

Giant Mine Perpetual Care Funding Options

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Submitted to:

Mackenzie Valley
Environmental Impact
Review Board

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Executive summary

The purpose of the study is to identify and evaluate perpetual care funding options and make recommendations on funding for the long-term care and maintenance (perpetual care requirements) for the Giant Mine in Yellowknife, NWT, Canada. This report will be submitted to the Mackenzie Valley Environmental Impact Review Board, which is currently carrying out an environmental assessment of the Giant Mine Remediation Plan.

The Giant Mine was a gold roasting operation just north of Yellowknife, NWT, that ran from 1948 to 1999. A by-product of the roasting operation was arsenic trioxide, a proven human carcinogen. In 1951, pollution control devices were installed that allowed for the capture of some of the arsenic trioxide emissions. The dust that was captured was blown underground into mined-out areas and later, purpose-built chambers. There are now 237,000 tonnes of arsenic trioxide dust stored underground at the mine. The site officially became a public liability in 1999 and is now listed as a \$617 million liability in the public accounts of the federal government.¹ The federal and territorial governments, acting as co-proponents, have developed a remediation plan for the Giant Mine that would see the arsenic trioxide frozen in situ using an active/passive system. The capital costs for the frozen block method have been estimated at \$480 million while the ongoing costs would be \$1.9 million per year.²

Current practice is to rely on annual appropriations of funds approved by the Treasury Board for the perpetual care of contaminated sites. While this may be the normal way of proceeding with such a project, Yellowknife residents remain concerned about the ability to continually fund the perpetual care requirements of the Giant Mine site. The significant costs associated with the perpetual care of the site will be competing with other (known and/or currently unforeseen) funding priorities on an annual basis as part of the overall federal budgeting process.

Furthermore, once the majority of the remediation has taken place and the liability in the public accounts has been reduced, the incentive to continue to invest in the perpetual care of the site is reduced. Thus, the Pembina Institute was commissioned to explore and make recommendations on alternative funding approaches for the perpetual care of the Giant Mine site. To that end, the following research tasks were completed:

- Identify and describe the historical and current funding process for ongoing and proposed remediation work at the Giant Mine.
- Identify and describe other long-term funding processes used for the perpetual care of contaminated sites or other purposes in Canada.
- Identify and describe funding processes used for perpetual care of contaminated sites in other countries for any lessons learned or options that might be applied to the Giant Mine.
- Develop evaluative criteria related to long-term funding of contaminated sites and evaluate potential funding options for the perpetual care requirements at the Giant Mine.

¹ As of March 31, 2011 (2012 estimate will be publicly available in the next few months). Personal communications, Contaminated Sites Program, Aboriginal Affairs and Northern Development.

² Giant Mine Remediation Project, *Developer's Assessment Report*, 6-107, Table 6.1.3.5.
http://www.reviewboard.ca/upload/project_document/EA0809-001_Giant_DAR_1288220431.PDF

- Make recommendations on appropriate funding options and further research needs.

The report presents the findings of the tasks listed above beginning with a review of the federal system for addressing the perpetual care needs of the Giant Mine. The three main categories of processes/plans/regulations that relate to the current funding, remediation and reporting arrangements for the Giant Mine are:

- Treasury Board guidelines, policies and procedures – which require contaminated sites to be assessed, remediated and listed as liabilities on the public accounts of the federal government.
- Federal Contaminated Sites Action Plan – the program for remediating contaminated sites that are a liability to the federal government.
- Other applicable policies and procedures – including the Contaminated Sites Management Policy and work of the Canadian Council of Ministers of the Environment on contaminated sites.

In addition to a thorough review of the Canadian system for the perpetual care of the Giant Mine site, the report presents details on a number of domestic and international examples of long-term funding programs. The examples presented in the report were chosen so as to demonstrate a range of alternative funding options for remediating and addressing the perpetual care needs of contaminated sites and/or because they have long-term care requirements and demonstrate varying degrees of local stakeholder engagement (characteristics of direct relevance to the Giant Mine site given the expected life cycle of the project and the close proximity of the contaminated site to community members).

The following domestic examples are profiled in the report:

- The Nuclear Waste Management Organization
- The Sydney Tar Ponds Agency
- The Britannia Mine
- The Cleanup of Abandoned Northern Sites
- The DEW Line Cleanup

For each of the domestic examples, an overview of the example is provided along with details on the perpetual funding requirements and plans (to the extent that they are available) and the strengths and limitations of each.

The review of international examples includes the following:

- The U.K. Coal Authority
- The U.S. Abandoned Mine Land Reclamation Fund
- The US Superfund Cleanup Program
- Hanford plutonium production site
- The Zortman-Landusky Mine reclamation
- The Town of Heerlen Minewater Geothermal District Heating Project
- The Broken Hill Community Foundation

For each of the international examples, an overview is provided along with details on perpetual funding (to the extent that they are available) and the strengths and limitations of each.

The domestic and international examples revealed the use of four main avenues for funding the perpetual care of contaminated sites:

1. Government funding through annual appropriations
2. Levies on existing operations (which can be used to establish a trust fund or be allocated annually)
3. Public-private partnerships
4. Trust funds

Perpetual care evaluation criteria were drawn from the review of examples presented in the report and developed to be of direct relevance to the Giant Mine. The criteria are presented in the table below.

Criteria for evaluating perpetual care funding approaches

Perpetual Care Criteria	Description
Life cycle	Funding allocated for full life cycle of site
Protection	Funding protected against swings in the economy
Contingency	Process for allocating funding in the event of emergency or other unforeseen circumstance
Stakeholder involvement	Local stakeholder involvement in funding process and associated decisions
Third-party expert involvement	Independent third-party experts involved in funding process and associated decisions
Reporting	Regular reporting of costs, revenues, liabilities and contingencies associated with site
Verification	Third part verification of all cost, revenue, liability and contingency estimates
Long-term monitoring and review	Funding mechanism established for long-term monitoring, review of technologies and funding details

These criteria were applied to the four funding approaches to identify those that would be most appropriate for the perpetual care of the Giant Mine.

The table below summarizes the evaluation of the funding options. The table demonstrates the relative ability of the alternative options to meet the funding for perpetual care criteria. It is clear from the summary that in the case of a long-term project that requires perpetual care, the trust fund is the most promising funding mechanism. However, for a number of the criteria, the ability of the particular funding approach to meet the criteria depends on the particulars of the design and implementation of the funding approach. For example, while a trust fund can be designed

and implemented in such a way as to include local stakeholders, the involvement of local stakeholders in the funding approach is not intrinsic to the approach itself. It is instead a design and implementation option that may or may not be exercised. Thus, the presence of a check in a number of the boxes below does not indicate the necessary achievement of the criteria, but rather the potential to achieve the particular criteria.

Evaluation of perpetual care funding options

Criteria	Appropriations	Trust fund	PPP	User-pay (endowment)	User-pay (annual)
Life cycle		✓		✓	
Protection		✓			
Contingency		✓		✓	
Stakeholder		✓	✓	✓	✓
Third-party experts		✓	✓	✓	✓
Reporting	✓	✓	✓	✓	✓
Verification	✓	✓	✓	✓	✓
Regular reviews	✓	✓	✓	✓	✓

The evaluation completed in this study suggests that establishing a trust fund for the perpetual care of the Giant Mine site would be the most appropriate option. This conclusion takes into consideration the high degree of toxicity associated with the Giant Mine site, the exceedingly long life span of the project, the close proximity of the contamination to community members, as well as the strengths and limitations of funding approaches employed elsewhere in Canada and abroad for dealing with perpetual care sites.

The establishment of a trust fund for the perpetual care of the Giant Mine would ensure a stream of revenue for the life cycle of the project and avoid the need for annual appropriations from government which cannot guarantee the availability of funds in perpetuity.

The design and implementation of the trust fund should heed the experience gained elsewhere in Canada and abroad to ensure that the following recommendations are achieved:

- Inclusion of contingency funds/plans for unforeseen costs and/or unforeseen control failures.
- Regular reporting of all aspects of the perpetual care funding including all costs, revenues, liabilities and contingencies.
- Third-party verification of costs, revenues, liabilities and contingencies that is readily available to the public.
- Local stakeholder involvement in decisions related to the management (governance, allocation and investment) of the trust fund.

- Independent expert participation in the management (governance, allocation and investment) of the trust fund.
- Communication between local stakeholders and third-party experts through public meetings and other forms of communication.
- Allocation of funds to regular assessments of perpetual care progress and plans (including alternative technologies and financial management options and practices) with the results readily available to the public.

In addition to the recommendations above, further research is needed to:

- Assess the feasibility of the trust fund option for the perpetual care of the Giant Mine site.
- Identify and assess key design and implementation considerations for such a fund.
- Identify appropriate governance and management processes and procedures related to the establishment and operation of such a fund.
- Assess the financial requirements and sustainability of such a fund over the life cycle of the Giant Mine project.
- Examine design and governance options for such a fund.
- Examine whether and how a trust fund might also be used to develop and implement an active research and development program into a more permanent solution for the underground arsenic trioxide.

1. Introduction

The purpose of the study is to identify and evaluate perpetual care funding options and make recommendations on funding for the long-term care and maintenance (perpetual care requirements) for the Giant Mine in Yellowknife, NWT, Canada. This report will be submitted to the Mackenzie Valley Environmental Impact Review Board, which is currently carrying out an environmental assessment of the Giant Mine Remediation Plan.

1.1 Background

The Giant Mine was a gold roasting operation just north of Yellowknife, NWT, that ran from 1948 to 1999. A by-product of the roasting operation was arsenic trioxide, a proven human carcinogen. In 1951, pollution control devices were installed that allowed for the capture of some of the arsenic trioxide emissions. The dust that was captured was blown underground into mined-out areas and later, purpose-built chambers. There are now 237,000 tonnes of arsenic trioxide dust stored underground at the mine. The site officially became a public liability in 1999 and is now listed as a \$617 million liability in the public accounts of the federal government.³ The federal and territorial governments, acting as co-proponents, have developed a remediation plan for the Giant Mine that would see the arsenic trioxide frozen in situ using an active/passive system.

The capital costs for the frozen block method have been estimated at \$480 million while the ongoing costs would be \$1.9 million per year.⁴ Aboriginal Affairs and Northern Development Canada (AANDC), on behalf of the Government of Canada, has stated that:

...the budgeting and approval of expenditure authority, required for all government projects, are the appropriate mechanisms to address funding of perpetual care associated with the Giant Mine Remediation Project. INAC is not prepared to research and investigate funding options outside of the ongoing and well established approach (i.e., the parliamentary budget approval process). [Response to Alternatives North First Round Information Request #22⁵]

While this may be the normal way of proceeding with such a project, Yellowknife residents remain concerned about the ability to continually fund the perpetual care requirements of the site. The significant costs associated with perpetual care will be competing with other (known and/or currently unforeseen) funding priorities on an annual basis as part of the overall federal budgeting process. Furthermore, once the majority of the remediation has taken place and the liability in the public accounts has been reduced, the incentive to continue to invest in the perpetual care of the site is reduced.

³ As of March 31, 2011 (2012 estimate will be publicly available in the next few months) Personal communications, Contaminated Sites Program, Aboriginal Affairs and Northern Development.

⁴ Giant Mine Remediation Project, Developer's Assessment Report, 6-107, Table 6.1.3.5.
http://www.reviewboard.ca/upload/project_document/EA0809-001_Giant_DAR_1288220431.PDF

⁵ Giant Mine Environmental Assessment, IR Response:
http://www.reviewboard.ca/upload/project_document/EA0809-001_AltNrth_IR_22_Response_1328899068.PDF

1.2 Research tasks

The Pembina Institute was commissioned by Alternatives North to review and evaluate perpetual care funding options from other jurisdictions in Canada, the United States and elsewhere. More specifically, for this research, the following tasks were completed:

- Identify and describe the historical and current funding process for ongoing and proposed remediation work at the Giant Mine.
- Identify and describe other funding processes used for the perpetual care of contaminated sites in Canada and whether there are any options for longer-term, secure funding that have been used. Identify and describe other funding processes that may have been used in Canada to fund longer-term projects, programs or services including trust funds, crown corporations or other mechanisms.
- Identify and describe other funding processes used for the perpetual care of contaminated sites in other countries such as the United States and Europe for any lessons learned or options that might be applied to the Giant Mine.
- Develop some evaluative criteria related to long-term funding of contaminated sites in general and the Giant Mine perpetual care requirements more specifically and evaluate potential funding options for the perpetual care requirements at Giant Mine.
- Make recommendations on appropriate funding options and further research needs.

1.3 Research approach

The research undertaken for this study was largely internet and literature based. Selected individuals with knowledge in this area were also contacted to provide guidance and information and review findings.

2. Current funding, remediation and reporting processes

This section examines three main categories of processes/plans/regulations that relate to the current funding, remediation and reporting arrangements for the Giant Mine:

- Treasury Board guidelines, policies and procedures – which require contaminated sites to be assessed, remediated and listed as liabilities on the public accounts of the federal government.
- Federal Contaminated Sites Action Plan – the program for remediating contaminated sites that are a liability to the federal government.
- Other applicable policies and procedures – including the Contaminated Sites Management Policy and work of the Canadian Council of Ministers of the Environment on contaminated sites.

Each of these is described below along with how the particular initiative relates to the Giant Mine. The constraints or limitation of the program in the context of providing and ensuring long-term funding for contaminated sites in general and for the Giant Mine more specifically are also identified.

2.1 Treasury Board guidelines, policies and procedures

A number of relevant Treasury Board guidelines, policies and procedures are described below.

2.1.1 Treasury Board Policy on Management of Real Property

Overview

The Treasury Board Policy on the Management of Real Property relates to the identification, assessment and remediation of contaminated sites in Canada. More specifically, the policy requires that “Deputy heads are responsible for ensuring that ... known and suspected contaminated sites are assessed and classified and risk management principles are applied to determine the most appropriate and cost-effective course of action for each site.”⁶ Through this policy, priority is given to sites that pose the greatest human health and ecological risks. There is an expectation in the policy that the costs of managing the contamination be recovered when it is economically feasible to do so.

According to this policy, management activities undertaken on a contaminated site must be guided by standards endorsed by the Canadian Council of Ministers of the Environment (described below) or by similar standards or requirements that may be applicable abroad.

⁶ Treasury Board of Canada Secretariat, “Policy on Management of Real Property.” http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/aas-gasa/pmrp-pgbi/pmrp-pgbi_e.asp

Giant Mine applicability

The Treasury Board Policy on Management of Real Property effectively requires the government to take action (assess, classify, manage including remediation) on the Giant Mine as it is a contaminated site and a federal government liability.

Constraints and limitations

- This policy requires the Government of Canada to take action on contaminated sites but provides no specific instructions or financial mechanism to enable action.
- The policy does not include a timeframe for when and how fast liabilities must be addressed.

2.1.2 Treasury Board Reporting Standard on Real Property

Overview

The Treasury Board Reporting Standard on Real Property came into effect on November 1, 2006. This standard “establishes the information management requirements to ensure compliance with the Treasury Board Policy on Management of Real Property which includes the Federal Contaminated Sites Inventory (FCSI).”⁷

The FCSI is the Government of Canada's central database containing information on all known or suspected contaminated sites for which the government (departments and consolidated Crown corporations) has assumed full or partial responsibility.

The information contained in the database includes key characteristics of the contaminated sites, their location and how they are being managed. These details form the basis of reporting liabilities associated with contaminated sites in the Public Accounts of Canada (i.e. the actual financial liability that is contained in the government's budget). The database also supports reporting on the implementation of Federal Contaminated Sites Action Plan (FCSAP) and government-wide progress in managing known contaminated sites, including remediation.

Giant Mine applicability

This standard requires reporting on contaminated sites including the Giant Mine. In doing so it creates the financial motivation for the federal government's efforts to remediate contaminated sites as such sites represent a financial liability.

Constraints and limitations

- This standard creates the reporting mechanism for contaminated sites but does not mandate action and/or management of contaminated sites.

⁷ Treasury Board of Canada Secretariat, “Reporting Standard on Real Property.” <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12047>

2.1.3 Treasury Board Policy on Accounting for Costs and Liabilities Related to Contaminated Sites

Overview

The Treasury Board Policy on Accounting for Costs and Liabilities Related to Contaminated Sites ensures that all costs and liabilities associated with the management and remediation of federal contaminated sites are properly accounted for and reported to Canadians.⁸

The policy provides very specific guidance on reporting requirements for the Federal Contaminated Sites Inventory (as per the description of FCSI in the previous section).

Giant Mine applicability

AANDC is required to report on total fiscal year expenditures for the care and maintenance and contingent liability associated with the Giant Mine site.

Contingent liability is not clearly defined in this policy but another Treasury Board document (Remediation Liabilities Related to Contaminated Sites: A Supplement to the Financial Information Strategy (FIS) Manual) gives the following guidance: “If it is likely that the future event will confirm the government’s responsibility, a contingent liability would be recognized if the amount can be reasonably estimated. If the amount cannot be reasonably estimated but the costs are expected to be significant, it should be disclosed in the notes to the departmental financial statements.”⁹

This situation seems to apply to the risk associated with failure of the frozen block method. In this case, a financial value for the risk may not appear in the financial statements but should be included as a note. In the note, the government will likely want to demonstrate that it is actively managing that risk — such as by having a long-term monitoring and reporting system in place.

In terms of costs associated with perpetual care, the long-term maintenance and monitoring costs are not included in the liability calculation. More specifically, “[t]he costs to “risk manage” a site should not be recorded as a liability unless the costs are directly related to reducing or removing the contaminant. Costs incurred to ensure the contaminant remains at an acceptable level or remains contained at the site are considered regular, ongoing operating costs required to manage the site, similar to care, maintenance and monitoring costs. Only those remediation expenditures required to bring the site to a “risk manageable” condition would be included in a remediation liability”¹⁰ Because of this, the impetus for the government to continually fund these costs is reduced.

⁸ Treasury Board of Canada Secretariat, “Policy on Accounting for Costs and Liabilities Related to Contaminated Sites.” http://www.tbs-sct.gc.ca/Pubs_pol/dcgpubs/TBM_142/aclds-ccpsc_e.asp

⁹ Treasury Board of Canada Secretariat, “Remediation Liabilities Related to Contaminated Sites: A Supplement to the Financial Information Strategy Manual.” <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=20888§ion=text>

¹⁰ Ibid.

Constraints and limitations

- The long-term liabilities associated with the Giant Mine will be accounted for under the Government of Canada's Public Accounts. That liability is based on the state of the site today, while the future liability associated with the site after the frozen block method has been implemented is largely unknown.
- The Treasury Board does not appear to have developed adequate policies or procedures for accounting for the perpetual care costs in management of federal contaminated sites.

2.2 Federal Contaminated Sites Action Plan

Overview

The Federal Contaminated Sites Action Plan (FCSAP) was established in 2005 as a 15-year program with a commitment of \$3.5 billion from the Government of Canada.¹¹ An additional \$80.5 million in new funding for the FCSAP was provided under Canada's Economic Action Plan in 2009 and 2010 to "enable accelerated action on site assessments and continued program management."¹²

FCSAP is arranged into three separate phases. Phase 1, now complete, focused on identifying, assessing and quantifying the liability associated with contaminated sites in Canada. Phase 2, which is focused on reducing the liability of contaminated sites through remediation, has been approved and is now underway. Phase 3 will focus on the long-term monitoring and care of remediated sites.¹³

FCSAP is funded through the standard Treasury Board submission processes (described in more detail in Section 2.1 above).¹⁴ That standard process amounts to annual budgetary approvals, which means that while \$3.5 billion was committed to the program, the government still has the discretion to change annual funding based on competing priorities.

In the allocation of funds from FCSAP, federal departments with contaminated site liabilities identify such sites and apply for funding to deal with the liability. Initial applications are for the total amount of money expected to be needed to address the liability, and when the money will be needed. Higher priority sites are given funding priority and final funding decisions are made by the Federal Contaminated Sites Steering Committee (members are senior representatives from 16 federal departments who are supported by an expert team and the Federal Contaminated Sites Action Plan Secretariat). Once approved, the departments must make annual submissions to request funds based on the original application and the remediation plan.

¹¹ Government of Canada, "Federal Contaminated Sites." <http://www.federalcontaminatedsites.gc.ca/index-eng.aspx>

¹² Canada's Economic Action Plan, "Cleaning Up Contaminated Sites (Budget 2009 and 2010)." <http://www.actionplan.gc.ca/initiatives/eng/index.asp?initiativeID=25&mode=3>

¹³ Personal communications, Contaminated Sites Program, Aboriginal Affairs and Northern Development

¹⁴ A simple-to-understand reference for this process is: Lydia Scratch, Funding a New Initiative: How a Department Gets Approvals and Money, Parliament of Canada, 11 December 2008 <http://www.parl.gc.ca/Content/LOP/ResearchPublications/prb0842-e.htm>

Giant Mine applicability

The liability associated with the Giant Mine is the responsibility of Aboriginal Affairs and Northern Development Canada, which is thus responsible for the care, maintenance and remediation of this contaminated site. AANDC has applied to and received funding from FSCAP to care for and remediate Giant Mine. In fact, Giant Mine is one of a limited number of projects that is solely funded by FCSAP — most projects are instead funded through cost-share programs. The table below shows annual budget figures (by fiscal year) from AANDC for the Giant Mine from 2000 to present.

Table 1. Annual budget for Giant Mine from AANDC¹⁵

Fiscal Year	Budget
2000/2001	\$2.5 million
2001/2002	\$5 million
2002/2003	\$5.7 million
2003/2004	\$8 million
2004/2005	\$9.8 million
2005/2006	\$9.6 million
2006/2007	\$14.4 million
2007/2008	\$10.7 million
2008/2009	\$11.4 million
2009/2010	\$31 million
2010/2011	\$23 million
2011/2012	\$25 million

The cost of care and maintenance (water treatment for example) at the Giant Mine site is approximately \$8 million annually. Note that the significant increase in budget in recent years is largely due to the freeze optimization study (a test freeze of one of the underground arsenic chambers) that has been carried out.

Constraints and limitations

- Funding allocations are contingent on the Government of Canada budgetary process i.e. annual or phased approval of funding.
- Government has the discretion to change/stop annual funding allocations based on overall government priorities.
- Phases 1 and 2 have been approved by Treasury Board; however, Phase 3, which will focus on the long-term care of the site and is likely of most interest with regard to the perpetual care funding needs for the Giant Mine, has not been defined or approved.

¹⁵ Personal communications, Contaminated Sites Program, Aboriginal Affairs and Northern Development

2.3 Other policies and procedures

2.3.1 Aboriginal Affairs and Northern Development Canada Contaminated Sites Management Policy

Overview

The Aboriginal Affairs and Northern Development Canada Contaminated Sites Management Policy offers guidance on the management of contaminated sites located on reserve lands, on federal lands north of the 60th parallel, and on any other lands under the responsibility of Aboriginal Affairs and Northern Development Canada. The policy defines management of a contaminated site as “the process of identifying, assessing, remediating and/or risk managing and monitoring a contaminated site.” This policy provides department-specific direction “in order to meet the requirements of the Treasury Board policies.”¹⁶

Through this policy “AANDC is committed to managing contaminated sites in a cost-effective and consistent manner, to reduce and eliminate, where possible, risk to human and environmental health and liability associated with contaminated sites.”

Giant Mine applicability

The objective of the policy is “to remediate, based on approved resource levels, all National Classification System (NCS) Class 1 contaminated sites in the North, and Class 1 and 2 contaminated sites on reserve, on a priority basis, unless it can be demonstrated that for a specific site an alternative form of management is appropriate.”¹⁷ The last part of this quote referring to an alternative form of management gives AANDC the flexibility to contain contaminants at a site rather than remediate them (i.e. frozen block vs. removal of underground waste).

The inclusion of monitoring in the definition for management under this policy means that once the frozen block approach is implemented, AANDC will have an obligation to continue monitoring the site as part of their requirements under this policy.

There is a guiding principle in the policy that “AANDC will promote First Nation, Inuit and northerner participation and partnership in the identification, assessment, decision-making and remediation/risk management processes relating to contaminated sites.”¹⁸

Constraints and limitations

- AANDC has the flexibility to manage the contaminants at a site rather than remediate the site.
- It is not clear from the language regarding participation what level of involvement First Nation, Inuit and northerner will have in the Giant site.

¹⁶ Aboriginal Affairs and Northern Development Canada, “Contaminated Sites Management Policy.” <http://www.aadnc-aandc.gc.ca/eng/1100100034643>

¹⁷ Ibid.

¹⁸ Ibid.

- The policy does not specifically allow for or require third-party oversight and monitoring by affected stakeholders like First Nation, Inuit and northerners.
- The reference to cost-effective points to the possibility of putting cost-effectiveness ahead of risk to human and environmental health.
- The policy contains no specific timelines for taking action or making commitments.
- The policy has no provisions for dealing with unforeseen events and contingency planning.
- The policy does not provide an explicit commitment to manage sites that have long-term management requirements.
- There is no requirement to minimize the perpetual care requirements or guidance on how the short-term remediation costs should be balanced with the long-term or perpetual care costs.

2.3.2 Canadian Council of Ministers of the Environment

Overview

The Canadian Council of Ministers of the Environment (CCME) is comprised of the environment ministers from the federal, provincial and territorial governments in Canada. These 14 ministers meet at least once a year to discuss national environmental priorities and determine work priorities for the CCME. The objective of the CCME is to achieve positive environmental results on national environmental issues that require collective attention by a number of governments. More specifically, “CCME serves as a principal forum for members to develop national strategies, norms, and guidelines that each environment ministry across the country can use.”¹⁹

Contaminated sites were identified as a priority for CCME in the late 1980s. Since then, the CCME has developed a series of documents that provide guidance on the technical aspects of assessing contaminated sites.

Giant Mine applicability

The attention paid to contaminated sites by the CCME demonstrates the importance of this issue and signals it as a priority for governments in Canada. Raising the priority of contaminated sites through organizations like the CCME helps create the impetus for programs like FCSAP as well as actions directly related to the remediation of Giant Mine.

The CCME provides a venue to addressing cross-jurisdictional issues, such as the issues related to the Giant Mine, and lays the groundwork for federal/provincial/territorial agreement on contaminated sites.

Constraints and limitations

- The CCME provides guidance documents only and does not require direct action by participating governments.

¹⁹ Canadian Council of Ministers of the Environment, “About CCME.” <http://www.ccme.ca/about/>

3. Contaminated sites and other funding processes in Canada

This section presents information on programs in place in Canada to address other contaminated sites, including:

- Nuclear Waste Management Organization
- Sydney Tar Ponds Agency
- Britannia Mine
- Cleanup of Abandoned Northern Sites
- DEW Line cleanup

It also presents details on another example of long-term funding provided by the federal government, that of multi-year up-front funding.

To the extent that such information was available, the discussion below focuses on actions and transparency and accountability from the perspective of funding for perpetual care.

The Giant Mine contaminated site is characterized by relatively close proximity to community members (including citizens of Yellowknife and the Yellowknives Dene First Nations), a high degree of toxicity (arsenic trioxide) and an exceedingly long life cycle (which will require significant perpetual care). Given these factors, taking action on remediation and setting up funding for the perpetual care of the Giant Mine site is critical. As well, transparency and accountability are of the utmost importance given the close proximity of community members. Thus, the examples presented below were chosen so as to demonstrate a range of alternative funding options for remediating and ways to address the perpetual care needs of contaminated sites, and/or because they have long-term care requirements and demonstrate varying degrees of local stakeholder engagement.

3.1 Nuclear Waste Management Organization

Overview

The Nuclear Waste Management Organization (NWMO) was established in 2002 under the Nuclear Fuel Waste Act (NFWA). The NFWA required electricity generation companies that produce nuclear fuel waste to establish and fund a waste management organization (the NWMO) to provide recommendations to the Government of Canada on the long-term management of used nuclear fuel. Currently, all used nuclear fuel is stored on-site at operating nuclear power plants in Ontario, Quebec and New Brunswick.

Funding

The NWMA requires each nuclear fuel waste owner to establish a trust fund to finance the long-term management of the used fuel. Ontario Power Generation, Hydro-Québec, NB Power Nuclear Corporation and AECL established trust funds in 2002 and began making contributions to those funds as prescribed by the NFWA. Each of the funds are managed by an independent trustee who reports annually on the contributions made by the waste owners with audited financial statements posted on the NWMO website. For example, CIBC Mellon Trust Company is the current trustee for the Ontario Power Generation trust fund.²⁰

As of 2010 (the most recent publicly available financials), the overall value of the trust funds was \$2 billion. Contributions are based on the average cost of managing used nuclear fuel and are gradually increasing so that the total annual value of the fund by 2035 will cover the expected costs of managing the waste.

The NWMO has commissioned significant work on the cost of used fuel waste management:

- Work was done to estimate the total cost of various used nuclear fuel disposal options. This included third-party reviews of the cost estimates to ensure they were transparent and accurate.
- Program costs for managing 3.6 million used fuel bundles are estimated to have a present value of \$7 billion (2010\$). Of that \$7 billion, \$2 billion is associated with developing the repository and obtaining construction licences, and \$5 billion is for construction, transportation of the used fuel to the repository, and the operation, closure and monitoring of the repository. These estimates cover 150 years of life cycle activity and assume the repository will be closed in 2160.²¹
- Baseline cost estimates are updated on a five-year cycle and the NWMO provides annual assessments of all factors that impact the cost estimates. Any changes in the estimated cost are disclosed in the NWMO's Annual Report.²²

Action plan

As required by the legislation, the NWMO submitted a report to the Government of Canada on the proposed approaches for the management of used nuclear fuel with a recommendation to use an adaptive phased management (APM) approach. Key aspects of the APM include:²³

- centralized containment and isolation of used nuclear fuel in an appropriate geological formation
- phased and adaptive decision-making

²⁰ Ontario NFWA Trust, Audited Financial Statements (2011).

http://www.nwmo.ca/uploads_managed/MediaFiles/1899_nfwafs2011auditedenglish.pdf

²¹ Nuclear Waste Management Organization, Financial Security and Updated Lifecycle Cost Estimate for Adapted Phased Management (2012).

http://www.nwmo.ca/uploads_managed/MediaFiles/1909_financialsuretyandupdatedlifecylecostestimateforapm.pdf

²² Ibid.

²³ Nuclear Waste Management Organization, *Choosing a way forward: The Future Management of Canada's Used Nuclear Fuel (Final Study)* (2005)

http://www.nwmo.ca/uploads_managed/MediaFiles/341_NWMO_Final_Study_Nov_2005_E.pdf

- optional shallow storage at the central site as a contingency
- continuous monitoring
- provision for retrievability
- citizen engagement

The government accepted the APM approach in 2007 and NWMO is currently implementing it, with much of the effort to date focused on working with interested communities on site selection assessments.

Transparency and accountability

The NFWA required the Nuclear Waste Management Organization to establish an advisory council whose comments on the organization's studies and triennial reports must be made public.

The advisory council "is an independent and arms-length body composed of individuals knowledgeable in nuclear waste management issues and experienced in working with citizens and communities on a range of difficult public policy issues."²⁴

The role of the advisory council is to:

- Ensure that the views of the public and communities of interest are considered and are reflected in a thoughtful, balanced way in the proposed approaches and reports of the NWMO
- Assist the NWMO in ensuring that its processes are of good quality and are open, transparent, thorough and sound.

The advisory council has the capacity to review cost estimates for all aspects of the project. For example, in March 2011, the Council "requested further detailed briefing on cost estimates of the APM program" which was delivered at the May 2011 advisory council meeting.²⁵

The NWMO has developed a transparency policy that is available to the public.²⁶ The policy is quite expansive and provides clear direction on the philosophy of open transparency and dialogue as well as specifics on which types of documents will be publicly shared on the website. The list of publicly available documents is extensive and comprehensive.

Strengths and limitations

- The NWMO is a large and expensive program with the ability to establish a trust fund from levies on companies who are still operating nuclear facilities.

²⁴ Nuclear Waste Management Organization, "Advisory Council." <http://www.nwmo.ca/advisory>

²⁵ Advisory Council to the Nuclear Waste Management Organization, *Record of Discussion, May 9, 2011 Meeting*. http://www.nwmo.ca/uploads_managed/MediaFiles/1891_advisory_council_minutes_may_9_2011.pdf

²⁶ Nuclear Waste Management Organization, *NWMO Transparency Policy* (2008). http://www.nwmo.ca/uploads_managed/MediaFiles/194_NWMO_Transparency_Policy.pdf

- The trust fund model provides a stable funding source that has enabled the NWMO to create a deliberate “step-wise” approach with internal processes and policies for important parts of the process of dealing with contamination. Stakeholder engagement, funding, and scientific and technical analysis of site characteristics are undertaken before waste sites are chosen. This has set the stage for a thorough engagement and transparent siting process.²⁷
- This program has had the luxury of time as the current nuclear waste is managed and is not presenting an immediate environmental or health risk.
- The trust fund model avoids the need for annual appropriations of funds for addressing nuclear waste issues.
- The trust fund model allows the life span of the funding to reflect the life cycle of the issue at hand.

3.2 Sydney Tar Ponds Agency

Overview

The Sydney tar ponds site is located in an urban area in Sydney, Nova Scotia. More than 25,000 people live within a four-kilometre radius of the site. The contaminants at the site are mainly the result of steel-making operations carried out until 1967 by several private sector owners. In 1967, the Nova Scotia government bought the steel-making operation and created the Sydney Steel Corporation (SYSCO), a provincial Crown corporation. The SYSCO plant was shut down in 2000. The federal government is also responsible for the cleanup of coke ovens that were owned and operated 1968 to 1973 by the Cape Breton Development Corporation, another federal Crown corporation. Over the years, the municipal landfill area also contributed contamination to the site.

Contaminants found within and surrounding the areas include heavy metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and raw sewage.²⁸

The Sydney Tar Ponds Agency, a special operating agency of the Nova Scotia government, was created in 2001 and tasked with managing the tar ponds cleanup. In 2004, the provincial and federal governments committed to funding cleanup through the Agency. It was initially envisioned that the Agency would have greater flexibility to avoid bureaucratic hurdles and processes that would slow down the project while increasing costs. However, the Agency ended up effectively working like a government department and did not bring the flexibility and efficiencies originally sought.²⁹

²⁷ Nuclear Waste Management Organization, “NWMO Study Process.”
http://www.nwmo.ca/the_nwmo_study_process

²⁸ Office of the Auditor General, 2002 October Report of the Commissioner of the Environment and Sustainable Development, “Case Study 2.1—The Sydney tar ponds—One of Canada’s largest and most contaminated sites.”
http://www.oag-bvg.gc.ca/internet/English/att_c20021002se01_e_12325.html

²⁹ Personal communication, Public Works and Government Services Canada.

Funding

A final cost-share agreement between the Nova Scotia government and the Canadian government was put in place September 2007.³⁰ The scope of agreement includes:

- cleanup requirements for tar ponds and coke ovens
- in-place treatment of contaminated material
- containment of both sites
- site restoration landscaping compatible with future development use
- future maintenance and monitoring of the sites for 25 years after completion of the project.

The overall project budget is \$400 million and is the shared responsibility of the provincial and federal governments. The Nova Scotia Department of Transportation and Infrastructure Renewal is the province's lead, while federal participation is led by Public Works and Government Services Canada.

In terms of the perpetual care of the Sydney tar ponds, the Nova Scotia government will take over responsibility for the long-term maintenance and monitoring of the site as of 2013. As part of the original cost-share agreement, \$15 million was allocated for the long-term maintenance and monitoring of the site with annual public reporting requirements to the Federal government. The Federal government will only re-engage in the project in the case of an unforeseen crisis. The environmental management plan included a “high level” assessment of the long-term monitoring and maintenance requirements.³¹ And, after waiting until the project was almost complete and all potential long-term issues became clear, a more detailed, long-term maintenance and monitoring plan has now been developed.³²

Action plan

Most of the toxic material is being mixed with a concrete-like substance that will solidify the waste and prevent any migration of the toxins. Once the solidification process is complete, the area will be covered with an impervious layer and covered with soil and vegetation.

When remediation is complete, Nova Scotia will take ownership of the lands. Any remaining contaminants will be managed and monitored by the Province of Nova Scotia.

Transparency and accountability

To effectively protect the federal and provincial government interests in the project, an independent engineering consultant has been contracted for the life of the project. According to a government official, this would be the first thing he would put in place for another project as it

³⁰ Government of Canada and Province of Nova Scotia, *Cost Share Agreement: Sydney Tar Ponds and Coke Ovens Remediation Project*, http://www.tarpondscleanup.ca/~stpa/upload/reports/FINALCost_%20ShareAgreement2007Signed.pdf

³¹ Sydney Tar Ponds Agency, *Remediation of the Tar Ponds and Coke Ovens Sites Design and Construction Oversight Services Environmental Management Plan*: <http://www.tarpondscleanup.ca/~stpa/upload/reports/emp.pdf>

³²Ibid.

provided great oversight and accountability for all parties.³³ “The role of the independent engineer is to make sure all design and remediation activities undertaken by the Agency are conducted in accordance with the conditions of the agreement. This includes technical, financial and environmental and project management requirements.”³⁴

In January 2007 the creation of a Remediation Monitoring Oversight Board was announced. The board has been assigned the task of monitoring and reporting on how the Department of Environment and Labour is performing in their role as regulator of the cleanup process. The Board submits annual reports to the Minister of Environment and Labour which are publicly available.

A Community Liaison Committee has also been established. This committee contains representatives from a number of relevant fields including business, construction, environment, health, municipal government, organized labour, post-secondary education, recreation, religion, and service clubs. It serves as a sounding board for the STPA activities, project progress and planned work. The committee meets with STPA once a month.

Strengths and limitations

- This example highlights the fact that there is no clear federal policy for dealing with contaminated sites where other levels of government are involved. Federal and provincial governments must continue to conduct one-off discussions and negotiations to address these types of sites.
- The use of a crown corporation did not create improved performance or result in a relatively more agile organization.
- Engaging an independent engineering consultant was seen as a critical tool for providing unbiased oversight on all parts of the project including costs and funding.
- The project included early allocation of budget and responsibility for long-term monitoring with provisions for contingency funds in the event of further problems. However, it was not until much later in the project that a long-term plan was actually developed, meaning the funding allocation may not be consistent with the actual long-term monitoring and management needs.

3.3 Britannia Mine remediation project

Overview

The Britannia Mine³⁵ in British Columbia is one of the largest sources of metal pollution in North America. As a result of the mine, highly acidic mine drainage from exposed metal sulphide containing high concentrations of heavy metals was discharged directly into Howe Sound and other local waterways, including the Squamish River.

³³ Personal communication, Public Works and Government Services Canada.

³⁴ Sydney Tar Ponds Agency, “Province.” <http://www.tarpondscleanup.ca/index.php?sid=4&cid=21>

³⁵ B.C. Forests, Lands and Natural Resource Operations, “Britannia Mine Remediation Project,” <http://www.agf.gov.bc.ca/clad/britannia/index.html>

Funding

Funding for this project was secured through a \$30 million legal settlement between the B.C. government and four mining companies that were held responsible for the contamination as well as an additional \$69 million from the British Columbian government. As part of the \$30 million settlement, the province has assumed responsibility for the site and provided indemnification to the mine companies for the environmental liabilities.

The annual costs of managing the site are drawn from an external fund that was seeded with the settlement money, as well as funds that are set aside in the provincial books based on the site's current liability, which sits at \$69 million.³⁶ To account for the long-term costs of managing the wastewater treatment plant, an additional \$1 million per year is added to the government's liability. This financial treatment effectively creates the funding budget to pay for the plant's future annual costs. The B.C. government will be obligated to continue future funding because of legal requirements in the private-public partnership agreement with EPCOR and provincial and federal legislation (such as the Fisheries Act and the B.C. Water Act).³⁷

Action plan

The B.C. Crown Land Restoration Branch is responsible for the remediation of the Britannia Mine site. The focus of the remediation program is the water treatment plant needed to treat contaminated mine water, water diversion structures to reduce water infiltrating the abandoned mine and reaching contaminated soil, and remediation of the shoreline.³⁸

Actual management of the treatment plant was established in 2005 through a public-private partnership with EPCOR Water Services Inc. to design, construct, finance and operate the plant over a 21 year period.³⁹ EPCOR covered the initial capital cost (estimated at \$15.5 million) and receives payment from the B.C. government based on the ability of the plant to meet environmental regulations as well as a formula that accounts for the volume of water processed.

The cost to the B.C. government over 21 years is estimated to be \$29.1 million. After the contract is completed, ownership will be given to the province (the agreement contains stipulations on the condition and state of the plant when it is given to the Province). There is no indication on what management approach will be selected for managing the water treatment plant after the province takes ownership.

Transparency and accountability

The contracting process and final awarding of the contract for wastewater treatment services was managed by the B.C. government and included a Request for Expressions of Interest and a Request for Proposals from interested companies. The final agreement and accompanying

³⁶ Personal communication, B.C. Crown Land Restoration Branch, Department of Forests, Lands and Natural Resources.

³⁷ Ibid.

³⁸ Ibid.

³⁹ British Columbia Ministry of Sustainable Resources Management, *Project Report: Achieving Value for Money, Britannia Mine Water Treatment Plant* (2005), http://www.partnershipsbc.ca/pdf/Britannia_Value_for_Money_Report_March_05_FINAL.pdf

schedule for services is posted online and available to public. During construction, EPCOR was required to publish monthly construction progress reports, and the company is currently required to publish quarterly operations reports and an annual report on operations.

In 2008, the B.C. Ministry of Agriculture and Lands conducted the Britannia Shoreline Community Consultation to engage stakeholders in the planning of the Britannia Creek shoreline remediation.

A technical advisory committee, comprised of local stakeholders, agency staff, and mining industry technical experts, provides guidance on the structure and implementation of the ongoing monitoring program.

Environment Canada and Fisheries and Oceans Canada provide monitoring, measurement and ongoing impact assessments of treated water into Howe Sound.

Communication with Squamish First Nation takes place through quarterly update reports and site meetings with project managers and Government of B.C. representatives.

Strengths and limitations

- The project has achieved great results in terms of reducing contaminated water influx into local waterways.
- The legal settlement revenue provided a source of funding for the perpetual care costs associated with managing the mine water. The acceptance of the liability associated with the mine site creates the impetus for the B.C. government to continue to fund the cleanup of the site and the long-term management of wastewater treatment plant.
- The stakeholder engagement process is relatively transparent although it has not included reviews of budget and/or financing, and the records of stakeholder meetings are not publicly available.

3.4 Cleanup of Abandoned Northern Sites

Overview

The Cleanup of Abandoned Northern Sites⁴⁰ (CLEANS) project is a multi-year, multi-million-dollar project that will assess and reclaim 38 contaminated uranium mining sites in Northern Saskatchewan. The sites were mined by companies in the 1950s and 1960s. Little to no decommission work was completed upon closure of the mines, so there is considerable environmental and human health risk for surrounding communities and ecosystems from these sites.

Project CLEANS is managed by the Saskatchewan Research Council (SRC). Most of the project is expected to be completed in an eight-year span, beginning in 2007. It is expected that many years of environmental monitoring will follow.

⁴⁰ CLEANS website: <http://www.saskcleans.ca/html/overview/index.cfm>

Funding

In 2007, the Federal government and Saskatchewan government agreed to provide \$24.6 million to fund the cleanup of 37 sites in Northern Saskatchewan.⁴¹ In 2008, the Lorado Mill facility, which is the largest waste site, was added to the project and the funding increased to \$47.9 million.⁴²

Under this same program, the Saskatchewan government in 2011 committed an additional \$36.2 million to the cleanup of an abandoned uranium mine site in northern Saskatchewan.⁴³ The increased funding was based on the SRC identification of additional remediation work required on the sites as well as increasing project costs compared to the original estimates developed prior to 2004.

The federal government contributes annual transfer payments to the Saskatchewan government who then adds their funds and transfers the total to the SRC based on their annual budget estimates.

Upon project completion, final responsibility for the sites will pass to the Saskatchewan government under the Institutional Control Program (ICP).⁴⁴ There is no public record of perpetual care funds having been allocated to these particular sites. However, the ICP has the Monitoring and Maintenance Fund, which is used to fund long-term monitoring and maintenance, and the Unforeseen Events Fund, which provides funds for unforeseen future events. These could be funding sources for the perpetual care of CLEANS sites. They are managed by the province and are independent from provincial revenue.⁴⁵

Action plan

The project is being carried out in three phases. Phase 1 began in 2007 and consisted of an environmental assessment under CEAA and an application to the Canadian Nuclear Safety Commission for a project license. Phase 2, which is currently underway, will last at least three years and involves the cleanup of the sites. Phase 3 is focused on site monitoring to ensuring that the wastes produced as a result of the past mining activities are properly treated and managed over time.

⁴¹ Government of Saskatchewan, “Canada’s New Government and Province of Saskatchewan Launch First Phase of Cleanup of Legacy Uranium Mines,” media release, April 2, 2007. <http://www.gov.sk.ca/news?newsId=f9c5241a-1a79-47ce-8b71-2ffd62665978>

⁴² CLEANS, “Overview.” http://www.saskcleans.ca/html/history/cleans_history/index.cfm

⁴³ Government of Saskatchewan, “Government Commits Additional \$36 million to Cleanup of Legacy Uranium Mine,” media release, February 25, 2011, <http://www.gov.sk.ca/news?newsId=7683ce47-672a-4d44-b756-4e4280925a36>

⁴⁴ Personal communication, representative from CLEANS.

⁴⁵ Ministry of Energy and Resources, *Institutional Control Program: Post Closure Management of Decommissioned Mine/Mill Properties Located on Crown Land in Saskatchewan*. (2009). <http://www.er.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=4819,3385,5460,2936,Documents&MediaID=27542&Filename=RISADiscussionPaperDec09pdf.pdf>

Transparency and accountability

The SRC created a partnership with seven northern communities to form a project review committee for CLEANS. Representatives from Black Lake, Camsell Portage, Fond du Lac, Hatchet Lake, Stony Rapids, Uranium City and Prince Albert Grand Council (Athabasca vice-chief) are all engaged. One of the stated goals of the project is to return the land to a state which is acceptable for traditional land use.⁴⁶ The committee has engaged relevant stakeholders to ensure that remediation planning will meet that objective. In doing so, the committee ensures involvement by the local communities impacted by the project.⁴⁷

Strengths and limitations

- The project is vulnerable to funding changes: after shared funding arrangement between Saskatchewan and Canadian governments for Phase 1 of the project expired, Saskatchewan government had to increase funding to manage cost increases from additional identified remediation work as well as increasing project costs. Without expanded Saskatchewan government support, even projects with small budgets would not have continued.
- The Institutional Control Program creates more robust processes and programs for funding and managing the long-term needs of relevant contaminated sites through the Monitoring and Maintenance Fund and the Unforeseen Events Fund.
- The project review committee allows committee members to call meetings as they deem necessary to discuss project progression. To ensure access to meetings, travel costs and expenses are paid for through the CLEANS project funding. Records of meetings are not publicly available.

3.5 DEW Line cleanup

Overview

Initiated by the Government of Canada in 1989, this program involves the cleanup of 21 Distant Early Warning (DEW) Line radar sites under the responsibility of Department of National Defense (DND) scattered in remote locations across 5000 km of the Canadian Arctic.

The two main objectives of the program are:

- to leave the sites in an environmentally safe condition
- to prevent contamination from entering the food chain

Funding

The total budget for projects undertaken to date is \$575 million. Between 80% and 90% of the funding for this program comes from FCSAP with the remainder coming from the DND environmental budget. Annual budget allocations are based on planned cleanup actions.

⁴⁶ Personal communication, representative from CLEANS.

⁴⁷ CLEANS, "Project Review Committee." http://www.saskcleans.ca/html/communities/project_review/index.cfm

The largest driver for action on this file comes from Government of Canada land claim agreements with Inuit and Inuvialuit. Based on those agreements, environmental cooperation and monitoring agreements for the DEW Line cleanup include specific requirements for contaminated site cleanup, monitoring, independent review and northern employment provisions.

Long-term monitoring is stipulated in these agreements based on a schedule of monitoring every year for the first five years after clean-up and then on the seventh, tenth, fifteenth and twenty-fifth years after cleanup. If problems are identified, the government is obliged to complete further remediation.⁴⁸

Action plan

The main areas of action include:

- the demolition of buildings and other structures no longer in use
- existing landfill repair, containment and monitoring
- landfilling of site debris
- excavation, treatment and disposal of contaminated soils
- removal of hazardous materials
- testing to confirm that the soil has been remediated to agreed standards

This project is managed by Department of National Defence with contract and project implementation management handled by Defence Construction Canada.

Transparency and accountability

An environmental working group with representatives from Inuit and Inuvialuit reviews and addresses technical and environmental issues at sites and provides advice on other technical issues that may arise. For example, in response to community and the environmental working group's concerns with the landfilling of contaminated soil, soil was removed and shipped to contaminated soil landfills sites that were hundreds of kilometres away.⁴⁹

The land claim agreements stipulated that a certain amount of the contracting for the clean-up must be procured with Inuit and Inuvialuit companies and people.⁵⁰

Strengths and limitations

- This is a well-funded project that has been effective at cleaning up contaminated sites.
- The various agreements including provisions requiring the government to fund and report on the long-term monitoring of sites.
- This example illustrates how important the creation of leverage and political will is to enabling local stakeholders to have an impact on the final outcomes of a project.

⁴⁸ Personal communication, Defense Construction Canada.

⁴⁹ Ibid.

⁵⁰ Ibid.

3.6 Up-front multi-year funding

Overview

The federal government has initiative funding instrument that provides “up-front multi-year funding” to eligible projects.⁵¹ This is defined as funding to meet expenditures for more than one year where an appropriation for the full amount has been obtained. This funding is technically a transfer payment from the federal government to other entities.

Recipients of up-front multi-year funding are usually not-for profit entities. Examples of programs that receive such funding are Sustainable Development Technology Canada (described in more detail below), Green Municipal Fund, and the Trans Canada Trail.

Up-front multi-year funding can be set up in three different ways:

- i. **Authorized by Statute:** The authority to provide the funding is provided through an act of Parliament. In such cases, the terms and conditions associated with the funding are defined as part of the technical financial and government policy processes necessary to get Treasury Board approval on the final funding agreement.

If the funding agreement is for more than \$50 million per year, Treasury Board will make annual payments based on the detailed provisions and requirements included in the funding agreement (e.g. Sustainable Development Technology Canada for the NextGen Biofuels Fund described below).

- ii. **Authorized by Treasury Board:** For programs/recipients who will be receiving no more than \$10 million for all years, the only requirement is Treasury Board approval of the terms and conditions that specifically permit an up-front multi-year funding approach.
- iii. **Endowment funding:** An endowment fund is established which will be invested to provide an ongoing source of income and where Treasury Board has put a funding agreement in place that explicitly establishes what the income will be spent on.

This is an appropriate funding tool for programs/recipients that require long-term funding where there is a capacity to manage invested funds to create annual income.

Ongoing monitoring and reporting on the use of the funds is usually required to give the federal government some accountability on the program deliverables. As part of that reporting, there are also provisions for a “review of the restrictions on the use of the endowment funding within a period of 20 years and a subsequent determination by the minister if such restrictions are to continue, be removed, or, with the agreement of the recipient, amended. Where the minister decides that the restrictions are to be continued for a further period, a date for a future review is to be established (e.g. Sustainable Development Technology Canada SD Tech Fund described below).”⁵²

⁵¹ Treasury Board of Canada Secretariat, “Guideline on the Directive for Transfer Payments” <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=19421§ion=text>

⁵² Treasury Board of Canada Secretariat, “Guideline on the Directive on Transfer Payments.” <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=19421§ion=text>

3.6.1 Sustainable Development Technology Canada

Sustainable Development Technology Canada (SDTC) provides an interesting example of this initiative as it has been entitled through two different up-front multi-year fund types, each of which is described below.

The Sustainable Development Technology Canada for the NextGen Biofuels Fund

Overview

SDTC's NextGen Biofuels Fund is an example of an up-front multi-year funding program set up through an act of Parliament.⁵³ It was started in July 2007 and the agreement ends September 30, 2027 with the last annual disbursement of funds to SDTC to be made by March 31, 2015.

The fund supports “the establishment of first-of-kind, large-scale demonstration next-generation renewable fuel production facilities to encourage the future sustainability and success of renewable fuels.”⁵⁴

Total funding for this initiative is \$500 million coming in equal amount from Natural Resources Canada and Environment Canada. Annual funding has been between \$30 million and \$45 million.

The funding agreement is legally binding; i.e., the government has made a legal agreement to pay SDTC a set amount per year and failure to do so would be considered a nonfulfillment of the contract.

Transparency and accountability

SDTC reports on this fund in its annual report which is available on the SDTC website.

Sustainable Development Technology Canada SD Tech Fund

Overview

The SDTC SD Tech Fund is an example of an up-front multi-year funding program set up through an endowment. The fund started in March 2001 and all money endowed is expected to be invested by June 2015. The objective of this fund is “to stimulate the development and demonstration of innovative Canadian technological solutions that address climate change, clean air, clean water and clean soil.”⁵⁵

⁵³ Canada Foundation for Sustainable Development Technology Act, S.C. 2001, c. 23, Assented to 2001-06-14. Available at <http://laws-lois.justice.gc.ca/eng/acts/C-5.5/FullText.html>

⁵⁴ SDTC, “About Our Funds,” http://www.sdtc.ca/index.php?page=about-our-funds&hl=en_CA

⁵⁵ Treasury Board of Canada Secretariat, “2011-2012 RPPs - Up-Front Multi-Year Funding.” <http://www.tbs-sct.gc.ca/rpp/2011-2012/info/myf-fpi-eng.asp>

Funding

\$550 million was endowed to SDTC in 2001 with equal amounts coming from Environment Canada and Natural Resources Canada.

The endowment fund has a low risk investment philosophy where annual liquidity requirements are planned for based on expected operational costs as well as anticipated fund disbursements.

Transparency and accountability

As part of the terms of this endowment, SDTC must publish an annual plan that describes plans for the current year and provides a forecast for the following year. The annual plan must include a disbursement plan, planned administration expenditures, objectives and proposed actions, an investment update, operating strategy, and performance expectations. The SDTC annual report and a summary of the corporate plan are tabled in the House of Commons by the Minister of Natural Resources Canada.

SDTC (including both the NextGen Biofuels Fund and the SD Tech Fund) is governed by a 15-member Board of Directors. Seven of the board members are appointed by the Government of Canada, while the remaining eight are appointed by the members of SDTC and are individuals representing the interests of the public, private and academic sectors.

The board has four committees: the Corporate Governance Committee, the Human Resources Committee, the Project Review Committee, and the Audit and Grant Investment Committee.

The board and committees play an important role in SDTC's funding allocation process. For example, board members sit on the Foundation's Investment Committee alongside investment leaders from the private sector. The Investment Committee identifies technologies with strong competitive and environmental potential and makes recommendations to the Project Review Committee. The Board of Directors has authority for final approval.⁵⁶

Strengths and limitations

- These types of funds are provided through legally binding agreements (either through Acts of Parliament or agreements made between the Government of Canada and other parties) that give fund recipients financial stability and the capacity to deliver longer-term plans.
- Considerable upfront investment of time and energy can be needed to create the up-front multi-year funding agreement.
- The process of obtaining funds can be very slow.

⁵⁶ SDTC, "Boards and Committees." http://www.sdte.ca/index.php?page=boards-and-committees&hl=en_CA

4. Review of international examples

This section describes other funding processes used for perpetual care contaminated sites in other countries or regions such as the United States, Europe and Australia. Lessons learned that might be applied to the Giant Mine are also identified. The examples were selected because they have long-term waste management issues that require long-term funding, demonstrate positive or negative stakeholder engagement, and/or demonstrate a range of potential funding models for the perpetual care of contaminated sites.

4.1 U.K. Coal Authority

Overview

The United Kingdom Coal Authority is the public body in the U.K. that deals with public safety risks arising from past coal mining activities including mine-water runoff.⁵⁷

The Coal Authority was established in 1994 as part of the U.K.'s privatisation of the coal industry. It is a non-departmental public body and receives funding from the Department of Energy and Climate Change (DECC). The DECC ministers are ultimately accountable for the activities and performance of the Coal Authority.

The Coal Authority currently operates 52 coal mine water treatment schemes to remediate existing discharges and prevent new discharges from coal mines. Eleven of those sites require active pumping and wastewater treatment plants to manage continual, long-term mine water discharge. The remaining projects are able to use passive or gravity-based systems combined with constructed wetlands to manage the wastewater and discharges.

The Coal Authority has recently made an agreement to take over mine water treatment for non-coal mines.

Funding

The Coal Authority is funded by the DECC for three years at a time. Funding for 2008/2009 to 2010/2011 was £116.3 million (\$183 million CAD)⁵⁸ and will be £120.5 million (\$190 million CAD) for the three years following that.⁵⁹ Ongoing active water treatment projects receive annual funding to support operational costs.

⁵⁷ The Coal Authority “Environmental Projects and Mine Water Treatment.” <http://coal.decc.gov.uk/en/coal/cms/environment/environment.aspx>

⁵⁸ The Coal Authority, “Report and Accounts 2008–2009.” <http://www.official-documents.gov.uk/document/hc0809/hc08/0889/0889.pdf>

⁵⁹ Ibid.

The 2011/2012 budget for the Coal Authority was £39.8 million (\$63 million CAD); included in this was £17.5 million (\$27 million CAD) for environmental management projects, which includes the mine water treatment.

There is evidence of financial challenges associated with the perpetual care of the coal mine sites, including reductions in budgets even after three-year approval (e.g., the 2010/2011 budget was reduced by 16% after approval). As well, the Authority has not been able to deliver on as many minewater remediation projects as originally targeted.⁶⁰

Strengths and limitations

- The funding model for the perpetual care of water treatment projects creates a long-term viability risk as government priorities shift over time.
- Reduced budgets and scale-back of the number of projects originally targeted are evidence of financial challenges.
- The authority has had success with passive treatment projects like constructed wetlands for managing mine water runoff.

4.2 U.S. Abandoned Mine Land Reclamation Fund

Overview

The United States Abandoned Mine Land Reclamation Fund (AMLRF) was established as part of the Surface Mining Control and Reclamation Act of 1977 (SMCRA).⁶¹

Funding

The reclamation fund is financed through levies on mining companies that are collected by the U.S. Office of Surface Mining (OSM) Enforcement and Reclamation. Coal companies are required to pay 35 cents per ton of surface mined coal and 15 cents per ton of coal mined underground. The Office of Surface Mining disperses the collected funds through grants to the states and U.S. First Nations (Crow and Hopi Tribes, and Navajo Nation) on an annual basis based on identified high-priority abandoned coal mine sites in each state. Since 1977, \$4.06 billion has been dispersed through this fund. For the 2012 budget year, \$258 million will be collected with \$485 million is expected to be dispersed.

As reported on the AMLRF website, proceeds from the fund have been used to reclaim almost 240,000 acres of hazardous high-priority coal-related problem sites. Safety and environmental hazards have been eliminated on almost 315,000 acres containing coal or non-coal problems. Almost 8,000 emergencies have also been addressed.⁶²

⁶⁰ Annual reports from 2008-09 to 2010-11 available at The Coal Authority, “Annual Reports and Accounts and Corporate Plan.” http://coal.decc.gov.uk/en/coal/cms/publications/annual_report/annual_report.aspx

⁶¹ Abandoned Mine Lands Portal, “What's Being Done.” <http://www.abandonedmines.gov/wbd.html>

⁶² Ibid.

Since 1999, OSM has funded 161 watershed cooperative agreements with local non-profit watershed organizations totalling \$14.1 million. This funding has been leveraged with other resources by these organizations to undertake projects valued at over \$45 million.⁶³

2006 amendments to the SMCRA extended the application of the reclamation fee to 2021. It is expected that this extension will be sufficient to address the remaining high-priority reclamation work.

At the same time, states were authorized to set aside up to 30 percent of each annual grant to address acid mine discharges. Some states (for example Pennsylvania, West Virginia and Colorado) are using this set-aside money to create trust funds to finance long-term operation and maintenance costs for ongoing mine drainage treatment facilities.⁶⁴

Strengths and limitations

- The use of levy revenue creates a long-term source of funds. In fact, the levy funding mechanism has been used since program inception, illustrating an effective long-term funding approach.
- The revenue from the levy is dependent on the continued operation of coal mines in the United States.
- The federal-state/First Nation partnership has been an effective method for enabling contaminated site cleanup.
- The watershed cooperative agreements approach is still growing and shows potential for engaging a broader range of stakeholders and leveraging funding mechanisms to enable cleanup efforts on smaller sites.

4.3 The U.S. Superfund Cleanup Program

Overview

The United States Superfund Cleanup Program is the program established to address abandoned hazardous waste sites in the U.S. The associated fund was established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980. This law was enacted in the wake of the discovery of toxic waste dumps such as Love Canal and Times Beach in the 1970s. It allows the Environmental Protection Agency (EPA) to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for EPA-led cleanups.

The Superfund cleanup process is complex and long-term, involving assessing sites, placing them on the National Priorities List, and establishing and implementing appropriate cleanup plans.⁶⁵ In addition, through this program the EPA has the authority to:⁶⁶

⁶³ Ibid.

⁶⁴ Pennsylvania Department of Environmental Protection, “DEP Restores 750 Acres of Dangerous Abandoned Mine Lands, Begins Construction on Two Major Mine Drainage Treatment Plants,” media release, April 3, 2010. <http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=9511&typeid=1>

⁶⁵ A summary of the Superfund Cleanup process can be found at <http://www.epa.gov/superfund/cleanup/index.htm>

⁶⁶ U.S. Environmental Protection Agency, *Superfund*, “Basic Information.” <http://www.epa.gov/superfund/about.htm>

- Conduct removal actions where immediate action needs to be taken
- Enforce against potentially responsible parties
- Ensure community involvement
- Involve states
- Ensure long-term protectiveness

The EPA's Office of Solid Waste and Emergency Response oversee the Superfund program. EPA Regional offices are responsible for implementing the necessary work at the site.

Funding

Originally, funding for the Superfund program came primarily from a tax on oil, chemical feedstocks, and imported chemical feedstocks with additional funds coming from appropriations from the U.S. General Treasury, cost recoveries from potentially responsible parties, interest on the fund, and penalties. The tax on oil and chemical feedstocks expired in 1995 and all of the funds for the Superfund now come from U.S. General Treasury and cost recovery settlements with parties responsible for contamination.

Since the expiration of the tax, it is the responsibility of Congress to approve funding for the cleanup of sites. Congress has provided \$1.2 billion a year to fund the cleanup of the sites and any additional cost overruns which typically occur on these large, contaminated sites.

Strengths and limitations

- Has addressed some of the largest and most dangerous contaminated sites in the U.S.
- The polluter-pay principle has been dropped from the program with the expiration of tax funding. This has created an increased financial burden on the U.S. government and made the program reliant on U.S. government funding appropriations.
- Liability and litigation concerns have meant that projects have not generally been very stakeholder-inclusive — EPA has largely managed communication in a controlled and meticulous fashion.

4.4 Hanford plutonium production site

Overview

The United States Department of Energy's Hanford Site sits on 586 square miles in the desert of southeastern Washington State. The area is home to nine former nuclear reactors and associated processing facilities that were built beginning in 1943. The facilities were closed in 1989. The facilities generated and stored onsite billions of gallons of radioactive liquid waste and millions of tons of solid waste, which now need to be cleaned up, removed, or remediated.⁶⁷

This site is considered to be the largest contaminated site in the U.S. The cleanup that is required is significant and complex. It involves cleaning up the reactors, the soil, the groundwater, the solid waste burial sites and existing buildings; disposing of the remaining plutonium; managing

⁶⁷ U.S. Department of Energy, *Hanford*, "Hanford Overview." <http://www.hanford.gov/page.cfm/HanfordOverview>

the liquid and semi-solid nuclear and chemical waste that is currently stored in 177 underground tanks; and constructing a waste treatment plant that will combine the wastes from these tanks with glass-making materials to make the liquid wastes solid and therefore more stable.

In 1989, a Tri-Party Agreement was signed between the Department of Energy, the Washington State Department of Ecology and the U.S. Environmental Protection Agency outlining the legally enforceable milestones for Hanford cleanup over the next several decades.⁶⁸

The comprehensive cleanup plan will not likely be completed until at least 2047. After cleanup completion, parts of the site where remediation was not possible will remain heavily contaminated with radioactive waste.

To manage the residual waste, a plan for Long-Term Stewardship (LTS) is required as per the U.S. Department of Energy's Real Property Management Directive.⁶⁹ In this context, long-term stewardship includes many aspects related to the ongoing care and maintenance of the site, including: engineered and institutional controls designed to contain or to prevent exposures to residual contamination and waste, such as surveillance activities, record-keeping activities, inspections, groundwater monitoring, ongoing pump and treat activities, cap repair, maintenance of entombed buildings or facilities, maintenance of other barriers and containment structures, access control, and posting signs.⁷⁰ The LTS plan for the Hanford Site was completed in 2010.⁷¹

A number of measures related to transparency, accountability and engagement have been pursued as part of this initiative. For example, an extensive community relations plan has been developed. The plan includes the use of a website with all relevant documents and publications; a cleanup hotline; site tours; public comment periods on planning documents; public meetings; and standards for effective public notice. In addition, the Hanford Advisory Board is in place as "...an independent, non-partisan, and broadly representative body consisting of a balanced mix of the diverse interests that are affected by Hanford cleanup issues."⁷²

Funding

Congressional funding approval is done every three years, with an annual budget submitted by the Department of Energy. Annual reports include details on the work to be completed in the year, the work that was completed in the past year, and compliance with the Tri-Party Agreement. Annual budgets for the cleanup are in the \$2 to \$2.5 billion per year range. The total project cost of constructing the waste treatment plant has grown from \$4.3 billion in 2000 to \$12.3 billion in 2006.⁷³

⁶⁸ U.S. Department of Energy, *Hanford*, "The Agreement." <http://www.hanford.gov/?page=81>

⁶⁹ U.S. Department of Energy, *Directives, Delegations and Requirements*, "Real Property and Asset Management." <https://www.directives.doe.gov/directives/0430.1-BOrder-bc2/view>

⁷⁰ U.S. Department of Energy, *Hanford*, "Long-term Stewardship." <http://www.hanford.gov/page.cfm/LongTermStewardship>

⁷¹ U.S. Department of Energy, *Hanford Long-term Stewardship Program Plan* (2010). http://www.hanford.gov/files.cfm/Final_LTS_Program_Plan.pdf.

⁷² U.S. Department of Energy, *Community Relations Plan for the Hanford Federal Facility Agreement and Consent Order* (2002). <http://www.hanford.gov/files.cfm/sec1.pdf>

⁷³ U.S. Government Accountability Office, "Uncertainties and Questions about Costs and Risks Persist with DOE's Tank Waste Cleanup Strategy at Hanford: Highlights." www.gao.gov/products/GAO-09-913

The Department of Energy estimates the overall cost of cleaning up the Hanford site at \$77 billion, while the U.S. Government Accountability Office estimates that delays and additional costs could put the total price tag at between \$86 billion and \$100 billion — or higher.⁷⁴

Strengths and limitations

- Innovative and realistic approach to long-term stewardship efforts including open recognition that the site will not ever be completely remediated and that it will require long-term monitoring and care in perpetuity.
- Strong community communication and engagement plan helped shift away from the culture of secrecy that existed within the organization and on the site during plutonium production.
- The recognition of and planning for the long-term stewardship needs has helped create the mechanism for long-term funding.
- This is a very large, complex and expensive project that has very long timeframes for completing the cleanup portion. Long timeframes increase risk of further environmental contamination from immediate environmental risks.

4.5 Zortman-Landusky Mine reclamation

Overview

The Zortman and Landusky mines in the state of Montana were open pit gold mines that utilized the cyanide heap leaching technique for gold recovery from rock. The mine site has a severe acid mine drainage problem with water flowing into the Milk River watershed. The Montana Department of Environmental Quality (DEQ) jointly oversees reclamation of the Zortman and Landusky mines in co-operation with the U.S. Bureau of Land Management (BLM) via a broad Memorandum of Understanding for all hardrock mining activities in the State dated August 2, 2004.⁷⁵

The Assiniboine and the Gros Ventre tribes who live adjacent to the mine site have had major concerns about the mine since it was first proposed, especially with respect to impacts on tribal water resources. There has been significant court action regarding the selected remediation option (dismissed by Federal Court due to lack of court jurisdiction) and water treatment operation.⁷⁶

Funding

After the bankruptcy of Pegasus, the original owner of the mine, the State of Montana and the BLM began a co-operative effort to reclaim the mines using reclamation (\$30 million) and water treatment (\$10 million) bonds posted by the mining company and held by the DEQ.

⁷⁴ Ibid.

⁷⁵ U.S. Department of the Interior, Bureau of Land Management, *DEQ and BLM Memorandum of Understanding for Hardrock Mineral Activities of BLM-Administered Lands BLM_MOU_MT921-0509* http://www.blm.gov/pgdata/etc/medialib/blm/mt/blm_resources/public_room/06foia/ims.Par.37530.File.dat/06mtm012_at1.pdf

⁷⁶ Personal communication, Montana Environmental Management Bureau.

The acid mine drainage from the site expanded and the cost of the project now exceeds the value of the bonds. The annual operating costs for the site are approximately \$1.5 million, about double the amount available from the water treatment bond. To cover the additional costs, the DEQ has had to identify alternative funding sources, including accessing budgetary leftovers from BLM's annual budget; working with the Montana Legislature to create new funding mechanisms including reclamation bonds and funds from the state's Resource Indemnity Trust; and finding additional federal sources of funds like the American Recovery and Reinvestment Act.⁷⁷

The work required to source annual funding has put additional demands on a team already overburdened with many other high priority projects (for example, other mine remediation projects and managing Montana's approval of a Canadian pipeline). Funding shortfalls for the ongoing water treatment operational costs have created great concern for local stakeholders.⁷⁸

Strengths and limitations

- Local First Nations have not supported the remediation plans as they do not feel the plans go far enough to mitigate risks.
- The project has been plagued by problems: poor design and management, inadequate insurance bond, and funding shortfalls for the ongoing water treatment operational costs.
- The lack of contingency or buffer funding in the initial budget and settlement for increases in the volume of acid mine drainage has led to significant financial challenges, increased the burden on staff, and caused concern for local stakeholders.

4.6 Town of Heerlen Minewater Geothermal District Heating Project

Overview

This is an example of a project where the financial liability that would have been associated with minewater from a decommissioned mine has instead been turned into a financial asset: a geothermal district heating project uses mine wastewater as a source of heat.⁷⁹

Mine wastewater contained in flooded underground mine shafts serves 350 homes and businesses in the town of Heerlen in the Netherlands, providing hot water and heating in the winter and cool water in the summer.

⁷⁷ Ibid.

⁷⁸ Indian Law Resource Centre, "Fort Belknap Tribes still fighting for clean water after mine closure." <http://indianlaw.org/en/fortbelknap>

⁷⁹ "District heating and cooling involves providing hot or cold water to a number of businesses or homes in an area in order to heat or cool the building. Sometimes the hot or cold water is used for an industrial process, but mostly the water flows through pipes to individual buildings and into radiators designed to transfer heat into a room. This is achieved through economies of scale by producing large amounts of water for individuals and operating much like an electric grid." Source: Bridgette Meinhold, "Old Coal Mines Adapted to Create Geothermal Energy," *Inhabitat*. <http://inhabitat.com/heerlen-minewater-project/>

Several deep wells (over 700 m deep) were drilled; the mine water at that depth has a temperature of 32°C. That warm water is brought to heat pumps in a plant on the surface in a closed-loop system where the heat is extracted and used to supply hot water for household use, including heating in the winter. In the summer, water is pumped from a depth of only 250 m — at 17°C, it can be used for cooling. The water from the mines is returned to a 450 m depth to be re-heated.

Construction started on this project in 2005 and it was operational by 2008. This kind of project is also being tested in Aachen, Germany and Lorraine, France. Much of the technology is being developed as needed, since there is no precedent for this type of geothermal energy project.

Funding

The total cost of the project is € 20 million (\$26 million CAD). A European programme provided almost half of the project budget while additional funding was provided by the Town of Heerlen through its 100%-owned utility that manages the district heating system.

4.6.1 Strengths and limitations

- The innovative approach turned a liability into a financial asset.
- By charging for the heat produced by the geothermal district heating system, a revenue stream is created that can then be used to finance the treatment of the mine water in the abandoned mine shafts.

4.7 Broken Hill Community Foundation

Overview

The Broken Hill Community Foundation⁸⁰ established a fund that is used to provide employment opportunities and encourage social development during the final phases of a mining operation. The community of Broken Hill is in a remote part of Australia where mining began in 1885. The site proved to be the world's largest known silver-lead-zinc mineral deposit. The original mining company Broken Hill Proprietary Company is now the world's largest mining company (BHP Billiton).

The foundation's key characteristics are:

- Creating partnerships and relationships with multiple sources of funding from a range of donors.
- Creating a permanent and growing source of funding for activities that will strengthen the local community.

The town of Broken Hill has used a growing artistic community and mine site museum/tours to create a vibrant tourism industry. The foundation has focused many of its grants on supporting these areas.

⁸⁰ Broken Hill Community Foundation website. <http://www.brandcreative.com.au/clients/bhcf/>

Funding

Due to the dwindling supply of economically viable ore deposits at the mine, the community has recognized the need to build a new basis for their economy for the day when the mine closes. In the late 1990s, the company owning the mine at the time provided seed funding of \$625,000 (AUD) (\$649,000 CAD) to support the establishment of the Broken Hill Community Foundation. The foundation established a permanent fund, which has grown through corporate donations from mining companies and active fundraising with former residents of Broken Hill. The income earned each year is returned to the community as annual grants to support community projects and programs.

Strengths and limitations

- This is a community effort to address local issues with economic and social issues caused from mine operation and potential closure.
- The local community has been enabled to take action by securing its own permanent fund.
- The size of initial fund dictates the annual budget and hence the projects that can be supported in any given year.
- The fund has not dealt with environmental issues or a contaminated site.

5. Evaluation of funding options

This chapter identifies and describes a number of criteria related to funding for the perpetual care of contaminated sites. The criteria are used to evaluate the funding mechanisms identified in this report with a view to identifying the most appropriate perpetual funding option(s) for the Giant Mine site. The results of the evaluation will inform a series of recommendations related to the perpetual care of the Giant Mine, presented in the next chapter.

5.1 Evaluation criteria

The perpetual care evaluation criteria were drawn from the review of examples presented in the preceding sections of this report, using the strengths and limitations of the various examples from a perpetual care perspective. For example, both the U.S. Abandoned Mine Reclamation Fund example and the Hanford Plutonium Production Site example demonstrate the importance of local stakeholder engagement. The Sydney Tar Ponds example demonstrates the importance of involving third-party experts.

As well, evaluation criteria were developed to be of direct relevance to the Giant Mine. In this regard, a number of key characteristics of the Giant Mine as they relate to perpetual care were considered — the high degree of toxicity at the site, the close proximity to community members, and the extremely long life cycle of the project. For example, the proximity of the site to community members speaks to the need to engage local stakeholders and have regular reporting of costs, revenues, liabilities and contingencies. The exceedingly long timeframe for the project speaks to the need to fund regular reviews of technologies and funding mechanisms as well as have a secure source of funding over the life cycle of the project. One of the challenges of perpetual care is that it, by its very nature, it is required in perpetuity yet it is often dependent on funding and planning horizons that by comparison are exceedingly short, generally annual. Relying on annual appropriations that are vulnerable to swings in the economy and competing demands for funds is risky in the context of the Giant Mine. A system is needed that will protect perpetual care costs from potential disruptions in economic and political conditions. This challenge speaks to the need for a funding mechanism that is protected from swings in the economy.

The criteria presented in Table 2 below are particularly geared towards funding the perpetual care of a contaminated site. As is the case with the Britannia Mine in British Columbia, as long as the liability associated with the Giant Mine is on the books of the federal government, the impetus for the government to remediate the site remains. Once remediation is complete or sufficiently underway and the liability associated with the site declines, then having a stable and secure source of funds for the perpetual care of the site becomes paramount as there is less pressure for any further investment of public funds.

Table 2. Criteria for evaluating perpetual care funding approaches

Perpetual Care Criteria	Description
Life cycle	Funding allocated for full life cycle of site
Protection	Funding protected against swings in the economy that result in boom and bust economic cycles
Contingency	Process for allocating funding in the event of emergency or other unforeseen circumstance
Stakeholder involvement	Local stakeholder involvement in funding process and associated decisions
Third-party expert involvement	Independent third-party experts involved in funding process and associated decisions
Reporting	Regular reporting of costs, revenues, liabilities and contingencies associated with site
Verification	Third part verification of all cost, revenue, liability and contingency estimates
Long-term monitoring and review	Funding mechanism established for long-term monitoring, review of technologies and funding details

5.2 Evaluation of funding approaches

The domestic and international examples reviewed in this report included several different approaches to financing the perpetual care of contaminated sites:

- Government funding through annual appropriations
- Levies on existing operations
- Public-private partnerships
- Trust funds

In the sub-sections that follow, each of these alternative funding mechanisms are briefly described and evaluated according to the perpetual care criteria identified above. The evaluation is from the perspective of a long-term project requiring perpetual care. The table at the end of the section summarizes the evaluation of the funding options.

Government funding through appropriations

With this approach, annual funding for the perpetual care of contaminated sites is provided through annual budget appropriations made by the Treasury Board (e.g. FSCAP). The challenges with this type of funding, especially over the long-term, is that the funds are limited; governments must assess which abandoned mine site projects to fund; and funds are susceptible to change due to budget volatility, new government policy and the general health of the government's finances. In other words, the funding is not secure over the **life cycle** of the project

or **protected** from economic boom and bust cycles. Financing for **contingencies** as well as **regular reviews** would also be subject to annual appropriations. While there is limited opportunity for **stakeholder** or independent **third-party expert** participation in the funding process, there is significant **reporting** of costs and liabilities and such figures can be **verified** by third-party experts.

Levies on existing operations

With this approach, governments charge a levy to fund the perpetual care of current and/or future abandoned mines (e.g. NWMO, Superfund). The revenue from levies can be used to establish a trust fund that can be used over the long run, or liquidated annually to those sites most in need.

In terms of the criteria set out above, if the levy revenue is used to set up a trust fund, then funding can be established for the **life cycle** of the project. However, the size of the trust fund will be limited by the revenue that is obtained from levies on operating entities. Thus, to the extent that a downturn in the economy results in lost production and/or operations, the total amount of revenue obtained will decline as will the value of the fund. In this way, the funding mechanism will not be **protected** from swings in the economy. The endowment can be established to account for **contingencies** as well as **regular reviews** of remediation and funding plans. **Stakeholders** and **third-party experts** can be involved in the funding process and **reporting** and third-party **verification** is possible with this funding mechanism.

If the revenue from the levies is liquidated annually to the contaminated sites most in need of remediation, then funding will not be guaranteed over the **life cycle** of the project or **protected** from swings in the economy. Funding for **contingencies** and **regular reviews** will only be available to the extent that such investments are deemed worthy in light of competing funding options. **Stakeholder** and **third-party expert** participation is possible as is **reporting** and **verification** of cost, revenue and liability estimates.

Another key limitation of this mechanism is that it only applies when a responsible party can be identified and thus is not applicable to abandoned contaminated sites. Other issues with this approach include finding the right levy amount to generate enough funds to manage existing liabilities while not creating disincentive to industry; gaining political will and industry support for a “tax”; and the specific design features of the levy (e.g. what it is levied, who on the supply chain pays, and how it is administered/distributed).

Public-private funding

This funding mechanism is increasing in popularity for mine remediation. With this arrangement, government and industry share the burden of remediating a site (e.g. Britannia).

This funding option can be pursued in a way that includes **stakeholder** and **third-party expert** participation as well as **reporting** and **verification** of costs, revenues, liabilities and contingencies. Funding can be made available for regular **reviews** to assess the most appropriate technology and funding options as well as **contingencies**. However, public-private funding partnerships require strong commitments and highly detailed contracts between players. Details related to any of the above criteria would need to be established through contractual obligations. As well, with this model, funding would not be guaranteed over the **life cycle** of the project as government funding would still be subject to annual appropriations and private funding would

depend on the financial health of the private partners. By the same reasoning, the funding would not be **protected** from economic swings which can dampen the ability of private companies to provide funding and increase demand for government funds.

Trust funds

There are a number of instances globally where large funds have been established for the purpose of funding the management of contamination (e.g. NWMO) and associated site remediation (e.g. U.S. Abandoned Mine Land Reclamation Fund). These funds can be seeded with funds from government, industry, levies, non-government organizations, or some combination of the above. These funds can be self-sustaining and, with clear governance and objectives, can continue to deliver on stated goals for long periods of time. Thus, they can provide funds for the **life cycle** of a project and are **protected** from economic swings that make competing with other funding priorities increasingly difficult. Funding can be made available for **contingencies** and **regular reviews** of technologies and funding processes. As well, **third-party expert** and **stakeholder** engagement can be an important part of the governance of such funds. **Reporting** and **verification** of costs, revenues, liabilities and contingencies are possible with trust funds.

5.2.1 Summary

The table below summarizes the evaluation of the funding options presented above. The table demonstrates the relative ability of the alternative options to meet the funding for perpetual care criteria. It is clear from the summary that in the case of a long-term project that requires perpetual care, the trust fund is the most promising funding mechanism. However, for a number of the criteria, the ability of the particular funding approach to meet the criteria depends on the particulars of the design and implementation of the funding approach. For example, while a trust fund can be designed and implemented in such a way as to include local stakeholders, the involvement of local stakeholders is not intrinsic to the approach itself. It is instead a design and implementation option that may or may not be exercised. Thus, the presence of a check in a number of the boxes below does not indicate the necessary achievement of the criteria, but rather the potential to achieve the particular criteria.

Table 3. Evaluation of perpetual care funding options

Criteria	Appropriations	Trust fund	PPP	User-pay (endowment)	User-pay (annual)
Life cycle		✓		✓	
Protection		✓			
Contingency		✓		✓	
Stakeholder		✓	✓	✓	✓
Third-party experts		✓	✓	✓	✓
Reporting	✓	✓	✓	✓	✓
Verification	✓	✓	✓	✓	✓
Regular reviews	✓	✓	✓	✓	✓

6. Conclusion and recommendations

This review has demonstrated that providing funding to projects requiring perpetual care is a large challenge world-wide. There are many projects that will need to be managed for hundreds if not thousands of years to come. The relatively recent increase in activities related to the remediation and management of perpetual care sites means that there has not been enough time to create the body of practice to conclusively define what activities works and what do not.

In spite of this, there is a great opportunity for the Giant Mine project in particular, and phase 3 of FCSAP more generally, to take a leading position on how to best manage long-term funding for perpetual care, learning from the lessons and experiences drawn from other jurisdictions domestically and abroad. Current funding for the remediation of the Giant Mine is provided through annual appropriations from the Treasury Board. After the frozen block method has been implemented, it is estimated that the ongoing costs will be \$1.9 million per year. There is a need to ensure perpetual funding for this expense.

Relying on annual appropriations for the perpetual care of the Giant Mine assumes that the money will be there as long as the need exists. Yet, the time horizon for the perpetual care of the Giant Mine site is exceedingly long in relation to government planning and budgeting cycles. The need for perpetual care at the Giant Mine site will exist in perpetuity regardless of whether the economy is expanding or contracting, and whether the competing demands for government funds are high or low. Depending on annual appropriations that are vulnerable to swings in the economy and competing demands for funds is risky in the context of the Giant Mine. A system is needed that will protect the expected \$1.9 million per year from potential disruptions in economic and political conditions.

The evaluation completed in this study suggests that establishing a trust fund for the perpetual care of the Giant Mine site would be the most appropriate option. This conclusion takes into consideration the high degree of toxicity associated with the Giant Mine site, the exceedingly long life span of the project and the close proximity of the contamination to community members, as well as the strengths and limitations of other funding approaches employed elsewhere in Canada and abroad for dealing with perpetual care.

The establishment of a trust fund for the perpetual care of the Giant Mine would ensure a stream of revenue for the life cycle of the project and avoid the need for annual appropriations from government which cannot guarantee the availability of funds in perpetuity.

The recommendations below provide additional detail on the establishment and execution of a trust fund for the perpetual care of the Giant Mine.

6.1 Recommendations

The main recommendation drawn from the evaluation presented in this report is the establishment of a trust fund to provide an on-going store of wealth to be used to finance the perpetual care of the Giant Mine site. Such a trust fund would comprise one component of a comprehensive perpetual care plan for the Giant Mine site. The comprehensive plan would describe not only funding-related details but also details related to ongoing monitoring and maintenance requirements, record keeping and preservation, site designation and land-use controls, and site markers. These components of a comprehensive plan, while outside the scope of this study, are integral to the long-term success of caring for the Giant Mine site in perpetuity.

With regards to perpetual care funding in particular, the focus of this study, a number of recommendations related to the design and implementation of the trust fund are warranted. These are based on experience elsewhere in Canada and abroad and are as follows:

- Inclusion of contingency funds/plans for unforeseen costs and/or unforeseen control failures.
- Regular reporting of all aspects of the perpetual care funding including all costs, revenues, liabilities and contingencies.
- Third-party verification of information on costs, revenues, liabilities and contingencies that is readily available to the public.
- Local stakeholder involvement in decisions related to the management (governance, allocation and investment) of the trust fund.
- Independent expert participation in the management (governance, allocation and investment) of the trust fund.
- Communication between local stakeholders and third-party experts through public meetings and other forms of communication.
- Allocation of funds to regular assessments of perpetual care progress and plans (including alternative technologies, financial management options and practices, record preservation, and plans and practices for communications with future generations) with results that are made readily available to the public.

In addition to the above, recommendations, additional research is required to:

- Assess the feasibility of a trust fund in the context of the perpetual care of the Giant Mine site.
- Identify and assess key design and implementation considerations of such a trust fund.
- Identify appropriate governance and management processes and procedures related to the establishment and operation of such a trust fund.
- Assess the financial requirements and sustainability of such a fund over the life cycle of the Giant Mine project.
- Examine design and governance options for such a fund that would protect it from significant disruptions in the economy and ensure a source of funds even in the face of dampened economic growth and declines in returns on investment.

- Examine whether and how a trust fund might also be used to develop and implement an active research and development program into a more permanent solution for the underground arsenic trioxide.