Mine Closure 2026 – AB Fourie, G Boggs, J Heyes & M Tibbett (eds)

doi:10.36487/ACG_repo/2615_22

Canadian and Australian regulatory comparisons in mine and tailings facility closure

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Abstract

The closure of mines and tailings storage facilities (TSFs) is an area that has seen rapid advancement over the last few decades. With the beginning of the environmental movement in the 1960s, the mining industry has seen increased scrutiny from internal and external stakeholders, with increased expectations of long-term environmental performance. This in turn has given rise to an increase in regulations, technical guidance, disclosure and auditing mechanisms to demonstrate alignment with the increased expectations.

Reviewing the different regulatory frameworks used globally shows the benefit of incorporating different approaches to regulation. Used alone, a command and control (CAC) approach which sets standards required, backed by legal consequences for failing to comply, offers strong protection as long as the standards imposed are set correctly. Self-governance, where groups, firms or individuals require specific behaviour (for example the Global Industry Standard for Tailings Management (GISTM) allows for experts with specialised knowledge to set targets, though enforcement is less consequential.

Separately, these regulations offer a particular risk profile to communities and industry. Uniting regulatory strategies, however, such as where a country has tough environmental laws (CAC) combined with the country's proponents following GISTM, can offer a unique value proposition. This offering balances different regulatory strengths and weaknesses, creating complementary benefits to both the public and proponents. This aligns with a global focus no longer just on the bottom line of the financial balance sheet, but also on the impact on the triple bottom line of economics, social and environmental accounting.

This paper discusses how key legislative and industry tools have been used to offer the ability to compare the benefits and drawbacks of decisions and revise alternatives, as well as to offer some suggestions of areas that may require future improvement. It does this through an analysis of academic research, selecting jurisdictions with mature mining industries and having well-known examples of the regulatory regimes in question. Specifically, the question being asked is: what areas of closure need to be the focus of regulatory or best practice guidance for the next phase of refinement? In particular, areas of relinquishment and cost estimating appear to be key gaps across multiple regulatory jurisdictions that pose a challenge for industry regulators and mine owners to reach a common understanding of the criteria and standards of practice.

The motivation for developing this paper is from an observed need to increase dialogue on this topic and provide an update on regulatory recent trends in Canada and internationally regarding tailings facility closure.

Keywords: *regulation, closure, command and control*

1 Introduction

Environmental protection and mine closure requirements enshrined in law are in their infancy compared to the age of the industry. The environmental movement began with 'public pressure and grassroots activism [that] ensured that environmentalism would move to the forefront of the [US] liberal agenda in the 1960s during the Kennedy and Johnson administrations' (Michigan in the World and the Environmental

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Justice History Lab n.d.). This movement would spark a change in regulatory standards and create the modern frameworks we use for mine closure.

Through much of the 1980s and 1990s, this approach was implemented in many countries, such as Canada and the US, through command and control (CAC) regimes. This approach uses legal authority and the 'command of the law to pursue policy objectives' (Baldwin 2012). This approach offered strong enforcement mechanisms and was the starting point for modern closure and financial assurance requirements. Through the early 2000s, this was bolstered by non-government entities creating best practice guides and standards. An example of this is the Global Industry Standard on Tailings Management (GISTM) (Global Tailings Review 2020). This is a form of industry self-regulation, which aims to prevent catastrophic failures.

This can be seen in the simplified and abridged timeline in Figure 1. At point 1 we see the beginning of the environmental movement. At point 2 we see the beginning of mine reclamation regulations. And at point 3 we see the beginning of best practice guides and self-regulation by industry. This shows the journey that the mining industry has been on since the 1960s and the evolution of government regulation as well as industry self regulation.

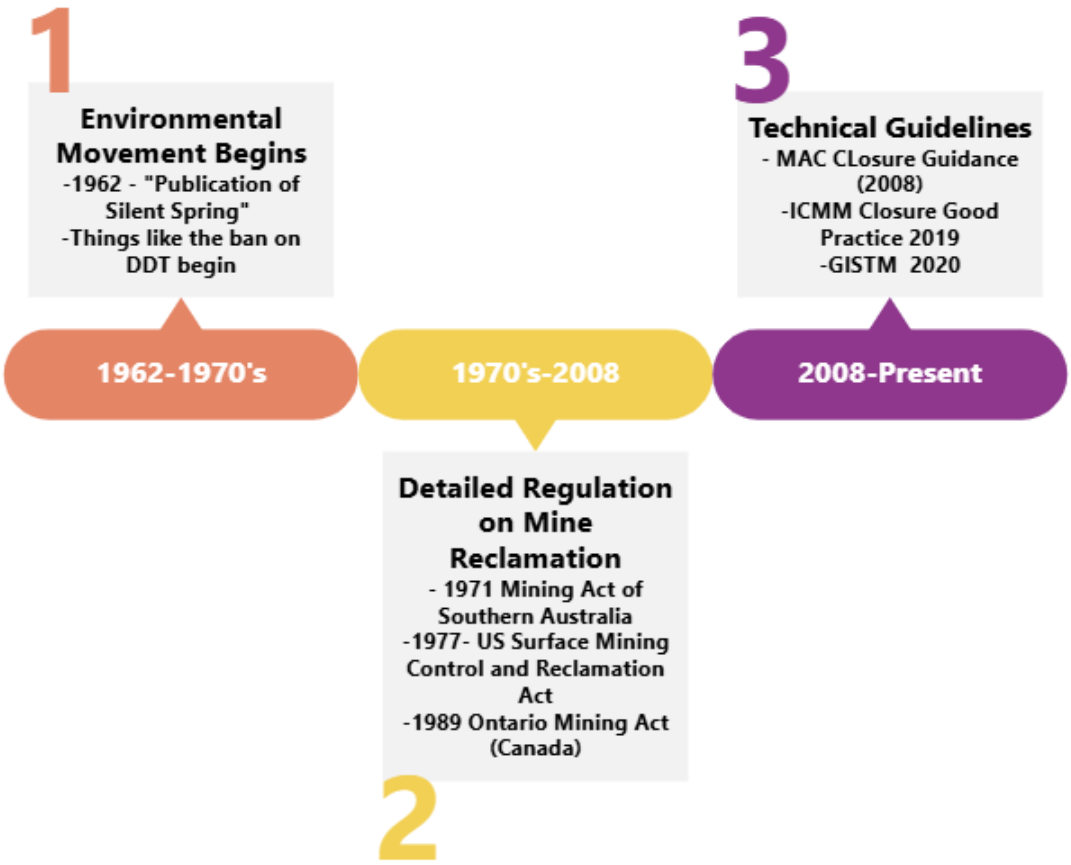

Figure 1 Abridged timeline of mine closure regulation and best practice standards adapted from Sullivan (2026)

An example of where we have seen improved outcomes on the ground over time is in the legislation in relation to metal leaching and acid rock drainage (ML/ARD). For example, in 1991, Ontario (Canada) mandated that 'All tailings impoundment areas, rock piles, overburden piles and stockpiles shall be rehabilitated or treated to ensure stability, erosion control and effluent quality' (Government of Ontario 1991). This was expanded in 2000 to include requirements for surface water and groundwater monitoring and ML/ARD prevention: 'Where the interpretation indicates that the materials have the potential for ML or ARD, a management plan shall be developed to ensure that these materials do not adversely affect the quality of the environment' (Ontario Ministry of Mine 2024). However, the law does not provide the technical details required to put this concept into practice. This is where we have seen industry group step in to fill the

void. Groups like Mine Environment Neutral Drainage (MEND) sought to fill this gap, publishing papers, case studies and reports on prevention, treatment and cover design. These can easily be formed into a standard that can form the basis for self-regulation.

CAC and self-regulation have similar goals, but fundamentally different approaches and powers. This raises the following questions:

1. Is one approach better than the other?
2. Is there a way for these approaches to work together to create a superior regulatory approach?

2 'Standard' government regulation

Globally, mine closure is predominantly regulated using CAC regimes. These are defined as imposing standards backed by the power of the law. Examples of this would be acts and regulations such as the S*outh Australian Mining Act of 1971* (Government of South Australia 1971), or the *Ontario (Canada) Mining Act 1990* (Government of Ontario 1990). The use of CAC methods is generally best practice as 'they can be the most efficient means of achieving a society's environmental protection goals' (Cole 1999).

A simple cases study in the evolution in thinking can be seen in the Canadian jurisdiction of British Columbia. 'Since 1969 mining companies have been required by law to reclaim all lands disturbed by mining. B.C. was one of the first jurisdictions in Canada to enact mine reclamation legislation and the first to extend this policy to exploration sites' (Errington 1992). This was then updated in 1989, stating: 'In accordance with the Mines Act (1989), reclamation security bonds…sufficient to provide for the costs required to perform all outstanding reclamation' (Errington 1992). This is similar to approaches in other jurisdictions such as Ontario (Government of Ontario 2024), South Australia (South Australia 1971), Queensland (Queensland Government 2019), New South Wales (Government of New South Wales 2025), Western Australia (Government of Western Australia 2025), Victoria (Government of Victoria 2026), all of which require a closure plan and financial assurance under the law. British Columbia, however, has continued to make more updates under the act, adding supporting regulations and in 2024 implementing under their regulations (i.e. the Health Safety and Reclamation Code) the requirement for a 'closure design report' in support of the requirement for a closure plan (British Columbia Ministry of Energy Mines and Low Carbon Innovation 2024) that addresses:

- physical stability, demonstrating how the TSF or dam will meet the criteria for final closure
- mitigation and management of metal leaching and acid rock drainage for the offsite release of mine affected groundwater and surface water
- ecological and landform aspects that influence closure
- land and water use objectives
- a design of permanent spillways and other necessary civil works including a cost estimate and schedule for implementation
- a long-term monitoring plan
- the requirement to ensure reasonable efforts are made to engage with local communities and affected First Nations.

We can see through this case study an evolution in the requirements and clarity of the CAC regime over time, seeking to strengthen protections and reduce ambiguity.

CAC uses the law and strong penalties to protect the public by setting fixed standards and an enforcement mechanism. This makes for strong protection that is well documented in legal documents and enforced through the courts. This enforcement through the courts is important, as it allows individuals to access the enforcement mechanism and bring legal action.

However, this approach is not without weaknesses. A key weakness of CAC can be standard setting. Setting standards under such a regime is difficult and political as governments try to balance the interests of industry and the economy, with environmental and social responsibility. This can create 'a generalized across the board rule. The result will be a broadly inefficient regime' (Baldwin 2012). Furthermore, these standards may not be forward-looking. Innovations or discovery of newly emerging impacts of actions can result in lagging standards that do not provide the level of protection required.

Another concern with CAC is the concept of legalism. This is when rules imposed are too complex. This creates a barrier for new companies to enter the market, as they do not have the history or access to teams of experts that existing proponents in the industry already have.

The last weakness to discuss is that of capture. Capture is when the relationships between regulators and industry is too close. In the case of capture, regulators start to pursue 'the interests of a regulated enterprises rather than those of the public at large' (Baldwin 2012). This again results in ineffective protections.

3 Self-governance

An emerging trend in industry is a movement towards some form of self-governance, where an industry imposes rules over their members. The best current example of this in mining is probably GISTM and the certification under it.

Self-governance is generally seen as beneficial due to the access to expertise, higher technical knowledge and relevant experience compared to the government. This is therefore seen as a more efficient form of regulation, able produce controls quickly and have easy access to the information of its members.

However, the drawbacks for self-governance lie in the perception of accountability and fairness in procedure. Of major concern is that 'non-members may be affected by regulatory decisions to which they have poor or no access… Third parties may also be excluded from negotiations that establish self-regulatory regimes and their outcomes in the first place' (Baldwin 2012). If the public has no mechanism for influencing the standards set or holding those regulated to those standards then the regulations become ineffective. This will also create an issue of the public losing faith in the regulator and those regulated, which creates opposition to future projects and creates a risk to the industry as a whole. Another concern is that self-regulation can incentivise mining companies to adopt biased interpretation of self-regulating standards to reduce effort rather than meeting the spirit of the standard.

4 The case for hybrid regimes

Due to the weaknesses inherent of the regulatory regimes described above, the use of one type of regulatory regime may not be sufficient to attain the outcomes demanded currently in our society. It was noted by the Intergovernmental Forum on Mining Minerals Metals and Sustainable Development that 'Many jurisdictions have outdated, incomplete or weak mine closure or environmental regulations… the MPF assessments indicate that there is limited use of publicly available, current and detailed international regulations, standards and guidance of mine closure.' (Stevens 2021). This report notes a weakness in the current CAC regulations related to closure, partly due to the lack of technical standards. The same report also found the following gaps in current regulations:

- The best and most up to date expertise exists in industry and international organisations, not regulation.
- Financial assurance policies need strengthening.
- Relinquishment policies and regulations which are unclear.

Given the relatively young age, comparatively, of this specialty also requires rapid advancement in technical standards. This requires the legal regulations and guidelines to be adjusted at the same pace with the evolution of industry best practices. The solution for this is the application of a hybrid system of regulation.

However, this type of approach requires a mature regulator with a strong enforcement mechanism and proponents who are willing to implement best practices, disclose information and work to improve standards. If the political will is present in a jurisdiction, this could be an effective tool; however, its absence could result in setbacks or failure.

This is not a new concept – in fact, in *Understanding Regulation*, it is stated that 'the best regulatory outcomes will usually involve mixtures of institutions and instruments' (Baldwin 2012).

Hybrid systems are already considered normal in media and internet regulation. A study on co-regulation in online environments found that for such a system to work:

> *'It should be open to all market actors and not favour traditional actors while leaving competitors out. On the other hand, the framework cannot be too loose, because co-regulation depends on industry commitments and the industry needs sufficient incentives to participate in regulation. There is no reason to believe that the industry will participate out of selfless reasons just to further a policy objective, there must be some pressure such as pending state intervention in the sector. The following requirements set basic conditions to foster public policy goals and absorb market failures with modest governmental participation.'(Doelker 2010)*

Simply put, this means that government must set clear direction and enforcement, while still incentivising, either positively or with pressure, industry participation.

Under a hybrid regime the government defines the overarching goal of the regulatory regime. The government then ensures enforcement mechanisms are in place and assists in developing strategies for the application of relevant standards. Industry under such a model helps in setting standards, proposing strategies while at the same time encouraging innovation and maintaining efficiency. 'Ultimately, the goal is to verify that various actors have translated the goals of the policy into practice-oriented policies' (Chapardar 2024).

This is particularly the case of preparing for relinquishment, hybrid regimes could be beneficial in supporting the social considerations that are often overlooked. An analysis of the impacts of mining and mine closure by Pagouni (2024) highlighted that 'the exploitation of mineral resources constitutes a fundamental component of national and regional economies and is strongly interwoven with the prosperity of local communities.' This highlights how impactful the social components of these projects including truly are. Further analysis by Koalhai (2025) looking at studies done by the World Bank highlighted that:

> *'While international standards such as the IFC Performance Standards and the UN Guiding Principles on Business and Human Rights emphasise the importance of stakeholder engagement in mine closure, implementation remains inconsistent, …regulatory frameworks often lack enforcement mechanisms, allowing companies to abandon operations without adequately supporting local communities.'*

The key point discussed here is that while there are international standards on consultation and social impacts, the current reality is that these are not effective in mine closure and relinquishment. The principles lack the enforcement needed from CAC regimes. A hybrid regime in this case would be beneficial; it would add the strength needed to meet international standards.

These systems require cooperation among the enforcement agencies. This works when:

> *'both sides [are] involved in enforcement… potential government sanctions, business actors expectedly establish their own monitoring and compliance mechanisms to ensure that their regulatory system is implemented' (Chapardar 2024).*

This co-regulation does not remove the requirement for government to provide enforcement. Such a system still requires government to enshrine the desired goals and the industry standard in a CAC regime. This then needs to be enforced by government to ensure compliance. A simplified example of the flow of regulation and the escalation of enforcement is shown in Figure 2.

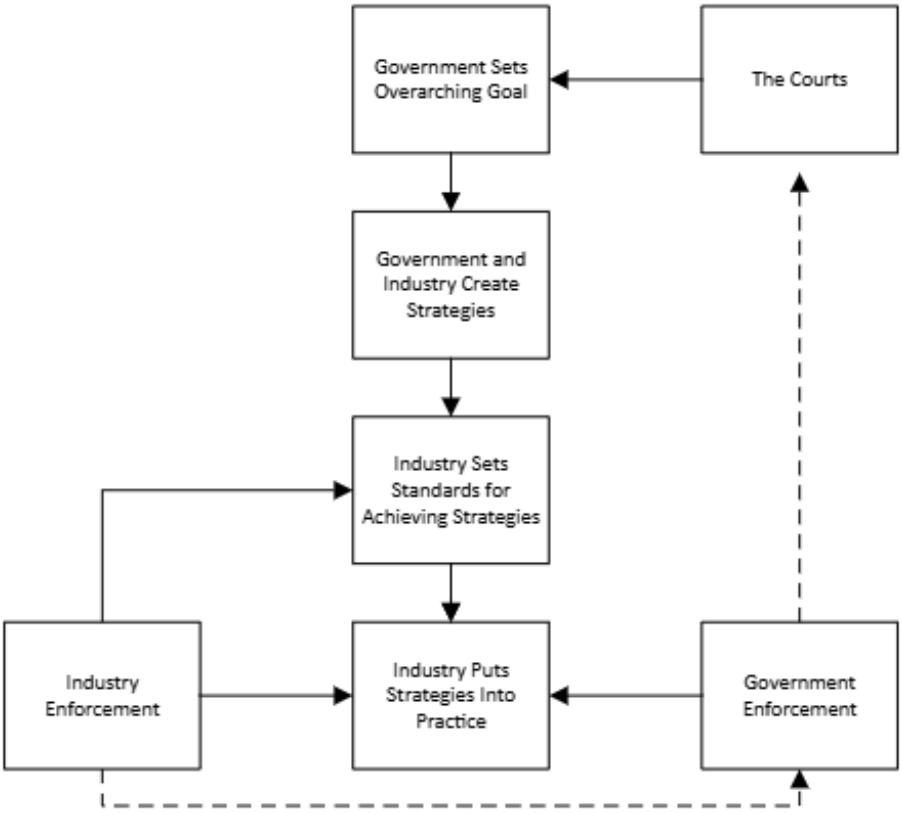

Figure 2 Flow of regulatory setting (dotted lines show potential escalation of enforcement)

Hybrid regimes are starting to take hold across the industry. In some cases, standards set by self-regulating bodies, such as GISTM, are being incorporated as reference documents in environmental impact assessments (EAIs)/environmental impact statements (EIS). An example of this would be the final EIS Rio Tinto submitted for Resolution Copper (United States Department of Agriculture 2025). This acknowledgement of the standard under the EIA helps to recognise it as best practice and begins to create a precedent under British common law.

Governments are making use of industry groups for overcoming the issue of standard setting. They are doing this by incorporating non-government best practices into legislation. This is the case in Canada, where the Canadian Dam Association's (CDA's) best practice bulletins are referenced in mine closure regulations in multiple jurisdictions. An example of this is in the Mine Rehabilitation Code of Ontario, under O. Reg 35/24, which states:

> *36.(1) All persons engaged in the design, construction, maintenance and decommissioning of tailings dams and other containment structures shall give due regard to the procedures and requirements set out in the following documents published by the Canadian Dam Association, as they are amended from time to time:*
>
> *(2) Details of the consideration given under subsection (1) shall be provided in the closure plan (Ontario Ministry of Mines 2024).*

By including the language related to the standards being periodically amended as well, it puts onus on the proponent to ensure that they are up to date regarding the latest best practice but does not solve the issue of capture.

This approach has been adopted in other Canadian jurisdictions as well. Quebec has referenced multiple CDA bulletins as best practices to be followed in Directive 019 (Government of Quebec 2025) and British Columbia which references CDA guidelines in its Part 10 Code guidance (British Columbia Ministry of Energy Mines and Low Carbon Innovation 2024).

5 The capture dilemma

The inclusion of industry groups, or experts in the setting of standards may not resolve the issue of capture. Even if capture does not exist in practice, the inclusion of industry in the process may create the perception that capture is occurring. It is important that standards created through the cooperation of industry and government be focused on the overall benefit to the public. Some items to consider as potential sources of capture are described by Hempling (2014):

- ambiguity, muddling regulation with multiple ambiguities
- near-sightedness, not considering the long-term implications of decisions
- presumption of conflict, assuming only public or industry can benefit from the outcome
- passivity, outcomes are judged by the parties' desires and not public need
- legal looseness failing to define the rights and obligations of a statute; and commission/court; difference
- regulators acting as a judiciary instead of a regulator.

By looking out for these warning signs, regulators can help to avoid capture. To also avoid the perception of capture, regulators must also consider access. Public participation, consultation or education on standards is an important first step, to ensure that everyone is participating from same starting point. The second step is being able to hold industry to account and disclose the results of enforcement orders. Open disclosure of the facts helps to promote fairness in decision-making and alignment with the public interest.

In the hybrid scenario, the government is still required to provide the ultimate enforcement mechanism. This means that access to the judicial system is essential to ensure that those impacted by industry can hold proponents to account. Unfortunately, this is becoming increasingly difficult to achieve.

There is an increasing recognition – from all sectors of the legal system, including the former Chief Justice of Canada – that:

> *'justice is in crisis… delays in the civil, criminal and family justice systems are massive and increasing. Costs of legal help are going up… Many communities feel alienated and do not see themselves represented by the justice system. Public trust and confidence in the legal system is being challenged. According to the president of The Advocates' Society, "we're approaching a breaking point." Something must change' (Farrow 2024).*

For our hybrid solution to work, we must work to also help solve the problem of legal access.

6 Conclusion

Regulation of the global mining industry has come a long way in the past several decades. As the environmental movement gained momentum, increased legislative controls have been implemented to ensure environmental protections, particularly with respect to closure. Starting in the new millennium, this has been augmented by industry and non-government groups publishing best practice guides and beginning to self-regulate. These 2 different regulatory tools raise questions on the efficacy and enforcement of the industry as a whole.

Hybrid regimes could be very useful in a number of areas for which technical standards are hard to entrench in law. These could include:

- ML/ARD prevention
- closure cost estimating
- dam design and dam safety.

Each of these areas already has technical groups creating best practice documents: MEND for ML/ARD, International Commission on Large Dams (ICOLD), Australian National Committee on Large Dams (ANCOLD) and Canadian Dam Association (CDA) for dam design and safety and the Association for the Advancement of Cost Engineering (AACE) for estimating. The work these groups have already completed would form the backbone required for hybrid regulation, requiring the industry to implement and internally enforce the applications of these standards. This is the already case for dam safety, which is seeing this approach beginning with GISTM.

Relinquishment is another area that would see major benefits from this type of regime. While standards like the ICMM *Closure Best Practice Guide* exist, more work is required to create better technical standards related to TSFs. ICOLD, ANCOLD and CDA have already begun to develop these.

Ultimately the industry is poised for a hybrid regulatory regime where governments and industry work together to promote a higher standard of regulation. This is a methodology already employed in other sectors and has been effective there. For our industry to employ it effectively, the following must be considered:

1. The Government must set clear objectives for the industry to meet.
2. Government and industry must work together to set strategies to meet or exceed these targets.
3. Government and industry must both participate in enforcement.
4. Access for the public to participate must be considered and established for both industry and government portions of the regulatory process.
5. Consideration must be given to avoiding regulatory capture.

In doing this, our industry is poised to raise the bar on environmental protection and closure. We are starting an exciting chapter that will take us into the next era of resource projects and how they are regulated.

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