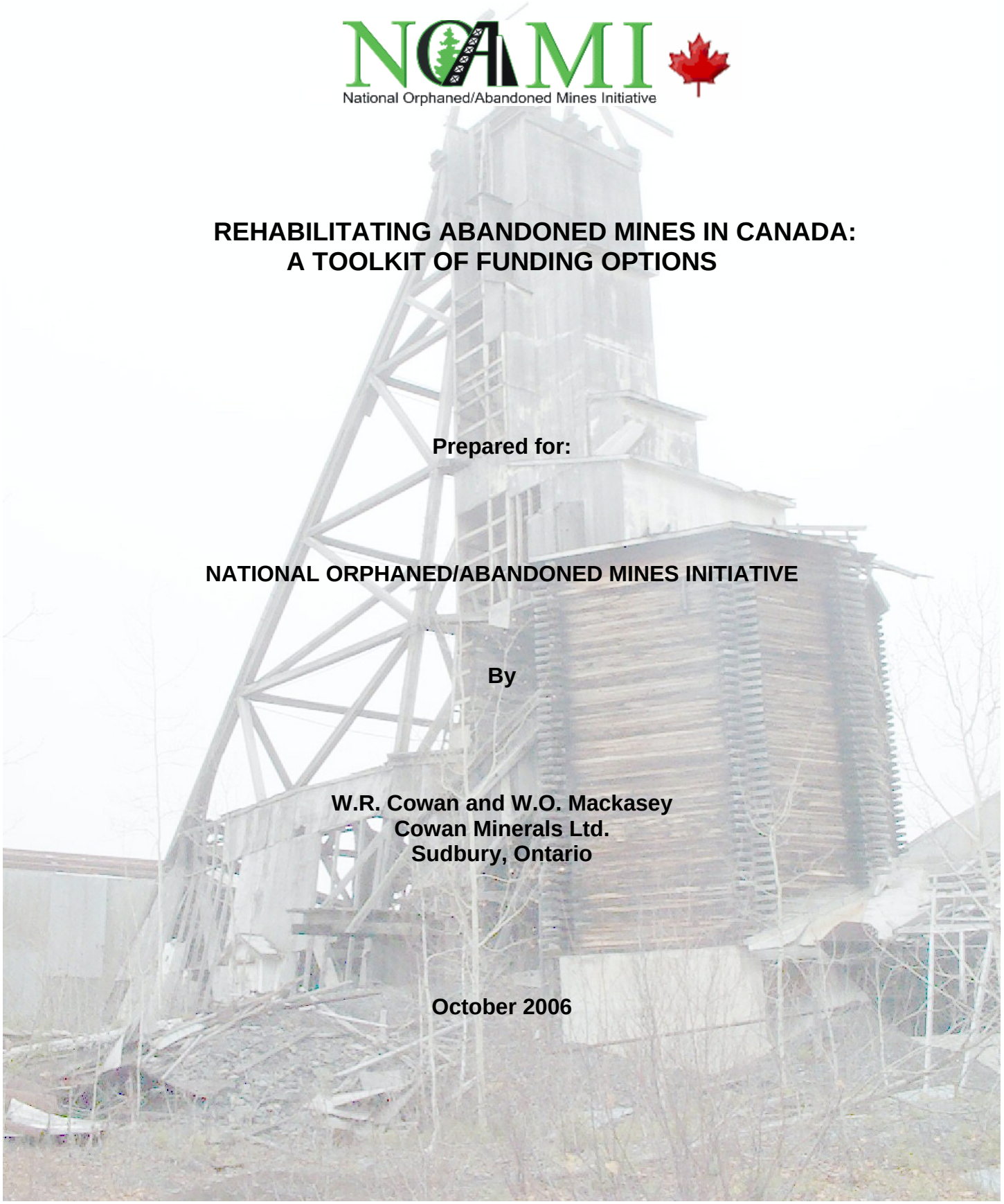

National Orphaned/Abandoned Mines Initiative

REHABILITATING ABANDONED MINES IN CANADA: A TOOLKIT OF FUNDING OPTIONS

Prepared for:

NATIONAL ORPHANED/ABANDONED MINES INITIATIVE

By

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DISCLAIMER

This document was prepared to provide a basic understanding of financial options open to government officials who have the responsibility of managing abandoned mining hazards which have become the responsibility of the Crown. The authors assume no responsibility for actions taken by others on the basis of information acquired from reviewing the material herein.

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EXECUTIVE SUMMARY

INTRODUCTION

This report was commissioned by the National Orphaned/Abandoned Mines Initiative (NOAMI) in June 2006. The report aims to provide a toolkit of funding options for rehabilitating abandoned mines that may be applied in Provinces or Territories. The target readers are politicians, government bureaucrats, municipal officials and other interested parties. The report utilizes considerable information provided through previous NOAMI projects and workshops, particularly the work completed by Mr. Joseph Castrilli.

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 socio-economic problems to communities, the mining industry and governments. Only options in which a Government is the sole funding agent or where a Government has a funding partner are considered herein. The report consists of two components; the first describes the funding options available and provides pros and cons for each; the second provides eight case studies for illustrative purposes. Four case studies describe site specific projects and the funding mechanisms used; the remaining four describe funding programs in three provinces and the Federal Government program that applies primarily to that area north of 60.

FUNDING OPTIONS

By definition governments are inescapably linked to the funding of abandoned mines rehabilitation. The objective is to put a stable funding mechanism in place that can get the job done in a reasonable period of time, e.g. 10-25 years. The source of the funds and the desire to find partners to share in the costs has led NOAMI to review five principal options at this time:

1) direct government funding from general revenues;
2) government funding through tapping existing revenue streams generated by mining, e.g. mining tax/royalties;
3) government funding through the imposition of a levy on current and future mineral production;
4) federal and provincial cost sharing arrangements from general revenues; and,
5) government-industry partnerships

OPTION 1: Direct Government Funding from General Revenues

Premise: That the issue of abandoned mines can be dealt with through the appropriation of funds from general revenues via government planning and budgeting processes.

Comments: This is the mechanism through which most abandoned mines work is presently completed. The principal negative feature of this process is that it is not stable due to changes in government priorities, planning changes by the bureaucracy, or the appointment of new Ministers or staff with different agendas.

OPTION 2: Direct Government Funding Through Tapping Existing Revenue Streams Generated by Mining

Premise: That the issue of abandoned mines may be dealt with through directing existing mining related revenue streams into an account dedicated to abandoned mines. In most instances this means diverting either front-end royalties or mining tax royalties (generally back-end taxes on profit) to a dedicated fund.

Comments: This option has the merit of producing funds from mining derived revenues. It requires that a jurisdiction collects sufficient royalties to create a meaningful, stable fund; this is subject to the ups and downs of the mining cycle. To produce stability, legislation should be put in place to make this option functional.

OPTION 3: Create a Fund Through a New Levy on Mining Production

Premise: That a sufficiently large, stable fund to deal with abandoned mines can be created by establishing a legislated levy on current mining production

Comments: This approach guarantees a revenue stream although it is subject to the ups and downs of the mining cycle. It has worked very well in the U.S. where a levy on coal production has produced huge funds for the rehabilitation of coal mines throughout the country. It is most frequently used where the burden can be passed on directly to the consumer, e.g. coal and construction aggregates. For price-taking commodities such as metals, the burden cannot be passed on and this method could impact the producers. Legislation would be required.

OPTION 4: Federal-Provincial/Territorial Cost Sharing Arrangements from General Revenues

Premise: That arrangements can be made for both senior levels of government to cost share the rehabilitation of abandoned mines on a continuing basis.

Comments: Constitutionally the Federal government has no direct role in mining activities “south of 60”; there are a few exceptions especially with regard to the mining and processing of radioactive minerals. As well, the Federal government has huge contaminated site liabilities in the Territories and elsewhere without venturing into provincial domains. Though potential for cooperation exists, it requires both parties to come to the table with long-term stable funding. This approach is subject to the same vagaries as Option 1. The ongoing work at Giant Mine represents this type of arrangement on a one-off basis.

OPTION 5: Creating Partnerships with Mining Companies to Fund Abandoned Mine Rehabilitation

Premise: That funding arrangements can be made between government and mining companies to accomplish the rehabilitation of abandoned mines.

Comments: Arrangements may be made with mining companies to share funding when the company desires something from government, usually indemnification against future liability or sharing of rehabilitation costs in exchange for access to mineral exploration or waste reprocessing rights. Such partnerships can provide win/win outcomes; both governments and mining enterprises should be entrepreneurial in devising partnerships where both parties benefit. That said, this type of approach usually deals with one-time, single site problems and cannot be seen as a major, long-term, stable funding option. The case studies of Lynn Lake Mine and the Hollinger/McIntyre Mines are illustrative of this option.

CASE STUDIES - PROJECT SPECIFIC

Britannia Mine, B.C. - This mine, located 50 km north of Vancouver, produced copper, zinc and gold between 1904 and 1974 creating many thousands of jobs. Acidic drainage from the site has resulted in large quantities of metals being dumped into Howe Sound, making it one of the largest metal polluting sources in North America. The site is now being remediated under the leadership of the B.C. Crown Contaminated Sites Branch. Estimated total costs are in the $75 –$100 million range. Funding includes $30 million paid to the Provincial government by successor companies to the previous mine owners in exchange for indemnification against further liability. Through a "Partnership Agreement", EPCOR Water Services Inc. has built a mine water treatment facility. Under terms of this agreement EPCOR will operate the facility for a 20-year period for a fee of approximately $27.2 million. The Province will use the money collected from the previous owners to cover the cost of this fee. Further financial requirements will come from general revenues of the B.C. Government.

Giant Mine, NWT - The Giant Mine produced gold from 1948 to 2004. It was placed in receivership in 1999 with some 237,000 tonnes of arsenic mine waste stored underground creating a potential groundwater contamination problem with contingent human health concerns. Site management and proposed remediation by in-situ freezing could cost $300 million or more. Interim funding is provided via a cooperative agreement between Canada and NWT. The bulk of the funding would be through the Contaminated Sites Program of the Federal Government.

Hollinger/McIntyre Mines, ON - Located within the City of Timmins these adjacent mines operated for about 80 years producing more than 29 million ounces of gold as well as vast numbers of jobs, tax dollars and other benefits. The sites went into receivership in 1999 with an estimated liability of $25 million, mainly for physical rehabilitation works to limit the potential for damage due to mine subsidence. The Receiver refused to sever these lands from adjacent lands which Kinross Gold Corporation wished to obtain for gold exploration; Kinross (the project is now assigned to the Porcupine Joint Venture) negotiated a cost sharing agreement in 1999 with Ontario. The resulting cooperation has provided a win/win opportunity with both rehabilitation and exploration proceeding.

Lynn Lake Mine, MB - The Lynn Lake Mine (Farley Nickel Mine) produced more than 20 million tonnes of nickel-copper ore between 1953 and 1976. Originally operated by Sherritt-Gordon, which later became Veridian Inc., the property was subsequently acquired by Agrium Inc. Some 22 million tonnes of sulphide tailings create acidic drainage hazards. Remedial work

on the site is estimated to be more than $60 million. Through an MOU between Veridian and Manitoba the remediation cost will be shared 50/50 for the East Tailings Management Area estimated at $60 million. Manitoba's total liability for the site is estimated at $38 million.

CASE STUDIES - GOVERNMENT PROGRAMS

Crown Contaminated Sites Program, B.C. - This program was established pursuant to a 2002/2003 Provincial Auditors report on contaminated sites. The program is managed through the Ministry of Agriculture and Lands; a total of $180 million (net present value) is the estimated contaminated sites management liability from 2001 forward; $23 million is budgeted for 2006/2007 fiscal year and $47 million is budgeted for the period 2007-2009. Funds flow from general revenues. Wherever possible "Polluters" are held liable and Private/Public Partnership Agreements are encouraged.

Federal Contaminated Sites Program, INAC - This program deals with mining and other contaminated sites primarily north of 60 degrees. Remedial action on contaminated mine sites has been prompted by the Auditor General of Canada who estimates the total mining liability to exceed $555 million, much of it related to acidic drainage. The program is coordinated by INAC aided by a series of steering committees and working groups involving staff from several agencies and ministries. Most of the funding comes from federal general revenues with the territorial governments contributing where feasible. Each project must be reviewed carefully in an effort to obtain funding from viable "Historic Polluters".

Manitoba Orphaned/Abandoned Mine Site Rehabilitation Program - Manitoba announced in September 2006 a new $70 million program to fully rehabilitate Manitoba's former mine sites; this includes the Manitoba component of the tailings work at Lynn Lake described above. The program responds to the Provincial Auditor General's report on contaminated sites. This program expands and extends the existing program which was established in 2000 to address the 149 orphaned or abandoned sites in Manitoba. Funding for the new program is derived from general revenues. It is coordinated by the Mines Branch of Manitoba Science, Technology, Energy and Mines.

Ontario Abandoned Mines Rehabilitation Program - The current Ontario program was initiated in late 1999. With recent commitments the program will expend some $117 million over 13 years to 2012; current annual budgets are $10 million. The program builds on a 1991-1994, $10 million program. Site assessments are largely completed and current spending emphasis is on acidic drainage issues, ground subsidence, openings to surface, open shafts etc. Ontario has some 5600 abandoned mines with a financial liability between $300 and $500 million; of this about 40 percent is in the Provincial domain. Funding is derived from general revenues. This program is coordinated by the Mineral Development and Lands Branch of the Ministry of Northern Development and Mines.

RECOMMENDATIONS

The following recommendations are put forward:

1) With some exceptions each jurisdiction is responsible for its' own abandoned mines. Before funding can be addressed in a meaningful way the problem must be defined and quantified through:
   a) creation of an inventory;
   b) site assessment;
   c) risk analysis;
   d) cost analysis, and
   e) prioritization.

   The question of how much money is required and how it can be annualized can then be estimated including a substantial contingency factor. A proposed program must be realistic in terms of time frames but must also be aggressive enough to get the job done within a reasonable period of time

2) Valuation of the liability is important in that auditors must be able to see the liability diminish as funds are expended. Planning for sufficient contingency funding is essential; we recommend 30 percent. However, the valuation of the cost to rehabilitate must not be viewed as static; issues such as climatic change, technological developments, regulatory changes, inflation, interest rates and many other items can and will influence the estimated costs, especially where perpetual care is required.

3) Before redirecting existing mineral related revenue streams jurisdictions must determine whether sufficient revenues can be generated to support sustainable funding.

4) Jurisdictions considering imposition of a new levy on minerals production must: determine whether the levy could generate sufficient revenue to support the required funding level; determine the impact on producers and consumers; and consider the overall fairness of the levy, i.e. who is really responsible.

5) Jurisdictions should be entrepreneurial and take risks in entering partnerships with industry on a site specific basis so that each party gets something, whether it is rights to explore, rights to reprocess wastes, indemnification against future liabilities or, from the governments' perspective, the completion of rehabilitation works.

6) Jurisdictions contemplating partnership agreements must develop policies on indemnification against future liability so that the rules are clear. As part of the policy discussion "Good Samaritan" legislation should be reviewed for appropriateness.

7) Where jurisdictions introduce rehabilitation programs, adequate staff resources and management must be put in place to ensure proper planning and inspection, value for money and emergency planning.

8) Finally, the funding mechanism should be legislated to provide greater certainty. Castrilli *et al* 2003, recommended factors for orphaned/abandoned mines (OAMs) which could be included in legislation; these should be reviewed by interested readers. Proposals requiring or desiring legislation live on a double-edged sword. Though legislation may provide a somewhat greater certainty of maintaining a program, it also takes time, great commitment and is subject to falling by the wayside during the legislative process.

The above discussion provides a snapshot as to what this "toolkit" provides, a series of options which bureaucrats, politicians and municipal officials may wish to consider. Any successful, stable funding program requires a "champion" to carry the load, e.g. a determined Departmental Minister or, better yet, a team of determined Ministers.

SOMMAIRE

INTRODUCTION

Ce rapport a été commandé par l'Initiative nationale pour les mines orphelines ou abandonnées (INMOA) en juin 2006. Il vise à fournir une boîte à outils qui contient des options de financement pour la réhabilitation de mines abandonnées à l'intention des provinces et des territoires. Le rapport s'adresse aux politiciens, aux fonctionnaires, aux représentants municipaux et à toutes les parties intéressées. Il utilise une bonne partie de l'information recueillie dans les projets et les ateliers précédents de l'INMOA, particulièrement les travaux effectués par M. Joseph Castrilli.

Les mines orphelines ou abandonnées sont les mines pour lesquelles il est impossible de déterminer qui en est le propriétaire ou les mines dont le propriétaire est financièrement incapable ou refuse d'en nettoyer le site. Ces mines sont une source de problèmes aux plans de l'environnement, de la santé et de la sécurité et du point de vue socio-économique, pour les collectivités, l'industrie minière et les gouvernements. Seules les options dans lesquelles un gouvernement est l'unique agent de financement ou un gouvernement a un partenaire financier sont prises en considération dans la présente. Le rapport comporte deux volets : le premier décrit les options de financement disponibles et présente le pour et le contre de chacune; le second contient huit études de cas pour illustrer le propos. Quatre de ces études décrivent des projets sur des sites particuliers et les mécanismes de financement utilisés; les quatre autres décrivent les programmes de financement dans trois provinces ainsi que le programme du gouvernement fédéral qui s'applique principalement à la région située au nord du 60^{e} parallèle.

OPTIONS DE FINANCEMENT

Par définition, les gouvernements sont inévitablement liés au financement de la restauration des sites miniers abandonnés. L'objectif est de mettre en place un mécanisme de financement stable qui peut résoudre le problème dans un laps de temps raisonnable, p. ex., en 10 à 25

ans. La source des fonds et le désir de trouver des partenaires prêts à partager les coûts ont conduit l'INMOA à examiner pour le moment cinq grandes options :

1) financement gouvernemental direct tiré des recettes générales;
2) financement gouvernemental tiré des flux de recettes existants liés à l'activité minière, p. ex. l'impôt minier/les redevances minières;
3) financement gouvernemental par le biais d'un prélèvement sur la production de minéraux actuelle et future;
4) partage des coûts entre les gouvernements fédéral et provincial, aux termes d'une entente relative aux recettes générales;
5) partenariats entre le gouvernement et l'industrie.

OPTION 1 : Financement gouvernemental direct tiré des recettes générales

Prémisse : Que la question des mines abandonnées puisse être résolue par l'affectation de fonds provenant des recettes générales, dans le cadre du processus budgétaire et du processus de planification gouvernementaux.

Commentaires : C'est le mécanisme par lequel sont présentement exécutés la plupart des travaux aux mines abandonnées. Le principal point faible de ce processus est son manque de stabilité dû aux changements dans les priorités gouvernementales, aux changements apportés à la planification par la bureaucratie ou à la nomination de nouveaux ministres ou de nouveaux employés qui ont des visées différentes.

OPTION 2 : Financement gouvernemental tiré des flux de recettes existants liés à l'activité minière

Prémisse : Que la question des mines abandonnées puisse être résolue par le versement de flux de recettes existants découlant de l'activité minière, dans un compte consacré aux mines abandonnées. Dans la plupart des cas, cela voudrait dire réaffecter les redevances exigibles avant la mise en production ou les impôts miniers (généralement les impôts finaux sur le profit) pour les verser dans un fonds spécial.

Commentaires : Cette option a le mérite de produire des fonds à partir de recettes découlant de l'activité minière. Cette option nécessite que le gouvernement recueille suffisamment de redevances pour créer un fonds utilisable, stable; cette option est soumise aux fluctuations du cycle minier. À des fins de stabilité, une loi devrait être adoptée pour rendre cette option fonctionnelle.

OPTION 3 : Création d'un fonds par le biais d'un nouveau prélèvement sur la production de minéraux

Prémisse : Qu'un fonds stable et suffisamment important puisse être créé pour résoudre la question des mines abandonnées, par l'établissement, en vertu d'une loi, d'un prélèvement sur la production minière actuelle.

Commentaires : Cette méthode garantit un flux de recettes bien qu'elle soit touchée par les hauts et les bas du cycle minier. Elle s'est révélée très efficace aux États-Unis, où un prélèvement sur la production de charbon a produit des fonds énormes pour la réhabilitation des mines de charbon dans l'ensemble du pays. Cette méthode est utilisée surtout lorsque le fardeau financier peut être transmis directement au consommateur, p. ex. charbon et granulats pour l'industrie de la construction. Dans le cas des métaux et des autres produits transigés au prix du marché, le fardeau financier ne peut être transmis, et cette méthode pourrait avoir un impact sur les producteurs. Il faudrait adopter une loi.

OPTION 4 : Partage des coûts entre les gouvernements fédéral et provincial, aux termes d'une entente relative aux recettes générales

Prémisse : Que des ententes puissent être conclues afin que les deux niveaux supérieurs de gouvernement puissent se partager le coût de la restauration des sites miniers abandonnés, et ce, de façon permanente.

Commentaires : Constitutionnellement, aucun rôle direct n'est dévolu au gouvernement fédéral dans l'activité minière « au sud du 60^{e} »; il y a quelques exceptions, particulièrement au plan de l'exploitation minière et du traitement des minéraux radioactifs. Par ailleurs, le gouvernement fédéral assume des responsabilités énormes à l'égard des sites contaminés situés dans les territoires et ailleurs, sans s'immiscer dans les domaines de compétence des provinces. Bien que cette option soit assortie d'un certain potentiel de coopération, elle exige des deux parties qu'elles offrent un financement à long terme qui soit stable. Cette approche est soumise aux mêmes aléas que l'option 1. Les travaux en cours à la mine Giant sont les seuls à représenter ce type d'entente.

OPTION 5 : Création de partenariats avec les sociétés minières pour financer la réhabilitation des mines abandonnées

Prémisse : Que des ententes de financement puissent être conclues entre le gouvernement et les compagnies minières afin que les sites miniers abandonnés soient restaurés.

Commentaires : Des ententes peuvent être conclues avec les compagnies minières afin que le financement soit partagé lorsque la compagnie demande un avantage au gouvernement, en général une indemnisation à l'égard de toute responsabilité future ou le partage des coûts de la restauration qui procure en échange un accès aux droits d'exploration minérale ou de retraitement des rejets miniers. De tels partenariats peuvent produire des résultats favorables à toutes les parties; les gouvernements et les entreprises minières devraient puiser dans leur sens de l'entrepreneuriat pour former des partenariats dans lesquels les deux parties retirent des avantages. Cela étant dit, ce type d'approche convient généralement à des problèmes uniques qui ne visent qu'un seul site et il ne saurait être considéré comme étant une option lorsque le financement doit être majeur, stable et à long terme. Les études de cas portant sur les mines Britannia et Hollinger/McIntyre illustrent cette option.

ÉTUDES DE CAS – SITES

Mine Britannia (C.-B.) – Cette mine, qui est située à 50 km au nord de Vancouver, a produit du cuivre, du zinc et de l'or entre 1904 et 1974 et a créé des milliers d'emplois. Le drainage minier acide à partir de ce site est responsable de l'accumulation de grandes quantités de métaux dans la baie Howe, ce qui fait de ce site l'une des plus importantes sources de pollution par les métaux en Amérique du Nord. Le site est maintenant restauré sous la direction de la Crown Contaminated Sites Branch de la C.-B. Le coût total estimatif est de 75 à 100 millions de dollars (M$). Le financement inclut 30 M$ versés à la C.-B. par les compagnies qui ont succédé aux premiers propriétaires de la mine. En échange de ce versement, les compagnies sont indemnisées à l'égard de toute responsabilité ultérieure. Selon une « entente de partenariat », EPCOR Water Services Inc. a construit une usine de traitement de l'eau. Aux termes de cette entente, EPCOR exploitera l'usine durant 20 ans pour une rétribution d'environ 27,2 M$. La C.-B. utilisera l'argent recueilli auprès des propriétaires précédents pour payer EPCOR. D'autres besoins financiers seront comblés à l'aide des recettes générales de la C.-B.

Mine Giant (T.N.-O.) – La mine Giant a produit de l'or de 1948 à 2004. Elle a été mise sous séquestre en 1999, mais près de 237 000 tonnes de rejets miniers contenant de l'arsenic sont entreposées dans ses installations souterraines. Ces rejets peuvent éventuellement contaminer l'eau souterraine et représenter un danger pour la santé humaine. La gestion du site et la méthode de restauration du site proposée, soit la congélation in situ, pourraient coûter 300 M$ ou plus. Du financement provisoire est fourni aux termes d'une entente de coopération entre le Canada et les T.N.-O. La majorité des fonds proviendrait du gouvernement fédéral, soit du Programme des sites contaminés du gouvernement du Canada.

Mines Hollinger/McIntyre (Ont.) – Ces mines adjacentes, qui sont situées dans la ville de Timmins, ont été exploitées durant près de 80 ans, ont produit plus de 29 millions d'onces d'or et ont été à l'origine de nombreux emplois, de recettes fiscales élevées et de beaucoup d'autres avantages. Les sites ont été mis sous séquestre en 1999, avec une responsabilité estimative de 25 M$ pour, principalement, la restauration physique qui vise à réduire la possibilité qu'un affaissement de surface cause des dommages. Le séquestre a refusé de séparer ces terres de terres adjacentes que Kinross Gold Corporation souhaitait obtenir pour y chercher des gisements d'or. En 1999, Kinross (le projet relève maintenant de Porcupine Joint Venture) a signé une entente de partage des coûts avec l'Ontario. La coopération et les travaux de restauration et d'exploration qui en ont découlé ont donné lieu à une situation qui ne fait que des gagnants.

Mine de Lynn Lake (Man.) – La mine de Lynn Lake (mine Farley) a produit plus de 20 millions de tonnes de minerai de nickel-cuivre de 1953 à 1976. Exploitée à l'origine par Sherritt-Gordon, devenue Veridian Inc., la propriété a été acquise par la suite par Agrium Inc. Quelque 22 millions de tonnes de résidus sulfureux créent un risque de drainage minier acide. Les travaux de réhabilitation sur le site sont évalués à plus de 60 millions de dollars. Aux termes d'un PE entre Veridian et le Manitoba, le coût de la réhabilitation du parc à résidus Est, estimé à 60 millions de dollars, sera partagé à parts égales. La responsabilité totale du Manitoba pour le site est estimée à 38 millions de dollars.

ÉTUDES DE CAS – PROGRAMMES GOUVERNEMENTAUX

Crown Contaminated Sites Program, C.-B. – Ce programme a été établi pour faire suite à un rapport de 2002-2003 du vérificateur de la province sur les sites contaminés. Le programme est administré par le biais du Ministry of Agriculture and Lands; la responsabilité de la gestion des sites contaminés est estimée à un total de 180 millions de dollars (valeur nette actuelle) à compter de 2001; le budget pour 2006-2007 s'établit à 23 millions de dollars et celui de 2007-2009, à 47 millions de dollars. Les fonds proviennent des recettes générales. Dans la mesure du possible, les « pollueurs » sont tenus responsables et les partenariats privés-publics sont encouragés.

Programme sur les sites contaminés fédéraux, MAINC – Ce programme porte sur les sites miniers et les autres sites contaminés situés principalement au nord du 60^{e} parallèle. L'assainissement des sites contaminés a été demandé par le vérificateur général du Canada, qui évalue à plus de 555 millions de dollars la réhabilitation des sites miniers, dont la contamination est due en bonne partie au drainage acide. Le programme est coordonné par le MAINC avec l'aide d'une série de comités de direction et de groupes de travail composés de représentants de plusieurs ministères et organismes. La plupart des fonds proviennent des recettes générales fédérales, et les gouvernements territoriaux apportent une contribution dans la mesure du possible. Chaque projet doit être soigneusement examiné en vue d'obtenir des fonds des « pollueurs historiques » solvables.

Programme de réhabilitation des mines orphelines/abandonnées du Manitoba – Le Manitoba a annoncé en septembre 2006 un nouveau programme de 70 millions de dollars visant à réhabiliter complètement les anciens sites miniers de la province; ce programme inclut le volet manitobain des travaux de réhabilitation des résidus de la mine de Lynn Lake susmentionnés. Le programme répond au rapport du vérificateur général de la province sur les sites contaminés. Ce programme prolonge et étend l'actuel programme qui avait été établi en 2000 pour prendre en main les 149 sites orphelins ou abandonnés au Manitoba. Le financement pour le nouveau programme est dérivé des recettes générales. Le programme est coordonné par la direction des mines du ministère des Sciences, de la Technologie, de l'Énergie et des Mines du Manitoba.

Programme de réhabilitation des mines abandonnées de l'Ontario – Le programme actuel de l'Ontario a été lancé à la fin de 1999. Avec les récents engagements, le programme dépensera quelque 117 millions de dollars sur 13 ans jusqu'en 2012; les budgets annuels courants s'élèvent à 10 millions de dollars. Le programme est fondé sur un programme de 1990-1994 d'une valeur de 10 millions de dollars. Les évaluations de site sont complétées dans l'ensemble et les dépenses courantes sont concentrées sur les problèmes de drainage acide, de subsidence du sol, d'ouvertures donnant accès à la surface, de puits ouverts, etc. L'Ontario compte quelque 5 600 mines abandonnées assorties d'un fardeau financier de 300 millions à 500 millions de dollars, dont environ 40 p. 100 sont du domaine provincial. Le financement est dérivé des recettes générales. Ce programme est coordonné par la Direction de l'exploitation des minéraux et de la gestion des terrains miniers du ministère du Développement du Nord et des Mines.

RECOMMANDATIONS

Les recommandations soumises sont les suivantes :

1) À quelques exceptions près, chaque gouvernement est responsable de ses propres mines abandonnées. Avant que le financement ne puisse être arrêté de façon concrète, le problème doit être défini et quantifié par les moyens suivants :
   a) création d'un inventaire;
   b) évaluation des sites;
   c) analyse des risques;
   d) analyse des coûts;
   e) établissement des priorités.

   Le montant du financement nécessaire et le calcul sur une base annuelle peuvent être estimés en prévoyant une marge d'imprévus importante. Les échéanciers proposés doivent être réalistes, mais suffisamment rigoureux pour que les travaux soient réalisés dans un délai raisonnable.

2) L'évaluation du fardeau financier est importante, parce que les vérificateurs doivent être en mesure de voir le fardeau diminuer à mesure que les fonds sont dépensés. Il est essentiel de prévoir des fonds pour éventualité suffisants; nous recommandons 30 p. 100. Cependant, l'évaluation du coût de la réhabilitation ne doit pas être considérée comme statique; des facteurs comme les changements climatiques, les développements technologiques, les modifications réglementaires, l'inflation, les taux d'intérêts et de nombreux autres éléments peuvent et doivent influer sur les coûts estimés, particulièrement quand les sites doivent être entretenus en permanence.

3) Avant de réorienter des recettes existantes liées à la production minérale, les gouvernements doivent déterminer si des recettes suffisantes peuvent être générées pour assurer un financement durable.

4) Les gouvernements qui envisagent d'imposer un nouveau prélèvement sur la production de minéraux doivent : déterminer si le prélèvement peut générer des recettes suffisantes pour assurer le niveau de financement requis; en déterminer l'impact sur les producteurs et les consommateurs; examiner l'équité globale du prélèvement, à savoir, qui est le véritable responsable.

5) Les gouvernements doivent manifester un esprit d'entreprise et prendre des risques en établissant des partenariats avec l'industrie propre au site de sorte que chaque partie obtienne quelque chose, que ce soit des droits d'exploration, des droits de retraitement des rejets, une indemnisation à l'égard de responsabilités futures ou, du point de vue gouvernemental, le parachèvement des travaux de réhabilitation.

6) Les gouvernements qui envisagent des accords de partenariat doivent élaborer des politiques en matière d'indemnisation à l'égard de toute responsabilité future de façon à clarifier les règles. Dans le cadre des discussions menant à l'élaboration de la politique, il conviendrait d'examiner les « lois du bon samaritain » pour en vérifier l'applicabilité.

7) Lorsque les gouvernements présentent des programmes de réhabilitation, ils doivent mettre en place des ressources humaines et de gestion suffisantes pour permettre un niveau de planification et d'inspection adéquat, l'optimisation des ressources et la planification de mesures d'urgence.

8) Enfin, le mécanisme de financement devrait être imposé par la loi pour conférer une plus grande certitude. Castrilli et coll. 2003, recommandait d'inclure dans la loi des facteurs pour les mines orphelines/abandonnées, lesquels devraient être examinés par des lecteurs intéressés. Les propositions nécessitant ou appelant une loi sont une arme à double tranchant. Si une loi peut conférer une plus grande certitude pour le maintien d'un programme, elle demande du temps et un grand engagement et est susceptible d'être laissée en plan au cours du processus législatif.

La discussion précédente offre un aperçu de ce que contient cette « boîte à outils », une série d'options que les fonctionnaires, les politiciens et les autorités municipales peuvent prendre en considération. Tout programme de financement stable et fructueux a besoin d'un « champion » prêt à porter le fardeau sur ses épaules, par ex. un ministre déterminé ou, mieux encore, une équipe de ministres déterminés.

INTRODUCTION

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. The means of funding the clean-up or rehabilitation of these sites has been the source of considerable discussion and research by *The National Orphaned/Abandoned Mines Initiative* (NOAMI) over the last few years. This report aims to provide a guidance document or toolkit for politicians, government bureaucrats, municipal officials or others who may encounter the problem and desire to proceed with doing something about it. This report draws heavily upon reports and workshops commissioned by NOAMI, in particular, the work of Joseph Castrilli and colleagues (2003, 2005).

Some"Need to Know" Background

- Abandoned mine features are found virtually everywhere on the planet where there has been a history of mineral exploration and extraction; they are not unique to Canada.

- Globally, mines become abandoned through a variety of processes including owner economic failure; resource depletion without provision for rehabilitation; corporation default; seizure of lands through none payment of taxes, rents or royalties; discontinuance of wartime strategic efforts directly commissioned by governments; political unrest which drives the responsible owner away; transient small scale miners, etc. However, the greatest reason for their occurrence is the failure of governments of the day to recognize the potential fall-out of abandonment and therefore the lack of provision for adequate regulatory regimens. To be fair, only in recent years have the consequences of not rehabilitating mine sites become apparent to many. The impact of mine wastes on the environment was not well understood and scientific testing methods and technologies were not as sophisticated as today's. As well, miners of the day were generally operating within the inadequate rules that were in effect.

- In the past governments collected revenues from mining activities but neither earmarked some of these funds for future rehabilitation, nor required the proponent to set aside funds for this purpose. These revenue streams included Federal and Provincial corporate and personal income taxes, direct royalties on commodity production, royalties on profits through mining taxes, rents and taxes on mining lands, and other mandated charges such as value added taxes, unemployment insurance etc. Over the years this has amounted to enormous sums in some mining jurisdictions.

- The abandoned features inevitably return to the Crown, State or in some instances the municipality due to the means by which mineral rights are conveyed from the Crown to individuals or corporations; upon default by the lessee or owner, the lands automatically return to the Crown. Consequently, the Crown is frequently the only responsible party

* Though NOAMI refers to orphaned and abandoned mines (OAMs), for the purpose of this report we will use the term "abandoned mines" for brevity

available to take action toward abandoned mine rehabilitation. In some instances municipalities seize surface rights and related liabilities due to none payment of taxes.

- In Canada minerals are Constitutionally the purview of the provinces and each is on its own to manage the issue of abandoned mines and related fiscal and environmental liability. Exceptions include terrain north of 60 where the Federal Government either has or previously had the responsibility for minerals management; a second instance occurs where the minerals are radioactive and the extraction and processing is regulated by the Federal Government.

- In Canada some 10,000 abandoned mine sites exist and the ultimate rehabilitation of these could approach several billion dollars.

- Risks related to abandoned mines include physical safety (open holes, subsidence potential, unsafe derelict buildings, etc); health issues due to tailings dusting; spills due to failure of tailings containment structures; chemicals left on site; chemical contamination of surface and groundwater leaving the site, commonly through oxidation of sulphide minerals which creates acidic drainage with associated metal leaching and contamination; aesthetic issues etc.

- Future accrual of additional abandoned mines in Canada is limited through modern legislation, which requires mine closure plans supported by financial commitments.

- Voluntary actions to assist with the remediation of abandoned mine features are hampered by liability issues. This can be overcome by specific legal agreements on a one-by-one basis such as that which The Ontario Ministry of Northern Development and Mines (MNDM) has with the Ontario Mining Association. More useful would be legislative mechanisms which protect third party individuals, companies or organizations from accruing liability if they have worked in good faith in accordance with accepted regulatory standards. The State of Pennsylvania has put “Good Samaritan” legislation in place which protects third parties from incurring liabilities when completing voluntary rehabilitation work in good faith.

- Many or most mines occur in areas of naturally elevated metal content in rock, soil and streams. It is usually impossible to determine the natural metal content after the fact for old sites. Completion of base-line studies to document natural conditions is a recommended, and frequently required, pre-mining practice.

- Abandoned mine features, with appropriate safety measures, may be used for tourist attractions – examples include the Cobalt Silver Trail and the Timmins Gold Mine Tour in Ontario, the “Gold Reef” theme park in Johannesburg, RSA, the Britannia Mine mill site in BC and Mine Capel and Mine Bourlamaque in Quebec.

- The desire by mining companies to access abandoned mine sites held by the Crown or State for either exploration or to reprocess wastes such as tailings provides some opportunity to negotiate the sharing of rehabilitation costs.

- It is reasonable that those who created the problems of abandoned mines should be the responsible party to pay for remediation and restoration - the so-called “Polluter Pays” principle. However, if those responsible for physical or environmental hazards on a site cannot be found or are financially destitute, then the government is usually left as the party responsible for the site, quite frequently as the owner by default, i.e. there is no-one else. It is the position of some non-governmental organizations (NGO) to take a broad view of the “Polluter Pays” equation, e.g. it is the mining sector which has profited from these abandoned mines and they should be responsible for past misdeeds through levies on current production. For the purpose of this report, where orphaned or abandoned mines are deemed not to have attachments to viable owners, the principal of “Polluter Pays” has no direct applicability. However, it is incumbent upon all officials responsible for abandoned mine issues to take every step possible to have the original owner or operator or their successors held responsible.

What the Auditors Say

Several government auditors have commented on the issue of abandoned mines over the past few years. A few notes from these follow to help paint the picture.

In 2002 the Report of the **Commissioner of the Environment and Sustainable Development**, a component of the Office of the Auditor General of Canada, Chapter 3, reported on Abandoned Mines in the North. The Commissioner noted an estimated $555 million public liability resulting from abandoned mines ‘north of 60’ and referred to the current care and maintenance programs at several key sites as a band-aid approach. “With insufficient financial resources the Department is scrambling to keep up with the demands. **Long-term stable funding and long-term stable solutions are required.”**

In 2005 the ***Manitoba Auditor General*** commented on orphaned and abandoned mines. In general the AG noted that the Mines Branch does not have sufficient processes in place or sufficient inventory information to complete adequate risk assessments of the abandoned sites in Manitoba. Notwithstanding this, a preliminary estimate of $61.5 million has been suggested as the potential Provincial liability for these sites. The Auditor General pointed out that by “March 31, 2006, The Province and all senior governments in Canada will be required under the Public Sector Accounting Board (PSAB) of the Canadian Institute of Chartered Accountants (CICA) to accrue and/or disclose its environmental liabilities in accordance with recent standards for accounting for liabilities and contingent liabilities.” Though critical of the Mines Branch and other responsible government parties, the AG provided no comment on the lack of resources or capacity to adequately get on with the job. In September 2006 Manitoba announced a new $70 million mine site rehabilitation program.

In 2005 the **Auditor General for Ontario** reported on the abandoned mine situation and recommended that the Ministry of Northern Development and Mines (MNDM) should ensure that its database on abandoned mines is complete; that the potential for chemical contamination at each site is assessed; and that a long-term strategy for managing, monitoring and rehabilitating abandoned mines that includes updated cost estimates, prioritization of all

sites based on risk and the estimated time required to complete the work base on an anticipated level of funding. During the last few years Ontario has provided an annual allocation of $10 million to deal with the issue. This funding has been recently extended to 2012.

In 2002 the **Auditor General for British Columbia** completed a review of contaminated sites and stated: "I am concerned that legislators do not receive comprehensive information about how well government is fulfilling its stewardship role for contaminated sites. A complete inventory and assessment of sites is needed if the government is to understand the nature and magnitude of the problem, set clear overall priorities, identify the work required to be done and provide legislators with a reliable plan and cost estimate of the remediation needs." A concern about the level and quality of financial bonding for rehabilitation of existing mines was expressed.

Summary

The above sampling of auditor reports generally had the following commonalities:

1. The governance of abandoned mines needs to be clear and coordinated;
2. Inventory, risk assessment and prioritization are fundamental to program and fiscal planning – in most instances the level of knowledge for sites is inadequate to do this.
3. Prevention of further accrual of abandoned mines requires sufficient financial assurance for existing operational mines with good financial instruments – in at least two of the examples the auditors expressed concern about both the level of funding and the adequacy of the instruments.
4. Auditors are concerned that governments use proper accounting procedures for dealing with abandoned mines. This requires that good estimates of the total financial liability are available so that when monies are spent on rehabilitation the net liability to the jurisdiction is reduced. This is an important factor in lobbying for funds, as progress in reducing the contingent liability must be demonstrable. The CICA liability disclosure requirement cited by the Manitoba Auditor General has to be considered. Effective March 31, 2006 federal officials will have to comply with the Treasury Board of Canada “Policy Framework for the Management of Assets and Acquired Services”.
5. The Federal Commissioner said it best with the comment “ long-term stable funding and long-term stable solutions are required.”
6. Websites for the above sited Auditor Reports are located as follows:
   - Northern Canada : http://www.oag-bvg.gc.ca/domino/reports.nsf/html/c20021003ce.html
   - Manitoba: http://www.oag.mb.ca/reports/2005/environaudit/Environ_Audits_nov21_05.pdf
   - Ontario: http://www.auditor.on.ca/en/reports_en/en05/309en05.pdf
   - British Columbia: http://www.bcauditor.com/PUBS/2004-05/Report8/contaminated.pdf

Emergencies and Opportunities

Abandoned mines have emergencies, though not as frequently as might be expected given the scope of the problem. Collapse of land into underground openings and the spill of tailings into inhabited areas or water bodies are two occurrences with which the public is generally aware. Emergencies heighten awareness and provide responsible agencies with a legitimate need to seek funding for abandoned mines programs to avoid environmental degradation or injury or death of persons. Abandoned mine hazards do not get the attention they deserve from governments because they occur in more remote communities where political considerations are limited and risks appear, superficially, to be diminished. The push and pull of fiscal needs for health, education and other high priority funding needs keep the abandoned mines concerns in the background.

Other opportunities to push the issue politically occur at changes of government and/or Ministers when the abandoned mine issues can be brought to the front during ministerial briefings**.** Officials responsible for abandoned mine liabilities must be ever watchful to seize such opportunities for funding requests.

Previous Work

NOAMI has been considering the issue of funding since 2001 when several presentations were made at the initial Winnipeg Workshop which are available on NOAMI website, http://www.abandoned-mines.org/winn_e.htm. Subsequently a Working Group was established to review the issue. This resulted in the commissioning of a project to be completed by Mr. Joseph Castrilli who reported on his findings in October 2003 (Castrilli *et al* 2003). In 2005 NOAMI sponsored a Workshop on Assessing Liabilities and Funding Options which was reported on by Stratos Inc., 2006. At that workshop the concept of a “toolkit” was created and this report is the result.

FUNDING OPTIONS

Introduction

This section of this report will portray several funding options which governments could review and perhaps implement to provide for funding the rehabilitation of abandoned mines in their jurisdiction. By the NOAMI definition of abandoned mines, government is usually the only available direct funding agency and that it has ready access to the abandoned properties. Information is presented in a briefing note format and draws heavily on the work of Castrilli *et al* 2003 with input from the authors, who have considerable background in abandoned mines rehabilitation and funding, and by the NOAMI Advisory Committee.

Funding Options**:**

1. Direct government funding from general revenues;

2. Government funding through tapping existing revenue streams generated by mining;

3. Create a fund through a new levy on mining production;

4. Federal-Provincial/Territorial cost sharing arrangements from general revenues; and

5. Creating funding partnerships with mining companies to fund abandoned mine rehabilitation.

Castrilli *et al* outlined a somewhat broader set of options and the reader may wish to consult the report; however, the intent of this report is to highlight those options which are most practical and subject to direct influence by the responsible provincial, territorial or federal government agency.

NOAMI and the writers recognize that each jurisdiction has its own budgeting processes, which include current and long-term needs. The following provides basic information for officials and politicians to get a grasp of the available and most practical choices; there are many more choices but the related legal and administrative issues render them impractical on more than local initiatives of modest scope. The intent is to create a stable long-term funding arrangement of sufficient proportion to deal with the problems within a jurisdiction over a reasonable time frame, e.g. 10-25 years.

Option 1: Direct Government Funding from General Revenues

Premise: That the issue of abandoned mines can be dealt with through the appropriation of funds from general revenues via government planning and budgeting processes.

Discussion: As noted in the introduction, over the years various governments in Canada have collected billions of dollars from mining related activities which flowed into general revenues. This money was spent on the government needs of the day. Since many or most mines occur in the hinterland, this was basically an extension of the colonial approach to resources in foreign lands – exploit the colonies to pay for expenses at home. This option suggests that it is payback time and that past, present and future mining related revenues should be directed to rehabilitating abandoned mine sites. The approach would create dedicated long-term abandoned mines funding lines in multi-year budgets.

Pros:

- This option has the potential to provide for stable rehabilitation programs to get on with the job, e.g., recently the Ontario government has committed to a time-limited program to provide $10 million per annum to rehabilitate abandoned mines to 2012. Similarly Quebec, Manitoba, B.C. and others have existing programs based on allocations from general revenues.
- Program managers can plan, direct and report on work in a systematic manner for multi-year programs.
- Emergency response monies and project staff should now be in place if they are needed.
- The public knows there is a program in place and who is in charge.
- All are pleased to see a defined program towards alleviating the issue.

Cons:

- Government Finance departments do not like to commit funds long-term from general revenues as it reduces flexibility.
- Unless the funding is legislated it is relatively straightforward to take back or reduce the funding.
- Those who view the overall industry as “the polluter” see this as a further incentive to the mining industry.
- A change of government priorities or senior government officials can impact on such a program.

Comments:

Stable funding for a progressive rehabilitation program is highly desirable. Long-term commitment of funding from general revenues can do this very well so long as government priorities do not change.

Option 2: Direct Government Funding Through Tapping Existing Revenue Streams Generated by Mining

Premise: That the issue of abandoned mines may be dealt with through directing existing mining related revenue streams into a dedicated account. In most instances this means diverting either front-end royalties or mining tax royalties (generally back-end taxes on profit) to a dedicated fund.

Discussion: As noted previously some/many-mining jurisdictions have generated and continue to generate considerable revenue through royalties of one form or another. Directing these to the rehabilitation of abandoned mines has considerable attraction to some people as it has the appearance that the present mining companies are actually paying for the rehabilitation of abandoned mines, i.e. a somewhat cloudy version of "Polluter Pays." The proposal requires that a jurisdiction continues to collect royalties of sufficient value to provide for a stable funding mechanism.

Pros:

- If viable for a jurisdiction, the method has the potential to provide for a stable rehabilitation program.
- A stable fund will allow program managers to plan, direct and report on rehabilitation work in a systematic manner.
- Emergency response monies and project staff should be in place if they are needed.
- This option contemplates that present day miners are paying for the sins created by their forerunners.
- If legislated the funding could be very stable.

Cons:

- In reality this is a limited version of creating a fund from general revenues (Option 1) as the revenue streams are merely being diverted and earmarked for a specific purpose.
- If restricted to royalty streams this funding option could suffer the vagaries of commodity "boom and bust" price cycles or economic cycles in general, i.e. contributions to the fund may not be as stable as desired.
- As with Option 1, this option is subject to government change, fiscal restraints within government etc.
- Achieving new legislation is a complex matter if that route is required.

Comments:

As with the previous option, stable funding for abandoned mine rehabilitation is fundamental. The earmarking of existing revenue streams for this purpose has many desirable properties from a public perspective.

Option 3: Create a Fund Through a New Levy on Mining Production

Premise: That a sufficiently large, stable fund to deal with abandoned mines can be created by establishing a levy on current mining production.

Discussion: Establishing a levy on production to create a dedicated fund for the rehabilitation of abandoned mines has considerable appeal to many as it has the appearance of requiring miners to clean up their own mess and some semblance to the "Polluter Pays" principal. This approach has worked very successfully in the U.S.A. where coal miners pay a fee/ton on mined coal, which flows into an Abandoned Mine Reclamation Fund. With about one billion tons of coal being mined annually at present the cash flow is considerable, e.g. in 2004 fees collected through this Act amounted to almost $300 million. This fee was created under the Surface Mining Control and Reclamation Act (SMCRA) of 1977 which holds that through this fee the coal industry and their consumers are bearing the costs created by their predecessors. The primary focus of the fund is coal related; however, surplus funds may be authorized for priority non-coal mining activities.

Canadian examples of requiring fees toward rehabilitation of abandoned mining properties include the Ontario Aggregate Resources Act; the Manitoba Quarry Rehabilitation Reserve Fund; and the Alberta Oil and Gas Orphan Fund. In Ontario aggregate pits and quarries located on private lands in designated areas pay a $0.06/tonne license fee of which $0.005/tonne is set aside in a trust fund for the rehabilitation of abandoned sites. The process is effective but the accumulation of funds is limited by the small levy and is subject to the cyclicity of aggregate demands. As it stands, the current program will require many decades to complete its work.

The Manitoba Mining Act requires operators of aggregate quarries to pay a rehabilitation levy toward a Quarry Rehabilitation Reserve Fund; this is a $0.10/tonne charge. The program provides certainty that depleted sites will be rehabilitated be they orphaned or otherwise.

For dealing with abandoned oil and gas wells Alberta introduced a levy system to create an Oil and Gas Orphan Fund pursuant to their Oil and Gas Conservation Act. This requires all licensees to pay an annual fee; as well, new licensees are required to pay a one-time start-up fee, which is $10,000.

Pros:

- This option relies on legislating a new revenue stream, which is dedicated to the problem at hand. This legislative approach guarantees a revenue stream to carry out programs at one level or another.
- A stable fund will allow program managers to plan, direct and report on rehabilitation work in a systematic manner.
- Emergency response monies and project staff should now be in place should they be needed.
- The industry is seen to be bearing the inherited burden of the mining sector.
- The monies are earmarked via legislation for the purpose intended thus providing an element of stability.

Cons:

- Each jurisdiction contemplating the imposition of a levy would need to do considerable research to determine whether sufficient funds would flow from this approach.
- Levies such as those described are tax deductible and therefore may reduce the taxes that would normally flow to government general revenues; i.e. the government may still be bearing part of the cost through lost revenues elsewhere.
- Most of the programs described include levies on commodities for which the cost can be passed on, e.g. coal and construction aggregates. It is therefore effectively the consumers who are paying through direct increases on energy costs or construction materials. For construction aggregates, Provincial and Municipal governments could be large levy contributors.
- For those commodities where the producer is a price-taker, i.e. most metals have fixed prices set through global pricing mechanisms, the levy cannot be passed on to customers. This may have potential implications on both the competitiveness and perhaps the economic viability of a producers operations. It should be noted that the US (SMCRA) levy applies only to coal mining.
- One can always question why current producers should bear the burden of the past – is this fair and does it provide a good governance principal.
- It is the imposition of a new tax, which might be contrary to government promises and policy.
- For price-taking commodities, the establishment of such a levy would be complex and possibly profits based, perhaps cutting directly into royalty streams based upon profits.
- Creating and promulgating such legislation can be very complex.
- Producers and mining associations may oppose this option.

Comments:

If one accepts the initial premise that it is fair to burden current producers with the cost of rehabilitation of abandoned sites then this process can be very effective if the revenue streams are sufficient and stable and if the levy is not too burdensome for the industry. The most successful industry levies appear to be for those commodities where the levy can be directly transferred to the consumers; for price-takers there is an element of concern.

Option 4: Federal-Provincial/Territorial Cost Sharing Arrangements from General Revenues.

Premise: That arrangements can be made for both senior levels of government to cost share the rehabilitation of abandoned mines on a continuing basis.

Discussion: Though minerals and mining are the domain of the provinces in Canada, the Federal Government has long enjoyed a substantial revenue flow from mining through corporate and personal income taxes and other mandated taxes. Logically this may lead to the conclusion that the Federal Government too has some responsibility for the lack of government oversight in the past. In addition, the Federal Government can be directly tied to many abandoned mines which were opened during World War II at the direction of or under the sponsorship of the Federal Government. Finally the Federal Government is tied to numerous mines and processing facilities through the regulation and licensing of mining operations extracting radioactive minerals, uranium being the most significant one.

In the early 1990's a "National Contaminated Sites Remediation Program" was established to remediate contaminated sites in a cost-sharing formula with the Provinces and Territories. From the mining perspective this program was quite ineffective, e.g. Ontario had only one site which qualified for the Federal funding. The funding was time-limited and the program ended without fanfare and very little is known of it. In fairness, during the time frame of the program the Provinces were experiencing fiscal constraints which may have reduced the impact of the Program. Affected Provinces have attempted to obtain federal assistance for the clean-up of sites opened during World War II under the auspices of the Canadian government. To date these approaches have not proved positive, http://www.abandoned-mines.org/pdfs/wwii.pdf.

A Federal-Provincial agreement for the rehabilitation of abandoned uranium mines and uranium waste sites should owners default was struck with Ontario in 1996. To date this agreement has not been required to be invoked and it is currently under a periodic review. This agreement has no dedicated funds attached to it and if need arose the funds would most likely be obtained from general revenues of each party. However, this agreement is a good example of cooperation when needed. A Natural Resources Canada press release in June 2005 announced that a Canada/Saskatchewan accord is in the final stages of development to deal with abandoned uranium mines in northern Saskatchewan. The Gunnar and Lorado sites will be assessed and remediated over a five-year period. The sites are abandoned with the exception of a portion of the Lorado site; here the owner will contribute to the clean-up.

Pros:

- Shared funding from general revenues is attractive as it potentially can create a larger pool of funding for getting on with the job.
- Such funding could possibly provide for stable rehabilitation programs.
- A stable fund will allow program managers to plan, direct and report on rehabilitation work in a systematic manner.
- Emergency response monies and project staff should now be in place should they be needed.

Cons:

- Despite arguments about mining related revenues provided to the Federal Government coffers over the years and the attempts to invoke the Federal Government via activities during World War II, the fact remains that minerals management is constitutionally the domain of the Provinces. Federal involvement in large-scale rehabilitation of abandoned mines is therefore unlikely south of 60. To date the Federal Government has funded projects in the Provinces only when they are very significant contaminated sites, e.g. Deloro Mine in Eastern Ontario. The Federal Government already has a huge financial liability for contaminated sites, e.g. at least $555 million estimated for northern abandoned mine sites. The Federal Contaminated Sites Program has a target to remediate all its priority sites by 2027. Clearly it is obligated to remediate these first.
- If not supported by legislation, such arrangements from general revenues are subject to both change of government and change of priorities.

Comments:

- It would be very desirable and helpful to have Federal Government funding working in tandem with Provincial/Territorial funding from general revenues for the rehabilitation of abandoned mines. It is unlikely that the Federal Government would commit to such a program for an extended period of time for areas south of 60 in which it has no major mining administration role. Time-limited cooperation of this nature is perhaps the best that can be hoped for during special initiative opportunities. The cooperative arrangement put in place for the Giant Mine represents post-devolution Federal/Territorial cost sharing on a site-specific basis.

OPTION 5: Creating Funding Partnerships with Mining Companies to Fund Abandoned Mine Rehabilitation

Premise: That arrangements can be made between government and mining companies to accomplish the rehabilitation of abandoned mines.

Discussion: This option is based upon both parties wanting something, frequently the whole carrot. In the case of government, the desire is to alleviate a public safety or environmental concern as well as government legal and financial liability. With regard to corporations, they desire to limit their liability whilst obtaining something, usually a mining property which may have considerable existing liability, or to eliminate or reduce their liability for a mining property through some form of indemnification. Two of the case studies included within this report focus on cooperation, which advantages both parties. In the case of the Britannia project, previous mine owners provided $30 million toward rehabilitation in exchange for indemnification for environmental liabilities. In the case of the Kinross Gold (now PJV) arrangement a partnership was struck which allowed Kinross to obtain mine exploration access to lands in receivership and which had huge financial liabilities for rehabilitation. Kinross eventually reached agreement with the Province. This limited the Provinces financial liability whilst allowing Kinross to obtain the lands with financial liabilities deemed manageable. Old mining properties may be desirable for several reasons. Firstly they once supported a mine and the potential through re-exploration is frequently high - “one of the best places to look for a new mine is near an old mine.” Secondly, mine wastes such as tailings may contain metals or other minerals, which can be extracted through reprocessing (so-called re-mining). Factors such as new technologies for mineral processing, mineral price increases, etc. can renew interest in old properties. These situations provide opportunities to cost share liabilities on some properties.

Pros:

- Opportunities for cost sharing on a site-specific basis exist and should be optimized.
- Since the Crown already has or will have the liability for abandoned mine hazards, taking risks through partnerships should not be precluded.
- All parties should be entrepreneurial in coming up with solutions.
- Enhanced values may be achieved with in-kind contributions.
- Provides the industry with an opportunity to do good deeds and achieve visibility for it.

Cons:

- Generally has application on a one-off basis only.
- Has limited or no potential for developing a significant pool of funds that can provide for an ongoing stable program, or provide for emergencies. Small contributions can be developed through the effort of mining associations
- Governments must be able to make decisions regarding indemnification, i.e. policies must be in place

Comments:

This option has many desirable features but is limited in scope. Governments should exercise an opportunity for partnerships wherever a desirable property has potential for either re-exploration or reprocessing of mine wastes.

CASE STUDIES ON FUNDING APPROACHES

INTRODUCTION: A total of eight case studies have been compiled to illustrate examples of abandoned mine reclamation funding. Four case studies deal with abandoned mine sites and four with comprehensive government programs. Location, history, issues, remediation and sources of funding are provided for each case history.

Scar from tailings run-off and pick- up truck entrapped in the tailings

The four site-specific abandoned mine reclamation examples are taken from three provinces and one territory. The Giant Mine in NWT presents a serious arsenic contamination problem. The Hollinger/ McIntyre Mine site has caused numerous subsidence problems within the City of Timmins, Ontario. The remaining two abandoned mines, Britannia in British Columbia and Lynn Lake in Manitoba, have acidic drainage problems and heavy metal contamination issues. The four government programs cover areas under federal jurisdiction, and the provinces of British Columbia, Manitoba and Ontario.

Old copper mine with collapsed rotten log cover

The federal program is managed by Indian and Northern Affairs Canada (INAC) for sites mainly north of 60. The provincial programs are managed by the Ministry of Agriculture and Lands in British Columbia, the Ministry of Science, Technology, Energy and Mines in Manitoba, and in Ontario, the Ministry of Northern Development and Mines. Each program takes a global perspective and follows a systematic process of inventory, site investigation and priority setting. The federal program is funded mainly through a dedicated “Contaminated Sites Fund” as well as, through joint agreements with territorial governments. The provincial programs are funded through dedicated allocations. In addition, the provincial programs have provisions to encourage partnership funding agreements. The federal and B. C. programs include provisions for “Polluter Pays” agreements. The Britannia abandoned mine in B. C. has received funding through such an agreement. The benefit to society through restoration of land values and resulting economic spin-offs is emphasized by all government programs.

Rock garden in a reclaimed quarry

The four site-specific case studies illustrate the complexities of abandoned mine remediation and the necessity for costly science-based solutions. Funding for the Britannia project is basically through “Private Public Partnership” and “Polluter Pays” agreements. The Giant Mine project in Yellowknife is funded mainly by the Federal Contaminated Sites Program and partially by the government of the Northwest Territories. At the Lynn Lake project, funding to date has come from the Manitoba Orphaned/Abandoned Mine Site Rehabilitation Program and from a Joint Agreement with Viridian Inc. and the Province. The Hollinger/McIntyre case history is somewhat unique in that a third party, Kinross Gold Corporation, is willing to provide joint agreement rehabilitation funds in exchange for the right to do mineral exploration on these and adjacent properties. The Province of Ontario provides its share through the Abandoned Mines Rehabilitation Program fund.

Remedial work project on an abandoned mine beneath a major city intersection

Airborne photograph of an abandoned graphite mine and tailings area

SITE SPECIFIC PROJECTS

BRITANNIA MINE, BRITISH COLUMBIA

INTRODUCTION

Location - The mine site is located at Britannia Beach, a small town on the shores of Howe Sound, some 50 km north of Vancouver, British Columbia.

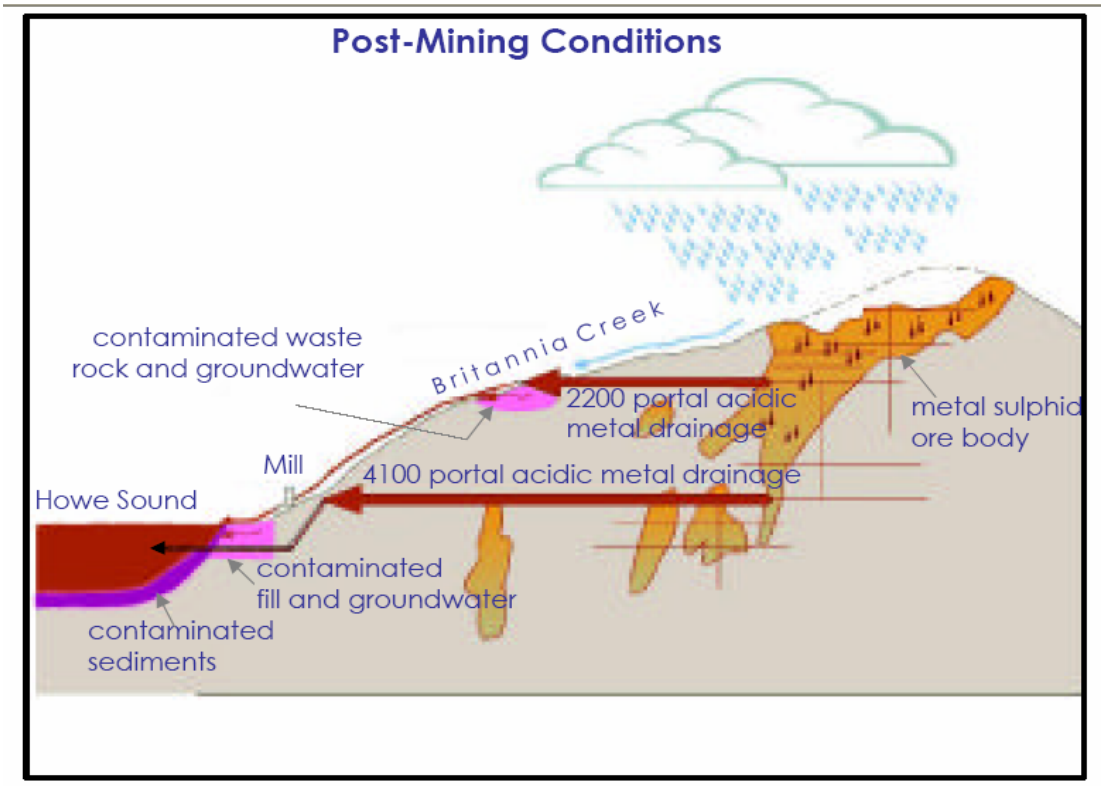
History - This large copper-zinc deposit was discovered in 1888, started production in 1904, and continued until 1974. More than 60,000 persons had been gainfully employed during this period. Over 1000 million pounds of copper, 270 million pounds of zinc and 484,000 ounces of gold were produced and 80 kilometres of underground workings were created. Mining operations ceased in 1974 and the property was sold to a real estate developer in 1979.

Britannia Mine site overlooking Howe Sound

ISSUES

Environment - The copper-zinc mineral deposit lies beneath Britannia Mountain.

Open pit and underground mining occurred throughout the mountain. Ground and surface water is able to flush through the mine workings and escape into Howe Sound. (See figure below) In 2001 the resulting acidic drainage system was found to be dumping 283 kg of copper and 226 kg zinc into sea water on a daily basis, making it one of the largest metal polluting sources in North America.



Mine cross-section showing acidic drainage

Public Safety - The mine workings openings to surface have not been made safe.

Impact on Society - The mill area has been declared a national historic site and turned into a tourist attraction as the BC Museum of Mining. The area is an active and vibrant residential community. The highway to the 2010 Olympic Winter Games site at Whistler passes through Britannia Beach. The effluent is damaging a significant salmon fishery.

REMEDIES

Objectives of Project

- To reduce environmental impacts on fisheries resulting from water and sediments originating from the mine site, by meeting site-specific risk-based provincial and federal requirements.
- To construct a water treatment plant under a Public Private Partnership (P3) to treat drainages to meet site-specific provincial and federal requirements.
- To reduce contamination-related human health risks on, and emanating from, the mine site by meeting site-specific risk-based provincial requirements.
- To consider future sustainable development, compatible with land use designations in the official community plan.

Management Team

- The Crown Contaminated Sites Branch of the British Columbia Ministry of Agriculture and Lands has the lead role in the remediation of the site.
- The provincial Ministry of the Environment is the regulator with respect to environmental laws under the Environmental Management Act and the Contaminated Sites Regulation.
- Partnerships British Columbia is a company responsible for bringing together ministries, agencies and the private sector to develop projects through public private partnerships.
- Partnerships British Columbia serves as business manager for the P3 water treatment plant project.
- An action plan was developed in 2001 by a committee of 33 representatives of various agencies and environmental specialists including Environment Canada, Fraser Basin Council, B. C. Museum of Mining, and the University of British Columbia.
- Golder Associates Ltd. has been retained as project manager.

Remedial Work Plan

- The mine workings are being used as a storage reservoir to control acidic drainage flow into a water treatment plant that came on stream in November, 2005.
- A groundwater management system has also been developed in the tailings fan area adjacent to the ocean.

SOURCES OF FUNDING

Historical Owner Agreement

- $30 million were given to the B.C. government from previous mine owners in exchange for an indemnity by the Province against further environmental liability for contamination related to the mine.

Partnership Agreement

- A P3 agreement between EPCOR Water Services Inc. and British Columbia has allowed the construction and operation of a water treatment plant for a 20-year period. The company undertook the design, capital cost, construction and operation of the plant and will assume the risk of compliance with environmental regulations. The province, using money from the previous owners, will pay EPCOR approximately $27.2 million over the 20-year contract period.

Britannia Bay Properties Agreement

- The Britannia Beach developer has formed an agreement with the Province to contribute to a local clean-up fund through the sale of new lots. The developer is also renovating existing homes, historic buildings and infrastructure.

HOLLINGER/MCINTYRE MINES REHABILITATION PARTNERSHIP

INTRODUCTION

Location - The Hollinger and McIntyre Mines are located at Schumacher Ontario, now part of the City of Timmins.

History - The Hollinger Mine in Schumacher operated from 1910 to 1988 producing 19 mllion ounces of gold. The adjacent McIntyre mine produced some 10 million ounces of gold during its operating life between 1912 and 1988. Royal Oak Mines acquired both properties in 1991 via amalgamation. Royal Oak went into receivership in 1999; at this time the company was under order to provide a closure plan for the site. During latter stages of mining, the surface rights were severed and sold to private individuals – a major part of the problem.

ISSUES

Subsidence - These mines have been subject to subsidence for 50 years. The subsidence has become more rigorous since the dewatering of the mines ceased. It is commonly believed that the sand backfill has flowed since becoming saturated, leaving voids in the upper workings.

Impact on Society - The subsidence creates both a public safety hazard and a loss of property value to surface rights owners whose property becomes subject to subsidence.

Subsidence impact on private business

Liability - The total liabilities for Royal Oak properties in Timmins were estimated to be as high as $45 milllion. Of this, as much as $25 million would be required for the Hollinger/McIntyre sites depending on the strategy for rehabilitation. The Receiver refused to subdivide the Royal Oak properties which meant that potential purchasers had to assume the full liability for the whole amount. Since no purchaser would assume full liability the Crown had a potential liability of $45 million.

REMEDIES

Partnership in Liability - Kinross Gold (now Porcupine Joint Venture (PJV)) wished to acquire part of Royal Oak holdings for exploration and potentially future mining; they were unable to assume the full liability for the entire land package. Kinross proposed that Ontario take over the subsidence liability at Hollinger/McIntyre site. Ontario agreed to negotiate a partnership and agreement was reached in December 1999. Key terms of the agreement included:

- Sharing financial liability for subsidence.
- Kinross would submit closure plans for the site by 2006.
- Ontario would stay order against property.
- Kinross would provide site inspection, fencing etc for safety concerns.
- Rehabilitation priorities and planning would be established by a joint steering committee.
- Agreement could not be assigned to another party without approval.

Management Team - the agreement is managed via a steering committee consisting of Ontario MNDM and PJV management and technical experts.

Remedial Work Plan - Following completion of a risk assessment work requirements were prioritized subject to emerging emergency issues. A work plan and budget is developed on an annual basis.

SOURCES OF FUNDING

Historical Owner Agreement

- There is no agreement for obtaining funds from past operators.

Ontario Ministry of Northern Development and Mines

- Funding has been provided through an annual assignment of abandoned mines rehabilitation program funds derived from general revenues.
- Ontario's share of the agreement is 50% of the first $5 million and the next $10 million for a total of $12.5 million.

Porcupine Joint Venture

- Per the agreement Kinross provided $50% of the first $5 million and will provide capital costs for work exceeding $15 million.
- Provides for security, inspection and fencing of subsidence area.
- Provide closure plans for site and ultimately, rehabilitation.
- Both rehabilitation and exploration are proceeding.

GIANT MINE, YELLOWKNIFE, NWT

INTRODUCTION

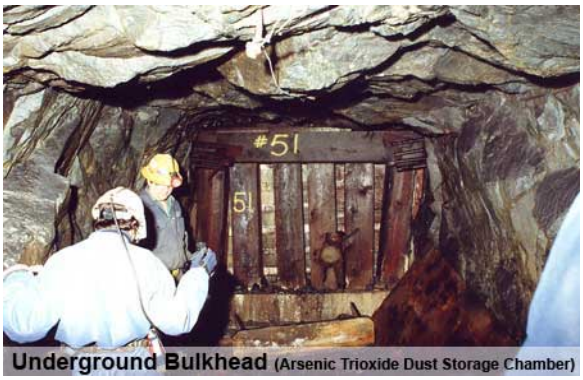
Location - The Giant Mine is situated on the west side of Yellowknife Bay, Great Slave Lake, 5 kilometres north of the Yellowknife City centre, Northwest Territories

History - This gold property was staked in 1935 and, after several years of exploration began production. The first gold brick was poured in 1948. Since then several companies, including Falconbridge owned the mine. In 1990 Royal Oak Resources Ltd. acquired the property but fell into receivership in 1999. Following this, the courts transferred the property to INAC, who in turn sold the mine's assets to Miramar Giant Mine Ltd. With the sale, INAC agreed that Miramar would not be held responsible for the existing state of the mine. Gold production continued until the summer of 2004. Over seven million troy ounces (220,000 kg) of gold were produced during the life of the mine.

Giant Mine Townsite 1955, looking west

ISSUES

Environment - Gold in the Giant Mine is associated with arsenic bearing minerals. Roasting of the gold concentrates was required to liberate the gold. This process released arsenic rich gas that, until 1951 was released directly into the environment. Special electrostatic precipitators and a baghouse were added along with other refinements that greatly reduced emissions. The resulting product was a highly toxic arsenic trioxide dust which was transported pneumatically and stored in sealed underground chambers and empty mine stopes. A total of 237,000 tonnes of arsenic trioxide dust is now stored in 15 underground chambers. (see following figure) Original assumptions were that the presence of permafrost, low water table, low groundwater movement and competent host rock would keep the chambers dry and the arsenic trioxide (which is water-soluble) safely contained. However the presence of surface pits, heat from mine ventilation through the mine workings (tunnels) and the filling of the chambers with "hot" arsenic trioxide dust appears to have caused the permafrost to degrade. If the mine were allowed to flood, there is then a potential for increased seepage of arsenic saturated water out of the chambers. This scenario presents a serious environmental risk to the region.



Underground bulkhead

Mine Site - There are four tailings impoundments on site and several waste rock piles on the site. Existing surface mine infrastructure, commonly with asbestos, including shafts, mill and the arsenic roaster complex are decaying and will be demolished. Bulk fuel storage tanks have already been cleaned and demolished. There are numerous junk piles and lay down areas of miscellaneous mine equipment. Areas of arsenic and hydrocarbon contamination identified on the site will be remediated.

Impact on Society - The presence of arsenic contamination from the early phase of mining as well as the potential threat of arsenic leakage from the underground storage chambers poses a long-term concern for public health in the region.

REMEDIES

A Technical Advisory team appointed by INAC assessed over 56 methods that were potentially applicable to the long-term management of the arsenic trioxide dust. Of these methods, nine alternatives were concluded to be capable of meeting the objective of limiting arsenic release from the underground storage chambers.
Options for management of the arsenic trioxide dust are:

1. *In-situ*
    - A1. Water treatment with minimal control

- A2. Water treatment with drawdown (current situation)
- A3. Water treatment with seepage control
- B2. Frozen shell
- B3. Frozen block
- C. Deep disposal

2. *Ex-situ*

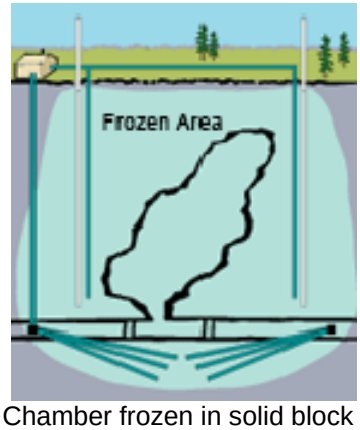
- Removal and surface disposal
- Removal, gold recovery and arsenic stabilization
- Removal and cement encapsulation

Management Team

- The Giant Mine Remediation Project is managed by an INAC team based in Yellowknife.
- In March 2005, a Cooperative Agreement between the Government of Canada and the Northwest Territories was signed, committing the two governments to work together on the Giant Mine Remediation Project.
- The Giant Mine Community Alliance (GMCA) consists of a group of Yellowknife residents and observers from Yellowknives Dene First Nation and from the Department of Environment and Natural Resources of the Government of the Northwest Territories. The role of the Alliance is to share project information and relay public concerns to the INAC project team.
- The Miramar Mining Company oversaw care and maintenance of the site from 1999 until the beginning of 2005. Deton'Cho/Nuna, a joint venture aboriginal and Northern company, has since won a competitive bid from INAC for care and maintenance of the site, including security.

Remedial Work Plan

- After several years of study and consultation, INAC decided to pursue the preferred option of *in-situ* freezing (Alternative B3. – frozen block) all 15 underground chambers and stopes containing the stored arsenic. Attempting to remove the arsenic dust from underground storage was found to have too many health and safety risks.
- *In-situ* freezing would occur in stages over a number of years. Once frozen, the arsenic dust and surrounding rock would form an impenetrable barrier, preventing ground water from entering and arsenic-bearing water from escaping. (see figure below).



Chamber frozen in solid block

- The storage chambers would be actively frozen using a freeze plant and then kept permanently frozen through the use of "thermosyphons". These devices are self-sustaining tall metal tubes that remove heat from the ground with no need for an external source of power.
- A remediation plan is being prepared that will address the remediation of both surface and underground aspects of the mine.
- The site will require indefinite care and maintenance.

SOURCES OF FUNDING

Historical Owner Agreement

- There is no agreement for obtaining funds from past operators.

Indian and Northern Affairs Canada

- Funding for work at the site has been provided through the Federal Contaminated Sites Action Plan (FCSAP). The most recent cost estimates for the remainder of the project range between $280 - $330 million.
- Over $28.9 million has been spent on test work and remediation studies between 2001 and 2005.

Government of the Northwest Territories

- Will contribute a total of $23 million over 10 years towards care and maintenance costs and surface remediation.
- Provide up to $250,000 annually for interim office costs and other in-kind services.

LYNN LAKE MINE, MANITOBA

INTRODUCTION

Location - The former Lynn Lake Mine (Farley Nickel Mine) is situated at the town of Lynn Lake, approximately 230 kilometres north of Flin Flon, Manitoba.

History - Nickel mineralization was first discovered at the site in 1941 and after several years of exploration Sherritt-Gordon commenced mining in 1953. This Lynn Lake nickel-copper mine produced over 20 million tonnes of ore between 1953 and 1976 making it the third most important nickel producer in Canada. Ore from some other nearby mines was also processed at the site. The company made Canadian history with the relocation, from Sherridon, some 90 kilometres North East of Flin Flon, Manitoba, of its entire former copper-zinc mining complex over winter and ice roads, between 1946 - 1953, using bulldozer “Cat-Trains”. In 1996 the company name was changed to Viridian Inc. It was subsequently acquired by Agrium Inc. The nickel potential of this site is presently being evaluated by Lynn Lake Nickel Mining Company. The Manitoba government has exempted this company from liability for existing site conditions.

ISSUES

Environment - The tailings waste management area lies on the east side of Lynn Lake and is close to residential areas (see figure below). The tailings from the nickel-copper sulphide mining operation, estimated at 22 million tonnes, have a high sulphide content. Acidic drainage and tailings run-off are considered to be threat to the natural environment, the Lynn Lake waterway system and to public health.

Lynn Lake - showing tailings area

Mine Site - This area is currently the focus of a nickel exploration program for Lynn Lake Nickel Mining Company.

Impact on Society - A number of contaminated sites are present within the town boundaries. Concerns have been expressed that metals leached from the tailings are contaminating drinking water. Public meetings have been held to discuss human health and environmental risk assessment studies.

REMEDIES

Investigation and Analysis

- Review of tailings compound stability
- Impact assessment of acidic drainage
- Study of waste rock used for town roads
- Study of ground/surface water flow
- Risk assessment for human health concerns.

Management Team

- The Mines Branch, Manitoba Science, Technology, Energy and Mines manages the Orphaned/Abandoned Mine Site Rehabilitation Program.
- A Technical Advisory Committee has been established to provide guidance in establishing a remediation and implementation plan. The committee consists of technical staff from Manitoba Conservation, Manitoba Health, and Manit oba Science, Technology, Energy and Mines. Town and First Nations officials were invited to participate.
- Viridian Inc. is working with the Province of Manitoba on environmental studies and remediation of the site.

Remedial Work

- A risk assessment report of health and environmental concerns was completed in 2003.
- Geotechnical investigations of tailings stability were completed in 2002.
- Acid generating potential of road base fill was completed in 2003.
- Overflow channel, weir replacement, and tailings dike stabilization was completed in 2004.
- Studies have commenced for the establishment of an engineered permeable reactive barrier to control acidic drainage.
- Develop a rehabilitation plan by 2007.
- Reduce dusting.
- Engineered wetland being tested.

SOURCES OF FUNDING

Viridian Inc.

- Working under a Memorandum of Understanding (MOU) agreement with the Province of Manitoba, Viridian, as of the end of 2003, has spent over $1 million on remedial work and studies.

Manitoba Department of Industry, Economic Development and Mines

- Funding for work at the site has been provided through the Orphaned/Abandoned Mine Site Rehabilitation Program.
- In excess of $1 million has been spent on this project to March 31, 2005.

Joint Agreement – Viridian Inc. / Province of Manitoba

- A 50/50 cost sharing agreement has recently been signed for the rehabilitation of the East Tailings Management Area (ETMA). The cost estimate for the ETMA site is $ 60 million, with Viridian Inc.'s contribution being $30 million. Provincial liability for the entire Lynn Lake site is estimated to be $38 million.

GOVERNMENT BASED PROGRAMS

CROWN CONTAMINATED SITES PROGRAM, BRITISH COLUMBIA

INTRODUCTION

Location - The offices of the Crown Contaminated Sites Branch are located on the 4th Floor – 780 Blanshard Street, Victoria, British Columbia.

History - The Province established the Crown Contaminated Sites Program (CCSP) in direct response to the Auditor General's report, *Managing Contaminated Sites on Provincial Lands, 2002/2003: Report 5*. The Crown Contaminated Sites Branch (CCSB) is the lead agency that the Auditor General's Report called for to "*oversee the development and implementation of a comprehensive and coordinated government-wide policy framework for management of its contaminated sites*." CCSB, which is now part of the British Columbia Ministry of Agriculture and Lands (MAL), was established in 2003. It is part of a "Coordinated Crown Land Administration" management system.

Crown land comprises 94 per cent of the province's land base. Natural resources make a significant contribution to the province's prosperity and the provincial government has taken the position that it has a responsibility to actively protect Crown land. The Auditor General estimates there are more than 2000 known or potentially contaminated sites in B.C.

ISSUES

Environment - Risks to the environment can be averted through remediation of contaminated sites.

Public Health and Safety - The remediation of physical and chemical stability hazards present at many sites remove threats to public health and safety.

Impact on Society - Remediation of contaminated sites will help contribute to sustainable, healthy communities that enhance the social, economic and environmental health of the province.

STRATEGIES

Provincial Roles and Responsibilities

- CCSB has the lead role for the management of provincial contaminated sites and individual ministries and agencies are responsible for the management of their own contaminated sites.
- The provincial Ministry of the Environment is the regulator with respect to environmental laws under the Environmental Management Act and the Contaminated Sites Regulation.
- CCSB chairs the Provincial Contaminated Sites Committee which has representatives from: Ministry of Labour and Citizens' Service; Ministry of Attorney General; Ministry of Energy, Mines and Petroleum Resources; Ministry of Finance – Risk Management Branch; Ministry of Forests and Range; Ministry of Transportation; Office of the Comptroller General; Crown Agencies Secretariat; Treasury Board; and the Oil and Gas Commission.
- Private Public Partnerships - where applicable.

Key Branch Strategies

- Apply a scientifically valid and coordinated government-wide approach to a provincial priority-based program to identify, prioritize, assess and remediate contaminated sites for which the Province is responsible and that pose the greatest potential risk to human health and the environment.
- Identify and manage government's financial liability for contaminated sites.
- Maintain a database of provincial contaminated sites to support sound management and decision-making.
- Provide public reporting on the management of provincial contaminated sites.
- Increase the flow of economic and social benefits to British Columbian's that may result from the remediation of contaminated sites and the future use of sites.
- Promote approaches that reduce the risk of contamination of provincially-owned lands.

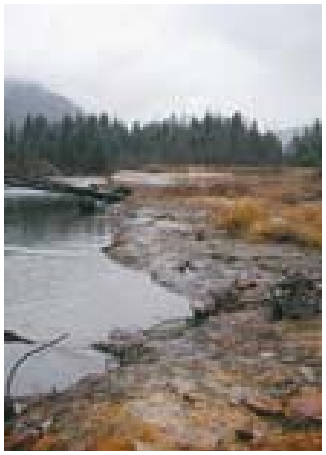
Policy Principles

- Provincial priority-based approach
- "Polluter Pays" as per the Environmental Management Act
- Consultation/cooperation with agencies and First Nations
- Consistency and fairness

- Accountability and transparency
- Innovative leadership approaches – including Private Public Partnerships, and brownfields re-development opportunities through the restoration of land values
- Promotion of prevention of future contaminated sites
- Sound science and technology

Site Management and Prioritization

- Creation and maintenance of a "Crown Contaminated Sites Database" as a central repository for provincial contaminated sites information. Currently the database contains information on 840 sites.
- Site prioritization to ensure public funds are used only on those sites that present the highest risk to human health and the environment using the following steps:
    1. Proximity to sensitive environments
    2. Ownership evaluation
    3. Preliminary site investigation
    4. Detailed site investigation
    5. Risk assessment
    6. Reconfirming Crown responsibility through Attorney General's office
    7. Site remediation
    8. Site monitoring
- Current priority abandoned mine sites:
    1. Britannia mine, Britannia Beach – construction and operation of a mine water treatment plant.
    2. Yankee Girl mine, Town of Ymir – clean-up of mine tailings.



Yankee Girl abandoned mine tailings

- The top ten candidate sites, all of which are historic (abandoned) mines sites for 2005-06 preliminary site investigations:
    1. Alpine Gold.
    2. Bralorne-Takla.
    3. Eureka.
    4. Kenville.
    5. Little Tim.
    6. Midway.
    7. Red Rose.
    8. Second Relief.
    9. Sultana.
    10. Tillicum.

SOURCES OF FUNDING

British Columbia Government

- A total of $180 million (net present value) has been budgeted by the B. C. Government for the management of the province's contaminated sites since 2001, including $23 million for the 2006-2007 fiscal year.
- An additional $47.2 million is a planned expenditure for 2007-2009.

"Polluter Pays" Agreements

- $30 million was given to the BC government from previous Britannia Mine owners in exchange for indemnity by the Province against further environmental liability.

Private Public Partnership Agreements

- A partnership agreement between EPCOR Water Services Inc. and British Columbia has allowed the construction and operation of a water treatment plant for a 20-year period. The company undertook the capital cost, construction and operation of the plant and will assume the risk of compliance with environmental regulations. The Province, using money from the previous owners, will pay EPCOR approximately $27.2 million over the 20-year contract period.
- A Britannia Beach developer has formed an agreement with the Province to contribute to a local clean up fund through the sale of new lots.
- The Britannia Mine is the subject of a separate case study.

FEDERAL CONTAMINATED SITES PROGRAM, INAC

INTRODUCTION

Location - The head offices of Indian and Northern Affairs Canada (INAC) are located at Terrasses de la Chaudiere, 25 Eddy St., Gatineau, Quebec. Three regional offices are located in the Northwest Territories, Nunavut and the Yukon.

History - INAC is the principal department responsible for meeting the federal government's constitutional, political and legal responsibilities in the North. Unlike many other contaminated sites that are the result of federal operational activities, INAC's portfolio of contaminated sites in the North originated from private sector resource development and national defence activities on federal Crown lands dating back over half a century, long before the environmental impacts of such activities were adequately understood or managed. INAC has recognized since the late 1980s that the legacy of contaminated sites in the North must be addressed and has directed considerable resources for environmental site assessment, remediation and monitoring these sites. The Contaminated Sites Program (CSP) was created in 1991, and focuses on sites in Canada's three territories north of 60 degrees latitude. Public lands in the Northwest Territories and Nunavut are federal Crown lands managed and administrated by INAC. For seven identified major abandoned mines (Type II mines) in the Yukon, the 2003 Devolution Transfer Agreement between the Federal and Yukon Territorial Governments assigns direct responsibility for care and maintenance, assessment, and remediation to the Yukon Territory, while obligating INAC to secure the necessary funding and provide support and expertise as necessary to reduce the risks and eliminate the liabilities associated with these sites.

Federal policy has been influenced by the Auditor General's 1996 review of federally managed contaminated sites. The Contaminated Sites Program has a long-term focus to "preserve and enhance economic, social and natural capital in order to improve the quality of people's lives and to contribute a legacy for the future". Priority is given to sites that have public health and safety concerns, legal and Aboriginal land claims obligations, serious environmental situations, and stakeholder concerns. Funding pressures increased dramatically since 1999 as a number of abandoned mines reverted to INAC control as a result of corporate bankruptcy or insolvency, and the Department's increased efforts to systematically address these issues. In 2002 the Auditor General reported the funding level was not sufficient to address the great increase in abandoned mine liabilities.

Until fiscal year 2002-2003, funding was provided primarily through internal departmental reallocation as approved by INAC's Management Committee. This year-to-year approach to funding made it difficult to develop and implement a comprehensive strategy for addressing contaminated sites in the North, and added to the overall costs and closure liabilities incurred by the federal government. With the announcement of the Federal Contaminated Sites Accelerated Action Plan (FCSAAP) in 2003 to address federal sites that pose the highest risk to human health and the environment, dedicated multi-year funding, commencing in 2003-04, was made available for high risk sites with liabilities greater than one million dollars on a cost share basis. The federal government spent an additional $175 million over two years from 2003 to 2005, over and above what the departments were already spending, to accelerate action on federal contaminated sites. The availability of this funding allowed the INAC Program to move from being primarily a reactive care and maintenance program into more proactive remedial planning and remediation.

The 2004 budget provided a further announcement of $3.5 billion in long-term funding for federal sites, plus $500 million for shared responsibility sites.

ISSUES

Environment - The Contaminated Sites Program was created to reduce and eliminate, where possible, risk to human health and environmental health and liability associated with these sites. This Program covers an area consisting of 40 percent of Canada's land mass and 10 percent of its freshwater supply. The 2002 Auditor General's report summarizes that 17 high risk abandoned mines have been identified. Estimated cost for remediating and closing out these sites is over $500 million. Environmental hazards range from acidic drainage and heavy metal contamination, to radioactive waste and arsenic pollution.

Public Health and Safety - The remediation of physical and chemical stability hazards such as open holes, unstable tailings deposits and chemical

contaminants will remove threats to public health and safety.

Impact on Society - Remediation of contaminated sites will help contribute to sustainable, healthy communities that enhance the social, economic and environmental health of the Territories. Land claims and devolution commitments to the three northern Territories contain legal obligations for clean-up of these sites.

REMEDIES

Objectives of Program

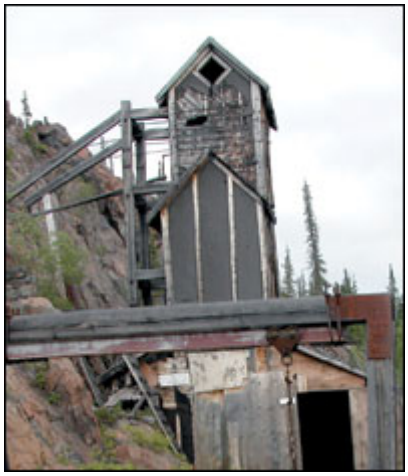
- To reduce federal liabilities over the long term;
- To meet legal obligations and federal and departmental policy requirements regarding the management of contaminated sites;
- Where a suspected contaminated site has been identified, the site be assessed in a timely, consistent and cost effective manner;
- To provide a scientifically valid risk management framework for setting priorities, planning, implementing, and reporting on the management of contaminated sites;
- To remediate, based on approved resources, all National Classification System (NCS) Class 1 and 2 contaminated sites in the North, unless it can be demonstrated that for a specific site an alternative form of management is appropriate;
- To coordinate with the Department of National Defence (DND) and other government departments to devise the most effective and efficient remediation schedules that will, among other things, allow for the greatest benefit to Northerners;
- To link with other government priorities such as the International Polar Year, the Northern Strategy and Aboriginal training and capacity building in the implementation of the plan;
- To use appropriate contracting and procurement mechanisms which realize value for money as well as other government and INAC priorities;
- To promote the social and economic benefits that may accrue to First Nations, Inuit and Northerners when carrying out activities required by this policy ; and
- To promote the federal “Polluter Pays” principle

Management Team

- The Deputy Minister of Indian and Northern Affairs and the Assistant Deputy Minister of the Northern Affairs Program have overall responsibility for the Program.
- The CSP Steering Committee, comprising Natural Resources and Environment Director General plus Regional Director Generals is the key corporate governance body. This committee reviews the CSP management plan, approves annual budgets and resolves major directional issues.
- The Contaminated Sites Management Working Team is chaired by the Headquarters (HQ) CSP Director and consists of HQ and regional CSP Directors and project managers
- The Program is decentralized with three Northern Regions in each of the three territories. Primary front line responsibility rests in each region, with HQ providing program management support and policy direction.
- Public Works and Government Services Canada acts as a strategic partner to the Program providing services in project management and contracting.
- The Program must adhere to Treasury Board Federal Contaminated Sites Management Policy. The Treasury Board policy does not apply to physical hazards. (Effective November 1, 2006 this policy will be superseded by Policy Framework for the Management of Assets and Acquired Services.)
- The Canadian Environmental Protection Act and Fisheries Act affect the management of the Contaminated Sites Program. Various Territorial Acts and Regulations also impact on the Program.

Policy Principles

- Consistent, transparent processes based on risk and priority
- Effective governance and accountability
- Capacity enhancement
- Northern solutions
- Teamwork and partnership



Contact Lake Mine headframe

Remedial Work Management Plan

- Establishment and maintenance of department database of known contaminated and waste sites (includes physical and chemical hazards)
- Provide information on contaminated sites to Treasury Board Secretariat for the central Federal Contaminated Sites Inventory
- Priorities set using a risk management procedure
- Employment of 10 Step Process for Remedial work on Priority Sites
    1. Identify suspect site
    2. Historical review
    3. Initial testing program
    4. Classify site
    5. Detailed testing program
    6. Reclassify site
    7. Develop remediation/risk management strategy
    8. Implement remediation/risk management strategy
    9. Confirmatory sampling and final report
    10. Long-term monitoring

- Current priority abandoned mine sites (Showing costs 2002-2005. A total of over $124 million.):
    1. Faro Mine - $41,437,877
    2. Giant Mine - $23,716,137
    3. Colomac Mine - $35,538,458
    4. Mount Nansen Mine - $3,949,774
    5. Tundra-Taurcanis Mine- $2,014,097
    6. Silver Bear Mines (4) - $1,272,228
    7. Clinton Creek Mine - $2,506,032
    8. United Keno Hill Mine - $3,766,471
    9. Discovery Mine - $4,451,634
    10. Port Radium Mine - $5,485,413
    11. Indore Gold/Hottah Lake Mine - (recently added to list)
    12. Roberts Bay Mine- $75,000
    13. Contact Lake Mine - $12,020

Colomac Mine

SOURCES OF FUNDING

Government of Canada

- Funding from INAC internal departmental reallocation
- Federal Contaminated Sites Assessment Initiative (FCSAI) (2000-2002 site assessment work)
- Federal Contaminated Sites Accelerated Action Plan (FCSAAP) (2003-2005 priority site work)
- Federal Contaminated Sites Action Plan (FCSAP) (2004-2019 long-term stable funding for priority site work)
- As of March 31, 2006, the contaminated sites financial liability for INAC's CSP was approximately $997 million.

Territorial Governments

- The Government of the Northwest Territories will contribute funds for care and maintenance and other costs for the Giant Mine reclamation project.

"Polluter Pays" Agreements

- Federal government policy requires each project be reviewed to assess potential sources of funds under the Polluter Pays principle.

MANITOBA ORPHANED/ABANDONED MINE SITE REHABILITATION PROGRAM

INTRODUCTION

Location - The offices of the Manitoba Science, Technology, Energy and Mines, Mineral Resources Division are located at 360-1395 Ellice Avenue, Winnipeg, Manitoba, R3G 3P2

History - The Province established the Orphaned/Abandoned Mine Site Rehabilitation Program in 2000 to address the public safety and environmental health concerns associated with orphaned/abandoned mine sites. In 2005 the Manitoba Auditor General Crown reported that the *Province has not developed adequate processes to identify and remediate its own contaminated sites.* The report also indicated *that legislation is not clear regarding the Province's responsibility and liability for orphaned/abandoned sites.* The report addressed all contaminated sites in Manitoba including mines. In September 2006 the Province, in response to the Auditor General's report, established a $70 million provincial account for orphaned and abandoned mines.

ISSUES

Environment - Risks to the environment can be reduced by eliminating contamination in the air and water.

Public Health and Safety - Risks to public health and safety can be minimized by identifying and correcting safety hazards, and by managing the disposal of potential hazardous and toxic substances.

Abandoned mine complex near Snow Lake, 1958

Impact on Society - Remediation of mine sites improves the lives of people who live near orphaned or abandoned mines. It can provide a more aesthetically pleasing environment for residents, visitors, and tourists. The economic viability of the rehabilitated areas can also be bolstered.

STRATEGIES

Provincial Roles and Responsibilities

- The Mines Branch of Manitoba Science, Technology, Energy and Mines has the lead role for the Orphaned/Abandoned Mine Site Rehabilitation Program and regulates mine reclamation under the Mines and Minerals Act.
- The provincial Department of Conservation is the regulator with respect to environmental laws under the Environment Act.

Policy Principles

- Manitoba supports the rehabilitation of abandoned mines through its programs, partnerships, community involvement and funding initiatives.
- Participates in the National Orphaned/ Abandoned Mines Initiative (NOAMI).
- To work consistently with NOAMI's objectives for inventory building, rehabilitation standards, ownership and liability issues, funding models and community involvement.

Site Management and Prioritization

- Five areas in the Province have been designated priority sites for rehabilitation: Gods Lake, Snow Lake, Lynn Lake, Sherridon Mine and Baker Patton.
- Another 144 sites are considered to be low to medium risk will have inspections completed in 2006. Rehabilitation plans will be developed for sites where environmental, health and safety risks have been identified.
- Current priority abandoned mine sites:
  - Gods Lake Mine - demolition, clean-up and tailings remediation.
  - Snow Lake – provincial liability extends to certain areas as result of earlier mine operations. Some of these are located on the site of the New Britannia Mine.
  - Lynn Lake Mine or Farley Nickel Mine, Lynn Lake – develop and implement a rehabilitation plan for the East Tailings

Management Area (ETMA) and demolition and clean-up work. (A separate case history describes this site in more detail elsewhere in this report.)

- Sherridon Mine – develop a tailings rehabilitation plan to prevent acidic drainage.
- Baker Patton Mine, Flin Flon – site monitoring of completed acidic drainage remediation project.

SOURCES OF FUNDING

Manitoba Government

- A total of $2 million has been provided for rehabilitation work over the past four years.
- In September, 2006 a $70 million dollar commitment was made by the Province to clean up abandoned mines.

Joint Agreement – Viridian Inc. / Province of Manitoba

- The Province and Viridian Inc. have entered into an agreement to share (50/50) the cost of rehabilitation of the Lynn Lake Mine East Tailings Management Area (ETMA).

ONTARIO ABANDONED MINES REHABILITATION PROGRAM

INTRODUCTION

Location - Ontario's program is administered by the Ministry of Northern Development and Mines (MNDM) from the Mines and Minerals Division Headquarters at the Willet Green Miller Center at 933 Ramsey Lake Road, Sudbury, ON, P3B 1E6.

History - The current program commenced in late 1999 when the government announced a four year $27 million program prorated by fiscal year at $2, $5, $10 and $10 million per annum. Subsequently the program has continued with an annual allocation of $10 million; in 2005-2006 Ontario committed to continue at this level of funding for a further six years, i.e. a total commitment of $117 million over 13 fiscal years. During the first seven years of funding some 75 of the worst sites have been rehabilitated and some 4000 sites have been assessed. A previous program ran from 1991 -1994 with a $10 million budget.

ISSUES

The Ontario program selects sites on the basis of physical hazards to life and property, environmental impacts, impacts on communities, aesthetics etc. Estimated total cost to rehabilitate some 5600 sites is in the order of $300-$500 million of which about 30-40 percent is known to be a liability to the Crown. Current focus is on two major areas - ground subsidence and acidic drainage.

Subsidence - Subsidence has been a primary area of concern for MNDM over the years due to the threat to human life and property values. Since much of Ontario's mining has been and continues to be carried out underground, issues related to weak crown pillars, openings to surface, unstable mine workings and human encroachment keep this topic at the forefront of concern and spending. A case study on subsidence at the Hollinger and McIntyre Mines in the Timmins area is presented elsewhere in this report. The following figure demonstrates the effects of a 2004 subsidence event at the former Moneta Mine in Timmins.

Subsidence event at Moneta Mine, Timmins, Easter Monday 2004

Acidic Drainage - Acidic, metal bearing drainage from sulphide tailings and waste rock are a primary concern in Ontario as elsewhere. The infamous Kam Kotia site near Timmins Ontario has been a source of major expenditure in the current program with more than $38 million being spent to date – about 65 percent of current cost estimate (see Hamblin and Kord, 2003, as follows, for a complete overview of this site:
http://www.mndm.gov.on.ca/mndm/mines/mg/abanmin/Sudubry%202003%20-%20Kam%20Kotia%20Paper.pdf)
The new treatment plant at the Kam Kotia site is shown in the following figure. Other sites are being studied and monitored for potential future rehabilitation.

New treatment plant at Kam Kotia site

REMEDIES

Objectives - the principal objectives of the current program are to reduce physical and financial risks to the public; to reduce environmental risk to fisheries habitat, drinking water etc.; and to reduce the contingent financial liability to the Crown. A further objective is to return derelict or contaminated lands to a viable future use be it forestry, wild life habitat, public green space or industrial or commercial development lands.

Management Team - the program is managed by a small, dedicated group of professionals at MNDM. For complex environmental projects members of the Ministries of Environment, Natural Resources and others are engaged for project planning and evaluation. Impacted communities and First Nations are consulted where appropriate and feasible. Projects have been executed at the request of First Nation Communities. Much of the evaluation and design work is completed by consulting firms.

Where funding partners are involved a joint advisory team is established

SOURCES OF FUNDING

Ontario Government

- As described above more than $100 million has been committed by the Government for the period 1999-2012.
- These monies are derived from general revenues on a year by year basis.

Partnership Agreements

- As described in the Hollinger/McIntyre Mines case study, the Province is willing to strike arrangements of mutual benefit with private sector proponents to share rehabilitation costs.
- Partnerships have been implemented with other Provincial Government agencies and municipalities in the past.
- Such partnerships offer opportunities to optimize on in-kind contributions.

Ontario Mining Association Agreement

- In 2003 MNDM and the Ontario Mining Association (OMA) struck a Memorandum of Understanding (MOU) in which funds acquired by OMA from its members would be matched by Ontario to work on projects of mutual interest. OMA information on the MOU can be found at "http://www.oma.on.ca/environment/goodsamaritan.asp"
  As well it was described in detail by Martschuk and Cowan, 2003 as follows:
  ".http://www.abandoned-mines.org/Martschuk%20-%20Cowan%20P6.pdf"

REVIEW & RECOMMENDATIONS

Based upon the foregoing discussion the following comments seem pertinent.

1) With some exceptions each jurisdiction is responsible for its' own abandoned mines. Before funding can be addressed in a meaningful way the problem must be defined and quantified through:
   a) creation of an inventory;
   b) site assessment;
   c) risk analysis;
   d) cost analysis, and
   e) prioritization.

   The question of how much money is required and how it can be annualized can then be estimated including a substantial contingency factor. A proposed program must be realistic in terms of time frames but must also be aggressive enough to get the job done within a reasonable period of time

2) Valuation of the liability is important in that auditors must be able to see the liability diminish as funds are expended - use a sufficient contingency - say 30 percent. However, the valuation of the cost to rehabilitate must not be viewed as static; issues such as climatic change, technological developments, regulatory changes, inflation, interest rates and many other items can and will influence the estimated costs, especially where perpetual care is required.

3) Before redirecting existing mineral related revenue streams jurisdictions must determine whether sufficient revenues can be generated to support sustainable funding.

4) Jurisdictions considering imposition of a new levy on minerals production must determine whether the levy could generate sufficient revenue to support the required funding level; determine the impact on producers and consumers; and to consider the overall fairness of the levy, i.e. who is really responsible.

5) Jurisdictions should be entrepreneurial and take risks in entering partnerships with industry on a site specific basis so that each party gets something whether it be rights to explore, rights to reprocess wastes, indemnification against future liabilities or, from the governments' perspective, the completion of rehabilitation works.

6) Jurisdictions contemplating partnership agreements must develop policies on indemnification against future liability so that the rules are clear. As part of the policy discussion "Good Samaritan" legislation should be reviewed for appropriateness.

7) Where jurisdictions introduce rehabilitation programs, adequate staff resources and management must be put in place to ensure proper planning and inspection, value for money and emergency planning.

8) Finally, the funding mechanism should be legislated to provide greater certainty. Castrilli *et al* 2003, recommended factors for orphaned/abandoned mines (OAMs) which could be included in legislation; these should be reviewed by interested readers. Proposals requiring or desiring legislation live on a double-edged sword. Though legislation may provide a somewhat greater certainty of maintaining a program, it also takes time, great commitment and is subject to falling by the wayside during the legislative process.

CONCLUSIONS

The writers believe that the foregoing provides a snapshot or toolkit from which bureaucrats, politicians, municipal administrators and others can obtain a "quick read" on options and scenarios which may be taken to deal with abandoned mines in their jurisdiction. Greater details can be obtained from Castrilli *et al* 2003 and from experts within their jurisdiction. Following is a quick listing of best practice steps to take.

Best Practices Summary

- Evaluate liabilities – physical, chemical, financial, and legal.
- Evaluate sites for responsible parties.
- Complete risk assessments and prioritize.
- Develop long-term plan and realistic cost schedule to complete work.
- Review funding options for viability/efficacy.
- Select workable funding option(s).
- Sell to financial managers and ministry.
- Be persistent and opportunistic.

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