

Improving the legislative framework for mine closure in Western Australia

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Abstract

It is critical for the Department of Mines and Petroleum (DMP), as the lead regulator of the mining industry in Western Australia (WA), to have an effective legislative framework that encourages mine closure planning and minimises closure liability for the State. The increase to regulatory requirements in WA, “Guidelines for Preparing Mine Closure Plans”, aim to improve mine closure management practices and outcomes, through an integrated approach to mine closure planning. The guidelines focus on the application of national and international principles to mine closure planning and implementation, including stakeholder consultation, risk based approach, development of completion criteria and financial provision.

The purpose of this paper is to discuss issues and lessons learned in transferring high level mine closure principles and approaches into the State’s regulatory framework.

1 Introduction

Western Australia (WA) is one of the great mineral provinces of the world, hosting 540 commercial mineral projects that produce over 50 different minerals. According to statistics for mining investment in Australia (ABS, 2010), WA also leads all other states in Australia in regard to investment expenditure by the mining industry, accounting for US\$ 24.5 billion or 62% of national mining expenditure. As a result, there is an increased community expectation on the WA mining industry to close mines in a socially and environmentally acceptable manner. This is due to the legacies of abandoned mines in WA (Strickland and Ormsby, 2006) and the development of national and international principles and guidelines for mine closure and abandoned mines.

In 2000, the *Strategic Framework for Mine Closure* was published by the Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Minerals Council of Australia (MCA). This framework intends to “promote a nationally consistent approach to mine closure management in all Australian jurisdictions” by providing high level objectives and guiding principles for an integrated mine closure planning process (ANZMEC/MCA, 2000). It is not a detailed set of guidelines for mine closure.

National and international guidelines have since been developed to provide the mining industry with more practical guidance on the application of the integrated mine closure approach and principles including practices, processes, examples and case studies. These guidelines include a handbook on *Mine Closure and Completion* published by the Australian Government, as part of the Leading Practice Sustainable Development Program for the Mining Industry Department of Industry, Tourism and Resources (DITR, 2006), and an *Integrated Mine Closure Planning Toolkit* published by the International Council on Mining and Metals (ICMM) for the mining and metals sector (ICMM, 2008).

In line with these initiatives, the Western Australian *Mining Act 1978* (the Act) has been progressively amended to provide for mine closure planning and implementation in accordance with the leading practice standards.

In conjunction with the mine closure plan requirements, Department of Mines and Petroleum (DMP) is currently conducting a major review of the State’s mining securities system. The review aims to ensure sufficient funds are available for government to rehabilitate mine sites, in the event of an operator not fulfilling their mine closure obligations.

This paper does not outline the mining securities system or its review.

2 Integrated mine closure approach and principles

Planning for mine closure should commence at the feasibility phase of the project, with closure considerations integrated into operational planning and engineering processes, from exploration through to post closure. The closure planning process is an evolutionary process through all stages of mining, with implementation detail, certainty and confidence increasing with time.

The principles for integrated mine closure planning and their application are briefly discussed.

2.1 National strategic framework on mine closure

The national strategic framework focuses on a process that gives certainty and confidence to the mine closure outcomes, rather than a detailed set of guidelines for mine closure (ANZMEC/MCA, 2000).

The six key aspects in the mine closure process and their objectives are:

- Stakeholder involvement – identification and consideration of all stakeholder interests (i.e. company, community and government).
- Planning – an orderly, cost effective and timely process through an integrated and risk based approach.
- Financial provision – cost estimates and adequate inclusion of the cost of closure in company accounts.
- Implementation – clear accountability and adequate resources.
- Standards – establishment of acceptable and achievable outcomes, measurable completion criteria and an agreed set of indicators.
- Relinquishment – acceptance by a Responsible Authority when the company has met agreed completion criteria.

As part of the planning aspect, a mine closure plan should be developed and maintained to reflect the current status of the project. A commitment to progressive rehabilitation and development and implementation of a detailed closure plan is a key component of this process.

2.2 Australian leading practice sustainable development program handbook on mine closure and completion

In 2006, the Australian Government launched the *Leading Practice Sustainable Development Program for the Mining Industry*. The program developed 14 publications on a range of topics including mine rehabilitation, risk assessment and mine closure. The aim was to promote mining industry best practice, i.e. moving beyond regulatory requirements, through the provision of information on current practices and case studies.

Additionally a ‘Mine Closure Working Group’ was formed with a steering committee chaired by the Commonwealth DITR; to develop the handbook on *Mine Closure and Completion* (DITR, 2006). This handbook builds on the key objectives and principles outlined in the *Strategic Framework for Mine Closure*. It also reflects the current leading practices and research on mine closure, with case studies provided to show how the principles are applied in Australia. The handbook describes the business case for planned, structured and systematic mine closure and completion of mines in the context of sustainable development. It further specifies the leading practice approaches for various aspects of closure planning to achieve successful mine closure and completion.

2.3 Integrated mine closure planning toolkit

A toolkit was developed to “*promote a more disciplined approach to integrated closure planning and to increase the uniformity of good practices across the sector*”, through provision of information on “*practical work processes, examples and contexts within which to apply closure planning discipline*” (ICMM, 2008).

The toolkit intended to help site practitioners and mine management personnel make decisions based on consideration of all closure aspects in a holistic manner.

A set of 13 tools were built on the key objectives and principles outlined in the *Strategic Framework for Mine Closure*, which were designed to deliver integrated closure planning and effective exit strategies. The tools include guidance on community engagement, risk and opportunity assessment and management, knowledge platform mapping, goal setting, cost estimates, change management and the domain model. The concepts can apply to both large and small operations.

Out of these tools, the domain model tool provides a useful approach to mine closure planning and implementation. In this model, the work to be carried out on closure is divided up by segregating the facility into specific areas or domains. Each domain is treated as a separate entity within an overall plan and includes landforms or infrastructure that has similar rehabilitation, decommissioning and closure requirements/objectives. Although the domain model provides a good focal point for developing strategy for closure implementation, closure planning and implementation should also consider the whole of landscape scale to ensure effective integration of final land uses.

2.3 Best practice uranium mining guidelines

Principle 11 of the World Nuclear Association's (WNA) *Sustaining Global Best Practices in Uranium Mining and Processing* stipulates the following actions for decommissioning and site closure (WNA, 2006):

- Plan for future site decommissioning, remediation, closure and final land use as an integral and necessary part of project development.
- Seek to maximise the use of remedial actions concurrent with production.
- Ensure that the long-term plan includes socio-economic considerations, and clear provisions for the accumulation of resources adequate to implement the plan.
- Periodically review and update the plan in light of new circumstances and in consultation with affected stakeholders.
- Establish a decommissioning organisation to implement the plan and safely restore the site for re-use to the fullest extent practicable.
- Engage in no activities – or acts of omission – that could result in the abandonment of a site without plans and resources for full and effective decommissioning or that would pose a burden or threat to future generations.

Based on global experience, the International Atomic Energy Agency (IAEA) published *Guidelines on Sustainable Development Principles* (IAEA, 2009) and best practice principles (IAEA, 2010) specific to uranium mining. These guidelines emphasise the importance of integrated mine closure planning for uranium mining, as a key to sustainable development. The best practice application in environmental management and mine closure planning includes baseline data collection, stakeholder involvement, impact assessment, risk assessment, designing for closure and waste management. These best practice principles are consistent with those stated in the *Strategic Framework for Mine Closure*.

3 Business case for improving the legislative framework for mine closure planning

Although the total environmental footprint created by the mining sector in WA is relatively small (less than 0.1%), it is recognised that the State has a wide diversity of landscapes, soils and climates, which support a highly diverse flora assemblages with many endemic species (EPA, 2006; EPA, 2007). Thus, conservation and sustainable management of biodiversity should be an on-going process during mine closure planning (ICMM, 2006; DITR, 2007).

WA has a large number of abandoned mines, as prior to 1981 mines were not required to rehabilitate or to be rehabilitated to standards that would be acceptable today. According to the State's inventory of abandoned mine sites, there were at least 11,411 mine sites that ceased operations during the time of unregulated closure

(Strickland and Ormsby, 2006). The majority of these sites relate to historic gold mining operations. About 52% of these abandoned mine sites (5,094 sites) are within proximity to regional towns or roads in Western Australia, containing approximately 200,000 abandoned mine features. These features include underground workings, collapsed shafts, open cut pits, waste dumps, shallow workings and infrastructure. The vast majority of these features relate to historic underground workings and are classified as a significant risk to public safety. Significant funding would be needed by the State to adequately address both public safety and environmental issues associated with high risk abandoned mine sites.

From 1981 to 2005, approximately 70% of the 800 mine closures in Australia were unexpected or unplanned, due to reasons other than depletion of the resource (Laurence, 2006). The reasons include low commodity prices, higher operating costs, lower than expected grades, safety or environmental breaches or government policy changes. As would be expected, the majority of the mine closures were in WA (60%) followed by New South Wales (20%) and Queensland (10%).

Experience in WA and in Australia indicates that the integration of mine rehabilitation works into day to day mine operations will reduce overall closure costs to industry (Dowd, 2005). Without proper planning, the costs of mine closures have been estimated to be four to ten times those for planned closures, in order to achieve the same environmental outcome(s).

A mining company's social licence to operate is increasingly dependent on successful mine closure, as recognised by the IAEA:

"...Demonstrating successful remediation of mining and processing operations through implementation of a mine closure plan is of critical importance to the mining industry if it is to continue to hold its social licence to access and exploit natural resources..." (IAEA, 2009).

The recently released *Strategic Framework for Managing Abandoned Mines in Australia* (MCMPR/MCA, 2010), reinforces the need to limit future abandoned mines problems.

From an industry viewpoint, the benefits of integrated mine closure planning are well documented (ICMM, 2008) and include:

- Engagement with affected and interested parties will be more consistent and transparent.
- Communities will participate in planning and implementing actions that underpin successful closure.
- Closure decisions will be better supported by stakeholders.
- Planning for closure will become easier to manage.
- The accuracy of closure cost estimates will be improved.
- The risk of regulatory non-compliance will be minimised, e.g. can plan for correct material placement as dumps progress, lowers risk of post closure issues.
- Potential problems will be identified in a timely manner.
- There is more likely to be adequate funding for closure, i.e. infrastructure, specialist equipment and management already in place to do the work.
- Potential liabilities will be progressively reduced.
- Less corporate management after closure.
- Tax effective, i.e. offset closure expense against revenue.
- Opportunities for lasting benefits will be recognised early and planned for adequately.

From a government viewpoint integrated mine closure plans make good business sense for DMP, to minimise the State's liability from unplanned closure and limits future abandoned mines. It is therefore necessary for WA to have in place a legislative framework that will deliver effective mine closure planning and successful closure outcomes, through a number of legislative mechanisms including:

- Providing specific mine closure requirement in the Act.

- Publishing guidelines on mine closure plans based on the application of integrated mine closure planning principles.
- Reviewing the implementation of mining security provisions of the Act.
- Improving enforcement tools to ensure compliance through sufficient incentives and penalties.

A more detailed discussion on these mechanisms is provided in the following section.

4 Issues and lessons learnt

The *WA Guidelines for Mining Proposal*, originally published in 2006 under the provisions of the Act, requires all mining proposals submitted to DMP to include a preliminary mine closure plan (DMP, 2006). This requirement was stated in Section 4.7 of the guidelines and is summarised as follows:

- The plan should include proposed post-mining land use(s) and an outline of the rehabilitation plan including site specific completion criteria.
- Mine closure planning and management should be consistent with the closure objectives and principles from the Strategic Framework for Mine Closure.
- The plan should be updated throughout the life of mining operations.

There was no legal requirement for submission or approval of the updated mine closure plans, other than “*The efforts to develop successful rehabilitation criteria and outcomes should be documented in the Annual Environmental Report (AER). In some cases, the updated mine closure plan may be included in the AER*”.

The 2006 mine closure requirement represented a step forward in promoting an integrated mine closure approach in Western Australia, it has not been effective due to the generic nature of the requirement. The quality and standard of the Preliminary Mine Closure Plan documents submitted to DMP have been widely varied; from being too brief (a few pages) to being too detailed (several volumes of 50 mm thick documents). In addition, there was no requirement for submission of the updated mine closure plans after the initial approval of mining proposals and the attached preliminary mine closure plans. As a result, many mining operations in Western Australia, despite their advanced stages, still have not developed any post mining land use(s), site specific closure objectives or measurable closure outcomes, other than commitments to DMP’s broad closure objectives, i.e. that mines should be closed in a safe, stable, non-polluting and ecologically sustainable manner.

Integrated mine closure planning has not been embraced by the mining industry, because of a lack of understanding of life of mine implications and perceived disadvantages of progressive rehabilitation (e.g. short term cash flow and cost implications), perceived reduction in net asset value when considering discounted cash flow analysis, and the immediate need for additional resources and management. Small to medium mining operators often stated to the author that without more specific and practical guidance, they did not have the resources or the expertise to prepare mine closure plans to meet the high level strategic framework principles. As a result the following challenges had arisen:

- Inadequate planning throughout the operations.
- Inadequate understanding of material properties.
- Cost cutting and deferral pressures reducing standards.
- Lack of experience or competencies.
- High turnover of professionals, supervisors and operators.
- Lack of clarity over standards or accountability.
- No sense of ownership of liabilities during operations.
- Inexperienced or disinterested contractors.

In 2010, the Act was amended to specify the following provisions:

- Mine Closure Plan must be submitted to DMP for approval as part of the Mining Proposal application.
- The approved Mine Closure Plan must then be reviewed and submitted for approval by DMP every three years after its approval, or at such other time as required in writing by DMP.
- All Mine Closure Plans must be prepared in accordance with approved guidelines.

These requirements are mandatory and aim to address the current issues with mine closure planning. These requirements apply to new mining projects from 1 July 2011, with existing mining operations receiving up to three years to comply.

Specific guidelines for Mine Closure Plans for the WA mining industry were developed to support the Act amendments. The *Guidelines for Preparing Mine Closure Plans* (the guidelines) were prepared jointly by DMP and the WA Environmental Protection Authority (EPA) following extensive consultation with stakeholders (DMP and EPA, 2011). The development of the guidelines focused on the application of the integrated mine closure planning principles and the industry best practice information, including stakeholder consultation, risk based approach, development of completion criteria and financial provision. The guidelines will not only improve the uniformity of integrated mine closure planning, but also improve the transparency and certainty of the mine closure sign off process by regulators.

The guidelines require the Mine Closure Plans to meet the following key requirements:

- Developed up front and reviewed throughout the life of mine.
- Site-specific.
- Relevant and appropriate to project status.
- Follow defined structure.
- Present a convincing case supported by evidence and data.

The content of the Mine Closure Plans must include:

- Identification of closure obligations and commitments.
- Collection and analysis of closure data including baseline data and identification of knowledge gaps.
- Stakeholder consultation including how outcomes from the consultation process have been dealt with.
- Post-mining land use(s) and closure objectives.
- Identification and management of closure issues, using a risk based approach.
- Development of completion criteria, based on site-specific, scientifically supported and measurable closure outcomes and performance indicators.
- Financial provision for closure (based on life of mine cost estimates).
- Closure implementation including implementation strategies and schedules of work for closure activities.
- Closure monitoring and maintenance including post-closure monitoring and maintenance.

All mining proposals submitted to DMP for approval on or after 1 July 2011 must include a Mine Closure Plans prepared in accordance with the guidelines. For existing mining operations (that have a Mining Proposal approved prior to 1 July 2011) the DMP requires mine closure plans to be reviewed in accordance with the guidelines and submitted for approval by 30 June 2014. A prioritisation ranking system will be used to ensure that there is a reasonably consistent workload for the industry and DMP, as there are around 600 active mine sites in Western Australia. The prioritisation takes into consideration how much time a

project has before planned closure, how well prepared the site is for closure, the type and nature of closure risk, how well environmental issues are being managed and public interest.

Additional powers are provided to DMP to:

- Reject a mining proposal application if the accompanying Mine Closures Plan does not meet the stated requirements in the guidelines.
- Ensure that Mine Closure Plans are regularly reviewed by companies and approved by DMP.
- Take enforcement action for non-compliance with approved Mine Closure Plans.

To ensure effective enforcement of the additional powers, adequate mine closure planning training and additional resources will be provided. Modifications to existing DMP Environmental Approvals and Regulatory System (EARS) to register and track submitted Mine Closure Plans are also required; all of these are currently being addressed.

In addition to the new Mine Closure requirements, there are existing provisions under various sections of the Act that enable DMP to require the holder of a mining lease to lodge a security for compliance with “*conditions for prevention or reduction of injury to lands*”, usually referred to as environmental conditions. This requirement provides an important legal mechanism to reduce or minimise financial risk to the State, in the event of operators not fulfilling their mine rehabilitation and closure obligations. To date the mining securities system in WA has provided some incentives to operators (particularly to those of small to medium sized operations) to conduct progressive rehabilitation, which is a critical aspect of integrated mine closure planning, through a staged bond reduction policy. The level of incentives has not been sufficient, because the degree to which the bond rates cover the cost of rehabilitation has been gradually decreasing over time. Mining securities were introduced in the late 1980s, and bond rates are now well below actual rehabilitation and closure costs (Cobby, 2006; White et al., 2009). The review of the mining securities, currently conducted by DMP aims to identify the most suitable financial model to reflect the full cost of mine closure and ensure sufficient funds are available to government to rehabilitate mine sites where operators fail to fulfil their mine closure obligations (DMP, 2010, 2011). A decision on the future mining securities system is expected to be made by early 2012. Depending on the outcome of the review, additional enforcement tools may be required to provide a more rigorous and effective compliance mechanism, including linking mine closure performance to the amounts of mining securities required.

It is too early to evaluate the effectiveness of the changes to the *Guidelines for Preparing Mine Closure Plans*, which came into effective on 1 July 2011. Based on lessons learnt in the past five years in WA and similar experience from elsewhere (Abi, 2006), the specific provisions in the WA legislative framework for mine closure planning, should go a long way in advance the principles of integrated mine closure planning. These provisions, together with an improved system for mining securities will reduce the State’s liabilities associated with future abandoned mines in Western Australia.

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