

THE CONCEPT OF CUSTODIAL TRANSFER OF MINED LAND

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ABSTRACT

Mining is a temporary use of the land. A mining company's interest in the land usually terminates with the implementation of the Closure Plan. The succeeding custodian's (and associated stakeholder's) interest is in the continued sustainable use of the land and commences only when the Closure Plan is completed. "Mine Closure Plans", while an advance on "Mine Abandonment Plans" suggest a short term planning perspective that appears shortsighted to the New Custodian. Periodic technical review and audit throughout a mine's life (feasibility, design, construction, operation and closure stages) will provide a basis for the rational planning, management and control of the site's long term needs and risks and development of an accepted Closure Plan. However, defects in the Plan, which may become apparent only after a time, become the liability of the New Custodian. Poor experience with the success of closure plans, as well as the recognition that many defects are not apparent (or not recognized) at the time of custodian transfer has resulted in reluctance by the New Custodians to accept transfer. This applies particularly to mine sites where significant risk of physical instability (tailings dams which could breach) or chemical instability (leaching of contaminants) could result in substantial liability. The potential for sustainable land use, including sustained revenue generation and sustained custodial care, becomes particularly important when the reclaimed mining lands require sustained or perpetual care and maintenance (active or passive). Custodial Transfer of land, post mining, requires an extension of the concept of "designing for closure", and the development of a Post Mining Sustainable Use Plan rather than a "Closure Plan". The mining industry can do much to limit the liabilities associated with operating a mine by actively participating in, or leading efforts to define the custodial transfer process, and by developing a sustainable post mining land use. "People do not plan to fail – they fail to plan". Planning initial mine development in a manner that fully considers final closure and post mining sustainable land use is an essential step in limiting future liability and in identifying the future custodian of the land. In so doing, the mining industry can also provide motivation and guidance to assist in the rationalization of the widely disbursed, largely uncoordinated administration and control of post mining sustainable land-use.

INTRODUCTION

We all share the same planet and benefit from the resources it provides us. As long as we continue to ride our bicycles and automobiles, listen to the radio or talk on the telephone, or require pace makers and dialysis machines, mining will

remain a strong global industry. The benefits, as well as the consequences of mining are very well understood. As an industry, we have learnt many lessons from past practices and have been evolving in our efforts to mine responsibly.

As a result of lessons learned, the regulatory goalposts and mining practices have shifted over time, primarily to ensure

past mistakes are not repeated. Many of these goalposts have been created with a view that mined land must be returned to it's pre mining state when mining ceases. It is now becoming accepted that this requirement is often not realistic or achievable. Mining is for the most part an invasive and irreversible activity in which mountains are moved. This is not to say that the moved mountains need be any less beneficial to society. To

optimize this benefit, there needs to be a shift in thinking from the concept of 'Closure Planning' to that of 'Post Mining Sustainable Land Use Planning' and 'Custodial Transfer' of land after mining. The objective of this paper is to discuss this concept and present an approach for the development of a sustainable land use post mining. Definitions for the terms used in this paper are given in Table 1.

TERM	DEFINITION
Sustainable use	Use or uses which can be sustained indefinitely with the resources provided (including fiscal resources), or which can be generated by the use. Renewable resource uses (forestry, hydro power, commercial recreation etc.) are typical examples of uses that may be self funding sustainable uses. Subsidized (from a adequately sized trust fund) managed parkland or recreational use are examples of fiscally augmented but sustainable use.
Self sustainable use	Use which is sustained by natural processes and does not require actions by man. e.g. unmanaged wilderness or nature reserve use. (No maintenance required)
Passive care sustainable use	Use which requires infrequent, periodic and low effort action by man to maintain the sustainable use. e.g. rangeland use requires range land management. (Passive care and maintenance required)
Active care sustainable use	Use which requires frequent or continuous high level effort action by man to maintain the sustainable use. e.g. operation and maintenance of a water treatment plant to remove pollutants from a discharge. (Active maintenance required)
Undisturbed land	land materially unchanged by mans activity.
Disturbed land	land which has been disturbed by man to the extent that there is a material difference in the physical chemical or biological characteristics of the land. Disturbance may either improve or degrade land use. Cleared land, regraded land, land affected by a surface or groundwater pollution plume etc. are examples.
Developed land	land disturbed to achieve an alternative land use. The developed land may be either improved or degraded. Development of managed forests, agriculture, industrial facility etc. are examples.
Reclamation	actions intended to return the land surface to an equivalent undisturbed condition. Reclaimed land has achieved the desired conditions.
Remediation	actions intended to improve disturbed land to achieve a desired land use. Remediated land is disturbed land which has been developed to an alternative desired land use.
Project "initiation"	initiation of land disturbance; assumption of custodian liability for reclamation or remediation of the disturbed land by the current tenant.
Project "closure"	completion of all reclamation and remediation measures to the satisfaction of the succeeding custodian, and of the steward.
Custodian transfer	transfer of custodian responsibility to a new custodian willing to accept residual liability and responsibility for long-term management.
Deed of Custodial transfer	documentation that reclamation or remediation objectives have been met and custodial transfer has been accepted by the transferee from the transferor. 'The certificate'.
Abandonment	unilateral rejection of custodial responsibility for on-going reclamation or remediation. This could be voluntary or involuntary as in the case of bankruptcy.

Table 1. Definitions for terms used in this paper

CHANGING PERSPECTIVE

The mining company's interest at the end of a mine's life, is in responsible and cost effective closure of the mine. The succeeding custodian's (and associated stakeholders) interest is in the continued sustainable use of the land after mining, and their period of interest only starts when that for the mining company ends. The succeeding custodian and associated stakeholders therefore have incentive to become part of the decision making process (i.e. permitting etc.) prior to or during mining. As a result, it is in the mining company's best interest to make the most of their role in the Custodial Transfer process by actively participating or leading efforts to define the sustainable land use and succeeding custodian. In order to achieve this, there will likely need to be a change in thinking. These changes include the following concepts.

- Instead of developing 'Closure Plans' mining companies should be developing Post Mining Sustainable Land Use Plans". This plan would include all the mine closure and reclamation measures needed to establish the post mining land use. Land units would not necessarily need to be restored to their pre-mining state, but to a state that could be sustainable. Examples could include golf courses, forest, parks, museums, industrial sites waste depositories etc.
- Progressive reclamation and custodial transfer (progressive certification) is desired to establish procedures for custodial transfer and to reduce accumulated closure liabilities. This can best be accomplished by dividing the site into "Reclamation Units" and seeking successful reclamation and custodial transfer as each unit becomes available.
- It is often realistic to expect that nominal long-term maintenance will be required, 'post closure', at a mine site. Natural landscapes experience natural erosion and change but are 'meta-stable' under the long term action of the forces which have 'worn' them to their current shapes. Reclaimed landscapes will be subjected to the same forces, but the areas of erosive weakness (such as embankments and spillways) have not been tested or worn down to more stable profiles. Increased rates of erosion and potential 'failure' of weaker spots must be anticipated. Stability will be complicated by the need to ensure safe containment of some features for a long period of time (e.g. tailings deposits) and to keep newly established streams (diversions and spillways) from migrating away from the desired location. In addition, anthropogenic land-use (farming, commercial forests, recreational etc.) can adversely affect stability. It needs to be recognized that an entirely maintenance free and management free (at least passive management) landscape is often economically unattainable. However, very low levels of monitoring and maintenance may be achieved, placing little burden on the successor custodians.
- The 'moving goalposts' of stakeholder interests and requirements, regulatory criteria, requirements and retroactive standards, and of custodial transfer conditions, will result in long term changes in closure requirements. More specifically the 'view point' of the successor custodian, at the time of critical review of the liabilities of the land for which they are accepting custodianship, may differ materially from the view of the original mine permitting authority at the time of initial mine permitting, sometimes 10's of years earlier. The mining industry should position itself to "manage" these inevitable changes.
- Stabilization of closure requirements, and hence closure liability, can be achieved only by the establishment of a successor custodian that is capable of stabilizing the temporal demands and activism of the stakeholders. Mining companies can do much to identify and create this successor custodian, and the process by which closure plan acceptance criteria are varied with time.

"Mine Closure Plans", while an advance on "Mine Abandonment Plans" suggest a short term planning perspective. 'Design for Closure' still appears shortsighted to the new custodian whose period of custodianship commences only when the Closure Plan is completed. Defects in the Plan, which may become apparent only after a time, become the liability of the New Custodian. Poor experience with the success of closure plans, as well as the recognition that many defects are not apparent (or not recognized) at the time of custodian transfer has resulted in reluctance by the New Custodians to accept transfer. This applies particularly to mine sites where significant risk of physical instability (tailings dams which could breach) or chemical instability (leaching of contaminants) could result in substantial liability. As a result there are an increasing number of mine sites in Canada, the United States and internationally which remain under perpetual care while mining companies try to achieve reclamation standards and criteria which the skeptical 'New Custodian', often a government agency, is willing to accept. The development of a 'Post Mining Sustainable Use Plan' provides a more positive perspective for both planning and negotiations with the New Custodian and other stakeholders.

In Canada and parts of the US, much of the mine development has occurred on essentially undeveloped land. Prior to mining the land was essentially 'self sustaining' in that it required no intervention by man to maintain this use. There has been a tendency to require mining companies to return mine sites to this condition post closure (to reclaim lands to achieve a land use equivalent to or better than that which existed prior to mining). This cycle is illustrated in Figure 1a. If the land had been developed prior to mining then the options would include reclaiming to the prior usage, to either an alternative usage, or to self sustainable use, as illustrated in Figure 1b. A developed use may require either passive care, such as would apply to rangeland or forestry, or active care, as would apply to any industrial site.

Figure 2 provides an illustration of successive cyclic use of land and its reclamation. If, on completion of mining, the site can be returned (economically) to a self sustainable land use then the cycle illustrated for Active Developed Use 1 is achievable. If, on mine closure, it is found that passive or active care must be maintained then it may be necessary or appropriate to reclaim to an alternative developed land use such as illustrated for Active Development Use 2. Mining, since it depletes a finite resource is inherently a temporary use of the land. The alternative (active or passive) development may be sustainable over a much longer period if the activity involves renewable resources, such as a nature or recreational park, forestry or similar.

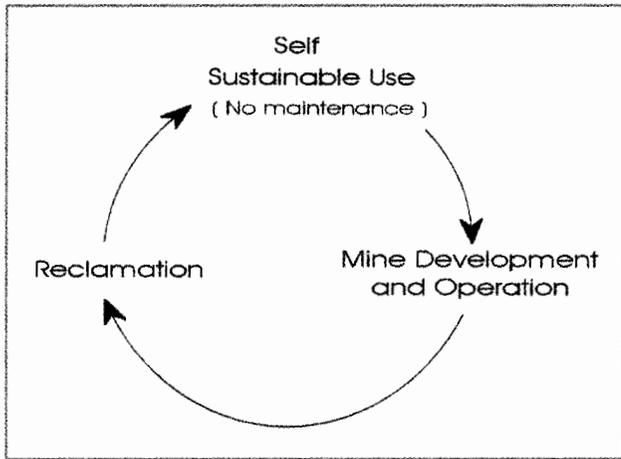


Figure 1a. Reclamation to self sustainable use.

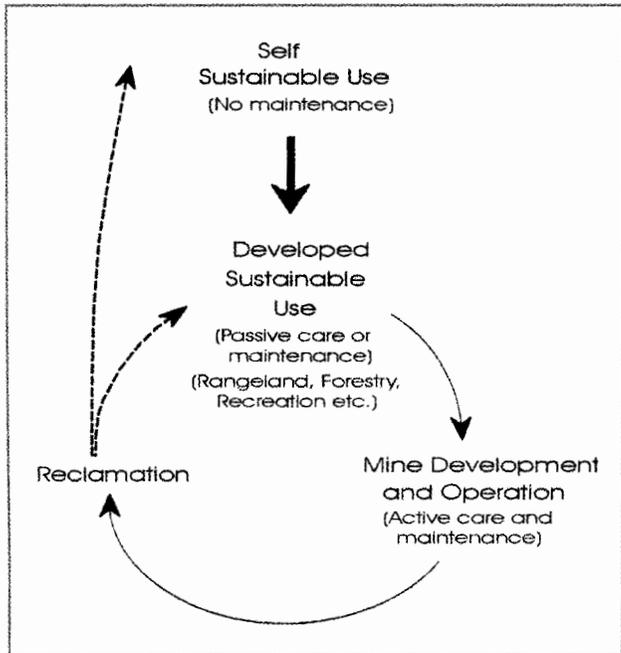


Figure 1b. Reclamation to a developed sustainable use.

The willingness of a New Custodian to undertake the responsibility of a reclaimed site, which requires continued interaction, will be much greater if the long term sustainability of the site under the alternative development can be demonstrated. If the alternative development is fiscally not of itself sustainable

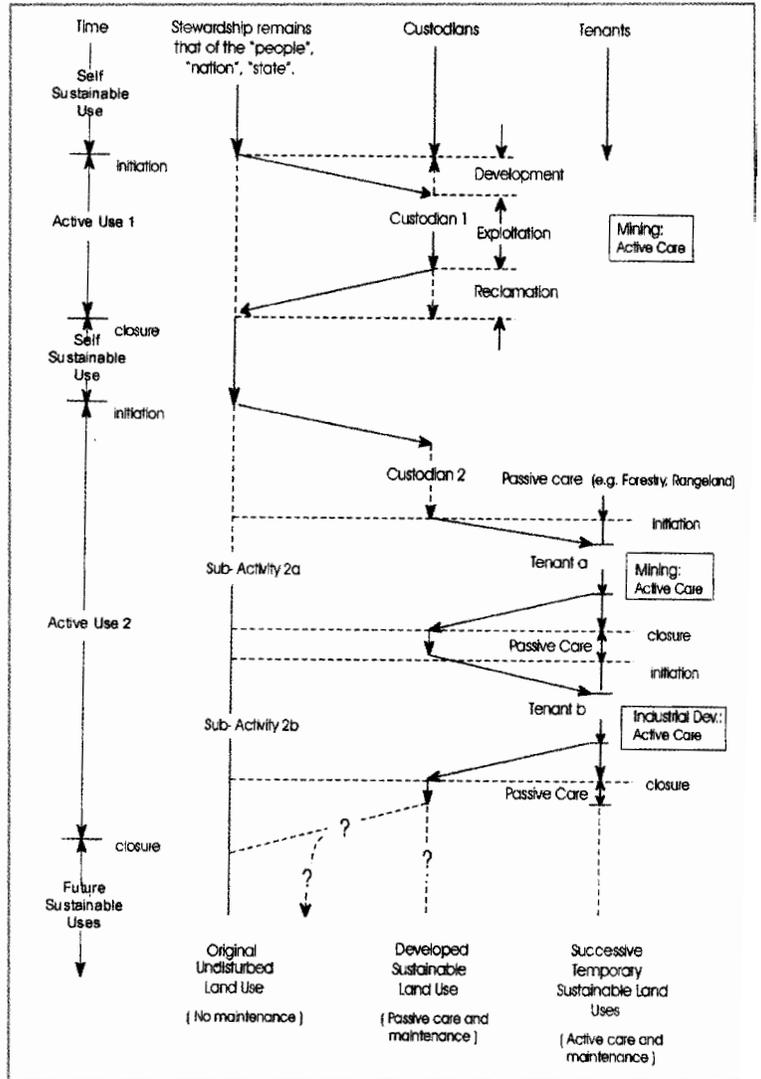


Figure 2. Land use and custodian succession.

then the development plan should include an appropriate endowment (trust fund) to finance continuing maintenance. The ultimate acceptance of a Post Mining Sustainable Use Plan may come more readily than for a Closure Plan, and the ultimate cost of long term interaction and/or custodial transfer terms may be significantly less if a suitable long term use plan can be demonstrated.

PROGRESSION OF A MINE'S LIFE: "FROM THE CRADLE TO THE AFTER-LIFE"

The development of a mine is progressive. As mining proceeds there is a cumulative impact resulting from the additional activities on the mine site. There may also be a progressive reduction of assimilative capacity on the site for the various impacts (e.g. contaminant plumes may migrate as the finite adsorption capacity of soils along the migration route is consumed), leading to additional, and possibly unacceptable, impacts. Experience at some large mines is that low level impacts, which may not be a concern during operation, may become chronic

and become large issues at, or post, closure. Mining companies must anticipate that such issues will emerge. The sooner these issues are identified in the mine's life, the greater the chance of minimizing the risk and impacts.

Figure 3 presents a picture of the successive activities and stages of a mine project's design, construction, operation and closure and the cycle of activities that take place at each stage. Those areas which a mining company is either required to or should be seeking input from stakeholders is highlighted and those stages in which a succeeding custodian should be identified and actively participating with the mining company in the process is also highlighted. The succeeding custodian should be identified as early as possible in the mine's life.

The mining process, from feasibility to permitting to operating and closure, has evolved so that today all stakeholders, including the proponent, regulatory agencies, community representatives and the succeeding custodian participate at various stages and in differing capacities. The various stakeholders are unequally affected by the range of positive and negative impacts associated with all aspects of mining projects, including location, design and management of mine waste. It is widely understood that mining in certain areas can result in long term and unforeseeable impacts. Making decisions, with all stakeholder concerns considered, considering all available designs and technologies to minimize these impacts is, to say the least,

difficult. The liabilities and economic and environmental consequences of making the wrong decisions can be extremely burdensome not only to the proponent but to society. It is therefore not surprising that the project approval and permitting process has evolved so that, today, all stakeholders, including the proponent, regulatory agencies and community representatives, participate in the project review process on many levels. This participation not only ensures that all concerns and issues are included in the decisions, but also provides a forum through which the mining company can educate and inform the stakeholders.

In order to minimize the various risks and liabilities a mining company faces, it is in the mining company's, as well as society's, best interest to consider all the impacts, both positive and negative as early in the process as possible and anticipate, to the degree possible, potential future liabilities and risks. This should involve, at least at a conceptual level, the development of potential post mining sustainable land use options at the feasibility stage of a mine's development. By so doing, the mining company can begin to identify post closure land use and hence potential succeeding custodians and seek their input. This will allow the mining company to gain the confidence of the succeeding custodian, and visa versa, and minimize the risks and liabilities that may be transferred with the land.

Progressive reclamation and custodial transfer, as reclamation units become available for reclamation, has the advantages that terminal closure liability is reduced, closure technology can be demonstrated and the potential of discovering 'hidden defects', prior to terminal closure, is increased. The risk to both the mining company and the successor custodian is reduced. Progressive reclamation and transfer provides a 'test' of the succeeding custodian's willingness to accept custodial responsibility and risk. If a successor custodian cannot be realized during the period when the mining company is operating (and is able to negotiate with economic and political strength) then the mining company's potential for negotiating conditions for transfer will reduce.

Financial assurance provisions for terminal and premature mine closure has become a standard for hard rock mines for most Canadian provinces and the United States of America. To provide the company owners with the technical and financial information they need to make such provisions, it is appropriate for the closure planning to also address premature closure liability.

ACHIEVING CUSTODIAL TRANSFER: THE COMPLEXITY PERSPECTIVE

The complexity of developing a Post Mining Sustainable Land Use and achieving Closure (i.e. successful, complete and irreversible custodial transfer) may be divided into two areas: Technical complexity and Procedural complexity.

Individual technical issues can generally be addressed as independent discreet problems and solved indivi-

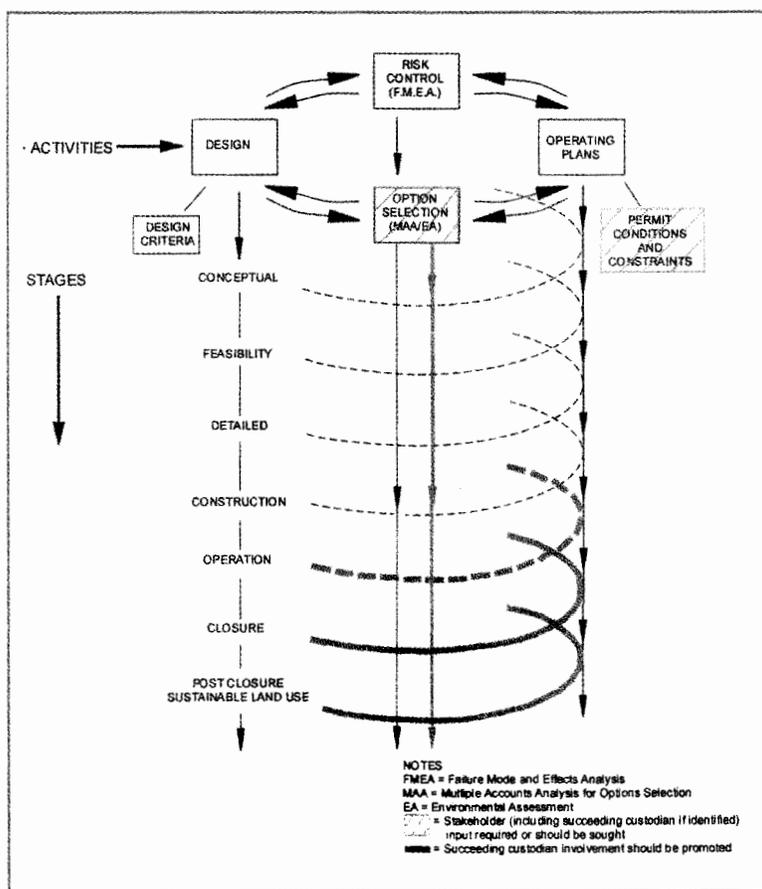


Figure 3. Successive Activities and Stages of Project Design, Construction, Operation and Closure.

dually. However, there is a need for a complete, technical understanding of overall long-term system performance. The natural processes of erosion, sedimentation, vegetation growth and blockage, biotic activity (beaver) and possibly glaciation (seasonal ice accumulation in drainages causing spring flow blockage) will complicate the performance of engineered structures such as dams, dykes, diversions etc. There are similar uncertainties about some of the low-level environmental impacts (such as salt and/or metal migration) on vegetation and aquatic biota. The development of such systems understanding is critical to the definition of the final closure measures, and the willingness of succeeding custodians to accept liability and responsibility at the time of custodial transfer.

Procedural complexity is more difficult to break into independent parts. There are key interdependent process components or steps from the perspective of a mine developer in terms of procedure in the custodial transfer and 'closure' process. The process is even more complex in certain areas when it is recognized that the ultimate closure criteria and custodial transfer mechanism will evolve as a result of the combined interaction of all mining companies and all stakeholders (other industry, regulators, activist groups, society etc.). The following steps are proposed in order to help achieve successful custodial transfer.

Establish project (Closure Plan) goals

The overriding goals for the closure plan development and implementation are:

- Operate in an economical, safe and responsible manner.
- Reclaim the landscape on an ongoing basis; progressive reclamation.
- Provide a landscape that will be physically and chemically sustainable for the long term.
- Provide a healthy sustainable ecosystem suited to an agreed land use.
- Achieve closure and custodial transfer in an economical, timely and secure manner.

Establish a procedure to screen options

Mining companies should review and formalize their approach to screening closure options. The screening process should involve:

- Knowledge of the relevant factors;
- Involve multi disciplinary input;
- Involve all stakeholders to identify option selection and design objective criteria (one methodology for achieving this is the Multiple Accounts Analysis as described by Robertson and Shaw, 1998);
- Address the full life cycle of all interacting components;
- Identify work and cost vs. time for each option;
- Have the ability to demonstrate viability, monitor (verify)

performance, take corrective action if necessary, and to achieve an early reclamation certificate;

- Include a probability and risk analysis;
 - * Of work to be performed,
 - * Of cost,
 - * Of probability of success.
- The methods, procedures, and criteria should be documented clearly and concisely to provide a 'transparent' view of the process to the stakeholders and concerned public.

Establish a closure path

Establish, early in the life of the project, the project closure path – knowing that it will be adjusted with time. To the maximum extent broaden the group that will establish this path to those likely to be involved in the final path definition (regulatory authorities and stakeholders) such that there is increased probability of the path being correct and durable.

Establish success indicators for closure and custodial transfer

Seek binding agreement with stakeholders and the final custodian on what will be considered success in closure.

Developers are entitled to know what the rules of the game are, use what political/financial leverage the operator has to have the rules defined and adhered to.

Establish economic evaluation tools

Standards exist for conducting normal economic evaluations. However, they do not exist for situations that involve potential environmental liabilities – especially if it is possible to defer corrective action for a decade or more. The operator should establish procedures to conduct economic evaluations of different reclamation/remediation options. The procedures should be shared with, and be vetted by, key stakeholders.

Realize Public Partnership

There needs to be a better understanding of how the public benefits from a profitable operation and why it is in the public interest to seek responsible and economical solutions for closure.

The public is a major benefactor from a profitable operation project. A large percentage of each profit dollar flows to the public (as company tax and through income tax). In a similar manner the public pays a large percentage of the cost of reclamation through foregone profits. It is very much in the public interest that the project be profitable and that it be operated and reclaimed in a manner that is responsible and economical.

Realization of the public partnership is needed to facilitate progress on other issues required to achieve satisfactory closure.

Identify the next Custodian and a Mechanism for custodial transfer of reclaimed land

The mechanism to transfer land ownership (and responsibility), when a site has been reclaimed, but will require perpetual care, is not always well defined. It should be. This may require that mining companies work actively with stakeholders to define the regional post mining land use as well as the custodian(s) that will manage that land use.

If necessary, establish an endowment for residual care

Perpetual care is one closure option. It may be the only option for some sites.

Economic evaluation should determine if it is the preferred option or not.

This cannot be done until the post mining land use, succeeding custodian and mechanism to establish an endowment to fund perpetual care is understood.

If the current laws discourage this option (e.g. by taxing money earned by the endowment) the problem should be identified and the laws changed.

Some stakeholders, mining company owners included, may insist that reclaimed land be maintenance free. Mining companies should be prepared to educate them about the impracticality and cost of the maintenance free option.

Establish a mechanism to identify and transfer residual assets and liabilities

There is a need to establish the "value" of any residual assets/liabilities.

- To identify requirements for financial assurance (to ensure that liabilities are addressed);
- To identify the asset value of a project. (when sold to a new owner – even during the operating phase);
- To identify funding needed to carry on perpetual maintenance. i.e. to establish sustainable land use.

An agreed upon mechanism should be established to identify and to transfer full custodian responsibility, including potential liabilities, to the succeeding custodian.

Establish a mechanism for independent technical review

Independent technical review and audit should be part of the entire mine development, operation and closure process

and would facilitate the acceptance of closure and custodial transfer. Key focus areas include:

- Adequacy of plans for closure and custodial transfer;
- Adequacy of success indicators;
- Appraising if conditions for satisfactory closure have been met;
- Identifying residual liabilities and plans to deal with them;
- Determining if economic evaluations of options are realistic;
- Establishing the "value" of residual liabilities;
- Establishing the amount that should be entered into an endowment fund to provide perpetual care – if needed;
- Determining that a property is ready for custodial transfer and that terms associated with it are reasonable;
- Suitability of plan to the objectives of the receiving custodian.

In the future, it may be difficult to achieve agreement on closure and custodial transfer without an independent review (audit), in the same manner as corporate financial auditors have become an essential component of corporate fiscal governance and assessment.

CONCLUSIONS

Custodial Transfer of land, post mining, requires an extension of the concept of "Closure Planning" with the development of a "Post Mining Sustainable Use Plan". The mining industry can do much to limit the liabilities associated with operating a mine by actively participating in, or leading efforts to, define the custodial transfer process at an early stage in the mine's life.

REFERENCES

- Robertson, A. MacG. and S.C. Shaw, 1998. Alternatives Analysis for Mine Development and Reclamation. Proceedings of the 22nd Annual BC Mine Reclamation Symposium, Penticton, BC. Canada, September 14-17, 1998, pp. 51-62.
- Robertson, A. MacG., D. Devenny and S. Shaw, 1998. Post Mining Sustainable Use Plans Vs. Closure Plans. In Mine Reclamation and Remediation, Proceedings of the Twenty-second Annual British Columbia Mine Reclamation Symposium, Penticton, B.C., Sept. 14-17, pp. 95-110.