

# Integrated Mine Closure Planning

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## 1 INTRODUCTION

Mining and metals operations are finite activities, whether they last a few years, fifty years or longer. The long-term environmental and social impacts of a site are manifested after closure. However, these are determined by the actions undertaken both during the operations phase and closure phase. In many ways, the reputation of the industry depends on what remains after a site closes and the closure activities are finalized. An integrated approach to closure – which takes environmental and social considerations into account at an early stage of an activity and throughout its lifecycle – plays a fundamental role in creating long-term value from both the environmental and social perspectives. Hence, the integration of closure considerations in an operation's lifecycle planning and engineering processes is an opportunity to leverage the value created by the mine.

Although the importance of integrated closure planning is intuitively evident, “ways to manage the associated economic, environmental and social impacts [are] relatively new” and there are “few case studies [...] on successful integrated [mine closure]” (MMSD, 2002).

Early in 2006, the International Council on Mining and Metals (ICMM) set out to understand current practices and issues relating to integrated environmental and social closure planning as part of an internal study. Although leading industry practices provide a benchmark of how integrated mine closure should be approached, the study concluded that this is an area where improvements can and need to be made across the sector. This paper outlines some of the study's findings.

## 2 WHAT IS INTEGRATED CLOSURE PLANNING?

ICMM considers that two types of integration need to take place: (1) integration of social and environmental considerations into the closure approach; and (2) integration of closure considerations into an operation's lifecycle planning and engineering processes.

The growing literature on integrated closure planning demonstrates the evolution of different stakeholder views on the subject. There is substantial agreement on the importance of integrated planning and the elements which it comprises. These include engineering, waste management, financial, and revegetation aspects, as well as social considerations such as sustainable economic programs.

A broad review of the legal frameworks reveals that there is significant diversity of legal mechanisms and requirements which pertain to mine closure. There is a recent trend towards the development and implementation of regulations and/or guidelines which relate to mine closure, although very few countries and their constituent states/provinces have enacted specific regulations devoted to this issue.

In most jurisdictions, mine closure laws and regulations are focused on technical rehabilitation issues. In practice, for most industrialized nations such as Australia, Canada and the USA, stakeholder engagement is required at various stages of project permitting. In a few countries, some progressive regulations related to mine closure planning have come into operation, such as the Western Australian government's 2006 Guidelines for Mining Proposals and the South African government's requirement for social and labour plans under the mining laws and the Socio-Economic Empowerment Charter for the South African Mining Industry. In addition, regardless of whether or not there are specific laws or regulations relating to integrated closure planning, there is a trend among regulators and the public to insist upon it and among companies to integrate social aspects into closure plans.

Generally, however, it is fair to say that legislation and regulation, although critically important, often lag behind the practice of industry leaders. For example, biodiversity and socioeconomic aspects of closure are issues that have not yet been captured in mine closure legislation, but are increasingly included in the closure planning of leading companies.

### **3 WHY INVEST IN INTEGRATED CLOSURE PLANNING?**

The business case for investing in integrated closure planning is closely linked to the fundamental reasons for viewing sustainable development as a goal for the mining industry in the first place.

For ICMM members, the business case began with recognition at the highest levels of the mining industry that the sector is facing very significant problems and needs to make a substantial cultural shift if it is to prosper in future. At the heart of the matter is the ability of the industry to gain permission for access to land containing new reserves. Securing finance and insurance under reasonable terms are other factors.

Leading companies also see strategic opportunities in this area. Companies can distinguish themselves in the eyes of stakeholders by showing that they can make a particularly valuable contribution to sustainable development in the long-term. A portfolio of safe, stable and prospering closed sites constitutes a very convincing case for granting a 'social licence to operate' in new areas. Investing in 'getting integrated closure planning right', in order to build this kind of portfolio, allows companies not only to protect access to land, but also hopefully gain preferential access to land.

Another key factor of the business case is the need to better understand the true cost of closure and the long-term management of sites. If long-term environmental and social closure costs were better accounted for, this would arguably have a significant impact on decision making. It is difficult to get a handle on long-term environmental costs (e.g. perpetual acid rock drainage (ARD)), and even more so to understand social costs and long-term provisions. More meaningful integrated closure planning, including stakeholder engagement, thorough costing analysis and an understanding of monitoring needs, would help minimize uncertainties with respect to long term costs and thus allow for more informed decision-making and better risk management.

If we accept the business case for pursuing better integrated closure planning, the next question is: how do we do it? Although the circumstances of every mine are unique; some general aspects of good integrated closure planning can be identified. A number of these aspects are described in following sections, along with some insights on how industry is currently performing on each of them.

### **4 CORPORATE POLICIES AND MANAGEMENT**

Good integrated closure planning requires a high level of corporate commitment. Most leading companies have a closure policy, which outlines objectives and an overall approach. They also have a standard or other supporting material which provides more detail on commitments vis-à-vis closure and how to achieve it.

At the most basic level, all operating mines should have closure plans regardless of the stage of their development. This includes retrospectively developed plans in the case of existing mines. There is also widespread agreement that good closure planning should be started early. Many would say it should start during the construction stage or earlier, with basic closure plans at the early stages becoming increasingly detailed as the site becomes operational. In many instances, closure planning is initiated when required by a regulator; demonstrating the important role that regulations play.

Having a requirement to develop a closure plan has little meaning if it is not enforced. Allocating responsibility is an important part of this. The Operations General Manager (GM) or Mine Manager is usually the person deemed responsible for the development and finalization of closure plans. Given that several people could be responsible for closure planning, the question of who has final responsibility for sign-off is relevant. For most leading companies this individual will be the Chief Executive Officer (CEO), the Operations GM or the Corporate Closure Coordinator.

In order to ensure performance, most companies use existing internal assurance processes. For example, annual performance reviews for managers are commonly used to ensure closure planning targets are being met. In addition, audits, both internal and external, are used to check on the use of closure plans.

Keeping closure plans current is critical. The frequency of revisions should be regular and can change depending on the stage of the mine life becoming more frequent as the site approaches closure. In addition, closure plan revision needs to take place when changes occur in the mine plan or social/environmental circumstances.

A very important point when contemplating integrated closure planning is to analyze how central a part of the overall business planning process it is. If closure planning is undertaken, even in a very sophisticated manner, but is sidelined when managers are making decisions about the rest of the business, it is less likely to be given adequate consideration. In practice, this means incorporating closure planning into annual business plans and ensuring that changes in mine planning and closure planning are sufficiently integrated that changes in one cause changes to be reflected in the other. This integration is increasingly occurring across the sector, however, integration is neither complete nor formalized for a large majority of companies.

Having good plans is one thing, but implementing them is sometimes another. Overall, among industry leaders there is a fairly high incidence of using standard project management tools to guide and manage the implementation of closure plans. These include monitoring and quality control methods, peer review and validation of outcomes against established criteria. Corporate support is also critical for implementing closure planning for three major reasons – in order to have the required endorsement, financial consideration and resources. Although both management tools and corporate support are present in examples of leading practice, they are by no means universally applied across the sector.

## **5 INTEGRATION OF SOCIAL AND ENVIRONMENTAL ELEMENTS**

How well are social and environmental aspects integrated into the closure planning process? Most leading companies integrate aspects such as rehabilitation, post-closure infrastructure use, community development, cultural heritage, communications and employee relations. Unsurprisingly, our study found that the aspects which are less frequently included are the ‘newer’ closure considerations such as social and cultural elements, as well as biodiversity and climate change issues.

One way of ensuring that closure plans do integrate the full range of issues is to have multidisciplinary teams develop the plans. In reality, the discipline with the greatest level of influence on closure planning is environmental, followed by engineering. Closure planning is still usually more concerned with revegetation and geophysical aspects than with social and community needs. This is not surprising given that in the past all that was required for closure planning was rehabilitation and landform stability. Companies need to move beyond that stage and develop much more rounded plans which include greater use of social and community expertise. One matter that deserves consideration is the low level of inclusion of human resources expertise in the closure planning process, which indicates that employee needs may be receiving less attention than required. This is of particular concern to labour unions.

## **6 STAKEHOLDER ENGAGEMENT**

Local community and other stakeholder input into closure planning is a high priority for good closure planning. By extensively consulting with local stakeholders from an early stage, the chances of ending up with a ‘good’ closed site where the outcomes are supported by all parties are far greater.

According to our study, the category of stakeholders most commonly included in the closure planning process is usually local government, which indicates a healthy level of interaction with local authorities, and not just reliance upon permits from central government. In a number of jurisdictions, this is also required by law. Regional authorities, regulators and community leaders are less frequently included. General community members are included in some cases, but not systematically so, and NGOs and labour unions are most often not engaged.

The stage at which stakeholders are engaged in the closure planning process also influences whether they are meaningfully involved in shaping the mine’s planning process as it leads to closure, or just included in the final stages of a project. Most leading companies would agree that stakeholders should first be engaged at an early stage, for example prior to construction, and continually as part of an on-going process.

The level of involvement of stakeholders also has an impact on the robustness of the engagement. This can vary from just receiving information, to providing input into plans, to the highest level of participation in making decisions. For leading companies, stakeholders are engaged at a decision-making level on issues such as post-closure land and infrastructure uses as well as community development. However engagement at a decision-making level on these, as well as other issues, is far from being widespread throughout the industry.

Looking more closely at the example of post-closure land uses, for most companies, physical (and geophysical) factors, followed by health and safety factors, have the greatest level of influence on post-closure land use decisions. This is to be expected, as leaving the site in a stable and safe condition has long been the primary objective of reclamation plans because these are critical sustainability issues as well as being the factors most likely to lead to a legal liability if not well-managed. Regulations, which guide land use decisions, will usually require that land be returned to a condition as close as possible to the pre-mining situation. However, when consulted and included in the planning process, local communities will often have different ideas about the possibilities that the former mine site could offer. Post closure land uses are far more likely to be supported by local stakeholders in the long-term if they have a voice in the decision-making.

## 7 COSTING

An area of concern about closure plans is whether the cost estimates used by companies cover all the necessary areas and provide sufficient funding for carrying out planned programs. The range of programs included in closure cost estimates usually includes restoration of land to the post-closure use condition, waste rock and tailings storage stability designs, and rehabilitation of contaminated sites. As these are the traditional components of reclamation plans, this is to be expected. Long-term water quality and retraining of employees are also commonly included, while sustainable community development and biodiversity programs feature far less frequently within costing estimates.

Closure costs can often be incurred after the mine is no longer generating revenue. Consequently, financial provisions for closure must be made either by the company during active operations, provided by other revenue streams or made available through the security of other assets. In the past, failure by some mine operators to make adequate financial provision for environmental closure costs has resulted in the abandonment of sites with unsafe and unacceptable environmental conditions. In such cases the environmental responsibility and financial liability for closure often defaults to government agencies. This has prompted governments in most mining jurisdictions to require closure plans and financial assurance as part of project approval.

The development of government policies should support responsible mine closure and reclamation and ensure an acceptable level of assurance that closure will be provided through the use of appropriate financial instruments. Therefore, financial assurance must be applied in a manner that ensures proper protection but does not place an unnecessary financial burden on the operator. It is important that the mechanisms put in place serve as far as possible to promote the efficient exploitation of mineral resources and their associated economic benefits while achieving levels of environmental protection and future land use that are acceptable to society. On this topic, ICMM has developed two publications, including a guidance document providing specific recommendations for both mine operators and regulators, that are aimed at improving standards of practice in this area.<sup>1, 2</sup>

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<sup>1</sup> Financial assurance for mine closure and reclamation (2005) [http://www.icmm.com/library\\_pub\\_detail.php?rcd=176](http://www.icmm.com/library_pub_detail.php?rcd=176).

<sup>2</sup> Guidance paper: Financial assurance for mine closure and reclamation (2006) [http://www.icmm.com/library\\_pub\\_detail.php?rcd=191](http://www.icmm.com/library_pub_detail.php?rcd=191).

## 8 MONITORING AND EVALUATION

An important means of determining the extent to which closure planning is being integrated is the use of comprehensive and detailed monitoring and evaluation programs. The most commonly used indicators within closure monitoring programs relate to geophysical stability, water quality, rehabilitation of contaminated sites and restoration of land to post-closure use. Retraining of employees and sustainable biodiversity are less commonly monitored, with sustainable community development programs even less frequently measured.

The low use of indicators for monitoring community development programs can be explained by the fact that there are few suitable indicators for such programs. Counting numbers of species to determine biodiversity, for example, is rather more straightforward. Community development indicators warrant attention in the quest to integrate social elements into the closure planning regime.

The involvement of stakeholders in developing indicators is another sign of integration of closure plan monitoring. Regulators are by far the most often included stakeholder group in the process of indicator development and monitoring activities. This is hardly surprising as they are often instigators of the monitoring process. Community members, NGOs and union representatives are much less frequently included.

The need to provide for long-term monitoring and management programs is also an area of concern as it relates to the sustainability of closure plans. If provision is not made for these long term management programs, there is a fear that if problems arise after the mining company has left there will be no-one willing or able to take responsibility for dealing with the situation.

The length of time allowed in closure plans for the continuation of post-closure monitoring is an important related issue. To consider a program as 'sustainable' implies that it must be durable and this can only be measured over time. Most companies plan ahead for monitoring for about five to ten years. This timeframe is established by operations and determined by considering when enough time has passed to achieve a reasonable post-closure situation. However, in some jurisdictions, for example in the USA and South Africa, there is an expectation that companies will be responsible almost in perpetuity for environmental impacts associated with mining, as long as the companies exist. In other words, there is uncertainty about how long environmental impacts may take to manifest themselves so that, even if completion criteria are reached, there may still be an expectation that a company will keep at least a low level watching brief on a site in case something should happen. This is clearly an area that requires further thinking and debate as companies will want to be relieved of liability for a site if closure criteria are successfully met and there is reasonable confidence that no further problems will arise.

A common complaint from people involved in closure planning activities is that records are not always adequately kept. This is particularly true of community meetings. The question about where records should be kept in the long term is also interesting, and one which few people generally consider. There is benefit in keeping records close to the site, even after it has closed, so that local people can check on historical data and plans themselves, which is not easy if documents are locked up at a distant corporate head office. Some consider that they should ultimately reside in government archives where the public can have access. The question of how long closure records should be kept is also pertinent. Intuitively, they should be kept at least until completion criteria are fulfilled.

## 9 CONCLUSION

When asked to rate the industry's current performance with respect to closure, responses will always vary considerably, both within industry and between different stakeholders. From the industry perspective, some of the reasons for poor closure performance include the technical challenges of long-term post-closure management and the uncertainties of social requirements for closure. Generally, those that consider that the industry is performing poorly in this regard consider that closure planning is not well integrated into the annual planning cycle and this is currently limiting performance.

ICMM's recent consideration in this area has highlighted that there are numerous examples of leading practice, but that there remain a number of areas for further improvement. In addition, more consistent implementation of good practices is required across the sector.

Integrated closure planning is a dynamic process which must commence in tandem with the other planning aspects of a mining process and must contain social and environmental aspects at the same core level of planning importance as waste management and revegetation, the more traditional rehabilitation components of closure plans. It will be this approach to sustainability planning that will give the greatest chance of longevity to an industry designed to exploit a non-renewable resource – proof that there can be long-term benefits to the people whose environments are affected by mining operations.