

Mine closure risks – from a financial institution's perspective

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Abstract

Mining companies post financial securities that are mandatory in many jurisdictions to cover reclamation and closure obligations. For a financial institution that underwrites such financial securities, financial liability constitutes a fundamental risk. Nevertheless, the nature of reclamation and closure obligations assumed by mining operations is such that appropriate understanding of underlying performance attributes is required. These non-financial attributes cover the spectrum from technical and environmental to regulations and stakeholders. Long duration of the obligations also means that the scope, methodology and cost of reclamation and closure activities are necessarily revised and refined with the passage of time, and ultimately determine the success or failure of the undertakings.

The paper offers insight into how a financial institution views and assesses mine closure risks and liability, and concludes that although tangible parameters and characteristics are critical for sound assessment, it is somewhat inevitable to encounter subjective and uncertain aspects of reclamation and closure obligations that render the assessment more challenging whilst making it difficult to fully mitigate the risks.

1 Introduction

Mining companies rely on different types of financial instruments as forms of financial assurance to cover estimated cost of reclamation and closure undertakings (from this point on, the terms closure or reclamation refer to both closure and reclamation). Financial assurances (this term is used interchangeably with the terms financial security and reclamation security in the paper) are usually demanded by regulatory authorities to ensure that sufficient funds will be available to reclaim and close a mine site if a mining company fails to satisfactorily conduct reclamation and closure in accordance with the approved closure plan and acceptance criteria, irrespective of the financial ability of the mining company. Such reclamation securities are usually one of the prerequisites for issuance of permits and licenses for the proposed mining activity, whether in exploration, development or production stage, and can impose a material demand on the financial capacity of a mining company. To minimise financial constraints brought about by the reclamation securities, mining companies avail themselves of a number of financial instruments underwritten by financial institutions such as commercial banks, insurance and surety companies.

Financial institutions providing financial assurance instruments in support of the closure obligations assume contingent financial liability risk (contingent since the liability becomes a reality only when the reclamation security is called or drawn by the beneficiary of the instrument – in this case, the regulatory authority). In order to understand the key attributes that drive this risk, a good understanding of closure obligations and the mine property's characteristics are required, and ranging from technical and environmental to regulatory and stakeholder issues. Long term nature of the obligations also means that the scope and cost that affect the performance of the undertakings are necessarily revised and refined as mining operation takes place. The result is that the underlying attributes often change during the life of a mining operation that ultimately affects financial risk.

The following sections describe a financial institution's perspective on mine closure obligations, how it assesses and mitigates mine closure risk and liability, and how it deals with issues that are sometimes nebulous and intangible.

2 Overview of financial securities

Closure practices in the mining industry evolved in response to governments, and by extension, tax payers inadvertently having to finance significant monies required to close mining operations at the end of their economic life, whether prematurely or as envisaged when the mines were initially developed. Together with

the evolution of practices, it has also become increasingly unacceptable in many jurisdictions for governments and tax payers to assume financial liability to close the properties to a generally acceptable state.

Accounting standards in many countries require future financial liability resulting from closure activities at the end of the mine's economic life to be estimated, accrued, recorded and reported on an ongoing basis on the company balance sheet. However, well documented cases of companies that have gone bankrupt with insufficient or no residual assets to fund closure do not offer adequate protection to the tax payer particularly when significant sums of money are required to bring a closed mine to an acceptable state.

These events have prompted regulatory authorities to stipulate acceptable closure conditions and require mining companies to post financial security in respect of closure obligations. Financial securities ensure that sufficient funds are available to fully reclaim and close the mine site if a company fails comply with closure obligations at any point during operation or post-closure. This may be done through a variety of instruments and may comprise of one or a combination of:

- Cash.
- Trusts/escrowed accounts.
- Sinking funds.
- Performance bonds.
- Letters of credit.
- Corporate guaranty/asset pledge.
- Surety bond.

It is important to note that none of the forms of instrument above are insurance products.

Common forms of financial security used are surety bonds and letters of credit, with trusts/escrowed accounts to a lesser degree.

Typically, the decision to issue a surety bond or letter of credit is based on the surety company's or the financial institution's analysis of the mining company's (permittee) credit rating, experience and specific site obligations. The security amount generally reflects the estimated closure costs at the projected point of maximum closure liability (usually the point of maximum disturbance) during the term of the financial security. Closure cost may increase over time and the regulatory authority typically requires the permittee to adjust the bond amount annually to cover additional closure costs.

The security is released after the permittee has successfully met all the closure requirements of the approved permit and regulatory program to the satisfaction of the regulatory authority. The permittee may also apply for release of the bond on all or part of the permit area as reclamation is completed. Typical attributes of reclamation securities include the following:

- Site/operation specific conditions – reclamation and closure issues and challenges depend on applicable regulations, local physical, climatic and environmental conditions, type and characteristics of deposit, type of mining activity, historical operations, etc.
- Multiple regulatory authorities (local, state/province, federal).
- Multiple financial securities to different regulatory authorities and for different mining activities in a single site.
- Value of financial security – based on approved reclamation and closure plans and cost estimates. Financial obligations are heavily negotiated between the company and the regulators, but regulators generally have discretion and authority to unilaterally set and change the amount.
- Length of obligation – usually for the life of the operation and post-closure phase until all obligations are fully discharged by the regulatory authorities. The conditions for release are based on qualitative and quantitative performance criteria and at the discretion of the regulators.

- Term of financial securities – rolling annual renewals or less frequent intervals, prior to expiry of current security.

Relative to other instruments, cash, trusts, escrowed accounts and sinking funds place the most onerous financial demand on a mining company since these require the estimated closure obligations to be funded through significant initial and ongoing cash accruals, diverting cash that could otherwise be directed towards activities that enhance shareholder return such as initial mine development, expansion or acquisition.

With letter of credit issued by a financial institution (typically a commercial bank) or surety bond issued by a surety company, the mining company is not required to immediately fund the closure obligations as with cash, trusts, escrowed accounts or sinking funds. However, this still imposes financial restrictions on the company since the issuing financial institution or surety company will protect itself by requiring the company to provide a form of collateral and/or reduce the company’s available operating line of credit by an amount equivalent to or greater than the value of letter of credit in the event the instrument is drawn by the regulatory authority. Figure 1 below depicts this arrangement.

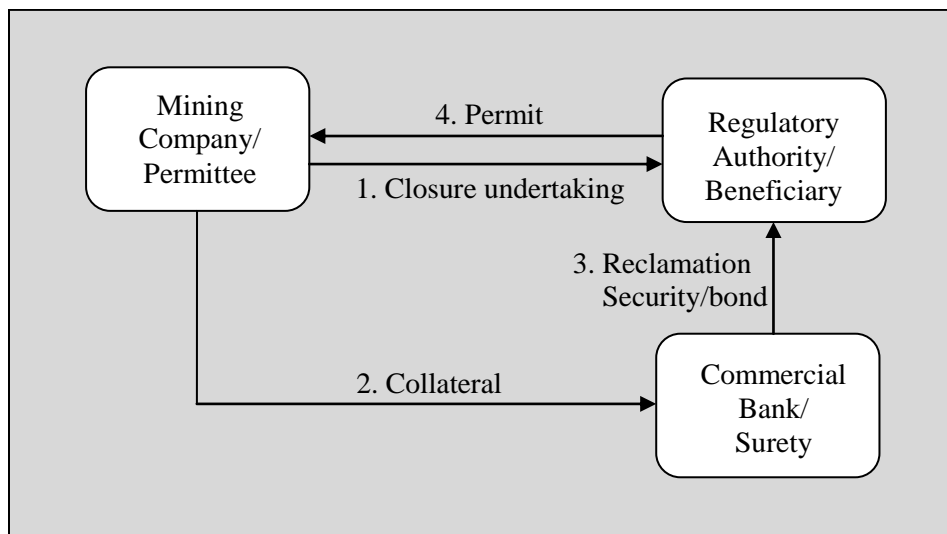


Figure 1 Parties and responsibilities in a reclamation security without financial guarantee

When the security covered by a letter of credit or surety bond is guaranteed by a third party financial institution (such as the author's employer Export Development Canada (EDC)), the issuing bank or surety will not reduce the mining company's available operating line of credit nor demand collateral as the company's financial risk is back-stopped by a third party guarantee with an acceptable credit rating. This in turn provides the mining company the advantage of having access to the unreduced line of credit (from the commercial bank) for its operating needs and/or not post collateral in return for paying a fee (premium) to the entity that is providing the guarantee. This of course also means that the company is required to pay fees twice – once to the commercial bank that issued the letter of credit or to the surety that issues the surety bond, and another to the third party institution providing the financial guarantee. While the nature of the obligation is long term, typical term of the financial security offered is valid for one year and renewed annually.

In accordance with the feature of the guarantee product, recourse will be sought from the mining company in circumstances where the regulatory authority draws on the security. In such circumstances, bank or surety will pay the secured amount to the regulator, and will seek to recover that amount from the mining company. Mining company will in turn draw on the third party guarantee to reimburse the bank/surety. The third party guarantor, having effectively paid out the security, will ultimately seek to recover the amount from the mining company. Thus, it would be important to recognise that the guarantee is not a form of insurance, but rather a credit advanced to the mining company. Figure 2 depicts this arrangement.

Given that the financial risk assumed can be large, strict underwriting criteria applies that primarily consists of strong financial capability among others, but will not be elaborated as it is outside the scope of this paper.

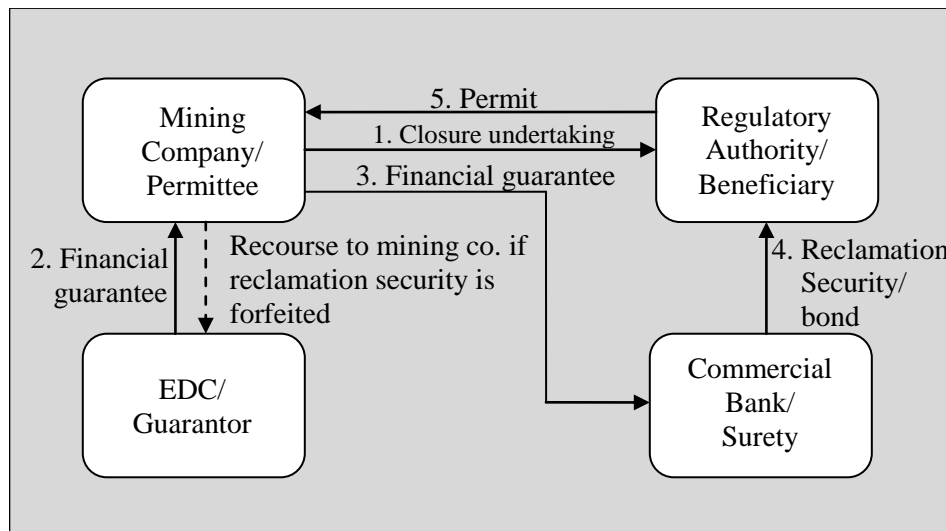


Figure 2 Parties and responsibilities in a reclamation security with financial guarantee

Corporate guarantees and pledge of assets have been and are still used to some extent, but are no longer considered by the regulators to be satisfactory as the sole form of security.

In the past, mining companies have relied on a small pool of specialised sureties and insurers who have the appetite and financial wherewithal to assume closure performance and financial liability that underlies surety and performance bonds. However, availability of such products have declined for some years in markets such as North America – through a combination of significant increase in premiums, additional requirements for collateral, reduction of coverage amount and elimination of pre-existing coverage – leaving mining companies with limited viable alternatives.

In the sections that follow, risks covered are from the perspective of a financial institution that provides third party financial guarantees backing the letter of credit issued by a commercial bank or the surety bond issued by a surety company.

3 Risk assessment

3.1 Risks reviewed

Depending on the type of financial instrument used and the institution issuing financial security for closure obligations, risks assumed cover the spectrum encompassing financial, technical, environmental, social and regulatory. The nature of closure obligations are such that they also tend to be many years, particularly for properties with long mine life.

Financial risks consider a mining company's recent and forecast financial attributes and performance that delves into assets, liabilities, liquidity, profitability, sustainability as a going concern, competitive position, prevailing and projected economic conditions, among others. These factors drive the financial rating and creditworthiness of the company and ultimately determine whether the company will be recourse-worthy in the event that the financial security is forfeited to the beneficiary (typically the regulatory authority). Financial performance risk due to economic or other external conditions is generally not within a company's sphere of control or influence, but how the company manages its operations, ensures competitiveness and plans to mitigate potentially adverse extraneous conditions are. Within its sphere of influence, the company's financial performance is underpinned by the company's technical performance such as mine production tonnage, grade, process recovery and operational efficiency.

Environmental and social risks encompass not only regulatory performance, but also the social license to operate and considerations associated with supporting a company that may have reputation or corporate responsibility issues.

The remainder of this section focuses on non-financial risk areas and due diligence activities.

3.2 Due diligence methodology and risk mitigation

The security obligations on the mine operator are continuous and long-term until closure obligations are deemed satisfactory by the regulators. Thus, in accordance with the regulatory requirements and the obligations assumed by the company, any or entire amount of the financial security could be forfeited to the regulator, resulting in potential financial loss to the financial institution. Accordingly, the assessment of future performance of the mine in accordance with the closure obligations is a key component of due diligence that comprise of:

- Reviewing obligations assumed by the mining company.
- Assessing the mining company's obligations in the context of the mine site attributes.
- Forecasting the future performance of the mine in the context of the obligations and performance criteria to release the financial security.

Specific tasks undertaken as part of initial due diligence typically includes review and assessment of the following as they relate to closure undertaking:

- Obligations assumed by the mining company as they relate to closure activities, including criteria for release of financial security.
- Corporate capability, experience and capacity.
- Corporate policies and management systems in place.
- Permits, approvals and regulatory compliance.
- Site specific attributes such as climate, historical and background site conditions, type of deposit, mining and processing, sensitive ecosystems, surface and ground water systems.
- Life of mine plan.
- Reclamation and closure plan.
- Reclamation and closure timeline.
- Reclamation and closure cost estimates, including cross-referencing the company's asset retirement obligations disseminated in financial statements.
- Certain key documents that are of particular importance to obligations. Examples include:
 - Geochemical characterisation of waste rock and tailings.
 - Post-closure effluent discharge limits.
 - Waste rock dump and tailings storage facility design.
 - Water management plan.
- Independent audits.
- Regulatory inspection and monitoring reports.
- Identify appropriate monitoring documents that will be relied to re-assess performance at the time of renewal (usually annually).

Due diligence tasks are undertaken to develop a sound knowledge base and adequate understanding of:

- The operation and the setting.
- Regulatory regime and key regulatory bodies.
- Reclamation and closure plan, obligations and criteria for release of financial security.
- Closure cost estimate methodology and adequacy.
- Corporate experience and operational capability to successfully undertake closure obligations.

- The nature of closure obligations and whether they can be reasonably met using proposed reclamation and closure approach and methods given site specific conditions.
- Potential performance risks and mitigating factors.
- Critical performance areas to closely monitor.
- Areas that could not be adequately assessed and actions and information required to minimise the risk.

In addition to undertaking due diligence prior to provision of the instrument, risks are mitigated to the extent possible by the following program criteria:

- Coverage of mine properties in countries that have well established and predictable regulatory environment – examples of this include countries such as Australia, Canada, U.K. and U.S.A.
- Term of the security is typically one year – this allows for re-assessment of the property prior to annual renewal, and if significant adverse issues have risen since the last review, possibility of not renewing.
- Covenants in the agreement requiring the mining company to be in good financial standing and in compliance with applicable laws and regulations, among others.
- Covenants in the agreement requiring the monitoring documents to be provided well in advance of the annual renewal.

4 Issues typically encountered

EDC's mine reclamation security portfolio comprise of properties ranging from intermediate to major mining companies that produce base, precious and ferrous metals and energy minerals. Properties are predominantly open pit mines with some underground and in situ operations. The securities in all instances back up letters of credit or surety bonds, and that EDC bears the ultimate risk of paying out if they are called by the regulatory authorities.

Initial due diligence and subsequent annual re-assessment undertaken for the portfolio indicate that potential for performance shortfall risk in closure obligations tend to emanate from the following key areas:

- Effluent discharge.
- Elevated background levels of heavy metals or suspended solids.
- Premature closure.
- Operational capacity and management.
- Efficacy of closure methods.
- Historical mining activities.
- Ecologically sensitive areas.
- Closure duration estimates.
- Closure cost estimates.
- Closure obligations and acceptance criteria.
- Conflicting interpretation between different regulatory authorities.
- Relationship with regulatory authorities.
- Public/stakeholder perception, concerns and expectations.

The list above is arranged in the order of increasing subjectivity from the author's point of view in characterising potential risks based on tangible data/information and the ease in determining the extent of residual risk after mitigation measures are considered.

Generally, risks toward the top of the list tend to be relatively straight forward to determine, provided adequate information is available. In contrast, as one proceeds down the list, the level of tangible information available to objectively assess a particular risk diminishes, with the result that these risks can only be ascertained qualitatively at best. For example, closure obligations and acceptance criteria often lack specifics or are vague, providing room for interpretation at the regulator's discretion. At the same time, what started out as a risk that can be assessed with relative ease based on tangible parameters can sometimes transform into a risk that is very subjective to quantify and mitigate as selected experiences below depict.

4.1 Effluent discharge and public concerns

Consider the case of a mine with high total suspended solids (TSS) discharge due to natural and elevated TSS levels, exacerbated by the mining activity. In this particular mine, certain amount of discharge from the tailings storage facility (TSF) is mandatory to maintain the regulated freeboard, while the ability to discharge in accordance with closure obligations depended on TSS levels in the receiving stream and not end-of-pipe discharge limits. While the seasonal TSS levels for the receiving water body were set originally based on extensive independent studies on impact to aquatic life, concerns expressed by stakeholders prompted the regulators to re-assess the permitted discharge levels with a view to potentially lowering them. In the event that the TSS levels are lowered, there is the distinct possibility of the mine not being able to meet either the freeboard level in the TSF or the TSS in accordance with the discharge permit. In this case, what appears to be undisputed scientific evidence was effectively pre-empted by subjective and intangible factors. What appeared at first glance to be a moderately low level of risk suddenly had the potential to become a much higher risk due to subjective matters. Until the revised TSS levels are set, this risk remains indeterminate, and the only mitigating factor for the financial institution is the stipulation that all laws and regulations have to be met and the option to not renew the financial instrument on expiry.

4.2 Elevated background levels of suspended solids

In another example, consider a mine with selenium discharge primarily due to natural but elevated level of selenium present in the area which has been exacerbated by the mining activity. In this jurisdiction, there are no pre-defined limits for selenium concentration in waters discharged to the environment, and hence are not included in closure obligations when the mine was originally permitted. Nevertheless, the regulatory authorities have since began to monitor and look into selenium concentration guidelines suggested in a number of academic research articles, and are contemplating the merits of introducing selenium discharge limits in the closure obligations. In addition, selenium, while higher in concentration than what the guidelines suggest, is difficult to remove from the effluent with commercially available technology at the present time given the high volume of effluent and relatively low concentration even at high costs. Hence, what started out as a tangible parameter and risk transformed into regulatory and performance risk that cannot be readily ascertained.

4.3 Premature closure

A premature closure event not only increases the overall closure risk since detail closure plans and cost estimates are not likely to have been developed and agreed by the regulator, but closure activities would have to be undertaken much earlier than anticipated. The extent of this risk is usually assessed by reviewing the economic viability of a mining operation during its anticipated life. This entails verifying the assumptions that underpin the mineral reserves (hence the economic life of the mine) and benchmarking the mine operating costs to gauge competitiveness among its peer group and sustainability of operation under long term commodity prices. A mine with borderline viability also means that closure undertaking is likely to be triggered prematurely.

4.4 Operational capacity and management

Experience and capability of the mining company in a particular setting and regulatory environment is an important consideration for the underwriting financial institution. For example, a mining company that has had successfully reclaimed and closed mines in a desert environment will still need to learn and adapt to the realities and peculiarities of closing a mine in an arctic environment under a different regulatory regime to be able to successfully meet its obligations.

General corporate experience and track record are considered to be the most reliable indicators of future success. When the corporate experience is limited or non-existent, expertise can still be developed by engaging appropriately experienced personnel in a complementary organisational structure. In some companies, the corporate culture and organisational hierarchy emphasises production in a way as to perhaps unintentionally conducting closure planning as an afterthought or as a separate exercise independent of mine production planning. This often directly impacts the long term success and cost of closing the mine. In the absence of demonstrable experience in having successfully closed a mine in a comparable environment, additional due diligence is required to ascertain the operational capacity and management that will be conducive to meeting closure obligations are sought, but the mitigation more or less it remains somewhat intangible as the assessment is subjective.

4.5 Historical mining activities

Pre-existing liabilities that result from historical mining activities can pose a significant challenge to the mine operator and the underwriter. In most circumstances, mining companies will do their best to eliminate legal or financial liability originating from pre-existing mining activities. However, this is not always possible in practice, for example, when the present activity entails re-processing of tailings materials, mining in a previously mined area or using a pre-existing tailings facility. Even when historical and present facilities can be clearly delineated on surface, when impacts are of latent or sub-surface nature, it becomes even more challenging to differentiate where the impacts emanate from and the ultimate responsible party. Further adding to this challenge is when impacts due to historical activities become intertwined with impacts due to present activities and affect the discharges of the mining company, the historical impact transforms into the present obligation. This is quite a common occurrence when hydraulic connection exists between delineated areas. In such scenarios, a proper characterisation of the area's hydrology and adequate understanding is critical for a sound assessment.

4.6 Closure cost estimates

As is the case with most mining operations that are not expected to cease in the short term, estimation of closure costs accurately is a difficult and subject to significant variations until detailed closure plans have been developed in consultation with the regulators and stakeholder communities and thus is subject to significant variations and increases.

While general closure objectives, concepts and activities are usually anticipated and defined in a closure plan, detailed closure activities are dependent upon actual mine plan, and are developed continuously and refined throughout the mine life, and when required, supported by reclamation trials and research work, culminating in the final reclamation plan towards the end of mine life. Given this, the future technical success of planned reclamation undertakings is inherently difficult to determine for any mining operation, particularly in early stages of the mine life. Performance risk can be mitigated to the extent practical by undertaking of studies and trial runs to characterise, establish and test and refine closure methods and costs.

Certain jurisdictions prescribe methodology to be employed in estimating closure costs while others allow the mining company to present their own estimating procedures. Even in cases where methodology is prescriptive, underlying assumptions and basis of estimates leaves ample room for disagreement between a mining company and the regulator. Some aspect of this is not surprising since the nature of closure activities are such that there are a lot of unknowns in early part of a mine's life.

When conducting due diligence in this area, the level of estimating details and basis for assumptions are verified for reasonableness and adequacy. Where available, the estimates are cross-checked with company's own asset retirement obligation (ARO) estimates since ARO calculations are the company's best estimate of closure costs without influence from the regulator's prescribed methodology and biases. While these two sets of estimates are not likely to be identical, they nevertheless serve as basis for comparison.

4.7 Closure obligations and acceptance criteria

More often than not, acceptance criteria are not defined to a level of specificity such that they can be relied to determine without ambiguity that closure obligations have been met. Closure obligations generally tend to be qualitatively specified for the most part, while leaving the final acceptance to be determined solely by the

regulator. While this approach is understandable given the historical context of legacy closure issues at abandoned mine sites, it nevertheless presents a material element of risk for the financial institution as uncertainties can lead to forfeiture of the reclamation security. When faced with such a scenario, the only mitigating factor to rely on would be to discover how other properties have been adjudicated by the same regulator (which is usually not possible), the mining company's capability and capacity, and the strength of their relationship with the regulators, all of which are subjective.

5 Conclusion

The foregoing discussion underscores the findings that tangible parameters and measures are critical for sound and objective assessment of closure risks from the perspective of a financial institution that underwrites financial liability risk associated with reclamation and closure securities. On the other hand, it is equally recognised that subjective and nebulous risks will inevitably be encountered that render the assessment more challenging and less objective whilst making it difficult to fully mitigate such risks.

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