

Navigating stakeholder engagement with regulatory bodies as part of the mine closure process

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Abstract

Mine closure can be a difficult and complex process and often takes years to plan and execute. Successful closure practices require an in-depth understanding of closure regulation and a strong understanding of the relevant stakeholders to the process. Often, achieving the successful closure of a mine can be made more challenging by convoluted and intimidating environmental regulatory processes, which differ from jurisdiction to jurisdiction. Understanding the various mine closure regulatory bodies, how they operate and how they apply regulations around mine closure requires a well-thought-out strategy and approach.

While it is recognised that mine closure requirements change across jurisdictions, there has been a significant international shift in the regulation of the rehabilitation and relinquishment of mines, which can provide key insights into the likely expectations of regulatory bodies. Due to this international shift, there are key pillars of information that should be provided to regulatory bodies, to enable compliance with best-practice standards in mine closure. For mining companies seeking to plan the closure of a mining activity, there are significant advantages in considered and positive stakeholder management with regulatory bodies early in the mine closure process, as well as benefits in providing information on key closure outcomes at strategic time frames throughout the process.

This paper will discuss the best-practice approach around the stakeholder management of regulatory bodies as part of the mine closure process and will examine international standards and discuss the key pillars of information that will assist engagement with regulatory bodies who manage and approve mine closure outcomes.

Keywords: *regulatory agency, engagement, stakeholder management, international best practice, mine closure*

1 Introduction

Stakeholder engagement is acknowledged as a crucial part of a best-practice mine closure approach. Developing and implementing stakeholder engagement processes (i.e. community involvement) should be intrinsic to the mine closure process to assist with successful and productive post-mining land uses (Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development [IGF] 2021c). While structured community engagement with impacted community bodies and persons is vital to the stakeholder engagement process according to most modern mine closure jurisdictions (IGF 2021c) and international publications (Asia-Pacific Economic Cooperation 2018; WorldBank Group 2021), this paper will only examine engagement with the regulatory body as a key stakeholder.

This paper explores whether developing an informed and structured engagement plan with a regulatory body or bodies is an essential step that should be considered as part of the mine closure process. The authors consider that regulatory bodies are major stakeholders in the process, who will ultimately be responsible for the development of the policy and regulatory requirements around closure, and the approval of the surrender or relinquishment of a mining activity. In some instances, they may also be responsible for taking ownership of the mining area, following rehabilitation and relinquishment by the mining company.

A poor relationship, or a lack of any relationship, with a regulatory body or bodies during the mine closure process, according to the authors' experience, can result in increased statutory approval risks, prolonged

decision-making timeframes, misunderstandings around the requirements and implications of closure activities and increased mining and closure costs (International Council on Mining and Metals [ICMM] 2019). The purpose of this paper is to recommend best-practice approaches to engagement with regulatory bodies around the mine closure process, to help companies avoid the risks associated with poor relations with regulatory bodies.

“Companies should engage regulators early in the process to improve alignment on expectations, understand regulator objectives and communicate mine closure processes and objectives to reduce uncertainty.” (ICMM 2019, p. 16)

This paper will aim to set out the key pillars of engagement with regulatory bodies, to assist mining companies with the mine closure process across different jurisdictions.

2 Methodology

In order to understand the current best-practice approach to engagement with regulatory bodies as part of mine closure processes, a wide-reaching review of standards and guidelines must be undertaken. This paper will review these standards and guidelines at an international level, as well as at a state and federal level.

2.1 International standards and guides

The international standards, guides and publications that have been examined relate to mine closure and stakeholder engagement processes and are globally recognised institutions that issue recommendations to mining companies and supporting bodies who are seeking to progress closure processes.

The following recognised international bodies have released authoritative publications in the last 10 years about mine closure practices, and are well-established institutions that provide advice to jurisdictions to form and guide mine closure policies (Table 1). The chosen international bodies are not considered to be all-encompassing but are based on the key bodies known by the authors through previous experience. This paper reviewed the recommendations provided by these international bodies as it relates to best-practice mine closure practices and how to engage with stakeholders, particularly regulatory bodies. Any advice around engagement with regulatory bodies and mine closure practices was extrapolated and further explained in the Findings (Section 3) of this paper.

Table 1 International publications

Body	Publication title	Subject considered
International Organization for Standardization (ISO)	<i>Mine Closure and Reclamation Planning (ISO 21795-2)</i>	Regulatory engagement Mine closure planning
AccountAbility	<i>AA1000 Stakeholder Engagement Standard</i>	Engagement process Engagement methods
International Council on Mining and Metals (ICMM)	<i>Key Performance Indicators: Tools for Closure</i> <i>Integrated Mine Closure: Good Practice Guideline</i>	Mine closure planning Regulatory engagement
Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF)	<i>IGF Mining Policy Framework – Mining and Sustainable Development</i>	Mine closure planning Regulatory engagement
World Bank Group – Energy and Extractives Unit (IEEXI)	<i>Mine Closure: A Toolbox for Governments</i>	Advice on regulatory bodies around engagement
Asia-Pacific Economic Cooperation (APEC) Mining Task Force	<i>Mine Closure: Checklist for Governments</i>	Advice on regulatory bodies around engagement
United Nations Development Programme (UNDP)	<i>Managing Mining for Sustainable Development: A Sourcebook</i>	Progressive rehabilitation Mine closure planning

2.2 Case studies – jurisdictions

Based on the level of information currently publicly available, a number of jurisdictions have been selected across the globe that have active mining activities and mine closure policies in place at a national or state level. The selected jurisdictions include Ontario (Canada), South Africa, Chile (South America), Western Australia (Australia) and Queensland (Australia).

The mine closure regulatory environment, and relevant regulatory body, have been examined for each jurisdiction in order to provide guidance on the relevant mine closure approval processes and requirements around stakeholder engagement with the regulatory body that approves mine closure. Any findings around engagement with regulatory bodies and mine closure practices were extrapolated and further explained in the Findings (Section 3) of this paper.

3 Findings

3.1 International standards and guides

3.1.1 Stakeholder engagement process

Practitioners in stakeholder engagement recognise the need to apply a formulated stakeholder engagement process so that any engagement undertaken is purpose driven and useful to all parties. The engagement process is similar across a number of international publications, including International Organization for Standardization (ISO) (2021), ICM (2019) and AccountAbility (2015). This engagement process follows the below high-level structure:

- Establish the purpose, scope and objective of engagement.
- Identify stakeholder/s.
- Undertake stakeholder mapping.
- Identify the engagement method.
- Implement response or grievance mechanisms.

3.1.2 Purpose and scope of engagement

A number of publications reference the application of a ‘*why, who, what, how, when*’ approach to understanding and implementing stakeholder engagement (University of Queensland 2020). This is mirrored in the AA1000 Stakeholder Engagement Standard (AccountAbility 2015) and is recommended as a first step in establishing a stakeholder engagement plan (Figure 1).



Figure 1 Purpose, scope and stakeholder (AccountAbility 2015)

Part of this requirement is to understand the scope of the engagement. For the purpose of this paper, this is understood to be researching and identifying the regulatory bodies' specific role in the mine closure process, their expectations, and purpose.

3.1.3 Stakeholder identification

The first step in the engagement process is identifying and recognising the relevant stakeholder. For the purpose of this paper, we are only considering engagement with the relevant regulatory body or government agency that will be responsible for the approval of a mine closure process.

“Sustainable mine closure is a shared endeavour, requiring collaboration between industry, communities and governments to understand and address the environmental, social and economic aspects of closure. In support of this, representative stakeholders must be identified and engaged.” (ICMM 2019, p. 25)

The recently released ISO (2021) standard on mine closure planning recognises that regulators, local resource agencies, as well as local, regional and national officials should be identified as relevant stakeholder groups. The ICMM's *Integrated Mine Closure: Good Practice Guideline* (2019) also identifies government and regulators as key stakeholders and recommends that the identification of government stakeholders should also consider non-regulatory bodies such as conservation bodies, education, health, economic development and energy, and other associations such as tourism, agriculture and natural resources.

The importance of developing stakeholder engagement plans for improved communication with regulatory bodies is derived from their role in the development of mine closure policy, approval of the mine closure plans and formal relinquishment, as well as the likelihood that the regulatory body may be responsible for taking over the mine site at the end of the mine's life.

Depending on the jurisdiction and relevant legislative or policy requirements, there may be multiple regulatory agencies involved in the mine closure process. An example would be where there is a regulatory agency for the resource and land ownership or tenure, and then a separate regulatory agency for the environmental approvals and mine closure process. This may be important to establish in the stakeholder identification part of this stakeholder engagement process.

3.1.4 Engagement method

There are multiple methods recorded for engagement with stakeholders, in particular regulatory bodies and agencies. Based on the level of engagement needed, such as informing, advocating, collaborating and negotiating, there are different types of engagement that are considered more effective (AccountAbility 2015). Table 2 provides an overview of the primary types of communication with regulatory bodies as stakeholders.

Table 2 Engagement methods

Level of engagement	Method of engagement
Advocate	Emails
One-way communication; organisation to stakeholder	Letters Meetings with clear agenda, minutes and actions
Inform	Letters
One-way communication; organisation to stakeholder, there is no invitation to reply	Reports
Consult	Surveys
Limited two-way engagement; organisation asks questions, stakeholders answer	Meetings with stakeholders Workshops

An additional engagement method could include mine site tours and meetings at the particular site of interest. For instance, a tour of recently completed rehabilitation is a method of engagement that can provide valuable firsthand information for a regulatory body to assist in understanding the mining project and closure practices (ISO 2021).

3.1.5 Engagement frequency and timing

The timing and frequency of engagement with a regulatory body, or another stakeholder group, is commonly recommended to occur throughout the mining construction, operation and closure process (ICMM 2019).

“Engagement should be conducted on a continuous basis and in accordance with the current engagement plan. Progress reports to the stakeholders and others should be issued at least annually during mine closure and reclamation and adaptive management phases.” (ISO 2021, p. 50)

Importantly, the mine closure process is recommended to be commenced at the start of a mine’s life, in the feasibility and design stage. At this stage, the mining company should already discern the closure goals for the mine.

The ICMM has published material that recommends stakeholder engagement, including engagement with regulatory bodies, should commence from the early design and permitting stage of mining, through to post-closure (ICMM 2019).

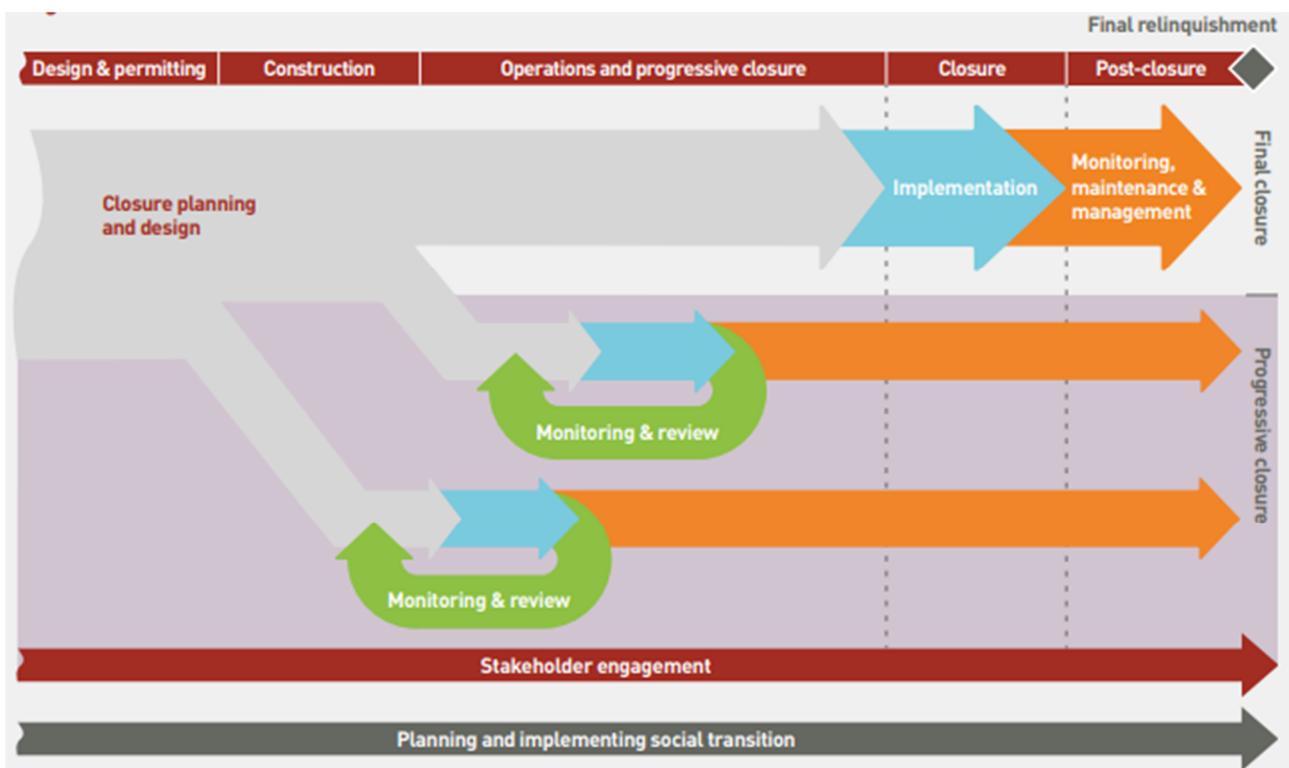


Figure 2 Mine closure process (ICMM 2019)

In some circumstances, the timing of engagement with a regulatory agency will be mandated by legislation in a certain jurisdiction. For instance, if a mine closure process or mine closure plan is required to be submitted to a regulatory body, this will often include an opportunity for the regulatory body to issue a request for information or ask questions about the provided information.

“Most countries have an EIA law requiring review of any projects with a potential impact on health, the environment, safety, and cultural and social aspects of stakeholders. These laws typically include requirements for stakeholder engagement as part of that process.”

Mining projects are normally subject to this process and often serves to satisfy the requirement for stakeholder engagement for mine closure during initial project development and permitting. Review of mine closure plans should be a part of that review. During later phases of the mine life, closure specific stakeholder engagement should be performed on any modifications to the closure plan.” (World Bank Group 2021, p .6)

It is also generally accepted in international publications that engagement with regulatory bodies needs to occur once the mine operator and/or owner determines there will be changes to the mine plan or rehabilitation practices. There may also be legislative requirements to re-engage if there are changes to the mine closure process. It is likely over the life of a mining project that there will be multiple iterative changes, as mine plans are subject to regular amendments based on financial, environmental and resource considerations and findings. In some publications, mine closure plans are recommended to be updated every three to five years, which would trigger further engagement with the regulatory body (ICMM 2019).

3.1.6 Engagement plan

Whether a stakeholder engagement plan is developed for all relevant stakeholders, or specific to communication and liaison with the regulatory agency, it is nonetheless consistently recommended as a vital step in the mine closure process and in developing a mine closure plan.

“The mine operator should take the lead in establishing and conducting a stakeholder engagement program.” (ISO 2021, p. 47)

The contents of an engagement plan are addressed in the AccountAbility’s standard AA1000:2015, which recommends that the contents of the plan include details of tasks and timelines, contact persons, technologies used, ground rules to engagement, comfort requirements, engagement risks, resource requirements/budget, channels of communication, monitoring and evaluation and reporting the engagement outputs and outcomes (AccountAbility 2015).

3.2 Jurisdictional case studies

3.2.1 Queensland, Australia

Queensland’s primary regulatory body for the environment is the Department of Environment and Science (DES); however, mining tenures and resource management is handled by a separate regulatory body. Queensland’s mine closure legislation underwent significant reform in 2019, with the adoption of the Progressive Rehabilitation and Closure (PRC) Plans framework, which is mandatory for all new mining operations (Hamblin et al. 2022). A transitional process was implemented for existing mining operations, which required the adoption of the closure plan and schedule within several years. Additionally, the Office of the Rehabilitation Commissioner was introduced and is responsible for undertaking best-practice research, connecting with stakeholders, and providing advice to ministerial bodies.

The new framework, compared to the previous, may be considered more prescriptive in nature and includes a detailed guideline that must be followed by mining proponents. The approach follows the primary aspects of a modern mine closure plan, including baseline environmental data, risk assessments, stakeholder engagement, post-mining land uses, completion criteria and a schedule of progressive rehabilitation. While mine closure plans (or PRC Plans) are only published externally for public comment for new mines, existing mines do not have to publish their transitional plans unless they differ from their existing approvals relating to post-mining land use or non-use management areas (i.e. no deemed land use).

Engagement with the key regulatory body is encouraged in external material as part of ‘pre-lodgement’ processes, prior to any formal application or transition to the new mine closure framework (Department of Environment and Science [DES] 2019). Following the submission and review of the plan, the regulatory body may issue a formal request for information, which will likely result in further engagement. Engagement with

the regulatory agency may continue to occur throughout the PRC Plan approval process, particularly towards the end of the process when the rehabilitation activities and milestones are negotiated and approved.

Where the PRC Plan or mine closure plan changes during the course of mining operations, the mining company must amend their plan and submit this plan to the regulatory agency for approval. As this framework is still in its early stages, the frequency of amendments to the PRC Plan or mine closure plans is not yet fully understood.

The Queensland jurisdiction also requires financial assurance from mining companies prior to commencement, which is now termed Estimated Rehabilitation Cost applications.

3.2.2 *Western Australia, Australia*

The Department of Mines, Industry Regulation and Safety (DMIRS) is the main regulatory agency involved with mine closure in Western Australia. The primary legislation relating to mining is the *Mining Act 1978*, and a statutory guideline for mine closure was released initially in 2011 and amended more recently in 2020.

The statutory mine closure plan guideline, similar to the Queensland framework, utilises up-to-date requirements for sustainable mine closure, including stakeholder engagement, baseline environmental data, post-mining land uses, closure outcomes and completion criteria and progressive rehabilitation. In some ways, it could be considered that this guideline is not as prescriptive as the approach taken in Queensland and instead recommends best-practice approaches rather than mandating certain information requirements in all instances. As an example, a 3D diagram showing final landform designs is recommended to be submitted (Department of Mines, Industry Regulation and Safety [DMIRS] 2020), whereas providing a 3D design plan of the final landform must be provided as part of the PRC Plan requirements in Queensland (DES 2019).

Mine closure plans must be resubmitted to the regulatory agency every three years, or at a date advised by the department. Additionally, public disclosure of mine closure plans is a requirement.

Interestingly, the external guidance material for mine closure plans released by the DMIRS did not include advice to 'pre-lodge' mine closure plans (DMIRS 2020).

In relation to financial assurance, holders of mining tenements must pay a non-refundable levy to the Mining Rehabilitation Fund, rather than the common approach of full financial cost estimates for closure.

3.2.3 *Ontario, Canada*

Ontario has two main pieces of mining legislation, the *Mining Act 1990* (Australian Government 1990) and associated Regulation (Government of Ontario 2003), both of which are administered by the Ministry of Northern Development, Mines, Natural Resources and Forestry.

The mine closure requirements are specified in the Regulation and the requirements are detailed in nature. The mining company must submit amendments to the mine closure plan at any time the mine plan is found to be materially deficient (University of Queensland 2020). Furthermore, there are requirements for the provision of financial assurance, in multiple forms (IGF 2021b).

Due to continued likely changes to mine plans, this may result in requirements to resubmit the mine closure plan on multiple occasions, and therefore require frequent engagement with the regulatory body. There are also requirements for public disclosure of mine closure plans under this Regulation.

The content requirements of the mine closure plan include defining the post-mining land use, progressive rehabilitation, sustainable development, and physical and geochemical stability requirements. The external website available for the Ministry of Northern Development, Mines, Natural Resources and Forestry appeared to have little information about early engagement around mine closure plans with the ministry or other pre-lodgement options.

3.2.4 South Africa

South Africa has a complex number of relevant legislative instruments for mine closure, and at least two administering authorities that regulate mine closure that include the Department of Mineral Resources and Energy and the Department of Environment, Forestry and Fisheries. Mine closure is regulated at a national level, and requirements for mine closure exist both under resource and environmental regulations and policies.

The process of mine closure in South Africa includes the assessment of completed rehabilitation at the end of a mine's life, which then results in the issuing of a closure certificate under the relevant mineral legislation.

The *Mineral and Petroleum Resources Development Act 2002* (South African Government 2002) requires that an application be made to a Regional Manager and must be accompanied by a final rehabilitation, decommissioning, and mine closure plan, an environmental risk report and a performance assessment of the closure plan. It was noted that mine closure plans or rehabilitation plans are not readily available in the public domain for review.

South African mining operations must develop closure cost estimates and associated financial assurance for three timeframes within the mining lifecycle (operations, decommissioning and post-closure) (IGF 2021b).

Overall, the South African mine closure framework has been reported as being complex due to multiple regulatory agencies involved and various legislative frameworks that mining companies must follow, which can result in overlapping closure requirements (Watson & Olalde 2019). Due to the involvement of multiple regulatory bodies, it is likely the amount of stakeholder engagement with regulators, especially towards the end of a mine's life, will be increased.

3.2.5 Chile, South America

Chile's regulatory body for mine closure has separate bodies that regulate the mining and environmental aspects of mine closure (University of Queensland 2020). Formal mine closure legislation was introduced in Chile in the mid-1990s and has since been amended as early as 2015; this new legislation included significant reforms to a modern mine closure approach. This methodology includes requirements to develop mine closure plans as a legal document; however, it is primarily related to new mining activities with extraction amounts of over 10,000 tpm (IGF 2021a).

The mine closure plan requirements include modern obligations, such as environmental impact assessments, and post-mining land use identification. However, public disclosure of the mine closure plan is not mandatory.

Updates to the mine closure plan, required under Law 20.551, are required at least every five years, which requires engagement with the regulatory body. Where changes to the mine plan occur, the mine closure plan must be updated with the regulatory body

Financial assurance is also required to be provided by mining companies and must cover the closure and post-closure costs as well as administrative and contingency costs (IGF 2021b).

4 Discussion and recommendations

The review of both international and individual jurisdiction case studies around mine closure processes and engagement with regulatory bodies resulted in findings around common best-practice mine closure requirements, consistent approaches to closure policy, and shared regulatory expectations. A discussion on these findings is included below and contains findings from the authors' experience in mine closure where relevant. This guidance may be of particular use if there is no authoritative or informative governing policy

on mine closure in a certain jurisdiction, or where mining companies have multiple operations across separate jurisdictions and need a singular defined approach for mine closure and engagement.

4.1 Regulatory engagement plan

The development of a stakeholder engagement plan, using recognised principles and a step-by-step process, is recommended by international publications and will assist in ensuring purpose-driven and meaningful engagement outcomes. Modern international requirements around mine closure require the setting and implementation of stakeholder engagement with impacted parties, such as landholders, local communities, traditional owners and interested groups. Companies also need to ensure their stakeholder engagement planning considers the importance of engagement with regulatory bodies.

With particular respect to regulatory engagement, companies should develop a stakeholder engagement plan to provide scope, purpose and structure to engagement with regulatory bodies, as they are a key stakeholder in the mine closure process.

The stakeholder identification step should be undertaken in the first instance (AccountAbility 2015), as there may be multiple regulatory bodies involved with the closure of a mine, with differing roles and expectations. Developing an understanding of any identified regulatory body's purpose and role in mine closure planning and approval prior to any engagement can provide key insights into the interest and expectations of the body. This may be achieved by reviewing the key legislative pieces that the regulatory body administers, publicly available guidelines and publications, and mine closure planning documents approved by the body, which may be available externally. The development of the engagement plan also should consider how the regulatory body considers the organisation's engagement with other parties and how this needs to be considered and communicated to promote better transparency in closure practices.

Acknowledgement that there are different types of engagement levels and methods, and that utilising the best method of communication, consultation or negotiation is essential. Companies should consider whether any communication is informative, consultative, and requires negotiation or input from the regulatory body. Alternative means of communication, such as tours of rehabilitated areas, may provide more beneficial outcomes than an email or meeting in an office.

Stakeholder engagement plans for communication with regulatory bodies should also consider that regular communication throughout the life of a mine, including in the planning and feasibility stage through to closure, can provide more informed mine closure outcomes and reduce risks around statutory approval. Timing should consider how often mine closure plans must be resubmitted to the regulatory body, and whether re-engagement is necessary when the mine plan changes or there are significant rehabilitation outcomes.

4.2 Closure design

The mining operation's proposed closure objectives, completion criteria and design specifications should be provided to the regulatory agency as a key stakeholder. The design for closure outputs should be compliant with local, state or national requirements and also consider international standards and guidelines.

For instance, a commonality across multiple jurisdictions and international publications is the formulation of realistic and achievable rehabilitation completion criteria, using the SMART principles (World Bank Group 2021). These principles require criteria to be specific, measurable, assignable, realistic and time related. By setting achievable completion criteria early in the design for closure process, mining companies can avoid the need to change their criteria later during the process when rehabilitation is not compliant with completion criteria.

The opportunity for the regulatory agency to provide feedback is important and can prevent delays or misunderstandings as part of the formal mine closure plan application or amendment process. This engagement should ideally occur prior to any formal application or amendment of the mine closure plan and should be discussed as part of 'pre-lodgement' proceedings if the regulatory body offers this service.

“Companies should engage regulators early in the process to improve alignment on expectations, understand regulator objectives and communicate mine closure processes and objectives to reduce uncertainty.” (ICMM 2019, p. 16)

Conducting these early informative and consultative discussions assist to allow the mining company to better understand the expectations of the regulatory body, and also communicate the mine closure process in a less high-pressure environment, without any statutory processes or time frames.

Additionally, it is also important to discuss the design for closure outcomes progressively throughout the life of a mine, especially for operations with extended life-of-mine scenarios (i.e. 40–50 years). The appropriateness of certain design for closure aspects, such as completion criteria, may have changed during the life of the mine, and the regulatory body can often provide advice on what design specifications or post-mining land outcomes have been successful in other recent mine closure processes (Australian Government 2016).

4.3 Mine closure planning

The primary piece of information that should be provided to a regulatory agency, whether it is voluntary or as per legislated requirements, should be a mine closure plan. This plan should be regularly updated and periodically reassessed or audited to ensure it is effective and appropriate. When changes are made to the plan, these should be provided to the regulatory agency.

The mine closure plan should be developed to mirror the best-practice approach of the day and consider not only any state or national requirements but also international standards and guidelines. This approach can reduce any risks associated with statutory approval of mine closure, prolonged statutory assessment time frames, and financial implications of delays. A review of international and state and federal requirements across the various case studies found that a mine closure plan should include the following information at a minimum:

1. Provide comprehensive baseline information, including climatic conditions, physical conditions (topography, geology, hydrogeology, hydrology, seismicity and geotechnical), local and regional environmental information (flora, fauna, ecology, communities and habitats), local receiving water details, and soil and waste materials characterisation.
2. Describe the stakeholder engagement activities conducted and planned.
3. Describe the post-mining land use for every applicable mining domain.
4. Include a closure risk assessment to determine whether landforms are safe, stable and non-polluting and that the environment and social risk is ‘as low as reasonably practicable’ (ALARP).
5. Define rehabilitation completion criteria in compliance with the SMART principles.
6. Provide a work program or schedule of progressive rehabilitation throughout the life of a mine.
7. Describe rehabilitation trials and any remediation activities needed, as well as monitoring and maintenance of rehabilitated areas.

Mine closure plans should detail the progressive rehabilitation that will be completed over the life of the operation and provide a schedule of likely works. In some jurisdictions, the provision of this information is mandatory, such as the Queensland mine closure framework, which requires a Progressive Rehabilitation and Closure Plan Schedule with defined rehabilitation areas, criteria and milestones. Progressive rehabilitation can provide both environmental and financial benefits, and if communicated to regulatory bodies during the mining operation’s life, can provide valuable opportunities for early agreement on the rehabilitation processes and outcomes.

“Progressive rehabilitation, as opposed to rehabilitation after the entire mine is mined out, is advantageous due to two reasons. First, progressive rehabilitation shortens the duration of time to stockpile the topsoil, thus reducing the loss of native seeds embedded in the

topsoil and increasing the chances of success of revegetation. Second, progressive rehabilitation allows spreading out costs more evenly over time and thus reduces the risk that rehabilitation may not be carried out at all, or might not be carried out adequately.”

(United Nations Development Programme and United Nations Environment 2018, p. 68)

Another key step to developing a mine closure plan is reviewing whether other mine closure plans have been published externally for the relevant jurisdiction to provide an understanding of the level of information that the regulatory body expects. As identified in the jurisdictional case studies, a large proportion of modern mining jurisdictions will require the publishing of this information.

Once the first iteration of the mine closure plan is developed, companies should strongly consider pre-lodgement or providing draft copies to the relevant regulatory body, who can provide opportunities for more informed and engaged discussions, without the pressure of approval statutory time frames.

Companies will also need to understand the triggers for resubmission and updating a mine closure plan and pre-empt this requirement through early communication with the regulatory body. Preparations should be made for updates to the mine closure plan at least every 3–5 years based on policy triggers or business requirements such as changes to mine plans.

4.4 Closure costs

The consideration of financial and budgetary aspects of closure, such as company closure cost estimates and regulatory financial assurance requirements, is an important component of sustainable mine closure.

As part of closure planning, proponents should both ensure they have estimated and made available the financial resources for closure and have also adhered to any financial assurance requirements relevant to the applicable legislative framework for a mining operation.

Similar to the mine closure plan recommendations around regulatory engagement, communication with regulatory bodies around the financial considerations of rehabilitation activities could assist mining companies in refining closure outcomes if those costs are no longer feasible. As an example, explaining to regulatory bodies the actual cost and business implications of undertaking certain rehabilitation activities, where they are too complex and cost inhibitive, may assist in the negotiation of more achievable and sustainable land outcomes. Providing actual examples of costs for closure to regulatory bodies, such as third-party quotes, may better provide evidence of costings on the ground.

Additionally, regular review and external auditing of closure costs is also strongly recommended (ICMM 2020), and updates to closure costs and financial assurance or bond amounts should be communicated with regulatory bodies as they arise.

4.5 Rehabilitation trials and remediation

The case studies examined for this paper revealed that often the conducting of rehabilitation trials is not a mandatory component of mine closure legislation or policy. Nevertheless, this can be an important step in the mine closure process, particularly for mines with a longer mine life, with poor quality materials such as topsoil or waste rock, or with difficult landform design specifications. A large majority of the mine closure plan requirements across jurisdictions, such as Queensland and Western Australia, recommended rehabilitation trials but didn't require these trials as compulsory steps.

Engagement with regulatory bodies around rehabilitation trials may demonstrate that a mining company is taking an active and informed approach to rehabilitation. Dialogue with the regulatory agency around concerns with active rehabilitation and remediation activities can also assist with discussions about setting more realistic completion criteria.

The review of the different levels of stakeholder engagement also identified that site visits can be a useful tool for communicating the difficulties or achievements of rehabilitation (ISO 2021). This may include

escorting representatives of the regulatory body to the mine site and demonstrating the rehabilitation or remediation works being undertaken.

5 Conclusion

With the continued development of mine closure plan policy across the globe, mining companies may be uncertain as to how to approach regulatory agencies and engage in these processes. There may be misconceptions that regulatory agencies will hinder a process rather than provide advice and valuable input into closure outcomes.

The purpose of this paper was to research and recommend best-practice approaches to engagement with regulatory bodies around the mine closure process and to help companies avoid risks such as prolonged statutory processes, approval uncertainty, and increased closure costs.

The review of international publications and individual case studies at a state and national level has provided insights into the expectations of regulatory bodies and identified the foundational elements of best-practice approaches to engagement during mine closure planning. This paper has provided an understandable and simple approach to demonstrating and achieving sustainable and best-practice mine closure processes with regulatory agencies from a global perspective.

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