



IGF

INTERGOVERNMENTAL FORUM
on Mining, Minerals, Metals and
Sustainable Development

GLOBAL REVIEW:

Financial assurance
governance for the
post-mining transition

Secretariat hosted by



Secretariat funded by



Kingdom of the Netherlands

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The IGF is focused on improving resource governance and decision making by governments working in the sector. It provides a number of services to members including: in-country assessments; capacity-building and individualized technical assistance; guidance documents and conferences which explore best practices and provide an opportunity to engage with industry and civil society.

The International Institute for Sustainable Development has served as Secretariat for the IGF since October 2015. Core funding is provided by the governments of Canada and the Netherlands.



Global Review: Financial assurance governance for the post-mining transition

August 2021

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ACKNOWLEDGEMENTS

This report outlines the current state of—and global leading practices in—mine closure financial assurance to support post-mining transition governance for IGF members.

During the development of the report, numerous discussions were held with relevant industry and regulatory specialists. Specifically, the authors and IGF would like to extend their thanks for insights provided by Jeff Parshley of SRK Consulting; Bjorn Weeks and Darren Murphy of Golder Associates; Adriaan Oosthuizen and Konrad Kruger of Jones and Wagener; Dawn Brock and Alice Davies from the International Council on Mining and Metals (ICMM); Doina Priscu of Teck Resources Limited; Nyundo Armitage of Armitage Consulting, Gilles Tremblay from the International Network for Acid Prevention (INAP); Kim Ferguson from BHP; Patrick Chevalier of Natural Resources Canada (NRCan); and Sheila Roberge, Ministère de l'Énergie et des Ressources Naturelles de Québec.



EXECUTIVE SUMMARY

As the number of mines expected to close in the coming years increases, governments are increasingly focussed on how mine operators manage the post-mining transition. One important aspect of that transition is mine closure financial assurance. That is the monetary sum that mining companies provide to governments or regulators to fund the mitigation and management of environmental and other liabilities related to a mine's closure if the company fails to fulfill its obligation of fully closing the mine. Financial assurance is key to ensuring mines are not orphaned or abandoned. If a mine operator fails to deliver proper mine closure and site reclamation, the financial assurance enables a third party to step in and do the work on behalf of government.

Accurately assessing the closure costs is critical, along with effective planning and implementation approaches. Leading-practice countries continue to refine and improve their financial assurance policies, and numerous international and country-specific guidelines, policies, toolkits, and standards have been produced. The global consensus is clear: Governments need adequate financial assurance to successfully achieve post-mining transition.

Mine closure has a multitude of socio-economic and land management implications—both positive and negative—and there is a lot at stake for governments, industry, and local communities alike. Financial assurance allows policy-makers to put people and the environment first and achieve post-mining transitions that allow communities to use reclaimed land (where possible) and effectively manage long-term environmental and other liabilities.

The Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) produced this report as part of its continued effort to promote, train, and support its member governments around international good practices on the post-mining transition. The report provides a review of publicly available information concerning financial assurance and includes input from key industry actors on the various approaches taken by leading-practice countries. It includes approaches to calculating closure costs and financial assurances and outlines the policy elements of good financial assurance governance. The report also identifies important tools to deliver effective assurance mechanisms and notes the key trends, uncertainties, and gaps among global leading-practice jurisdictions.



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Photo: Raina Hattingh

1.0 MINING-RELATED FINANCIAL ASSURANCE

1.1 INTRODUCTION

Governments worldwide are struggling with the impacts and associated human and financial resources needed to manage a multitude of existing orphaned or abandoned mines. This, together with the knowledge that many operating mines are nearing closure and have the potential to generate further long-term liabilities if not adequately reclaimed, has placed renewed emphasis on identifying and implementing the most appropriate processes, approaches, and mechanisms for accurately determining a site's closure costs and the required financial assurance.

This report has been compiled in support of the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development's (IGF's) continued effort to promote, train and support its member governments around international good practices on the post-mining transition. It provides the outcomes of a review of publicly available information and engagement with industry players on the approaches followed across various global country leaders in determining closure costs and the associated financial assurances, as well as key instruments and mechanisms used to make provision for this assurance.

1.2 WHAT IS FINANCIAL ASSURANCE, AND WHY IS IT IMPORTANT?

Modern mining reclamation and closure practices are more highly regulated, better implemented, and more accountable than ever before. Nevertheless, there is a risk that some operators may not be able to fulfill their closure obligations to the standards required. In these circumstances, financial assurance mechanisms provide government with access to enough funds to rehabilitate/reclaim and relinquish these sites properly (Minerals Council of Australia, 2017).

The term "financial assurance" refers to "any required contractual document and financial instrument used to confirm that an operator will perform rehabilitation" as required in country-specific legislation (Shen, 2016, p.7). It may also be referred to as a financial provision, or an environmental, closure, or reclamation bond.



If the mine operator fails to carry out the required closure activities, the financial assurance should enable a third-party contractor to undertake these activities at the direction of the responsible party (federal or state land administrator). The financial assurance aims to ensure that the industrial users of lands and resources are the ones who pay for the closure and, ultimately, successful post-mining transition. This approach is also in compliance with the “polluter pays principle” that is broadly applied in today’s mining industry (Kuipers, 2003).

Ultimately, financial assurance is a monetary safeguard to protect governments from incurring unfunded liabilities should a mining company be unable to meet its closure obligations.

Financial assurance is important for three main reasons (Dondo, 2014):

1. Revenue will no longer exist post-mining to support rehabilitation, monitoring and care and maintenance activities.
2. Unforeseen variations in mineral prices or other circumstances can result in premature/ unplanned/ unscheduled mine closure, or in the bankruptcy or insolvency of the mining company.
3. Premature mine closure may negatively affect the disturbed environment even long after rehabilitation has been completed.

Planning for financial assurance implies knowledge of closure cost estimates, as well as the various instruments/mechanisms used to support the financial insurance.

Figure 1 illustrates the interrelatedness of these various aspects, highlighting the following:

- **Closure cost estimates** are the actual calculations used to determine the monetary value of the required financial assurance. The calculations are based on identified closure activities (in the form of mitigations or controls) for individual physical and biophysical site components, also referred to as closure liabilities. Cost estimates are typically subject to company audits and periodic third-party reviews and verifications, which are used by authorities to review and approve them both for permitting and as part of the mining licence.

RECLAMATION, RESTORATION, REHABILITATION, AND REMEDIATION

A number of terms are used to describe the actions that are taken to close a mine site and return it back to a natural or productive state. In this paper, we primarily use the term reclamation, but other terms are often used to describe these actions, including restoration, rehabilitation, and remediation.

Reclamation: The process of restoring or returning disturbed land to a natural state that may include return to a natural sustainable ecosystem or alternative vegetation.

Restoration: The process of assisting the recovery of disturbed land to a natural sustainable ecosystem that is as close as possible to the pre-disturbed condition.

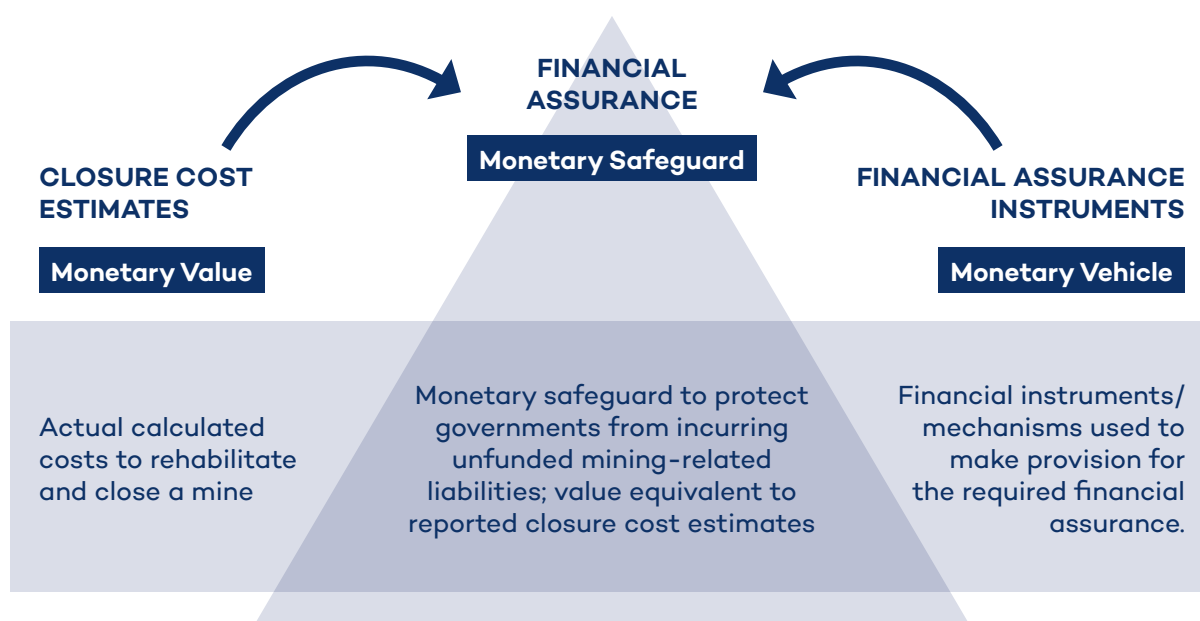
Rehabilitation: Similar to reclamation, although it can be used interchangeably with mine closure in some jurisdictions.

Remediation: The process of cleaning up contaminated areas and materials such as soil. It can also be used more broadly to refer to the clean-up and reclamation of a mine site.



- **Financial assurance** is the monetary provision (safeguard)—based on the value reported from the closure cost estimates—required to be made by the company to mitigate and manage mining-related closure liabilities.
- Financial assurance can be provided through various **financial instruments or mechanisms** based on in-country legislation and agreement with government decision-makers. Closure cost estimates, the resultant financial assurance and preferred instruments are always site-specific.

FIGURE 1. RELATIONSHIP OF CLOSURE COST ESTIMATES, FINANCIAL ASSURANCE, AND FINANCIAL ASSURANCE INSTRUMENTS



Source: Author diagram.

1.3 TYPES OF CLOSURE COST ESTIMATES

The mining industry uses a number of different types of closure costs estimates to meet the internal requirements of companies and those of regulators, investors, and others. As highlighted in the International Council on Mining and Metals' (ICMM's) recently published *Integrated Mine Closure Good Practice Guide* (2nd Ed.) (ICMM, 2019b, p. 47), "it is important for mining companies to make clear distinctions between the different types of cost estimates as they serve different purposes." For governments, the most important cost estimate is the one that forms the basis for the financial guarantee that will be provided to the regulatory body. The different types of cost estimates, as highlighted by the ICMM, are provided in Table 1 (modified). A detailed description of each of these types of closure cost estimates is provided in the ICMM's *Financial Concepts for Mine Closure* (ICMM, 2019a).

**TABLE 1. TYPES OF CLOSURE COST ESTIMATES USED BY INDUSTRY**

<p>LIFE-OF-ASSET (LOA)</p> <p>Costs that the operator expects to incur at the end of the mine life</p>	<ul style="list-style-type: none"> • Used internally to estimate the expected full cost to close a mine for asset valuation, business planning and budgeting purposes. • Based on owner/ operator costs of mine closure at the end of planned mine life. • Considered as the total cost of preparing for closure (including studies, research, trials, and progressive reclamation), labour, adjustment costs, decommissioning and demolition, reclamation, post-closure monitoring and relinquishment.
<p>FINANCIAL LIABILITY</p> <p>Estimated liability based on applicable accounting requirements</p>	<ul style="list-style-type: none"> • Used for financial reporting to shareholders and stock exchanges and is normally not used for regulatory cost estimates or financial assurance. • Typically referred to as the Asset Retirement Obligation. • Represents public disclosure to support accounting and reporting requirements as defined by the mine owner's relevant financial reporting standard and based on any legal obligation, liability or compliance as a minimum. • Represents a net present value (NPV) estimation for the closure and reclamation costs of the current disturbed footprint and decommissioning of the mine infrastructure at the time of reporting (usually annually). • Represents the amount that a company would reasonably and rationally pay to settle the obligation (liability) on the reporting date or to transfer to a third party.
<p>SUDDEN CLOSURE</p> <p>Costs to close the operation in its current state</p>	<ul style="list-style-type: none"> • Used for internal planning purposes to evaluate business risk response to unforeseen changes in the physical, political, social, or economic conditions (e.g., sudden commodity price drop). • An estimate of the costs to close the mine tomorrow. • Not normally applicable to or used for regulatory purposes, although some jurisdictions may require a regulator's cost estimate to be based upon assumed unplanned closure at a particular point in time that may not be at the end of mine life.
<p>REGULATORY ESTIMATE (FINANCIAL ASSURANCE)</p> <p>Costs that form the basis of a financial guarantee provided to a regulatory body</p>	<ul style="list-style-type: none"> • Used by the regulator to establish a financial assurance as required by regulation. • Calculated liability at all phases of the mine life cycle from exploration activities through to full operation. • Closure cost estimates are required by law to be included in financial assurance against sudden/ unplanned closure. • Based on a third-party, non-government contractor undertaking the work. It is not discounted by mine asset values.

Source: Adapted from ICMM, 2019a.



1.4 FINANCIAL ASSURANCE INSTRUMENTS

Internationally, there are numerous instruments for providing financial assurance, such as bank guarantees, surety bonds (insurance), trust funds, cash deposits, and company guarantees. Deciding which of these instruments to apply often depends on a multitude of factors, including specific in-country legislative requirements, the financial standing and capabilities of the mining company, the value of the calculated environmental liability, or the time period over which the liability is to be managed or mitigated. What works for one company or jurisdiction may not be suitable for another. In some cases, more than one type of instrument may be used for a given mine site and change as the mine nears closure. For example, requiring a small amount of cash in addition to a letter of credit or surety bond may be prudent to provide funds to stabilize a site if it is abandoned, while the full amount of the financial assurance is recovered. Also, mines that are self-assured by the mining company may transition to a more secure form of assurance such as a letter of credit near the end of the mine life. In all cases, the company is responsible for the costs associated with obtaining and maintaining financial assurance.

Below and in Table 2 is a description of the most common instruments used for financial assurance along with their strengths and weaknesses drawn primarily from Miller (2005) and Sassoon (2009).

LETTER OF CREDIT

A letter of credit, also referred to as a bank guarantee, is an irrevocable agreement between a bank or financial institution and the company whereby the bank agrees to provide funds to a third-party beneficiary (the government) according to the terms and conditions of the agreement. The terms and conditions need to reference the approved closure plan and associated costs. Since the credit is irrevocable, the bank must provide the funds to the beneficiary for a legitimate claim according to the terms of the agreement. A letter of credit normally has a one-year term and is renewable. Any changes to the terms of the credit must be agreed to by all parties (company, government, and bank). If the bank does not agree to renew the agreement and the company does not provide a suitable alternative form of assurance, then the letter of credit is in default, and the government can request payment in full. This is considered a secure form of financial assurance.

SURETY BOND

A surety bond, also referred to as a performance bond or insurance bond, is an agreement between a mining company and an insurance company with the government as the beneficiary of the bond. The bond guarantees that the company will fulfill its closure obligations as required by government; otherwise, government can draw from the bond to recover any financial losses. The insurance company should be licensed under relevant local or national legislation. Similar to a letter of credit, they are issued for a defined period of time and are renewable, and any changes must be agreed upon by all parties. The terms and conditions need to reference the approved closure plan and associated costs. Upon renewal, the value of the bond may be adjusted to reflect current closure liabilities. If the bond is not renewed, and the company does not provide a suitable alternative form of assurance, then the government can request payment in full. This is considered a secure form of financial assurance.



CASH

A deposit of cash, a bank draft, or certified cheque that will cover the closure costs. The funds are deposited with government and should be held in an account that can only be accessed and used by government to cover a default in closure completion by the mining company. Cash is a secure form of financial assurance as long as the funds remain in account to be used only for mine closure if needed.

COMPANY (SELF) GUARANTEE

A company guarantee, also referred to as a corporate guarantee or self-test, is where an evaluation of the assets, liabilities, and financial strength of a mining company is used to assess the company's ability to cover closure costs. A range of measures may be considered in the evaluation, such as the company's current bond rating, the ratio of assets to liabilities, the company's financial history, and the net worth of liquid assets. A company guarantee may be used to cover the full financial liability for closure but is more often combined with other forms of financial assurance to make up only a portion of the total financial assurance required by government. Many jurisdictions have moved away from accepting company guarantees due to risks involved in this form of assurance and due to public perception and the contradiction that a company is guaranteeing itself against its own liabilities.

TRUST FUND

A trust fund, also referred to as a cash trust, a qualifying environmental trust, or mining reclamation trust, is an agreement between a mining company and a trust company whereby a specific amount of money is set aside for the sole purpose of funding the closure of a site. There should be an agreement between the mining company and government that is administered by the trust that specifies the amount of funds required in the trust, the acceptable forms of the funds (e.g., cash, bonds, securities), how the funds can be used and the contribution schedule into the trust. The funds should be designated for closure liabilities only and ringfenced from general budgets, and each mining operation should have its own separate fund that is not combined with other funds in the same company. Contributions by the mining company typically occur over a number of years and can be structured to reflect increasing closure liabilities as a mine develops. While this is a secure form of financial assurance, it may not be fully funded in the early years of a mine operation and thus includes a level of risk.

GOVERNMENT MINING REHABILITATION/RECLAMATION FUND

The state of Western Australia replaced the requirement for closure performance bonds with a Mining Rehabilitation Fund in 2012 (although bonds may still be required for high-risk operations). In this scheme, mining operations pay an annual non-refundable fee into a pooled Mining Rehabilitation Fund based on the level of ground disturbance at the operation. The funds are held and managed by the state and can be used for closure costs of any operation in the event a company defaults on its closure obligations and efforts by the state to recover funds from the operator have been unsuccessful. The funds are held in a special purpose account and can only be used for purposes set out in the Mining Rehabilitation Fund Act. As such, they are separated from general revenue and budgets. It is important that the use of government-managed closure funds is clearly defined and that the funds are separated and secured from general revenues and cannot be accessed and used for purposes other than closure costs in the case of a shortfall or default by a company. Interest earned by the



fund is intended to be used to reclaim abandoned mining sites across the state. The scheme moves away from the requirement for every operation to maintain full financial assurance and thereby reducing the capital requirements on industry. It is expected that it will take several decades before the fund is fully capitalized. Other states in Australia, including Queensland and the Northern Territory, have implemented similar funds but still require performance bonds at individual operations while the fund is being capitalized.

TABLE 2. ADVANTAGES AND DISADVANTAGES OF COMMON FINANCIAL ASSURANCE INSTRUMENTS

INSTRUMENT	ADVANTAGES	DISADVANTAGES
<p>Letter of credit (bank guarantee)</p>	<ul style="list-style-type: none"> • Inexpensive to set up, with low administrative requirements. • Secure (subject to the strength of the financial institution). • Does not tie up company capital. • Irrevocable and non-transferable. Any changes require consent of all parties including government. • If the bank does not renew the credit, and the proponent fails to provide an acceptable alternative, the government can request payment of the full outstanding credit. • Government can reserve the right to approve which banks can issue guarantees which can reduce the risk of failure of weak institutions. 	<ul style="list-style-type: none"> • Annual review and renewal by the bank, which may decide not to renew the guarantee. • Availability is subject to the credit rating of the company. Some companies may need to place up to the full value of the credit on deposit with the bank. This may reduce their borrowing power. • Annual cost to the company ranges from 0.5% to >3% of the guaranteed amount. • Funds do not generate interest. • Government may specify which banks it accepts. This could be a disadvantage in some countries if a local bank that may have limited financial resources is required. • Bank or financial institution may fail or become unable to cover the liability.
<p>Surety bond (insurance/performance bond)</p>	<ul style="list-style-type: none"> • Low cost to the company, but often more than a letter of credit. Low administrative requirements. • Does not tie up company capital. • Any changes require consent of all parties, including government. • If the insurance company does not renew, the government has the option of drawing the full amount (unless the operator provides another form of financial assurance). 	<ul style="list-style-type: none"> • Bond issuer may fail • Availability is subject to the credit rating of the company. Some companies without a proven track record may need to place up to the full value of the bond on deposit with the insurance company. This may reduce their borrowing power.



INSTRUMENT	ADVANTAGES	DISADVANTAGES
Cash, bank draft, certified cheque	<ul style="list-style-type: none"> • Cash is secure and readily available to cover closure costs. • High public acceptance ("visibility"). • Suitable for small/junior miners who may not meet stringent bank criteria for a letter of credit. • Deposited funds may accrue interest. 	<ul style="list-style-type: none"> • Significant company capital is tied up. • Some governments may be tempted to use deposited cash for other purposes. • Financial institution may be under the control of government. In such cases, mining companies may be reluctant to use those banks due to the risks of theft/fraud/redirection of the funds.
Company (self) guarantee (balance sheet test)	<ul style="list-style-type: none"> • Does not tie up company capital. • Least costly instrument for companies. • Simple to administer. • Company annual reports and financial statements are publicly available (for listed companies). • Many jurisdictions that accept self-guarantees require that they be converted to other types of financial assurance (e.g., bonds, letters of credit, etc.) well before the end of mine life. 	<ul style="list-style-type: none"> • Limited public acceptance. • Requires a long history of financial stability, a credit rating from a specialized credit rating service, and at least an annual financial statement prepared by an accredited accounting firm. • Even large companies can fail, regardless of financial history. • Governments must have the capacity and expertise to regularly review the financial strength of the company.
Trust fund (mining reclamation trust/ environmental trust)	<ul style="list-style-type: none"> • High public acceptance due to "visibility and transparency." • The fund may appreciate in value. • Types of investments available can/should be decided by the proponent and government and specified in the agreement. • If payments are not made by the proponent, and no acceptable alternative is provided, the government can draw the full amount of the fund. • Trust Fund management and performance subject to periodic review. • Could be used to fund post-closure operating and sustaining capital costs (as opposed to funding costs during the actual closure period). 	<ul style="list-style-type: none"> • Relatively costly to manage and administer. • Company funds are increasingly tied up. • Risk of poor long-term fund investment and management. • May not accumulate enough value if the mine closes prematurely. • A secondary financial assurance instrument (bond, letter of credit, etc.) may be required until the full amount of the fund is reached.



INSTRUMENT	ADVANTAGES	DISADVANTAGES
<p>Government mine rehabilitation/reclamation fund</p>	<ul style="list-style-type: none"> • Intended to reduce the capital requirements of financial assurance for companies. • Cost may be similar to other forms of assurance for some companies, particularly smaller and lower-credit-rated companies. • Funds could be used to address closure issues that develop after relinquishment, thus supporting a pathway to relinquishment. • Interest earned on the fund can be used by government to address abandoned mine sites. • In the long term, once the fund grows to an acceptable size, it can reduce the cost of financial assurance to companies. 	<ul style="list-style-type: none"> • May not have sufficient funds to cover a default in the first few years after the creation of the fund and may not have sufficient funds to cover multiple closure defaults at the same time. • May take decades to fully capitalize. • Company contributions are non-refundable. • Requires a relatively large mining sector in order that sufficient funds are deposited annually to grow the fund. • Funds are controlled by government, which has the risk that funds are used for other purposes.

Source: Adapted from Miller, 2005 and Sassoon, 2009



Photo: Raina Hattingh

2.0 LEADING GLOBAL FINANCIAL ASSURANCE PRACTICES

Within the mine closure space, certain countries are at the forefront of ongoing refinement and improvement of closure planning, guidance, and implementation. Australia, Canada, Germany, as well as the state of Nevada in the United States, are some of these “global leading-practice players,” tending to have wide-ranging, stringent, and effective regulations in place that combine a command-and-control approach and economic incentives to stimulate best practice in the mining sector.

Numerous international and country-specific mine closure guidelines, policies, toolkits, or standards have been produced in the past 20 years by these countries and others (see Appendix A for a consolidated list), often providing detailed step-by-step approaches to the key required aspects of mine reclamation and closure planning. More recently, this guidance has emphasized the importance of the following:

- Ensuring mine closure is an integral part of life-of-mine planning starting at project inception and as part of assessment, engagement, design, and permitting.
- Developing a well-planned post-mining landscape, conceptualized at project inception. This can guide progressive operational reclamation activities (where possible) and optimized associated reclamation expenditure.
- Updating, refining, and improving the mine closure plan on a continual basis throughout the life of the mine, using the outcomes of ongoing site-specific studies, progressive reclamation performance and monitoring, and stakeholder engagement to guide this improvement trajectory.
- Using a risk-based closure planning approach to identify, mitigate, and manage operational, residual, and latent risks—physical, biophysical, social, and economic—toward reducing the long-term financial exposure to the mine and state.
- Establishing specific, measurable, achievable, realistic, and time-bound (SMART) completion criteria to demonstrate achievement of reclamation and closure goals to decision-makers, toward receipt of closure certification and, ultimately, relinquishment of their mine-related responsibilities.



- Involving all levels of decision-makers and direct stakeholders, including regulators and various government agencies, mine employees, post-mining landowners, private funders, and nearby communities in mine closure planning, toward building accountability and stewardship for the post-mining landscapes and socio-economic transitions across all levels of interested or affected communities.













2.1 LEADING FINANCIAL ASSURANCE POLICY REQUIREMENTS: WHAT GOOD FINANCIAL ASSURANCE GOVERNANCE LOOKS LIKE

Financial assurance policy requirements of the leading jurisdictions have a number of common features that collectively outline what good financial assurance governance currently looks like (below and Table 3). Governments that are implementing or updating financial assurance policies and regulations should incorporate most or all of the features listed below to meet current best practices. For additional details, please refer to Appendix B which outlines the financial assurance practices and mechanisms currently employed by a number of leading jurisdictions in mine closure planning and execution.

Best practices in financial assurance policies and regulations include:

- A closure plan and closure cost estimate are required as part of the mine permitting process before mine development begins.
- Closure cost estimates are based on a third party completing the closure activities in current dollars (not discounted) and include maintenance and monitoring costs for a period after closure. Issues such as long-term water management should be included in the cost estimate and may be discounted to the date of proposed closure. Reductions in costs for the sale of assets or value of the mineral property are not included.
- The full amount of the current closure cost estimate should be covered by financial assurance at all times. In some jurisdictions, the full amount of the closure cost estimate may be required up front before construction begins, in others the full amount is reached over the first few years of development and operation as the level of disturbance and closure liability increases.
- The closure cost estimate and level of financial assurance should be reviewed and adjusted regularly to reflect the level of disturbance and changes in the mine plan. This adjustment is undertaken annually in many jurisdictions but up to 5 years in others. Updated cost estimates and financial assurance should be required whenever there is a material change to the mine plan that would impact closure costs.
- Partial release of financial assurance should be authorized as progressive reclamation is undertaken and outstanding closure costs are reduced.
- Cost estimating and financial assurance guidance documents should be developed, or leading international guidance documents should be referenced to support the preparation of cost estimates by companies and the review by government.
- Standardized cost estimating spreadsheets should be considered. Several jurisdictions require the use of spreadsheets that contain standardized rates for the cost of different activities. In some cases, these rates are fixed, and in other cases the proponent can adjust the rates with justification.

**TABLE 3. FINANCIAL ASSURANCE (FA) INSTRUMENTS OF LEADING-PRACTICE JURISDICTIONS**

	 Cash and equivalents	 Letter of credit/ bank guarantee	 Surety/ insurance bond	 Corporate guarantee	 Environmental trust	 Government rehabilitation/ reclamation fund			
JURISDICTION	FINANCIAL ASSURANCE INSTRUMENTS						COST ESTIMATING TOOLS	REVIEW PERIOD* (YEARS)	PARTIAL RELEASE OF FA FOR PROGRESSIVE RECLAMATION
									
Western Australia						✓	N/A	1	Annual payment related to area of disturbance
Queensland	✓	✓	✓			✓	✓	1	✓ (If financial surety is required)
New South Wales	✓	✓	✓				✓	1	✓
Victoria		✓					✓	Variable according to changes in mine plan	✓
South Australia	✓	✓	✓				✓	Variable according to changes in mine plan	✓
Northern Territory	✓	✓				✓	✓	1	✓
British Columbia	✓	✓		✓	✓		✓	5	✓
Ontario	✓	✓	✓	✓	✓		Guidance only	Variable according to changes in the mine plan	✓
Quebec	✓	✓			✓		Guidance only	5	✓
Northwest Territories	✓	✓					✓	Variable according to changes in mine plan	✓
South Africa	✓	✓			✓		✓	1	✓
Nevada	✓	✓	✓	✓	✓		✓	3	✓

* In most jurisdictions, a review of financial assurance is undertaken at regular yearly intervals and whenever there is a material change in the mine plan that may impact the cost of closure.



- The most commonly accepted forms of financial assurance are: cash (or cash equivalent), letter of credit/bank guarantee, and surety/insurance bonds. A few jurisdictions also accept environmental trusts and company (self) guarantees. The use of government rehabilitation/reclamation funds is increasing, particularly in Australia.
- The financial assurance instrument is normally proposed by the proponent based on the forms accepted in the jurisdiction and confirmed through agreement between the government/regulator and the proponent.

2.2 CROSS-CUTTING SOCIAL ISSUES

Among the global trends in financial assurance, achieving and promoting a post-mining transition that contributes to thriving economies, communities, and alternative land use are critical. The following key cross-cutting social and emerging issues should be considered from project design through operation and closure.

- Sustainable Development Goals (SDGs) and how a site's long-term closure can contribute to advancing these goals, should be factored into planning and financial assurance calculations, using predictive modelling tools, and especially relative to: gender equality; climate adaptability; long-term food and water security; and broader goals such as poverty reduction, equitable education, economic growth, and local to global partnerships.
- Monitoring and measurement techniques that incorporate local and traditional knowledge should be used in addition to technology to demonstrate that agreed-on relinquishment criteria have or are being met.
- Development of alternative economic opportunities for closed mine sites, such as alternative power, recreation facilities, and infrastructure repurposing should form part of closure planning without compromising safety and environmental stability. Including these post-mining options into a site's long-term plan can significantly alter the focus of reclamation activities and the associated closure costs.
- Post-mining transition planning requires strategic retraining/upskilling of employees and identified vendors in support of identified post-mining land uses and economic activity, as well as to expand potential markets for vendors. This should be aligned with national and local socio-economic strategies in addition to social and economic development assistance programs. Retraining and upskilling are not currently included in most financial assurance calculations.
- Development of alternative economic opportunities cannot be the responsibility of the mining industry alone. Government, private–public partnerships and support from international and local organizations and academia are likely required. More work is required to understand and quantify how social and non-reclamation-related closure costs should be incorporated into cost estimations and financial assurance.
- Addressing social and sustainable development goals in the site-specific post-mining transition can be challenging and may take years to plan effectively. This emphasizes the importance of initiating mine closure planning as early in the mining life cycle as possible as part of baseline studies, stakeholder engagement, project design, and impact assessments.



Photo: Raina Hattlingh

3.0 FINANCIAL ASSURANCE— GLOBAL, UNCERTAINTIES, AND GAPS: DISCUSSION

There is no doubt that mine closure planning with adequate financial assurance to support successful reclamation and closure is moving higher on regulators’ agendas internationally: good mine closure and post-mining transition planning and governance are considered good practice.

Together with a continued focus on environmental cleanup and landscape reclamation, there are several key global good practice trends in governance applicable to devising and implementing adequate financial assurance for mine closure. However, there are also numerous uncertainties and gaps that, if not addressed, could hinder the long-term management of mining-related rehabilitated landscapes for decades to come.

3.1 REGULATORY FOCUS AND GOVERNANCE

GOOD PRACTICE TRENDS

Financial assurance requirements are becoming increasingly stringent in legislation worldwide. Where this legislation is in place, it conveys that the purpose of financial assurance is to guarantee that an arms-length private operator can cover present and future environmental costs related to its activities. It is clear that governments are no longer willing to take on the burden of possible future orphaned, abandoned, or ownerless mines.

Regulations appear to adopt either a prescriptive or performance-based approach around financial assurance requirements. As identified by May (2003, p. 2), “highly-prescriptive regulation specifies particular materials to be used and particular grades of the material that are acceptable for different conditions. A performance-based regulation specifies a threshold of acceptable performance and a means for verifying that the threshold has been met.” Hence, a prescriptive approach focuses on control and accountability for specific dimensions or material parameters, whereas a performance-based approach underlines flexibility with accountability for specific outcomes.



Prescriptive regulations may allow for simpler monitoring and enforcement by regulators. However, they allow little room for a mine to apply flexibility in its site-specific approaches or materials—this could limit its ability to adapt reclamation activities and associated cost estimates to a changing mine plan, biophysical, or socio-economic condition. Performance-based approaches allow for consideration of a range of planning levels (e.g., upper and lower costing limits), promoting flexibility in selected approaches and allowing for innovative, often less costly, options for reclamation. However, performance-based approaches require a good level of technical capacity within regulatory bodies to manage effectively, and this may not be available in all jurisdictions.

To assist in the implementation of closure regulations, there has been an increase in jurisdictional guidelines, policies, and frameworks to support overarching acts and regulations. In the absence of country-specific guidance, international standards such as the International Finance Corporation's (IFC's) Performance Standards and Equator Principles continue to play an important role in providing underlying guiding principles to establish baseline closure and financial assurance requirements.

There is a global consensus that closure cost estimates need to be periodically reviewed—this ranges from annually to every five years (longer in some jurisdictions). This review could include annual inflation indexing, periodic updates based on field verification of stated reclamation activities, incorporation of site changes, and refinement of cost estimate accuracy. Most countries require a refinement to the cost estimate (and associated financial assurance) when the “mining title is renewed; there is a change in the operating plan; there is a transfer of assets; progressive reclamation is undertaken; and/or the regulator has due reason to request a review” (Kung et al., 2020).

The expected standard of site reclamation and closure, the monetary value of the financial assurance to achieve this standard, as well as the preferred instrument for provision of this assurance need to be agreed on before a mining project is authorized. This implies that the process and methodology for financial assurance need to be transparent and verifiable. Although the value of the financial assurance may fluctuate and is adjusted over time, “the process of adjustment must be well understood and agreed in advance so there will be no surprises” (ICMM, 2005, pp. 12–13).

Orphaned, abandoned, and ownerless mines (legacy sites) are mostly managed as separate entities by governments. Money for this management is sourced from various state schemes, with some countries having specific “legacy sites” funds. In Australia, through the Mining Rehabilitation Funds in Western Australia, and Queensland,, operating mines need to assist in funding rehabilitation of these “past transgressions,” which places a strong focus on the “polluter pays principle.” Similar funds/programs have been in place in the United States for years.

UNCERTAINTIES AND GAPS

While there have been important advances in the management of mine closure over the past few years, the pace of change in regulations around mine closure and the post-mining transition appears to be slow, compared to the pace of change expected by society. Citizens and communities are becoming vocal and demanding in all regions of the world. They want legacy sites to be cleaned up, will not tolerate adding to the number of legacy sites, and are refusing to or are blocking government's right to approve new sites in part because of the poor record of governments and industry on post-mining transition and closure governance.



In addition, there continues to be a lack of technical capacity, experience, and resources (human and financial), within many regulatory bodies to consistently carry out the monitoring and associated enforcement required to ensure appropriate application of governing legislation. This hinders the effective enactment of closure-related legislation, often unwittingly underpinning industry submission of insufficient closure plans and associated inadequate provision of financial assurance.

3.2 CLOSURE COST ESTIMATION

GOOD PRACTICE TRENDS

Over the past decade, where closure, rehabilitation, or reclamation plans have been designed based on site-specific conditions, cost estimates have become considerably more detailed. This has resulted in closure knowledge that is more detailed, has risks and gaps identified for further investigation, and produces associated cost estimates that are more accurate and realistic.

In some countries, specified closure cost models or tools are provided by regulators to support legislative requirements. Many of these are publicly available for global use or site adaptation. In countries where specific tools are not prescribed, it is generally accepted that financial provision is estimated based on the closure activities identified by the team calculating the costs.

Good closure cost estimates are those based on well-defined and documented cost estimating methodology and that include a project-specific work breakdown structure, general and site-specific cost assumptions, and site uncertainties, risks, and inherent sensitivities: “Without a documented basis, interrogation of closure costs to determine their robustness and understand temporal shifts in liability estimates is difficult—if not impossible” (Richards et al., 2018).

Although closure cost estimates are always site specific, there are numerous common aspects and costing qualifications that need to be included in a robust estimate. These aspects include, but are not limited to:

- Consideration of physical (infrastructure), chemical and biophysical (environmental) closure activities that can be progressively implemented and monitored.
- Inclusion of equipment and machine mobilization costs, including associated labour requirements (assuming the need for use of third-party equipment/machinery).
- Inclusion of site post-closure care and maintenance and/or monitoring and management, while achievement of closure criteria is being demonstrated.
- No allowance for the offset salvage value of equipment and/or scrap materials generated from demolition activities.
- No allowance, or separate allowance, for internal company costs such as research and development, employee severance costs, taxes, or project management. Severance, retrenchment, retraining, and final community development costs are sometimes reviewed at the same time as reclamation costs although they are not part of financial assurance since they are governed or overseen by different agencies and under different laws and agreements.



- No discounting of reclamation and closure activities to the present using NPV, as unplanned closure could occur at any time.
- No reduction in costs for progressive reclamation activities until after the work has been completed, and closure criteria can be demonstrated.
- Discounting of costs that occur after closure (such as post-mining monitoring and care and maintenance), to the time of closure (but not to the present).
- Inclusion of a contingency allowance that reflects the degree of uncertainty in the closure planning at the time of closure cost estimation.

Regardless of the cost model used, recent focus is being placed on understanding and including the costs associated with residual and longer-term site liabilities such as the physical stability of waste rock facilities, ongoing water management, and erosion control. There is a significant monetary value difference between sites that can be successfully relinquished at the end of the mine life and those that require ongoing care and maintenance due to the presence of residual site risks. The latter requires financial assurance to fund the costs of ongoing site care and maintenance by the next landowner/s. In cases where post-closure residual risks exist, legislation should provide that the operator can still obtain a closure certificate by making financial provision for the management activities of these ongoing liabilities.

UNCERTAINTIES AND GAPS

Closure cost estimation tools based on standard unit costs are generally accepted as being less accurate than methods that use first principles to estimate site-specific costs. The accuracy of the estimate for any one mine will be dependent on the ability to apply site-specific conditions and good cost estimating principles. Some jurisdictions abandoned the "standard unit cost" or "standard cost per area" approaches because they could not address site-specific conditions and apply a single unit cost for all the mines. For example, these tools typically use a single cost for all tailings impoundment covers (or for the entire impoundment). However, good tailings design, operation, and closure practice says the cover designs should be site specific.

As highlighted by Richards et al. (2018), many publicly available cost estimation models appear to have been devised specifically to inform financial assurance requirements for regulators: "While these models impart the benefits of accessibility and simplicity, these cost tools often do not adequately account for the full suite of elements required of a mine closure cost estimate" (Richards et al. 2018). The risk-based approach adopted by the mining industry is resulting in operators increasingly looking to more detailed approaches and tools to prepare estimates for full life-of-mine closure liabilities.

As many closure costs are prepared for activities that will take place years or decades in the future, the ability to "predict" actual site conditions at the time of decommissioning and closure can be challenging and may result in identification of unrealistic actions. For this reason, most jurisdictions require closure cost estimation to be based on current conditions/prices; thereafter, these estimations are subjected to regular reviews and updates. As a site nears decommissioning, cost models should refine the cost estimates and improve certainties around how the costs could vary (i.e., "best- and worst-case scenarios").

The above highlights the importance of implementing ongoing site monitoring as early in the mine's life cycle as possible; ongoing data collection and trend analysis against predictive



models will be key to accessing the longer-term data required to confidently inform and improve closure cost estimates over time.

3.3 FINANCIAL ASSURANCE INSTRUMENTS

GOOD PRACTICE TRENDS

Leading policy elements for financial assurance are outlined in Section 2. Good practice in financial assurance management allows for site-specific flexibility and, more importantly, incentives for good performance (such as partial release of the assurance amount after progressive reclamation has been successfully achieved). Important to consider is the fact that the “provision of large cash-based security bonds can impact a company’s borrowing capacity and unnecessarily tie up company cash resources that would otherwise be available for growth, reclamation work, and other improvements. Options should be considered that provide flexibility to reduce the opportunity cost of financial assurance while providing appropriate protection for government” (Minerals Council of Australia, 2017, p. 17).

UNCERTAINTIES AND GAPS

Very few, if any, regulations refer to the length of time that regulators can retain a company’s financial assurance. Although consensus is that the money can be released back to the mining operator on demonstration of achievement of closure criteria, uncertainty exists around the long-term funding of ongoing monitoring and maintenance activities, or management of possible latent liabilities. This raises questions as to whether or not a mining operator will ever be able to fully relinquish accountability for its closed mine site. There is also uncertainty in some jurisdictions about how a shortfall or surplus in financial assurance will be managed and when the issues will be addressed.

The accounting and tax treatment of funds, letters of credit and other forms of financial assurance should be defined in consultation with tax ministries to ensure they are consistent with tax treatments across the jurisdiction. There are a number of items that need to be defined and that vary across jurisdictions such as the currency of the instrument, the tax treatment of contributions to the instrument or earnings accrued in a fund, and the tax treatment of expenditures from an instrument such as a trust fund. The *United Nations Handbook on Selected Issues for Taxation of the Extractive Industries by Developing Countries* provides a good discussion on the various tax issues that need to be considered and how they are managed in selected countries (United Nations Department of Economic and Social Affairs, 2018, p. 292 onward)

Pooled rehabilitation funds (such as the Mining Rehabilitation Funds implemented in Western Australia), only work if sufficient funds are available to cover all of the liabilities that exist at the point in time when the fund is needed. It is assumed that only one or two mines would need money from the fund at a time, and that withdrawals are replenished rapidly to have sufficient funds available if another mine defaults. These funds are not normally managed to allow for large-scale mine defaults (for example, as experienced in Nevada during the late 1990s/early 2000s during which time more than 20 mines went bankrupt at the same time).



Photo: Raina Hattingh

4.0 SUMMARY

Effective governance and management of the mining sector require that mine closure and the post-mining transition are considered, planned for, and implemented from pre-permitting to the closure and relinquishment of the mine site. It also requires that accurate and current mine closure cost estimates and associated financial assurance instruments are in place throughout the operating life of the mine.

Through the review of leading-practice jurisdictions, this paper outlines current best-practice standards that governments should consider when implementing or reviving financial assurance policies and regulations.

These practices focus on ensuring that government holds sufficient and secure financial assurance throughout the mine life such that a third party could implement mine closure activities if a company fails to fulfill its closure obligations. This requires that mine closure cost estimates and the related financial assurance are reviewed and updated regularly during the mine life based on leading global practices, and that incentives to progressive reclamation are implemented that allow for the return of a portion of the financial assurance as reclamation and closure activities are completed. Increasingly, these leading practices also take into account the social and community implications and costs associated with the post-mining transition and the need to consider these costs when calculating financial assurance values.

As the number of mines expected to close in the next decade and beyond increases, the need for governments to have modern, well-articulated, and responsive financial assurance policies and regulations is clear.



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APPENDIX A. EXISTING GUIDELINES, POLICIES, STANDARDS, AND/OR TOOLKITS SUPPORTING MINE CLOSURE PLANNING

TABLE A1. EXISTING GUIDELINES, POLICIES, STANDARDS, AND/OR TOOLKITS SUPPORTING MINE CLOSURE PLANNING

GUIDELINE/TOOL	COUNTRY	DATE	AUTHOR	RELEVANCE	TYPE
Guide to Financial Assurance for Mine Closure in Argentina: Toward Responsible Mine Closure	Argentina	2021	International Institute for Sustainable Development	Government/Regulator	Guideline
Resolución que aprueba los Lineamientos Generales para el Cierre de Minas con Garantías Financieras	Argentina	2021	Government of Argentina	Government, Industry	Policy (Resolution)
Mine Closure: A Toolbox for Governments	International	2021	World Bank	Government/Regulator	Guideline
Integrated Mine Closure: Good Practice Guide	International	2019	International Council on Mining & Metals	Industry	Guideline
Financial Concepts for Mine Closure	International	2019	International Council on Mining & Metals	Industry	Guideline
Guía de Recursos de Buenas Prácticas Para el Cierre de Minas	Argentina	2019	Government of Argentina	Government, Industry	Guideline
Land Rehabilitation Guidelines for Surface Coal Mines	South Africa	2019	Coaltech/Minerals Council of South Africa / Land rehabilitation Society of Southern Africa	Industry	Guideline



GUIDELINE/TOOL	COUNTRY	DATE	AUTHOR	RELEVANCE	TYPE
Mine Closure Checklist for Governments	Asia-Pacific	2018	Asia-Pacific Economic Cooperation	Government/ Regulator	Checklist
Better Mine Rehabilitation for Queensland: Discussion Paper	Australia	2017	Australian Government: Department of Premier & Cabinet	Government/ Regulator	Policy
Mine Rehabilitation: Leading Practice Sustainable Development Program for the Mining Industry	Australia	2016	Australian Government	Government/ Regulator	Toolkit
Policy and Process Review for Mine Reclamation Security	Canada	2016	Prepared by Stantec Consulting for the Government of British Columbia	Government/ Regulator	Policy
Guidelines for Preparing Mine Closure Plans	Australia	2015	Government of Western Australia: Department of Mines and Petroleum - Environmental Protection Authority	Government/ Regulator	Guideline
Rehabilitation Requirements for Mining Resource Activities	Australia	2014	Queensland Government: Department of Environment and Heritage Protection	Government/ Regulator	Policy
Guide for Mine Closure Planning	Brazil	2014	Brazilian Mining Association	Industry	Guideline
Anglo American Mine Closure Toolbox, Version 2	International	2013	Anglo American	Industry	Toolkit
Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories	Canada	2013	Mackenzie Valley Land and Water Board	Government/ Regulator	Guideline



GUIDELINE/TOOL	COUNTRY	DATE	AUTHOR	RELEVANCE	TYPE
The Equator Principles III	International	2013	The Equator Principles Association	Other	Guideline
Case Studies and Decision-Making Process for the Relinquishment of Closed Mine Sites	Canada	2013	Cowan Minerals Ltd, National Orphaned/ Abandoned Mines Initiative (NOAMI)	Industry	Guideline: Case Studies
Anglo American Socio-Economic Assessment Toolbox (SEAT), Version 3	International	2012	Anglo American	Industry	Toolkit
A Guide to Leading Practice Sustainable Development in Mining: Leading Practice Sustainable Development Program for the Mining Industry	Australia	2011	Australian Government: Department of Industry, Tourism and Resources	Government/ Regulator	Guideline
Planning for Integrated Mine Closure: Toolkit	International	2011	International Council on Mining and Metals	Industry	Toolkit
Towards Sustainable Decommissioning and Closure of Oil Fields and Mines: A Toolkit to Assist Government Agencies	Global	2010	World Bank	Government/ Regulator	Guideline
Coaltech - The Socio-Economic Aspects of Mine Closure and Sustainable Development: Literature Overview and Lessons for the Socio- Economic Aspects of Closure, Report 1 of 2 and 2 of 2	South Africa	2010	Centre for Sustainability in Mining and Industry	Industry	Guideline



GUIDELINE/TOOL	COUNTRY	DATE	AUTHOR	RELEVANCE	TYPE
The Policy Framework in Canada for Mine Closure and Management of Long-Term Liabilities: A Guidance Document	Canada	2010	National Orphaned/ Abandoned Mine Initiative	Government/ Regulator	Guideline, Policy
Mine Closure Handbook: Environmental Techniques for the Extractive Industries	Finland	2008	Industry, Academia and Public Agencies in Finland	Industry, Government	Guideline
Environmental, Health, and Safety Guidelines for Mining	International	2007	World Bank / International Finance Corporation	Other	Guideline
Guía Para la Elaboración de Planes de Cierre de Minas	Peru	2006	Government of Peru	Government/ Regulator	Guideline
Yukon Mine Site Reclamation and Closure Policy	Canada	2006	Government of the Yukon Territory	Government/ Regulator	Policy
Mine Closure and Completion: Leading Practice Sustainable Development Program for the Mining Industry	Australia	2006	Australian Government: Department of Industry, Tourism and Resources	Government/ Regulator	Guideline
Mine Rehabilitation: Leading Practice Sustainable Development Program for the Mining Industry	Australia	2006	Australian Government: Department of Industry, Tourism and Resources	Government/ Regulator	Guideline
Rehabilitating Abandoned Mines in Canada: A Toolkit of Funding Options	Canada	2006	National Orphaned/ Abandoned Mines Initiative (NAOMI)	Government/ Regulator	Toolkit
Financial Assurance for Mine Closure and Reclamation	International	2005	International Council on Mining & Metals	Industry	Report



GUIDELINE/TOOL	COUNTRY	DATE	AUTHOR	RELEVANCE	TYPE
<u>Mining for Closure: Policies and Guidelines for Sustainable Mining Practice and Closure of Mines</u>	International	2005	Environment Security (ENVSEC) initiative UNEP, UNDP, OSCE, NATO	Other	Guideline
<u>Guidelines Mine Closure Planning in Queensland</u>	Australia	2001	Queensland Mining Council	Industry	Guideline
<u>Strategic Framework for Mine Closure</u>	International	2000	Australian and New Zealand Minerals and Energy Council Minerals Council of Australia	Regulator, Industry	Guideline
<u>Mine Rehabilitation for Environment and Health Protection</u>	International	1998	United Nations Environment Programme World Health Organization	Other	Toolkit



APPENDIX B. COUNTRY PROFILES

AUSTRALIA

APPROACHES AND FINANCIAL ASSURANCE MECHANISMS

In Australia, all the seven states—New South Wales, Western Australia, Queensland, South Australia, Victoria, the Northern Territory and Tasmania—have jurisdiction-specific mine closure legislation. In general, the separate mineral acts provide statutory requirements enforcing the management and rehabilitation of the affected mining environment. Detailed guidelines on mine rehabilitation and closure are available in each state.

For all states, the required objective of financial assurance estimates is generally aimed at achieving a safe, stable, and revegetated outcome to mitigate or manage the particular state's long-term environmental risk. However, these estimates do not cover cleanup of contamination (even though a requirement of closure is that contaminated sites' obligations have been met), human resources, and/or socio-economic impacts.

The states also have varying cost estimation methods and mechanisms for financial assurance (also referred to as a security bond in New South Wales (NSW)). However, for all states, the financial assurance estimate needs to be submitted to the relevant regulator as part of legislated mineral tenement licensing requirements. Published regulator guidelines are used as the basis for determining the value of the financial assurance submitted, and most of them require that the estimate include/consider the following (Australian Government, 2016, p. 79):

- Be based on work being conducted by third-party contractors (rather than on execution of work by the mine/self-performance).
- Include the projected rehabilitation costs for each type of disturbance, calculated at the current year's dollar rates (regulators usually require assurance for the maximum value within the plan life).
- Include maintenance and monitoring costs for rehabilitated areas, for a period after closure.

In Australia, the financial assurance or security bonds have the following commonalities across the states (Minerals Council of Australia, 2017, p. 16):

- “The bond must be lodged with government prior to the commencement of mining (and often in advance of final approval).
- The form of bond typically includes cash or a bank guarantee. It cannot be accessed by the company.
- The bond is intended to cover the forward liabilities for a mine over a defined period, usually aligned with the mine plan or operations.
- The bond amount is periodically reviewed and updated in line with changes to the mine plan and evolving rehabilitation methods.
- In some cases, a bond can be discounted based on an operator's good environmental performance or other social and economic factors.



- Bonds are returned to the company only once the regulator is satisfied rehabilitation targets have been achieved.”

WESTERN AUSTRALIA

In Western Australia (WA), prior to 2012, bonds were the mechanism of choice for dealing with mining-related environmental liabilities. However, assessment of the suitability of the traditional approach used to determine the closure cost estimates identified that the money in individual bonds was often significantly lower than what was required to mitigate or manage the potential environmental liabilities associated with mine closure. In addition, bonds could only be used to represent individual mine sites. Furthermore, large melliferous mines operating under State Agreement Acts were not subject to the Mining Act and associated royalties were channelled away from liability assurance processes (D. Murphy, personal communication, 2020). Hence, these bonds did not cover potential environmental liabilities that could manifest within adjacent areas not in the actual mining lease area, nor legacy (abandoned or derelict) mine sites (Morrison-Saunders et al., 2016).

Based on the above, in 2012 the Mining Rehabilitation Fund Act 2012 (MRF Act) was promulgated, administered by the Department of Mines and Petroleum. As summarized by Gilbert & Tobin (2018, n.p.), the MRF Act

requires all holders of mining tenements granted under the Mining Act 1978 (WA) to pay a non-refundable levy into the MRF ... [which is] a pooled fund held by the State]. Contributions are based on the level of ground disturbance [at an operation and] could be used for rehabilitation in the event of the inability of a mine operator to meet its rehabilitation commitments. ... Interest on the MRF is intended to be used to fund the Abandoned Mines Program, to address the legacy of abandoned sites resulting from WA's long history of mining.

Publicly disclosed management and expenditure of the MRF is undertaken in terms of the WA Financial Management Act 2006, with reporting needing to comply with the office of the Auditor General (Morrison-Saunders et al., 2016). Currently, surety (performance) bonds are generally still used in WA.

QUEENSLAND

In Queensland (QLD), prior to April 1, 2019, financial assurance was provided for each resource project in terms of an environmental authority (EA) that needed to be aligned to the requirements of the Environmental Protection Act 1994 (EPA Act). This assurance was then only relevant for activities undertaken under that specific EA.

Based on findings similar to those in WA (which indicated the inadequacy of submitted financial assurances to address potential environmental liabilities appropriately), on April 1, 2019, the QLD Mineral and Energy Resources (Financial Provisioning) Act 2018 came into force. Referred to as the Financial Provisioning Scheme, this act repealed the previous financial assurance requirements under the EPA Act.

Importantly, the new Financial Provisioning Scheme allows for the following:

- Establishment and management of a pooled financial provisioning fund (similar to the MRF in WA) (as opposed to the previous resource project-specific assurances).



- Establishment of QLD Treasury-supported Scheme Manager (statutory officer), who will have direct responsibility for the management of the resource projects' financial assurance.

The new scheme allows for the financial provisioning fund to be accessed by the Queensland government should the EA holder fail to comply with the mitigation and management of its agreed environmental obligations. In addition, the government can also use the funds for rehabilitating (or remediating) abandoned mines/operating plants or for researching rehabilitation techniques.

In addition, calculating the financial surety or cash contributions that a resource project must provide is now contingent on the following (Queensland Government Financial Provisioning Scheme, 2018, n.p.):

- “Allocation of a risk category for the resource activity
- Determining the estimated rehabilitation cost (ERC) for the activity
- Payment of a contribution to the scheme fund based on a prescribed percentage of the ERC or provision of a required surety.”

The risk category allocated to the EA will determine whether participation in the scheme fund is available to an EA holder or whether a surety is required.

Aligned to the calculation approach provided in an updated state-specific rehabilitation calculator (State of Queensland, 2019), the ERC needs to be determined for a period specified as 1–5 years. The following qualifications are relevant to the ERC determination:

- No allowance is made for discounts for environmental performance.
- The ERC must be aligned to the current level of site disturbance, ensuring concurrent and integrated mine and rehabilitation planning.
- The EA holder will report on and apply for a new ERC within 10 business days from becoming aware of any changes to the mine plan and/or site activities that result in either an increase in the rehabilitation cost or a change in the amount of site disturbance.

As stipulated in the Queensland Government Financial Provisioning Scheme (2018, n.p.):

a surety will be required instead of (or as well as) a contribution to the scheme fund in certain circumstances. A surety will be also required for any amount by which the ERC for activities under the EA exceeds the scheme fund threshold. As with the amount contributed to the scheme fund, sureties are calculated by reference to the ERC for the activities permitted under the EA.

In terms of the new scheme, upon surrender of the mining tenure and EA, a mining company will have to pay a cost for management of residual risk based on an agreed assessment.

Acceptable financial assurance mechanisms include a bank guarantee, insurance bond, or cash payment.

NEW SOUTH WALES

In NSW, the Mining Act 2012—actioned by the recently consolidated Department of Planning, Industry and Environment (DPIE)—is used to regulate rehabilitation activities to ensure that



the conditions of a development (such as a mine) approved under the Environment Planning & Assessment Act (1979) are met.

A security deposit that covers the full rehabilitation costs (the Rehabilitation Cost Estimate, or RCE) (NSW Planning and Environment, 2017) is the mechanism used in NSW to protect the state's government from having to manage potential unmitigated or unmanageable resource-related environmental liabilities associated with a site's rehabilitation and closure activities. The value of the financial assurance must be consistent with the current life-cycle stage of the mine and, for significant mining projects, the assurance amount is required to be reviewed annually.

The DPIE, as the regulating authority for rehabilitation, is responsible for ensuring that a mine site can adequately demonstrate the achievement of its agreed-on relinquishment criteria. Only once these rehabilitation targets have been met can a closure certificate be issued, and the associated security deposit released. As an incentive, the Mining Act (2012) allows for the partial release of a site's financial assurance for progressively rehabilitated areas within the mining tenement for which successful rehabilitation can be demonstrated.

A Derelict Mine Site Fund was established under the governance of the Mining Act (2012) to finance rehabilitation work on ownerless mine sites; this fund receives an annual financial allocation from the state budgets.

In NSW, allowance is made for financial assurance in the form of bank guarantees, insurance bonds, cash, or a combination of these.

VICTORIA

In Victoria, the Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013 "requires a licensee to enter into a rehabilitation bond for an amount determined by the Minister" (Australian Department of Premier & Cabinet, 2017, p. 51). The Earth Resources Regulation unit of the Department of Jobs, Precincts, and Regions is the responsible regulator for setting and reviewing resource-related rehabilitation bonds. State guidance for determining a feasible financial assurance value for larger mining operations is provided in the form of the rehabilitation bond calculator (Victoria State Government, 2019).

Victoria's rehabilitation bonds are expected to be aligned to the most current mine plan, and the bond should represent the full rehabilitation liability value linked to this current mine plan. The financial assurance value is reviewed as changes occur in the mine plan, if a tenement is transferred, or at the specific request of a tenement holder.

The Regulations also allow for application for a partial release and/or reduction in the bond for areas within the tenement area for which rehabilitation targets can be progressively and successfully demonstrated.

At present, the only acceptable financial assurance mechanism for Victoria is an unconditional bank guarantee.

SOUTH AUSTRALIA

The Department of State Development (DSD) is the lead agency responsible for administering South Australian mining legislation, including resource rehabilitation. All mining tenements in South Australia are subject to a bond under Section 62 of the Mining Act, 1971.



The rehabilitation bond is expected to account for the full cost of rehabilitation (including contingencies) for site disturbance at any given time in the mine's life cycle. The financial assurance value needs to be reported on as part of the mine's required Program for Environment Protection and Rehabilitation (PEPR) (aka Rehabilitation and Closure Plan) (Government of South Australia DSD, 2015).

As the PEPR is reviewed, refined, and resubmitted for Departmental approval, the associated bond will also be reviewed.

In South Australia, financial assurance can be in the form of a bank guarantee or rehabilitation bond.

NORTHERN TERRITORY

Mining activities in the Northern Territory are administered under the Mineral Titles Act 2010 (MTA) and the Mining Management Act 2001 (MMA), under the responsibility of the Department of Primary Industries and Resources.

Rehabilitation surety in the Northern Territory is required to reflect a site's rehabilitation liability as aligned to its current site disturbance. As highlighted by the Department of Premier & Cabinet (2017, p. 55), "at any time the operator may request a reassessment of the security amount based on either successful close out of disturbances or a change in project activities." As with other states, the rehabilitation liability amount needs to be reflected in an associated rehabilitation and closure plan, referred to as a Mining Management Plan (MMP) in the Northern Territory. The MMP is reviewed annually or as the site undergoes changes to its mine planning.

In the Northern Territory, allowance is made for partial release of the security fund on successful demonstration of rehabilitation targets.

In 2013, the Mining Management Act (2001) was refined, with a key change being the introduction of a non-refundable annual levy of 1% of a site's total determined rehabilitation cost to be used to fund the rehabilitation of the state's legacy abandoned and derelict sites.

In the Northern Territory, acceptable financial assurance mechanisms are in the form of cash or bank guarantee.

CLOSURE COST ESTIMATION TOOLS

Determination of closure cost estimates within Australia is generally well-governed, with most states providing specific tools and guidelines to help a mine suitably calculate appropriate financial assurance values.

Most of these tools and guidelines require the use of third-party post-mining unit rates, regardless of the possible lower costs for an operation to undertake progressive rehabilitation activities by on-site contractors or using mining-related machinery (Minerals Council of Australia, 2017). These financial assurance calculators are periodically updated across the states to reflect changing expectations, refined rehabilitation methods or approaches, and changes to service or rehabilitation activity costs. Below is a summary of some of the Australian calculators:

- Western Australia: Rehabilitation Liability Estimate Calculator (<https://ace.dmp.wa.gov.au/ACE/Public/MrfRleCalculator/RleCalculator>)



- Queensland: Estimated Rehabilitation Costs Calculator for Mining (https://environment.des.qld.gov.au/data/assets/pdf_file/0029/89615/rs-gl-user-guide-erc-calculator-mining.pdf)
- New South Wales: Rehabilitation Cost Estimation Tool Handbook (https://www.resourcesregulator.nsw.gov.au/_data/assets/pdf_file/0010/718597/PUB17-282-Rehabilitation-Cost-Estimation-Tool-Handbook-June-2017.pdf)
- Victoria: Rehabilitation Bond Calculator (<https://earthresources.vic.gov.au/legislation-and-regulations/guidelines-and-codes-of-practice/rehabilitation-bonds/bond-calculator>).

CANADA

APPROACHES AND FINANCIAL ASSURANCE MECHANISMS

In Canada, mine rehabilitation and closure fall under various federal and provincial/territorial jurisdictional responsibilities.

Natural Resources Canada (NRCan) is the federal government ministry responsible for natural resources, energy, and minerals and metals. Its role is to develop policies and programs that enhance the contribution of the natural resources sector to the Canadian economy. In parallel, the Federal Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) is directly responsible for mineral exploration and extraction, development, management, and reclamation of mine sites, and collection of resource revenues and royalties for sites located North of 60° (territories of Nunavut, Yukon and Northwest Territories; as well as international waters, reserves and in areas affecting fisheries).

However, “under the Canadian federal system, responsibility for mining falls within the exclusive domain of the provinces. The country has instituted a series of legislative initiatives designed to create procedural and enforcement mechanisms supportive of mine closure planning, implementation and assessment across all provinces” (Kabir et al., 2015, p. 146). In most of the 10 provinces, these legislative initiatives are supported by detailed guidelines for mine closure (and associated closure cost estimation) that help align the approaches used across operations yet provide flexibility for the implementation of site-specific rehabilitation activities.

The following section highlights the financial assurance approach adopted by some of the Canadian provinces and territories.

BRITISH COLUMBIA

British Columbia (BC) was “one of the first jurisdictions in Canada to enact mine reclamation legislation, and the first to require companies to post rehabilitation financial assurance prior to exploration and mining” (Shen, 2016, p. 18). Governed by the Ministry of Energy, Mines & Low Carbon Innovation (MEM), the BC Mines Act (Sections 10.4 and 10.5) requires that mines provide some form of financial assurance to cover costs of rehabilitation and long-term maintenance.” “The security is designed to ensure that the company returns land, watercourses and cultural heritage resources to a safe and environmentally sound state after operations have ended. It is also intended to ensure that the taxpayers will not have to contribute to reclamation costs and any potential on-going monitoring costs if a company defaults on its permit obligations” (BC Auditor General, *An Audit of Compliance and Enforcement of the Mining Sector*, 2016, p. 50)



A detailed estimate of the total expected costs of outstanding reclamation obligations for the mine, including all long-term costs for monitoring, maintenance, and water treatment (if required), must be included in the mine's Annual Reclamation Report. Although this may be submitted using an [Excel Costing Spreadsheet \(Version 3.5.1\)](#) provided by the MEM, other formats are also acceptable. Reporting of financial assurances is expected together with the annual submission of a site's Annual Reclamation Report. The value and associated mechanism used for the provision of the financial assurance is reviewed every five years by the Chief Inspector of Mines, or whenever there is a significant change in the mine plan (Shen, 2016). The financial security deposit will only be returned after reclamation is completed to a level deemed satisfactory by the Chief Inspector of Mines.

"Available financial assurance instruments in BC include the letter of credit (LC, preferred), the Qualified Environmental Trusts and Funds (QETF) held within the Reclamation Trust Fund . . . Asset Agreements . . . which have been accepted in the past and are acceptable only under specific conditions)" (Shen, 2016, pp. 18–19). Also acceptable are "cash, certified cheques, bank drafts, term deposits (i.e., GICs) and Government of Canada bonds and irrevocable standby letters of credit (ISLOCs)" (Faizuldayeva, 2016, p. 5). In BC, a mine's financial assurance is expected to be reviewed annually, as part of reclamation reporting (Stantec, 2016).

It is noted that in 2016 the BC Auditor General published a report highlighting an inadequacy in the financial assurance amount and requiring a review of the existing system. Specifically, the report highlighted that the MEM resources "...could not provide evidence that government is holding an adequate amount of security to cover the reclamation costs, including any ongoing management and monitoring to achieve environmental protection" (BC Auditor General, *An Audit of Compliance and Enforcement of the Mining Sector*, 2016, p. 50). Based on this, the BC government is currently undertaking consultations with relevant stakeholders on the requirements for review and reform of the existing (as described) provincial rules for securing the closure and post-closure obligations of mining operations.

ONTARIO

In Ontario, the regulating agency is the Mines and Minerals Division, Mineral Development and Land Branch under the Ministry of Northern Development and Mines (MNDM). The requirements for a closure plan, including financial assurance, are set out in Part VII of the Ontario Mining Act and elaborated in Ontario Regulation 240/00 – Mine Development and Closure. The Mining Act requires progressive rehabilitation throughout the life of the mine, with review of closure costs required every three years.

The closure guidelines in the state are the Mine Rehabilitation Code (Ontario Regulation 240/00) and the Financial Assurance Policy Index (2011).

Allowance is made for provision of financial assurance in the form of cash, an LC from a certified bank, an insurance bond, a mining reclamation or any other form of security or any other guarantee or protection, including a pledge of assets, a sinking fund or royalties per tonne, that is acceptable to the Director of the MNDM (Stantec, 2016).

QUÉBEC

In Quebec, the regulating agency is the Ministère de l'Énergie et des Ressources Naturelles (MERN). Under the Mining Act and Regulations, exploration and mining activities require a rehabilitation and restoration plan, or closure plan, before being initiated. Once their plans



are approved, companies must provide MERN with a financial guarantee covering all the estimated reclamation costs for the entire mining site. Payment is made in three instalments, within the 2 years following the date on which the plan is approved: 50% within 90 days of approval, 25% each year thereafter. As summarized on the MERN website (<https://mern.gouv.qc.ca/en/mines/mining-reclamation/legislative-provisions/>), guarantees can be in the following forms:

- A cheque made out to the Minister of Finance of Québec
- Bonds issued or guaranteed by Canada, Quebec, another Canadian province, or a municipality in Canada
- A guaranteed investment certificate or term deposit certificate
- An irrevocable and unconditional letter of credit
- A security or a guarantee policy issued on behalf of the Government of Québec
- A trust constituted in accordance with the provisions of the Civil Code of Québec.

NORTHWEST TERRITORIES

As previously mentioned, the federal government (via the CIRNAC) is responsible for regulation of mine closure in the Northwest Territories for federal areas. The territory's Government of the Northwest Territories (GNWT) shares responsibility with co-management boards such as the Mackenzie Valley Land and Water Board (MVLWB) for the regulation, guidance and enforcement of mine closure on non-federal areas.

Since 2002, with the development of the *Mine Site Reclamation Policy for the Northwest Territories and Nunavut* (INAC, 2002), rehabilitation and closure guidance within the NWT has been amended and refined resulting in a sophisticated, modern and coherent approach to closure regulation and associated financial assurance. In 2013, the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWM/AANDC, 2013) were compiled, outlining the requirements for Closure and Reclamation Plans (CRPs). Following this, the *Guidelines for Closure and Reclamation Cost Estimates for Mines* (MVLWB/INAC/GNWT, 2017) were published in November 2017.

“Proponents that wish to construct and operate a mine are required to post a security deposit with the owner...to cover the costs to close and reclaim the site, should the proponent become insolvent and not meet these obligations” (MVLWB/INAC/GNWT, 2017, p.1).

The GNWT provides regulatory guidance for closure cost estimations in the form of the Excel-based RECLAIM 7.0 cost estimate tool (mining version) (Government of the Northwest Territories, 2017) (https://www.enr.gov.nt.ca/sites/enr/files/resources/reclaim_user_manual_mining.pdf). The tool is the regulators' preferred closure cost estimation model, with the estimates required to be aligned to detailed rehabilitation activities documented in the site's CRP.

Due to the co-responsibility for mine closure with various water and land boards, in the NWT, the value of a mine's financial assurance (referred to as a security bond/deposit) is closely linked with the requirements/conditions of a site's water licence and/or land-use permit.

“The Board writes the amount of the security deposit into a schedule attached to the water licence or into a condition in the land-use permit. In the case of an adjustment to the water licence security deposit, the Board will update the appropriate water licence schedule. ... The



proponent must post the required security deposit(s) with the GNWT (or CIRNAC on federal areas). Timelines for posting a security deposit may be outlined within the water licence or land-use permit (e.g., security is to be posted prior to commencement of construction, etc.) ... The RECLAIM model allows the user to divide each line item into land-related vs water-related liability. Based on this split, the boards may use their discretion to determine how to allocate security between authorizations (licences and permits related to the project)” (MVLWB/INAC/ GNWT, 2017, p. 11).

Allowance is made for a mine to submit a request for phased return of its security bond aligned to progressive demonstrable achievement of closure obligations.

ABANDONED SITES

Canada also has a long history of mining, which has resulted in orphaned or abandoned mines in all jurisdictions. Cleanup of orphaned/abandoned mines is a joint federal/provincial/territorial responsibility. In 2002, the NOAMI (<https://www.abandoned-mines.org/en/>) was established as a multistakeholder initiative including representation from federal, provincial, and territorial governments, non-government organizations (NGOs) and Indigenous Canadians. The initiative’s main goal is to critically review Canadian legislative, policy, and program frameworks for addressing issues associated with orphaned and abandoned mines, and make recommendations for improvement toward preventing the occurrence of similar situations in the future. It is jointly managed and funded by industry and jurisdictional partners (in the form of an Advisory Committee), with funds are generated from the following (Cowan & Mackasey, 2006):

- “Direct government funding from general revenues
- Government funding through tapping existing revenue streams generated by mining e.g., as mining tax/royalties
- Government funding through the imposition of a levy on current and future mineral production
- Federal and provincial cost sharing arrangements from general revenues
- Government-industry partnerships.”

NOAMI does not have the mandate or financial resources to undertake actual site cleanup; this remains the responsibility of the federal government.

In the Yukon and NWT, CIRNAC operates a remediation program—formally referred to as the Northern Abandoned Mine Reclamation Program—that manages the remediation of abandoned mines in these areas (Northern Canada). At present, this is the only mechanism available for orphaned/abandoned mine cleanup by the Canadian federal government.

CLOSURE COST ESTIMATION TOOLS

In Canada, like many developed countries, the closure cost estimate is most often developed based on the closure and reclamation plan (also called a mine closure plan) developed for the site. As this plan is refined throughout the life of the mine, and as progressive rehabilitation is completed, the closure cost estimate is adjusted accordingly.

Mining operators can decide what cost model they would like to apply to their operations. In some regions, regulatory guidance is provided, such as in the form of the NWT’s RECLAIM cost estimate tool.



GERMANY

APPROACHES AND FINANCIAL ASSURANCE MECHANISMS

Germany—due to its prescriptive, enforced regulatory structures and well-funded government supporting structures—remains at the forefront of mine closure from all perspectives, including planning, community collaboration, and funding.

Mining (exploration, production, processing) and associated land redevelopment (reuse) in Germany is governed by the Federal Mining Law, as last amended in 2006.

In support of the Federal Mining Law, mining companies are also governed by the requirements of the following: the Federal Nature Conservation Law, which describes expected outcomes for nature conservation and overarching landscape management (including for areas exposed to exploration and extraction of mineral resources); the Spatial Planning Law, which requires the re-establishment of residential and/or open space structure post-mining; and the Environmental Impact Assessment (EIA) Law, which governs a mine's upfront environmental impacts identification and mitigation process.

In terms of the above, each mine is required to compile and submit an Impact Mitigation Regulation Plan (IMRP). Similar to an Environmental Management Program Report (EMPR), the IMRP needs to identify mining-related impacts and mitigation or management measures for these. Local or regional nature conservation authorities assess the content of these plans, but the Mining Authority has the final say on whether or not the project can proceed, the impact on nature and the landscape, as well as any conditions of approval (Wende, 2015).

Specific to the Federal Spatial Planning Act, mining land-use plans are jointly developed as part of municipal and regional spatial plans, ensuring an integrated regional land-use framework: the aim is the optimal spatial planning and development of the regions, incorporating the disciplines of ecology, economy, settlements, and infrastructure (Isolde, 2009). In addition, land-use planning in Germany is being undertaken as a multidisciplinary approach aiming to identify future land-use solutions that provide places to live, produce food, supply recreational areas, or help mitigate climate change or temperature rise (which is a top priority of Saxon state regional planning efforts) (Larondelle & Haase, 2012).

Documented public information on the rehabilitation approach and associated financial assurance mechanisms followed in Germany appear to not be widely available. However, the country's global success in demonstrating achievable rehabilitation of large regional areas (such as the Ruhr Valley) appear to be underpinned by comprehensive, intergovernmental and multistakeholder regional planning, research, and technical investment in industry (post-mining), land-use diversification, and underlying support in the form of a fiscally strong government.

CLOSURE COST ESTIMATION TOOLS

"The financing of the rehabilitation work in Germany is ... incumbent upon the mining companies, but [in] areas where no company now exists the rehabilitation is covered by a cooperated funding of the federal government and the affected states" (Zillig et al., 2015, p. 502).



SOUTH AFRICA

APPROACHES AND FINANCIAL ASSURANCE MECHANISMS

South Africa, with its long and prosperous mining history, has long been an African leader in mining-related good practice, including regulations, governance, and implementation.

In South Africa, the process of mining is governed by the Mineral and Petroleum Resources Development Act, No. 28 of 2002 (MPRDA), enforced by the Department of Mineral Resources (DMR). Environmental aspects are co-governed by the Department of Environmental Affairs Forestry and Fisheries (DEFF) in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA), and by the Department of Water and Sanitation (DWS) in terms of the National Water Act, No. 36 of 1998 (NWA).

Until 2015, the MPRDA was also the underpinning legislation governing the process for mine rehabilitation and closure planning. However, in November 2015, the Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations (GNR1147) in terms of NEMA, were promulgated. In terms of GNR1147, every mining operation is required to submit to Regulators an Annual Rehabilitation Plan, Environmental Risk Report, and Final Rehabilitation, Decommissioning and Mine Closure Plan. These plans would be submitted in conjunction with the required annual Closure Costing Report detailing determination of allocated financial provision for identified rehabilitation measures. After years of refinement of GNR1147 (due to notable industry unease on the content), the latest version—GNR667—was issued for public comment in support of NEMA on 17 May 2019. An extension of the date for compliance for existing Mining Rights holders was issued on January 17, 2020 (GN 24 of 2020), with the date being shifted to 19 June 2021.

Notably, South African mining operations are now required to determine closure cost estimates and associated financial assurance for three timeframes within the mining life cycle—during operations, reported on a progressive 12-month rolling period; at decommissioning and post-mining, monitoring and care-and-maintenance stages; and post-closure (remediation and management of residual and latent environmental liabilities).

Chapter 3 of GNR1147 (South African DEFF, 2019) focuses on financial provisioning, with the appendices providing minimum content for the required plans, methodology for calculating the required financial provision, minimum content of a trust fund company, and a template for the financial guarantee.

Allowance is now also made to apply to withdraw funds to facilitate decommissioning and final closure activities, aligned to activities stipulated in the final rehabilitation, decommissioning, and mine closure plan. However, approval of this withdrawal is based on the company's rehabilitation and associated financial expenditure track record in the preceding years, as well as demonstration that previous rehabilitation has been successful. It is not possible to withdraw funds from the provided financial assurance specifically related to the management of residual or latent liabilities.

Closure cost estimates must be revised annually, and the associated financial provision updated.

As with many countries that have long mining histories, South Africa also has a number of derelict and ownerless mines. In 2009, the National Strategy for the Management of Derelict and Ownerless Mines (South African DMR, 2009) was developed, under the governance of



the DMR. Rehabilitation-related programs are funded from the national treasury, with other (private) stakeholder funding sourced wherever possible.

CLOSURE COST ESTIMATION TOOLS

In 2004, the South Africa DMR developed a guideline for calculating the quantum for financial assurance for mine closure (South African DMR, 2004). Although originally developed as a guide to assist regulators in determining the appropriateness of the value of financial assurance received from mines under the MPRDA requirements, this guideline was also [incorrectly] adopted by industry. It provides a step-by-step approach to determining the key cost elements for unscheduled and scheduled closure (guideline document and costing spreadsheet) and has been the main tool used in South Africa (and many African nations following South Africa's lead) since its development.

However, as the accuracy of documented financial assurance has come under scrutiny in the past few years, many large mining operators have taken to using more focused, life-of-mine-aligned in-house costing spreadsheets (now including long-term water management costs and other possible residual risks). In addition, the recent changes to the Financial Provision Regulations no longer require the use of the above calculation tool; however, mines are now required to appoint independent specialists to determine the actual closure cost based on detailed itemization of all activities and costs, based on actual market-related rates.

UNITED STATES

APPROACHES AND FINANCIAL ASSURANCE MECHANISMS

Mining activities in the United States are complex and regulated by various entities at both the federal and state levels: "Each mine faces a somewhat unique set of regulatory requirements, depending on State statute or regulation; whether it is on State, Federal, Tribal or private land; local regulations; the kind of mining and metal recovery operation proposed; and the specific environmental considerations unique to the site" (U.S. Environmental Protection Agency, 1997, p. 3).

The Federal Acts in the United States set the overarching guidance for *public* lands.

The Federal Land Policy and Management Act of 1976 (FLPMA) is administered by the Bureau of Land Management (BLM), and governs the management, protection, development and enhancement of public land across the United States. Exploration, mining, and mineral-processing activities undertaken on BLM-administered land are controlled by the Regulations at 43 CFR Subparts 3715 and 3809 and in Wilderness Study Areas, 43 CFR Subpart 3802. As highlighted on the BLM's website (<https://www.blm.gov/>), mining operators "are required by these regulations to prevent unnecessary and undue degradation or avoid impairment of wilderness characteristics." In terms of the BLM's Surface Management Rules for Hardrock Minerals at 43 C.F.R. Subpart 3809 (3809 Regulations), mining operators on land of any size are required to compile and submit a reclamation plan and reclamation cost estimate, as well as make provision for the associated reclamation bond to be administered by the BLM. The value of the reclamation assumes that the BLM—not the company—will undertake site reclamation using third-party contractors in accordance with government contracting procedures (Parshley & Struhsacker, 2009).



In parallel to the BLM, the U.S. Forest Service (USFS) is responsible for the administration of the Surface Mining Regulations—36 CFR 228, Subpart A (228A Regulations). The 228A Regulations underpin the U.S. mining laws of May 10, 1872, as amended (30 USC 22), and focus on mining operations taking place on public National Forest land. The USFS has had bonding requirements for mineral projects since 1974, administered by the discretionary authority of District Rangers (Parshley & Struhsacker, 2009). As for the BLM's 3809 Regulations, the USFS-required reclamation bonds need to assume third-party (governmental) contracting procedures. Since 2004, the USFS utilizes its *Training Guide for Reclamation Bond Estimation and Administration* “to ensure reclamation bonds are adequate to fund reclamation and closure, and is relevant to new bonds and updating existing bonds for projects on National Forest System lands” (Parshley & Struhsacker, 2009).

In addition to the above, the Surface Mining Control and Reclamation Act 1977 (SMCRA) is the primary federal law regulating environmental management for resource projects, and specifically coal mining. The SMCRA is governed by the Office of Surface Mining Reclamation and Enforcement (OSMRE). The SMCRA stipulates that companies must make financial assurance for the restoration of mined-out areas.

Each state is entitled to develop, promulgate and enforce its own set of regulations, provided they are aligned to the overarching guidance provided by the federal law. Should a state have its own pertinent act that exceeds the requirements of federal legislation, this then supersedes authority over the associated federal law. Conversely, should a state not have its own regulation in place, the requirements of federal law take effect. State laws have administration capabilities over both *public and private* lands.

For hard rock mining operations, self-guarantees are not allowed by federal land management agencies managing public lands. The state of Nevada is one of the few states that still allows corporate guarantees, but their financial test requirements are so strict that only one company qualifies for self-guarantees, and only a portion of the total closure liability can be secured using this type of financial assurance. As of October 2019, less than 1.5% of the more than USD 3 billion USD in total financial assurance in Nevada is in the form of self-guarantees (J. Parshley, personal communication, 2020).

Due to the number of U.S. states, it is not possible to document all the adopted financial assurance approaches. However, the state of Nevada is deemed to have one of the longest-standing and best-tested financial assurance systems in the country. Numerous other U.S. states have reviewed and adopted Nevada's general approach to closure planning and financial assurance. Some have also approved use of the Nevada cost estimation tool for estimation of financial assurance amounts. Hence, the following highlights the approach followed by Nevada.

NEVADA

Although federal laws and regulations have applied to mine reclamation on public lands since the 1970s, mining was not regulated on private lands in Nevada until the late 1980s. This was when the state passed two new laws and promulgated corresponding regulations to manage all activities related to mining, including detailed requirements for closure and financial assurance.

These new regulations included stringent requirements for closure plans and financial assurance estimates for projects on public, state, and private lands. Since the promulgation



of these regulations, all Nevada mines and exploration projects affecting more than two hectares—regardless of land status—require financial assurance. The state of Nevada manages the financial assurance program cooperatively with BLM and the USFS through an interagency Memorandum of Understanding (Parshley & Struhsacker, 2009).

After mining company bankruptcies in the early 2000s created more than 20 new abandoned mine sites without sufficient financial assurance, the state and federal regulatory agencies worked collaboratively with the mining industry to revise the financial assurance program for the state (Parshley, 2009). The revisions to the program included:

- A new program financed by the mining industry to provide immediately available funds to the agencies to manage bankrupt sites to protect the environment while plans for closure were being finalized.
- An updated list of all aspects, including miscellaneous costs, that needed to be considered in closure and financial assurance cost estimates.
- New standards for management of water and process solutions during and after closure, including methods for predicting the quantities and chemistry of future solutions.
- A new cost estimating tool that provided standardized, first-principles approaches to cost estimating and a standardized database of equipment, labour, and material rates.

ABANDONED SITES

Similar to NOAMI in Canada, the United States has the Abandoned Mine Land (AML) Trust Fund which was initiated by the SMCRA to address derelict or abandoned coal mining areas that existed before 1977. It is “funded through a reclamation fee on underground and surface coal mining ... The OSMRE collects these fees and distributes the monies through grants to states with Abandoned Mine Reclamation Programs” (Danielson & Nixon, 2010, p. 19). It is calculated as a nominated fee per ton of mined ore. Funding for abandoned metal mines is generated from general funds and a portion of the annual claim assessment fees collected by the federal and state agencies.

CLOSURE COST ESTIMATION TOOLS

In the United States, a detailed model for estimating closure costs for financial assurance, referred to as the Standardized Reclamation Cost Estimator (SRCE) has been developed as a joint initiative between regulators and the mining industry in the state of Nevada. The SRCE estimates the cost of reclaiming a mine site using standard reclamation calculation methods, productivity data, and procedures (Parshley et al., 2009). Due to the collaborative effort undertaken to develop and refine the SRCE, the tool is considered to be robust and defensible—as it can be adapted for site-specific conditions, it is now widely applied around the world. (Since its initial development, the SRCE has been constantly refined, with the improvements made publicly available on the website [SRCE, 2020]).

It is noted that, as with all models, the SRCE is sensitive to the assumptions and limitations used to develop the cost estimate, as well as to the quality of input data. In addition, attention needs to be given to ensuring that where the tool's standard calculations are not site specific (e.g., assumed road and bund construction methods versus those actually used on a site), that these are adjusted accordingly for site-specific conditions.

**TABLE B1. OTHER COUNTRIES**

COUNTRY	GOOD PRACTICE POLICY AND LEGISLATIVE REQUIREMENTS
Brazil	Mine closure plan with mine life cycle implementation
Chile	Mine closure plan with financial guarantee plus post-closure fund Guidelines in place to support industry
DRC	Financial guarantee, reduced upon successful rehabilitation
Ghana	Reclamation bond of 10% cash and insurance legislated
Kenya	Rehabilitation bond; partial release upon successful progressive rehabilitation
Mozambique	Financial provision for rehabilitation, paid annually as assurance, subject to government review every two years
Namibia	Pending Framework and Mining Bill include planning, estimate, financial assurance Reduced assurance for progressive rehabilitation, and relinquishment criteria
Nigeria	Rehabilitation Plan with cost estimate and future economic development Rehabilitation fund
Peru	Closure plans implemented over the mine life cycle with financial assurance Leadership on abandoned mines
Tanzania	Closure plan, rehabilitation cost estimates for life of mine, and financial assurance
Zambia	Rehabilitation schedule, closure cost estimate, and cash for government fund



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