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Experience of Canadian Partnership Programs - MEND and NOAMI

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Abstract

Sustainable development has become a driving force in how the mining industry approaches all existing and future activities. Progress has been made to advance environmental performance and stewardship and provide benefits to civil society. Technologies are now in place to plan for, open, operate and decommission a mine property in an environmentally acceptable manner, both in the short and long term. Moreover, mining companies, governments and consultants have acquired a great deal more capability to deal with environmental and societal issues such as water contamination from mine wastes, including acid generation.

Acidic drainage is one of the most significant environmental issues facing the mining industry. The Mine Environment Neutral Drainage (MEND) program was the first international multistakeholder initiative to develop scientifically-based technologies to reduce the effect of acidic drainage. The original program and its subsequent initiatives have contributed enormously to the understanding of acidic drainage and how to prevent it. MEND focused the acidic drainage effort and developed a toolbox of technologies that is available to all stakeholders.

The legacy of orphaned/abandoned mines, with their associated environmental liability, human health concerns and the financial costs of clean up, is a serious issue facing Canada. Canada's long history in mining has resulted in more than 10,000 orphaned or abandoned sites, requiring varying degrees of rehabilitation. The National Orphaned/Abandoned Mines Initiative (NOAMI) was established in 2002 and is a co-operative Canadian program that is guided by an Advisory Committee consisting of the mining industry, federal/ provincial/territorial governments, environmental non-government organizations and Aboriginal Canadians. The advisory committee's role is to assess key issues and put forward recommendations concerning collaborative approaches and partnerships in the implementation of remediation programs across Canada

The successes of MEND and NOAMI have come through the collaborative efforts of the partners, the sharing of experiences, the thorough evaluation of technologies and practices. Through these efforts a significant advancement in environmental management is achieved and thus has contributed to the long-term sustainability of the mining industry and the environment.

1 Introduction

Mining with environmental stewardship involves not only optimizing the technical performance of mining and extraction processes so as to maximize the profitability of an operation, but also entails leaving a positive environmental and social legacy. Up until the 1970s, the focus was primarily on generating profits. Since that time, there has been a growing awareness of the need to minimize the negative imprint that mining has left on the natural environment. In the 1980s a collective approach to problem solving emerged in Canada. Multi-stakeholder initiatives that address technical issues of national importance have been models for cooperation among industry, various levels of government, NGOs (non-governmental organizations) and First Nations (i.e. Aboriginal Canadians).

Programs are frequently launched to focus research efforts into areas of concern, and also to obtain information for formulating sound policy. It is especially important in the environmental area to ensure that government policy is underpinned by sound science. The benefit of the collaborative programs has come through the sharing of experiences, the thorough evaluation of technologies and their incremental improvement.

The Mine Environment Neutral Drainage (MEND) initiative was the first international multistakeholder program to develop scientifically based technologies to reduce the effect of acidic drainage. Central to the success of MEND was the development of a multi-year research strategy based on feedback from the

extensive network of Canadian experts. The MEND model of collaboration is now being used by both Canadian and international programs to address issues of national importance. The National Orphaned and Abandoned Mines Initiative (NOAMI) adopted the MEND framework to develop a policy-based program for remediation of orphaned and abandoned mine sites in Canada.

2 MEND

Acidic drainage has long been recognized as the largest environmental liability facing the Canadian mining industry, and to a lesser extent, the public, through abandoned mines. Since 1987 the Canadian mining industry and governments have been cooperating to develop technologies to prevent and control acidic drainage. The initial MEND Program (1989-1997) and its successor (1998-2000) contributed greatly to the understanding of acidic drainage. Tremendous technical progress was made in the areas of prediction and modelling, prevention and control, disposal technologies, lime treatment, passive treatment and monitoring. Despite the progress, acidic drainage remains the most significant environmental issue facing the mining industry, governments and the public. In 2002, funding was provided to launch a renewed MEND initiative that would identify Canadian national and/or regional information needs.

The first major activity was a "gap analysis" report (MEND 8.1) that identified opportunities to advance acidic drainage knowledge, along with a prioritized list of research needs. In April 2002, the recommendations of this study were reviewed during a multistakeholder Strategy Session held in Ottawa (MEND 8.2). To provide a framework for discussions, four broad research themes were presented; mine waste management practices, emerging challenges, prediction and post-closure management. This session developed and recommended a number of research activities for a multi-year program. A questionnaire was also distributed to the MEND Network to help define research priorities. The conclusion was that closure management, verification of technologies, metal leaching, passive treatment, early prediction and sludge management were viewed as the top priorities. Strong support was also given for projects on cold temperature effects, paste backfill and monitoring methodologies. The need for guidance documents, technology transfer activities (e.g. workshops), and updates on emerging technologies was identified as a crosscutting theme within each of the priorities.

Based on the widespread support received from all stakeholders, a recommendation was made to move ahead with a renewed MEND with a research program that focused on these top priorities. Since 2003, the MEND Steering Committee has developed an annual work plan that addressed many of the key research priorities. A brief overview of the research program and project descriptions is given below.

2.1 Mine Waste Management Practices

Research recommendations under this theme included sludge management, cold temperature effects, paste backfill and passive treatment.

Acidic drainage treatment and sludge management are two important facets of mine site environmental control practices. Sludge production is an increasing concern to the industry as the inventory of sludge continues to grow due to "perpetual pump and treat" operations. Research is needed to explore current sludge management practices such as long term sludge disposal options and sludge stability. In addition, opportunities for alternate uses of sludge needs to be investigated, such as metal recovery and reuse (e.g. in construction materials). MEND supported two projects on treatment practices.

MEND 3.42.3. *Review of Disposal, Reprocessing and Reuse Options for Acidic Drainage Treatment Sludge.* The report provides a review of technologies related to the management of acidic drainage treatment sludges. The technology areas assessed included conventional disposal technologies such as pond disposal and co-disposal with tailings and alternative disposal options such as underground sludge disposal. Options for metal recovery and novel sludge reuse technologies were reviewed and sludge stabilization and reclamation applications were documented.

Acidic Drainage Treatment Operations in Canada - An Interactive Database (In progress). Currently there is no single comprehensive treatment and sludge management information for sites in Canada. Most sites employ some form of chemical treatment to address acid drainage issues and the type of treatment implemented varies from site to site. This project aims to collect, compile manage and interpret information

available on acidic treatment and sludge disposal. In addition, a comprehensive database will be developed to store the information. The project should be completed in late 2007.

With the large number of mines opening in Northern Canada, the effect of cold temperature on various technologies is of increasing importance. Oxidation kinetics, permafrost and mine waste management in cold weather conditions warranted further research.

MEND 1.61.4 *Covers for Reactive Tailings Located in Permafrost Regions*. The report provides a brief introduction to permafrost issues and then focuses on applications of covers constructed over reactive tailings in Canadian permafrost regions. Case histories for Nanisivik, Raglan, Lupin and Rankin Inlet are examined, which represent sites with different tailings operations, cover design approaches and physical and climate conditions.

MEND 1.61.6 *Cold Temperature Effects on Geochemical Weathering*. The report examined geochemical processes expected to occur differently at low temperatures, or were unique to low temperatures. A compilation of fourteen case studies, along with a literature survey, form the basis of the findings. Progress has been made on understanding several of the mechanisms; however, much of the data was limited and site specific. Main technology gaps were identified along with opportunities to harness low temperature conditions to limit acidic drainage.

Northern Soil Covers. Project-in-progress is reviewing cold region phenomena that could impact on the soil cover performance, including ground freezing, snow-distribution, limits to revegetation, and identification of research priorities to develop soil cover design and construction methods suitable for cold regions.

Diavik Waste Rock Scale-Up. This 5-year collaborative project with the International Network for Acid Prevention (INAP) and several Canadian universities is aimed at evaluating and preventing the possible leaching of metals and acidic drainage from waste rock at the Diavik Diamond Mine operation in Northern Canada. The project involves multiple facets including laboratory tests, construction of large scale test sites, field instrumentation and measurements, numerical modelling, and various types of analysis.

The influence of paste backfill on operational and long-term mine and ground water quality was identified as a priority and MEND completed a summary of current practices in the industry. MEND 10.2 *Paste Backfill Geochemistry - Environmental Effects of Leaching and Weathering* provides a brief summary pertaining to the geochemical characterization of both cemented and uncemented paste backfill, and methods used to predict environmental impacts to surface and ground water quality associated with the application of paste backfill in underground applications

2.2 Emerging Challenges

At the Strategy session issues around metal mobility were considered “emerging challenges”, including; metal leaching (ML) in neutral or non-acid conditions; mobility of arsenic, selenium, antimony, molybdenum, nickel, tellurium and thallium; and cost effective treatment of hard-to-treat elements.

MEND 10.1 *Water Quality Issues in Neutral pH Drainage: Examples and Emerging Priorities for the Mining Industry in Canada.* A review of selected Canadian mining operations was completed to determine priority chemical elements of interest associated with leaching under non-acidic conditions.

Environmental Management Criteria for Selenium and Molybdenum. MEND 10.1 identified molybdenum and selenium as emerging issues at several mining operations across Canada. This project further evaluated the potential environmental effects associated with molybdenum and selenium on downstream environmental receptors. Additional challenges such as treatment costs and effectiveness will also be discussed. This work will be completed in 2007.

Application of Membrane Separation Technology to Mitigation of Acidic Drainage. The use of membrane separation processes for the mitigation of mining effluents will be reviewed. Economics of the technology will be assessed in comparison with currently used processes.

2.3 Prediction and Post-Closure Management

The MEND Strategy Session recommended documenting case studies, both as a vehicle for technology transfer and a means of comparing predicted and actual field performance. The objective of MEND Case

Studies is to show the practical experience with different aspects of ML/ARD mitigation and assessment practices at well-characterized sites. Several MEND projects that look at the field performance and sustainability of various aspects of the prediction and mitigation of drainage chemistry are currently ongoing or have been completed.

Case Study Assessments at Canadian Mine Sites. A study to assess and verify the effectiveness of acidic drainage pollution prevention and control techniques at several sites. Prediction methods, prevention and control techniques, monitoring programs, and closure planning were evaluated. In Phase I three sites were assessed. Phase II included further field studies at Heath Steele, where a water cover was used as closure technology for the tailings impoundment.

MEND 5.10E *List of Potential Information Requirements in ML/ARD Assessments and Mitigation Work*. This document lists potential information requirements and factors to consider for ML/ARD work and serves as a general guide for practitioners employed by the mining industry, regulators and the public reviewing their work, as well as educators and students.

Case Studies of Metal Leaching/Acid Rock Drainage (ML/ARD) Mines. Case studies that illustrate site-specific application of ML/ARD mitigation and assessment at three mine sites (Johnny Mountain Mine, Snip Mine and the Sulphurets project) in British Columbia. The CD for this project will be available in 2007.

Performance of Water Cover at Louvicourt Mine. The long-term performance of the shallow water cover at Louvicourt Mine is being investigated by comparing geochemistry results from the 1996 and 2005 sampling campaigns. Additional information on the impacts of the fully established periphyton layer at the tailings–water interface, and on the mineralogy of the submerged tailings will be provided. This project will also be completed in 2007.

2.4 Guidance Documents

MEND 5.4.2 *MEND Manual.* More than 200 technology-based reports were generated by MEND. These reports represent a comprehensive source of information. The objective of the manual was to summarize work completed by MEND in a format that would provide practitioners in Canadian industry and government with a manageable single reference document. The document is not a “How to” manual. It is a set of comprehensive working references for the sampling and analyses, prediction, prevention, control, treatment and monitoring of acidic drainage.

Accurate and timely prediction of metal leaching and acid rock drainage are keys to preventing potential environmental impacts from ML/ARD and minimizing the high costs of mitigation. Prediction of the future characteristics of drainage chemistry is required for all phases of a mine life. Prediction is technically very demanding and prediction methods and results are easily misinterpreted. As a result, specialized geochemical consultants are required to do much of the work. MEND and various jurisdictions have sponsored a project to update and expand the *Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia* (Price, 1997) making it applicable on a national scale. The document will be both a "tool-kit" and a critical review of current best-testing procedures.

MEND 2.21.4 *Design, Construction, and Monitoring of Covers Systems for Waste Rock and Tailings*. The manual incorporates and integrates the best available technology for the design and construction of cover systems over mine wastes. It is meant for use by mining personnel and others interested in cover systems. Summary volume and four technical documents on theory and background, site characteristics, cover design and modelling, field performance monitoring and case studies are available.

Manual for Macro-Scale Cover Design and Performance Monitoring. The current manual (MEND 2.21.4) addresses micro scale design, construction, and performance monitoring issues. This project would extend the design and performance monitoring components to a macro, or landscape scale, while addressing the uncertainty associated with long-term cover system performance of the latter facet.

2.5 Technology Transfer

An integral part of MEND is technology transfer - the dissemination of information on developed technologies to the partners and the public. Information is transferred through a number of routes. A MEND web site (**http://mend.nrcan.gc.ca**) is regularly updated with report summaries, a publication list, case

studies, newsletters, workshop and conference announcements and links to other relevant initiatives. Workshops are an effective vehicle to transfer information, and MEND hosts one or two workshops each year. The BC-MEND Annual ARD/ML Workshop selects one research theme each year - one that reflects current practices, new research technologies and developments and is relevant to the times. Participants have a strong interest in field-test results and case studies, so these are always included in the sessions. Themes in recent years were performance of dry covers (2004), prediction of drainage chemistry (2005) and open pits and underground workings (2006). This year's theme (2007) is Challenges in Collection and Treatment of Mine Drainage. Workshops in Eastern Canada have focused on sludge management, treatment of neutral pH drainage, and case studies on mitigation technologies.

MEND technical reports are available from the MEND Secretariat in paper and/or CD ROM versions. In addition, over 160 of the 200 MEND technical documents are available on three CD-ROMs.

3 Global Alliance

The International Network for Acid Prevention (INAP) was formed in 1998 by a number of international mining companies dedicated to reducing the liabilities associated with sulphide-bearing mine materials. In 2002, INAP formally proposed the concept of an international model of interaction among the various organizations involved in acidic drainage (INAP, MEND, ADTI, ACMER). The Global Alliance (GA) partnership between INAP and the regional organizations was formally announced in Cairns, Australia in July 2003. The alliance brings numerous benefits to the partners, including additional resources, minimization of research duplication, worldwide links and enhanced technology transfer capabilities. PADRE (Europe) and the Water Research Commission (South Africa) have both joined the GA since the formation of the group and additional regional partners for South America and Asia are sought.

An immediate benefit to the alliance is a greater understanding of the activities of each organization and possible joint support of projects that are of mutual interest. For example, INAP's Diavik Waste Rock Scale-Up project receives support by the MEND program.

A major undertaking for INAP and the Global Alliance is the production of a Global Acid Rock Drainage Guide (GARD Guide) that will be a "state" of the art" reference for the mining industry, regulators, NGO's and other stakeholders. Current best practice in the management of contaminants produced by sulphide mineral oxidation will be consolidated to produce a guide that will be up to date and global in scope. The Guide will address the production of contaminants from sulphide mineral oxidation that can result in ARD, neutral mine drainage and saline mine drainage. It will apply to the entire mining industry and all commodities produced by mining including base metals, coal, iron ore, gold, diamonds and uranium, and will cover all phases of an operation from initial discovery through to post-closure. INAP has established an organization to coordinate production of the Guide, which is scheduled for review and testing in 2008.

4 National Orphaned/Abandoned Mines Initiative (NOAMI)

The assessment and remediation of orphaned and abandoned mine sites across Canada has received increased national attention over the past several years. The NOAMI (National Orphaned/Abandoned Mines Initiative) was formed in 2002 at the request of the Canadian Mines Ministers that a multistakeholder advisory committee be established to study various issues and initiatives relating to the development of partnerships in the implementation of remediation programs for orphaned and abandoned mines across Canada.

Mining has been central to the Canadian economy for over 100 years and Canada is a supplier of mineral commodities worldwide. The legacy of orphaned/abandoned mines (OAMs), with the associated environmental liability, human health concerns and financial costs, is a serious issue facing Canada.

In 1999 and 2000, a number of stakeholders put forth requests to the Mines Ministers 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 multistakeholder workshop be organized to identify key issues and priorities.

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

Building a National Inventory; Community Perspectives; Setting Standards and Rational Expectations; Ownership and Liability Issues; and Identification of Funding Models.

Participants developed, by consensus, guiding principles and recommendations that were presented at the Mines Ministers' Conference, September 2001. Ministers agreed on the importance of a large-scale program for the rehabilitation of orphaned/ abandoned mines sites, and requested that an Orphaned/Abandoned Mines Advisory Committee be established.

With annual funding obtained through its government and industry partners NOAMI formed task groups to address the following key areas: Community Involvement, Information Gathering, Legislative Barriers to Collaboration, and Funding Approaches. Program summaries for these task groups are provided below.

4.1 Community Involvement

There is a need for a plan that will foster community involvement in decision-making on closure and reclamation, and ensure that targeted end-use and reclamation standards are acceptable to local communities. Case studies related to community involvement were completed for three Canadian mine sites, along with experiences in community involvement at abandoned mines in the United States. The "lessons learned" from these studies were developed into a series of guidelines and published in the pamphlet "Best Practices in Community Involvement" (Figure 1).

The eleven guiding principles for Community Involvement Policy Development, Site Management and Process Administration presented in the pamphlet are:

- Communication
- Inclusiveness
- Representation
- Fostering Confidence in Decision-Making
- Information Dissemination and Communication
- Participation and Representation
- Resources and Assistance
- Facilitation
- Integration
- Consistency of Involvement
- Respecting Local Cultures

Figure 1. Best Practices Pamphlet (produced in both official languages of Canada)

These principles were developed for use by governments, industry, local communities and other parties as a template for the development of policy and citizen engagement plans prior to, during and after the rehabilitation of problematic sites. The final report and the pamphlet are available on the NOAMI web site (www.abandoned-mines.org). NOAMI plans to complete additional community involvement case studies in 2008.

Another project underway in 2007 is to construct a best practices toolkit to build capacity of communities located near abandoned mines to understand environmental issues associated with these sites. Three diverse communities will be visited as part of the pilot project wherein the community will be engaged in a dialogue to determine their concerns, and to develop an approach so they can participate in the government decision-making process towards remediation.

4.2 Information Gathering – National Inventory

It is currently difficult to accurately estimate the costs associated with rehabilitating orphaned and abandoned mines across Canada. These sites are not well documented with respect to 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.

A principal objective of NOAMI was to develop capacity for a national inventory of orphaned and abandoned mine sites based on compatible inventories from each province and territory. A database was essential for comprehensive classification and analyses, but first, a consensus had to be reached on the definitions and terminology to be applied to orphaned/abandoned mine sites. The first task was a comprehensive review of Canadian, US and other international efforts to inventory orphaned and abandoned mines. The report "Capacity Building for a National Inventory of Orphaned/ Abandoned Mines in Canada" (Cal Data, 2005) is available on the NOAMI web site (www.abandoned-mines.org).

The problem with the creation of a nation-wide inventory essentially relates to variations in the way that hazards or features are defined, and what hazards are included in any particular inventory. All Canadian provinces with a history of mining, territories and several federal agencies maintain their own inventory of mining and exploration sites that pose a risk to human health and safety or the environment. Many of these inventories only contain the sites that are known to pose a risk and are now the responsibility of the jurisdiction. There is a large discrepancy in the level of detail and completeness of these inventories from jurisdiction to jurisdiction. The concept of a national database must account for these gaps in coverage, detail and standardization. A system that builds on the strengths of the individual inventories and does not impact their current operational status is essential in obtaining their collaboration.

The recommendation was for a high level inventory that includes all inactive mineral sites, is web-based and has a map interface. Such a system acts as an index, or portal, to the existing inventories maintained within the provinces, territories and federal agencies. Internet links are utilized to make the investigative experience of the user virtually seamless between the national database and the component databases. A high level, all-inclusive database provides uniform representation of inactive mineral sites from all jurisdictions regardless of their level of database development. Such systems have been proven operational with existing commercial off the shelf software (MapGuide). The review of existing inventory systems has shown the value of a map interface, especially for users without expert knowledge of the local land designation system and details of the inventory metadata.

The definition of orphaned and abandoned sites varies among jurisdictions in Canada. The primary object was to provide a set of definitions under which information from all jurisdictions can be defined, and to avoid most existing inventory definitions, which could be in conflict.

Various options were explored to determine the most suitable host for the NOAMI Internet map site. The Mineral and Mining Statistics Division (MMSD) of Natural Resources Canada was selected to host the portal. NRCan maintains several sites using MapGuide-based technology, which deal with mineral producers and related areas, such as Aboriginal communities. These sites can be visited at:

http://mmsd1.mms.nrcan.gc.ca/maps/intro_e.asp

http://www.nrcan-rncan.gc.ca/aboriginal/aboriginal-maps-e.htm

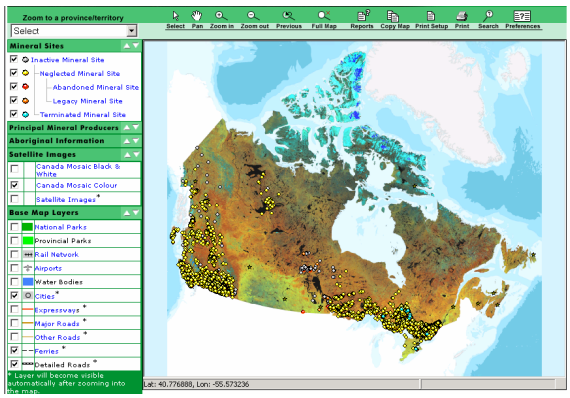

Figure 2. Working model of national inventory under development by NRCan.

The development of a national inventory is now underway and support from all partners is required to achieve complete success (Figure 2). NOAMI in collaboration with NRCan and the provinces and territories are collaborating to accomplish this important task. The plan is to launch the site in September 2007 at the Mines Ministers Conference in Whistler, BC.

4.3 Legislative Barriers to Collaboration

A review was undertaken to examine existing legislative requirements in Canada, and selected international jurisdictions, on regulatory or institutional barriers, liability disincentives, and collaborative opportunities regarding voluntary abatement, remediation, and reclamation of OAMs. Particular emphasis was placed on

four approaches: 'Good Samaritan' legislation; permit blocking; allocative versus joint and several responsibility; and non-compliance registries. The final report titled "Barriers to Collaboration: Orphaned/Abandoned Mines in Canada" was completed in 2002.

The report findings provided background for a multistakeholder workshop in Ottawa, 2003 that assessed the key barriers and developed approaches to overcome them. The report and the Workshop Proceedings are posted on the NOAMI web site (www.abandoned-mines.org).

4.4 Guidelines for Jurisdictional Legislative Reviews

In 2003, the Mines Ministers asked NOAMI to complete guidelines for jurisdictional legislative reviews with respect to collaboration, liability and funding to ensure that approaches across jurisdictions are consistent, certain, transparent, coordinated and efficient. A series of guidelines was developed to facilitate a focused review of legislative/regulatory/policy frameworks as they apply to OAMs across Canada. A report on all legislation relevant to the remediation of orphaned/abandoned mine sites has been completed. It contains a synthesis of the jurisdictional analyses, including an assessment of gaps, limitations, barriers and opportunities to remediation, along with a summary of observations. The final report is to be released on CD-ROM in 2007. A toolkit of legislative approaches, outlining a number of options tailored to each of the jurisdictions, and to be used towards implementation of legislative change, is part of the workplan for 2007.

4.5 Funding Approaches

The task group was to identify funding approaches and preferred options for the remediation of OAMs across Canada that could be adapted to the needs of each jurisdiction. A report titled "Potential Funding Approaches for Orphaned/Abandoned Mines in Canada" (Castrilli, 2003) was prepared that outlined a variety of funding approaches to be considered for the clean up or management of liabilities related to OAMs. Advantages and disadvantages of each approach were evaluated and preferred options were recommended for consideration by governments. It was concluded that no single funding approach would constitute a complete solution; a combination of a number of approaches would likely be required.

A multistakeholder workshop on *Assessing Liabilities and Funding Options* was held in Ottawa in 2005 that further developed funding approaches and related issues for OAMs. A roll-up discussion identified gaps and future priorities for NOAMI. One recommendation was for a toolkit of funding options, outlining a series of options and illustrated with case studies. This would be a resource document for use by jurisdictions across Canada to help guide the establishment of potential funding options for the remediation of OAMs. The report, "Rehabilitating Abandoned Mines in Canada: A Toolkit of Funding Options" (Cowan Minerals, 2006) was completed and is posted on the website, along with the above stated Proceedings and report.

4.6 Technology Transfer

Dissemination of information to the partners and the public is an important function of multistakeholder initiatives. Orphaned and abandoned mines are a "hot issue" in Canada and indeed, around the world, and the public wants to be kept well informed.

NOAMI uses a number of routes to transfer information. The Secretariat distributes documents, such as the NOAMI Newsletter, and other bulletins, to a huge mailing list. In addition, a NOAMI Internet site (www.abandoned-mines.org) has been established. The site is regularly updated with information, such as NOAMI reports, workshop proceedings, pamphlets, announcements and newsletters.

Workshops are the preferred vehicle to share information and obtain feedback from the mining community. Several NOAMI workshops have been held and are previously discussed. The most recent was in October 2006, when NOAMI hosted a workshop in Winnipeg on *Orphaned/Abandoned Mines: A Workshop to Explore Best Practices*. The objective of the workshop was to explore and understand the best existing, emerging and innovative practices relating to the management of orphaned and abandoned mines. The proceedings from this workshop are available from the Internet site. Additional workshops are planned as the program moves forward.

5 Conclusions

Canada is well known for establishing multistakeholder initiatives to address issues of national importance. This model of cooperation among industry, various levels of government, NGOs and First Nations is now applied both nationally and internationally. These initiatives pool resources, minimize duplication, form and strengthen networks, and create an environment where responsible mining can move forward. MEND and NOAMI are two of many successful multistakeholder initiatives.

Through these multistakeholder initiatives, a significant advancement in environmental performance and the understanding of sustainable development as it relates to mining and society is achieved.

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