND)**

www.mend-nedem.org

**National Orphaned/
Abandoned Mines Initiative
(NOAMI)**

www.abandoned-mines.org



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Manitou-Goldex Project

