BC Ministry of Energy and Mines

EY report & recommendations for BC's mine reclamation financial security policy

February 2017

Building a better working world

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Private and Confidential

Re: EY Report and Recommendations for BC's Mine Reclamation Financial Security Policy

Dear Mr. Foster and Mr. Amann-Blake:

We are pleased to present our Project Report that summarizes findings and provides recommendations for consideration related to the Mine Reclamation Financial Security Policy for the province of British Columbia ("BC").

This report represents the culmination of over three months of work to support BC in your aim to ensure a sound, transparent, and risk-based approach to financial security for mine reclamation. The process included extensive input from representatives of the BC provincial government and First Nations, as well as many other stakeholders and contributors that are closely connected to the mining sector. We appreciate the contributions provided by your staff and the other participants.

Overall, our work found that the Ministry has put in place a financial security program based on sound principles that include elements of a risk-based approach. The proposed approach and supporting policy components provided in this report are in large part based on the formalization of existing practices with certain key additions or modifications that we feel would enhance the program and allow you to better meet your dual objectives of appropriately managing risk for BC taxpayers while supporting a competitive mining sector in the province.

This report has been drafted for the information and use of the BC Ministry of Energy and Mines ("MEM") to assist it in the formalization of the Mine Reclamation Financial Security Policy. In the event that others read this report, we caution them that it may not be fit for their purpose and disclaim any responsibility to any party other than our client.

Very truly yours,

Ernst & Young LLP

Ernst & Young LLP
Per Bill Kessels, Partner

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Glossary of terms

Consequence - As defined in the Risk Management Guideline for the BC Public Sector, the severity of effect upon goals, objectives, or values.

Chief Inspector of Mines (Chief Inspector) – Appointed by the Minister of Energy and Mines to administer the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia, and is the statutory decision maker.

Financial security – The financial mechanism by which one party guarantees its performance to another party (such as a government).

Investment risk – The risk of financial loss on an investment relative to an anticipated rate of return.

Irrevocable standby letter of credit (ISLOC) – A guarantee of payment issued by a bank on behalf of a client that is used as "payment of last resort" should the client fail to fulfill a contractual commitment with a third party. Neither the bank granting it nor the letter holder may cancel under the ISLOC in any circumstances.

Letter of Credit – An instrument issued by a financial institution agreeing that it will pay money to a third party beneficiary on behalf of the bank's customer upon the happening of certain events.

Leading practices - A method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things.

Likelihood – As defined in the Risk Management Guideline for the BC Public Sector, the chance that a risk event will actually occur. Likelihood rarely implies mathematical certainty, rather it is a subjective estimate.

Mine reclamation – The process of restoring land that has been mined to an approved end land use (as determined by the Chief Inspector).

Net present value – A discount calculation conducted to value the liability associated with long term requirements at a mine. This calculation is used to factor in the time value of money (i.e. money available at the present is worth more than the same amount in the future due to its potential earning capacity).

Non-performance risk – Failure of a party to abide by or fulfill the terms of a contract; a failure which may lead to a breach of contract.

Progressive mine reclamation – The process of restoring land that has been mined to a natural or economically usable state in an ongoing manner over the life of the mine.

Qualified person – As defined by the Health, Safety and Reclamation Code for Mines in British Columbia, a person who, in the opinion of the manager, is (a) qualified because of the person's knowledge, training and experience to design, organize, supervise and perform the duties for which the person is appointed, (b) familiar with the provisions of the Code, the code and the regulations that apply to the duties for which the person is appointed, and (c) capable of identifying any potential or actual danger to health or safety in the workplace.

Reclamation and closure liabilities – All liabilities associated with the reclamation and closure of a mine, including any obligations for post-closure ongoing environmental protection, monitoring and maintenance.

Risk-based approach – A methodology that addresses issues at varying degrees depending on their relative risk or level of importance based on pre-defined criteria.

Risk-free rate – The theoretical rate of return of an investment with no risk of financial loss. The risk-free rate represents the interest that an investor would expect from an absolutely risk-free investment over a given period of time.

Risk tolerance – As defined in the Risk Management Guideline for the BC Public Sector, the maximum level of risk an organization is willing to accept for a particular exposure.

Security policy – The principles of action adopted by MEM as they relate to the financial security required as part of the Mines Act permit for planned mine reclamation activities.

Security program – The Ministry's plan of action for accomplishing the objectives of the security policy, with details on what work is to be done, by whom, when, and what means or resources will be used.

Surety bond – A three-party agreement where the surety company promises to perform obligations of the bonded party or pay up to the agreed sum of money to the beneficiary if the bonded party fails to perform those obligations.

Executive summary

In October 2016, EY was engaged to support the BC Ministry of Energy and Mines ("MEM") in their ongoing efforts to ensure a sound, risk-based approach to BC's financial security program for mine site reclamation. The objective of our work was to provide analysis, consultation and recommendations regarding the components required to draft a financial security policy. Based on our review and analysis, the approach and policy components we have laid out in this report would facilitate a streamlined, objective and transparent program. It would also encourage mine proponents and operators to conduct reclamation, closure and environmental protection activities while balancing the province's two objectives of mitigating financial risk to the taxpayer and enabling continued economic investment from the mining industry.

Our review covered three primary areas: 1) administration of the current program; 2) liability estimating process; and 3) type and amount of security provided. Over the course of three months, EY reviewed over 35 governmental policies and existing reports, conducted interviews or workshops with over 50 individuals representing First Nations, government, industry and other stakeholder groups, and performed an analysis of 10 other jurisdictions in order to inform the recommendations contained in this report.

It should be noted that we found considerable variability in the financial security programs of similar mining jurisdictions, revealing that there are few easy answers in dealing with the challenge of securing for reclamation activities. Additionally, given that MEM's current practices have not yet been formalized into policy or formally shared with the public, there is a significant opportunity to enhance transparency with stakeholders outside of government and industry, in particular for First Nations and local communities.

Our work uncovered a number of key findings which are presented in summary here and are discussed in further detail in the report that follows. Specifically, we found that:

- MEM has already established a carefully considered and systematic financial security approach for mine reclamation that includes elements of a risk-based approach and is tailored to the context of mining in BC.
- Many aspects of the Ministry's current practice are sound and are ready to be formalized into a policy reflective of current state. There are opportunities for the Ministry to enhance its current program, including:
  - Improving the rigour of its risk assessment process for determining required security.
  - Leveraging policy tools to better incentivize strong environmental performance.

- Basing key factors such as discount rates on independent standards.

Overall our main recommendation is for MEM to formalize its risk management framework for mine security. The body of this report contains additional details and recommendations on how this may be done.

Background and context

Background on mining in BC

British Columbia is one of the most resilient and productive mining jurisdictions in the country, and is a major contributor to the Canadian economy. With its combination of fiscal incentives and a stable policy environment, BC's rich mineral diversity attracts mining investment from all over the world. BC is Canada's largest exporter of coal and producer of copper, and it produces significant amounts of gold, silver, zinc and over 30 industrial minerals. The Province is also known as the global hub for mineral exploration, with Vancouver home to more than 1,200 exploration companies. Over the years, the Government of BC has developed many industry-leading policies and practices on environmental stewardship (including mine reclamation security) and on First Nations engagement in order to support the sustainable growth of the sector. These policies and practices have served as a model for other mining jurisdictions across Canada and abroad.

It is clear that the mining sector also plays a critical role in the economy of British Columbia. Mining companies operating in the Province generated $7.7 billion in gross revenue in 2015, and paid a total of $476 million in tax to all levels of government. The industry is an important source of direct and indirect jobs for many British Columbians, and is a particularly significant employer for First Nations communities. For instance, in 2015 the industry employed 8,726 people in BC directly, with many additional jobs generated in downstream industries. Given the importance of the sector, MEM has been focused on developing BC's natural resources within the context of government's commitment to responsible environmental management.

Background of the reclamation security program

BC's reclamation laws aim to ensure that land, watercourses and cultural heritage resources are returned to a safe and environmentally sound state. Before starting work at a mine site, companies are required to obtain a Mines Act permit approving the mine plan, a program for protection of the land and watercourses, and a reclamation program. Mining companies must also place a reclamation security with the Province to ensure reclamation obligations are kept. This security is only returned once the mine site has been reclaimed to a satisfactory level and there are no ongoing monitoring or maintenance requirements.

The need for financial security arises from a risk that a mining company may not carry out the reclamation and closure activities required under the Health Safety and Reclamation Code and conditions of its *Mines Act* permit due to bankruptcy, lack of available funds or other reasons. In such an event, the government may be forced to conduct the necessary reclamation and/or

closure activities. Unless adequate financial security has been previously posted by the mining company, these activities will, in whole or in part, be at taxpayer expense. Security helps to maintain conformance with BC's principles of fairness and the "polluter pays".

There are a number of persistent challenges and uncertainties with respect to the security process. First, reclamation liabilities must be calculated decades into the future using predictive modelling, resulting in a considerable amount of uncertainty on costs that can only be mitigated to an extent by contingency and the five year review process. Second, the extent and type of environmental remediation might not fully be known at the assessment stage. MEM has seen a number of new environmental issues arise in recent years that were in some cases not known at the time of permitting such as acid rock drainage (ARD) and other water quality issues that require costly water treatment in perpetuity. These are informed by evolving science, changing government regulations and expectations from the public and First Nations. Third, the cyclical nature of the mining sector, particularly with BC's junior and mid-sized miners, has resulted in a number of boom and bust periods that have seen some companies go bankrupt.

History of reclamation security in BC

The first Provincial legislation in BC covering reclamation was enacted in 1969 and applied to major coal and mineral mines, with coal and mineral exploration being added in 1973. In 1990, British Columbia amended the Mines Act, providing the current legislative framework for mine reclamation in the province. Given that mining is seen as a temporary land use, the legislation requires that companies carry out reclamation and closure of mines in order to achieve the approved end land use. This definition also includes the conservation of cultural heritage resources. Thus, mining companies must submit land reclamation and closure plans, including detailed cost estimates, and post financial security against existing and potential future liabilities as a condition of their Mines Act permit. The purpose of this requirement is to ensure that funds are available to carry out the reclamation work in the event that a company defaults on their obligations.

In 1991, given the complexity and scale of the environmental remediation challenges at the Equity Silver mine, MEM and Equity Silver established a technical committee that included public representation – the Equity Mine Financial Security Technical Advisory Group (EMFSTAG) – to assess liability estimates and make recommendations to the Chief Inspector of Mines on the amount of security on a rolling five year basis. The EMFSTAG assists with managing ongoing environmental risks by identifying areas of uncertainty, recommending triggers for revising reclamation and remediation costs, and monitoring and evaluating site-specific environmental data. The practices and learnings that have come out of the EMFSTAG around liability costing standards, triggers for adjusting liability, and company risk assessment have formed an important part of MEM's current approach to mine reclamation security.

Recognizing that the mining sector is an important part of the BC economy, MEM's objective with the security program is not to place punitive financial constraints on the industry. In February 1995, the Ministry's Advisory Council on Mining appointed a special Mine Reclamation Security Policy Task force in order to address some key reclamation security issues facing the Province such as company insolvencies and an increasing prevalence of long-term water treatment requirements. The Task Force's report in 1996 acknowledged the significance of the industry to BC as well as the need for BC mining companies to remain competitive internationally. Among the main recommendations was an emphasis on a risk-based approach that balances the overall financial health of the mining company with the nature and complexity of environmental reclamation and remediation required at a mine site. According to the Task Force, in order to be effective the approach needs to be both rigorous and transparent. While assessing the risk posed by individual companies already formed part of ministry practice in 1996, the report recommended formalizing and expanding existing policies and procedures. Some effort has been made internally to address this in the time since the Task Force's report was released, however, this report reflects the first time that such an assessment has been made public.

EY approach

EY has undertaken an extensive review of the financial security policies on mine reclamation in other mining jurisdictions as well as the current practice in BC in order to set our recommended policy components in the proper context. This experience has demonstrated that no two financial security programs are alike; the approaches governments have taken in developing the liability estimate and determining the amount and types of security are necessarily different given the varying nature of their resource sectors, environment, and projects. However, there are relevant points of comparison across jurisdictions, and we have incorporated those findings into this report. In recommending potential policy components for a financial security program made for BC, we have considered challenges faced by the Province, perceived issues with the current program, and the desire to support a sustainable mining industry.

Scope

The scope of our review included:

- Administration of the program, including documentation of policies, procedures, and guidelines for proponents.
- Liability estimation, including types of costs used, parameters defined, and short vs. long term modelling.
- Security, including the type, amount, and schedule of security required.

It is also important to highlight what our review did not cover, for instance, catastrophic failings. The primary reason for this is that these events fall outside of planned reclamation activities, and are thus not within the scope of the mine reclamation financial security program. We also noted during our review that other areas of government have protections against these types of failings. Recent amendments to the Environmental Management Act (EMA) contain provisions that hold the polluter accountable in the event that a catastrophic failing has adverse effects to the environment. EMA provides the government with the legislative tools to order the cleanup and restoration of the impacted site. There are penalties for failing to comply with an order or to carry out recovery.

In addition, our review did not consider the quality or consistency of mine closure plans. Reclamation costs and associated financial security requirements are built from agreed-upon mine closure plans submitted during the permitting process. In accordance with the Mines Act, such plans must include "a program for the conservation of cultural heritage resources and for the protection and reclamation of the land, watercourses and cultural heritage resources affected by the mine." The sufficiency of those plans is evaluated by MEM, typically with the input of other government agencies and First Nations. The province is currently undergoing a separate process to develop mine closure planning standards that would provide more detailed guidance on what types of conservation and closure activities should be included in such plans, when during the mine life these activities should take place, and the extent and timing of engagement with First Nations and local communities expected during the planning process. We have therefore not considered this aspect of the liability estimation process in this report.

Approach

Functionally, EY's assessment was composed of three main elements: 1) a current state assessment through interviews and review of key documents and other reports; 2) assessment of potential future state through review of other jurisdictions and feedback from stakeholders, and 3) design of potential policy components that are relevant for BC and meet the Province's objectives for the mine financial security program. MEM and the Ministry of Finance provided access to relevant documentation such as previously conducted independent reviews of the program, liability cost estimating spreadsheets and guidelines, relevant environmental policies, and other documents and reports both internal and external to government. The project team interviewed representatives from First Nations, the Mining Association of BC (MABC) and other provincial government departments to identify potential policy components. The jurisdictions interviewed as part of the jurisdictional review were determined based upon input from all of the stakeholder groups previously identified, as well as a determination of jurisdictions with reasonably comparable regulatory frameworks and industries to those of BC.

Additional interviews and documentation included in the assessment were identified as the review proceeded. (For a list of interviews conducted and jurisdictions reviewed, see Appendices A and B respectively).

In this report, we have summarized our recommendations on the policy components that could form part of BC's financial security policy for mine reclamation. It should be noted that many of these policy components already form part of MEM's practices, or are otherwise laid out in the Mines Act or Health, Safety and Reclamation Code for Mines in BC. Others are informed by relevant leading practices we observed in other jurisdictions, stakeholder input and EY's recommendations. See Appendix C for a full list of these components.

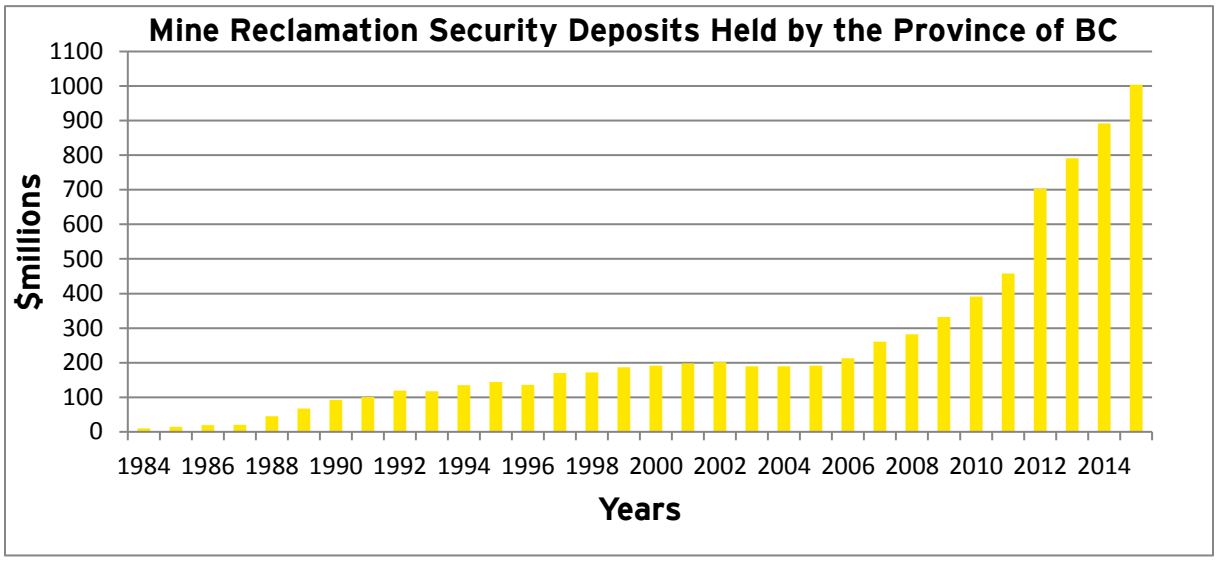
A financial security program made for BC

Current state

In conducting our work, we observed a number of key principles that guide MEM's current policies and practices related to financial security. These include:

- Companies are financially responsible for the full scope of their environmental disturbance and liability.
- A consistent process for determining the liability estimate, type and amount of security should be applied.
- The financial security program should follow a risk-based approach.
- The financial security program should incentivize reclamation, including progressive reclamation.
- No one size fits all – given that all mines sites have their own unique environmental conditions and thus carry inherently different levels of risk, the security program will necessarily be varied from mine to mine.

Over the course of our review, we observed that MEM's approach has not always achieved the desired outcomes of the financial security program. In addition, there have at times been public criticism on inconsistencies in the amount of security required relative to the overall liability. However, it is important to view gaps in the proper context. First, over the past decade there has been an evolving understanding of environmental challenges (e.g. long term water treatment), as well as of reclamation activities and the associated costs. In response to these circumstances, government has made a significant effort to increase the amount of security held, as can be seen in the following figure. In addition to the amount of security held today, a further $846 million is scheduled to be received over the next eight years. Second, in some cases, MEM has accepted a level of security below the total liability amount because the residual risk to the province of doing so is low. The perception that the Province has a portion of "unfunded" or "unsecured" liability may instead speak to the fact that MEM's risk management framework, including both its risk tolerance and its approach to assessing and managing risk, has not been clearly articulated.



A risk-based approach

A key tenet of a risk-based approach is that absolute assurance over future outcomes is impossible to obtain, and would be prohibitively costly to do so even if it was. The Province has therefore adopted a working practice of requiring *reasonable assurance* that the taxpayer will not need to contribute to reclamation costs. In implementing its approach to achieving reasonable assurance, MEM has generally considered the stage of permitted mine life, strength of company, evolving science and changing reclamation standards, and other factors in making statutory decisions on the amount and schedule of security required. It is recommended, however, that MEM formalize and enhance this approach to ensure that:

- Risk is reduced to an appropriate level that is consistent with the Ministry's risk assessment factors and tolerance.
- Companies are assessed on an equal playing field.

In doing so, the process will become more transparent to all involved, including First Nations, industry and the public.

Recommended risk management framework for mine security

Based on the findings of our review, EY has designed the following risk management framework for mine security. These concepts are further explored in Appendix D of this report.

Conceptual risk management framework for mine security

*Other non-security assurance and policy considerations that could reduce liability, risk or uncertainty, for example performance/corporate guarantees, insurance policies, significant expenditures such as research and development and capital investments.

Overall, the risk that the government is seeking to manage through the holding of security is the risk of mine operator default. From a risk management perspective, MEM should consider both the *likelihood* and *consequence* of such an event. The consequence relates to the amount of the calculated liability based on projected costs to government in a default scenario. Factors such as the financial strength of the organization, stage of mine life and the organization's environmental track record should be considered as well, as they may impact the consequence and/or the likelihood of default depending on the circumstances.

Each of these factors is in some way already being considered by the Ministry in determining the amount of security to hold. What has not yet been defined, however, is MEM's acceptable threshold for each factor above which may lead the government to not require full security. We have included these factors as 'risk assessment gates' through which a company may be able to pass if it meets a given threshold to be determined by MEM. Combined, this approach and the thresholds set will be reflective of MEM's overall risk management approach and *risk tolerance*, i.e. the amount of residual risk at which MEM believes it has achieved reasonable assurance. If one or more gate thresholds is achieved, a company may be eligible for a reduced amount of security or a modified security schedule. Alternatively, if certain other thresholds are not met, the Ministry may require security equal to, or possibly in excess of the liability estimate depending upon the risk. Given the Province's low risk tolerance for financial default, we would expect that the thresholds set for the risk gates would be set high such that many mines may be required to provide full financial security for their reclamation liability. For those which satisfy the risk gates and qualify for less than full financial security at a point in time, we expect that the security schedule would be developed that achieved full financial security by the cumulative end of mine life for its portfolio of domestic mines.

Articulating the circumstances under which this assessment is conducted, what the gates and associated thresholds should be, and what the amount of security reduction or the nature of

the schedule modification should be, will require additional analysis by MEM. The intersections of this proposed approach to MEM's overall risk management framework should also be considered.

Consideration of other risk mitigating factors and non-security assurance

The risk management framework for mine security depicted above will enable the Ministry to achieve its desired tolerance for operator default risk. There are certain other considerations, however, that the Ministry may choose to include in its policy or otherwise request from companies which could provide additional assurances in case of default or otherwise incent good environmental management practices. These other considerations might include:

- Performance guarantees or corporate guarantees
- Other forms of insurance
- Other factors that could reduce liability, risk or uncertainty (for example, significant expenditures such as research and development, capital expenditures, etc.)

These may be considered by the Chief Inspector in their determination of the security requirements.

Implementation considerations

To support the effective implementation of the Ministry's mine financial security policy we have identified a number of additional considerations. It is our view that pursuing or addressing some or all of the areas laid out below in parallel to implementing a policy will serve to establish a stronger mine reclamation financial security program overall.

- **Ensuring adequate resources**

  The BC Auditor General identified a lack of sufficient resources at MEM to manage existing environmental risks in her May 2016 report. While the scope of our review did not include an assessment of the adequacy of resources, we do recommend that MEM conduct a review to identify what resources will be required to effectively implement the policy components below and any others it chooses to address. This review should include what minimum experience requirements may exists for various positions.

- **Transparency and communication**

  Throughout our review, conversations with First Nations and other stakeholders identified significant concern with the lack of transparency regarding the mine financial security program, for example how cost estimates are developed, what reclamation activities are accounted for, and to what extent the financial security program was available to deal with the costs of unplanned spills or other catastrophic events. Concerns around transparency were likewise highlighted in the recent Auditor General report, and were also acknowledged by MEM representatives at the outset of this assessment.

  While the establishment and publication of a policy based on the risk framework proposed above will in itself demonstrate a significant improvement in transparency, there will likely remain opportunities to engage First Nations, local communities and other stakeholders to discuss additional concerns with the financial security program. MEM should consider developing a stakeholder engagement plan in conjunction with the publication of the policy. This should apply for the near term as well as for the communication of ongoing changes to legislation, policies and guidance in the long term.

- **Capacity building within First Nations and local communities**

  The extent to which First Nations and local communities engage with government and industry on the topic of reclamation and financial security depends in many cases on the level of related expertise within the community or resources to engage reliable consultants. Multiple interviews suggested there is room to improve this capacity.

- **Coordination of activities with other ministries**

  Ongoing coordination and collaboration with other ministries involved in the regulation of natural resources will be critical to the success of the future reclamation security program. For instance, security is a government-wide matter for the Ministry of Finance Risk Management Branch. In addition, we recommend that MOE be more directly involved in the liability estimation review process. Given MOE's ongoing environmental monitoring and evaluation at mine sites, they have an important role in helping assess the nature and scale of future land remediation costs.

- **Documentation of rationale for key decisions**

  To ensure appropriate records for future audits and assessments that may occur, we suggest that MEM document the rationale for final decisions regarding the policy, including key concepts, tools or strategies considered but not implemented.

- **Establishment of formal roles and responsibilities**

  Following the design of the policy and the determination of appropriate resources, MEM should consider developing a RACI (Responsible, Accountable, Consulted, and Informed) document in order to establish clear roles and responsibilities for administering the financial security program, including as they differ between MEM, MOE and other government ministries.

- **Managing unfunded liability**

  A plan should be developed which identifies objectives, strategies and timelines to reduce the delta, if any, between desired security and the liability posed by these sites in line with the risk management framework for mine security described above.

Appendix A: Interview list

We would like to acknowledge the meaningful insights provided to EY by representatives of the following organizations which supported the development of this report:

BC Government

- Ministry of Energy and Mines
- Ministry of Finance
- Ministry of Environment
- Ministry of Forests, Lands and Natural Resource Operations
- Ministry of Aboriginal Relations and Reconciliation
- Oil & Gas Commission

First Nations

- Halfway River First Nation
- Ktunaxa First Nation
- Saulteau First Nations
- Soda Creek Indian Band (Xats'ull First Nation)
- Tahltan First Nation
- Williams Lake Indian Band

Industry

- Association of Mineral Exploration British Columbia (AMEBC)
- Business Council of British Columbia
- Mining Association of BC (MABC) Policy Group, including representatives from:
  - Anglo American - Canada
  - Copper Mountain Mining
  - HD Mining
  - IDM Mining
  - MABC
  - Taseko Mines
  - Teck Resources

Non-governmental organizations

- Environmental Mining Council of British Columbia (*former)*
- Northern Conference/One Sky

Appendix B: Jurisdictional review

The following jurisdictions were included in our assessment through interviews with government representatives as well as review of available policies, regulations or other documents.

Ref.	Jurisdiction
Canada	
1	Alberta
2	Manitoba
3	Nova Scotia
4	Ontario
5	Quebec
6	Saskatchewan
7	Yukon
International	
8	Alaska
9	Chile
10	Western Australia

Appendix C: Potential policy components

Introduction

EY has developed the policy components set out in this section based upon current practices at MEM, consultation with stakeholders, successes in other jurisdictions, and EY's experience. In our view, together these policy components would facilitate a streamlined, transparent, and risk-based process that suits the needs of British Columbia. Some policy components require additional analysis and development by MEM, and EY has provided additional comments that will help guide this work. To assess the efficacy of these policy components, we have developed a set of evaluation criteria based upon input from key stakeholders involved in our review. The criteria provide a consistent and reasonable framework from which to assess whether or not potential future policy components adopted by MEM meet the overall objectives of the financial security program, and allowed us to ground our recommendations accordingly. These criteria are:

- The financial security program should, at its core, encourage reclamation and environmental protection activities and provide reasonable assurance that BC taxpayers will not pay the costs of reclaiming, closing and managing mines in the long term.
- The financial security program should be objective in nature and transparent to industry and external stakeholders.
- The financial security program should not create an unreasonable additional administrative burden on industry or the Ministry.
- The financial security program should consider risks and forms of security appropriate to each proponent in order to reduce the risk that the taxpayer will be responsible for reclamation costs to an appropriate level.
- The financial security program should support continued competitiveness of BC's mining industry both locally and in other jurisdictions.

Jurisdictional review findings

In performing the jurisdictional review, it is clear that there is considerable variability in financial security programs around the world. This is in part due to differences in homegrown resource sectors, types of mineral deposits and environmental setting, but it is also due to the varying approaches to dealing with uncertainty around the scale of future environmental impacts and associated costs. As a result, jurisdictions apply different levers within the security program in order to minimize and contain risk for their taxpayers.

Proposed policy components

Our proposed policy components are focused on a number of key themes: 1) adopting a risk-based framework towards financial security; 2) applying a consistent methodology in developing the cost of reclamation and remediation activities; and 3) providing potential administrative improvements to streamline the process. As such, we have broken the proposed solution into three distinct sections:

- Acceptable financial security
- Estimating reclamation and post closure activity costs
- Program administration

The majority of components we recommend already form part of MEM's practices, or are otherwise set out in law by the Mines Act or the Health, Safety and Reclamation Code for Mines in British Columbia ("the Code"). Other components are informed by relevant practices we observed to have success in other jurisdictions, or by EY's experience. Finally, the interviews conducted with First Nations, industry, NGOs, and others were a critical component of ensuring that the policy is tailor-made for BC. In some key areas we have provided additional EY comments in order to provide further context and explanation around our recommendations.

Potential policy components

A. Acceptable financial security

- The province will take a risk-based approach to determining the amount of security required, based on an assessment of the likelihood and consequence of operator default.
- The Province requires reasonable assurance that planned mitigations including proper mine design to minimize impacts and encourage progressive reclamation throughout operations will be undertaken, as well as assurance that long-term requirements are fulfilled. In order to achieve this objective, the province relies on the receipt of financial security. In considering the amount and schedule of security required for a project, the Ministry may consider a combination of factors to assess risk*, including the following:
  - Financial strength of the company
  - Compliance history
  - Stage of mine life
- For companies that meet the Province's financial and stage of mine life risk gates, a risk self-assessment, including underlying analysis and supporting information, should be provided by the project proponent or operator based on the Ministry's guidelines.

*For an illustration of suggested risk assessment criteria, see Appendix D.

Potential policy components

Acceptable security instruments

- The range of security types that are acceptable to the Ministry should be clearly outlined.
- Mining permit holders should provide security in any of the forms deemed acceptable by the Chief Inspector on the Accepted Forms of Security List which include:
  - Guaranteed investment certificates held under a safekeeping agreement (only for financial securities less than $25,000)
  - Cash and cash equivalents (certified cheques, money orders, bank drafts)
  - Irrevocable standby letters of credit (ISLOCs)
  - Reclamation surety bonds
  - Qualified Environmental Trusts (QETs)
  - Section 12 Mine Reclamation Fund

Determining the schedule of acceptable security

- The schedule for providing security should be assessed by Ministry staff based on the risk management framework and consistent with the Code and *Mines Act*.
- For major mines the reassessment of financial security requirements should occur on a regular basis (not to exceed five year increments) and in coordination with updates to mine plans and reclamation and closure programs.
- If a mine permit holder carries out progressive reclamation activity at any point during the life of the mine, they can revise their liability estimate accordingly and resubmit for MEM's consideration. Once the Chief Inspector is satisfied that the progressive reclamation activity has been completed to satisfaction, they should adjust the overall liability amount and security required accordingly.

Other considerations

- The Chief Inspector, at their discretion, may consider other forms of assurance or factors that reduce risk, liability and uncertainty in determining the amount and schedule of financial security required. These may include, for example:
  - Performance guarantees or corporate guarantees
  - Other forms of insurance
  - Significant expenditures such as research and development, or capital investment

Permit decision

- The final decision on the amount and schedule for placing a financial security is a statutory decision of the Chief Inspector and should be set as a condition of the Mines Act permit, as amended from time to time.

Exploration

- For most exploration projects, financial security should be placed prior to issuance of the Mines Act permit. For large exploration projects that have permanent mine features or liabilities that change significantly over time (e.g. declines, waste rock dumps etc.), financial security may be determined in stages, over time, to keep pace with site liabilities, similar to major mines.

Potential policy components

Private land

- Private land used for mining activities is subject to the requirements of the Mines Act and Code, including the requirements for reclamation and closure and the posting of financial security. However, where the post-closure end land use is not typical for a mining activity (e.g. residential, golf course, retail, vineyard etc.), the financial security required should be based on achieving the same reclamation standards accepted by the Ministry, but should also be supportive of that general use and ensure the safety of the public.

Other securities in place

- In some instances, financial securities on mines may be required under other provincial legislation such as the Agricultural Land Commission Act. If the Ministry is satisfied that the security provided under other provincial legislation minimizes the risks of mine reclamation being borne by the Crown to an appropriate level, security under the Mines Act should not be required.

EY Comments: Per Ministry staff, work is underway to review the alignment of financial securities on mines that may be held by other ministries.

Work in lieu of security

- Under certain circumstances, the Ministry should consider accepting specific work to be done in the short term in lieu of requiring additional financial security being posted by the mine. This may be considered in instances where short term default is unlikely and work is quickly needed to address immediate risks/issues, which would reduce the overall risk and liabilities associated with the mine.

B. Reclamation and post closure activity estimates

Detailed cost estimates

- In accordance with the Code, mining proponents applying for a Mines Act permit must submit a detailed liability cost estimate as part of the reclamation and closure plan. The cost estimate should include the detailed breakdown of the total costs for the complete reclamation and closure of the mine, including any ongoing management, monitoring and maintenance requirements.
- Mining companies have the option of creating their own liability costing spreadsheets in Excel format to detail costing parameters or to use the Ministry example costing spreadsheet with modifications as appropriate.
- Cost information should be presented in a clear and transparent manner, and allow for formulas and calculations to be verified. Detailed rationale and assumptions used to determine costs should also accompany the submission.

Preparation by qualified persons

- The determination of the outstanding mine reclamation and closure liabilities should be prepared and signed by qualified persons, as defined by the Code. Specialized valuation experts should be used for relevant key components (e.g. decommissioning costs, water treatment costs).

Management sign off

- Cost estimates should be signed-off on by a member of the proponent's management team or delegate.

EY Comments: While not currently practice in BC, this practice, which could be performed by the Chief Executive Officer, Chief Financial Officer or Mine Manager, would enhance accountability in the liability estimation process.

Potential policy components

Third party rates

- The liability costing information should utilize third party contractor costs (i.e. blue book costs or equivalent) for all works, since this would represent the real liability to government in a company default scenario.

EY Comments: This practice, coupled with a five year review or annual resubmission, provides incentive for the operator to perform progressive reclamation, since this will be performed using operator costs, reducing the future liability once verified.

Third party operation

- Costs related to third party management of the reclamation activity should be included since this would represent the real liability to government in a company default scenario.

Salvage value

- Salvage value (i.e. the estimated resale value of an asset) should not be applied to offset or eliminate any reclamation and closure costs.

Contingency costs

- Reasonable contingency costs should be applied to account for uncertainties with cost estimates. The level of contingency applied should vary depending on the nature and degree of certainty of each specific cost. Where there are large uncertainties with mitigation performance or with estimated costs, higher contingency factors should be applied. Decisions regarding contingency costs should be supported by internal or external analysis.

EY Comments: The level of contingency applied to the proponent's cost estimate should be based upon the maturity of the estimate. Standards for determining the appropriate level of contingency should be informed by nationally and internally recognized standards such as the Association of Advanced Cost Engineering Recommended Practice 47R-11 "Cost Estimate Classification System – As Applied in the Mining and Mineral Processing Industries" or equivalent standards provided by the Government of Canada, which provide relevant benchmarks.

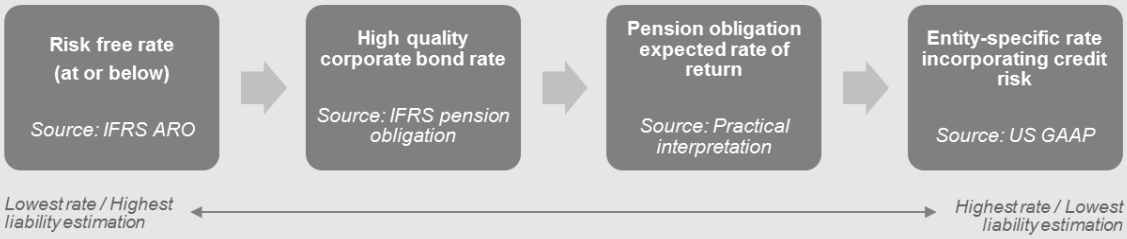
Discounting

- Long term costs (both periodic and annual) associated with all on-going mitigation, monitoring, maintenance and site improvement requirements should be discounted at an inflation-based discount rate, or a discount rate reflective of actual public sector investment returns.
- Shorter term costs should not be discounted (i.e. those costs associated with re-sloping, revegetation, decommissioning and removal of structures etc.).

EY Comments: MEM's current liability estimation and costing framework prescribes the use of a risk-free rate (i.e. the nominal rate unadjusted for risk) to calculate the present value of long term reclamation costs. This rate is set using Government of Canada Real Return Bond yields and is updated periodically. The use of a risk free rate means that the government is accepting zero investment risk (i.e. the risk of loss relative to an expected rate of return) in the event that the security must be claimed and used by the province to pay for future reclamation activities. The use of this low rate results in a correspondingly high valuation of future reclamation costs.

Potential policy components

It is recommended that MEM allow an appropriate discount rate to be applied to liability estimates in accordance with Generally Accepted Accounting Principles (GAAP), or International Financial Reporting Standards (IFRS). The diagram below demonstrates the spectrum of discount rates that could be appropriately adopted into MEM's liability costing guidance. Such guidance should be developed in partnership with MEM economists and MOF Risk Management Branch.



The left hand side of the spectrum represents the highest potential liability valuation and presumes that the province assumes no investment risk for security claimed. The right hand side of the spectrum represents the lowest potential liability valuation and presumes the province assumes potentially very high investment risk and associated high returns.

Our position is that this rate should be within the "goalposts" outlined above, as this would meet the objectives of both Government and Industry and is supportable based upon current authoritative guidance.

Netting of future cash flows

- Companies can net certain positive future cash flows against negative cash flows in cases where the company is able to generate significant revenue from alternative uses of the site on a long term basis. The specific types of revenue allowed will be determined at the discretion of the Chief Inspector.

EY Comments: The current practice of calculating the present value of future outflows related to reclamation does not consider or encourage the development of long term positive cash flows associated with the site. While the current practice provides the most conservative valuation, it may not reflect the reality of net reclamation or remediation costs.

Upon consideration of the issues and feedback, including the fact the jurisdictional review did not identify other jurisdictions netting cash flows, we propose that the Ministry consider the feasibility of allowing positive long-term cash flows substantiated by the mine operator with significant economic analysis and/or other support (such as power purchase contracts for power generation facilities) to be netted against forecasted costs in certain circumstances. Such a policy decision would have to be thoroughly vetted by Risk Management Branch and would require establishing clear criteria and legal protections to the Ministry with respect to the nature of the cash flows allowed and the financial and risk thresholds that must be met.

Updated liability cost estimates

- In accordance with the Code, an updated detailed reclamation and closure liability cost estimate should be submitted to the Ministry every five years (typically with the submission of the Five Year Detailed Mine Plan and Reclamation Plan), and whenever there are significant proposed changes to the mine plan or reclamation programs. This includes when significant changes to the operation or reclamation plan occur, resulting in a material increase or decrease in the liability.
- An annual liability cost estimate, which shows the details of the mine's current reclamation and closure liabilities, should be submitted with the Annual Reclamation Report due March 31 every year.

Potential policy components

C. Program administration

General program administration

Costing guide

- A detailed reclamation costing guide should be provided to proponents. The guidebook should include clear information and instruction on the program's scope, MEM assessment criteria, detailed requirements for estimating costs, contingency requirements, and accepted discounting methods.

EY Comments: Guidance is currently provided in Section 4.9 of the *Joint Application Information Requirements for Mines Act and Environmental Management Act Permits*, and in the user guide for the example costing spreadsheet. These requirements should be updated and expanded to include more precise guidance on the methods of estimating that the MEM deems appropriate. MEM currently uses detailed costing requirements and standards to assess liability estimates; however, these should be more formally documented and made available to external stakeholders. Activities to be costed should be based at a minimum on the requirements of the reclamation and closure plan. Providing clear, detailed, and consistent guidance will create consistency in proponent submissions, reduce the number of revisions required, and expedite the review process for MEM staff.

Guidance for exploration sites and operating mines should be documented separately.

Calculation examples

- The costing model and user guide provided by the Ministry should include an example and be updated regularly.

EY Comments: This would be helpful for smaller companies that may not have the in-house detailed costing expertise required. Furthermore, for exploration companies, sand and gravel, and quarries there is no guidance provided which could lead to inconsistencies in costing and security amounts between regional offices. The example provided should be based upon net present value calculations using prescribed discount rates.

Security review

Review - Liability cost estimates

- Ministry staff should review detailed liability cost estimates submitted by mining companies. Ministry staff reviewing a reclamation liability estimate for a mine should have sufficient understanding of the site, the reclamation and closure plan requirements, and the potential risks and issues associated with long term environmental performance. Key considerations typically include mitigation and performance aspects of mine tailings and waste rock geochemistry/water quality, geotechnical stability of tailings dams and waste rock dumps, and reclamation and re-vegetation of a mine to a productive end land use.
- Cost estimates should be reviewed and may be adjusted by Ministry staff (i.e. increased or decreased) where required to address incorrect assumptions, missing components, underestimated costs or key uncertainties.

Potential policy components

Review – Metal and coal mines (and other operations)

- The Ministry should have detailed and consistent internal documentation on the security review process for metal and coal mines (and other operations), including procedures, roles and responsibilities, and handoffs. This process should focus on adherence with the policy and guidebook, with the ability to have key areas of focus on significant estimates and site specific issues.

EY Comments: Having a documented process will increase the consistency between reviews and coverage over the various components. The process should allow for MEM staff to identify key areas of focus on significant estimates and site specific issues in addition to the base review procedures. By having the process documented and adhered to, the confidence in the reviews can be increased. The review process for other operations is performed by the regional offices, which creates opportunities for inconsistencies based on the office and staff performing the review.

Requirement to update security

Adjustments to security to reflect changing liability and risk assessment

- The financial security requirements for a mine should be adjusted over time (increased or reduced) to reflect the outstanding reclamation and closure liability of the site and the changes to the risk assessment. Progressive reclamation and other works completed may reduce the amount of financial security that is required to be provided by a mine operator. Economic factors, such as changes to real interest rates, can also result in significant changes to the assessed liability.
- In accordance with the Code, a modification to the financial security requirements for a mine can only occur by approval of the Chief Inspector through an amendment to the conditions of the Mines Act permit.

Progressive reclamation

- The Ministry should not apply a liability credit or release security for progressive reclamation that has yet to be undertaken at a mine. When reclamation has been completed and site liability reduced to the satisfaction of MEM, a mine operator may apply for a reduction or release of financial security requirements.

Triggers

- In accordance with the Code, the Ministry may establish triggers as permit conditions for increasing or reducing the amount of financial security required between five year security reviews to cover the risk of large changes in costs during that time period.

Transfer of permits and financial security

Transferability of securities

- A financial security placed by a permit holder may be held by MEM for more than one mine operated by the Mines Act permit holder. At the discretion of the Chief Inspector, the financial security may not be specific to an individual mine owner for a specific mine property and may be transferred to other mine sites that are owned and/or operated by the same mining company.

EY Comments: The transferability of security between mines is not currently enabled in the Mines Act and Code, and may require legislative changes. However, allowing the transfer of security across mines would, in our view, provide the government with maximum flexibility to decide where the security should be used in the event of a company default, and should thus be reconsidered going forward.

Potential policy components

Change in mine ownership

- A mining company wishing to acquire an existing mine and its Mines Act permit should apply to the Chief Inspector for transfer of the permit. The financial security associated with the mine site does not transfer and the Ministry requires financial security coverage at all times. Thus a new financial security should be placed by the new permit holder, before the original financial security can be released.

EY Comments: The risk based approach proposed in this document would require a new assessment in the case of change of ownership, since a number of the risk assessment factors are company specific (e.g. financial stability and compliance track record).

Application to acquire mines act permit

- In accordance with the Code, in order to transfer a Mines Act permit to a new company, the Chief Inspector should be satisfied that the new entity has the ability to meet the regulatory obligations under the Mines Act, Code and conditions of the Mines Act permit, including the financial security requirements. The new company should provide an application to the Chief Inspector requesting the transfer of the permit and clearly stating that they are assuming all reclamation and closure obligations associated with the mine.

Financial security review

- A financial security review should be undertaken by the Ministry before a proposed transfer of the Mines Act permit can occur to ensure that the reclamation and closure liabilities are defined, any unsecured liability is identified, and the prospective new owner understands their potential obligations. A financial security review may be deferred in cases where the transfer of a permit reduces government risk, such as where the transfer lessens the risk of default of a mine property to the Province.

Return, confiscation, and draw down of security

Access to security

- Mining companies should not be able to access or remove funds from a financial security held under the Mines Act. Release of a portion or all of a security can only be approved by the Chief Inspector, and requires an amendment to the mine permit.

Request for security release

- A permit holder or an Inspector of Mines may apply to the Chief Inspector for a release or partial release of financial security based on work completed and reduced reclamation and closure liabilities at a mine site. The Ministry should conduct a review of work completed and assess any outstanding liabilities to determine whether a return of some or all of the security is warranted.

EY Comments: Feedback received from industry, including both mine operators and exploration proponents, suggested that the timeliness of site assessments required to release security following reclamation was a concern. This should be considered by MEM during the implementation of the financial security policy.

Mine relinquishment

- Consistent with the Code, the Ministry does not allow for the release of obligations, relinquishment of a Mines Act permit, or custodial transfer of a mine, where there are any on-going requirements for inspection, monitoring, mitigation or maintenance.

Potential policy components

Confiscation

- Failure to Meet Obligations – If a mine operator fails to fulfill their reclamation and closure obligations under the Mines Act, Code or conditions of the Mines Act permit, the Chief Inspector may confiscate all or part of the financial security. The permit holder's legal obligations are not extinguished as a result of confiscation of the financial security unless the permit is closed.
- Undertaking Work - Upon draw down of financial security, the Ministry can cause work to be done to address outstanding liabilities. If funds needed to do the necessary work exceed the amount of available security, the shortfall forms a debt due to the government and a lien and charge on the mine and/or mineral title may be exercised by Chief Inspector under Section 17 of the Mines Act.
- Bankruptcy - Upon receipt of notification of bankruptcy proceedings against a mine permit holder, the Ministry will confiscate the financial security for any affected mines.

Government accountability

Policy application

- The application of financial security requirements for reclamation and closure of mines should be as clear and predictable as possible, to minimize uncertainty for the mining industry, government, First Nations and the public.

Ability to provide comment

- During a Mines Act permit application review process, the Ministry should provide an opportunity for any person to comment on the financial security requirements of a mine. This feedback should be considered by the Chief Inspector during statutory decision making and the establishment of financial security requirements.

EY Comments: To improve transparency and accountability of the financial security program, we recommend that MEM formalize a consistent process for receiving stakeholder comments during the liability review and security determination process. See also *Implementation Considerations*.

Disclosure

- The Ministry should disclose the total value of financial security requirements for a mine and their payment schedule. However, as per the Code, detailed costing information should be kept confidential if requested by a company as its disclosure has the potential to harm a company's competitive position.

EY Comments: MEM currently discloses the total liability and security amounts for major coal and metal mines on its website; this reporting should continue on an annual basis. This disclosure would benefit from being expanded to include the total security held for other sub-sectors, such as exploration and aggregates, in order to provide additional transparency to external stakeholders. Disclosure will increase stakeholder confidence in the program as external stakeholders may not be aware these other entities are part of the security program.

Chief Inspector annual report

- The Chief Inspector should report out annually on the estimated reclamation and closure liabilities that exist at each permitted major mine in BC, and the amount of financial security held by government. The Ministry should also disclose the total amount of security held on all mining projects in BC.

Policy review

- The Ministry should periodically review the effectiveness of this policy.

Additional policy considerations

Stakeholder consultations provided valuable input into this review. This section discusses the use of funds (i.e. a pool of cash raised across a broad base) as a form of security which arose from this input, but requires additional consultation and research to appropriately resolve.

Funds as a form of security

During our review the concept of a central mine reclamation security fund to cover reclamation costs across all mines in the province was raised by multiple stakeholder groups, including industry and First Nations. The concept that was suggested differs from the type of fund that is currently provided for under the Mines Act in which security for each site is held in a separate account and monies deposited by one site cannot be used to reclaim land at any other site. Instead, suggestions were made that such a fund centrally hold monies deposited from a source, yet to be determined, that would not ultimately be returned to the mine operators or proponents, but instead act as a reserve to fund the cost of reclamation activities at any site that the government finds itself responsible to conduct. It was suggested that a fund might be a solution to deal with planned reclamation activities, reclamation of historical abandoned sites and/or remediation required as a result of catastrophic events.

Research findings

Western Australia (WA) implemented a Mining Rehabilitation Fund (MRF) as a major component of its reclamation security program in 2013. For mining companies that meet certain eligibility criteria, such as financial health and a track record of meeting governmental reporting obligations, annual contributions to the MRF can replace the requirement to post security. The amount of the contribution is calculated based on approximated unit costs for five different classes of mining activity that are multiplied by the hectares over which the activity is performed and other adjustment factors based on the entity's risk. Contributions continue annually until reclamation is performed to reduce the area under active disturbance. Monies from the fund are not returned to the mining companies, but are instead held and invested with interest income being used to reclaim abandoned mine sites under the government's ownership.

The MRF is a very new mechanism, however, feedback so far has been generally positive. Positive aspects include improved incentive to conduct reclamation (including progressive reclamation) to reduce annual contribution payments, availability of industry-provided funds to finance reclamation of abandoned sites, reduced administrative burden for industry and government to calculate site-based liabilities and establish security bonds, and immediate

access to funds for government in the case of default when reclamation activities may be time sensitive.

Additional discussion and analysis

In response to the suggestion that the concept of a reclamation fund should be considered, a number of distinct challenges relevant to the BC environment were expressed by multiple areas of government. First, the pooled approach represents a significant departure from BC's "polluter pays" model, which is a fundamental principle that informs all natural resource development across the Province. Second, there is considerable lack of clarity on how a fund would sufficiently manage both short and long term risk to the Province. For instance, it would be difficult to assess the level of funds required to cover all manner of potential mine reclamation and remediation challenges. Finally, given the range of large, established and small, new operators in the Province, a fund would be challenging to implement fairly such that large miners were not ultimately covering costs for the junior miners' reclamation or remediation activities in the event of default.

It is important to note that the Province has previously reviewed the fund concept for BC at various points over the course of the security program and has found this option not viable. It should also be noted that, since 1998, the BC Oil and Gas Commission (OGC) has used the Orphan Site Reclamation Fund (OSRF) to finance the cost of remediating abandoned wells, test holes, production facilities and pipelines. The OSRF is funded by levies on current operators, similar to Alaska's AMLF. As reported in the OSRF's 2014/15 Annual Report, however, it is currently underfunded by $3.3 million, leaving 44% of estimated liabilities uncovered.

Overall there are aspects of a fund approach that are attractive, for instance, funds can be simple to administer and more easily explained to stakeholders. However, issues regarding the source of monies to establish the fund, the accuracy with which the levy rates can be calculated, and maintaining an appropriate balance between the junior and major mine operators in the province are valid concerns. Overall, we suggest that BC continue to monitor funds – or certain aspects of funds – as a future option.

Recommended policy consideration

The Ministry should continue to monitor funds – or aspects of a fund approach - as one of many potential forms of security, however, a variety of concerns indicate that such an approach may not be a viable option in BC at this time.

Appendix D: Policy implementation tools

The purpose of this section is to provide additional guidance to support the Ministry in the implementation of the proposed risk management framework for mine security that was introduced in the body of this report (duplicated below for reference).

Conceptual risk management framework for mine security

* Other non-security assurance and policy considerations that could reduce liability, risk or uncertainty, for example performance/corporate guarantees, insurance policies, significant expenditures such as research and development and capital investments.

The remainder of this section explores each area of the framework further.

Calculation of amount of financial security

The amount of financial security is calculated based on the liability estimation, while taking into account the relative risk of the company. This risk is assessed using the 'Risk assessment gates', which will assist Ministry staff in evaluating both the likelihood and consequence of the risk that an operator will default on its obligations. We have identified three potential risk factors for the Ministry's consideration:

- **Stage of mine life**

  While this factor is also inherently considered in the calculation of the reclamation liability (through the application of an appropriate discount rate to account for the time value of money), we suggest that it also be explicitly evaluated at the risk assessment stage. As a site approaches end of life, the amount of resources in the ground and available to be mined has decreased, reducing cash inflows to the operator and making it less attractive to stay and meet their obligations (increasing likelihood of default). For these reasons, the stage of mine life should be considered in the risk assessment process. To provide an example, Chile divides the anticipated mine life into thirds and assesses risk differently depending on which third of the mine life the company is currently in.

- **Financial strength of company**

The financial strength of the company is a good potential indicator of the likelihood of future default. It may be evaluated using standard financial evaluation metrics and ratios. The Ministry should require that information submitted by the companies to substantiate their self-assessed risk level be directly provided or evaluated by independent third parties, such as external rating agencies or audited financial statements. Common metrics that may be applicable for this type of assessment could include:

- Corporate bond rating
- Total assets to reclamation liability ratio
- Total equity to reclamation liability ratio
- Debt to EBITDA (earnings before interest, taxes and depreciation/amortization) ratio
- Debt to equity ratio
- Interest coverage ratio
- Free cash flow

The Ministry should ensure that whatever set of metrics and ratios are selected includes at least one that will change based on commodity prices (e.g., assets to liability) as this is a significant practical indicator of financial viability.

- **Compliance history**

  The provincial government (including MEM as well as other ministries) collects and has available to it a large amount of data which could be used to assess company track record, which is a potential predictor of the amount of disturbance not reclaimed on a site. This could include:

  - History of meeting permit obligations
  - History of meeting submission deadlines for five-year reviews
  - Results of investigations into any incidents which may have occurred

  These factors may be considered for individual sites or at the parent company level. (The inclusion of parent companies in the assessment should be reviewed with legal counsel.)

The Ministry will need to determine which of these or other factors will be used in its risk assessment process for financial security, and will also need to determine the appropriate risk thresholds for each. The Ministry will also need to determine how the achievement of the various thresholds will impact the percentage of financial security required, based on its risk tolerance. These factors and thresholds should be made available to industry and the public to enable a transparent assessment process.

As noted in the body of the report, if a company feels that it has satisfied the Province's risk gates, it is expected that it will document results and details and submit to the Ministry for review and approval. Risk gates will be objective and easily quantifiable based upon third party information (e.g. financial ratios based upon audited financial statements, bond ratings from bond rating agencies, stage of mine life based upon reporting by qualified persons, etc.).

Determination of appropriate security schedule

In its current practice, the Ministry determines the schedule at which each company deposits the required security amount. Depending on the size of the liability, stage of mine and other factors, this is often spread over a number of years. A specific framework to determine the schedule of security has not been proposed here, as the size of the liability and the stage of mine life have already been considered above. However, it will be necessary for the Ministry to continue to determine the appropriate security schedule, taking into account the results of the risk assessment for each company.

Ongoing monitoring and reviews

None of the risk factors or inputs to the calculation of the amount of financial security is expected to remain stable over the life of the mine. In order maintain a level of security that is appropriate based on the Ministry's risk tolerance, these factors and inputs should be regularly reviewed.

In accordance with the proposed policy components, the liability calculation should be reviewed at a minimum every five years. The risk assessment factors, however, should be evaluated more frequently given the speed at which some of them may change (in particular, financial strength of the company). Audited financial statements are typically only produced on an annual basis. The Ministry may determine that this is not a sufficient frequency at which to monitor ongoing developments. In its financial security program, the Alberta Energy Regulator (AER) is beginning to monitor alternative triggers that are updated more frequently, for example commodity prices or stock prices. Once a trigger demonstrates a certain level of variance over a monthly or quarterly basis, the amount of the liability and security may be reviewed. This is particularly important for the AER which calculates security based on an asset to reclamation liability ratio, however, the Ministry may consider implementing this type of approach as well to support an effective risk management approach. The Ministry should work with Ministry of Finance Risk Management Branch to design this type of monitoring program.

Consideration of other risk mitigating factors

If implemented, the risk management framework for mine security depicted above should enable the Ministry to achieve its desired tolerance for operator default risk. There are certain other considerations, however, that the Ministry may choose to include in its policy or otherwise request from companies which, while not contributing to the management of the risk of default, may be helpful to the Ministry or otherwise incent good environmental management practices. It is expected that these would be requested or required in instances where the Ministry determines that full financial security is not required. These other considerations might include:

- **Performance guarantees or corporate guarantees**

  Performance or corporate guarantees are written statements made by a site's legal owner and/or parent company that commit the organization to the performance of certain activities or the promise to pay for certain activities in the event of a site-level default. Such guarantees are not a replacement for security as there is no guarantee that funds will be available if called upon. However, such guarantees may provide the Ministry with additional comfort that the company is committed to meeting and/or paying for their obligations.

  Note that seeking guarantees from a parent company would need to be thoroughly assessed with government legal counsel.

- **Significant expenditures, such as research and development**

  Neither industry nor government has all of the answers today with respect to how existing and future problems may be solved. Reclamation liabilities are estimated based on current technology and cannot take into account new technology that may be developed in the future that could change the cost of reclamation activities and reduce uncertainty. As a matter of policy, MEM is interested in encouraging sound research and development (R&D) by the industry to improve its overall efficiency, including increasing the efficacy and reducing the cost of reclamation activities. There could also be other significant expenditures on a mine that could reduce liability, risk and uncertainty such as near term capital investment (e.g. water treatment plant, reprocessing of tailings).

  In Canada, the Canada Revenue Agency's Scientific Research and Experimental Development (SRED) program provides tax incentives for approved R&D expenses. In cases where less than 100% financial security is obtained, the Ministry should explore considering information on companies' approved SRED activities that relate to reclamation activities to gain additional comfort over their commitment to meeting their obligations.

- **Other forms of insurance**

  Currently, insurance products exist to help companies finance the risk of unplanned environmental spills or other accidents. To our knowledge insurance products that might help to manage uncertainty with respect to costs of planned reclamation (for example due to unforeseen changes reclamation activities required or fluctuating prices) do not yet exist. However, we understand that some companies are exploring the development of such products with the insurance industry. In the event that a product can be and is developed, this may not decrease the actual risk to the Ministry of operator default, but it may help the Ministry to gain comfort over the company's overall commitment to environmental stewardship and the level of its liability estimate.

These or other forms of assurance and policy considerations may be considered by the Ministry in establishing appropriate schedule of security.

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