

Introducing the International Council on Mining and Metals' Integrated Mine Closure Good Practice Guide

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Abstract

The International Council on Mining and Metals (ICMM) is an international organisation that brings together 27 mining and metal companies and over 30 regional and commodities associations to strengthen environmental and social performance and enhance mining's contribution to society.

The Integrated Mine Closure: Good Practice Guide (2019a) presents a major update to ICMM's Planning for Integrated Mine Closure: Toolkit (2008). The guide is intended to support the goal of ICMM members, other responsible mining companies, and regulators in delivering a positive legacy while balancing environmental protection and social wellbeing with financial performance.

The document provides mining companies with guidance intended to promote a disciplined approach to integrated closure planning and to increase the uniformity of good practices across the sector. Like the earlier version, guidance is provided on the key aspects of mine closure focused on an iterative process, from the earliest stages of knowledge gathering, engagement and planning. The updated guide reflects modern leading practice, with additional emphasis on the importance of social transitioning, progressive closure, and strategies for relinquishment and closure governance. The guide also includes a range of tools that can be utilised in formulating well-considered decisions when planning and executing closure.

Successful integrated mine closure utilises a dynamic and iterative process that takes into account environmental, social and economic considerations at an early stage of mine development and runs through to closure.

Fundamental to this process is the need to consider closure as an integral part of the mine operations' core business. The structure of the guide reflects this process, providing good practice guidance in delivering key elements of mine closure planning and implementation.

This paper provides an overview of how the guide was developed and its contents. The guide was developed over an 18-month period by the ICMM Closure Working Group, which is made up of mine closure practitioners from leading global mining companies. As the guide was developed, further input and review was contributed by industry specialists, academia, and government representatives.

Keywords: *closure, integrated, guide, progressive*

1 Introduction

By the mid-to-late 1990s, the mining and metals industry was in crisis. Commodity prices had plummeted and investors were reluctant to commit to mining operations. Added to this was growing community unrest, criticism from civil society, and opposition from the broader public, which threatened the industry's 'social licence to operate'. At this time of increased scrutiny, a group of industry leaders acknowledged that the sector needed to change. A small group of mining and metals company CEOs came together and initiated the Global Mining Initiative (GMI). The initiative, led by the World Business Council for Sustainable Development (WBCSD), sought internal reform, a review of the various associations they belonged to, and a rigorous study of the societal issues their industry had to face.

To advance progress in an independent manner, the WBCSD commissioned the International Institute of Environment and Development (IIED) to undertake consultation and research to understand the role that mining and metals could play in the transition to sustainable development. This led to the development of the Mining, Minerals and Sustainable Development (MMSD) initiative; a research project looking at how the mining and minerals sector could contribute to the global transition to sustainable development. The MMSD report proposed an agenda for change that would revitalise the industry and bring greater alignment between actions of the industry and the values of contemporary society – precisely where a significant gap had opened up (International Institute of Environment and Development [IIED] 2002). The GMI and MMSD gave rise to the creation of the International Council on Mining and Metals (ICMM) in 2001 to catalyse change for the mining and metals industry.

ICMM today brings together 27 mining and metal companies and over 30 regional and commodities associations to strengthen environmental and social performance and enhance mining's contribution to society. Member companies commit to implementing 10 defining principles that serve as a best practice framework on sustainable development for the mining and metals industry. The vision of ICMM is for mining and metals to be a respected industry, trusted to operate responsibly, and contribute to sustainable development.

ICMM in its early years was very active on mine closure issues starting with MMSD, which shone a light on tailings, acid drainage, and abandoned/legacy sites as issues of particular note that required focused attention (IIED 2002).

To support ICMM members in strengthening environmental and social performance, ICMM released the document *Planning for Integrated Mine Closure: Toolkit* in 2008. This document emerged as one of the leading international guidance documents for mine closure. It has been widely cited and remains one of ICMM's most downloaded documents in the 10 years since its publication. However, responsible mining practices are continually evolving with greater emphasis being placed on values-based behaviours that deliver sustainable benefits for people and the planet long after a mine has closed.

Over the next decade many mines across the globe face closure making it an increasing priority for the industry, government and communities.

Recognising this, and the considerable evolution in mine closure practice since 2008, ICMM published a major update to its mine closure guidance in February 2019 called the *Integrated Mine Closure: Good Practice Guide* (Closure Guide) (ICMM 2019a). The new guide is intended to support the goal of ICMM members, other responsible mining companies, and regulators in delivering a positive legacy that balances environmental protection and social wellbeing with financial performance.

The guide is free for mining companies and regulators to use and contains a range of tools that can assist in formulating well-considered decisions when planning for and closing a mine

This paper provides a brief overview of the development of the guide and sets out the key elements of mine closure as included in the ICMM guide in planning for and implementing closure by means of an integrated approach.

2 Development

The Closure Guide was developed over an 18-month period by the ICMM Closure Working Group, which is made up of mine closure practitioners from some leading global mining companies. As the guide matured, further input and review was contributed by industry specialists, academia, and government representatives.

The 10 ICMM Sustainable Development Framework principles were utilised in the early scoping of the guide. The following six of these principles have direct application to closure:

- Principle 2: Integrate sustainable development in corporate strategy and decision-making processes.

- Principle 4: Implement effective risk-management strategies and systems based on sound science and which account for stakeholder perceptions of risks.
- Principle 6: Pursue continual improvement in environmental performance issues, such as water stewardship, energy use, and climate change.
- Principle 7: Contribute to the conservation of biodiversity and integrated approaches to land use planning.
- Principle 9: Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner. Effectively report and independently verify progress and performance.
- Principle 10: Pursue continual improvement in social performance and contribute to the social, economic, and institutional development of host countries and communities.

From the start, the Closure Guide was envisioned as a major update to the previous 2008 version. The working group recognised from the outset that the state of practice in mine closure had evolved considerably in the last decade and that it was important for ICMM guidance to better reflect a modern approach. Of particular importance was growing recognition of the important role of the social dimension to mine closure and managing the social transition from an operating mine to a closed mine.

Another fundamental change to the previous guidance was explicit recognition of the cyclic nature of closure planning, with information gained from research and progressive closure works incorporated into plans over the life of the mine. Furthermore, the updated guide provides emphasis on the need for adequate closure governance structures to ensure closure planning is integrated into life-of-mine (LoM) planning.

Development of the updated guidance started in 2017 with a gap analysis of the 2008 version, drawing on existing good practice guidance and publications on mine closure available across the globe. A draft document was then reviewed by the Closure Working Group and other company representatives specialising in water, finance, community, environment, and other key disciplines. Meetings of the working group in 2017 and 2018 provided opportunities to discuss the content and agree on the structure of the document. As the Closure Guide neared completion, review and recommendations were sought from industry specialists, academia, and government representatives.

The updated draft was further refined and until a final version was approved by ICMM's Principles Liaison Committee (made up of member company representatives that oversee the strategic direction of ICMM), and officially published on the ICMM website in February 2019 (ICMM 2019b).

3 Document structure

Integrated mine closure is a dynamic and iterative process that considers environmental, social, and economic factors from an early stage of mine development and throughout the life of an asset. Fundamental to this process is the need to consider closure as an integral part of the mine operations' core business. The structure of the guide reflects this process, providing good practice guidance to key elements of mine closure planning and implementation.

A pathway that is aligned with the organisation of the Closure Guide can be drawn through the key elements of mine closure (Figure 1), although the steps through the planning cycle will not necessarily be sequential. In practice, there are many feedback loops that interconnect each element; hence the need for an iterative process.

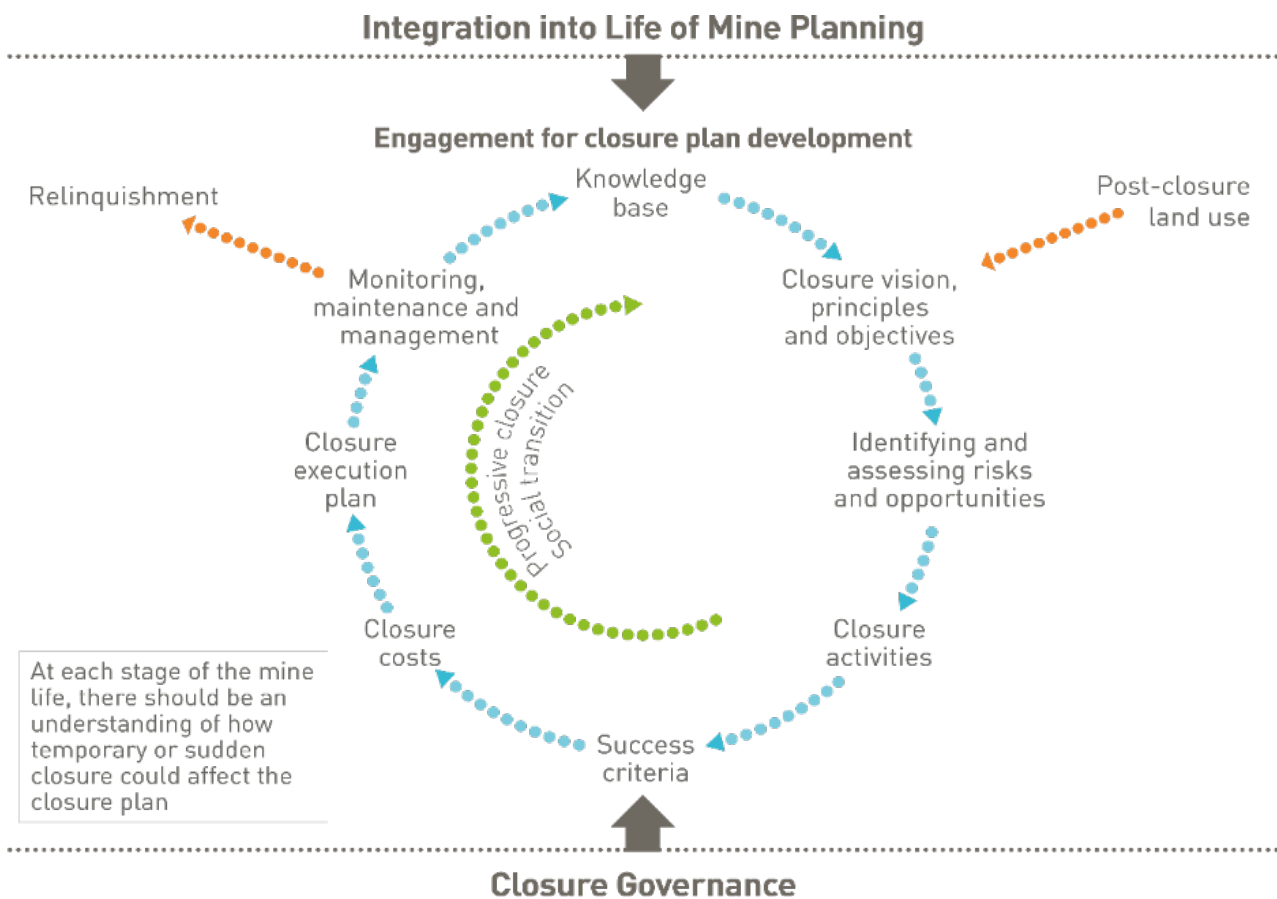


Figure 1 Key elements of mine closure planning and implementation

Each of the elements for the planning process are summarised as follows:

- **Integration into life-of-mine planning:** Closure should be integrated into the mine business plan, including the short, medium and LoM planning processes, throughout the mine life. This planning should take into account environmental, social, and economic considerations. ICMM Principle 2 requires that sustainable development principles are integrated into company policies and practices. This means that mines should be planned, designed, and closed in a manner that enhances sustainable development. Integrated mine closure should incorporate stakeholder involvement and community consultation throughout the mining lifecycle. When closure is fully embedded in LoM planning, there are better results for the mining company and stakeholders, as expectations, risks, and opportunities can be proactively managed during operations.
- **Knowledge base:** The knowledge base is the repository for information that will be developed throughout the life of asset (LoA), with regular updates as data is collected and reviewed. This is the information that will inform site-specific closure planning such as the environmental and socio-economic setting, environmental baseline data, operational data (such as volumes and types of waste currently and planned to be deposited, waste characterisation), commitments, and compliance requirements. Regular updates of the knowledge base facilitate adaptive management. As an example, if another mine operator commences mining in the region or if there is some other activity 'beyond the fence' of the mine, this will be incorporated into the knowledge base and may affect planning in a variety of ways.
- **Closure vision, principles and objectives:** These will be defined early in the closure planning process and refined throughout the LoA with input from stakeholders and the up-to-date knowledge base. The closure vision is an aspirational description of what will be achieved with mine closure, compatible with regulatory requirements. The vision will typically incorporate an overview of the

post-closure land use and will evolve as more information becomes available. Closure principles are the common precepts that form the basis of a closure plan such as promoting physical and chemical stability, meeting regulatory obligations, and facilitating social transition. The closure objectives indicate in concrete terms what is to be achieved through implementation of the closure activities.

- **Post-closure land use:** A clear articulation of the land use after mining greatly aids closure planning. A defined post-closure land use, or range of possible post-closure land uses and required land capabilities, will inform all aspects of the closure plan, particularly the definition of the closure objectives. A wide variety of alternative uses for mined lands may be available, including adapting post-closure landscapes for forestry, agriculture or wildlife habitat, or use of land for recreational purposes. Some post-closure land uses have the possibility of generating economic benefits which could potentially facilitate transfer of the site to a third party once closed, or provide for ongoing post-closure operating and maintenance costs. Changes to the post-closure land use options during the LoM should be expected as the knowledge base improves, the local and regional environment changes, technology advances, and social expectations evolve. This is of particular significance for mines that have a long operating life that can extend across generations. Integrated land use planning is a component of Principle 7.
- **Engagement for closure plan development:** Engagement with stakeholders will take place throughout the closure planning process, with insight from that engagement used to shape key elements of the closure plan. Effective mine closure planning and implementation considers the views, concerns, aspirations, efforts, and knowledge of internal and external stakeholders in identifying mutually beneficial closure outcomes for the company and its host communities. Stakeholder engagement serves as a critical aspect of managing social risks and realising social opportunities of closure. This step of the closure planning process aligns with Principle 9 that calls for key stakeholders to be proactively engaged on sustainable development challenges and opportunities in an open and transparent manner. Further, meaningful engagement is necessary to meet Principle 10, to contribute to community development from exploration to closure in collaboration with host communities and their representatives.
- **Identifying and assessing risks and opportunities:** As per ICMM Principle 4, risk-management strategies and systems should be based on sound science and account for stakeholder perceptions of risks. A wide range of risks and opportunities are associated with closure, covering physical, social, economic and ecological considerations. Formal identification and evaluation of risks and opportunities helps to set priorities and shape many aspects of the closure plan, including the selection of closure activities. Risks and opportunities should be assessed in a manner that considers timeframes appropriate for closure.
- **Closure activities:** Specific closure activities or works are executed in the implementation of the closure plan, both at final closure and progressively through the LoA. Examples include installation of a tailings cover, waste dumps being reshaped, water treatment plants being commissioned, and contaminated soil being removed or remediated. Closure activities are undertaken to achieve specific closure objectives and satisfy success criteria.
- **Success criteria:** These are developed as quantitative indicators of successful closure activities. Meeting success criteria can mark the end of the post-closure period for a mine or part of a mine. This may be associated with the release of associated financial assurance to the mining company, an opportunity for relinquishment of the land to a third party, or both.
- **Progressive closure:** Progressive closure is the implementation of closure activities during the operating LoM. There are many benefits to implementing progressive closure, including the learnings that can be integrated into the knowledge base, ability to demonstrate the success of closure activities, and reduction of closure liabilities.

- **Social transition:** This encompasses the efforts that are associated with transitioning of a community, including its workforce, towards closure of an operation. These efforts take place throughout the LoM and into closure.
- **Closure costs:** A key part of the closure planning process is the estimation of the cost of all aspects of closure and includes the update of those estimates as mining progresses, plans evolve, and more information becomes available. Reconciliation of planned versus actual costs should be completed with the results used to update the closure cost estimates.
- **Closure execution plan (CEP):** A CEP will be developed and regularly updated through the closure planning process. While the closure plan describes the actions that will be carried out as part of implementing site closure, a CEP identifies specific actions to be carried out during the mine life in support of closure planning, and implementation of closure activities. As per Principle 6, providing adequate resources to meet the closure requirements should be planned for.
- **Monitoring, maintenance and management:** Following the completion of closure activities, monitoring should be carried out to document and evaluate their effectiveness. This allows for an assessment of how the agreed closure objectives and success criteria have been met, or on a pathway to be met. Monitoring of sites against success criteria may lead to identification of maintenance needs. Rehabilitated areas may also need to be managed as part of the broader ecosystem. This may lead to an update of cost estimates.
- **Relinquishment:** Relinquishment occurs when ownership, residual liabilities, and responsibility for a former mine site can be returned to the corresponding jurisdiction, or to the original owner, or transferred to a third party. This would be expected following completion of closure activities and satisfying agreed success criteria. Relinquishment is not always the end point for the LoA, but it is a stated objective for many mine sites. Attaining relinquishment requires careful planning and engagement with the appropriate regulatory regime. Where relinquishment is planned, ongoing engagement with stakeholders will be required leading up to the eventual relinquishment with attention to developing agreed success criteria. In some cases, a transfer of residual liability may be required. In such cases, the terms of any ongoing financial support would need to be clearly defined.
- **Temporary or sudden closure:** While the expectation is that mines will maintain uninterrupted operation from start-up to completion of economic extraction of the ore, temporary or sudden closure can occur. Both have implications for closure planning. Various factors can result in the temporary or unplanned closure of an operating mine such as changes to economics or disruptions to production caused by unforeseen events. At each stage of the mine life, there should be an understanding of the potential triggers for temporary or sudden closure and how these could affect the closure plan. Awareness of these triggers should be maintained current throughout the mine life.
- **Closure governance:** An overarching approach to closure governance is needed to ensure the effective allocation of resources to closure planning. This includes resources from many disciplines across the mining company and can include both site resources and corporate support. This also aligns with Principle 6. Effective closure governance will affect every aspect of closure planning at an operation.

The guide provides detailed information and considerations on each of the above topics. The guide also includes supplementary information in the form of a series of tools to aid the practitioner in developing closure plans and carrying out activities in support of closure. The relevant tools are listed throughout the document. Case studies are drawn from the experiences of both ICMM member companies and other mines and are presented throughout the document to illustrate recent, practical experience with mine closure at sites around the world.

4 Conclusion

Planned mine closures around the world are expected to become more frequent over the next decade offering an important opportunity to improve performance. By initiating a progressive and integrated mine closure process, innovative solutions can be formulated to support the mining industry while also supporting engaged and sustainable communities. The social and economic risks and opportunities of closing a mine are usually significant and underline the importance of early and proactive planning and preparation throughout the mine life.

The Closure Guide provides ICMM members and other responsible mining companies with guidance needed to effectively integrate closure across the mining lifecycle. This in turn creates the opportunity for companies to be proactive in identifying and addressing risks early before they become material with the potential to compromise eventual mine closure, as well as to building stakeholder confidence.

The guide is intended to support the goal of delivering a positive legacy while balancing environmental protection and social wellbeing with financial performance.

Mining companies must prioritise responsible closure of their mines to ensure that the social license of mining is not diminished and continues to deliver the raw materials required for ongoing sustainable development of society.

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