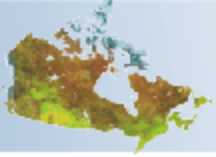


13th Annual BC-MEND ML/ARD Workshop
Vancouver, BC
November 29th & 30th, 2006

Update of MEND and NOAMI Programs

Gilles Tremblay and Charlene Hogan
MEND and NOAMI Secretariats

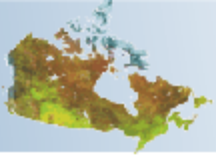




Presentation Highlights

- Mine Environment Neutral Drainage (MEND)
- National Orphaned/Abandoned Mines Initiative (NOAMI)

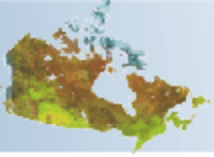




Mine Environment Neutral Drainage (MEND) Program

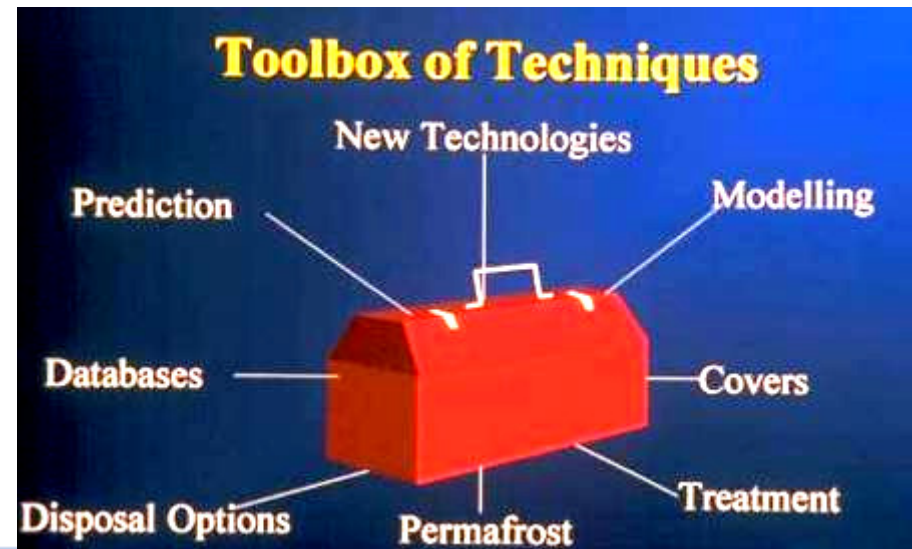
- **1989 – 2006**
- **Volunteer participation**
- **17 years ~\$20 M**
- **Research and technology**

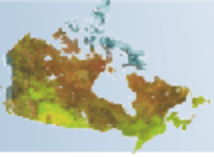




MEND Highlights

- Toolbox of methods to reduce environmental impacts of mining
 - Prevention best strategy
- Over 200 technical documents available
- 3 CD's with over 160 reports
- > 30 workshops completed
- Video
- MEND Manual
 - Six volume set





MEND Supported Technologies

- Prediction techniques
- Water covers for unoxidized and partially oxidized wastes
- Dry covers using soils/tailings, organic materials and geomembranes
- Mine waste management options for tailings, waste rock and treatment sludges
- Active and passive treatment
- Cold climate issues (permafrost)



Rabbit Lake, CAMECO



Solbec



**Man-made
Impoundments –
Water covers**

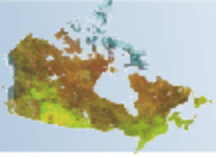
Equity Silver



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Canada

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Engineered Dry Covers

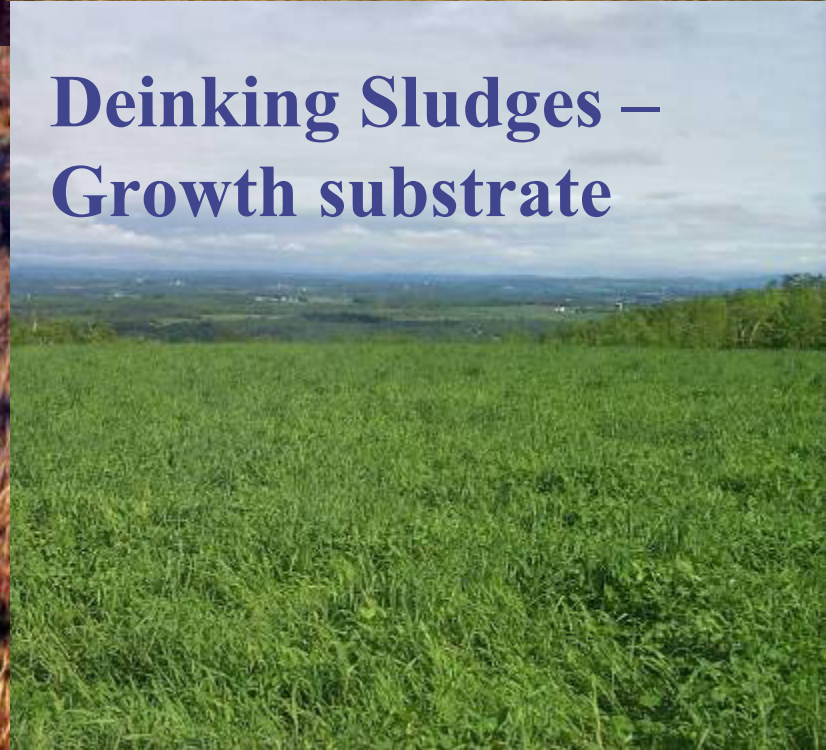


Equity Silver





Albert Mine, QC



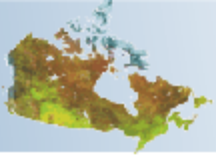
Deinking Sludges – Growth substrate



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CANMET Mining and Mineral Sciences Laboratories



Poirier 1998 - 2001

**Unique solution using
existing liner technology**



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Victoria Junction Coal Preparation Plant (CBDC)



October 2006



Active treatment



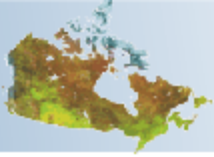
Passive treatment



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Canada 



MEND Projects - Completed

**Update on Cold Temperature Effects on
Geochemical Weathering (MEND 1.61.6)**

Underground Paste Backfill (MEND 10.2)

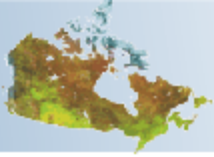
**MEND Technology Transfer Workshops to
Community Groups**

- Ontario Mining Action Network
- Sault Ste Marie, September 2006

Case Studies in BC (MEND 9.1)

- 9.1a Johnny Mountain Mine
- 9.1b Sulphurets Mine
- 9.1c Snip Mine





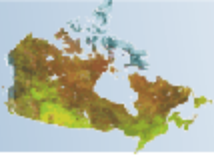
MEND Maritimes Workshop

- Challenges in Acidic Drainage : Case Studies on Mitigation Technologies and Current Research
- May 23 to 25, 2006 / Halifax, NS
- Proceedings available on CD-ROM



Environment and Labour





Ongoing MEND Projects

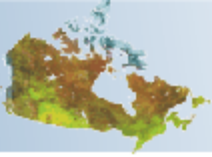
Prediction Manual - Update of the Draft “BC Prediction Manual” to be published as national document (NRCan)

Macro-Scale Cover Design and Performance Monitoring i.e. watershed (O`Kane)

- Watershed Scale Monitoring Methods
- Tracking Cover Evolution with Time

Literature Review on Impacts of Molybdenum and Selenium on Terrestrial Environment (EcoMetrix)





Ongoing MEND Projects

Northern Soil Covers (SRK)

- Study on cold region phenomena that could impact on the performance of soil covers

PJV – Encapsulation (EcoMetrix)

- Laboratory study on encapsulating acid-generating tailings between two acid-consuming tailings

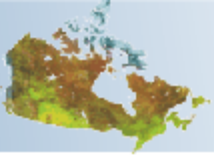
Membrane Separation Technology (CANMET)

- Literature review on the feasibility of the application of different membrane separation processes for the mitigation of ARD



Louvicourt Water Cover

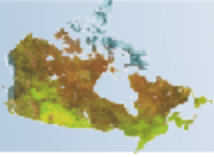




Treatment Plant Survey

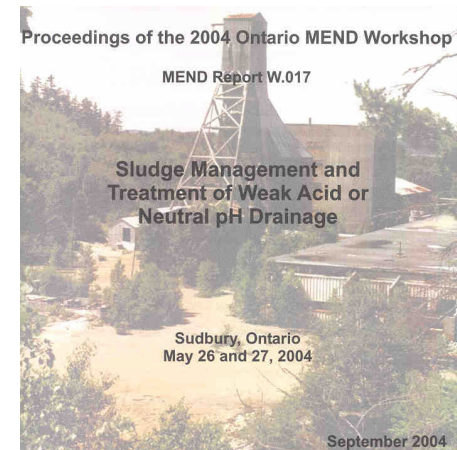
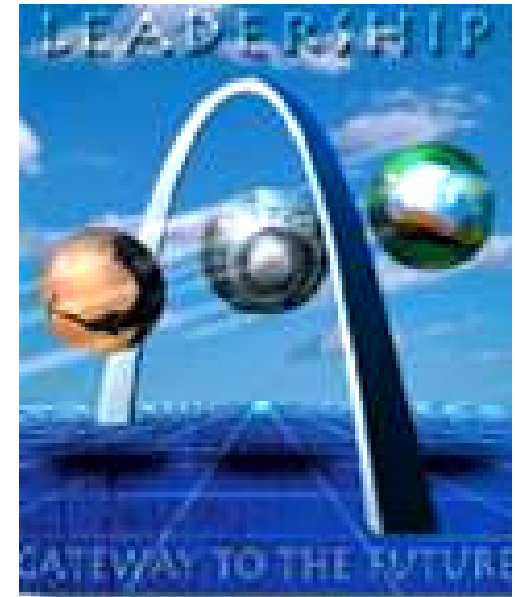
- Most sites employ some form of chemical treatment to address acidic drainage issues
- Currently there is no single, comprehensive database containing treatment and sludge management information for mine sites in Canada or worldwide
- MEND survey to address
 - Treatment processes, reagent/flocculant usage, solid/liquid separation
 - Sludge management practices, sludge production and metal leaching/monitoring data
 - Costing

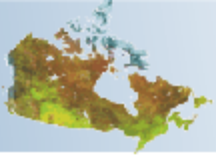




Technology Transfer

- The MEND Monitor
- Presentations
- Workshops
- MEND Reports
- Global Alliance
- 7th International Conference on Acid Rock Drainage, St-Louis, MO
- MEND Website at: mend.nrcan.gc.ca





Global Alliance



Acid Drainage Technology Initiative



Water Research Commission



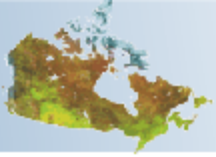
Abandoned Mines



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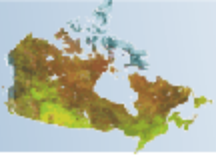


National Orphaned/Abandoned Mines Initiative (NOAMI)



Sullivan Site
Abitibi-Témiscamingue, PQ

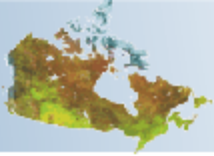




NOAMI

- Multistakeholder partnership
- Five task groups overseeing prioritized projects:
 - Information Gathering (for Inventory)
 - Community Involvement
 - Barriers to Legislative Collaboration
 - Funding Approaches
 - Jurisdictional Legislative Review





National Inventory

NOAMI

National Orphaned/Abandoned Mines Initiative

INMOA

Initiative nationale pour les mines orphelines/abandonnées



[Home](#) [Definitions](#) [Interactive Maps](#) [Search the Database](#) [Contacts](#) [Links](#)

Welcome



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 clean-up. 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/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.

© National Orphaned/Abandoned Mines Initiative (NOAMI) 2004

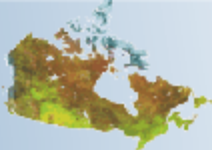
Home Page



Natural Resources
Canada

Ressources naturelles
Canada





Definitions

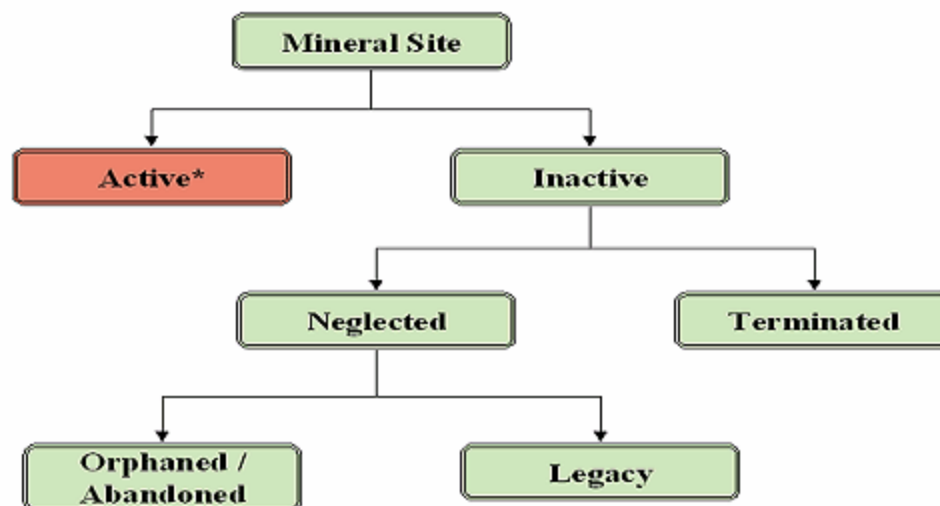
Definitions

National
Definitions

Provincial/Territorial
Definitions

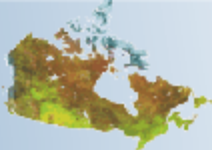
National Definitions

The suggested NOAMI database definitions presented below are designed to accommodate as many of the definitions used by the Canadian jurisdictions as possible or at least avoid any direct conflict. An attempt to avoid terms already in use in these jurisdictions and yet provide terms that may be directly correlated has been made. The inclusion of all mineral sites that are not active and not just those considered orphaned/abandoned allows all jurisdictions to place their mineral sites within the definitions without drawing any unwarranted conclusions about the site ownership.



*Note: The Interactive Maps and Search the Database sections of this website do not include Active Mineral Sites.





Links

Links

Information Sources

Alberta

Alberta Mineral Deposits and Occurrences Database (AMDO)

The database can be purchased from the Alberta Geological Survey and contains only metal and industrial mineral showings and prospects.

<http://www.ags.gov.ab.ca/MDA/AGS-1.HTML>

Coal Mine Atlas

The Alberta Energy and Utilities Board (EUB) maintains a Coal Mine Atlas which contains the operating and abandoned coal mines in Alberta. The Atlas provides access to a listing of all coal mines by operator, location, mine number, type of mine and mining method. Each entry in these listings is linked to the appropriate PDF map.

<http://www.eub.gov.ab.ca/BBS/products/publications/statseries/st45-index.htm>

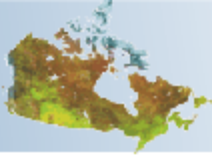
British Columbia

Historic Mine Sites Database (HMSDB)

The Historic Mine Sites Database (HMSDB) contains approximately 1887 sites at which some production occurred and no current mine permit is present. The database was built using Microsoft Access as the platform and was designed to incorporate geological, geochemical, geotechnical and administrative information for each site.

<http://www.em.gov.bc.ca/Mining/Geolsurv/Publications/OpenFiles/OF2003-03/toc.htm>





Interactive Maps

The screenshot shows the NOAMI website header. On the left is the NOAMI logo (National Orphaned/Abandoned Mines Initiative) and on the right is the INMOA logo (Initiative nationale pour les mines orphelines/abandonnées). Below the logos is a banner image featuring a red maple leaf, a 'DANGER Open Hole' sign, and the words 'safety', 'environment', and 'health'. A green navigation bar contains the following links: Home, Definitions, Interactive Maps, Search the Database, Contacts, and Links. Below the navigation bar is a large grey arrow pointing right with the text 'Interactive Maps' in bold black font.



As part of an ongoing collaborative effort with provinces and territories, NOAMI has begun to develop an interactive map displaying the abandoned/orphaned mine sites across Canada. In this first phase, the map identifies the locations of these mine sites in British Columbia, Manitoba, Ontario, Northwest Territories and Yukon courtesy of data sets provided by these provinces. The map also includes satellite imagery and details displaying infrastructure at the regional and national level.

Efforts for the next phase of the interactive map are to follow.

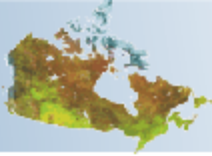
Enhanced Mapping Interface

To access the enhanced mapping interface, you will have to first download and install the [MapGuide Viewer Plug-in](#). This version includes increased functionality such as the ability to copy the map into other application, customizable print options and helpful information bubbles for various features on the map.

Basic Mapping Interface

The basic mapping interface does not require you to download a plug-in. The basic mapping interface includes the same information as in the enhanced version without the features stated above.





CANMET Mining and Mineral Sciences Laboratories

Zoom to a province/territory

Select Pan Zoom in Zoom out Previous Full Map Reports Copy Map Print Setup Print Search Preferences

Select

Mineral Sites

- Inactive Mineral Site
- Neglected Mineral Site
- Abandoned Mineral Site
- Legacy Mineral Site
- Terminated Mineral Site

Principal Mineral Producers

Aboriginal Information

Satellite Images

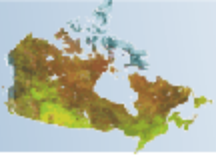
- Canada Mosaic Black & White
- Canada Mosaic Colour
- Satellite Images *

Base Map Layers

- National Parks
- Provincial Parks
- Rail Network
- Airports
- Water Bodies
- Cities *
- Expressways *
- Major Roads *
- Other Roads *
- Ferries *
- Detailed Roads *

* Layer will become visible automatically after zooming into the map.

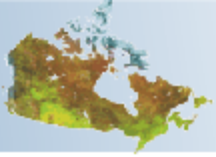
Lat: 40.776888, Lon: -55.573236



National Inventory -

Next phase: Integrate datasets for other provinces and territories to produce a nation-wide inventory with a national definition





NOAMI Projects - Completed

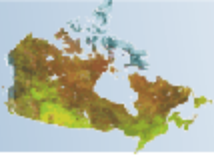
Rehabilitating Abandoned Mines in Canada: A Toolkit of Funding Options

Report describes five funding options available and provides pros and cons for each and provides eight case studies for illustrative purposes



Mines Ministers Tour Brewery Creek, YT

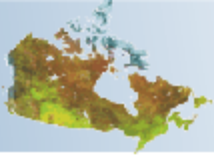




Best Practices Workshop

- A Workshop to Explore Best Practices on the management of orphaned and abandoned mines
- Winnipeg, MB on October 26-27
- Themes included:
 - Setting priorities (site & risk assessment)
 - Public engagement & capacity building
 - Partnership approaches (funding options, regulatory structure)
 - Applying best practices – Case study to bring it all together
- CD of proceedings to be produced





Provincial Initiatives

- Some provinces have programs for abandoned mines

Québec

- \$20 million (1987-2002)
- \$7.5 million (2006)

Ontario

- \$78 million (1991-1994, 1999-2007)
- \$60 million (2006-2012)

Manitoba

- \$2 million (~2002 - 2006)
- \$70 million (2006)

BC

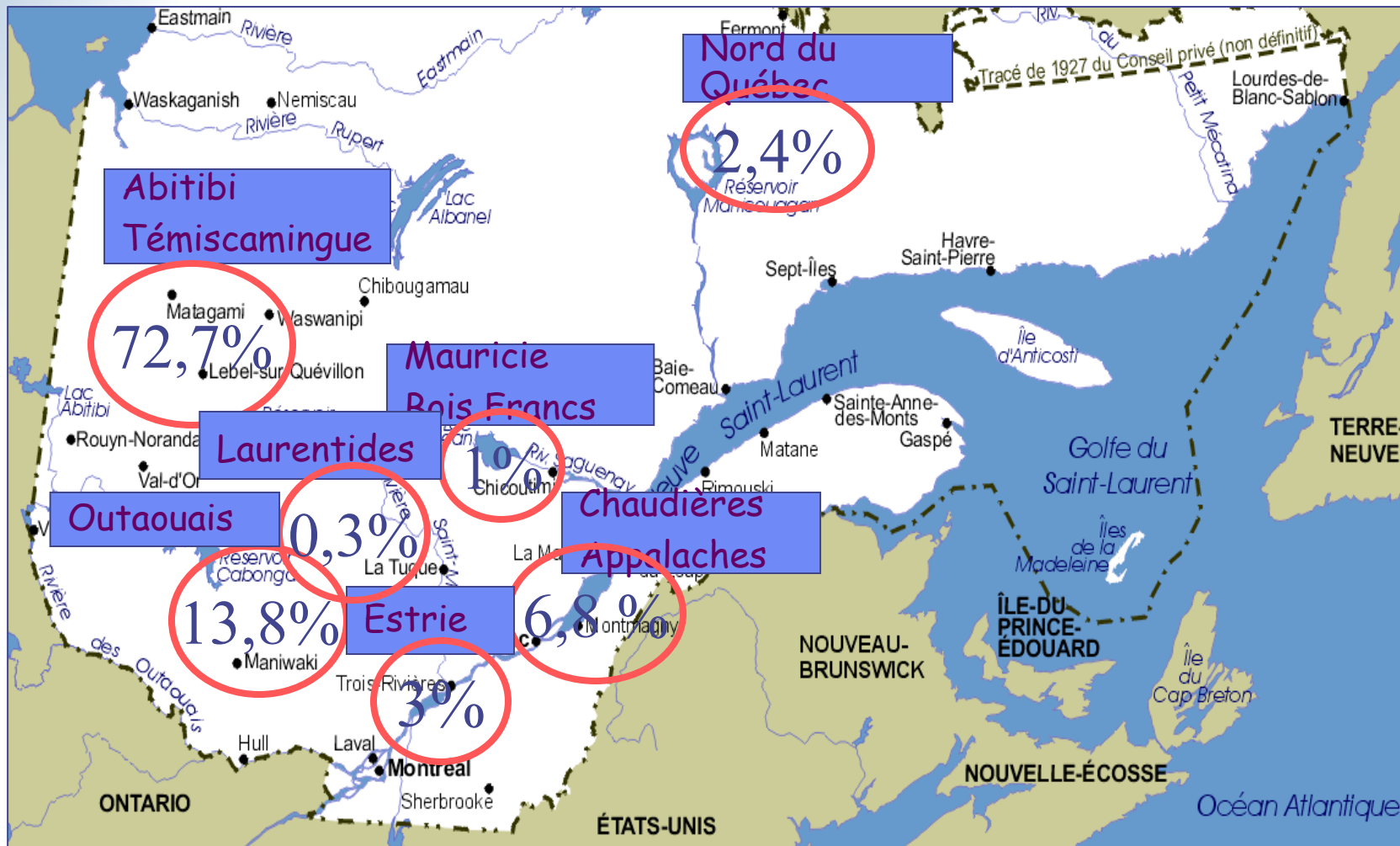
- \$180 million (since 2001) for contaminated sites

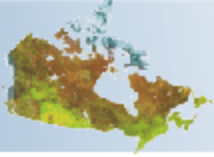


- Companies completing rehabilitation on historical or acquired properties



Province of Québec - Sites

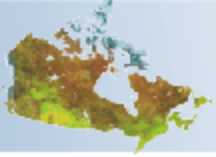




Ontario's Rehabilitation Program

- To date, > \$60 million spent on 75 priority, mainly Crown-held, abandoned sites
- Includes > \$38 million on the Kam Kotia Mine (KKM) site, near Timmins.
 - Next phase \$12.3 million, completed by 2007/08
 - Estimate of \$58 million to fully rehabilitate



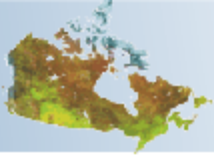


General Conclusion

“ The success of the mining industry of the twenty-first century begins with its relationship with the public”

National Mining Association, 1998





Mine Environment Neutral Drainage (MEND)

mend.nrcan.gc.ca

National Orphaned/ Abandoned Mines Initiative (NOAMI)

www.abandoned-mines.org

