ABSTRACT

British Columbia's reclamation legislation has been in place since it was first enacted in 1969, when existing mining legislation was amended, requiring reclamation for major coal mines and hardrock mineral mines. As part of British Columbia's commitment to improving its investment climate, all ministries have been asked to develop standards that are clear and results-based. Standards for mine reclamation are currently set out in Part 10 of the Health, Safety and Reclamation Code for Mines in British Columbia (Code). These standards define mine reclamation and include provision for returning the land and watercourses to a productive land use, ensuring that impoundment structures and waste rock dumps are stable over the long-term, and ensuring that water quality released from a minesite is of an acceptable standard. The reclamation standards are, in many respects, already results-based and the issue is how to improve the existing system rather than implementing an entirely new system. Currently, an internal-to-government Code Review has commenced and will conclude its work by the 2003 spring session of the Legislature. This paper will review the history of reclamation regulations, explore the implications of results-based reclamation standards, and discuss possible directions for regulatory reform.

INTRODUCTION

Mining is British Columbia's second largest industry and a major contributor to the provincial economy. Although mining has always been a highly valued use of the Province's land base, the number of operating coal and metal mines has steadily declined. The Province is viewed by some as a poor place to invest mining dollars. Reasons cited for the decline in mining investment in British Columbia include land use uncertainty, First Nations conflicts, non-competitive tax regime, restrictive energy policies, security of mineral tenure, and environmental and regulatory issues.
The Government of British Columbia is committed to improving the Province's investment climate and has taken a number of steps to address these issues. On the environmental and regulatory side, Government has set a goal of reducing red tape, and has requested all ministries to reduce legislation and regulation by a minimum of 30 percent. In addition, Government has asked that all regulations be reviewed and standards developed that are clear and results-based. Government remains committed to preserving high environmental and safety standards, while reducing the size of the public service.

This paper will review the history of reclamation regulations, explore the implications of results-based reclamation standards, and discuss possible directions for regulatory reform.

CURRENT RECLAMATION LEGISLATION

Reclamation legislation was first enacted in 1969, when existing mining legislation was amended, requiring reclamation for major coal mines and hardrock mineral mines. In 1973, legislation was amended to include coal exploration, mineral exploration, sand and gravel pits, and quarries. In 1984, the Minister of Energy, Mines and Petroleum Resources published reclamation guidelines. The Mines Act remained relatively unchanged until it was amended in 1990, when reclamation standards were adopted as part of the "Health, Safety and Reclamation Code for Mines in British Columbia" (HSR Code). Some minor amendments to the Mines Act and HSR Code were made in 1997, which continue to provide the framework for reclamation legislation and policy.

The Permitting System

In order to mine in British Columbia, you are required to apply for and receive a permit under the Mines Act. The permitting system itself has remained relatively unchanged since 1969, and provides for the following:

- A Mine Plan and Reclamation Report - to be submitted prior to commencement of operations, it outlines a program for the protection and reclamation of the land and watercourses potentially affected by the mine. In recent years, the report has focussed on the prediction and prevention of metal leaching and acid rock drainage.
• Publication of a Notice of Filing in the British Columbia Gazette and Local Newspapers - this is a requirement for major mines and, depending on the level of public concern, can be required for sand and gravel pits, exploration activities or placer mines.

• Report Review - by an inter-agency committee of Government. Coordinated by the Victoria-based Reclamation Advisory Committee, the Regional Mine Development Review Committees provide detailed technical review.

• Reclamation Security - reclamation securities are usually required as a condition of all Mines Act permits. Over the last decade, reclamation security bonds have increased for many mines, as permits have been revised or renewed. This policy reflects Government's desire to reduce the possibility that public funds are required to reclaim outstanding obligations on each minesite. Reclamation security deposits increased from $18 million in 1984 to over $197 million by March 31, 2002. Acceptable forms of security include term deposits, GICs, bonds of not longer than three year's duration guaranteed by the Government of Canada or a province of Canada (all of which are held by a bank using a Safekeeping Agreement), cash, an irrevocable letter of credit and, in some circumstances, surety bonds. The Mines Act also makes provision for a mine-specific reclamation fund which enables companies to set aside money now for obligations which are being incurred (such as acid mine drainage) that will require funds to be expended at some future date.

• Permit - a permit is issued with special terms and conditions based upon recommendations from the Reclamation Advisory Committee, as well as public response.

• Continual and Progressive Reclamation - is required, where practicable, over the life of the mine, including an annual submission of a report describing the progress of the mine plan, the management of metal leaching and acid rock drainage issues, and the reclamation program.

• Confiscation - where there is non-compliance with conditions of the Reclamation Permit, the Chief Inspector of Mines may order closure of the mine and forfeiture of the security, and use the security to perform the required reclamation.
The Technical and Research Committee on Reclamation

- Permit Amendment - like many other approvals, permits often require updating. The company's proposed mine plan and reclamation plan may change due to economic, geological or environmental factors. Thus, the Ministry of Energy and Mines regularly reviews reclamation programs and modifies permit conditions and security levels where necessary.

For major mines, the Province reviews projects under the Environmental Assessment Process. The existing process was established under the Environmental Assessment Act (EA Act) in 1995. The EA Act has recently gone through a number of revisions, and a revised EA Act was given Government consent during the 2002 spring session of the Legislature. Under the amended EA Act, large mines and major modifications to mines are still required to be approved; however, the approval will now require the concurrence of three ministers: the Minister of Energy and Mines, the Minister of Sustainable Resource Management, and the Minister of Water, Land and Air Protection. The changes to the Environmental Assessment Process will be the topic of another paper at this symposium.

Reclamation Standards

Standards for mine reclamation are described in Part 10 of the HSR Code. These standards define mine reclamation and include provision for returning the land and watercourses to a productive land use, and ensuring that impoundment structures and waste rock dumps are stable over the long-term, and that water quality released from a minesite is of an acceptable standard. In addition, mineral exploration standards are outlined in the Mineral Exploration Code, in Part 11 of the HSR Code.

Although the Mines Act itself has remained constant during the 1990s, there have been a number of significant guideline and policy initiatives that have been developed and are complimentary to the legislation. Some of these include:


The Ministry of Energy and Mines' philosophy has been to set broad reclamation standards which allow each company to develop their own program on a site-by-site basis. The standards set out in the Mines Act and accompanying HSR Code maintain this philosophy. They were produced following considerable discussion with industry and other Government agencies.

The HSR Code sets out general Reclamation Standards and gives individual companies substantial freedom to achieve these standards in the most efficient way possible. It requires that the owner reclaim the land and watercourses to an "acceptable use, that considers previous and potential use".

The HSR Code sets the standard for productivity to be achieved on reclaimed land, which "shall not be less than existed prior to mining on an average property basis unless the owner, agent, or manager can provide evidence which demonstrates to the satisfaction of the chief inspector the impracticality of doing so".

The Reclamation Standards also set out broad requirements for watercourses, long-term stability, revegetation to a self-sustaining state using appropriate species, retention and use of surficial soil material where necessary, and removal of machinery, structures and equipment. There are also broad requirements for metal uptake in vegetation, metal leaching and acid rock drainage, and disposal of toxic chemicals and reagents.

As well as setting out these broad requirements, the HSR Code is also more specific about waste dumps, tailings ponds, open pits and roads. Waste dumps, for example, must be reclaimed to ensure long-term stability, long-term erosion control, water quality released from waste rock dumps to the receiving environment is of a standard acceptable to the inspector, and land use and productivity objectives are achieved.
RESULTS-BASED STANDARDS

The incentive for Government to establish a results-based system was largely initiated out of the desire to rewrite the Forest Practices Code. The Forest Practices Code, as well as many other statutes, had established a regulatory system in British Columbia that had became very complex, bureaucratic, prescriptive, expensive to both the public and private sectors and, as a result, stifled innovation.

The mining industry also had concerns. The imposition of the Contaminated Sites Regulations in 1997 resulted in two authorities responsible for reclamation of a mine. This overlap was corrected during the 2002 spring session of the Legislature with amendments to the *Waste Management Act*. The result is that the *Mines Act* remains primarily responsible for approving work, environmental protection and reclamation on minesites, while the *Waste Management Act* regulates emissions and discharges from minesites. Contaminated Sites provisions now only apply to process chemicals and hydrocarbons.

The theory of a results-based system is to set up a series of standards that are clear, measurable, auditable and enforceable. They must be designed to impose greater responsibility and accountability for delivery of required results. They will rely to a greater degree on professional conduct of registered professionals who, by their codes of practice and ethics, will be obliged to undertake due diligence. This reliance on professionals is expected to reduce the number of plans that must be reviewed and approved by Government.

The reclamation provisions of the *Mines Act* and the HSR Code are, in many respects, already results-based. The issue is how to improve the existing system rather than implementing an entirely new system. The present system relies on good baseline information, sound operational design and management, and the knowledge, expertise and resources to carry out the program. However, problems occur when any of these factors are absent. When this happens, the reclamation program usually suffers and Government must often act as the consultant. Also, when a company fails to perform, the onus of proof usually falls to Government.

Currently, an internal to Government HSR Code Review has commenced. The full HSR Code Review Committee is expected to begin work on Code revisions during September 2002. This Committee consists of three members from the mining industry, three members from mining unions, and the Chief Inspector of Mines. The goal is to amend the *Mines Act* and HSR Code in the spring of 2003.
Some of the major issues and problems that will need to be discussed and addressed during the HSR Code Review are noted below.

**Small Mines**

A results-based system should work well for large mines possessing good expertise or the ability to access experts from the consulting community. However, a results-based system is likely to be more problematic for small mines that cannot presently finance external expertise. Ministry of Energy and Mines staff currently spend considerable time reviewing poorly prepared plans and doing what amounts to free consulting. With a reduced staffing complement in the Ministry, Government will require significantly more credentials-based reporting, putting the responsibility more firmly on professional expertise as well as mine management, who will be responsible for ensuring that designs and recommendations are carried out.

**Clearly Defined Results**

A results-based system works well when the results are clearly defined. For example, permitted discharge levels for effluent and air emissions set out in Waste Management Permits are clearly defined and measurable. The objective to prevent metal leaching and acid rock drainage can also be easily measured.

However, depending on the end land use objectives, a results-based system will be challenging to establish. For an end land use such as grazing land, it is relatively easy to establish forage and measure productivity. Forested land is more problematic, since long-term performance can be in doubt. For wildlife land uses, each individual target species may have vastly different ecological requirements and, for example, elk, moose, deer, bighorn sheep and mountain goat all have significantly different ecological niches.

**Productivity Measures**

Because productivity is not easily measured for a number of land uses, the Ministry of Energy and Mines is considering the adoption of capability measurements. Although productivity and capability are closely
related, capability measurements can be more readily described by physical characteristics including elevation, slope, aspect, soil materials and climate.

**Productivity and Major Changes of Land Use**

The HSR Code requires that the productivity of reclaimed land be equal to or greater than before mining on an average property basis. This works reasonably well if a mine restores the land to its original land use. However, there are several problems with this current requirement. For instance, the average property requirement means that if a component of land cannot be reclaimed (such as a pit wall), it may not be possible to attain the necessary productivity on the remaining reduced land mass to achieve pre-mining productivity levels. A similar problem exists when the proposed reclamation objective is not already present, or is only present at a very low level. For example, if the land use changes from a forest to a lake, and no waterfowl existed prior to mining, it will be difficult to establish a meaningful productivity (or capability) goal for waterfowl.

**Waste Rock Dumps**

Because of the general nature of our standards, the present system has not always worked well for reclamation of waste rock dumps. The high cost associated with recontouring waste rock dumps has led several companies to propose to reclaim them by using direct seeding, biosolids, placement of growth medium, chaining or by partial resloping. Most of these techniques have not fully achieved the provincial reclamation standards, and companies have often strongly resisted or have been unable to go back and complete the reclamation program.

The Ministry of Energy and Mines has been evaluating revegetation sustainability and productivity over the last 20 years at minesites in British Columbia. Field results show that the success rate of revegetating angle of repose dump faces is very low due to:

- difficulty in placing and evenly distributing growth medium on steep dump faces;
- difficulty in placing growth medium of a suitable depth for the rooting of vegetation;
- susceptibility of growth medium to erosion and runoff; and
- low field capacity (water retention) of growth medium due to moisture percolation (drainage), resulting in rapid wilting point conditions for vegetation.
There are a number of possible alternatives for regulating the construction and reclamation of waste rock dumps. These could include prescribing a maximum slope angle along with specified maximum distances for topographical breaks, or requiring reclamation plans to be prepared and signed off by a registered professional. Alternatively, the current standards could remain in place, but with specified design and construction standards to limit bench heights. This would make resloping less expensive in the event that the Permittee could not meet the standards without resloping.

**High Consequence of Failure**

A results-based system cannot be used where the consequence of failure is high. It would not be acceptable to society to allow a mine to be entirely responsible for worker health and safety, relying totally on accident frequencies and only taking action when an employee is killed or seriously injured. Society would also not accept a major failure of a tailings impoundment, or the release of significant metal leaching or acid rock drainage to the environment. In these cases, the regulatory system must impose suitable checks and balances prior to mine development and then, throughout the mine's life.

For tailings impoundments, the Ministry of Energy and Mines will likely still issue permits approving the location and design of the structure, but will take on more of an auditor's role. The detailed impoundment design and construction will be the responsibility of the mine manager, who will be required to employ a professional geotechnical engineer, who in turn will be responsible for ensuring that the impoundment is constructed to recognized design standards.

Similarly, our regulatory management of metal leaching and acid rock drainage will continue to be rigorous throughout the planning, operation and closure stages of mining. The Ministry will undoubtedly rely on certified practitioners to a greater extent, who will be responsible for the design and implementation of plans for prediction, prevention and mitigation. This will likely be costly for smaller mines; however, the Ministry will not have the resources to review every plan submitted.

**Exit Tickets**

No discussion of results-based reclamation standards would be complete without looking at the concept of exit tickets. Exit tickets would signal that mine closure and reclamation is complete, and that there are
no known existing or future liabilities. Over the next year, the Ministry of Energy and Mines will be fully examining this concept and will determine the conditions under which an exit ticket could be granted.

A number of issues will need to be fully considered. For example, an authority will need to be established to take on the responsibility for closed mines. This could be Government, a Crown corporation, commission, agency, or a private entity. Exit tickets will undoubtedly come at a cost to industry, and this money could be used to fund the authority into the future. Government also needs to determine what aspects of the mine could be given an exit ticket, whether or not the indemnity would be granted for other provincial legislation, such as the *Waste Management Act* in addition to the *Mines Act*, and whether the agency would be willing to take on the liability associated with long-term treatment of metal leaching and acid rock drainage.

**CONCLUSION**

Revision of the *Mines Act* and HSR Code will take place during the fall of 2002, in readiness for the 2003 spring session of the Legislature. The final authority for revisions to the *Mines Act* will be the Provincial Legislature. The responsibility for the HSR Code rests with the HSR Code Review Committee. It is hoped that much of the language for the new Code will be agreed to by consensus; however, if agreement cannot be reached, then wording will be decided by a majority vote of all seven members of the Code Committee. By the time this symposium is proceeding, the Code Committee will have commenced its review.