

***Post Mining Regeneration  
Best Practice Review:  
North American Perspective***

Prepared for

ECUS Environmental Consultancy  
University of Sheffield,  
Sheffield, England  
and  
The Eden Project

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# ***Practice Review: Post Mining Regeneration***

## ***North American Perspective***

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### ***1. Introduction***

This report documents the results of the North American component of a review of post-mining regeneration-related best practices. Our work is part of an assessment of the feasibility of establishing a global centre for research, training and education in mine site regeneration at the Eden Project, Cornwall, England. The larger project is being coordinated by ECUS at the University of Sheffield.

The objective of this review is to undertake a scan of best practices relating to post-mining regeneration in North America noting:

- What is considered to be good practice and trends in future development of the concept;
- Key components of good practice with reference to, for example, socio-economics, land-use and revegetation, pollution control and other environmental issues, engineering, planning and process management, cultural, stakeholder involvement, financial and other aspects;
- Where drivers for good practice are coming from (e.g. industry, regulators, financial institutions, non-government organizations, general public, etc.)
- The extent to which post-mining regeneration-related recommendations of the project “Mining Minerals and Sustainable Development” have been incorporated at regional and national levels and, specifically, the extent that multi-stakeholder participation in post-mining regeneration-related activities has been achieved; and
- Major problems/challenges that can be identified and how these are going to be resolved.

Two aspects of mining are excluded from the study: (1) abandoned and orphaned sites; and (2) small-scale artisanal mining.

There is significant and growing interplay between mining activities in North and South America. Our review team has included participants in South America and examples are included and comment is offered where justified on best mining regeneration practices in South America.

For a number of years, elements of the mining industry have been involved in a process of self-examination and change with an eye to preserve and even enhance its long-term stability and overall financial position. A central motivating element has been a realization that the industry’s “social license to operate” was being seriously challenged. Without such a “social license to operate” the industry would be in trouble.

One part of the industry response was the Global Mining Initiative (GMI) with the project Mining, Minerals and Sustainable Development (MMSD) as its main substantive component. GMI and MMSD were initiated by nine of the world's global mining companies as an innovative process of broad consultation in the hopes of developing a specific agenda for change while generating a new way for the industry to interact with the many "external" concerned interests.

One of MMSD's principal findings was the need to more effectively address the issue of mine closure. The industry's past inability to effectively deal with the legacy of closure was identified as one of the dominant impediments to: (1) being seen as a more attractive investment opportunity; (2) achieving a more positive public image in general; (3) attracting bright people into the industry; and as a result of all of these factors; (4) enjoying a more stable and brighter future.

The objectives of closure planning and regeneration activities should be to:

1. Eliminate safety, social, and environmental hazards;
2. Restore disturbed areas to robust and viable ecosystems in a way that is consistent with local needs and desires;
3. Provide sustainable livelihoods for all employees; and
4. Serve as a catalyst for local development such that the overall contribution of the mine project from an environmental and social perspective is positive over the long term.

The ability to achieve the above objectives will require:

1. Engaged, responsible, proactive, open and secure companies and communities;
2. Comprehensive, fair, and respected government laws, regulations, policies, and programs;
3. Active and adequately resourced environment and social interest groups;
4. Engaged service & supply organizations - financial, insurance, auditors, suppliers, and sub-contractors;
5. Effective mechanisms for communicating best practices across the industry and to the general public as well
6. Mechanisms that will enhance capacity and raise the performance standard of all elements of the industry;
7. Mechanisms that will enhance the knowledge and capacity of non-industry interests so they can more effectively engage with the industry;
8. Effective systems of education, skill development, capacity building, research and development on a the broad range of technical, environmental, health and safety, social, cultural and economic issues related to closure; and
9. Effective global standards - World Bank Group, International Standards Organization (ISO), International Labour Organization, United Nations Family of Organizations, Regional Development Banks, etc. – that can serve to raise standards of practice across the industry and in all countries

We were aided in our task by a 16-person review team located in both North and South America and drawn from a range of interests (Appendix 1). We are extremely appreciative of their willingness to

participate and much of the richness of ideas that this report contains is due to their insights. However final responsibility for synthesis, interpretation, expression, and any shortcomings rests with us.

## **2. Methodology**

This work involved the following five steps:

- Step 1.** Development of an analytical approach for assessing best practices that builds from the MMSD experience;
- Step 2.** Information gathering on best practices through web searching and telephone contacts with key industry and non-industry players to discuss their view on best practices;
- Step 3.** Compilation of a preliminary draft report;
- Step 4.** Review of the preliminary draft with a team of sixteen practitioners active in the field but drawn from a range of perspectives (Appendix 1).
- Step 5.** Revision/enriching of the draft report to produce the final report.

Development of the analytical approach is described in detail in Appendix 2. It combines two elements:

- 1. The use of a life cycle perspective focusing on the idea of designing for post-closure from the earliest phases of mine project activity (Figure 1); and
- 2. The use the Seven Questions to Sustainability (7Qs) assessment template that was developed as part of the work of MMSD – North America (Figure 2).

The result is the template shown below in Figure 3. This template was used as a means to systematically identify aspects of best practice and as a guide in the interview process.

For each element of the matrix, the following information was sought:

- 1. Current “best” practice giving concrete examples where possible;
- 2. General impressions about “typical” practices and the gap between what is now typical and the best practices;
- 3. Identifiable trends in the industry over time; and
- 4. Drivers of change.

*Design, Build and Operate for Post-Closure*

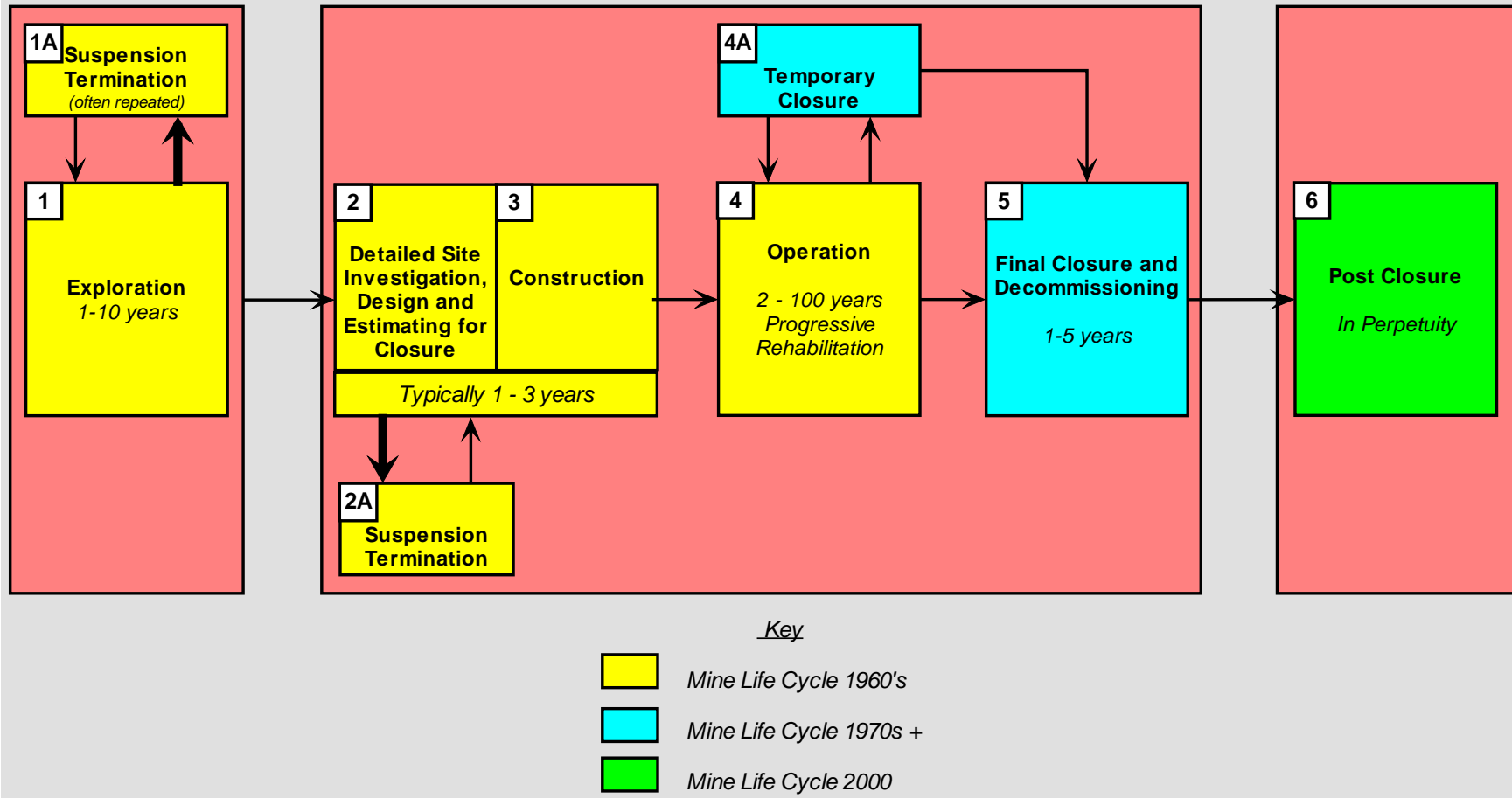
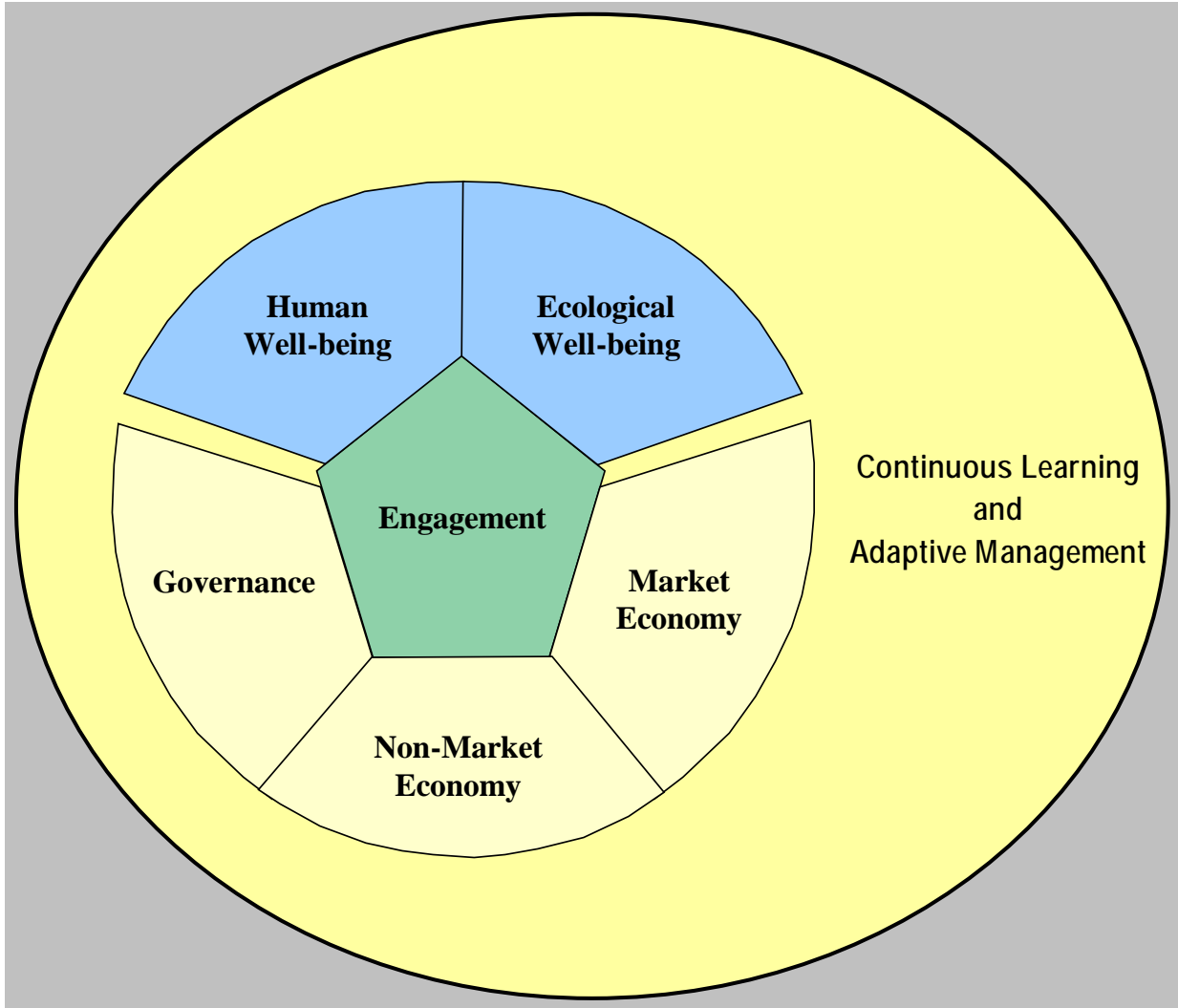


Figure 1. The Full Mine-Project Life Cycle (modified from John Gadsby, 2001). Up until the 1960s, little thought was given to activities beyond the operational phase; in the 1970s, the need for decommissioning and surface reclamation was recognized; only in the last few years has attention been given to the full range of human and ecological implications of the post-closure period.



Source: modified from Ian Thomson, Personal Communication, 2003.

Figure 2. The Seven Questions to Sustainability (7Qs) framework. Human well-being and ecological integrity are the ultimate results to be achieved (and therefore to be assessed against for success). Mining in particular can be used as a catalyst in this process. Activities of engagement, market economy (in this case the mine operation and related activities as well as the economy of the surrounding community/region), non-market activities and governance are all sets of activities that provide the means to achieve well-being. In the ideal, all of these elements lie in a field of continuous learning and contribute to adaptive management. To plan and act effectively, this larger picture needs to be considered as decisions are made about any particular mining activity – particularly those aspects related to post-mining closure.



Practices Aimed Achieving:	1. Exploration	2. Design, build, and Operate for Post-Closure <ul style="list-style-type: none"> <li>➤ Investigating, Design, and Estimating</li> <li>➤ Construction</li> <li>➤ Operation</li> <li>➤ Temporary Closure</li> <li>➤ Final Closure</li> <li>➤ Decommissioning</li> </ul>	3. Post Closure
<b>1. Effective Engagement:</b> <i>Are engagement processes in place and working to establish the needed foundation for successful post-mining regeneration?</i>			
<b>2. Peoples' Well-being:</b> <i>Will people's well-being be maintained or improved now and throughout the post-mining phase?</i>			
<b>3. Environmental Integrity:</b> <i>Is the integrity of the environment assured over the long term?</i>			
<b>4. Robust Economic Activities:</b> <i>Is project economic viability assured and will the economy of the community and region be better off as a result throughout the entire post-mining phase?</i>			
<b>5. Enhanced Non-market Activities:</b> <i>Are non-market (traditional, cultural, home support, volunteer etc.) activities better off as a result?</i>			
<b>6. Effective and Trusted Governance:</b> <i>Are rules, incentives, programs and capacities in place (corporate, community, government) to address project consequences both in the immediate and over the long term?</i>			
<b>7. Integration, Synthesis, Continuous Learning and Adaptation:</b> <i>Does a full synthesis show that the net result will be positive on the long term; is there periodic reassessment to provide a means of continuous learning and adaptation?</i>			

Figure 3. Analytical Framework. For each element of the matrix, the following information was sought: (1) current “best” practice giving concrete examples where possible; (2) general impressions about “typical” practices and the gap between what is now typical and the best practices; (3) identifiable trends in the industry over time; and (4) drivers of change.

### **3. Overview of Post-Mining Regeneration-Related Best Practices**

Introduction  
Exploration and Post-Mining Regeneration  
The Active Mining Phases and Post-Mining Regeneration  
Post Closure and Post-Mining Regeneration  
The Gap between Best and Typical Industry Practices  
Trends over Time  
Drivers

#### **Introduction**

The mining industry in North America is both diverse and complex. This project focused on the industry in the US and Canada. Mexico would add a significant additional dimension to the discussion. Because North American-based companies are very active in South America, some comment on activities there has been included.

The Mining Association of Canada (2003) identifies 795 actively producing mines in Canada for 2002 including 57 metal mines, 129 non-metal mines, 583 structural materials mines, 23 coal mines and 3 synthetic crude oil mines.

The most recently available (1997) map of Mine and Mineral Processing Plant Locations in the US (Kramer et al., 2003) shows for 1997, 1,879 coal mines and facilities, 8 uranium mines, 1,965 mines and processing plants for 74 types of non-fuel minerals and materials.

In addition to the active producers noted above, there are between 500 and 1000 placer mining operations in the US and Canada. Further, there are hundreds of closed mines for which liability is assigned and many more abandoned and orphaned sites for which liability is either in limbo or has reverted to government.

From a corporate perspective MacDonald (2002) documents about 1,875 publicly traded mining corporations with North American head offices. Of these, about 1800 are juniors generally with an exploration focus while intermediate and senior producers comprise the remainder. In addition, there are likely about 3,000 – 4,000 service and supply companies.

None of the above sets of numbers account for the hundreds of construction aggregates companies and operations (crushed stone, sand and gravel, and common clay) scattered across both countries.

Lastly, the industry includes a range of about 50 professional and trade organizations, some focused at the state/provincial level and others at the national level, some commodity specific, others geographically focused.

In sum, while the above profiles of the US and Canada mining industry are not exactly equivalent, in overview terms it is fair to say that the North American mining industry (outside of Mexico) spans:

- Over 2,000 active exploration groups (not all are incorporated and/or publicly traded);
- About 4,000 producing mines not including the many small aggregates operations;
- At least that many closed mines, some suggest double or triple that number or even more;
- 500 – 1000 placer mines;
- Several thousand service and supply companies; and
- An array of professional and trade organizations at the state/provincial and federal levels.

The above industry components are all interrelated at least in the sense that to the public they are all part of “mining” and a black mark against one part is a black mark against all mining. Thus, the industry is judged by the actions of the lowest common denominator, not the highest.

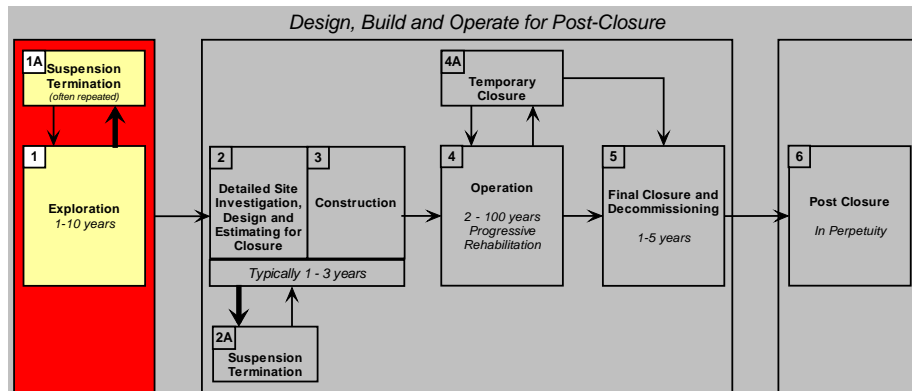
Of the listed components, all but placer mining receive at least some attention in this study or are linked to the examples provided. In a cursory review such as this, a comprehensive review of the activities of all of the parts of the industry noted above is impossible. As a result it is inevitable that many other examples of best practices exist and are not documented here.

In the US and Canada and increasingly in Latin America, society through its regulators has imposed cradle to grave responsibility on the mining industry for its practices and performance. Thus, planning for post-mining regeneration must begin with exploration and continue through the subsequent phases as plans are implemented.

In the following pages, the project life cycle is used to guide a discussion of best practices related to post-closure regeneration. Twenty-eight examples (marked “cases” and numbered sequentially) are used to illustrate different aspects of best practices. These examples are projects that have come to our attention from a variety of sources: through comment from others, from reading, as a result of awards, or from our own personal experience.

In a given project, there are many small elements of best practices. For example, tailings dam design or community engagement (or elements of these at a finer level of detail). Generally it is the case that projects that reflect best practices in one area will do so in others. We recognize that this is not always the case but the efforts required to untangle this maze is well beyond the scope of this work.

# Exploration and Post-Mining Regeneration



There are two aspects of exploration that are key to establishing an effective foundation for post-mining regeneration:

1. Establishing positive relationships between the exploration team and implicated communities of interest;
2. Designing and implementing a data and information system that will facilitate the transfer of knowledge from exploration activities to later phases of the project life cycle.

## Exploration and Engagement

The explorer provides the initial contact between the mining industry and others living close to, or otherwise involved in areas of potential mining activity. The relationships that are established during this initial period of contact will influence all that follows for years to come – right through to post-closure. While their professional focus must be on discovery, if those relationships go sour, mistrust and acrimony will follow; if they are positive, a strong foundation for an effective working climate will be established.

As important as this insight is, we are not aware of any university or college that is educating exploration geologists in a program that includes a treatment of effective engagement in their curriculum.

The vast majority of exploration projects will begin and end without proceeding to mine development. Therefore, a key aspect of effective engagement for any exploration project is the “Exit Strategy” that addresses the environmental, social, and economic conditions left in the aftermath of the exploration project.

In all of this, finding an effective balance between on the one hand, raising expectations in the hopes of encouraging investment while on the other hand, controlling expectations for fear of unjustifiably inflating local hopes or fears is exceedingly difficult.

Three examples of best practices are provided below (Cases 1 – 3).

Tan Range Exploration Corporation, a Vancouver-based firm active in the gold belt of Tanzania (Case 1), provides an exceptional example of sustainability-based corporate policy development linked to top-notch technical capacity and positive relationship building in the field. BHP Billiton's exit from the La Granja exploration project (Case 2) built rather than destroyed bridges. Lastly, the Prospectors and Developers Association of Canada's "Environmental Excellence in Exploration (E3)" program is an outstanding example of an industry-wide association-driven attempt to educate while simultaneously raising the standard of practice amongst all explorers.

#### **Case 1**

### **From Strategy to Action: Sustainability and Tan Range Exploration Corporation**

Tan Range Exploration is a unique, Vancouver-based publicly traded financial gold company whose business strategy is to acquire royalty interests in gold production from its core assets in the Lake Victoria greenstone belt of Tanzania. At present, Tan Range holds 73 prospecting licenses in the Lake Victoria goldfields, eleven of which fall under option agreements with Barrick Gold. Another nine projects are the subject of royalty agreements with Montreal-based Northern Mining Explorations. The Tan Range strategy is to develop royalty income by way of property agreements with senior industry partners.

Tan Range has developed a comprehensive policy on Social Responsibility (Sustainable Development) that begins with their mission statement: *Our mission is to increase the known mineral resource base of Tanzania in a way that enhances the well being of its people, the environment, and the investors and stakeholders of Tan Range Exploration.*

A fully audited Sustainable Development program is presently being implemented that will enable the Company to develop "Social Capital" and leave a positive legacy in Tanzania. Future negotiating positions for new royalty agreements will include a provision whereby 1% of all royalty payments owed to Tan Range will be applied to social and development work within Tanzania. These payments will be the responsibility of the mine operator.

Tan Range is positioning itself to be seen as the leader of the exploration juniors, worldwide. To achieve this goal, it has recognized the need to be able to pass on its properties to developers with full confidence that the foundation of geological information, social relationships and environmental conditions is fully understood and without hidden risks and liabilities. All of these factors together provide the most attractive package from an economic perspective.

For further information see: <http://www.tanrange.com/s/BusinessOverview.asp> and <http://www.tanrange.com/s/SocialResponsibility.asp>

## **Case 2**

### **Overcoming Discontent Through a Model Exit Strategy BHP Billiton's La Granja Project**

BHP Billiton acquired the La Granja copper project through merger activity in 2000. The advanced exploration project is located in a remote part of northern Peru. A feasibility study concluded in November 2001 that the project was not viable and shortly after the decision was made to exit and a closure program was developed.

In the mid-1990's, several hundred families had been re-located by the previous owner to make way for the project in a process that was not compatible with World Bank guidelines. The rural families in the area of the project, and the families who had been relocated away from the project area prior to its acquisition, were living in poverty. Relocated families were worse off than when they lived in the La Granja area. Families who continued to live in the area also suffered social and economic impacts from the project prior to its acquisition. The local schools and medical centre had been closed as a result of the presence of the project. Significant discontent existed.

A socio-economic study of the earlier relocation process provided the basis for developing the initial social program. The primary concerns of the population were found to be health and education. As a result, the program prioritised reopening the schools and the medical centre. The Company paid the cost of operating the schools for two school years and the medical centre for a year, until agreement was reached for the government to reassume its responsibilities in these areas. Until the medical centre could be reactivated, La Granja's medical personnel provided free medical services to the community. They continued to supplement the activities of the medical centre until project closure was complete.

Once the decision had been made to exit the project, a risk assessment was conducted to support the exit strategy. The assessment focused on the environmental and social consequences of various exit scenarios and was highly effective in supporting the final plan of returning relocated people to the La Granja area and in re-establishing a self-sustaining support infrastructure through the development of a foundation. The steps taken to implement the plan included:

- An intensive consultation campaign in December 2001, involving meetings in La Granja and each of the areas where there were concentrations of relocated people
- Subsequent ongoing consultations, resulting in some modifications to the plan
- Sale of approximately 2000 hectares of land back to its relocated original owners or, where the previous owner declined to buy, to other community members (these sales took place at less than half the price that the Company had paid for the land)
- Access to independent legal advice for relocated families before they made the decision whether to repurchase their former land
- Transportation for families returning to La Granja
- Free medical checkups for returning families
- Creation of the Foundation for the Development of the Upper Paltic with NGO participation (The Mountain Institute) at the board level
- Support to the community in establishing a development association in each of the four villages in the immediate area of project influence to facilitate community interaction with the Foundation
- A project by The Mountain Institute to build the community's institutional capacity and help it identify development priorities for the Foundation
- Publication of user-friendly guidebooks on each aspect of the closure process (land sale, return process, environmental remediation, the Foundation)
- Donation of all proceeds of the land sales to the Foundation
- Provision of materials or livestock to help returning families re-establish their livelihood (to be repaid to the Foundation over ten years)
- Donation of materials or livestock to families who decided not to repurchase their former land, to help them consolidate their livelihood in their new location
- Rehabilitation of school and medical centre infrastructure
- Negotiation with the Ministries of Health and Education, at national and regional levels, for the reopening of the schools
- Local hiring policy for environmental remediation work, resulting in the temporary employment of more than 200 people.

Unsold land, and land in the village centres, has been donated to the community development associations; and much of the camp furniture and equipment has been donated to local institutions. With successful execution of the exit strategy, relationships with the local community took on an extremely positive spirit.

For further information see [www.BHPbilliton.com/hsecReport/2003/CaseStudies/cs\\_community25.html](http://www.BHPbilliton.com/hsecReport/2003/CaseStudies/cs_community25.html)

### **Case 3**

#### **Exploration Industry Guidelines: The E-3 Program of the Prospectors and Developer's Association of Canada**

The Environmental Excellence in Exploration (E3) project provides an online reference (an e-manual) of best practices in exploration. E3 offers rapid access to the most up-to-date information on environmental management practices for minerals exploration globally. It seeks to support environmental stewardship in the exploration stage of global mineral development by encouraging the implementation of sound environmental management practices by the exploration community, its contractors and subcontractors, and by promoting the awareness of all stakeholders. Its development is based on the belief that: (1) exploration crews act as ambassadors for the global mining community; and (2) by following E3's best practices, a company's performance will further promote goodwill with any local community and will reduce, if not prevent, the need for mediation.

E3 was launched at the 2003 PDAC Annual General Meeting on a subscription basis. There are now over 200 users in 23 countries including major and junior mining companies, consultants, government agencies, non-government organizations and private individuals. In March 2004 it will be offered free of charge.

For further information see <http://www.e3mining.com/> and <http://www.pdac.ca/>

### **Exploration and its Contribution to the Knowledge Base Needed for Effective Post-Closure Regeneration**

Exploration teams gather together a remarkable data and information base in order to assess the potential for a mine. While their focus must be on geology and mineral potential, the material that is gathered is multidimensional and includes significant insight that can help understand an array of issues such as potential for acid rock drainage or metal leaching, hydrology, hydrogeology, geotechnical characteristics of the site relevant to tailings impoundment emplacement or facility siting, and a host of observations related to the site's environmental and social characteristics. Sadly, much of this data and information are lost over time.

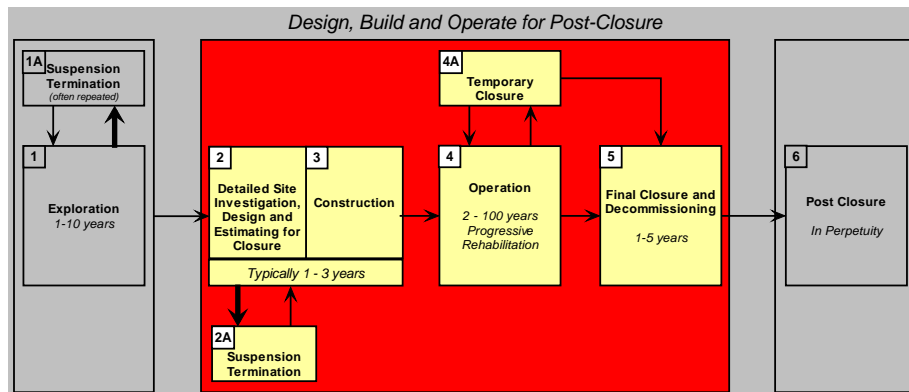
Four factors come into play:

1. The nature of the industry impedes information sharing. Because information defines competitive advantage there is an explicit discouragement of information sharing. Thus, the competitive nature of the industry discourages information sharing. Examples exist of vicious fighting over information in the courts.
2. The regulatory system does not encourage information sharing. There is no regulatory requirement for making public data and information. This is in contrast to the water-well and oil and gas industries that are governed by regulations that require a filing in the public domain of certain information (such as well-logs) after a period of time during which the validity of proprietary use is recognized.
3. Information systems are lacking. Environmental and social data and information at the exploration stage are rarely organized and packaged in a fashion that facilitates onward transfer of knowledge through the project life cycle and indeed, to the corporate knowledge base for application elsewhere. This lack of effective information systems is something that is in significant need of attention particularly with the capacity that current computer systems now have to offer.

4. Intra-industry communication is weak. Communication between the exploration world and the world of mine development can be very limited. They are two different cultures within the same industry. There may be changes of ownership from the initial work of the junior exploration company to the larger mining company. Geologists, engineers and other disciplines commence their careers in separate university programs. They may then work within the exploration and development “silos” of the larger vertically integrated companies where communication between the groups is often weak. Professional and trade associations are often separated along these lines.

All four of these factors lead to a loss of insight that in turn adds an unnecessary degree of inefficiency. We are unaware of any company or project that can be offered as an example of best practice in this regard.

## The Active Mining Phases and Post-Mining Regeneration: Design, Build, and Operate for Post-Closure



While exploration sets the early stage for all to follow, the vast majority of exploration projects will not evolve into a developed mine. And while the spirit of engagement established during exploration ripples out to touch the broad mining industry, it is when the decision is made to proceed beyond exploration that the foundation for post-closure really begins to take shape.

Thus, it is in the early stages of mine development – pre-feasibility, feasibility, early design, and estimating that decisions are taken that firmly shape how the post-closure phase will play out. This is when the comprehensive work on site-characterization is undertaken and projections made regarding future conditions. It is at this point that initial post-closure concepts are developed, estimates of post-closure costs are made, and the financial instruments established that are aimed at ensuring adequate



resources will be in place to cover the costs of post-closure requirements – technical, environmental, and social.

Further, it is in construction and operation that closure plans are reviewed and refined. Progressive closure is then implemented. It is in the decommissioning that occurs immediately after closure that the nature of the long-term legacy is finally established.

Premature and temporary closure are wild-cards. Effectively planned for, neither need be more than minor events in the over all scheme of things. However, their advent as surprises (sometimes unavoidable) can cause serious difficulty from an economic, environmental, health and safety, and community perspective. This latter situation is too often the case and the issues of premature and temporary closure require more attention than they have received to date.

#### Key Definitions

**Closure:** the point at which operations cease for good.

**Closure Period:** the period following cessation of operations during which on-site decommissioning activities are taking place such as the removal of buildings and other infrastructure, the implementation of public safety measures, modification of the surface water and groundwater systems to adjust to post-operation conditions, re-contouring to achieve stability and re-vegetation.

**Premature Closure:** changed conditions (could be unexpected geology, drop in prices, change in markets) leads to permanent closure before the projected end of the mine life.

**Temporary Closure:** labour discord, price drop, market change, some unexpected event or accident on site, or company instability (such as problems with other operations, unexpected takeover, or financial difficulty) leads to a temporary shutdown. Can be very short term or extend to several years.

**Post-Closure:** the period that follows site decommissioning. Activities could involve perpetual maintenance, care, and monitoring and long-term social, environmental and economic programs.

The concept of “design-for-post-closure” is a very recent development. In 1983, the proposed Cinola Gold Mine located on the Queen Charlotte Islands off the coast of northern British Columbia was the first mine project to be conceived of using a “design-for-closure” lens. Now 20 years later and driven by the need to reduce long-term liabilities, maintain mining as an attractive investment, and build relationships that create a positive foundation for future activities, the mine planning time-horizon has been extended to encompass “design-, build-, and operate- for-post-closure.”

Below, eleven cases are offered that point to current best practices in providing the needed foundation for post-mining regeneration. In northern Alberta, Syncrude’s massive oil sands mining operation serves as the largest employer of aboriginal people in Canada (Case 4). Their role in the Alberta economy in general and in particular their role as a catalyst for aboriginal development is pivotal. In

Montana, the “Stillwater Agreement” that formalized the relationship between the Stillwater Mining Corporation and three community-based organizations has moved the bar higher in terms of relationship building. Subsequently, SMC has won awards for its environmental work (Case 5). Practices as Placer Dome’s Musselwhite Mine in northern Ontario, Zaldivar Mine in Chile, and Bald Mountain Mine in Nevada (Case 6), Teck Cominco’s Red Dog Mine in Alaska (Case 7), the Antamina Mine in Peru (Case 8), Barrick’s Pierina Mine in Peru (Case 9), BHP Billiton’s Tintaya Mine also in Peru (Case 10), and Kennecott Energy’s Colowyo Coal Mine in Colorado (Case 11), all provide examples that touch on technical, environmental, social, and economic best practices during active mining that contribute to developing an effective foundation for post-closure regeneration.

**Case 4**

**Syncrude’s Oil Sands Operation and First Nations People**

The Syncrude Project is a joint venture undertaking among Canadian Oil Sands Limited Partnership, Canadian Oil Sands Limited, Conoco Phillips Oilsands Partnership II, Imperial Oil Resources, Mocal Energy Limited, Murphy Oil Company Ltd., Nexen Inc., and Petro-Canada Oil and Gas, as the project owners, and Syncrude Canada Ltd. as the project operator.

Syncrude operates a large oil sand mine, utilities plant, bitumen extraction plant and upgrading facility that processes bitumen and produces value-added light, sweet crude oil for domestic consumption and export. Operations are located about 500 km northeast of Edmonton, Alberta. Production is expected to reach 350,000 barrels per day of crude oil by 2005.

Syncrude employs some 14,000 people directly and indirectly in Canada. They are the largest industrial employer of Aboriginal people in Canada. Aboriginals make up 11% of the employee/contractor workforce. In 2001, approximately \$92 million was invested in Aboriginal contributions, businesses, employment, salaries and benefits. Syncrude has developed a range of formal agreements and partnerships with local Aboriginal people addressing such topics as education, arts and culture, recreation, science and technology, community development, employment, and environment.

The Canadian Council for Aboriginal business honoured Syncrude with the Gold Level Achievement Award for its demonstrated commitment and leadership related to its work with Wood Buffalo’s Aboriginal community. Syncrude is one of only two companies to have received this honour.

For more information see <http://www.syncrude.ca>

## **Case 5**

### **The Stillwater Good Neighbour Agreement**

In May 2000, an historic agreement was signed between the Stillwater Mining Company (SMC) and three not-for-profit organizations. SMC is engaged in the exploration, development, extraction, processing, and refining of platinum group metals. It operates mines near Nye, Montana (the “Stillwater Mine”) and southeast of Big Timber, Montana (the “East Boulder Mine”). SMC also owns and operates a refining and recycling complex at Columbus, Montana. The agreement specifically applies to the current company as well as any successors, partners, subsidiaries, affiliates, and assigns.

The three not-for-profit organizations include the Northern Plains Resource Council (NPRC), Stillwater Protective Association (SPA), and Cottonwood Resource Council (CRC). All three of these organizations play a role in ensuring that quality of life in the region is maintained and improved. NPRC was founded in 1972 by ranchers, farmers, and conservationists concerned with proposals for coal and energy development in eastern Montana. Through the years NPRC has worked on a variety of issues including coal and energy development, hard rock mining, air quality, water quality, and responsible management of hazardous wastes. SPA is a local grassroots organization that has been working to protect the quality of life in Stillwater County since 1975. SPA has focused on ensuring that SMC operates the Stillwater Mine without harming the natural environment or human community. The CRC mission is to safeguard for future generations the high quality of life in Sweet Grass County, clean air and water, abundant wildlife, and a heritage of cooperation among neighbours. CRC has been actively involved in all phases of the state and federal permitting processes for the East Boulder Mine

The agreement sets out to:

1. Minimize the adverse impacts caused by SMC Mining Operations on the local communities, economies, and environment;
2. Establish and maintain a mechanism of open lines of communication between the Parties to address Issues of Concern raised by Councils and the residents of the region impacted by SMC Mining Operations;
3. Provide Councils with the opportunity to Participate in SMC decisions that may impact the local communities, economies, or environment. For the purposes of this Agreement, “Participate” means that SMC shall provide Councils with access to Information and notice of proposals and meetings before final decisions are made. The purpose of this access and notice is to provide Councils with the opportunity to provide meaningful input and advice to SMC decision-makers before final decisions are made. For Arbitrable Issues, this right to Participate includes a vote in the decision-making process, subject to the limitations set forth subsequently in the agreement;
4. Bind SMC and SMC successors, partners, subsidiaries, affiliates, and assigns to this Agreement for the life of Mining Operations; and
5. Minimize future litigation between Councils and SMC by utilizing the processes and mechanisms established by this Agreement to resolve disputes.

Elements of the agreement address access to information and the handling of confidential information, funding obligations, use of third parties to undertake work related to the agreement, determination of economic feasibility of related work, oversight, creation of a “Responsible Mining Practices and Technology Committee”, dispute resolution and enforcement, inspections, conservation easements, mine-sponsored housing, and a range of additional details.

In summary, the agreement brings SMC and the other organizations together in a legally binding contract to protect the area’s quality of life while providing for responsible economic development.

On another front, Stillwater was the recipient of the U.S. Bureau of Land Management’s Hardrock Mining Award, which recognizes effective environmental stewardship. The award recognizes the company’s efforts in water management and its work to minimize impacts through the reduction of pollution sources, recycling, and treating water prior to discharge through biological de-nitrification, land application, and snowmaking.

For further information see <http://www.northernplains.org> and [http://www.blm.gov/nhp/news/releases/pages/2003/pr031001\\_mining.htm](http://www.blm.gov/nhp/news/releases/pages/2003/pr031001_mining.htm)

## **Case 6**

### **Placer Dome's Musselwhite Agreement**

Musselwhite is located on the southern shore of Opapimiskan Lake, 500 kilometres north of Thunder Bay. Production at Musselwhite began in 1997. The Musselwhite Agreement is an innovative arrangement between Placer Dome Canada Limited, Kinross Gold, four First Nations, the Windigo and Shibogama First Nations Councils, and the governments of Ontario and Canada. It was originally signed late in 1992 to address Aboriginal participation in the project. The agreement addressed issues such as employment and training provisions, business development opportunities, funding mechanisms, provisions for the protection of the environment and monitoring procedures.

At the time of design and construction, Placer Dome estimated the mine would produce three million ounces over 15 years. By late 2001, however, Musselwhite had already poured its one-millionth ounce. Today, Musselwhite produces about 140,000 ounces of gold per year and employs 350 people. In 2001, the Musselwhite Agreement with local First Nations was re-negotiated to remove a limit on the amount of ore that could be processed through the mill. The agreement also adopted a revenue-sharing provision that will help bring the mine's economic benefits directly into local communities.

The Musselwhite Agreement is an attempt to provide all partners, particularly First Nations, with the opportunity to benefit from the project and to establish positive new relations between local communities and the mining industry.

For further information see <http://www.cim.org/meetings/Abstract.cfm?PaperNum=1315&ShowID=33> and <http://www.placerdome.com/investors/content/financials/downloads/operations03.pdf>

### **Zaldivar (Copper/Gold)**

Operations of Placer Dome's Zaldivar Mining Company (ZMC) are located 3300 metres above sea level, in the Atacama Desert, some 1400 kilometres north of Santiago, Chile. It is one of the driest places on earth. Since commercial production began in 1995, ZMC has employed some 770 people producing 325 million pounds of copper each year. The mine life is anticipated to extend to 2022.

ZMC maintains close and permanent relations with its workers through dialog with their representative organizations and programs of social development, occupational health and safety. In the community, ZMC provides donations and executes programs that benefit social groups of greatest need. Partnerships and collaboration include local and national NGOs, trade associations, the indigenous community, the Catholic Church, charities, public schools, police and fire services, and municipal and regional governments.

Amongst their projects, ZMC has worked with the NGO, RIDES to develop a better understanding of the Atacama Desert ecosystem and to raise the local communities' awareness of this unique environment. Since 1997, it has been assisting economically deprived students, exceptionally talented students, athletes and teachers. Equipment, teaching materials and books are supplied to schools in the nearby communities of Antofagasta, Mejillones and Taltal. At San Pedro de Atacama, a nearby indigenous community, a scholarship program and social development support program addresses the community's interest in preserving its cultural and heritage values while recognizing its growing tourist potential.

For further information see: <http://www.placerdome.com/sustainability/downloads/reports/2002/Zaldivar.pdf> and <http://www.iipm-mpri.org/?lang=eng>

### **Bald Mountain (Gold)**

Mineralization on the Bald Mountain property located in the Southern Ruby Mountains in the northeastern Nevada, was discovered in 1869. The existing open-pit/heap-leach operation has been producing gold since the development of a pilot project in 1983. In 2001, a new heap leach chemistry solution dramatically improved recoveries and increased production by 60%. Bald Mountain produces about 90,000 ounces of gold per year and employs about 100 people.

With a focus on ecosystem design, the Duckwater Tribe, Native Americans, are presently contracted at Bald Mountain and are operating a nursery of native species for revegetation at both Bald Mountain and Cortez Mine. Their local knowledge is key and there is potential for on-going post-closure maintenance and monitoring work to be performed by them.

For further information see <http://www.placerdome.com/investors/content/financials/downloads/operations03.pdf>

**Case 7**

**Teck Cominco's Red-Dog Zinc Mine, Alaska**

Red Dog, now the world's richest zinc deposit, was discovered in 1953. It is located 55 miles east of the North Slope Inupiat Eskimo village of Kivalina (382 residents) along the Chukchi Sea coast and 40 miles from Noatak (428 residents). The mine complex is in the DeLong Mountains, in a valley in the middle of the western Brooks Range in northwestern Alaska. The mine has been operated by Teck Cominco, a Canadian company since 1989.

Kotzebue-based Northwest Native Alaskan Association (NANA) Regional Corporation, one of a dozen regional Alaska Native corporations, owns the Red Dog mine mineral deposit. The NANA Regional Corp. was formed by Inupiat shareholders under the 1971 Alaska Native Claims Settlement Act. Red Dog's minerals would have been a part of the national park had NANA not interceded with the U.S. Secretary of Interior in 1971 to let the Kotzebue-based company own the acreage.

The land in which the Red Dog ore body is located is part of a land claim settlement agreement between NANA and the government of the United States. After a long period of meetings and negotiations covering the development of the Red Dog deposit between NANA and Teck Cominco, a lease agreement was reached in 1982. This landmark agreement contained significant provisions and commitments to be implemented during the development and life of the mine.

Under the agreement, Teck Cominco financed, constructed and now operates the mine and mill, in addition to marketing the concentrates produced. Teck Cominco also assumed responsibility for employing and training NANA shareholders to staff the operations. Royalties are paid to NANA until Teck Cominco recovers its capital investment, after which NANA will begin to share in the net proceeds from the development. NANA will get an estimated \$1 billion over the mine's projected 50 year life, and under terms of the Alaska Native Claims Settlement Act, 70 percent of all royalties will be split with the state's other Native regional corporations.

An important provision in the agreement deals with employment; first preference on all hiring at the mine goes to qualified natives in the NANA region. Red Dog employs over 400 mine-mill workers. Touted as a major breakthrough in Native hire agreements, the formal operating agreement between NANA and Teck Cominco required the mine to have 100 percent Native workers by 2001. That goal has not been met; currently 55% of the workers are NANA shareholders with \$15 million paid to these employees annually. Teck Cominco has adopted a progressive training program that includes management training and a job shadow program.

An essential factor in the success of the Red Dog mine was early participation of NANA in supporting the development and establishing the shared objectives. NANA and Teck Cominco shared the objectives of profitably developing the mine while maximizing benefits to the people of the NANA region. A joint NANA/Teck Cominco management committee was set up to regularly review and approve the mine operation's activities. Other committees, such as the subsistence and employment committees, were established to oversee specific aspects of the NANA/Teck Cominco agreement. Agreements with NANA govern the review of the impacts of mining on traditional hunting and fishing activities, and give the local people authority and input over these activities.

Red Dog embarked on the development of a comprehensive Environmental Management System (EMS) in 2002. This should allow the mine to become certified under ISO 14001 in early 2004.

The mine is currently bonded for \$11,010,250 as an interim bond until the full costs for reclamation and water treatment are calculated as part of the revised reclamation plan/solid waste permit process. Preliminary estimates for the final bond, which will include costs for water treatment in perpetuity, are closer to \$100 million.

For further information see <http://www.teckcominco.com/operations/reddog/index.htm>  
<http://www.northern.org/artman/publish/reddogfact.pdf>

### **Case 8**

#### **The Antamina Copper/Zinc Mine, Peru**

The Antamina copper/zinc project is owned by BHP Billiton plc, Mitsubishi Corporation, Noranda Inc., and Teck Cominco Ltd. At an initial capital investment of \$2.3 billion it is the largest "greenfield" mine development in history.

The project consists of an open pit mine, a 70,000 ton per day concentrator, a 302 km long concentrate pipeline, port facilities, a new access road, power line, and town site. The project is designed to produce up to 1.5 million tonnes per year of copper and zinc concentrates over a 23-year project life, and will be the third largest producer of zinc and the seventh largest producer of copper in the world.

Commercial production began at the end of October 2001 following 32 month construction and 5 month testing periods. Some 10,000 people were employed during construction and the permanent workforce is 1,400 – the majority of which are Peruvian. During construction, Antamina was twice formally recognized for its community and environmental work: (1) in 1999 during an international symposium organized by the Universidad del Pacifico, various non-governmental organizations, and CONFIEP, Peru's largest private sector business organization for entrepreneurs, and (2) again in 2000 by CONFIEP.

The company has implemented a successful approach to community development and environmental protection based on sustainable development principals. Some of the key components include:

- An explicit tripartite perspective involving the company, government, and society;
- A comprehensive safety program based on building a culture of awareness through standards, training, inspections, audits, and continuous learning;
- The adoption of internationally accepted principals of social responsibility based on (1) the need to obtain a "social license" (defined as the consent or acceptance by the principal stakeholders) to be able to operate in harmony with the local communities in the project's area of influence; (2) triple bottom line reporting that includes economic and financial balance, environmental, safety, and health balance, and social responsibility balance; and (3) an extensive program of stakeholder engagement based on consultation and dialogue;
- The use of collaborative community-company committees to address a range of environmental concerns including San Marcos (open pit), Ayash Basin (tailings dam), the Huarmey (port), and Huallanca (access road) and serving in a monitoring and dispute resolution function;
- Participation in a number of regional environmental working groups involving other mining companies, NGO's and local government
- A number of special programs related to agriculture, education, and health

For further information see <http://www.unr.edu/mines/mlc/mlcSME2.html>

### **Case 9**

#### **Social Investment at Barrick's Pierina Gold Mine**

The Pierina Gold Mine is located in the Callejón de Huaylas in the Peruvian Andes at an elevation of 4,100 meters, approximately 10 km north of Huaraz and 400 km north of Lima. Since operations began in 1998 through 2002, there have been 12,167,000 tonnes of ore processed and 898,000 ounces of gold produced. The workforce includes 405 employees and 780 contractors, including three health and safety, five environmental, and eight community relations specialists.

The mine supports programs in 11 communities around the mine as well as Huaraz, with a primary focus on health, education and economic development. This region has a high infant mortality rate and many respiratory and parasite-related illnesses. Only 52 percent of the children are in school and less than 30 percent of the population is literate. About 90 percent work on the land in a subsistence economy. The mine's community relations program is based upon engagement and working with the communities to decide priorities for their area and to sign agreements with them to carry out those decisions. The result is an investment in social well being designed to enable people to support themselves.

Pierina has funded the construction of health care facilities, built homes, roads, power systems and constructed drinking water supplies as well as sanitary systems. Education is a priority and Pierina has built the Robert M. Smith School, named after Barrick's former president, to provide children in the area with quality education, from kindergarten through secondary graduation. As well, under agreement with the community of Mataquita and the Ministry of Education, a technical high school was created to teach trades.

An integrated rural development program is being carried out under agreement with the community of Cuncashca. Components include improving water storage tanks, irrigation canals, introducing better grasses to grow as feed for their animals and better livestock as well. A tree nursery provides locally grown and acclimatized tree saplings, of common and threatened or endangered native species, for mine and community utilization.

For more information, see [http://www.barrick.com/5\\_Corporate\\_Responsibility/BARRespEng02final.pdf](http://www.barrick.com/5_Corporate_Responsibility/BARRespEng02final.pdf)

#### **Case 10**

### **BHP Billiton's Tintaya Copper Operations, Peru**

BHP Billiton's Tintaya open-pit copper mine in southern Peru commenced operations in 1984 with BHP Billiton acquiring its interest in 1996 as part of the Magma purchase. Mining is expected to continue until 2009.

In December 2001, a facilitated meeting between Tintaya management and community representatives about environmental and social issues associated with the company's activities led to the creation of a formal and continuing "Mesa de Dialogo" or "Dialogue Table." Since that time, this collaborative mechanism has provided a way to address many long-standing community concerns about environmental and land management issues, some of which date from the days of state ownership. The resolution of the land purchase issue has been a particularly high priority. All parties recognize that success is only possible if the communities are actively involved through a participative planning process. It has also provided a means of dealing with recent issues relating to development of a new tailings dam that have been raised by a group of community stakeholders located downstream from the dam that have not been traditionally involved with the mine.

To further enhance its relationship with the local communities, Tintaya has participated in the development of a Convenio Marco, or Framework Agreement, that specifies the Company's environmental and social commitments going forward. As part of this process, the mine has committed to spending up to 3 per cent of its pre-tax profits on community programs over the remainder of its life. This commitment, which is in excess of BHP Billiton's corporate target of 1 per cent of pre-tax profits, has been proposed due to the extreme needs of the impoverished local communities around the mine site. The Convenio Marco is now being formalized.

All participants are committed to outcomes that facilitate both the ongoing operations of the mine and realization of the legitimate aspirations of the surrounding communities for sustainable development.

For further information see [http://www.BHPbilliton.com/hsecReport/2003/CaseStudies/cs\\_community34.html](http://www.BHPbilliton.com/hsecReport/2003/CaseStudies/cs_community34.html)

#### **Case 11**

### **Kennecott Energy's Colowyo Coal Mine**

Located in the hills of northern Colorado's Uinta Basin, the Colowyo Mine produces approximately 5.5 to 6 million tons of low-sulphur coal annually. It holds federal and state permits covering nearly 7,500 acres, with 144 million tons of surface-recoverable reserves.

Colowyo consists of three adjacent pits, the largest being a multi-bench pit in which eight seams are mined consecutively. Coal is recovered using conventional surface mining techniques consisting of dragline and truck/shovel removal. Following primary and secondary crushing, the coal is sorted as required and shipped by rail.

After coal mining is complete, topsoil and subsoil are replaced and contoured to match the pre-existing landscape. The soil is seeded with native plants providing diverse vegetation for livestock and wildlife grazing. Reclamation sites are monitored and maintained until plant growth regains its natural state.

In 2001 and 2002, Colowyo received a Mined Land Reclamation Award and the Mine Health and Safety Recognition Award from the Colorado Division of Mining and Geology.

For further information see: <http://www.kenergy.com/>

Best practices do not only apply to the corporate players. In Case 12 below, an innovative example is described of strategy building that has been undertaken by the Tahltan First Nation whose Traditional Territory covers close to 100,000 km<sup>2</sup> in a geologically attractive part of northwestern British Columbia.

The Tahltan have assessed their relationship with the mining industry past, present, and future using the lens of sustainability. They have done this: (1) as a means of building a strategy for themselves that will facilitate more effective participation in mining activities on their part; (2) to maintain cultural attributes important to them; and (3) to solidify and clarify the operating conditions in which any exploration company or operating mine can expect to find themselves in.

#### **Case 12**

#### **Taking the Initiative Outside the Industry: Mining, Sustainability, and The Tahltan First Nation**

In the spring of 2003, the Tahltan First Nation, whose traditional territory covers over 90,000 km<sup>2</sup> in northwestern British Columbia set out to assess their relationship with the mining industry, past, present, and future. The exercise used the Seven Questions (7Qs) assessment template (see Appendix 2, this report) developed by MMSD North America to develop a “Tahltan Mining Strategy” that has at its objectives:

1. To send a signal that Tahltan people are supportive of mining and mineral activity in their land under conditions that such activities are “done right” from a Tahltan perspective;
2. To facilitate Tahltan participation in mining and mineral activity – not only through direct and indirect employment, but also in terms of overall management/co-management as well as the broad perspective of seeing a fair distribution (considering all participating interests) of all benefits, costs and risks;
3. To ensure that the broad range of concerns raised in the “Seven Questions to Sustainability” are addressed, in particular the health/social/cultural implications of mining/mineral activity that continue to receive inadequate attention.

The Tahltan have been active in providing support for mining exploration for well over 50 years. However, they are increasingly active in both mine development and in particular, mine closure activities as well as post-closure monitoring and follow-up.

This pro-active stance of the Tahltan people reflects another aspect of best practices. In particular, it ensures that not only the economic concerns of the Tahltan people are taken into account, but also the health and non-market cultural concerns that have so often been sacrificed as First Nations peoples have embraced a wage-economy way of life.

For more information see: The Tahltan First Nation and The IISD Mining/Minerals Team, in press – available late fall 2003. *Out of Respect – The Tahltan, Mining, and the Seven Questions to Sustainability*. Report of the Tahltan Mining Symposium, April 4 – 6, 2003, Dease Lake British Columbia. Winnipeg: International Institute for Sustainable Development.

While the above examples focus on technical, environmental, economic, non-market, health and safety, and other social aspects of best practices during the mining operation, there are other aspects of best practices to be considered that have significant implications for post-closure regeneration. These include best practices related to internal corporate governance, mining-related governance at the level of society (federal, state/provincial, local), and a capacity for continuous learning and adaptation.

Below, brief descriptions are provided of the Mining Association of Canada’s Towards Sustainable Mining initiative (Case 13) and the US Bureau of Land Management’s newly developed Reclamation and Sustainable Development Awards (Case 14). Best practices related directly to corporate governance post-closure as well as the overarching issue of continuous learning and adaptation are dealt with subsequently.



MAC's Towards Sustainable Mining initiative has been a quiet effort to raise the performance of all of its 27 members starting with policy and extending right through to practices at operations.

**Case 13**

**The Mining Association of Canada's Toward Sustainable Mining Initiative**

The Mining Association of Canada (MAC) was originally incorporated in 1935. Its mission is to promote, through the collective action of members, the growth and development of Canada's mining and mineral-processing industry, for the benefit of all Canadians. As of May 2003, its membership included 27 full members (active producers) and 27 associate members (drawn from service industries).

In 2000, MAC started its Toward Sustainable Mining Initiative (TSM) in order to improve the industry's reputation by improving its performance. Draft Guiding Principles have been adopted as the overarching framework for TSM that include commitments to demonstrate leadership worldwide by:

1. Being responsive to community priorities, needs and interests through all stages of mining exploration, development, operations and closure; and
2. Providing lasting benefits to local communities through self-sustaining programs to enhance the economic, social, educational and health care standards they enjoy.

For the past 2 years, work across the MAC membership has been facilitated by each member appointing a TSM "Champion" to see the principles implemented through practical programs.

As part of the process to implement TSM, MAC is now creating a Community of Interest Advisory Panel (COI) drawn from outside the industry. Their task is to:

- Help the members of the Mining Association of Canada, the mining industry more broadly and its communities of interest to improve performance of the industry, in line with the TSM Guiding Principles;
- Provide a mechanism for two-way dialogue between MAC and its communities of interest and for MAC to respond to issues raised by communities-of-interest; and
- Provide input to and build understanding and support for the goals of TSM.

Panel membership will include representatives of aboriginal peoples, labour, community leaders, NGOs, non-MAC members of the mining industry, and the investment community. Other participants may be involved as resource persons and links to other dialogue processes including academics/researchers, other mining associations e.g. provincial/territorial mining associations, customers and suppliers.

In the long term, TSM is envisioned to serve as a mechanism to strengthen the criteria for MAC membership by raising the performance bar.

For additional information, see <http://www.mining.ca/>

The use of awards as an encouragement for best practices represents one effective means to extend learning across the industry.

**Case 14**

**The BLM's Reclamation and Sustainable Development Awards Program**

In 2003, the U.S. Department of Interior's Bureau of Land Management created the Reclamation and Sustainable Development Awards Program to showcase some of the finest examples of responsible mineral resource development. The award winners will illustrate the BLM's understanding of Sustainable Development - development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Two awards will be made:

**The Hardrock Mineral Environmental Award**

- Adopting best practices to minimize environmental degradation and adapting them to local conditions as necessary.
- Preventing pollution and minimizing noise and dust during operations.
- Handling hazardous materials safely.
- Reclaiming the land to prevent erosion and planting native species targeting the same plant communities as existed prior to mining.
- Being a leader in developing, establishing and implementing good environmental practices.

**The Hardrock Mineral Award For Community Outreach and Economic Security**

- Engaging local communities and other affected organizations in an open, honest and effective process of consultation for the entire project life.
- Promoting health and safety both on and off the project site.
- Investing in programs that improve the skills and productivity of the workforce.
- Developing strategies for sustaining the local economy after mine closure.

For further information see <http://www.blm.gov>

The following observations arise from our work on this middle portion of the project life cycle:

**Engagement**

1. The examples described above demonstrate that effective engagement with a broad range of communities of interest implicated by any mine project is not only possible but essential to successful mining operations and ultimately their post-closure legacy; unfortunately, there are many instances where a "de minimus" approach to meeting regulatory obligations with respect to stakeholder engagement still prevails.
2. Effective engagement requires a commitment of human and financial resources but the return on investment is significant in terms of (a) timing of approvals processes; (b) pride of workforce with attendant productivity improvements; and (c) social license to operate which has a direct link to attractiveness of investment opportunity for both individuals and perhaps more importantly, major investment houses.

### **Peoples' Well-being**

3. There is a remarkable richness of practical field examples that links economically successful mining to a pro-active catalytic role in local development and to an overall positive contribution to the well-being of both employees and residents within the project's area of influence;
4. In this case, "people" include all interests including: employees, shareholders and investors and the local community. Health safety and security are uppermost in people's minds. During the operational phase of activity, the foundation needs to be established for ensuring that all interests' well being is maintained or improved through the post-closure phase. There is an important limit – the mine with its revenue stream and associated employment will come to an end. However during this active mining phase, many actions can be taken that will both enhance the efficiency of operations and provide for a continuing contribution to human well being in post-closure. Some of those actions include training and education (of the directly employed workforce, of contracted employees, and of other members of the community) and assistance with development of local infrastructure.
5. Programs to address the needs of employees caught in the transition from operation through to closure and post-closure are now used without exception amongst industry leaders – both majors and juniors. However, in smaller operations that is less likely the case.
6. Company concern for the well being of the broader community is given greater attention now than even a decade ago. However, there is an ongoing and understandable tension between a desire to do good and a realization that overall responsibility for the broader good lies well outside the mine operation's sphere. There is also an understandable fear of creating a dependency that cannot be sustained over the long term. While best practice means proactively entering the conversation to establish where a fair line can be drawn at this stage – and subsequently acting on the resulting collaborative decisions that are taken, typical practice remains defensive and reticent to get involved.

### **Environmental Integrity**

7. There is an equally rich experience that demonstrates that economically viable mine activities are best managed in an environmentally sensitive and responsible manner and will result in a net positive environmental contribution over the long term.
8. Environmental practices across the industry have shown significant improvement over the past decade. Here as in other categories, the leaders are getting better and the main challenge is one of getting the practices accepted broadly across all players in the industry. A site-specific driven combination of voluntary initiatives, legislated incentives and effective but fair enforcement are all needed. As a research topic, this moves into issues of effective change management.

### **Economic Issues**

9. Project economic viability is at the centre of any successful operation and is the focus of all mining companies. In that sense, best practice is the operation with the greatest rate-of-return or greatest earnings per unit of ore produced. Further, project viability becomes a real concern because in its absence, resources for a successful post-closure phase will not be available. Thus, project viability is of great concern not only to employees, shareholders and investors, but also the implicated community – provided mechanisms have been created to see a transfer of economic benefits from the mine to the community. This requires careful thought and ultimately negotiation.
10. Industry leaders have demonstrated a significant increase in concern for the economy of the implicated community outside company property. However, such concern is not standard across the industry.

### **Non-Market Issues**

11. The non-market economy spans volunteer activities, culture- and faith-motivated activity, unpaid housework and in some rural areas a thriving underground barter system. Together, these activities make an enormous contribution to well being and most mining companies are implicated to a much greater extent than they realize through not only local financial contributions to recreational activities, the arts, and various charities, but also through the actions of their employees as residents in the local community. At locations where indigenous people live, companies play a key role in supporting (or undermining) important cultural activities and working with indigenous people in finding the best possible balance between their traditional life style and desirable aspects of the wage economy.
12. The best practices illustrated in the case examples demonstrate that effective relationships with indigenous people are easily possible. However, relationships between indigenous communities and mining companies are often established by necessity rather than by a proactive commitment to creating a sense of trust and mutually beneficial cooperation. The long history of alienation and exclusion has fostered misunderstanding and neglect.

### **Early Closure Planning**

13. Throughout the mine life, closure planning must be reviewed and updated to ensure that it reflects changes in the mine operation. It is an anticipatory tool that avoids costly surprises at the end of mine life. As early as possible in the design phase, the closure-related concerns under the company's control must be identified and managed. However, in addition, the closure-related concerns of the implicated community or communities outside the mine must also be identified and addressed. The key to making this work is creating a bridging mechanism with the local community that will facilitate collaboration in the overall closure planning exercise that includes company and community. As operations proceed and as the community evolves, closure preparation should be an ongoing element of activity. Until recently, most closure and post-closure planning occurred as operations neared their end and involvement of the local community and other implicated interests was minimal. Rarely was closure planning given emphasis at the design stage. Where regulatory requirements are in place, a conceptual closure plan may be required but given the deferred expenditure obligation, the intensity of investigation

may be minimized and the idea of collaboration with other interests can also be minimized. Such an approach runs the risk of costly errors that may result in extreme social discord and loss of company/industry credibility.

### **Social License to Operate and Openness**

14. Although the industry is in transition, many of its decision-makers have not yet embraced an appreciation of the unwritten need for a “social license to operate”. Many industry people maintain an apprehension that engagement will cause roadblocks to development. This posture severely limits the possibility of contributing to individual or community well being.
15. The critical ingredient to achieving a social license to operate is achieving a degree of openness, respect and transparency with all interests. This has not been a characteristic of the mining industry in the past and across the industry there remains great resistance to doing so.

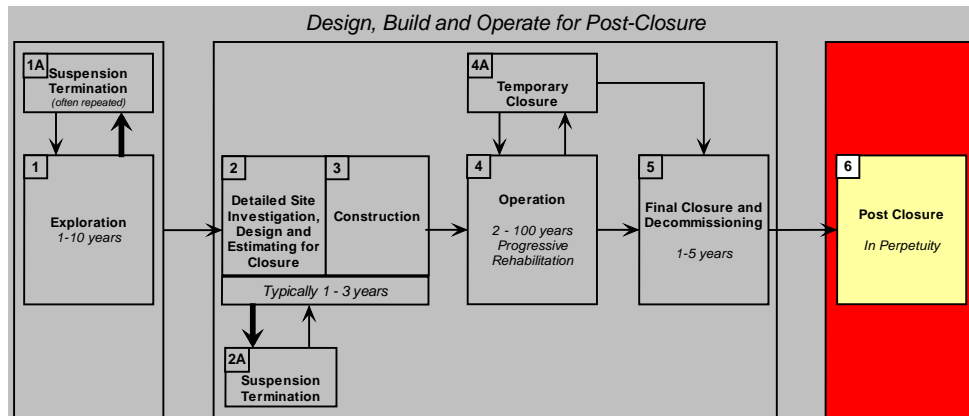
### **Overarching Governance**

16. Legislated rules, financial instruments, voluntary programs, and industry codes of practice all play a part here. The topic is exceedingly complex with local, municipal/county, provincial/state, and national components all playing a part.
17. Throughout the Americas, the enactment of effective legislation that establishes long-term surety for financial, social, and environmental requirements remains an elusive goal. The balance between attracting investment while safeguarding the social and environmental interests is often unresolved.

### **Integration and Continuous Learning**

18. Best practice is centring on the development of integrated sustainability reporting with support from comprehensive sustainability data and information systems. Most of the major companies are moving in this direction including Rio Tinto, Placer Dome, BHP Billiton and Western Mining Corporation.
19. The industry is far from having an accepted standard either for synthesis and reporting or for the needed support data and information systems. There remains significant resistance to assuming responsibility for this kind of integrated overview. This issue again suggests a real need for research related to effective change management in the mining industry.

## Post-Closure and Post-Mining Regeneration



In the past, companies have given little attention to the post-closure phase. This is now changing as: (1) rules governing long-term liabilities are strengthened, (2) NGO watch-dog organizations assess and report publicly on performance, and (3) communications systems enhance the awareness level of the general public. As more effort is put to closure and post-closure, greater understanding is appearing of the importance of putting in place the foundation for effective post-closure long before post-closure occurs. This realization applies to technical design, economic surety, social relationships, and environmental concerns.

For this exercise, we have found it useful to differentiate two parts of the post-closure period. In the first part (early post-closure) decommissioning is complete but the company (or its successors) remains legally responsible for the site. With very few exceptions, all currently closed mines are in this condition except for those that have been abandoned or orphaned.

A second part of post-closure would begin when agreed upon criteria have been met and legal responsibility for the site would or could be passed to another party (could be a developer, a local community or government). This change would allow the original company to withdraw from the picture and as the company steps back, society steps in with government acting as its agent. This situation is the "walk-away" situation that is often described within the industry as the desirable end-point. In the U.S. and in parts of Canada (such as Quebec) legislation creates a permanent tie between a mine property and its owner(s), preventing a "walk-away" situation from ever being possible (it is the same for all industrial activities). In other parts of Canada (such as Ontario) an "exit-ticket" can be granted after certain conditions have been met.

This is relatively new terrain from a public policy perspective and all interests are currently gingerly feeling their way through. However, current trends are such that the possibility of "walk-away" conditions being established and broadly applied across the industry is diminishing. Thus, companies have to come to grips with the idea that they will likely carry a liability for closed sites on their books in-perpetuity. As a result, there is significant pressure to minimize that long-term liability as the impact on initial and ongoing financial health and investment can be profound. Further, recent changes in the laws governing corporate reporting of liabilities mean that closure-related liabilities must now be assessed and publicly reported with much greater rigour than before.

Contemporary best practice begins with early and full engagement with implicated interests to define closure objectives. While the tendency is to think in terms of restoring sites to their original condition, experience now shows that collaboratively generated closure objectives almost always extend beyond simple restoration to include environmental and social innovations that will work together to bring benefits to the area indefinitely over time.

More and more, “Impact-Benefit Agreements”, “Good Neighbour Agreements” or Memoranda of Understanding between the mine and various interests are being negotiated and signed. These are a means of ensuring that the distribution of costs, benefits, and risk is fairer than has been the case in the past. Also, they serve to entrench mechanisms that facilitate transparency of decision-making, access to information, capacity building, and dispute resolution. Ideally, such arrangements are struck early in the operating phase to ensure that needed actions are taken during the period when an operation’s cash flow is healthy. Often a third-party expert or panel oversees implementation.

In the following examples, a range of best practices directly related to post-closure regeneration is described. Case 15 provides an overview of BHP Billiton’s rapidly evolving system of corporate governance for managing closed properties. Thereafter, seven sets of examples are provided that describe closure projects that demonstrate best practices in a variety of ways: Teck Cominco’s Lead/Zinc Sullivan Mine, British Columbia (Case 16), Placer Dome’s McDermott Mercury Mine, Nevada (Case 17), Vulcan Materials Morongo Project, Southern California (Case 18), Kennecott’s Ridgeway (South Carolina) and Flambeau Mines (Wisconsin) (Case 19), Barrick’s Geraldton (Ontario), Bullfrog (Nevada), and Homestake Mines (South Dakota) (Case 20), Viceroy Resource’s Brewery Creek Mine (Yukon) (Case 21), and Anaconda’s Britannia Beach Mine (Case 22).

This last example, Britannia Beach, was for years in limbo, caught in legal wrangling between the former operator and government while at the site itself, severe ARD led to it being labelled one of the worst marine pollution sources on the Pacific Coast of North America. It is included here because it is now evolving into a potentially positive example through the innovative and collaborative planning and visioning that is currently taking place. A key element of what is emerging is the creation of a centre for mine-related research that would prove to be a natural partner for the Eden Project.

The subsequent five Cases change perspective and deal with best practices related to post-closure regeneration relevant research and development. Case 23 highlights British Columbia’s Technical and Research Committee on Reclamation, now in its 28<sup>th</sup> year. It is a mechanism that was explicitly created to bring together best practices related to environmental protection and reclamation associated with mining.

In Case 24, a brief description is provided of the International Network for Acid Prevention (INAP) a mechanism through which leading research related to acid generation and metals leaching is taking place. INAP links three regionally-based organizations including: (1) the U.S.-based Acid Drainage Technology Initiative (ADTI); (2) Canada’s Mine Environmental Neutral Drainage initiative (MEND); and (3) Australia’s Centre for Mining Environmental Research. Cases 25, 26, and 27 provide brief descriptions of each of these. These four cases are included because they are the leading mechanisms for pursuing best practices research and development-related practices.

The last case in this section highlights a very different aspect of best practices. Case 28 describes the nature and work of the Mountain Studies Institute (MSI), a non-government organization working in a region where collapse of mining in the early 1990s led to economic and social devastation.

#### Case 15

### **Corporate Governance: BHP Billiton's Management of Closed Properties**

BHP Billiton's corporate governance system for management of closed properties lies within their Health Safety, Environment and Community (HSEC) envelope. It is based on a hierarchy of the following elements:

1. Company **Charter** that sets out the overarching company purpose, framework for action, values, and success indicators. The Charter is mandatory to all company sites and operations.
2. **HSEC Policy**. The Policy is mandatory to all company sites and operations.
3. **HSEC Management Standards**. The Standards are mandatory to all company sites and operations. They address the following topics: leadership and accountability; legal requirements and document control; risk and change management; planning, goals and targets; awareness, competence and behaviour; health and hygiene; communication, consultation and participation; business conduct, human rights and indigenous affairs; design, construction and commissioning; operations and maintenance; suppliers, contractors and partners; product stewardship; incident reporting and investigation; crisis and emergency management; monitoring, audit, and review.
4. **BHP Billiton-wide Procedures** and Fatal Risk Control **Protocols**. These Procedures and Protocols are mandatory to all company sites and operations. They address the following topics (for example): corporate performance reporting, risk management, incident investigation.
5. BHP Billiton-wide **Guidelines**. Guidelines provide advice on the implementation of Standards. They are advisory only.
6. **Toolkits** are not mandatory but provide preferred methods for meeting the requirements of Standards, Procedures, Protocols and Guidelines.
7. **Site- or Operation-specific Business-based HSEC Management Systems**. These may be either mandatory or advisory.
8. **Site- or Operation-specific HSEC Procedures**. These may be either mandatory or advisory.

A key element of implementing the above system is annual reporting which documents a scorecard of targets and success achieved (or not). The reporting system is synchronized with the framework of the evolving Global Reporting Initiative.

This past year, closure properties have been re-aligned within the HSEC group and are now considered "projects" and subject to the same kind of multi-stage formal planning and Executive approvals process that all company projects are subject to. With closure projects now subject to the same requirements as any capital project, a new degree of discipline and rigour in the management of closed properties has been introduced. Importantly, taking this step has cemented the link between the Senior Executive and field operations.

A key task is the maintenance of a comprehensive property management inventory, a task that is complicated by mergers and acquisitions. BHP Billiton is currently managing an inventory of 27 – 30 closed sites (depending on how they are defined and counted).

In principle, all closure projects (like other "projects" in the BHP Billiton system) have a beginning, middle, and end. However, there is no current standard for removing closed sites from the inventory through final surrender, sale, or some other form of full exit and no examples of successfully doing so. Some jurisdictions such as Ontario have provision for an "Exit Ticket" in the governing legislation. The creation of a government-managed fund to cover any ongoing costs is required. However in the US and Quebec, explicit legislation allows government to go back to previous owners (or string of owners) regardless of how long ago they might have been active. Thus, while "walk-away" might have occurred in some sense, the liability is not totally removed. For its part, Government is reticent to assume risk and responsibility in any case where ongoing maintenance is required.

The entire concept of achieving a "walk-away" condition while maintained as a goal, has receded as an immediate goal. Rather, effort is being put more to the idea of "capping the liability" associated with closed properties.

For further information see [http:// www.bhpbilliton.com](http://www.bhpbilliton.com) and <http://hsec.bhpbilliton.net/Bb/standards/standards.asp>



**Case 16**

**Closure of Teck Cominco's Sullivan Mine  
Kimberley, British Columbia**

The Sullivan mine has been one of the most important mines in Canadian mining history. Discovered in 1892 and operated from 1909 until 2000, it produced almost 8 million tonnes of zinc, more than 8 million tonnes of lead and 280 million ounces of silver metal. Over the mine's 92 year life, the average number of mine employees has exceeded 1,000 people. During its life, the mine was consistently one of the world's most significant producers of lead and zinc.

A key to the mine's economic success came in 1920 when Teck Cominco's predecessor developed the processes necessary to separate lead and zinc concentrates from ores in the milling process. They also pioneered the development of high-density sludge water treatment systems and in the early 1970's, the company installed the world's first water treatment plant in Kimberley to treat acid rock drainage.

Closure expenditures are expected to reach \$70 million and will cover removal of infrastructure, and reclamation of tailings areas and waste dumps. Ten years prior to closure, the Sullivan Mine Public Liaison Committee (SMPLC) was created. Chaired by a government official, it provides a forum where people can receive information about Teck Cominco's plans, make comments, and reach decisions by consensus on the best way forward.

Through development of social capital created by the mine's operations which includes a community of educated and able people and infrastructure such as schools, hospitals and roads, the Sullivan Mine has given the City of Kimberley the foundation upon which it can build its future.

**The Sullivan Factor.** Following closure and as a result of a recent change in provincial government, a shift in government policy at the provincial level led to the closure of the regional hospital located in Kimberley. The result was a shock for the community and a shock to the closure process that had been nurtured so carefully by both Teck Cominco and community representatives. Loss of the regional hospital, a major employer in Kimberley, has seriously undermined attempts to solidify long-term post-mining community stability. Ironically, the government is pro-mining in its stance but in this case, actions of one part of the government were not synchronized with other parts. This kind of undermining change in conditions brought about by a completely unexpected turn of events beyond the control of company or community has come to be called "the Sullivan Factor."

For more information see <http://www.teckcominco.com>

**Case 17**

**Closure of Placer Dome's McDermott Mercury Mine**

The McDermott Mine was a former mercury producer that Placer Dome closed in the 1980s. Closure activity included the removal of all structures and securing the mine site. The site includes about 600 acres of which about 200 are fenced off around the tailings area and a smelter calcine deposit. Surrounding lands include a mixture of deeded properties and federal lands. The principal use is for grazing.

Essentially all statutory obligations have been met. The State of Nevada has signed off and the Bureau of Land Management is expected to sign off soon with their final inspection. There are no formal reporting requirements for the McDermott Mine. Placer Dome maintains an engagement program with the local community. Placer Dome has no plans for divestiture of the property however this case illustrates a situation that is likely as close to "walk-away" as exists in the US.

**Case 18**

**Closure of Vulcan Material's Morongo Sand and Gravel Operation**

The site of the former Morongo sand and gravel operation lies on leased land within the Morongo Indian Reservation. In turn, the reservation is located in southern California on the northwestern fringe of the Colorado Desert and within a broad alluvial fan created by the San Gorgonio River and its tributaries. The San Gorgonio River drains a watershed area of about 23 square miles that extends into the San Bernardino National Forest.

While the site is located in California, it was within the jurisdiction of a separate sovereign nation where the standard practices and regulations of the California Surface Mining and Reclamation Act (SMARA) did not apply. Federal laws were applicable but there were no set protocols or standards on which to base compliance. Thus, pragmatic solutions had to be developed with a focus on doing what was "right" rather than what was "required."

The project was subject to sociological, cultural, and political factors that mining operations do not regularly encounter. Unfortunately, prior to the site's reclamation, a mutual lack of trust between the Band and the Company had developed. The Band feared that the Company would not live up to its promises to reclaim the land. It also worried that the state-of-the-art habitat restoration techniques used at other Vulcan sites would not be used at this site. On the other hand, without a definitive and familiar process, the Company feared that the Band would not be satisfied with any amount of reclamation. Both parties required an ironclad solution to build trust and accountability into the reclamation program. Both process and substance had to be addressed.

At the start of mining, a reclamation plan had been approved both by Federal agencies and the Band. However, when it came time to reclaim the site, the company and the Band decided to re-formulate the plan. To overcome the mutual lack of trust, reclamation objectives were redefined collaboratively and a very specific work program was developed and entrenched in a formal "Site Closure Program." A key element was that each work item was individually bonded with specified bond amounts released once work items were completed.

To ensure fair and complete implementation, both parties agreed to use an independent third party to evaluate the work and its completion. This "Administrative Technical Expert" was selected and approved by both the Band and the Company. Thus the solution ultimately provided for a clear and redefined reclamation program, a bond to ensure its implementation, and an objective third party to sign-off on the successful completion of each task and release the associated portion of the bond. The site has been successfully restored using state-of-the art reclamation programs.

The Morongo Reclamation Project was awarded the 2001 California Mining Association's "Excellence in Reclamation" Award and the 2003, Bureau of Land Management's Hardrock Mineral Environmental Award. In 2003, Vulcan Materials Company was ranked in the top 10 companies in the United States for social responsibility in Fortune magazines "America's Most Admired Companies" list.

For further information see <http://www.vulcanmaterials.com/press.asp?content=detail&NewsID=124> and [http://www.blm.gov/nhp/news/releases/pages/2003/pr031001\\_mining.htm](http://www.blm.gov/nhp/news/releases/pages/2003/pr031001_mining.htm)

## **Case 19**

### **Closure of Kennecott's Ridgeway Gold Mine**

Kennecott Ridgeway Mining Company (KRMC) operated a 15,000 tons-per-day open-pit gold mine located approximately 5 miles east of the town of Ridgeway, and 25 miles north of Columbia, South Carolina. The mine operated 24 hours a day, 7 days a week, and employed over 100 people. For most of its active mine life, Ridgeway was the only producing gold mine in the Eastern United States, with production beginning in December 1988.

The mine produced a gold/silver doré product from bulk-mineable, open-pit deposits, located one mile apart. The mill poured the millionth ounce of gold in 1995. The deposit consisted of two ore bodies, the South Pit and the North Pit. Mining in the South Pit finished first, and the bulk of the waste from the North Pit was directly backfilled into the South Pit, as it was filling with water, on its way towards becoming a lake. Mining in the North Pit ended in November 1999. The whole site is currently being reclaimed.

During exploration, development, and operation, relationships within the local communities changed from one of mixed scepticism and outright opposition to one of mutual support and trust. In the 1980s, local communities banded together to form ***GOLD CAMOUFLAGE*** – Citizens Against Mining Operations Unsafe For Land And Good Environment. In 1987, a mine permit was granted but increased opposition led to a lawsuit. Subsequent engagement between Kennecott and the local communities led to: enhanced environmental monitoring, implementation of a number of extra design precautions, commissioning of an independent groundwater consultant to study the area, the creation of financial guarantees for domestic wells, development of a wildlife management plan and support for a fulltime Department of Natural Resources Wildlife Technician, increased size of a buffer zone to minimize noise and visual effects and a formal Settlement Agreement in 1989.,

The tailings, waste rock, and pit walls are acid generating and the closure has involved capping and revegetating the tailings impoundment, the creation of two pit lakes and a 40 acre wetland system. Pit lake development will take place during the “interim reclamation phase” estimated to be approximately 10 – 14 years. As the pits fill, the water limnecology is being closely monitored.

A 30-year post-reclamation monitoring period will begin when the pit-lakes reach their ultimate level. At this point in time, clean storm water runoff will flow through the lake system into the seasonal drainages adjoining the site. In October 2002, a memorandum of understanding (MOU) was signed with a local non-profit organization, the Southeastern Natural Sciences Academy (SNSA) whose aim is to promote environmental stewardship through education, research, land conservation, and public outreach programs. The MOU entrenches a vision of creating a sustainable development environmental research and education centre: the Ridgeway Ecological Restoration Centre. The objectives of the centre would be to promote a sustainable program for economic growth at the site, balanced with environmental protection and education, achieved by a transfer of knowledge through workshops and seminars coupled with general public interaction. The MOU creates a Community Advisory Committee intended to assist and advise an Operations Committee in guiding future decisions and programs of the centre. For its part, Ridgeway commitments include: long-term lease of facilities, master plan development by August 2003, remodelling of the former administrative building, \$300,000 (\$US) funding for a three-year period, provision of initial research opportunities, encouragement of locally-based business ventures, and effort put to creating self-sustaining capability for the Centre through public support.

For more information see <http://www.kennecottminerals.com/mines/ridgeway.html> and <http://www.unr.edu/mines/mlc/sme/Fox.pdf>

### **Closure of Kennecott's Flambeau Mine**

The Kennecott Flambeau Mining Company began copper production from a small, but rich, open pit mine near Ladysmith, Wisconsin, in 1993. The Flambeau ore deposit is now exhausted, after having yielded 181,000 tons of copper, 334,000 ounces of gold, and 3.3 million ounces of silver in just four years.

The ore-body extends under the Flambeau River, which is considered an important regional resource. Early on, community concerns were not treated as a top priority and early attempts to permit the mine stalled as a result of this opposition. However, in the mid-1980s, engagement with the local community led to a formal three-party Local Agreement addressing economic, environmental, and social considerations that included: protection of the Flambeau River, hiring of locals (75 % of workforce), public transparency with a visitor centre, daylight operation for most activities, protection of potable water supplies, right of first refusal for property sales, construction and annual payments, net proceed taxes returned to locals. On the company side, concessions were made that reduced the reach of the mined area and protected the Flambeau River.

Operating permits were received in January 1991, the first ore was shipped in May 1993 and closure began in the fall of 1996. During operation, the extent of the site footprint was closely controlled and water treatment was required for control of acid rock drainage. In closure, the open pit was backfilled to original contours and following the same geological sequence.

In addition to the metals produced by the mine, its economic contribution included \$16 million net proceeds tax to the state, \$10 million to local community projects, 500 jobs created or retained in the county, and a \$6.5 million new county tax base. On the closed site, 32 acres are set aside for commercial development, 130 acres of diverse prairie ecosystem have been created as well as 10 acres of wetlands and 4 miles of public conservation trails. Flambeau High School students planted native trees, grasses, forbs and wetland plants to create the diverse wildlife habitats. The local community gained a \$1.3 million library, \$30,000 playground and an annual scholarship program. Some 125,000 visitors come to the site annually. State mine regulations were updated as a result of this project and the capacity of all parties including company, government, and community was enhanced through this experience.

Flambeau was awarded the Bureau of Land Management's 2003 National Hardrock Mineral Award Mining Award, which recognizes effective environmental stewardship. Flambeau demonstrated success at meeting or exceeding federal, state, and local reclamation requirements with minimal oversight.

For more information see <http://www.unr.edu/mines/mlc/sme/Fox.pdf> and [http://www.blm.gov/nhp/news/releases/pages/2003/pr031001\)\\_mining.htm](http://www.blm.gov/nhp/news/releases/pages/2003/pr031001)_mining.htm)

#### Case 20

### **Engagement and Closure: Barrick's Geraldton, Bullfrog, and Homestake Mines**

Barrick Gold through the acquisition of the Lac Minerals and Homestake operations assumed responsibility for the clean-up and acceptable closure of properties in Canada and the U.S. including sites at Geraldton, Ontario; Beatty, Nevada and Lead, South Dakota.

Geraldton, Ontario is located to the north of Lake Superior, 1000 km northwest of Toronto. No stranger to mining, six producing gold mines were developed in the region producing over four million ounces of gold. Among them was the MacLeod-Cockshutt underground mine, which operated from 1938 to the early 1970's processing at a peak rate of 2500 tons of ore/day. In 2000, working in partnership with the local and provincial governments, the site of the mine tailing deposit was rehabilitated, landscaped, and the new Geraldton Heritage Interpretive Centre was constructed and now offers visitors an opportunity to learn about the history of the region through interactive media displays and a friendly, knowledgeable staff. In 2002, a new nine-hole addition to the nearby Kenogamisis Golf Club was completed.

The Bullfrog Mine is situated about 225 km west from Las Vegas and 65 km from Death Valley National Park. The underground mine was developed in 1991 and operated through 1998 producing 340,000 ounces of gold and 400,000 ounces of silver. The workforce was in the order of 260 employees and contractors. Closure of the mine presented economic difficulty for the nearby community of Beatty, Nevada. Working with the Bureau of Land Management (BLM) and the community, innovative options were explored to leave some of the office and maintenance buildings for utilization by other businesses. Barrick agreed to donate 60 acres of reclaimed mine site for a Beatty industrial park. An additional 10 acres will be donated for the National Park Service to build a remote visitor's centre and administrative offices. In 1996, Barrick was awarded the Nevada Division of Minerals, Excellence in Mining Reclamation Award. In 2001, they received the BLM Sustainable Development Award for Post-Mining Land Use at Bullfrog Mine.

The Homestake Mine in Lead, South Dakota was the largest underground gold mine in the United States. Commencing its operations in 1878, it continued as an underground and open pit operation until the end of 2001. Working with the National Science Foundation and others, Barrick agreed in principle to donate the mine for use as a National Underground Science and Engineering Laboratory. The plan has drawn broad scientific support, with the endorsement of a group of Nobel Prize winners and internationally acclaimed physicist Stephen Hawking. The laboratory would be one of the lead international centres for research in neutrino physics, the stability of matter, the nature of the mysterious "dark matter," the ability of microbial life to adapt to hostile conditions deep underground, and a variety of important engineering and materials science topics. The ability to move forward remains contingent on Barrick receiving adequate assurance that it will be protected from liability for a property it would no longer control. This is not certain in light of recent liability protection legislation

passed by Congress and signed into law by President Bush. The state of South Dakota is looking for ways to protect the company with insurance or trust funds.

In videos prepared by the company to communicate about their activities, regulators were invited to give comment. An overwhelming message comes through: where success was achieved it was because Barrick took early initiative, often on a voluntary basis, to develop effective working relationships with regulators and other implicated interests to collaboratively identify the issues and to work together to propose solutions. The result includes both cost-savings and effective engagement that leaves all parties better off.

For further information see [http://www.barrick.com/5\\_Corporate\\_Responsibility/BARRespEng02final.pdf](http://www.barrick.com/5_Corporate_Responsibility/BARRespEng02final.pdf)  
<http://www.travelnorthernontario.com/geraldton.html>  
<http://www.washington.edu/newsroom/news/2003archive/07-03archive/k071803.html>  
<http://www.rapidcityjournal.com/articles/2003/08/13/legislature/news/799news.txt>

#### **Case 21**

### **Closure of Viceroy Resource Corporation's Brewery Creek Heap Leach Gold Operation, Yukon**

The Brewery Creek property is located 57 km east of Dawson City in central Yukon. Seasonal mining began in 1996, reached full production (11,000 tonnes per day April – October combined with year-round heap leaching) in 1997 and was discontinued in 2001. Trickle-down heap leaching continued until 2002 when closure was initiated. As part of the closure and reclamation plan, the mine was required to stabilize the heap leach pad and treat drainage for cyanide and other dissolved contaminants.

Consulting firm ARCADIS was contracted to perform these services using patented in-situ bioremediation technology. Predicted results were achieved and Water License requirements were met within 10 weeks. Use of innovative technology eliminated the need for rinsing or active water treatment with an estimated savings of \$4.5 million.

The progressive reclamation undertaken by the company, its innovative use of vegetation, combined with its use of the closure technology described above resulted in the mine winning the 2002 Robert E. Leckie Award for Outstanding Mining Reclamation Practices given annually since 1999 by the Department of Indian and Northern Affairs of Canada. The award recognizes reclamation and site restoration efforts that go well beyond what is required by law, either by reclaiming land for which there is no obligation to reclaim, adding features to the land that have enhanced the area and local community, or returning mined land to a condition that is not only sound but aesthetically pleasing.

A key element of closure planning was a requirement for Viceroy to post an \$8.0 million (CAN) dollar security with the Canadian federal government. With devolution of responsibilities, that security was transferred to the Government of the Yukon on April 1, 2003. Reclamation success led to a reduction in the financial security requirement by \$1.5 million in August 2003.

Viceroy Resource Corporation has recently merged with several other companies to form Quest Capital Corporation.

For further information see [http://www.geology.gov.yk.ca/publications/yeg/yeg02/05\\_crowther.pdf](http://www.geology.gov.yk.ca/publications/yeg/yeg02/05_crowther.pdf),  
<http://www.arcadis-us.com/service+types/infrastructure/mining/projects/brewery+creek+mine.htm>, and  
<http://www.gov.yk.ca/news/2003/aug/03-180.pdf>

**Case 22**

**Anaconda's Britannia Beach Mine**

The Britannia Mine was a copper mine that operated on the southwest coast of British Columbia between 1902 and 1974. By 1929 it was the largest copper producer in the British Commonwealth and during the seventy year life of the mine, 60,000 people of many races, languages, and religions, worked and made their homes in the adjacent community. In 1975 a portion of the mine was transformed into the B.C. Museum of Mining. It was designated as a National Historic Site in 1988 and in 1989, the Museum site was designated a British Columbia Historic Landmark.

When the Britannia Mine ceased operations in 1974, the owners of the property, Anaconda, closed the mine to a standard that satisfied the regulatory requirements of the time. However, since then, it had continued to be one of North America's most significant discharges of acid rock drainage that flowed to nearby Howe Sound damaging its valuable fishery resources. For more than two decades, the situation remained unresolved until Anaconda's successor accepted a voluntary responsibility to contribute to the installation of a water treatment facility.

In 2001, the Province provided indemnification for environmental liabilities to the successor companies of the mine operators, in exchange for \$30 million. Using this money, the government has been considering options for long-term closure.

In 2001, the University of British Columbia Centre for Environmental Research in Minerals, Metals, and Materials (CERM3) initiated a program at the mine site to control the mine drainage by plugging the underground workings using new technology with a design life of 1000 years.

Most recently a proposal has evolved that would see a significant expansion of the community and the creation of a centre of mining history and research established at Britannia Beach. The proposal is linked to development of the transportation corridor between Vancouver and Whistler Mountain, the site of the 2010 Winter Olympics. In October 2003, the future of the community and closed mine site were subject to a "Design Charette" involving some 66 individuals from a broad range of implicated interests and facilitated by the University of British Columbia's Chair in Landscape and Liveable Environments.

For further information see: <http://www.britanniamine.info/>

**Case 23**

**Collaboration through Research  
British Columbia's Technical and Research Committee on Reclamation**

In British Columbia, the Technical and Research Committee on Reclamation (TRCR) originated in the early 1970's in response to a demonstrated need for greater government-industry communications in the area of environmental protection and reclamation associated with mining. Membership is drawn from the corporate sector (several of the large mines are represented); the Ministry of Energy and Mines (MEM); the Ministry of Water, Land and Air Protection (MWLAP); the Mining Association of British Columbia and British Columbia universities and colleges. The Committee meets four or five times a year to discuss matters of joint concern and interest, exchange experience, plan activities and prioritise research needs.

Since 1977, the TRCR has annually sponsored the British Columbia Mine Reclamation Symposium to foster the exchange of information and ideas on reclamation. Proceedings, published concurrently with the symposia, are a valuable source for anyone interested in this field.

In addition to the annual symposium dealing with the entire spectrum of reclamation issues, the TRCR also sponsors symposia and studies focusing on single issues. For example, in 1985 the Committee sponsored a preliminary study of the practice of resloping waste dump faces, with support from the Canada-British Columbia Mineral Development Agreement. A second study, with support from the Coal Association of Canada, focused on materials handling and cost. In 1986, the Committee sponsored an International Rock Drain Symposium, which drew attendance from the United States, France, Australia and the Soviet Union, again with support from the Canada-British Columbia Mineral Development Agreement. In 1990, the Committee established a special project to improve the environmental management of cyanide and in July 1992 published a "Technical Guide for the Environmental Management of Cyanide in Mining". As a follow-up, the TRCR, in

cooperation with MEM, hosted the Cyanide Gold Heap Leach Workshop in Vancouver, May 27 and 28, 1995. In 1992 a TRCR committee was struck to direct a study to identify environmental and reclamation issues from which research and development priorities could be identified. This initiative resulted in a report entitled "Key Environmental Issues Assessment", released April 1993. In addition, TRCR members are currently involved with MEM, MWLAP and the industry in sponsoring work on Metal Uptake by Vegetation, and effects of molybdenum on cattle and fish. The Acid Mine Drainage Task Force recently amalgamated with the TRCR to strengthen the Committee's scope to include all aspects of mine development and reclamation. In 1999, the TRCR co-sponsored a workshop on molybdenum held in conjunction with the symposium in Kamloops, B.C. The TRCR is also affiliated with the Canadian Land Reclamation Association (CLRA) and has co-hosted symposia on several occasions, including 2002 in Dawson Creek.

To promote excellence in reclamation, the Committee annually presents the British Columbia Mine Reclamation Award and several citations for excellence in mine reclamation. Citations are provided for the reclamation of exploration sites, metal mines, coal mines, placer operations, sand and gravel operations, and industrial mineral operations.

For further information see <http://www.trcr.bc.ca/annual.html>

#### **Case 24**

### **International Network for Acid Prevention (INAP)**

INAP is an organization of international mining companies dedicated to reducing the environmental liability associated with sulphide mine materials. Acid Rock Drainage (ARD) is one of the most serious and potentially enduring environmental problems of the mining industry. Left unchecked, it can result in such extensive water quality impacts that it could well become this industry's most harmful legacy.

Although no global estimation of the impact of ARD exists, total liability costs for potentially acid generating wastes at mining sites is estimated to be US\$530 million in Australia, between US\$1.2 and US\$20.6 billion in the USA, and US\$1.3 and US\$3.3 billion in Canada. Effectively dealing with acid drainage has been – and continues to be – a formidable challenge for which no global solutions currently exist.

The International Network for Acid Prevention (INAP) was created to meet the challenge of dealing with ARD in a sustainable way and to reduce the associated environmental liability. Comprised of eight member companies, INAP globally coordinates information sharing and research on ARD knowledge and promotes significant improvements in the management of sulphide mine materials.

Since its inception, INAP has become a proactive, global leader in its field. The recent Mining, Minerals and Sustainable Development (MMSD) project, commissioned by the Global Mining Initiative (GMI), identifies the International Network for Acid Prevention (INAP) as possessing the best known research initiatives aimed at preventing and controlling ARD.

Participating companies are: Barrick, BHP Billiton plc, Falconbridge, Inco, Noranda, Phelps Dodge, Placer Dome, and Rio Tinto.

For further information see <http://www.inap.com.au/inap/homepage.nsf>

**Case 25**

**The U.S.-based Acid Drainage Technology Initiative – Metal Mining Sector (ADTI-MMS)**

**Vision:** ADTI-MMS uses consensus to promote scientifically sound mineral development that minimizes adverse impacts on water and maximizes beneficial post-mining land uses.

**Mission:** The mission of ADTI-MMS is to identify, evaluate, develop, and disseminate information about cost effective, environmentally sound methods and technologies to manage mine wastes and related metallurgical materials for abandoned, inactive, active, and future mining and associated operations and to promote understanding of these technologies. ADTI-MMS is not a policy or regulatory initiative; it is a technically focused consensus group of volunteer representatives from state and federal government, academia, the mining industry, consulting firms, and other interested parties who are involved in the environmentally sound management of metal-mine wastes and drainage quality issues.

**Membership:** The membership of the ADTI-MMS consists of volunteer representatives from state and federal government, academia, the mining industry, and consulting firms who are involved in the technologies to manage metal-mine wastes in the United States. Overall direction for the ADTI-MMS is provided by a Steering Committee that has representatives on the Operations Committee of ADTI. The latter also include members from the Coal Mining Sector (ADTI-CMS). The ADTI-CMS recently completed the manual "[Prediction of Water Quality at Surface Coal Mines](#)".

**Objectives and Goals:** The objectives of the ADTI-MMS are to identify, evaluate, develop, and disseminate information about cost effective, environmentally sound methods and technologies to manage mine wastes and related metallurgical materials for abandoned, active and future mining and associated operations and to promote understanding of these technologies. Drainage quality issues will be considered for ore and waste as well as from alkaline, neutral and acidic conditions in the mining and related metallurgical processing environment. This is a technical initiative, not a regulatory or policy initiative. Activities will be coordinated with other related national and international organizations with similar interests and be carried out using voluntary consensus standardization procedures. More specifically, the goals of the ADTI-MMS include:

- Finding ways to reduce the extent and severity of adverse impacts of drainage from mine wastes and mining related materials.
- Develop consensus on environmental mine waste management technologies for sampling and monitoring, drainage quality prediction, mitigation, and modelling.
- Identify technological needs and work to address these needs.

Use sound scientific and technological fundamentals to interpret, assess, and summarize published literature and operational practices; communicate these findings to those responsible for environmental mine waste management.

For further information see <http://www.unr.edu/mines/adi/index.html>

**Case 26**

**Canada's Mine Environmental Neutral Drainage (MEND)**

Acidic drainage is recognized as the largest environmental liability facing the mining industry and, to a lesser extent, the public through abandoned mines. MEND was implemented to develop and apply new technologies to prevent and control acidic drainage. The target is for new mines to open without long-term concerns about acidic drainage upon closure.

It is estimated that through the investment in MEND of \$17.5 million, Canadian mining companies and provincial/territorial and federal departments have reduced the liability due to acidic drainage by at least \$400 million. Funding for the MEND Secretariat is shared by Natural Resources Canada and The Mining Association of Canada.

For further information see [http://www.nrcan.gc.ca/mms/canmet-mtb/mmsl-lmsm/mend/default\\_e.htm](http://www.nrcan.gc.ca/mms/canmet-mtb/mmsl-lmsm/mend/default_e.htm)



**Case 27**

**Australian Centre for Mining Environmental Research**

**Vision:** To be an internationally recognized centre of excellence supporting continual improvement in environmental performance in the minerals industry for the benefit of all stakeholders.

**Mission:** To provide the scientific rigour and support to enable the minerals industry to enhance its environmental performance from exploration to active mine management and closure.

**Objectives:**

- To work with industry, government, researchers and the community to define key environmental issues facing the minerals industry from exploration through to mine closure;
- To focus the collective skills of researchers nationally (and internationally where appropriate) to produce technical solutions to key environmental issues identified by industry and relevant stakeholder groups;
- To ensure effective national and international transfer of research outcomes and key environmental technologies through the conduct of short courses and workshops, the production of research reports, workshop proceedings, manuals and handbooks, and the provision of advisory services; and
- To provide scientific and technological foundations to facilitate industry and government in defining and achieving acceptable standards for environmental management.

The Centre partners comprise five of the major groups in Australia carrying out environmental research for the minerals industry (Australian Nuclear Science and Technology Organization (ANSTO) – Environment Division, CSIRO – Environmental Projects Office, Curtin University of Technology - Mulga Research Centre and Mine Rehabilitation Group, The University of Queensland Centre for Mined Land Rehabilitation, and the University of Western Australia Centre for Land Rehabilitation) and five of the country's major mining companies (BHP-Billiton, Placer Dome Asia Pacific, Rio Tinto Limited, WMC Resources Ltd. and Newmont Australia Limited (associate)). Additionally the Centre draws upon the expertise of consultants and other research organizations and mining companies in its research and technology transfer activities.

For further information see <http://www.acmer.com.au/>

**Case 28**

**The Mountain Studies Institute, Silverton Colorado.**

The Mountain Studies Institute (MSI) is a non-profit mountain research and education centre established in 2002 in Silverton, Colorado. MSI's mission is to enhance understanding and sustainable use of the San Juan Mountains by facilitating field research, academic studies, and experiential learning opportunities. The Institute is capitalizing on the San Juan Mountains as a living laboratory and natural classroom, and demonstrating a new sustainable economic development model for mountain communities – research and education as a rural development tool.

MSI will assist Silverton and San Juan County, devastated by the collapse of the hard rock mining industry in the early 1990's, diversify its economy and become a premiere locale for mountain research and education. Through a collaborative coalition of Fort Lewis College, the US Forest Service/BLM, San Juan County, and the Town of Silverton, MSI will facilitate study of the San Juan Mountain system, its geology, ecology and human history.

MSI's range of products and services will include: Educational seminars and certificate programs for university students in a range of programs including snow and avalanche studies, heritage preservation, GIS/GPS/Orienteering, and Outdoor Leadership; Integrated scientific database on all aspects of the San Juan Mountains; Facilitated opportunities for focused research; and packaged facilities and logistics management services for faculty and students.

MSI activities will “mine and mill” the region's historic, natural and cultural resources in a new way to produce unique research and educational opportunities to benefit kindergarten to university students and teachers, public land managers, the general public and the Silverton community.

In one project of particular interest to this study, the Mountain Institute is taking a lead role with six surrounding counties that comprise the “San Juan Focus Area,” the USEPA, the US Forest Service, and the Bureau of Land Management to assume responsibility as the repository for and caretaker of all land information, particularly that relating to mining activity.

For further information see <http://www.mountainstudies.org>

The following observations arise from our work on this portion of the project life cycle:

### **Engagement**

1. A central key to successful post-closure regeneration is the maintenance, on the part of implicated interests, of a sense of trust and respect towards the project. Some degree of ongoing engagement is therefore required. Key elements of this include:
  - Completion of a comprehensive mapping of interests;
  - Design and implementation of an appropriate engagement strategy,
  - Collaborative design and implementation of a dispute resolution mechanism,
  - Development of ongoing systems of reporting and verification, and
  - Assurance that adequate resources lie with all of the parties that must participate.
3. Best practices must incorporate cultural training and sensitivity in all project phases from exploration through to post-closure.
4. Best practices must recognize that there are vulnerable sub-groups within any community. Engagement with “officials” will be forthcoming but not with all elements of the community.
5. Socio-economic performance guidelines and checklists are significantly behind technical and environmental equivalents.
6. **Typical Practice:** There is a broad practice of asking what the community wants and after a “wish-list” is obtained, doling out portions of the wish list according to what works for the company budget. In contrast, an approach based on the question “how can we work together to make closure and post-closure a win-win situation?” is now emerging that changes the entire spirit of engagement from confrontation and negotiation to one of partnership. While leading companies are beginning to understand this, the majority of companies are not operating in this kind of new context.

### **Peoples’ Well-being**

6. This element draws on traditional socio-economic impact work as well as insight from worker health and local and regional population health studies. The principle challenge is to ensure a continuation of human and community well being that is consistent with the contribution of the project. Best practice elements include ensuring that:
  - Direct, indirect, and diffuse effects are considered;
  - All stresses imposed on people (workers and the general population) are considered;
  - The state of local infrastructure implicated by the project is addressed;
  - The distribution of costs, benefits, and risks associated with the project is addressed;
  - Responsibilities and sureties for ensuring short and long-term human well-being have been fully and fairly assigned and accepted (including those attached to company, community, government, and non-government organizations)

7. There is an absence of research needed to develop a real understanding of well being.
8. The idea of creating independent Foundations to manage the community-directed proceeds of mining projects over the long term appears to be gaining momentum.
9. **Typical practices** for closure planning see at least some attention paid to environmental concerns but little attention given to the human resource and labour issues (on- and off-site) until late in the mine life. This topic merits high priority for attention.

### Environmental Integrity

10. This aspect of practice draws insight from traditional environmental impact work and subsequent development of environmental management systems. It spans all of the interactions that take place between a project and the ecosystems in which it is hosted. Best practice elements include ensuring that:
  - All physical, chemical, and biological stress that occur have been addressed as well as all environmental costs, benefits, and risks; surface water, groundwater, land stability, biota;
  - A data/information system is in place to ensure that the best possible site understanding is being captured and built upon;
  - Ecosystem function, resilience, and self-organizing capacity will be maintained;
  - Responsibilities and sureties for ensuring both short- and long-term ecosystem well-being have been fully and fairly assigned and accepted;
  - Practices build upon insights from exploration through all phases of subsequent activity;
11. **Typical Practice:** Leading companies are now well into effective design and implementation for post-closure from an environmental perspective. However, much remains to be done in terms of transfer of knowledge and practice to others in the industry.

### Market Economy

12. In post closure, the mine itself is no longer generating income but costs remain related to long-term implications. The key then is to be setting aside resources along the way to cover these costs. If not, a serious shortfall occurs. Many historic and current examples exist that attest to such lack of forethought. The key to best practice is thus:
  - Ensuring complete post-closure costs are fully integrated into project economics from the start;
  - Ensuring that the financial sureties are in place to cover all post-closure implications;
  - Ensuring that the role played by the project in the community economy is fully accounted for and recognized by all interests.
  - Ensuring that the distribution of roles and responsibilities across company, government, and local community are well understood and accepted.
13. Best practices in terms of the specific instrument of financial surety (for example bonding, letters of credit etc.) vary significantly depending on site requirements and the size and strength of the company.

14. **Typical Practice:** Leading companies are now well into effective design and implementation for post-closure. However, much remains to be done in terms of transfer of knowledge and practice to others in the industry.

### **Non-Market Economy**

15. As with market activities, adjustments to non-market activities (traditional, faith-based, cultural, home support, volunteer etc.) that themselves have been changed as a result of the presence of mining activities must be prepared for long in advance of the post-closure phase. Key elements of best practice include:
- Being sensitive to the existence of non-market activities;
  - Working with the local community to ensure continuity of non-market activities through the post-closure phase in a way that is consistent with the goals and values of the community.
16. A greater appreciation of the significance of non-market activities needs to be integrated into best practices. Work scheduling needs to consider cultural issues.
17. **Typical Practice:** This is very new terrain for the industry in general and much remains to be learned and put into practice.

### **Governance**

18. This envelope includes both internal corporate governance as well as broader societal governance – the legislated rules, financial instruments, voluntary programs, and industry codes of practice that serve to control the conditions in which mining takes place. From the perspective of corporate governance of post-closure, sophisticated systems are now emerging to provide the organizational capacity to effectively manage closure. Legislated rules evolve and there is always a time lag between the evolution of society’s values, the resulting demands of society and any entrenchment in legislation.
19. Formal agreements between mines and implicated interests such as “impact and benefits agreements,” “good neighbour agreements,” or broad memorandums of agreement are increasingly common. In some jurisdictions they are becoming a formal requirement either because the local communities are insisting on them or because of legislation.
20. **Typical Practice:** From a corporate governance perspective, few in the mining industry have in place effective systems for addressing closure and post-closure management. From a societal governance perspective, the gap between what is needed and what exists is great.

### **Integration and Continuous Learning**

21. Research and development related to the technical and environmental issues of reclamation, closure, and post-closure have a significant history already. Research and development related to the social implications of closure and post-closure are in their earliest stages. This currently represents a significant gap.
22. While the concept of synthesis and continuous learning is entrenched in the total quality movement that swept the business world several decades ago, it has not caught on throughout the entire mining industry. The concept is straight forward and requires the development of a

mechanism to track conditions across all aspects of the project and feed the observations and learning back into decision-making not only within the company but also outside in the broader community. In the post-closure phase, with the changing responsibilities over time, responsibility for this practice first falls to the company but in time, would transfer over to some kind of non-company mechanism. In the ideal, a collaborative treatment of this responsibility would be established during the operations phase of the project life cycle. There is an opportunity here for the company to make great gains for itself while also making a significant contribution by working with the community to build a tracking and reporting mechanism that ultimately becomes self-sufficient.

23. **Typical Practice:** Corporate reporting systems are now emerging and the work of the Global Reporting Initiative is crystallizing ideas in this regard. There are few examples of effective corporate social record keeping. Few companies have a system of reporting and adaptive management that can support the kind of continuous learning that is needed.

## The Gap between Best and Typical Industry Practices

In spite of the leading examples that exist, a few of which are described in this section, there remains a significant gap between best and typical practice across the industry.

This last year's resurgence in exploration investment has brought many previous players back into the field that turned elsewhere when the financial going got rough. Many of these returnees have missed the debate about sustainable development that has ensued in the past several years. They have returned looking for "the way it was" and may serve to slow down or even reverse the improvements in practices that have been seen steadily over the past several decades. It is undeniable that the business case for non-sustainable development still drives a large part of the mining industry's practices and performance.

A best practices gap exists between North and Latin/South America. For example, in South America, typical engagement practice is to limit contact to the local authorities and the elite. The community is divided with money. Generally, there are few examples of relationship building and corporate social record-keeping that will allow companies to build upon their experience.

In Latin America, exploration groups in particular haven't come under pressure to perform from either an environmental or social perspective. There is little closure effort – sealing drill holes to protect ground water or on going monitoring, for example. There is a lack of know-how and a profound belief that exploration doesn't cause environmental damage. The development of performance criteria remains a real challenge. Some exploration groups sustain a "cowboy culture" that can remain separate and distinct from the corporate mainstream.

## Trends over Time

The operating environment has changed and there is no doubt that in general terms, environmental and social practices have “improved” over the past decade. However, less progress has been made on social issues than environmental issues and the emphasis is only recent.

The 1990s saw a swing away from legislated rules to voluntary programs. Now, there is an adjustment again going on based on a realization that a mix of legislated rules, financial incentives, and voluntary programs is needed. The exact mix will be specific to the implementing culture. However, the rules are essential to create a level playing field across the industry and to ensure participation of laggards. Financial incentives where they are applicable will always assist and for the leaders, voluntary programs is where their competitive advantage will continue to be found.

## Drivers

The following drivers are significant:

1. Investment practices remain the dominant driver in the world of mineral exploration and mining, and the requirements of the stock markets, securities commissions and the financial services industry including banks, insurance companies and investment houses are all important;
2. Industry peer pressure that is influenced by:
  - The examples set by the actions of and success achieved by leading companies;
  - Cross-industry attempts to improve practice
3. Public pressure for demonstrating environmental and social responsibility;
4. Continuing work of non-government organizations that bring bad-practices into the public spotlight;
5. Government regulation of investment, environmental, and social practices.

There are significant differences between North America and Latin America. In the U.S. and Canada, there is a fairly high level of assurance that mining projects will be designed and performed to minimize long-term, adverse impact. Further, a requirement for some degree of financial assurance for covering post-closure costs to be borne by the company is usually included within the terms of licensing. The form of the financial surety and its adequacy is still very much a topic of debate. In Latin America, the situation is much less advanced. In some cases, governments and financial institutions can work against sustainable practices in their efforts to attract exploration investment.

The market for mine products can also influence environmental and social performance. For example, the threat of imposition of non-tariff barriers by developed countries on countries like Chile is recognized by its mining industry. Chilean mining companies give much consideration to their international market as a driver of their environmental performance and the need to provide appropriate resources and due diligence. Europe’s concern for life cycle analysis requires environmental performance information from mining companies and this is communicated to the market.

#### **4. Progress Indicated, Major Issues, and Priorities for Action**

As a basis of analysis, this review has compiled some encouraging examples of best practices from within and around the periphery of the mining industry. As we gathered insights on best practices, we also sought general comments on: (1) typical practices; (2) peoples' sense of change over time; and (3) the nature of the gap between the best and the rest.

Perhaps the most significant conclusion that emerges is that together these examples show in poignant terms that on all fronts – technical, social, environmental, health and safety, cultural, economic – the knowledge currently exists to “do mining well” from any perspective. Further, the reach of these good practices is not limited to the resource-rich majors and global giants. Some of the best practices are being implemented by junior exploration groups and junior and intermediate producers. In short, “size” need not be an impediment to doing mining well.

As in any industry, across the mining industry it is possible to identify a hierarchy of companies in terms of leadership, innovation, and change (modified from Nitken and Powell, 1993):

##### **Leaders (10 % - 20 %)**

- **Leading edge companies** – early adapters and self-chosen leaders;
- **Vanguard of the rearguard**, cautious innovators that are preparing to move into best “sustainability” practices related to post-closure regeneration;
- **Corporate couch potatoes** – slow adapter companies that are watching the competition to see what transpires and positioning themselves to move quickly if the competitors move;

##### **Laggards (60% - 70%)**

- **Rearguard of the rearguard** – companies when asked if they are interested in these practices identify a multitude of reasons for not doing these things – for example that it is not practical, economical, possible, or in their best interests to do so;
- **Hostile avoiders** – companies that are active resisters and oppose the very idea of change at all.

In the case of the mining industry, the laggards can destroy much of the best effort of the leading companies. That is so because in public discourse regarding mining, everything is referenced to the lowest common denominator not the highest. Thus, if the gap between leaders and laggards is great, the entire industry is vulnerable.

And indeed, our sense and that of all whom we spoke with, is that while great strides have been made in the past decade, the gap between leaders and the norm remains far too wide for any complacency to be drawn from the examples described in Section 3. On the flip side of the story of the best practice examples, is the continuing reality of the vast gap between the companies that are committed to best practices – the leaders – and those who are doing the minimum – the laggards. This continuing gap is the greatest challenge facing the mining industry today related to post-closure practices. It points to the wisdom of the quiet, small-step-by-small-step approach of the Mining Association of Canada's Towards Sustainable Mining initiative. It also points to a key potential role for a Post-mining

Regeneration Centre should it be created at the Eden Project: reducing this gap through intra-industry knowledge sharing and capacity building.

Additional specifics comments on issues and priorities for action are summarized below:

### **Engagement**

1. A serious lack of capacity remains related to the design and implementation of effective engagement programs for all stages of the project life cycle. This capacity limitation applies not only to mining companies and their capacity to engage with others but also with regard to other interests' capacity to engage effectively with the industry.
2. A particular issue for the industry is the lack of capacity to effectively engage with indigenous people. The lack of sensitivity to indigenous peoples that is demonstrated by some elements of the mining industry is astounding. And often, it is subtle things that make the difference. For example, exploration companies typically enter traditional territory to look before asking – arguing that if they don't find, asking only raises expectations. Too often what happens is that if/when something is found (or if some environmental, cultural, or social issue arises) and well after the fact, contact is made with the indigenous people. Rather than being able to respectfully ask permission to be there, the explorationists then find themselves in the position of having to apologize for their presence or even ask forgiveness for a problem created. As a result, everything starts off on the wrong foot – a totally avoidable legacy that is remembered for years. The lack of inter-cultural communication skills is not surprising – there is not one university or training school that we are aware of that raises this issue as part of their curriculum. Another indigenous-related issue that many mining people are unaware of or insensitive to is the impact of projects on the internal culture of the indigenous communities caused by a split between those interested in embracing the wage economy and those wishing to maintain a strong traditional direction. Many mining people simply side with their “allies” and in the process further aggravate a difficult problem, something that will inevitably come back to haunt any project.

### **Peoples' Well-being**

3. Taking a perspective that mining can be a catalyst to generating well being for not only employees and shareholders/investors (but including them) but also for those living in the project's area of influence, is not on the radar of many in the mining industry except in the sense that money might buy well being. Often the prevailing attitude is one of doling out dollars to the extent required to pacify the locals and facilitate short-term approvals. It is not surprising that bitterness about an unfair distribution of costs, risks and benefits raises its head. How to most effectively address this topic without assuming responsibilities that clearly lie outside the sphere of an individual mining company is a high priority topic for research and action.

### **Environmental Integrity**

4. There is no question that the mining industry now has the technical capacity to not only minimize environmental harm but also to ensure that over the long term a positive contribution can be made to environmental integrity. There are priority research areas that include:



- Continuing work on ARD and Metal Leaching science and mitigation technology;
- A range of bio-monitoring and wildlife-monitoring issues;
- Development of data and information management systems;
- Site-specific revegetation practices;
- Closure planning and techniques for small and medium companies; and
- Developing a capacity for understanding cumulative implications (positive and negative) of all mining-related activities in the implicated ecosystem.

### **Market Economy**

5. Internal company economic systems are a forte of the industry. The weakness here is developing the capacity to effectively interact with the economic system active within the projects area of influence. Understanding how to do this in a way that is win-win is another priority area of concern. The issue includes such topics as training of both company personnel and local residents to facilitate effective sub-contracting, economic diversification and micro-enterprise and small-business development.

### **Non-market and Traditional Activities**

6. The lack of sensitivity to and capacity for dealing with non-market and traditional activities represents a significant gap in mining industry knowledge. Mining is not unique here, just more exposed because of the remote locations of most mines and the nature of their activities. Developing a capacity in this area is a significant priority.
7. Specific areas of concern include: developing guidelines on the use of traditional knowledge, developing a system of social performance indicators, gaining a capacity to define social well being within the context of any given site situation.
8. Most effort here is focused on traditional activities of indigenous people. In fact, a huge aspect of non-market activities relates to volunteer work (recreation, faith, education, professional development etc), housework, and other unpaid activities that are the backbone of most North American communities. These activities define the fabric and spirit of a community and without realizing it; most mining companies make a large contribution here and are not even aware of it.

### **Governance**

9. Corporate Governance. Much remains to be done to see the best practices now in place in leading companies reflected in the corporate governance structures across the industry. A significant issue here is the teaching of this topic in universities and colleges dealing with professionals who move into the mining industry.
10. Overall Societal Governance as it relates to Post-closure. This is a complex area and this review has not done justice to the topic. There are leading practices to draw on both in North and Latin America but the mechanisms to transfer the knowledge are not well developed. Of

particular concern is the issue of instruments of financial surety. This is a significant priority issue.

### **Continuous Learning and Adaptive Management**

11. **Research and Development.** Research on many of the technical/environmental issues such as ARD and metals leaching is being carried out by industry, university and government collaborators and these mechanisms should be encouraged to continue. There are some specific issues such as the use of native vegetation that may be usefully examined however effort would have to be put to learning what others are doing before decisions to proceed were taken. In fact, a significant contribution would be to work with others in a clearinghouse capacity to see that sharing of knowledge was being maximized. The same cannot be said for learning lessons on the social side. Here, much remains to be done and the kind of collaborative networks evident for treatment of the technical/environmental issues do not exist for the social issues.
12. **Tracking and Reporting Change Over Time.** The current work that is being undertaken between be the International Council for Mining and Metals and the Global Reporting Initiative should be actively supported. However, there are elements of it that will likely need refining over time, particularly on the social side of things. Further, there is a significant concern that in this effort, a capacity for synthesis and the feeding of insights into decision-making in a way that ensures maximum learning and adaptive management is lacking.
13. **Recognizing Good Work and Giving Credit where Credit is Due.** The various local, regional, and national awards that are given to recognize good work and give credit where credit is due are in need of an overall assessment to ensure that enough is being done in this regard. This issue is critically important for developing a degree of pride in the positive work that is taking place in the mining industry.

### **MMSD: Change Since; Significance Of**

One aspect of this review is to offer a comment on whether or not there has been a recognizable response by industry in the 18 months since the release of the MMSD recommendations. The answer is that it is too early to say. Change in any industry as complex and diverse as is mining industry will take time – certainly more than 18 months – and particularly given the fundamental nature of change that is suggested by the MMSD recommendations.

MMSD is significant because it marks a willingness of certain elements of the industry to engage, openly and comprehensively. However, MMSD should not be seen as reflecting some sort of epiphany. Rather it marks a small but important step in a continuing evolution of industry attitudes and values. This evolution can be traced back a century and more (see Smith, 1993, and MMSD North America, 2002).

This change in values within the industry in fact reflects a similar change across society. However, in the case of mining, in the last part of the 20<sup>th</sup> century a significant time lag developed that led to a kind of disconnect and loss of synchronicity between what society expected and what the mining industry thought necessary. MMSD was a remarkable attempt to re-find that synchronicity. However, both

those who suggest that as a result of MMSD change will quickly occur as well as those who expect change overnight, will be sorely disappointed.

## **Summary**

Overall, while much progress has been made, the whole concept of design, build, and operate for post-closure is recent and not yet deeply entrenched in the industry. As a result, much remains to be implemented in terms of ensuring effective post-mining regeneration. Currently, the industry remains exposed and vulnerable in the face of increasing pressure from society to fully recognize and deal with significant environmental, social, and financial liabilities that until the past several decades were not of great concern to the industry.

### **5. Implications for the Eden Project Business Case**

One of the final recommendations of MMSD Global (MMSD Global, 2002; see also Appendix 3, this report) argues the need for:

*A Sustainable Development Support Facility to serve in a number of roles that might include a central clearing house on mining and sustainable development-related initiatives and information, an independent source of capacity building and advice to national governments; a supplement to governments on certain technical tasks such as inspections, a convener in the development of technical standards, provision of technical advice to companies and communities.*

Following the completion of MMSD, the World Bank put some effort into this idea but there has been no concrete action taken. The idea that has been proposed for the Eden Project with its focus on post-mining regeneration is a more streamlined and more effective subset of this idea than the original general concept contained in the MMSD-global recommendation. In fact by implementing the “smaller idea” and focusing on the closure, post-mining regeneration priority, it may well serve over a longer period of time to facilitate addressing the larger set of issues and concerns.

Based on work undertaken in this review, there is unqualified support for the proposed Eden Centre and an overall sense that contributing financial and human resources would be well worth the investment. There is also a sense that at this stage in the evolution of the industry and while there are many technical topics worthy of support related to post-closure regeneration, the highest priority for attention should be the “management” envelope of activities including:

- Change management that would see current best-practice knowledge and capacity distributed across the industry; and
- Engagement capacity that allows the industry and its communities of interest to apply best practice with shared commitment.

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## **Appendix 1.**

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## Appendix 2.

### Development of the Analytical Framework Used in this Study.

Over the past 30 years there has been a significant change in the mining industry's treatment of post closure. The evolution in thinking is summarized in Figure A-1 below. Into the 1960s, little thought was given to activities beyond the operational phase. In the 1970s and much driven by the world-wide rise in concern for the environment, the need for decommissioning and surface reclamation was recognized. However, it is only in the last five years that the breadth of the post-closure phase has come into the perspective of leaders in the industry.

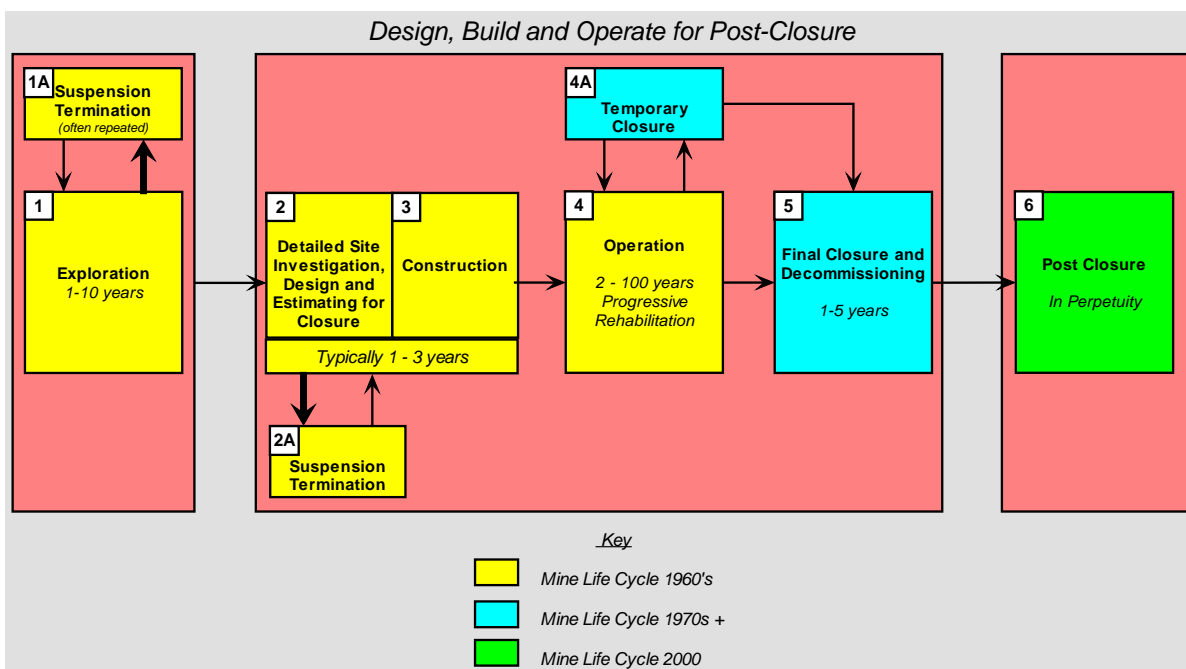


Figure A-1. The Full Mine-Project Life Cycle (modified from John Gadsby, 2001) . Up until the 1960s, little thought was given to activities beyond the operational phase; in the 1970s, the need for decommissioning and surface reclamation was recognized; only in the last few years has attention been given to the full range of human and ecological implications of the post closure period.

The transition described above has been much accelerated by at least five major factors:

1. Strengthened government post-closure-related regulations addressing: (a) post-closure planning; (b) requirements for financial surety to cover long term post-closure costs (mainly environmental to date but increasingly social as well); and (c) reporting of post-closure-related liabilities;

2. Changes in the attitudes and practices of the financial services industry regarding calculation of post mining liability stemming from both environmental and social conditions found in the aftermath of mining operations;
3. Enhanced capacity and influence of local communities on industry operations;
4. Continuing pressure on the industry from environmental and social-responsibility interest groups (local and globally linked) stemming from ongoing concerns they hold regarding industry practices; and
5. Response to the above four factors by industry leaders, which in turn has provided impetus for others in the industry to follow suit.

In responding to the resulting pressures and as illustrated in Figure A-1, industry best practices have progressively moved towards a full “design-for-post-closure” stance. This kind of stance is fundamental to practical application of sustainability ideas and the full suite of economic, social, cultural, and environmental considerations that require attention.

This review of post-mining regeneration-related best-practices draws on the above perspective. It is a perspective that has at its centre, a realization that effective post-mining regeneration practices must begin at the start of the entire mine-project life cycle and cannot await the decommissioning and post-closure phases of activity.

The concept of best-practices requires further elaboration. In this project, the assessment of “best” or “good” practice is interpreted as practice that meets or attempts to meet the “principles generated by MMSD.” However, underneath this general assessment criterion is significant complexity not only from a substantive perspective but also from where or how the signal of best practice is taken.

In particular, three points in a management system need consideration in terms of best practices:

1. Inputs – practices related to setting the best policies and committing the needed financial and human resources to policy implementation;
2. Outputs – practices related to following through and actually implementing in an effective and timely manner; and
3. Results – practices that reflect the achievement of the results that are sought.

Each of the above three are described below in Table A-1 in greater detail. In each case, the task of describing best practices is one of identifying (1) key competencies that are required, and (2) the current capacity to meet these requirements. Obviously this task requires applying judgment and what is considered “good” or “best” by someone, might be considered “indifferent” or “excessive” by another. It is for this reason that we engaged with a group of active practitioners drawn from a range of perspectives. At least within the range of limited resources available, a cursory review would be possible that involved a range of values and perspectives.

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Table A-1. Elements of a management system that need consideration in reviewing best practices.

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1. **inputs:** policies governing practices, resources (human, financial, technical) put to cause practices to occur. Examples might include:

- The creation of a sustainable development or even a post-closure regeneration policy,
- Resources put to creating a full sustainability management system (spanning environmental, social, cultural, and economic requirements) and within that a comprehensive sustainability data management system,
- Resources put to internal staff training related to post-closure requirements,
- Resources put to establishing effective relationships with implicated communities of interest,
- Resources put to research and development related to management systems, breakthrough technologies, and human resource capacity building.

2. **outputs:** the immediate outcome of an action. Examples might include:

- The successful implementation of a sustainability management system and within that a comprehensive sustainability data management system;
- The creation of financial instruments to cover long-term social and environmental liabilities related to post-closure regeneration,
- Staff and community competency levels achieved through training programs related to post-closure requirements,
- Successful completion of research and development programs aimed at technological improvements related to post-closure requirements,
- Continuing engagement program aimed at the full range of implicated communities of interest,

3. **results:** the longer term conditions that are achieved. Examples might include:

- Gains in company fundamentals as a result of implementing a sustainability management system: ease of access to capital, internal rate of return, shareholder satisfaction, investment attractiveness from an analysts point of view,
  - Healthy relationships with implicated communities of interest including those internal to the company (including employees, shareholders and investors), the rest of the industry (including organized labour, industry associations, other companies), the financial services industry, government (local, provincial/state, national) implicated indigenous people and communities, the academic support system, and non-government organizations);
  - Confidence and satisfaction with governing rules and institutions;
  - Robust social, cultural, economic and ecological conditions achieved.
-



In considering all three elements of Table A-1, a time sequence must be allowed for that recognizes that results follow from outputs, which in turn begin with inputs. This is a process that takes time. However, ultimately, it is the results achieved that really count, particularly from a general public or external perspective. Thus, while best practices related to inputs (which signal intentions) and outputs (which signal a short-term deliverable completed) are essential steps, it is only when these two components translate to results that public confidence will be forthcoming. These ideas, of course, are fundamental to concepts of quality control and continuous learning that drive, for example, the work of the International Standards Organization (e.g. ISO 9000 and ISO 14,001).

To develop a logical way to review best practices within the above time-frame context, a simple matrix was developed that links life cycle thinking on the horizontal axis with practice elements on the vertical axis. In this way, the general concept of “best practices” can be approached through a series of discrete and concrete elements.

For the life-cycle axis, and for ease of use, the 6-part project life cycle shown in Figure A-1 was reduced to three phases:

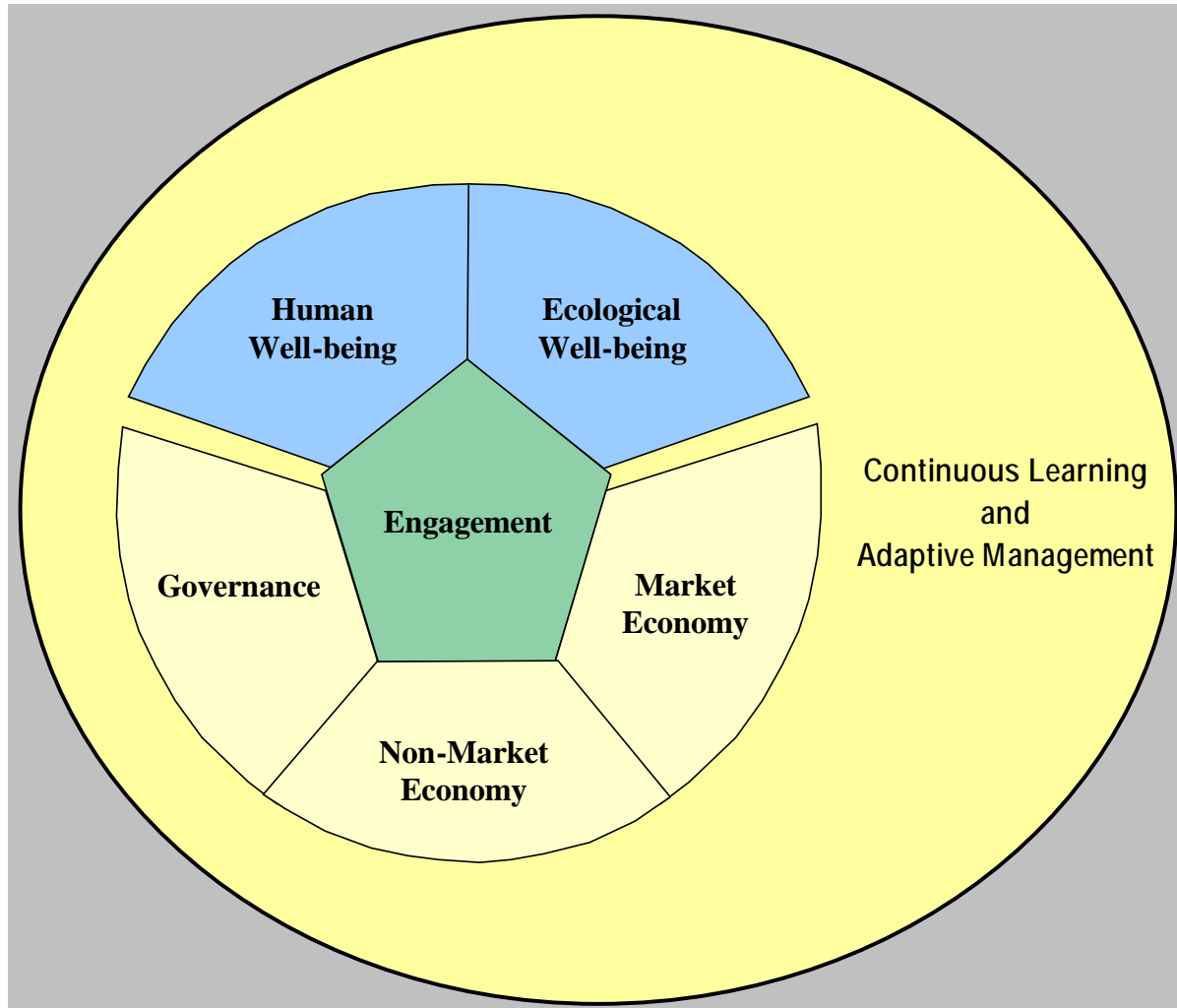
1. An early phase that spans exploration;
2. A middle phase that includes all activities that occur once a project implementation is approved and during which active design, building, and operating for post-closure takes or should take place (including detailed site investigation, design, estimating, construction, operation and decommissioning); and
3. The actual post-closure phase.

These groupings are highlighted with background shading in Figure A-1.

For the vertical, “practice element” axis, a body of work was used to guide thinking that was completed under the auspices of MMSD North America called the Seven Questions to Sustainability (7Qs). 7Qs is a robust framework for testing the compatibility of mine projects with practical application of sustainability concepts. It is an approach that:

- Un-bundles the social, economic, and environmental “pillars” of sustainable development in a practical way while remaining true to MMSD principles;
- Builds directly from leading company practices in applying sustainability principles including Rio Tinto’s U.S. Borax mine, Inco’s Voisey’s Bay experience, ALCAN, Placer Dome and Noranda’s early and continuing work in developing and implementing sustainable development policies and programs;
- Provides for flexibility in addressing the needs of all elements of the mining industry including juniors, intermediates, seniors, and global giants;
- Is applicable across the full range of commodities including base metals, precious metals, industrial minerals etc.;
- Captures the value base of sustainability concepts while respecting the physical, social, cultural, and institutional variation presented by any given project location; and
- Provides a comprehensive and logical way for addressing the topic areas listed in the terms of reference including socio-economics, land-use and revegetation, pollution control and other environmental issues, engineering, planning and process management, cultural, stakeholder involvement, financial and other aspects.

Seven Questions to Sustainability has now been translated into Spanish, particularly for application in South and Central America. Figure A-2 is a schematic of the 7Qs approach and Table A-2 provides a detailed listing of the Seven Questions template for use as a kind of background check list.



Source: modified from Ian Thomson, Personal Communication, 2003.

Figure A-2. The Seven Questions to Sustainability framework. Human well being and ecological integrity are the ultimate results to be achieved (and therefore assessed against for success). Activities of engagement, market economy (in this case the mine operation and related activities as well as the economy of the surrounding community/region), non-market activities and governance are all aspects of activity undertaken to achieve well being. Effort put to them represents inputs and the specific activities that result are outputs. In the ideal, all of these elements lie in a field of continuous learning and adaptive management.

Table A-2. Detailed questions and sub-elements of the Seven Questions Assessment Framework

<i>Question</i>	<i>Sub-elements</i>
<p>1. <b>Engagement.</b> Are processes of engagement committed to, designed, and implemented that:</p> <ul style="list-style-type: none"> <li>• ensure all affected communities of interest (including vulnerable or disadvantaged sub-populations by reason of, for example, minority status, gender, ethnicity, or poverty) have the opportunity to participate in the decisions that influence their own future; and</li> <li>• are understood, agreed upon by implicated communities of interest and consistent with the legal, institutional, and cultural characteristics of the community and country where the project is located?</li> </ul>	<p>1.1 Engagement processes 1.2 Dispute Resolution Mechanism 1.3 Reporting and Verification 1.4 Adequate Resources 1.5 Informed and Voluntary Consent</p>
<p>2. <b>People:</b> Will the project/operation lead directly or indirectly to maintenance of people’s well being (preferably an improvement):</p> <ul style="list-style-type: none"> <li>• during the life of the project or operation?</li> <li>• In post-closure?</li> </ul>	<p>2.1 Community Organizational Capacity 2.2 Social/Cultural Integrity 2.3 Worker and Population Health 2.4 Availability of Basic Infrastructure 2.5 Direct, Indirect and Induced Effects 2.6 Full Social/Cultural Costs, Benefits, Risks 2.7 Responsibilities and Sureties 2.8 Distribution of Costs, Benefits, and Risks 2.9 Social/Cultural Stress and Restoration</p>
<p>3. <b>Environment:</b> Will the project/operation lead directly or indirectly, to the maintenance or strengthening of the integrity of biophysical systems so that they can continue in post closure to provide the needed support for the well-being of people and other life forms?</p>	<p>3.1 Ecosystem Function, Resilience, and Self-organizing capacity 3.2 Ecological Entitlement 3.3 Full Ecosystem Costs, Benefits, Risks 3.4 Responsibilities and Sureties 3.5 Environmental Stress and Action to Ensure Ecosystem Integrity</p>
<p>4. <b>Economy:</b> Is the financial health of the project/operation assured and will the project or operation contribute (through planning, evaluation, decision-making and action) to the long-term viability of the local and regional economy in ways that will help ensure sufficiency for all and provide specific opportunities for the less advantaged?</p>	<p>4.1 Project or Operation Economics 4.2 Operational Efficiencies 4.3 Economic Contributions 4.4 Community/Regional Economies 4.5 Government and Broader Society Economies</p>
<p>5. <b>Traditional and Non-market Activities.</b> Will the project/operation contribute to the long-term viability of traditional and non-market activities in the implicated community and region?</p>	<p>5.1 Activity/Use levels 5.2 Traditional/Cultural Attributes</p>
<p>6. <b>Institutional Arrangements and Governance:</b> Are the institutional arrangements and systems of governance in place to provide a reasonable degree of confidence that the capacity to address project or operation consequences will continue to exist through the full life-cycle including post closure?</p>	<p>6.1 Efficiency and Effectiveness in the Mix of Legislated Rules, Voluntary Programs, Market Incentives, and Unspoken Cultural Norms 6.2 Capacity to Address Operational Consequences 6.3 Bridging to Post Closure Conditions 6.4 Overall Confidence that Commitments Made Will be Fulfilled</p>
<p>7. <b>Synthesis and Continuous Learning:</b> Has an overall evaluation been made and is a system in place for periodic evaluation based on:</p> <ul style="list-style-type: none"> <li>• Consideration of all reasonable alternative configurations and designs at the project level (including the no-go option in the initial evaluation)</li> <li>• Consideration of all reasonable alternatives at the overarching strategic level for supplying the commodity and the services it provides for meeting society’s needs</li> <li>• A synthesis of all the factors raised in this list of questions, leading to an overall judgment that the contribution to people and ecosystems will be net positive over the long term?</li> </ul>	<p>7.1 Project Level Alternatives 7.2 Strategic Level Alternatives 7.3 Overall Synthesis 7.4 Continuous Learning and Improvement</p>

In this exercise, the elements of Table A-2 were used as a checklist of elements to consider. Also the 7Qs questions were modified as shown below in Table A-3 to focus on post-mining regeneration-related practices throughout the full mine project life cycle.

Table A-3. The 7Qs assessment template modified for application in assessing best practices related to post-mining regeneration.

Elements of Practice Aimed at Achieving:	Assessment Question
1. Effective Engagement	Are engagement processes in place and working to establish the needed foundation for successful post-mining regeneration?
2. Peoples' Well-being	Will people's well being be maintained or improved now and throughout the post-mining phase?
3. Environment Integrity	Is the integrity of the environment assured over the long term?
4. Robust Economic Activities	Is project economic viability assured and will the economy of the community and region be better off as a result throughout the entire post-mining phase?
5. Enhanced Non-market Activities	Are non-market (traditional, cultural, home support, volunteer etc.) activities better off as a result?
6. Effective and Trusted Institutions and Governance	Are rules, incentives, programs and capacities in place to address project consequences both in the immediate and over the long term?
7. Effective Integration, Synthesis Continuous Learning, and Adaptation	Does a full synthesis show that the net result will be positive on the long term; is there periodic reassessment to provide a means of continuous learning and adaptation?

Table A-4 is the resulting template that was used for guiding this review of best practices. For each element of the matrix, an attempt was made to describe:

1. Current “best” practice giving concrete examples where possible;
2. General impressions about “typical” practices and the gap between what is now typical and the best practices;
3. Identifiable trends in the industry over time; and
4. Drivers of change.

Table A-4. Template used to guide the review of best practices.

Practices Aimed Achieving:	1. Exploration	2. Design, build, and Operate for Post-Closure <ul style="list-style-type: none"> <li>➤ Investigating, Design, and Estimating</li> <li>➤ Construction</li> <li>➤ Operation</li> <li>➤ Temporary Closure</li> <li>➤ Final Closure</li> <li>➤ Decommissioning</li> </ul>	3. Post Closure
<b>1. Effective Engagement:</b> <i>Are engagement processes in place and working to establish the needed foundation for successful post-mining regeneration?</i>			
<b>2. Peoples' Well-being:</b> <i>Will people's well being be maintained or improved now and throughout the post-mining phase?</i>			
<b>3. Environmental Integrity:</b> <i>Is the integrity of the environment assured over the long term?</i>			
<b>4. Robust Economic Activities:</b> <i>Is project economic viability assured and will the economy of the community and region be better off as a result throughout the entire post-mining phase?</i>			
<b>5. Enhanced Non-market Activities:</b> <i>Are non-market (traditional, cultural, home support, volunteer etc.) activities better off as a result?</i>			
<b>6. Effective and Trusted Governance:</b> <i>Are rules, incentives, programs and capacities in place (corporate, community, government) to address project consequences both in the immediate and over the long term?</i>			
<b>7. Integration, Synthesis, Continuous Learning and Adaptation:</b> <i>Does a full synthesis show that the net result will be positive on the long term; is there periodic reassessment to provide a means of continuous learning and adaptation?</i>			

## Appendix 3.

### Summary of MMSD Recommendations: Global and North America

Elements with potential implications for post-mining regeneration are highlighted.

#### 1. From MMSD Global

##### Major Category 1. Increase Understanding of Sustainable Development

- **Education.** Sustainable development concepts should be integrated into the curricula for mineral professionals – at formal institutions and through professional development short courses; Donors should insist on this emphasis.
- **Research on priority areas.** Policies for transparency and rigour of research should be established for all research projects; multi-interest mechanisms to set research priorities should be used more often; the business case for recycling of metals and minerals and the implications of mineral development on community health should be given priority attention; **integrative, cross-disciplinary research should be encouraged**; international links should be cultivated
- **Development of practical tools.** An emphasis should be put on practical tools; industry needs should be surveyed; tools for enhancing government decision-making should be surveyed.
- **Improving professional practice and knowledge.** A series of meetings to examine priority issues facing labour and different disciplines working to apply principles of sustainable development should be convened at international, national, and local levels.

##### Major Category 2. Create Organizational-level Policies and Management Systems for Implementing the Principles of Sustainable Development

- **Organizational level sustainable development policies and appropriate management systems** should be established for all organizations: companies, labour organizations, governments, NGOs, and international organizations

##### Major Category 3. Collaborate With Others With Common Interest to Take Joint Steps Towards Sustainable Development

- **Collaborative mechanisms** bringing together groups of actors should be used to:
  - Review and formulate sustainable development policies
  - Share information and capacity building
  - Establish stronger networks for artisanal and small scale miners
  - Establish stronger networks for communities
  - Consider the establishment of an international indigenous peoples organization focused on mining

- Develop and agree on norms and principles that could include non-binding statements, conditions of membership, codes or protocols that verify performance through third-party audits
- Industry should adopt a **Global Declaration on Sustainable Development** and establishing a **Sustainable Development Protocol** to support its commitment. A three-phase development process is suggested.
- National and regional **Industry Codes of Conduct** related to sustainable development should be established
- Regional (e.g. southern Africa, the Americas) **Statements of Sustainable Development Principles** by governments should be considered
- Non-government organizations should consider adopting minerals-related **Statements of Principles**
- A collaboratively supported international **Emergency Response Facility** should be established.

#### **Major Category 4. Increase the Ability to Work Towards Sustainable Development at the local, national, and global levels**

- **Local level.** Where a local community is affected by mineral development, the following should be established:
  - A shared Community Development Vision including how the costs and benefits of any mineral activity are apportioned, how decisions are taken, and who comprises the “community.”
  - Programs for continuous engagement
  - Integrated Impact Assessment (IIA) that considers all of the economic, environmental and social implications
  - Community Sustainable Development Plan (CSDP)
  - Integrated Planning for Closure
  - Supportive labour-management agreements
  - Dispute Resolution Mechanisms
  - In relevant situations, mechanisms for cooperation between large companies and artisanal/small-scale miners
- **National level.** The following should be addressed at the national level:
  - Legislation that gives interested parties the legal right to access to information as well as the support infrastructure that makes information accessible
  - Continued regulatory reform to support public participation and access to information
  - Clear rules for access to and use of land and clear and fair processes for their application;
  - Resolution of indigenous land claims; clear definition of the extent of indigenous territories; maintenance by companies and government of the principle of prior informed consent
  - A framework that can be used to maximize and sustain the benefits of mineral development through a distribution of costs, benefits, and risks that is fair and acceptable; international organizations should continue to promote dialogue on the wealth distribution issue
  - An appropriate, transparent, consistent policy and regulatory framework that focuses on both the facilitation and management of artisanal and small-scale mining
  - A collaboratively-built framework for community development that includes a coordinated legal and institutional framework to incorporate integrated impact assessment (including clear quality standards), Community Sustainable Development Plans, integrated closure planning (including the complete range of environmental and social issues), and a clear assignment of responsibilities among agencies
  - Legislation addressing mining-induced displacement and re-settlement

- Concerted effort to combat corruption including legislation that enshrines the anti-corruption convention of the Organization for Economic Co-operation and Development
- Adoption of the practice of more open publication of basic information about how much wealth is generated from projects, the amount of revenue received by government departments, and how that money has been spent; industry should consider establishing an international and public register of all payments by mining companies to governments at all levels
- Requirements for regular independent audits of tailings storage facilities; guidelines for evaluating different disposal methods on a case-by-case basis with a clear value in the short term of the need to avoid riverine disposal; standards for baseline data and analysis addressing such specific issues as acid drainage assessment, closure planning, and water quality; effective communication of the results, and integrating into decision-making processes from exploration through closure.
- An international review of national government capacity to address sustainable development issues
- Promotion by national governments of labour-management agreements in support of sustainable development
- Active involvement of national governments as facilitator of multi-interest discussions on policy and change

➤ **Global level.** The following should be addressed at the global level:

- An effective and broadly accepted complaints and dispute resolution mechanism
- Further development of the stewardship concept through a *Product Stewardship Initiative* that promotes greater exchange of information and integration of views with the industry's principle customers, intermediary processors, recyclers, and others
- A Sustainable Development Support Facility to serve in a number of roles that might include a central clearing house on mining and sustainable development-related initiatives and information, an independent source of capacity building and advice to national governments; a supplement to governments on certain technical tasks such as inspections, a convener in the development of technical standards, provision of technical advice to companies and communities.
- Development of a harmonized system of reporting guidelines covering the sustainable development performance of companies and projects
- A collaborative, multi-interest Protected Areas and Mining Initiative that works towards resolution of issues related to protected areas and mining
- A collaborative, multi-interest Minerals Legacy Initiative that addresses the issue of abandoned and orphaned sites starting with a full-scale feasibility study
- The convening by the World Bank and world's mines ministers of an international dialogue, starting with a high-level conference, on how best to achieve financial surety of mining/mineral projects
- Development of a global-level agreement between labour federations representing workers in the minerals sector and international organizations representing companies aimed at achieving broad cooperation in support of sustainable development
- A periodic Forum on Mining Minerals and Sustainable Development that would assist in establishing priorities for action by all players, suggesting process guidelines for governing issue-specific initiatives, and endorsing the processes and results of work on priority issues



## **2. From MMSD North America**

### **The Legacy Issue**

#### *Immediate Priority*

1. Enhance effort to address the legacy of past mining and mineral activities.

#### *Longer Term*

2. Strengthen the basket of legislated rules, market incentives, and voluntary programs to prevent the same from happening in the future.

### **Improving Practices**

#### *Immediate Priorities*

3. Initiate a series of pilot tests as the next step in the collaborative development of the Seven Questions to Sustainability Framework.
4. Design and implement effective approaches for rewarding good and discouraging bad performance within the context of sustainability as indicated by the Seven Questions framework.
5. Design and implement a set of effective dispute resolution mechanisms tailored for application across the full life cycle of mining and mineral projects.
6. Review and optimize the rules and systems for designating and controlling recyclable material and hazardous waste to encourage recycling while maintaining safety.
7. Develop and implement a practical approach to addressing the equity issue at the project/operational level.

#### *Longer Term*

8. Initiate a review of the current financial - business - economic decision support model and the processes used in its application in the mining and minerals industry to identify how ecological and social costs, benefits, and risks can be more effectively incorporated than at present.

### **Enhancing Capacity**

9. Strengthen the learning and research/development system in support of the North American mining and minerals industry to avoid serious human resource problems within the next decade.

### **Monitoring and Reporting on Follow-up**

10. Create a mechanism to facilitate follow-up activities and report on MMSD North America outcomes, 2002 – 2007.