



Public Science in Canada: Strengthening Science to Protect Canadians Symposium

Multi-stakeholder Research Initiatives: *Success through partnership and collaboration*

Janice Zinck

September 6, 2007



Natural Resources
Canada

Ressources naturelles
Canada

Canada



Introduction

- Sustainable development cannot occur without an integrated effort on the part of governments, industry, academia and the public.
- Canada is a leader in cooperative research and has established several very successful multi-stakeholder initiatives.



Natural Resources
Canada

Ressources naturelles
Canada

Canada



Key Messages

- Domestically, Canada partners with industry, the provincial governments, universities and non-governmental organizations to cooperate in technology development.
- Internationally, Canada partners with other governments to build capacity and transfer knowledge to improve the environmental management of their mining sectors.



Presentation Highlights

- Canadian Approach - Consortia
- Mine Environment Neutral Drainage (MEND)
- Green Mines Green Energy (GMGE)
- National Orphaned/Abandoned Mines Initiative (NOAMI)
- Metals in Soils





The Changing Scene

- Since the 1960's, growing awareness of the industry, public, regulatory agencies on the consequences of long-term environmental liabilities and costs
- Financial and human resources responsibilities
- Enlightened sustainable development policies
- New mining & waste technologies
- New/recent legislation in Canada
 - MMER
 - Provincial



Multi-stakeholder Approach

- Federal Government - Provincial Governments
- Industry - University partnerships
- Participation of non-governmental organizations
- Maximum buy-in
- Maximization of resources - shared goal
- Active participation by stakeholders





Multi-stakeholder Approach

- Collaborative effort - results in a better perspective of the issues
- Experiences shared freely and openly, information exchange
- Provides continuity
- Avoids duplication of effort



Multi-stakeholder Initiatives

- Mine Environment Neutral Drainage (MEND) Program
- Green Mines Green Energy (GMGE) Initiative
- National Orphaned / Abandoned Mines Initiative (NOAMI)
- Metals in Soils





Mine Environment Neutral Drainage – MEND Program



Key Message

MEND is a Canadian partnership with industry, the federal and provincial governments and non-governmental organizations to cooperate in technology development and to transfer knowledge to improve environmental management





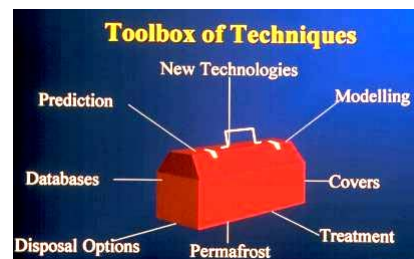
Mine Environment Neutral Drainage (MEND) Program: 1989-2007

- Participants
 - Federal government
 - 5 provincial governments
 - Mining companies
 - Non-governmental organizations
 - Volunteer participation
 - 18 years ~\$20 M
- Scope
 - Prediction
 - Prevention and Control
 - Treatment
 - Monitoring
 - Technology Transfer



MEND Results

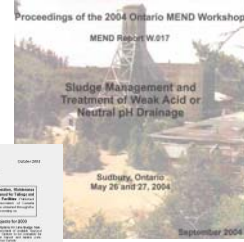
- Toolbox of methods to reduce environmental impacts of mining
 - Prevention best strategy
 - Increased understanding of acidic drainage (AD)
- Reduction in liability between \$400M and \$1 billion, an impressive return on an initial investment of \$20M
- Consensus building among government, industry and NGOs
- Recognition for Canada's leadership role in addressing AD for metal mines





Technology Transfer

- The MEND Monitor
- MEND Manual
- Presentations
- Workshops
- Global Alliance
- MEND Website at: mend.nrcan.gc.ca



Global Alliance

- International model of interaction among the various initiatives involved in acidic drainage.





MEND Conclusions

- Better understanding of the science of acidic drainage amongst all stakeholders
- The regulators, the industry and the public have increased confidence levels
- A model for industry/government/NGO cooperation for technology development

Solbec Mine



Green Mines Green Energy





Green Mines – Green Energy Biosolids to Bioenergy

NRCan – led consortium to examine use of “waste” organic materials (municipal compost, pulp and paper waste) to rehabilitate mine sites and establish energy crops (canola, corn, soy) for the production of biofuels

Biosolids + Mine Tailings + Energy Crops = Green Fuel



Now

Future??



Current Participants

Mining: CVRD Inco , Xstrata Nickel, Goldcorp (PJV), BHP-Billiton, Highland Valley Copper, Barrick

Forestry: Domtar, St. Marys Paper, Abitibi Consolidated

Government: Natural Resources Canada, Agriculture Canada, Ont. Ministry of Food & Rural Affairs, Ont. Ministry of Environment (observers)

Academia/Other: Laurentian University/MIRARCO, Alberta Research Council, GSI Environment, City of Greater Sudbury, City of Toronto

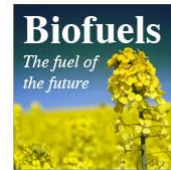




Scope of the Project

Four main target areas proposed:

- Quantity and quality of biomass
- Impact of organic covers on tailings
- Improving economic feasibility
- Communication, public education and technology transfer



Source: <http://itsgettinghotinhere.org/>



Anticipated Benefits

- Reclamation of mine tailings to a productive land use that represents a major contribution from the mining industry towards sustainable development and greenhouse gas reductions
- Beneficial management and reuse of bio-based wastes from municipal and industrial sectors
- Brownfield utilization for green energy production
- Potential for on-going cash flow on reclaimed tailings as a means of subsidizing monitoring and treatment costs
- Use of one industry's waste to remediate another and produce bio-energy that will be available for consumption by the local community/industry





Quantity and Quality of Biomass

- Depth of biosolids/compost
 - Normal crop rooting depth
 - ~ 3 – 5 feet at maturity
 - When roots meet tailings....
- Corn, canola, soy, others?
 - (willow, poplar, pin cherry??)
- Specific variety of crop
 - e.g. variety of corn with lower crop heat unit requirement



Impact on Tailings

- Examine effect on groundwater, effluent treatability and toxicity
- Depth of biosolids/compost
- Type of biosolids/compost
- Copper vs. Gold tailings, etc.
- Measuring metals, anions, DOC and nutrient release
- Laboratory and field trials





Improving Economic Feasibility

Determine economic and environmental impacts (positive and negative) for all sectors involved

- **Mining** – stabilization of tailings/productive land use/reduced effluent treatment costs/environmental image
- **Forestry** – Reduce or eliminate long term liability associated with disposal/storage
- **Energy (biofuels)** – additional biomass/expansion
- **Municipalities** – contribution to productive bioproducts sector/productive Brownfields/waste diversion and disposal of green compost



Communication, Public Education...

- Not in my back yard!!
 - e.g. Adams Mine - Kirkland Lake
- Competition to local farmers – opportunity!
- Improve image of mining
- General public education: reclamation, brownfields development, biofuels etc.





National Orphaned and Abandoned Mines Initiative - (NOAMI)



North Coldstream Mine - Burchell Lake, ON



Natural Resources Canada

Ressources naturelles Canada



NOAMI

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



Natural Resources Canada

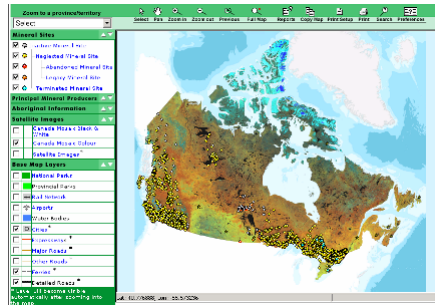
Ressources naturelles Canada





Information Gathering

- Report on “Capacity Building for National Inventory of O/A Mines”
- Canadian and international inventories
 - Web-based and map interface
 - Umbrella (index style) system



Information Transfer

- NOAMI News
- Presentations
- Pamphlet
- Reports
- Workshops and conferences
- NOAMI Web site at: www.abandoned-mines.org





Metals in Soils Initiative

- Metal contamination of soil can be a problem in and around many mining sites.
- Extent and type of contamination not well understood
- Multistakeholder initiative to better quantify and assess the liabilities associated with metal contamination in terrestrial systems



General Conclusion

Whereas in the past successful development was strictly a technical and financial pursuit, it now requires additional “soft skills” such as communication, collaboration, conflict resolution, and an awareness of the changing environment.





CANMET Mining and Mineral Sciences Laboratories



Thank You
Merci



Natural Resources
Canada

Ressources naturelles
Canada

Canada