



Circumstances for requiring financial assurance on a licence (with or without development approval)

Sections 364 and 367 *Environmental Protection Act 1994*

Operational policies provide a framework for consistent application and interpretation of the legislation by the Environmental Protection Agency (EPA). Operational policies will not be applied inflexibly to all circumstances. Individual circumstances may require an alternative application of policy.

Keywords

Financial assurance, licence, *Environmental Protection Act 1994* (EP Act).

Issue

Sections 364 and 367 of the EP Act allows the administering authority to require a financial assurance through a condition of a licence. A financial assurance may be required as security for environmental compliance and remediation costs where appropriate.

Section 364(1) of the EP Act sets out when a financial assurance may be required:

- 364.(1)** The administering authority may, by condition of an environmental authority, other than a level 1 or 2 approval... require the holder of the environmental authority... to give the administering authority financial assurance as security for—
- (a) compliance with the environmental authority... and any conditions of the authority...; and
 - (b) costs or expenses, or likely costs or expenses, mentioned in section 367.

Section 367 outlines the additional grounds for the requiring of a financial assurance:

- 367.(1)** This section applies if the administering authority incurs, or might reasonably incur, costs or expenses in taking action to—
- (a) prevent or minimise environmental harm or rehabilitate or restore the environment, in relation to the carrying out of an activity under an environmental authority or an environmental management program approval for which financial assurance has been given; or
 - (b) carry out work to remediate land managed under a site management plan approval for which financial assurance has been given; or
 - (c) to secure compliance with an environmental authority, environmental management program or site management plan or any conditions of the authority, program or plan, for which financial assurance has been given.

If the administering authority might incur costs or expenses to prevent or minimise environmental harm, to carry out work to remediate land, to rehabilitate or restore land the administering authority may require a financial assurance after having regard to section 364(2)(a) of the EP Act. This section requires the administering authority to have regard to:

- 364.(2)(a)(i)** the degree of risk of environmental harm being caused, or that might reasonably be expected to be caused, by the activity carried out, or to be carried out, under the environmental authority or program; and
- (ii) the likelihood of action being required to rehabilitate or restore and protect the environment because of environmental harm being caused by the activity; and
 - (iii) the environmental record of the holder.

What criteria are to be applied when considering if a financial assurance should be required when applying for an environmental authority under the EP Act?

Determination

Where the administering authority might reasonably incur the expenses as stated in section 367(1)(a), (b) and (c) the EPA will apply the criteria of section 364(2)(a) to each individual application in determining if a financial assurance is required.

Environmentally Relevant Activities (ERAs) which disturb the land will generally cause a degree of environmental harm. The ERAs listed below are considered to be activities with a higher level of risk. ERAs such as mining, and landfills will nearly always require remediation and rehabilitation to restore and repair the disturbed land.

After having regard to site specific information and to section 364(2) financial assurances may be required for the following ERAs involving a disturbance of the landform (this list is a guide as to the types of activities which could attract financial assurances and is not intended to be exhaustive):

- mining activities¹;
- ERA 1 — aquaculture in potential acid sulphate soils areas;
- ERA 20(c) — extracting rock or other material (100 000 tonnes or more per annum²);
- ERA 75 — waste disposal; and
- ERA 84(a) — regulated waste storage (tyre storage³)

If assessing officers believe imposing financial assurances for other ERAs not on the above list is justified in accordance with section 364, they should prepare a proposal for consideration to their Regional Service Director. The applicant should be notified as early as possible that a financial assurance might be necessary. If it is decided that a financial assurance is needed the assessing officer must always ensure that the decision to do so can be justified against the criteria.

Section 364 of the EP Act requires that in addition to section 364(2)(i) and (ii), the environmental record of the holder should also be taken into account. Regard should be had to section 367 and the need to prevent where possible the administering authority and the State of Queensland incurring the cost of rehabilitation and restoration of land the subject of the application.

The major risk of environmental harm being caused by an activity and not being rehabilitated or restored after the completion of the activity is the lack of financial resources or access to those resources by the applicant. Whilst the past environmental record of an applicant is an important indicator in establishing the willingness of an applicant to comply with any financial obligations and is a factor that must be taken into account by the administering authority when considering if a financial assurance is needed, past performance by the applicant does not ensure that the applicant has the financial capacity to fulfil its obligations to rehabilitate or remediate a site in the future. The nature of the activity being undertaken, the extent of environmental harm or the extent of the potential of environmental harm to be caused and the cost to prevent, remedy or rehabilitate should be given greater weight.

The primary purpose of the financial assurance is to minimise the risk of the administering authority and the State of Queensland incurring the cost of prevention of environmental harm and rehabilitation and restoration of the environment damaged by the activity. Officers have an unfettered discretion not to require any financial assurance when they are satisfied there is no risk to the administering authority with regards to the financial ability of the applicant to be able to rehabilitate and remediate the land. If an officer considers that the administering authority is at risk, the officer may exercise the discretion to require financial assurances where the risk to the administering authority is not acceptable.

For example:

There is a very low risk (if any) that a council will not be able to meet the costs of rehabilitation or restoration of the environment affected by an activity on completion of that activity. The council will not cease to exist as an entity, as is possible with corporations. Provided the conditions of an environmental authority for a council clearly articulate the required rehabilitation, a financial assurance from a council may not provide any greater level of protection from the risk of the holder of the environmental authority not being able to carry out their obligations.

Other issues to consider

Attachment 1 of *Guideline 17 Financial Assurances for Mining Activities*, and other Agency guidelines as they become available, can be used for guidance on determining an appropriate amount for financial assurance based on the amount of disturbed area left unremediated during the period being considered. No discount is allowed for activities other than mining.

Table 11 of the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998* by C.R. Ahern, M.R. Ahern and B. Powell gives an indication of the costs for treatment of acid sulphate soils (cost of lime only).

The applicant should be advised as early as possible (e.g. at a prelodgement meeting) that a financial assurance will be required.

This policy will only apply to applications received after 1 June 2001.

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Environmental Protection Agency should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved by

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Signature

6/6/2001

Date

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¹ Financial assurances for mining activities are detailed in *Guideline 17 Financial Assurances for Mining Activities*.

² If quarrying is carried out in an environmentally sensitive area financial assurance may be required for quarries less than 100 000 tonnes per annum.

³ The circumstances for determining the amount of financial assurance are outlined in operational policy *Conditioning environmental authorities for regulated waste storage — scrap tyres*.

Guideline 18: Rehabilitation requirements for mining projects

This Guideline provides information on both progressive and final rehabilitation requirements for mining projects operating in Queensland under the Environmental Protection Act 1994.

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1. Introduction

1.1. Purpose

This Guideline is to assist mining companies to propose acceptable rehabilitation outcomes and strategies during the planning stages of a mine or when changes to the proposed rehabilitation outcomes and strategies become necessary during the operational stages of a mine.

The Guideline also explains how the Environmental Protection Agency (EPA) will assess whether progressive or final rehabilitation for either new or established mining projects is satisfactory. Assessment will be based on the accepted rehabilitation objectives for each domain within the mine site and monitoring of indicators to demonstrate that the completion criteria have been met and are likely to be sustained for an acceptable period. Establishment of early contact with the EPA through pre-design conferencing is recommended to ensure there are “no surprises” in the later stages of the assessment process. Similar contact during any proposal to change rehabilitation outcomes or to obtain progressive certification or final sign-off is also recommended.

1.2. Scope

This Guideline applies to Level 1 (larger) mining projects. The Guideline applies to both progressive and final rehabilitation.

The Guideline does not apply to Level 2 mining projects, which have simplified rehabilitation requirements listed in relevant Codes of Environmental Compliance. This Guideline is not to be used to interpret the standard environmental conditions in those codes.

1.3. Structure of the guideline

Section 1 provides an introduction to the Guideline. Section 2 describes the policy and legislative frameworks that provide direction for mine rehabilitation outcomes. Section 3 lists the goals that the Government expects rehabilitation to achieve. Sections 4, 5 and 6 describe how a mining company should develop site-specific rehabilitation strategies comprising:

- rehabilitation objectives for each domain in a mining project;
- indicators that can measure progress towards the objectives; and
- completion criteria that are consistent with the rehabilitation goals set by Government and with the rehabilitation objectives established in the environmental authority for each domain in a mining project.

Section 7 describes the assessment process that will provide transparent and consistent decisions for progressive and final rehabilitation based on the rehabilitation goals, objectives, indicators and completion criteria for the mining project. Section 8 describes how existing mining projects with inadequate rehabilitation objectives, indicators or completion criteria will be assessed.

1.4. Other relevant guidelines

The following Guidelines should also be consulted:

Guideline 4: Deciding the level of impact assessment for the mining industry

Guideline 8: Preparing an environmental management plan (mining lease) (EM plan (ML));

Guideline 16: Final and progressive rehabilitation reports and audit statements for level 1 mining lease projects;

Guideline 17: Financial assurance for mining activities.

2. Policy and legislative framework

2.1 Policy framework

Unlike most other industrial activities, each mining operation is expected to cease in the foreseeable future. This generally occurs when its finite resources are depleted. However, like other industries, a mining operation may also cease when production costs exceed returns or as a result of an unrelated management decision. The closure of a mine provides opportunities for land disturbed by mining to be rehabilitated to one or more sustainable post-mining land uses. Technological advances and changing market conditions in recent decades have facilitated the development of many new mines and increased production at existing mines. There have also been changes in community expectations about the management of the impacts of mining. These factors have focused the attention of regulatory authorities on mine rehabilitation.

The *National Strategy for Ecologically Sustainable Development* (COA 1992) (NSES) promotes economic growth that safeguards the welfare of future generations, provides equity within and between generations, protects biological diversity and maintains essential ecological processes and life support systems. The ecologically sustainable development (ESD) framework includes the “polluter pays” principle, i.e. those who generate pollution and waste should bear the cost of containment, avoidance or abatement. To ensure sound environmental practices throughout the industry, the NSES also sets several objectives for mining including development of rehabilitation policies based on:

- repairing the land so its ongoing maintenance needs are consistent with those of equivalent unmined land under equivalent land use;
- rehabilitation requirements that are open to public scrutiny; and
- treating rehabilitation and mine closure as integral components of the planning and operation of mines.

The Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Minerals Council of Australia (MCA) jointly published the *Strategic Framework for Mine Closure* (ANZMEC 2000). The Framework recognised that the mining industry is responsible for rehabilitation of mine disturbance in an environmentally and socially acceptable way. It considered mine planning, stakeholder involvement, financial provisioning for rehabilitation, implementation, standards and relinquishment; and developed the following key principles:

- legislation should provide a broad regulatory framework for the mine closure process;
- standards of rehabilitation should be acceptable and achievable;
- completion criteria are specific to each mine and should reflect its unique set of environmental, social and economic circumstances;
- an agreed set of indicators should be developed to demonstrate that successful rehabilitation has been achieved; and
- targeted research will assist both government and industry in making better decisions about rehabilitation.

In 2003, the International Council on Mining and Metals (ICMM) adopted 10 principles for sustainable development for mining. Specific elements of principles 4 and 6 included:

- consulting interested and affected parties¹ on all significant impacts;
- regularly updating risk management systems;

¹ Similar consultation requirements are included in sections 38 and 39 of the *Environmental Protection Act 1994* in regard to environmental impact statements.

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- providing safe disposal of waste and process residues; and
- rehabilitating land in accordance with appropriate post-mining land use.

The MCA sought government input when it developed *Enduring Value* (MCA 2004). That publication provides a framework for implementing the ICMM principles in an Australian context and indicates that effective rehabilitation planning and implementation are intimately linked to the “social licence to operate”. The ICMM has stated that the mining industry’s contribution to sustainable development is dependent on ensuring acceptable long-term environmental performance of mine rehabilitation (ICMM, 2005).

The mining industry has been working with Australian governments to improve the mutual understanding of how rehabilitation can minimise the future impacts of mining activities. During the 1990s, the Commonwealth Government supported the development of a series of booklets on *Best Practice Environmental Management in Mining*. The Commonwealth Department of Industry, Tourism and Resources is currently replacing this series with booklets in the *Leading Practice Sustainable Development in Mining* series.

2.2. Rehabilitation hierarchy

In assessing the acceptability of rehabilitation objectives, indicators and completion criteria that may be proposed for a mining project, the EPA will have regard to a hierarchy for mine rehabilitation that is similar to the waste hierarchy. The strategies listed higher in the hierarchy should be adopted in preference to those listed lower, unless there are significant environmental, economic or social issues that override such a selection. The rehabilitation hierarchy, in order of decreasing capacity to prevent or minimise environmental harm, is:

1. avoid disturbance that will require rehabilitation
2. reinstate a “natural” ecosystem as similar as possible to the original ecosystem
3. develop an alternative outcome with a higher economic value than the previous land use
4. reinstate previous land use (e.g. grazing or cropping)
5. develop lower value land use
6. leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values.

In determining whether it is feasible to achieve levels in the top half of the hierarchy, the applicant and EPA should consider the pre-mining land use, any compensation or other agreements regarding the land, the potential uses of likely rehabilitated landforms and existing use or environmental values of surrounding land.

Developing a lower value use may be acceptable if that use is acceptable to the relevant stakeholders and all higher strategies are impractical. Leaving the site in an unstable condition or with potential to cause environmental harm will rarely be acceptable.

In general there is a higher risk of future environmental harm after the mine closes if the strategies listed lower in the hierarchy are adopted. However a “lower value” land use may be more sustainable in terms of preventing off-site impacts, especially if the post-mining land use makes an economic return that is sufficient to maintain the rehabilitation. To manage a site so that the potential for on-going environmental harm is kept to acceptable levels, future monitoring and maintenance may be required. For this reason, the acceptance of a rehabilitation strategy involving outcomes lower in the hierarchy may mean that, when progressive or final rehabilitation is assessed, the company may have to make larger payments to cover the remaining residual risk. (See Guideline 17 for a discussion of residual risk and related payments).

2.3. Legislative framework

In Queensland, rehabilitation is required under the *Environmental Protection Act 1994* (EP Act)², which has as its object the attainment of ESD. The principles in the NSESD must be considered in decision-making under the EP Act. Section 4(6) of the EP Act requires that all reasonable and practicable measures are taken to protect environmental values from all sources of environmental harm and requires persons who cause environmental harm to pay costs and penalties for the harm. The fundamental reasons for rehabilitation are to reduce the apparent disturbance caused by authorised mining activities and to minimise the potential for future environmental harm.

Section 9 of the EP Act defines environmental values as characteristics of the environment that are conducive to environmental health or public amenity or safety, as well as qualities of the environment declared to be environmental values by an environmental protection policy (EPP) or a regulation. The environmental values listed in the EPP for Water are the suitability of water for recreation, drinking, agriculture, industrial use and maintaining biological integrity; the environmental values listed in the EPP for Air are qualities that are conducive to suitability for life, health and human wellbeing; and the environmental values listed in the EPP for Waste Management are life, health, human wellbeing, diversity of ecological processes and ecosystems, and land use capability (having regard to economic considerations).

Sections 201 to 203 of the EP Act requires all Level 1 mining projects to have an environmental management plan (EM plan) which states the objectives for progressive and final rehabilitation as well as measurable indicators and standards (called completion criteria in this Guideline) that are to be achieved. An EM plan is used to help the EPA prepare the draft environmental authority for a mining project.

The EPA must be satisfied with the rehabilitation before it can certify progressive rehabilitation for part of a mining project or accept the surrender of an environmental authority for the whole or part of a project. The EPA's decision is based on an assessment of either a progressive rehabilitation report for part of the project (s266G) or a final rehabilitation report (s274) for the whole project or a part being surrendered. The holder of the environmental authority for mining activities must prepare a progressive / final rehabilitation report and submit it to the EPA for assessment. The EPA must consider the relevant completion criteria (s266K or s278) when deciding whether to certify progressive rehabilitation or whether to approve a surrender application. (See Section 7 of this Guideline and Guideline 16).

Under the current legislation it is difficult to enforce future land use constraints for rehabilitated land after the mining tenement has been relinquished. Appropriate post-mining land use may require some form of statutory constraint to future land use in order to prevent or limit the extent of "inappropriate post-mining land use". The options currently available include:

- specific land tenure (protected estate, reserve, etc);
- lease conditions (e.g. term lease under *Land Act 1994*);
- covenant (freehold, perpetual lease); or
- site management plan (for contaminated land).

The various legislative / administrative steps and their associated timeframes relating to rehabilitation during the life of a mine are shown schematically in Figure 1.

² A small number of mines operating under Special Agreement Acts have their rehabilitation requirements set under the *Mineral Resources Act 1989* and/or the relevant Special Agreement Act.

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Figure 1. Elements of the rehabilitation process for a mine

	REGULATORY ELEMENTS	COMPANY-CONTROLLED ELEMENTS	TIMEFRAME
PRE-MINING		Exploration and Feasibility Studies – <i>including baseline studies and planning possible rehabilitation objectives</i>	3 to 10 years
		Pre-Design Conference	1 week
		Apply for Environmental Authority (EA)	
	EIS Requirement Decision (EPA)		10 business days
		Prepare EIS, if required, and/or Environmental Management (EM) Plan	Up to 12 months
		Submit EM Plan – <i>including commitment to rehabilitation objectives, indicators and completion criteria</i>	
	Assess EM Plan (EPA)		30 business days
	Prepare draft EA (EPA)		10 business days
	Public Notification		At least 28 days
	Objections hearing if required		3 to 6 months
	Issue final EA (EPA) – <i>including conditions defining rehabilitation objectives, indicators and criteria</i>		10 business days
DURING MINING		<u>Progressive Rehabilitation and Monitoring</u>	
		Apply for Progressive Certification	
	Assess Progressive Rehabilitation Report (EPA refers to Progressive Rehabilitation Advisory Committee)		30 business days
	Decide Application (EPA)		10 business days
	Adjust Financial Assurance		
POST-MINING		Apply for Surrender of EA – <i>including Final Rehabilitation Report and Residual Risk Calculation</i>	
	Assess Final Rehabilitation Report (EPA refers to PRAC)		30 business days
	Decide Application and advise holder of decision (EPA)		10 + 10 business days
		Lodge any Residual Risk Payment	
		<u>Post-closure management (if required)</u>	

3. General and specific rehabilitation goals

3.1. General rehabilitation goals

In this Guideline, the Government's policy objectives for rehabilitation are called rehabilitation goals to distinguish them from the rehabilitation objectives selected by mining companies in their rehabilitation strategies for a particular mine. The rehabilitation goals have been developed from the ESD policy framework, especially in relation to intergenerational equity, polluter pays principle, protection of biodiversity and maintenance of essential ecological processes.

The four general rehabilitation goals require rehabilitation of areas disturbed by mining to result in sites that are:

- safe to humans and wildlife³;
- non-polluting;
- stable ; and
- able to sustain an agreed post-mining land use .

3.2. Site specific goals

There may be specific additional goals that are relevant at some mine sites. These may be indirectly identified by Government through requirements under other legislation dealing with matters such as endangered species, water, registered heritage places or regional or local planning. For example, there may be requirements to:

- establish vegetation communities that are demonstrably similar to a pre-existing ecosystem (especially where native vegetation is the proposed land use);
- establish or enhance the habitat of an endangered species (especially where the mining has affected such habitat);
- restore stream patterns where there has been a temporary stream diversion;
- achieve water quality that meets some specific beneficial use;
- maintain or restore some specific aesthetic values;
- preserve specific European and indigenous heritage that has been registered for the site (note that these values are managed under other legislation); or
- achieve specific socio-economic outcomes (e.g. restore high value agricultural land necessary to maintain a viable rural industry).

4. Rehabilitation objectives for a mine

4.1. Setting rehabilitation objectives

Rehabilitation objectives must provide a clear description of proposed rehabilitation outcomes within the individual domains⁴ in the mine site. One domain may contain elements that require different rehabilitation. If the elements are essential components of a single land management unit, e.g. a waste rock dump with battered slopes and a flat top, it is preferable for the elements to be included in the same domain (with different

³ Human safety at mine sites is largely managed under the *Mining and Quarrying Safety and Health Act 1999* and the *Coal Mining Safety and Health Act 1999* but fauna safety is not covered in those Acts. It will generally be appropriate to consider both human and fauna safety when designing rehabilitation under environmental legislation.

⁴ Domains are defined in Appendix C.

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rehabilitation objectives) rather than to be treated as separate domains. The rehabilitation program for a mine site must address the general rehabilitation goals listed in section 3 and any relevant site-specific goals. To ensure that the mine fulfils its environmental, economic and social responsibilities within the ESD principles, the rehabilitation objectives must:

- address potential environmental impacts;
- achieve the highest practicable level in the rehabilitation hierarchy; and

identify post-mining land uses that are acceptable to the community, local government and any other relevant stakeholders.

The first steps in identifying the potential environmental impacts for a level 1 mining project will generally be baseline environmental investigations and consultation with local residents and other interested parties to identify the environmental values in the proposed mining lease and adjoining areas. Economic or social studies may also be undertaken. The mining company is advised to seek a pre-design conference with the EPA at this stage in the planning of the mining project. While the main purpose of a pre-design conference is to assist the applicant to identify potential environmental issues at the site, it also allows the applicant to propose a stakeholder consultation program for discussion. The EPA may give an indication that a stakeholder consultation program proposed by the applicant is satisfactory for the development of rehabilitation conditions that will be used for assessment of progressive and final rehabilitation. Any agreements between the applicant and stakeholders should be committed to writing and where it is relevant to the rehabilitation requirements, should be forwarded to the EPA with the relevant application.

The second step is to develop ways to prevent or minimise the potential environmental impacts from mining and mineral processing activities that may occur on the site. Both the design of the mine and the rehabilitation strategies will be influenced by the spatial distribution of the various environmental values, the potential impacts and the costs associated with the various options for preventing or minimising the impacts. An environmental impact statement (EIS) will be required if the project exceeds the triggers in Guideline 4 – *Deciding the level of impact assessment for the mining industry*. Another consideration is how to minimise the residual risk associated with the rehabilitation. If that risk is too high (i.e. issues are identified that have the potential to result in significant failure of the rehabilitation in the future, say within 30 years), the administering authority may not accept the rehabilitation. In some cases, a high risk may be accepted if the residual risk payment was sufficient to cover the expected maintenance of the rehabilitation. However, the Government is unlikely to accept the role of long-term involvement with a large number of mine sites.

Other matters that may influence decisions about selecting a rehabilitation strategy include:

- the conservation value of a proposed environmental outcome;
- the importance to the local community of the economic productivity of the proposed future land use;
- the consistency of the proposed land use with local and regional plans; and
- the long-term ownership of the affected land.

Mine rehabilitation provides opportunities to restore ecosystems or create wildlife corridors which may produce major environmental benefits in all or part of the mining lease. There will also be cases where rehabilitation of a mine site may not be able to achieve future economic productivity that is comparable to the pre-mining situation. Irrespective of the rehabilitation outcome, the environmental authority holder must ensure that the rehabilitation will endure normal climatic variations and the agreed post-mining land will be sustained so that future generations are not paying maintenance costs that are higher than those normally incurred for the same land use on unmined land. To achieve this, the rehabilitated land may need to have constraints placed on its future

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use (e.g. a site management plan for contaminated land or a nature refuge) making any future land owner responsible for meeting those constraints.⁵

The final step in setting the objectives is to include them in the EM Plan. This makes them publicly accessible and provides guidance to management and workers on the need to conduct activities on the site in a way that is consistent with the future use. They must also be stated in a way that allows the development of measurable indicators that can be audited against the completion criteria. Table 1 gives examples of strategies that contain a range of objectives for different mine domains. It does not attempt to identify all possible domains, nor does it list all possible strategies for any domain. The EA holder proposes both the domains and the strategies.

4.2. Combining the rehabilitation hierarchy with the rehabilitation goals

For each of the goals there may be many rehabilitation strategies that can be developed and applied to a mine. It is possible that the rehabilitation requirements for different domains at a mine may be significantly different. For example, a waste rock dump domain will require a different rehabilitation approach than a tailings storage facility. Rehabilitation strategies for each domain should be developed and documented in the EM plan for the mine.

Table 1 provides some examples of how the hierarchy described in Section 2.3 might be applied to establish the possible rehabilitation strategies that would achieve the main rehabilitation goals for particular mine domains. The table has not covered all the possible strategies or all potential post-mining land uses, which can be widely divergent (e.g. nature conservation, grazing, cropping, waste disposal, water supply, etc). Nor does Table 1 specify which strategy will be acceptable in a particular locality for a specific mine.

It is probable that strategies in the top row of Table 1 would be considered to produce satisfactory rehabilitation if the strategies are implemented effectively. Strategies in the middle row of the Table may be accepted in some circumstances but will generally have a higher residual risk payment associated with them. Strategies in the bottom row will rarely be acceptable.

4.3. Describing rehabilitation objectives in the EM plan

Sections 189 and 203 of the EP Act require environmental protection commitments in the EM plan for exploration or mining projects. The Act lists rehabilitation objectives as an example of these commitments. They are the basis for the conditions of the environmental authority. The conditions are initially agreed between the proponent and the administering authority (on behalf of all stakeholders) when the authority is granted. If there is no agreement, the conditions may be decided by the Land and Resources Tribunal.

The EM plan must describe the proposed rehabilitation of the mining disturbance and how it will control future environmental harm to an acceptable level. As part of the progressive rehabilitation certification process and final surrender application, the environmental authority holder will be required to submit a risk assessment that documents the probability and consequence of future environmental harm across each of the rehabilitated domains. Where there is potential for future environmental harm, the cost to remediate this harm must be calculated in order to decide whether a residual risk payment is required (See Guideline 17).

During mine planning, the post-mining land use must be identified, as this is a controlling factor in setting rehabilitation objectives that are consistent with the goals described in Section 3.1 and in defining how rehabilitation success will be measured.

⁵ EPA is considering extending the concept of a site management plan to ensure appropriate post-surrender land management where contamination is not an issue. The intent is to require a third party to implement a management plan prepared by the mine operator to minimise future risk. Funding (if not covered by the compensation agreement) and the third party's level of responsibility for the management plan will require further consultation.

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TABLE 1. POSSIBLE STRATEGIES TO ACHIEVE REHABILITATION GOALS FOR VARIOUS DOMAINS⁶

PART A – Domains involving surface features including Final Voids, Shafts, Adits, Subsidence

OUTCOMES	GOALS			
	SAFE	NON-POLLUTING	STABLE LANDFORM	SUSTAINS AGREED LAND USE
Generally acceptable	<p>Backfill to original ground level (or higher to allow for settlement.</p> <p>Seal or install bat gates for shafts and adits</p> <p>Structurally sound; safe to people and animals;</p> <p>No hazardous materials</p> <p>Treat hazardous material</p> <p>Remove hazardous material</p>	<p>Contains good quality water</p> <p>Moderate quality but no connectivity</p> <p>Low risk of groundwater contamination or overflow but monitoring and management in place</p>	<p>Backfill voids and shallow shafts</p> <p>Stable collar and capping or cover for shafts</p> <p>Battered slopes with vegetative cover</p>	<p>Natural ecosystem restored</p> <p>Alternative high value use, eg. water reservoir, good quality agricultural land, recreational use</p>
May be acceptable	<p>Cover hazardous material with benign material or water</p> <p>Build safety barriers</p>	<p>Void acts as a sink or reservoir for contaminated water with minor risk to stock or wildlife</p>	<p>Battered moderate slopes with little vegetation</p> <p>Steep slopes in competent rock</p>	<p>Waste disposal (if site approved under <i>Integrated Planning Act 1997</i>)</p> <p>Industrial or commercial land use</p> <p>Unused void with low risk</p>
Rarely acceptable	<p>Contains exposed hazardous materials (eg. potentially acid forming or containing heavy metals)</p>	<p>Poor water quality that poses a high risk to stock or wildlife</p>	<p>No action but site is structurally unsound, geotechnical unstable, a threat to nearby sensitive places and infrastructure</p>	<p>Accumulates hazardous material</p>

⁶ Not all of these structures may be grouped in the same domain. However, similar matters will have to be considered in developing the rehabilitation outcomes for areas that have been used for these activities. There may be more than one domain of any particular type of activity within a single mine if the rehabilitation outcomes are going to be different because of variations in the topography, adjoining land use, scale of activity or other considerations.

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Table 1. Continued

PART B - Domains involving solid waste disposal*

OUTCOMES	GOALS			
	SAFE	NON-POLLUTING	STABLE LANDFORM	SUSTAINS AGREED LAND USE
Generally acceptable	Structurally safe, no hazardous materials Structurally safe, treated hazardous material	Runoff and seepage will be good quality water that is unlikely to affect known environmental values	Place wastes below natural land surface (ie. below grade). Place wastes above natural surface with minimal slopes (eg. less than 5°)	Reinstate original ecosystem Create a different use with enhanced environmental, economic or social values acceptable to stakeholders Return to previous use/condition
May be acceptable	Structurally safe, hazardous material adequately contained	Potential for pollution of water that is managed by: <ul style="list-style-type: none"> ▪ Natural low groundwater connectivity (demonstrated by hydrological studies) ▪ Impervious capping or lining ▪ Store and release capping 	Place wastes above ground with moderate slopes	Return to previous use, or a different use with reduced environmental, economic or social values. (Evidence that use is acceptable to stakeholders would be essential) Managed constrained use
Rarely acceptable	Uncontained or inadequately contained hazardous materials	Waste disposal facility contains inadequately managed severely contaminated water or water requiring continuing treatment	Place above ground with angle of repose slopes	Unusable contaminated site that is not adequately managed

* Note – Solid wastes include rejects, waste rock dumps, heap leach pads and general refuse disposal facilities.

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Table 1. Continued

PART C - Domains involving tailings dams

OUTCOME	GOAL			
	SAFE	NON-POLLUTING	STABLE LANDFORM	SUSTAINS AGREED LAND USE
Generally acceptable	Structurally safe (appropriate certification against relevant code) - no hazardous materials Structurally safe - treated hazardous material	Runoff and seepage will be good quality water that is unlikely to affect known environmental values	Stored in redundant pit below natural surface level with appropriate erosion control Outer walls designed for long term stability Vegetation cover established and preventing erosion	Reinstate original ecosystem Create a different use with enhanced environmental, economic or social values acceptable to stakeholders Return to previous use/condition Site management plan in place and effective
May be acceptable	Containment of hazardous material but limited strengthening of walls or capping	Eliminate inflow Breach wall to prevent ponding Armoured impervious capping with capillary break if needed Store and release capping Collect and treat seepage	Appropriate maintenance program proposed	Return to previous use, or a different use with reduced environmental, economic or social values. (Evidence that use is acceptable to stakeholders would be essential) Manage constrained use
Rarely acceptable	Unstable poorly designed structure	Seeping contaminated water to surface or ground water	High risk of instability and structural failure	Unusable contaminated site that is not adequately managed

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Table 1. Continued

PART D – Infrastructure

OUTCOMES	GOALS			
	SAFE	NON- POLLUTING	STABLE LANDFORM	SUSTAINS AGREED LAND USE
Generally acceptable	<p>No hazardous structures or chemicals used in mine</p> <p>Avoid effects of hazardous materials on site by restricting use to fully contained facilities which are cleaned and removed from site</p> <p>Treat hazardous materials</p> <p>Remove hazardous materials</p>	<p>After removal of infrastructure - runoff and seepage will be good quality water that is unlikely to affect known environmental values</p> <p>Remediate contamination so that runoff and seepage will not have unacceptable effects on known environmental values</p>	<p>Allow continued use of permanent infrastructure that is stable or is managed under a maintenance program</p> <p>Remove infrastructure, re-shape disturbed areas to resemble surrounding landscape and establish adequate vegetation cover</p>	<p>Avoid areas of remnant vegetation by locating infrastructure on previously cleared areas</p> <p>Reinstate original ecosystem</p> <p>Create a different use with enhanced environmental, economic or social values acceptable to stakeholders</p> <p>Return to previous use/ condition</p>
May be acceptable	<p>Containment of hazardous materials</p>	<p>Minimise runoff or seepage that is likely to have unacceptable effects on known environmental values eg. by eliminating inflow through impervious capping</p> <p>Collect and treat seepage</p>	<p>Erosion rates higher than surrounding areas but an appropriate maintenance program proposed</p>	<p>Return to previous use, or a different use with reduced environmental, economic or social values. (Evidence that use is acceptable to stakeholders would be essential)</p> <p>Managed constrained use</p>
Rarely acceptable	<p>Unsafe poorly designed structure</p>	<p>Seeping contaminated water to surface or ground water</p>	<p>Landform has doubtful stability</p>	<p>Unusable contaminated site that is not adequately managed</p>

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Definition of the final land use is essential for the assessment of the long-term environmental impacts of the project by the administering authority and is typically required for the development of realistic life-of-mine costs in feasibility studies that will be assessed by the project financiers. It is also necessary for calculating financial assurance as that is based on the third party costs of rehabilitation, which cannot be calculated if the final land use is not specified. Consultation with the landowner, the local community and other stakeholders is essential when considering the future land use.

Other rehabilitation objectives may be determined through a risk assessment of the proposed mining operation and mine closure where that process identifies hazards likely to prevent the achievement of the rehabilitation goals. The objectives will focus on the end result of the rehabilitation and will not normally describe in detail how the hazards can be avoided or managed to achieve the agreed future land use. The end result must, to the maximum extent possible, be maintenance free and require no future management intervention beyond the normal land management practices for the post mining land use. The future landholder will be responsible for the management and maintenance requirements when undertaking any post mining land use at the site. A regular review of the objectives is desirable as mine plans and technology change frequently.

Achievement of short term objectives may not deliver rehabilitation outcomes that are considered sustainable in the long term i.e. centuries. Decision-making should involve stakeholders who have been provided relevant information about possible future impacts developed through a thoroughly documented risk assessment process which considers the likelihood and consequence of hazards being realised.

During the environmental impact assessment of a project, several rehabilitation options may be proposed. However, the resulting EM plan for the mining project must clearly identify the intended land use and other rehabilitation objectives for the mine at the domain level and cover the relevant rehabilitation goals listed in the previous section for each domain within the whole site. The objectives must be specified in sufficient detail to allow the administering authority to assess long-term impacts and for the community to understand the post-mining condition of the site. For a mining lease, this information is made public and objections may be lodged. Objections are considered by the Land and Resources Tribunal and the recommendations that come from the Objections Hearing may result in changes to the proposed land use or other objectives before the lease is granted. The objectives must be clearly reflected in the environmental conditions for the project.

The typical details required in the EM plan for each domain within the mine site include:

- **safety measures** – If safety hazards remain at mine closure or inevitably will develop after closure, solely as a result of the mining activities (e.g. steep slopes, exposure of hazardous materials, subsidence or potentially unstable structures), the EM plan must indicate what management controls will be implemented to reduce risks to humans or animals. These may include exclusion of access to unstable areas, waste rock characterisation and segregation or selective management of hazardous wastes. These measures complement any requirements under the *Mining and Quarrying Safety and Health Act 1999* or *Coal Mining Safety and Health Act 1999*.
- **water management and water quality** – Details of any reconstructed water courses or proposals to contain surface water on the site must be provided. The risk of any significant environmental harm resulting from potentially contaminated water entering surface waters or groundwater must be considered. An assessment of the possible quality of water impounded in a final void or surface dam must be provided. This is likely to be based on a model and will require an ongoing monitoring program to verify the predicted water quality and hydrology so that modifications can be made to the rehabilitation plans if water quality trends or flow rates are found to vary from the predicted values in a way that is likely to cause a significant increase in the resultant environmental harm.

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- **landforms** – There must be a clear indication of the post-mining topography of the site. The final shape of waste rock heaps, tailings dams and voids must be indicated on a contoured plan at a suitable scale. The choice of landforms must be supported by an assessment of the factors that will affect long-term stability with particular reference to hazardous materials, protective capping, geotechnical stability, and surface stability under the proposed post mining land use.
- **land use** – The proposed post mining land use must be clearly specified using terms such as grazing (up to a particular intensity), cropping (including type of crop), forestry plantation (for a specified type of wood), habitat (for a nominated species), or return to native vegetation (see next dot point). Indicating that the land will achieve a specific land capability class (DME 1995) will generally not be sufficient description of the proposed land use. The prior land capability and use of the site, the existing uses of adjacent land and the views of landholders when selecting the future land use should be considered.
- **vegetation** – When establishing native vegetation is one of the rehabilitation objectives for the mine site, the EM plan must specify the ecosystem(s) or habitats that are intended to be developed on the rehabilitated domains. The plan may also nominate reference / analogue sites that will be used for comparison.
- **socio-economic objectives** – An example of when such objectives might be considered is where mining occurs on good quality agricultural land and there is an agreement that the land is to be returned to a similar productive use so that it will support a viable community similar to what was there before mining.

4.4. Changing or amending objectives

Should circumstances or knowledge change during the life of the mine, rehabilitation objectives and completion criteria may need to be reviewed. If substantial changes to the rehabilitation objectives are involved, there must be a transparent amendment process that gives the public an opportunity to comment on significant changes. The current process allows the environmental authority holder to apply for a change to the objectives through an amendment of the environmental authority. In such cases the rehabilitation goals applying at the time of the application will be taken into account. It is considered good practice for the mining company to consult community members who are likely to be affected by the changes before the amendment application is lodged.

5. Rehabilitation indicators

5.1. Defining good indicators

Rehabilitation indicators provide defensible measurements of progress towards the rehabilitation objectives. Environmental indicators may involve the measurement of a single parameter or they may involve the amalgamation of measurements of several parameters into an index or model. There could be several indicators for one objective and one indicator may have relevance to more than one objective. Some may be important over a wide area while others may have a local significance or relate to how a particular objective is to be achieved for a particular mine. Although there will be site-to-site variations in the indicators, some regional groupings are expected to emerge as knowledge improves and is shared among companies and consultants.

The properties of a good indicator (CSIRO 1998) are that it:

- has an agreed, scientifically sound meaning;
- represents an environmental aspect of importance to society;
- tells us something important and its meaning is readily understood;
- has a practical measurement process;

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- helps focus information to answer important questions; and
- assists decision making by being effective and cost-efficient.

5.2. EA holder to nominate indicators

The EA holder is responsible for nominating the indicators for the mining project and should consider the properties of good indicators when doing so. The EM plan submitted with the initial application for a mining tenement is required to list the indicators that are proposed to measure the success of the rehabilitation. The plan must justify why the particular chemical, physical, biological or socio-economic parameter or index has been selected (i.e. identify the implied relationship to a key element of a particular rehabilitation objective listed in the EM plan).

As rehabilitation deals with complex systems, and the relationships between indicators and objectives may not be well understood at the mine planning stage, there needs to be appropriate mechanisms for reviewing the indicators if improved information or more cost effective rehabilitation techniques become available during the life of the mine. If the proposed change to an indicator is to be accompanied by a change in the rehabilitation objectives for a particular domain, an amendment of the environmental authority will be required. If there is likely to be a significant change to the level of environmental impact, the EPA must require the amendment to be publicly notified.

For all indicators that are selected, the environmental authority holder will:

- state what objective(s) the indicator relates to;
- justify the selection of the indicator, including how the relationship between the indicator and the objective has been established (supported by references to authoritative sources or relevant monitoring data);
- state how the indicator is to be measured; and
- state how the results will be reported and interpreted.

5.3. How the EPA will consider the indicators

A major area of concern for government is the relevance of the indicators to the specific rehabilitation objectives for the mining project, and ultimately to the long term sustainability of the rehabilitation. To ensure that the indicators are relevant, it is recommended that monitoring of the indicators start as soon as possible and continue until the application to surrender the area has been approved by the EPA (or beyond that time if a site management plan or transitional environmental program is in place). Presentation of a long time series of monitoring data is potentially the most credible way to demonstrate that the risk of rehabilitation failure is low and/or quantifiable. The monitoring will also assist in improving the validity of the completion criteria. Despite the monitoring, there may be some remaining risk that the rehabilitation was inappropriate or will fail and serious environmental harm will occur. Quantification of the cost of this residual risk is addressed in Guideline 17 *Financial assurance for mining activities*.

Examples of possible indicators for a selection of rehabilitation objectives are presented in Appendix A. For land use objectives, the indicators may range from simple quantitative measures of grazing capacity or crop yields to a complex array of indicators that might be needed to establish the viability of a native species ecosystem or its similarity to some analogue / reference site or baseline study. Two recent reviews of the use of indicators show the complexity of this issue at a regional scale and the need to establish the validity of a set of indicators for each specific site (Nichols, 2004; Tongway et al 2003).

6. Completion criteria

6.1. Setting completion criteria

The completion criteria must provide a clear definition of successful rehabilitation for each domain at the mine site in the form of a set of measurable benchmarks against which the rehabilitation indicators can be compared to determine whether the objectives are being met. At least one completion criterion must be developed for each indicator. Completion criteria should specifically relate to the environmental, social and economic context of the mine site. However, it is possible that some completion criteria may be applied uniformly across a region if supported by technical evidence.

The criteria should be developed in consultation with stakeholders (e.g. the landowner, local government, indigenous groups, community groups and various State departments). The criteria are of importance to landowners because they may set limitations on the agreed future land use and expose the landholder to risks and potential costs associated with maintaining the former mine site in a safe and productive condition.

The applicant is required to propose completion criteria in their EM plan during the application process. If these are based on relevant regional or local studies of successful mine rehabilitation, then the administering authority will include these criteria or modified versions of the proposed criteria in the environmental authority as rehabilitation conditions. The administering authority will require a risk assessment of possible failure modes for the rehabilitation, based on their consequences and probabilities of occurrence. The option to require a cash residual risk payment may defuse some potential debates about what is achievable by making the justification of rehabilitation costs a commercial decision. However, the EPA may refuse to accept rehabilitation that is clearly not sustainable. Some examples of the type of completion criteria that might be developed are provided in Appendix A. **Note that not all of the indicators and criteria listed in the Appendix would be required for all of the goals at all mines and that specific percentages and other numbers are indicative only.**

The quantitative value of a particular criterion may vary significantly from mine to mine or even between domains within a single mine depending on the nature of the disturbance, climate, topography, soil characteristics and other factors. The rehabilitation objectives will guide the selection of the indicators and the specific completion criteria. For example, stability could be reflected in criteria that do not allow erosion of materials from the disturbed areas at rates that exceed natural rates for the locality (and that may range from 1 t/ha/yr in western Queensland to more than 100 t/ha/yr in wet coastal areas). The criterion would be set at an appropriate rate, and in some cases a maintenance program may need to be developed to repair eroded areas, especially if the eroding material is contaminated or the erosion is likely to expose contaminated material.

As another example, if the outcome is to re-establish (as closely as possible) the native ecosystem that was on the mine site there may be an array of vegetation-related criteria. These may emphasise specific species, species diversity, wildlife corridors or fauna re-population. The criteria may require high levels of similarity with baseline studies or reference sites. If the vegetation is of greatest relevance as erosion control, the criteria may focus on canopy foliage cover; ground cover or the biomass developed per unit area. Comparisons with reference sites may be used as an indirect indicator of how sustainable the rehabilitated ecosystem is likely to be. If the vegetation is for aesthetic purposes, a criterion may be the abundance of a nominated species.

If the desired outcome is not related to native vegetation (e.g. the future land use is to be agriculture, grazing, urban development, waste disposal or recreation), native vegetation criteria are likely to have limited, if any, application within the site. Other criteria such as agricultural productivity, chemical and geotechnical stability, and water runoff quality/quantity may become relatively more significant. In some cases certification that a structure is meeting engineering specifications may be appropriate criteria (e.g. for tailings dam walls, waste rock dump slopes, erosion rates or void slope stability).

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In areas where suitable rehabilitation information is not available, the applicant may be required to establish a research program. It may benefit the potential applicant to commence this research before an application is made for a mining lease (i.e. while the applicant holds a mineral development licence). As a fallback, this research may occur after an application is made during the preparation of an environmental impact statement. Where neither of these options is possible, the environmental authority must contain criteria based on similar mines or general research and should contain a condition requiring the commencement of on-site trials to verify or modify these criteria within a relatively short timeframe (e.g. less than two years). The absence of field trials to verify the criteria is not justification for omitting completion criteria from the EM plan.

6.2. Monitoring and changing completion criteria

Once the criteria are established, the environmental authority holder will be expected to collect relevant information to assist the administering authority to make decisions about the adequacy and sustainability of the rehabilitation. Progressive certification of rehabilitation requires the administering authority to make the decision on whether rehabilitation is satisfactory possibly several years before the final rehabilitation application is made. In that time monitoring of the rehabilitation will continue and may disclose inadequacies in the earlier rehabilitation.

The later information does not invalidate the earlier certification unless the rehabilitation ceases to meet the original completion criteria. However, it may be used to reassess the residual risk. If the residual risk payment is likely to increase substantially or there are technical or social reasons for change, the holder may apply to amend the rehabilitation objectives and/or change the indicators or completion criteria.

A similar consultation process should be undertaken if there is a need to change the criteria because of subsequent rehabilitation research, strong community concerns or improved technology. The environmental authority must be amended and the amendment must be publicly notified if it is likely to increase the level of significant environmental harm or a significant change in the impacts on environmental values, including land use capability. If the amendment is granted, the new requirements will be taken into account at final surrender to assess the rehabilitation and to calculate the residual risk.

Monitoring of the indicators for an area of progressive rehabilitation should result in a clarification of issues, minimisation of risks and an increasing certainty in the sustainability of the rehabilitation. Where there is evidence of decreasing potential environmental harm, the monitoring of low risk matters may become unnecessary. However, unless the environmental authority is amended, evidence that the low risk matters are continuing to meet the relevant completion criteria will still be required at the time of surrender.

7. Certification or surrender

7.1. The assessment process

The certification or final sign-off of rehabilitation requires the appropriate application form to be completed and adequate information to be provided by the applicant in a rehabilitation report. This includes evidence that the rehabilitation meets the completion criteria and a risk assessment. The benefits of providing high quality information include expediting the assessment by the EPA, improving the likelihood of a positive outcome, and minimising any necessary residual risk payment.

The EPA regards the surrender as a very significant decision as it effectively transfers future liabilities at the site from the mining company to the State and in some cases to the landowner. The EPA will establish a Progressive Rehabilitation Advisory Committee (PRAC) consisting of senior staff members with a range of technical skills relevant to rehabilitation. The PRAC will consider any rehabilitation application for a Level 1 mine, and will be available to discuss critical issues with the applicant. The PRAC will have an advisory role and

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provide recommendations to the decision-making delegate, based on the wide experience of its members and external advisors, if necessary.

The completion criteria are an important component of the certification process and need to be agreed before the application can proceed. The other necessary component is clear and comprehensive information on the performance of the rehabilitation from when it was undertaken until when the application for certification or surrender is made. This information is required in the progressive or final rehabilitation report that must accompany the application for certification or surrender. *Guideline 16: Final and progressive rehabilitation reports and audit statements for level 1 mining lease projects* gives details of the type of information and detail required. The EPA may seek advice from landholders, other government departments or technical experts when deciding the application.

To minimise delays in the assessment process, the mining tenement holder should provide this information together with an interpretation of its significance by an appropriately qualified person. The number of measurement sites and the monitoring period will vary due to differences in the size of mines, climate and the complexity of ecosystems being established. Most mine sites are listed on the Environmental Management Register and to be removed from the register they require a site investigation and suitability report. If they remain on the register a site management plan (under s401 of the EP Act) must be lodged before or with the final surrender application. It must include the landowners' agreement to the proposed management arrangements for the contamination and be approved by the EPA.

An audit statement will be required from an appropriately qualified person on behalf of the holder of the environmental authority. A risk assessment must be provided in accordance with the methodology outlined in *Guideline 17: Financial assurance for mining activities*. Before the EPA issues a certificate for progressive rehabilitation, it will require any residual risk payment to be made. This can be in a bank guarantee with the financial assurance for the mining project. This may be paid in cash or bank guarantee. If the application is for the final surrender of a tenement, EPA will require the total residual risk payment to be made in cash, even if it includes amounts that were covered by a bank guarantee when progressive certification was granted for all or part of the area. The EPA must decide whether the rehabilitation is satisfactory or meets other requirements such as an approved transitional environmental program or site management plan. The EPA will consider whether the conditions of the environmental authority and any environmental protection policy (EPP) requirements have been met, the final or progressive rehabilitation report, any assessment report on the rehabilitation report, the risk assessment report, the audit statement, any site investigation conducted with regard to the contaminated land provisions of the EP Act and the standard criteria in Schedule 3 of the EP Act.

The rehabilitation will be accepted if the procedures outlined in this Guideline demonstrate that it meets the specific objectives set for the mine site in its environmental authority.

7.2. Relationship between completion criteria and residual risk

The completion criteria must be met in order to obtain either certification of progressive rehabilitation or approval of a surrender application (involving final rehabilitation). Some of the criteria may require achieving a nominated value for an indicator for a specified time period. Others may require evidence that the nominated value has been achieved, or is expected to be achieved, on the basis of current trends. The latter is potentially a higher risk option and that would be reflected in the residual risk calculation described below.

Because natural processes and human activities may have adverse effects on rehabilitation, it is possible that a site that meets a criterion at one time may fail to meet the same criterion at some future time. Even if all criteria are met for several years, there is no guarantee that the rehabilitation will not fail in the future. The risk of failure is called the residual risk. Guideline 17 indicates how it is calculated through a risk assessment that considers:

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- what components of the rehabilitation are most likely to fail (hazards)
- the likelihood of failure and
- the consequences of failure.

For any given set of completion criteria, the cost of rehabilitation will depend to some extent on the length of time that the rehabilitation is designed to meet the criteria. If more costly rehabilitation were undertaken, the risk of failure within a specified time period would generally decrease. This would be reflected in a requirement for a lower residual risk payment. It is a commercial decision for the mining company whether it should design its rehabilitation to a standard that goes beyond compliance with the environmental authority and be rewarded by a lower residual risk payment.

7.3 Use of the risk assessment in decision making

Risk assessment involves measures of likelihood and consequence of a potentially hazardous event. In order to quantify the risk, both likelihood and consequence need to be estimated quantitatively. That means likelihood will be identified as the probability of rehabilitation failing to meet completion criteria within specific timeframes after certification or approval and consequence will be estimated as the cost of managing the hazardous event. More detail on this process will be included in Guideline 17: *Financial assurance for mining activities*.

The probability of rehabilitation failure will usually be established from estimates of the minimum time before the rehabilitation has a 50 percent probability of failure and the variance of that estimate. In some cases it will be possible to model when a particular structure may fail, or to predict when a final void is likely to overflow on the basis of empirical measurements at the mine. In other cases there may be empirical data from nearby mines or theoretical calculations based on general scientific principles. If relevant scientific data is not available, anecdotal evidence from this or nearby mines may be of some use. However, there will be cases where the only source of information will be the best estimate of people with extensive experience in particular aspects of rehabilitation. A risk assessment based on poor data will have relatively high levels of uncertainty that would be factored into the EPA decision on whether or not to accept the application.

While estimates of probability of failure would normally assume that the proposed land use will occur, the estimates may not be relevant if the rehabilitated land is used for a purpose other than the specified/agreed use. This needs to be considered where an alternative/more intensive use may occur without constraint. As indicated in section 2.2, there are few legislative constraints on future land use and most of these (except site management plans and nature refuges) depend on voluntary actions by the land owner.

The consequence of a hazardous event will be estimated as the cost of management if the event happened at the present time. A consequence that does not reach the threshold of material environmental harm, i.e. an actual or potential loss to property or rehabilitation costs of at least \$5000 within the first year period, will not be considered in calculations. Because risk is defined as the product of likelihood and consequence, the threshold for consideration will be set at a risk-cost of \$5000 per year to provide consistency with material environmental harm.

The first decision the EPA must make is whether to accept the rehabilitation for certification or approval of surrender. Certification or approval is unlikely to occur unless the likelihood of failure of the rehabilitation to meet the required outcomes over the medium term (e.g. at least 30 years) is expected to have a low probability (e.g. less than 0.01). If there is a higher probability of failure that would exceed the risk-cost threshold in the medium term, the EPA would generally determine that the risk of failure is unacceptable. However, in some cases the failure would be accepted because the company has proposed a financial scheme to cover ongoing costs, such as a sinking fund. This type of arrangement is only likely to be an appropriate solution if maintenance is required for a short period. (See Guideline 17: *Financial assurance for mining activities*). An alternative

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rehabilitation strategy would be needed if perpetual maintenance (in excess of the maintenance that would normally be required to undertake the proposed land use on un-mined land) is considered necessary to deliver a sustainable outcome.

The second application of the risk assessment is to assist the EPA in determining whether any residual risk payment will be required and if so, how much will be required. Because these costs are likely to occur at some future time, standard accounting procedures should be used to establish the net present value (NPV) of the consequences. Note that the NPV is not used in calculating the risk-cost of the incident.

8. Dealing with existing mines

8.1. Mines with clear rehabilitation objectives

Historic rehabilitation must be evaluated against the rehabilitation requirements that were in place for the mining project at the time the rehabilitation was completed. This could lead to a matrix of different rehabilitation outcomes within a single domain. For example, over a period of time the species mix may have been changed in response to earlier experience or changing community expectations. The following does not deal with mines operating under Special Agreement Acts (see s614 of EP Act).

Mines operating prior to September 1990 may have had special lease conditions relating to rehabilitation. Many would have had no specific rehabilitation requirements. Otherwise they may have been subject to rehabilitation conditions applied under s60 (2) of the *Mining Act 1968* or under s61 of the *Mining Act 1968*, which gave the Minister discretion to require the tenement holder to:

- undertake certain activities if directed by the Minister;
- level the surface and otherwise restore the land to its original condition (as nearly as may be); and
- reinstate (as nearly as may be) the natural contours and channel of every watercourse.

The standard wording used typically was even more stringent and required:

- shaping the area so that it conforms as far as reasonably practicable with the surrounding topography;
- reforming all drainage lines, waterways and creek beds to stable contours and as near as reasonably practicable to the situation existing prior to mining; and
- achieving a post mining landuse capability across the lease area equal with that pre-existing the Lease, where this is technically feasible.

Between 1 September 1990 and 1 May 1995, all mining leases that were current under the *Mineral Resources Act 1989* (MR Act) had a condition that the holder shall undertake rehabilitation to the satisfaction of the Minister for Mines (s7.33(1)(d)). From June 1992 until 1 January 2001, a Department of Mineral Resources policy, *Environmental Management for Mining in Queensland 1992*, explained how those requirements were to be defined in an Environmental Management Overview Strategy (EMOS). An amendment to s276 of the MR Act in May 1995 made the preparation of an EMOS a statutory requirement. All EMOSs that had been accepted or approved (except for mines operating under Special Agreement Acts) were validated by s585 of the EP Act. Also in 1995, the Minister for Mines and Energy was prevented from accepting the surrender of a mining lease, unless the Minister was satisfied that the holder had satisfactorily rehabilitated the land (s309(5) of MR Act).

Rehabilitation completed prior to 2001 would generally not be assessed against the current legislation or the policy position proposed in this Guideline. Where rehabilitation was completed prior to the preparation of an accepted EMOS or EM plan, the rehabilitation requirements may have been in:

- the instrument of lease;

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- special conditions imposed by the minister at grant, renewal or assignment;
- a direction by the Minister for Mines under s309(3) of the MR Act; or
- a decision of the Mining Warden.

Between 1992 and 1996, almost every mining project prepared an EMOS. Most will have identified at least one rehabilitation objective (typically low intensity grazing), but few will have established indicators that can be used to measure the success of the rehabilitation and even fewer will have any specific completion criteria.

Where there is a clear intention for the rehabilitation to achieve a specified objective, the EPA will consider applications for surrender or progressive certification from the environmental authority holder on the basis of that objective. The application must show how the holder has rehabilitated the site to achieve the objective, and provide evidence to support the success of the rehabilitation. This success must be demonstrated for the four rehabilitation goals described in Section 3.1 of this Guideline (and any other site specific goals that are appropriate). The application must also be accompanied by an environmental risk assessment consistent with s266G(2) or s274(2) of the EP Act.

As the overall rehabilitation objective for these mining projects is likely to be some form of agreed post-mining land use, the environmental authority holder will be expected to demonstrate that the land use has been established and is sustainable. If on-going maintenance needs are likely (above the level that would typically be required for the specified land use in that locality), an explanation of how the holder intends to fund those costs is required.

A site that is unsafe (or is likely to become unsafe because of stability issues) would not be accepted as adequately rehabilitated. Similarly, a site that is causing or likely to cause, material or serious environmental harm (e.g. water pollution), would not be accepted as being successfully rehabilitated. If an environmental risk assessment shows that the risk cost of the rehabilitation failure exceeds the threshold set by the EPA (currently \$5000), the applicant will be required to nominate an appropriate amount as the residual risk payment. A site that is likely to require on-going maintenance would not normally be accepted without a fully funded maintenance program.

8.2. Mines without clear rehabilitation objectives

The rehabilitation requirements that applied at the time the rehabilitation was completed will be considered. However, if those requirements do not clearly define rehabilitation objectives, the environmental authority holder should apply to amend the environmental authority to define rehabilitation objectives, indicators and completion criteria for the site that are consistent with the four rehabilitation goals described in section 3.1 of this Guideline. Public notice of this application will be required and public objection rights will apply to any new rehabilitation objectives and any associated amendments that are likely to cause a significant increase in environmental harm. Approval of any amendment application will be required before an application for surrender or progressive certification of rehabilitated areas can be decided. An application that provides a strategy to ensure that the proposed future land use will be adopted would reduce some of the uncertainty that may delay decision making.

An environmental risk assessment and residual risk calculations must also be included with the application. If the rehabilitation meets the rehabilitation requirements that were in place at the time the rehabilitation was completed and there is an acceptably low risk of environmental harm occurring from the site, a certification application should be accepted. Acceptance of a surrender application may require lodgement of an appropriate residual risk payment.

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Appendix A – Examples of Possible Rehabilitation Objectives, Indicators and Completion Criteria

REHABILITATION GOAL	POSSIBLE REHABILITATION OBJECTIVES	POSSIBLE INDICATORS	NATURE OF COMPLETION CRITERIA
Long-term safety	Site is safe for humans and animals now and in the foreseeable future	<ul style="list-style-type: none"> • Safety assessment of openings 	<ul style="list-style-type: none"> • Certification in rehabilitation report that openings are now safe and will remain so
		<ul style="list-style-type: none"> • Safety assessment of slopes that are >30° and >5m in height 	<ul style="list-style-type: none"> • Certification in rehabilitation report that slopes are safe and predictions about future safety
		<ul style="list-style-type: none"> • Exposure to and availability of heavy metals and other toxic materials (selected because of relevance to site) 	<ul style="list-style-type: none"> • Certification in rehabilitation report that specified cover thickness (and/or other specific criteria) is in place and predictions about future changes • Evidence in rehabilitation report that dust monitoring results have complied, and will continue to comply, with limits (derived from EPP Air or other agreed reference source) • Evidence in rehabilitation report that measures required in site investigation report have been implemented • Leaching tests of exposed material meet specified guideline values (using standard protocols such as US EPA Toxic Characteristic Leaching Procedure) • Evidence that monitoring surface water quality for [X] years has complied with specified guideline values (derived from ANZECC 2000 or agreed reference source) • Site management plan to include measures for fire reduction and to control woody weeds
		<ul style="list-style-type: none"> • Adequacy and predicted long-term performance of safety barriers 	<ul style="list-style-type: none"> • Evidence in rehabilitation report that adequate safety plan has been implemented

REHABILITATION GOAL	POSSIBLE REHABILITATION OBJECTIVES	POSSIBLE INDICATORS	NATURE OF COMPLETION CRITERIA
Non-polluting	Hazardous material adequately managed	• Technical design of capping	• Engineers certification of construction and maintenance to design performance stated in environmental authority or EM plan
			• Evidence that X years monitoring data demonstrates that capping is functioning according to environmental authority
		• Results of site investigation report	• Removed from Environmental Management Register or Adequate funds to implement approved site management plan
	Acid mine drainage will not cause serious environmental harm (a) by excluding water and/or air from sulphides Or (b) by implementing a treatment system to remove acidity	• Technical design of barriers	• Engineers certification of construction and maintenance to specified design performance
		• Hydrostatic head / temperature in waste rock piles	• Certification that monitoring data show no unexpected rise of water levels or temperature
		• Downstream surface/groundwater monitoring	• Certification in rehabilitation report that water neutralisation system is meeting and will continue to meet design requirements
Polluted water contained on site	• Downstream surface/groundwater monitoring	• Certification that water diversion/containment structures to minimise quantities of polluted water and containing it on site are effective • Certification that monitoring data meet specified criteria relevant to potential contaminants	

REHABILITATION GOAL	POSSIBLE REHABILITATION OBJECTIVES	POSSIBLE INDICATORS	NATURE OF COMPLETION CRITERIA
Stable	Very low probability of subsidence or rock falls with serious consequences (link to environmental harm?)	• Geotechnical studies of existing structures, underground workings, highwalls or voids	• Evidence in rehabilitation report that appropriate risk assessment has been undertaken and control measures are in place
		• Past record of subsidence or rock falls in this mine	• Evidence in rehabilitation report that appropriate control measures are in place to prevent recurrence
	Very low probability of slope slippage with serious consequences (link to environmental harm?)	• Geotechnical, geochemical and hydrological studies of existing structures (outer batter slopes of waste rock dumps & tailings storage facilities)	• Evidence in rehabilitation report that appropriate risk assessment has been undertaken and control measures are in place that will continue to meet agreed requirements
		• Past record of slope failure in this mine	• Evidence in rehabilitation report that appropriate control measures are in place to prevent recurrence
	Landform design achieves appropriate erosion rates	• Slope angle and length	• Slopes <math><12^{\circ}</math> (or other value determined for particular waste material and climate)
		• Engineered structures to control water flow	• Evidence in rehabilitation report that required contour banks, channel linings, surface armour, engineered drop structures, etc are in place and functioning
	• Rate of "soil" loss	• Evidence in rehabilitation report that measured erosion rates meet limits set from reference sites, regional studies or by agreement (eg. derived from in situ trials or calculated from Universal Soil Loss Equation or similar agreed method)	

REHABILITATION GOAL	POSSIBLE REHABILITATION OBJECTIVES	POSSIBLE INDICATORS	NATURE OF COMPLETION CRITERIA
<p>Stable (Continued)</p>	<p>Vegetation cover to minimise erosion</p>	<ul style="list-style-type: none"> • Vegetation type and density 	<ul style="list-style-type: none"> • Evidence that the vegetation type and density are of species suited to the spoil/waste composition, slope, aspect, climate and other factors, and that the measured erosion rates meet the limits set. (Only relevant to stability where root systems are a major control of erosion).
		<ul style="list-style-type: none"> • Foliage cover 	<ul style="list-style-type: none"> • Evidence that the percent cover meets the set values based on the regional assessment of cover requirements. (Note: Values in excess of 70% are typically needed to protect surface soils from rain-induced erosion. In arid areas achievable values are likely to be much lower (perhaps less than 50%) and in high rainfall areas the values may be higher.)
		<ul style="list-style-type: none"> • Leaf litter, humus, depth of growing medium 	<ul style="list-style-type: none"> • Evidence that nutrient cycling is occurring and the presence of leaf litter is assisting in limiting erosion of the soil/spoil surface.

Rehabilitation requirements for mining projects

REHABILITATION GOAL	POSSIBLE REHABILITATION OBJECTIVES	POSSIBLE INDICATORS	NATURE OF COMPLETION CRITERIA
Sustainable Land Use	Soil properties that support and will continue to support desired land use (The soil indicators are less likely to be used for completion criteria than as planning tools to improve chances of other outcomes being achieved)	<ul style="list-style-type: none"> • Chemical properties (eg. pH, salinity, nutrients, trace elements) of topsoil and in soil profiles that are within range of roots of proposed vegetation 	<ul style="list-style-type: none"> • pH in range 5.0 to 8.5 (narrower range if necessary to achieve specific outcomes or broader range depending on local conditions) • Salinity < 0.2% chloride (lower levels if necessary to achieve particular outcome or broader range depending on local conditions). • Evidence that highly saline material should not be used as surface cover or potential growth medium
		<ul style="list-style-type: none"> • Physical properties (eg. depth of top soil, water infiltration, crusting, slope) 	Limits set from reference sites, regional studies or agreed conditions (eg. derived from trials)
		<ul style="list-style-type: none"> • Biological properties (eg. nutrient cycling, microbial biomass, invertebrates) 	<ul style="list-style-type: none"> • (Completion criteria for such indicators may require site trials because they will be specific to the site)
	Establish specified self sustaining natural vegetation or habitat	<ul style="list-style-type: none"> • Presence of key species • Species type and diversity • Abundance of weeds 	<ul style="list-style-type: none"> • Certification that key species are present • Certification that species diversity achieved • Certification that weed management successful
	Establish specified water body with low risk of environmental harm	<ul style="list-style-type: none"> • Hydrological studies to establish water levels and connectivity • Water quality established by monitoring or modelling validated by monitoring • Structural report on integrity of structure 	<ul style="list-style-type: none"> • Certification that water body will not overflow in 1:100 ARI event (or less frequent event if containing hazardous material) • Monitoring specified contaminants (eg. pH, As, cyanide) for X years • Meets specified water quality guidelines • Hydrologists report • Engineers certification of structure
Establish land use with comparable management requirements to similarly used non-mined land.	<ul style="list-style-type: none"> • Crop productivity • Achieve agreed capability distribution 	<ul style="list-style-type: none"> • Meets specified yield (eg 90% of unmined land or 20% of unmined land) 	

Appendix B – Definitions

Term	Definition
Appropriately qualified person	The person or persons should have qualifications and/or experience that are relevant to aspects of the rehabilitation so they can give an authoritative assessment of the performance of that aspect of the rehabilitation, especially in relation to the completion criteria.
Completion criteria	These are the standards that are to be met by successful rehabilitation. They will generally be in the form of numerical values that can be verified by measurement of the indicators selected for the rehabilitation objectives. They may include an element based on time, eg. the criterion has been achieved for 7 consecutive years for 95 percent of the area.
Consultation	The act of providing information or advice on, and seeking responses to, an actual or proposed event, activity or process.
Domain	<p>Land management units within a mine site, usually with similar geophysical characteristics.</p> <p>Some examples of typical domains include:</p> <ul style="list-style-type: none"> • Mine pit • Waste rock piles • Tailings dam • Infrastructure area <p>Within domains, elements may be designated where different rehabilitation techniques and/or timing of work is required, eg. an access road</p>
EA	Environmental authority
EM plan	Environmental management plan
Environmental hazards	These are chemical, physical or biological changes that may cause environmental harm to one or more environmental values.
Goals	These are the policy objectives for rehabilitation that are set (often informally) by Government.

Rehabilitation requirements for mining projects

Indicator	An indicator is something that can be measured and audited according to an established protocol and used to evaluate changes in a system.
Land capability class	Classification of the capacity of land to achieve and sustain specified land uses. Class I land is capable of supporting most agricultural and grazing activities whilst class VIII land imposes severe limitations on agricultural or grazing uses. "Average" management inputs are assumed.
Objectives	The end points that rehabilitation aims to achieve. They may be described in terms of future land use, biodiversity values, conservation values, health and safety outcomes, aesthetics or social outcomes or combinations of these.
Rehabilitation	Rehabilitation is the process of making a former mine site safe, stable and self-sustaining. Note: This usage is far broader than rehabilitation's literal meaning of re-establishing former condition or effectiveness. While it may be appropriate to attempt to restore the pre-mining conditions after mining has ceased for some smaller mines and mines in areas with special values, this may not be possible or an optimum result across mine sites particularly in specific domains.
Residual risk	Residual risk is defined in Schedule 3 of the EP Act to include the risk that: <ul style="list-style-type: none"> • apparently satisfactory rehabilitation will fail in the foreseeable future and require repair, replacement or maintenance; • the area will need ongoing management; or • contaminants will be released and potentially cause environmental harm that requires monitoring or management.
Stable	Resistant to change in landform, pollution generation or land use potential to an extent that is similar to unmined land in the locality. The acceptable rates of change of specified parameters or the maximum risk of specified environmental harm may be set in an environmental authority.
Stakeholder	A person or organisation that is potentially affected by a decision, such as a resident, land owner, community group, government agency, company,

Rehabilitation requirements for mining projects

	traditional owner, or environmental group.
Suitably qualified person	A person whose professional training or experience is relevant to the matter being considered.

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While this document has been prepared with care, it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Environmental Protection Agency should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved By

Mark Williamson

Signature

7 June 2007

Date

Executive Director, Environmental Operations Division
Delegate under the *Environmental Protection Act 1994*

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http://www.epa.qld.gov.au/environmental_management/land/mining/frequently_asked_questions
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Queensland Government
Environmental Protection Agency/Queensland Parks and Wildlife Service



[Environmental management](#) > [Land](#) > [Mining](#)

Frequently asked questions

This page contains some of the most frequently asked questions about the transfer of environmental regulation of mining to the Environmental Protection Agency. For more specific questions or for further information please contact the Mining Unit by e-mail at epamining@epa.qld.gov.au. Additional information can also be found in the [guidelines](#) that have been prepared on specific topics of relevance under the legislation.

Copies of legislation referred to in these answers can be purchased from [GoPrint](#). Electronic copies of the legislation are available at the [Office of Parliamentary Counsel](#).

[Mining project](#)
[Anniversary day](#)
[Fees](#)
[Renewal of a tenement](#)
[Plans of operations](#)
[Consolidation](#)
[Tribute mining](#)

Mining project

Q. What defines a mining project?

A. A mining project is defined in s149 of the *Environmental Protection Act 1994* (EP Act) to mean all mining activities carried out or proposed to be carried out as a single integrated operation under one or more mining tenements.

The key is that an integrated operation can have only one environmental authority which must be in the names of all holders of the tenements in the project. If all the leases/claims do not have the same holder(s), all holders must become jointly (and separately) responsible for all mining activities on all the mining tenements in the project. They will all have to be holders of the single environmental authority.

There should also be a clearly documented management system for all the tenements in the project that shows that they are being operated as an integrated operation. If the same team of miners operate a group of claims, one claim at a time, it would probably be a project. If they mine separately and have no unifying infrastructure such as a treatment plant, then it is unlikely the operations will be considered a "mining project". It follows that if something like an explosives plant or fuel depot is on a mining lease, it can only be authorised under the mining provisions of the EP Act if it is considered to be part of the integrated operation that forms the project and has an environmental authority in the name of the tenement holder(s).

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Anniversary day

Q. What is the anniversary day of my authority?

A. Under s602 of the *Environmental Protection Act 1994*, the anniversary day for the following transitional authorities is 1 January:

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- a transitional authority under s588, that is, one which was issued to persons immediately prior to the commencement of the mining provisions on 1 January 2001 held a mining tenement for which no environmental authority was in force for any mining activities under the mining tenement;
- a transitional authority that was previously a level 2 approval, that is, all ERA 21 approvals and a small number of other approvals (but not the level 1 approvals).

All previous licences for ERAs (that is, environmentally relevant activities listed in Schedule 1 of the *Environmental Protection Regulation 1998*) that are now mining activities retain their previous anniversary day while they are transitional authorities, even though s601 does not require the payment of their annual fee until 31 December 2001 in the first year of the transitional period.

Q. What happens to the anniversary day when a transitional authority ceases to be a transitional authority?

A. When any transitional authority ceases to be a transitional authority and becomes another type of non-standard environmental authority (that is, as a result of transfer, amendment or consolidation), the anniversary day for the new authority is taken to be the date the authority ceased being a transitional authority.

Consolidation of conditions from a transitional authority into another transitional authority is an amendment that resets the anniversary day for the consolidated authority. If the conditions from the transitional authority are consolidated into an existing environmental authority (mining activities) that is not a transitional authority, the anniversary day of the consolidated authority remains that of the existing authority as the provisions relating to transitional authorities do not apply.

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Fees

Application fees

Q. Is there an application fee for a Conversion or Consolidation application?

A. No.

Q. Is there a fee for any other application to amend an environmental authority (mining activities).

A. Yes. Section 240 of the *Environmental Protection Act 1994* requires that an amendment application be accompanied by the fee set down by regulations.

Q. Where should amendment application fees be lodged?

A. All amendment applications together with the relevant fee should be lodged with Department of Natural Resources and Mines to allow a check for Native Title constraints to the amendment.

Q. Where can I find out the amount of application fees?

A. Fees for environmental activities (mining activities) are specified in one of the Schedules to the *Environmental Protection Regulation 1998*. Part 1A of Schedule 6 itemises the fees payable for each application.

Annual fees

Q. What are the annual fees for transitional authorities?

http://www.epa.qld.gov.au/environmental_management/mining/frequently_asked_questions/ Go AUG SEP OCT
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 A. In the first year of the transitional period, the annual fee is an amount equal to the highest annual fee for any environmentally relevant activity proposed to be carried out

under the authority. Environmental relevant activities (ERAs) are listed in Schedule 1 of the Environmental Protection Regulation 1998. In calculating the annual fee payable, however, the ERAs numbered 21 to 21D should not be included. This fee will commonly be zero, but there could be several separate fees for a tenement. Where there is a fee, it is to be paid by 31 December 2001.

After the first year, the annual fee is the highest annual fee for any ERA to be carried out under the authority. The ERAs numbered 21 to 21D should be considered in calculating this fee. The annual fee is to be paid on the day of the specific authority and there could be several separate fees for a tenement.

Q. What are the annual fees for other authorities?

A. The annual fee for a non-standard environmental authorities is the highest annual fee for any ERA proposed to be carried out under the authority.

There is no annual fee for a standard environmental authority. Section 316 of the *Environmental Protection Act 1994* exempts them from the annual notices that require the payment of the annual fee.

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Renewal of a tenement

Q. Does the EPA have a role in the renewal of mining tenements?

A. Generally not. Although the mining registrar or chief executive of the Department of Natural Resources and Mines must provide the EPA with a copy of all renewal applications within 5 business days, the only instances where EPA will be involved is where the renewed tenement will involve significantly changed activities or will be assigned to a new holder. These will require separate applications to amend or transfer the environmental authority.

Q. When are mining tenements renewed?

A. Unless a specific condition of the tenement prevents renewal, all mining tenements except prospecting permits may be renewed. A renewal application must be made between 6 and 12 months before the tenement expires for mining claims, mineral development licences or mining leases, or between 28 days and 3 months before an exploration permit expires.

Q. What if the application to renew is not decided when the tenement is due to expire?

A. The holder is allowed to continue to operate in accordance with the conditions of the 'expired' tenement which is continued in force by the *Mineral Resources Act 1989* (MR Act) until the application is decided, provided that the holder pays rent and any royalties and complies with the MR Act.

A similar situation exists if the holder of an exploration or prospecting permit applies for a mining lease, mineral development licence or mining claim and that application is not decided when the tenement 'expires'. Rights of the 'expired' tenement continue within the area of the proposed new tenement.

http://www.epa.qld.gov.au/environmental_management/land/mining/frequently_asked_questions/when_should_a_plan_of_operation_be_lodged Go

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 plans of operations

About this capture

Q. When should a plan of operation be lodged?

A. The *Environmental Protection Act 1994* intends the first plan of operation (PO) to be submitted after the mining lease has been granted, and a replacement PO should be lodged with EPA at least 28 days before the existing one expires to ensure continuous operations.

Q. Where should POs be lodged?

A. POs should be lodged with the relevant EPA District Office. Lodgment can also be made at Department of Natural Resources and Mines office, but allow extra time for the application to reach the EPA.

Q. What should a PO contain?

A. The requirements are set out in s234 of the *Environmental Protection Act 1994*.

The PO will generally contain more specific details than than an environmental management overview strategy (EMOS) relating to:

- where activities are to occur in the mining project (during the period of the Plan);
- how the activities will achieve or implement the commitments or control strategies in the EMOS;
- how the activities will comply with the environmental authority;
- how and when disturbed land will be rehabilitated; and
- the amount of financial assurance required to cover the maximum cost to fully rehabilitate the mining tenements during the period of the Plan

A [guideline](#) has been prepared to assist in preparing a PO and audit statement. There is another guideline on setting and administering [financial assurances for mining activities](#).

Q. Is there a form or fee to accompany the submission of a PO?

A. No form or fee is necessary. The PO must comply with the content requirements set out in s234 of the *Environmental Protection Act 1994*, including a statement of the proposed amount of financial assurance, and be accompanied by an audit statement. No fee has been set in the *Environmental Protection Regulation 1998*.

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Consolidation

Q. Is there a fee payable for consolidation applications?

A. No.

Q. Are amendment or surrender applications required as part of the consolidation process?

http://www.epa.qld.gov.au/environmental_management/land_mining/frequently_asked_questions

A. No. Section 607 of the *Environmental Protection Act 1994* only requires that the application to consolidate be in the approved form and that if the stated mining tenements holder is not the applicant, it be accompanied by the tenement holder's written consent.

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Q. Can an amendment be made at the same time as a consolidation?

A. Yes. If the holder wishes to conduct the transferred activity or any other activity covered by the environmental authority (EA) or transitional authority (TA) in a way which is not authorised by either the TA that is to be surrendered or the other EA/TA involved in the consolidation process, the holder of the latter may make a separate application for an amendment at any time. The relevant provisions of the *Environmental Protection Act 1994* are s604 for TA and s238 for EA. An amendment application currently attracts a fee of \$150.

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Tribute mining

Q. What is tribute mining?

A. A tribute miner works someone else's mining lease (often when it has become non-economic for a larger mining company) or mining claim under an agreement where the tribute miner sells the mineral produced and pays a fee (tribute) to the lease or claim holder. This differs from contract mining where the contractor does the mining but the lease holder sells the minerals and pays the contractor.

Q. Who needs to hold the environmental authority under a tribute agreement?

A. The mining lease holder(s) must all be joint holders of the environmental authority and a person who is not a holder of a tenement in the mining project cannot be a holder of the environmental authority. That means that unless the tributer holds at least one tenement in the mining project that the tributer is working, the tributer will not be a holder of the environmental authority, and the lease holder is responsible for the environmental management of the mining lease.

It is possible that the tributer and the lease holder could jointly hold the environmental authority EA in circumstances where the tributer has another lease or leases nearby and is doing the tributing as part of a project involving the other lease(s). That would probably require either the tributer or the other lease holder to amend their environmental authority to include the other party's leases into a new project.

Last updated: 15 June 2006

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Policy Framework To Encourage Progressive Rehabilitation of Large Mines

Note:

The following amendment needs to be taken into account when reading this document:

1. Any reference to Environmental Management Program (EMP) in this document is incorrect and should be referred to as a Transitional Environmental Program (TEP).
2. The Address of the Head Office in now, as follow:
 - Head Office
160 Ann Street
Brisbane QLD 4000
 - Postal Address
PO Box 15155
City East QLD 4002

Published on DES Disclosure Log
RTI Act 2009

A policy framework to encourage progressive rehabilitation of large mines



Published on DES Disclosure Log
RTI Act 2009

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Executive Summary

Rehabilitation that is completed before a mine ceases operations is progressive rehabilitation. Ideally, rehabilitation should commence as soon as the disturbed area is no longer needed for mining, as that maximises the benefits of reduced environmental impacts from the disturbed land, reduce liability on the company's balance sheet, and reduce likelihood of the company leaving large areas of unrehabilitated land that the government or landowner might have to rehabilitate.

Although there is a legislative expectation that progressive rehabilitation will be done and a financial incentive built into the discounted financial assurance (FA) system, the rate at which progressive rehabilitation is occurring could be increased. Industry considers that the lack of a certification process is a major impediment. Currently, a company that spends millions of dollars on rehabilitation to a standard that was acceptable at the time, has no certainty that the government will accept that rehabilitation when the mining lease is surrendered.

In November 2003, the Premier, Mr Peter Beattie MP, announced that the Environmental Protection Agency and the Queensland Resources Council would work together on setting clear standards for rehabilitation and developing other incentives to encourage progressive rehabilitation. The EPA commissioned a consultant to undertake benchmarking studies and consultation to assist in this work.

The proposed framework to encourage progressive rehabilitation includes:

- new provisions in the *Environmental Protection Act 1994* (EP Act) for certifying progressive rehabilitation, recording details of the areas certified and verifying this at final relinquishment of the mining tenement;
- minor changes to the current process for setting and recording the rehabilitation objectives for each mining and exploration project and how progress towards those objectives will be measured;
- a Guideline on rehabilitation requirements and the criteria to assess the suitability of rehabilitation;
- a mechanism to assess the residual risk of each rehabilitated area; and
- changes to the FA system in the EP Act and Guidelines (which are being developed through a separate review).

The legislative elements of the proposed framework are relatively simple as they would describe the performance objectives of progressive rehabilitation. The Guideline on rehabilitation is expected to address the planning, implementation and measurement of rehabilitation, including a process for developing the rehabilitation objectives, measurable indicators and completion criteria for each mine, and advice on the type of information that will be required to accompany an application for certification. An innovative element of the framework is the proposal to have a transparent mechanism to estimate the residual risk posed by the completed rehabilitation so that an appropriate amount of FA can be held for monitoring, maintenance and management of other identified medium to long-term risks.

Your comments on the proposed framework should be sent to:

Director, Systems and Support Branch
Environmental Operations Division
Environmental Protection Agency
PO Box 15155
CITY EAST QLD 4002

before 5 February 2005.

1. Introduction

Rehabilitation of mined land is generally expected to reverse or minimise the wide range of environmental, economic and social impacts that occurred during mining and prevent future impacts. Rehabilitation can in some cases commence shortly after land has been disturbed (**progressive rehabilitation**) but in other cases it cannot occur until the end of the operational life of a mine (**final rehabilitation**). Mine rehabilitation standards and the future liability are issues that both mining companies and the government in Queensland would like to resolve.

The transfer of the regulatory responsibility for environmental management of mining activities from the then Department of Mines and Energy (DME) to the Environmental Protection Agency (EPA) occurred in 2001. Soon after that a Mining Legislative Review Committee (MLRC) was formed to assess how amendments to the *Environmental Protection Act 1994* (EP Act) and the *Mineral Resources Act 1989* (MR Act) performed during the first 18 months after the transfer. The Queensland Resources Council (QRC) identified issues associated with sign-off, progressive rehabilitation and financial assurance (FA) as needing further refinement.

In November 2003, the Premier, the Honourable Peter Beattie MP, announced that the EPA would work with the QRC to develop a policy for rehabilitation that would include:

- setting clear standards to decide when rehabilitation is completed;
- creating greater incentives for companies to carry out progressive rehabilitation; and
- reducing the likelihood of any environmental liability for the government.

In accordance with the Premier's direction, the EPA has met with Queensland Treasury, Department of Natural Resources and Mines (NR&M) and the QRC. A benchmarking study by HLA-Envirosciences Pty Ltd (HLA, 2004) provided the EPA with background information on what is done in other jurisdictions and summarised the results of a small consultation program that HLA conducted.

This Discussion Paper provides an overview of the issues and proposes a framework to encourage progressive rehabilitation. The main elements of the proposed framework are:

- new provisions in the EP Act for certifying progressive rehabilitation, recording details of the areas certified and verifying this at final relinquishment of the mining tenement.
- minor changes to the current process for setting and recording the rehabilitation objectives for each mining and exploration project and how progress towards those objectives will be measured;
- a Guideline on rehabilitation requirements and the criteria to assess the suitability of rehabilitation;
- a mechanism to assess the residual risk of a rehabilitated area; and
- changes to the FA system in the EP Act and Guidelines.

2. What is the problem that needs to be solved?

The mining industry is concerned that the present legislation does not provide certainty that progressive rehabilitation, which met the standards required when it was completed, will be accepted when the mining tenement is eventually relinquished. The possible reasons for this uncertainty include:

- there is no mechanism to certify that the standards were met;
- legislation or policy that sets rehabilitation requirements could change;
- stakeholder expectations may change;
- monitoring or research may result in changes to rehabilitation requirements;
- different interpretation of the rehabilitation requirements may occur (especially if they were not clearly specified); or
- new measurement techniques may be developed or used.

At present rehabilitation is only assessed during the relinquishment process. Before a mining tenement (e.g. a mining lease, mineral development licence or exploration permit) can be relinquished, the surrender of the environmental authority for the tenement or project must be accepted. The surrender process under the EP Act requires the tenement holder to prepare a final rehabilitation report (FRR) and audit statement that describe the rehabilitation that has been undertaken. The surrender is not complete until the EPA decides that the rehabilitation is satisfactory or there are other statutory mechanisms in place to manage any remaining impacts.

There are potential benefits to both industry and government from encouraging progressive rehabilitation. Progressive rehabilitation may reduce the liabilities on a company's balance sheet and government would have less contingent liability should the company fail to complete the rehabilitation. The possible environmental benefits include a reduced area of disturbance and more rapid return to productive use or native vegetation.

Both industry and government are seeking clear criteria to determine what rehabilitation is required and when it is to be completed. They also require certainty regarding future liability. The government is concerned that if a surrender application is accepted prematurely, the site may have the potential to cause unacceptable environmental impacts in the future. That would be inconsistent with the principle of intergenerational equity. Industry would prefer to be free of obligations when the tenement is relinquished.

Risk assessment may assist in identifying and quantifying possible costs after a tenement is relinquished so both industry and government concerns can be addressed. These future costs are not considered in the current FA system which is intended to meet the potential cost to fully rehabilitate the site should a mine prematurely close due to bankruptcy or other causes. During the life of a mine, the EPA may cover this risk by requiring a FA. At present, the FA held is commonly less than the full cost for several reasons including:

- the rehabilitation requirements have changed with time;
- some costs were underestimated or unknown;
- inflation; and
- the discount system (based on previous environmental management performance) that is available at some sites¹.

The FA is rarely retained after the surrender is accepted, unless an environmental management plan or site management plan is put in place under the EP Act. Guideline 17 does not indicate how FA might be calculated after an area of progressive rehabilitation is certified or after final relinquishment, even though the EP Act allows FA to be held until the EPA is satisfied no claim is likely to be made.

¹ A copy of the EPA Guideline 17, *Financial Assurance for Mining Activities*, is available on www.epa.qld.gov.au

3. Legislative basis for mine rehabilitation and financial assurance in Queensland

The existing legislation in Queensland requires the applicant for a large (non-standard or Level 1) mine to prepare an Environmental Management Overview Strategy (EMOS) and, where applicable, an Environmental Impact Statement (EIS) for the mining project. These documents must describe:

- the environmental values of the area;
- how these values will be protected through identified environmental protection commitments, including objectives, strategies, standards and measurable indicators; and
- control strategies to ensure the objectives (including progressive and final rehabilitation requirements) will be achieved.

Sections 40, 189 and 203 of the EP Act define the requirements for an EIS, environmental management plan (EM Plan) and EMOS respectively. These applicant-determined assessments and commitments form the basis of conditions of the environmental authority (EA) for a mining project. If the application is for a mining lease, the draft EA is then publicly advertised and people can submit written objections about the proposed EA. Properly made objections are referred to the Land and Resources Tribunal.

Once the final EA has been issued, NR&M is able to grant the tenement. Following grant of a mining lease, the EA holder is required to prepare and submit a Plan of Operations (PoO) which includes a rehabilitation program. The PoO describes the actions that the company will take to comply with the EA and EMOS for a period of between one to five years.

Sections 189 and 234 of the EP Act require the tenement holder to propose the amount of FA that should be lodged. The EPA may impose a FA on a mining activity under section 364 as a condition of the mining environmental authority or under other environmental management documents. The EPA decides the amount required. This FA is distinct from a security deposit for exploration and mining tenements that may be imposed under the MR Act to ensure compliance with conditions of the tenement; rectification of damage to improvements and payment to the State of rent and royalty fees. However, NR&M currently collects both the FA and any security deposits on behalf of the State.

Before operations commence, the EA holder is required to lodge a FA with NR&M. The FA is calculated on the basis of area of disturbance on the site and third party costs to rehabilitate the disturbance as described in EPA Guideline 17 *Calculating Financial Assurance for Mining Activities*.

Section 278 of the EP Act requires satisfactory completion of the rehabilitation work before the EPA can accept a surrender application, unless other management arrangements are in place. It should be noted that some mines operating under Special Agreement Acts have a legislative requirement to undertake progressive rehabilitation. A similar requirement is included as an EA condition for several other mines. However, legislative requirements relating to progressive rehabilitation of mine sites are uncommon. Operators at large mines may decide to undertake rehabilitation to reduce their FA liability. They also commonly undertake research and trials to establish appropriate landforms and vegetation for final rehabilitation. Following successful trials the holder may decide to amend their EA conditions relating to final rehabilitation.

As research and monitoring information becomes available, previous rehabilitation may be shown to be inadequate. This has liability implications for the Government and landowners if the progressive rehabilitation has been signed off and that decision cannot be reviewed. However, a review against different criteria at final relinquishment would remove the certainty that industry is seeking through progressive rehabilitation. A way to overcome this dilemma through the use of risk assessment and a FA for the residual risk is presented in Chapter 7.

Other issues relating to the current system that have implications for progressive rehabilitation are:

- There is no legislative mechanism in the EP Act that allows the certification of rehabilitation unless the underlying mining tenement is relinquished;
- Final rehabilitation conditions that are included in the EA may not be adequate for progressive rehabilitation as they are commonly high level and rarely include criteria for determining rehabilitation success;
- There are no Guidelines listing the information required to support an application for certification of progressive rehabilitation;
- Additional site investigations or audits will be required so that decisions on progressive rehabilitation can be made;
- There is no document where the area of land that has been certified can be clearly defined; and
- A risk-based methodology will be needed to calculate adjustments to the FA requirements.

4. Approaches in other Australian states and overseas

New South Wales (NSW) has a systematic process for progressive signoff of rehabilitation. This system accepts “completed” rehabilitation on part (or all) of a lease, as opposed to rehabilitation that is developing through specified stages towards completion. Mineral Resources Tasmania and Department of Primary Industries, Water and Environment in Tasmania have in one case issued a letter of acceptance of rehabilitation for a mining lease in which mining has temporarily ceased.

NSW is the only state with legislation that holds the mining companies liable for any remediation after relinquishment (Section 240 *Mining Act 1992*). Although this provision is rarely used, the knowledge that the government could require the former mining tenement holder to undertake remedial work has probably expedited the sign-off of progressive rehabilitation in that state.

No state has a system for certifying rehabilitation that is developing towards completion. The Alcoa framework in Western Australia is the only example of a systematic process for setting completion criteria for various stages of rehabilitation development. Alcoa assesses achievement of these rehabilitation stages but the State only issues a ‘certificate of completion’ for areas that are deemed to have “completed” rehabilitation. The Alcoa example is also unique in the establishment of a liaison group with delegated responsibility for the development of rehabilitation completion criteria.

The Victorian system is the only one with a distinct separation between the granting of the mining lease (which does not by itself allow mining to commence) and the granting and approval of the Work Plan (which includes a rehabilitation plan).

No state has standardised prescriptive indicators or criteria. Some regulatory authorities (namely in WA, NSW, Tasmania and the Northern Territory) stated that they had set standardised prescriptive criteria in the past but that these had caused considerable problems and they now all prefer to use non-prescriptive criteria developed on a site-specific basis. WA still applies “guideline” criteria and standards to some extent.

In the USA, state laws are required to implement federal laws, but may be more stringent. In Colorado, permit holders can apply at any time for total or partial release of a performance bond or deposit. Bonds can be released progressively as the rehabilitation activities achieve the milestones of landform and drainage establishment, the rehabilitation meets the approved success standards for cover and productivity and, finally, all reclamation is completed in accordance with the approved reclamation plan.

In South Africa, the closure certificate is issued at the end of the rehabilitation process once the regulator is satisfied that all requirements of the EMP have been met. Closure certificates are unconditional and, therefore, the state accepts responsibility or co-responsibility for environmental management of the land after closure. In practice closure certificates are rarely issued. New legislation requires that an environmental risk assessment be undertaken to identify the risks that will remain after issue of the closure certificate.

5. Measuring rehabilitation success

5.1 What is good rehabilitation?

The generally expected outcome of a successful rehabilitation program is the creation of an agreed post-mining landuse that requires no more resources to maintain than a similar landuse in an area that has not been mined. The following paragraph list a number of objectives that should be considered when deciding what the post-mining landuse should be, and some principles to consider when establishing the process that will make these decisions.

The United Nations Environment Program (UNEP) has published six objectives for closure of mines. Oberholzer and Harrison (2003) summarise them as:

- future public health and safety;
- physical and chemical stability (no deterioration);
- post mining use of site is beneficial and sustainable (land use);
- minimisation of adverse social impacts; and
- socio economic aspects are maximised.

The Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia (ANZMEC/MCA, 2000) established principles for mine closure that could provide greater consistency in the development of regulations by government and rehabilitation programmes by industry. These principles are outlined under the following objectives:

- enabling all stakeholders to have their interests considered;
- ensuring that mine closure occurs in an orderly, cost-effective and timely manner;
- ensuring the cost of rehabilitation is adequately represented in company accounts and that the community is not left with a liability;
- ensuring there is clear accountability, and adequate resources, for rehabilitation;
- establishing a set of indicators which will demonstrate the successful completion of rehabilitation; and
- reaching a point where the company has met agreed completion criteria to the satisfaction of the regulating authority.

5.2 Setting objectives, indicators and criteria for rehabilitation

The technical characteristics of a successfully rehabilitated mine site vary widely around Australia and in other countries depending on the nature and location of the previous mining and community expectations. In general terms, the objectives of rehabilitation should be to reduce the present and future adverse impacts of the mine site to acceptable levels in respect to:

- safety;
- public health;
- environmental values;
- flexible or specified land use;
- social structures; and
- economic viability.

To achieve these objectives, a number of indicators would be selected that can be measured to demonstrate whether rehabilitation is successful. These might include:

- soil physical properties and stability;
- soil chemical characteristics (pH, electrical conductivity, heavy metal content) and fertility (nitrogen and phosphorus content);
- surface and groundwater quality (including impounded water);
- vegetation (establishment, growth, function, floristics, recruitment and recovery); and
- fauna (vertebrates and invertebrates, soil biota).

In order to receive sign-off of rehabilitation, it will be necessary for the tenement holder to show that the indicators have reached the criteria that have been established to identify when a site has been properly rehabilitated. A situation that would be of concern to the government and nearby landowners, is where rehabilitation that has met the criteria subsequently fails (e.g. vegetation dies and the exposed soil erodes rapidly). The rehabilitation framework should address the question of who is then responsible for any repairs, i.e. who should carry the long-term risk: the mining company or the Government or the landowner.

During the life of a mine it is common to reassess the completion criteria as a result of ongoing monitoring programs. Industry benefits from this continuing research as it allows the project to get approval on the basis of untried rehabilitation proposals on the understanding that the details will be developed through subsequent rehabilitation trials. However, there may need to be some overall objectives that relate to future land use and these should only be changed through an open consultative process.

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6. Applying risk management to rehabilitation

6.1 What are the risks that need to be managed?

Mining has only adopted formal risk assessment techniques since the late 1980s (Joy, 2003). Joy believes that the Australian mining industry is attempting to improve the quality of risk assessment as it addresses more complex questions. The industry is applying formal techniques more frequently, such as the Australian Standard for Risk Management (AS/NZS 4360:1999).

The standard establishes a generic risk assessment process that can be applied to a range of activities including mine rehabilitation. The process is based on the following steps:

- establish the context;
- identify the risks;
- analyse the risks;
- evaluate the risks to establish priorities for action;
- treat risks;
- monitor and review; and
- communicate and consult.

The first step in identifying the risks is to identify the potential hazards at the mine site. These are features or qualities of the mine which have the potential to impact on people or the environment. A consequence is the impact of the hazard after an exposure event has occurred. The consequence multiplied by the likelihood (i.e. probability of the exposure event occurring) is the common measure of risk.

The features of a mine that might present potential hazards include:

- shafts, open pits, boreholes and adits;
- hazardous minerals or processing chemicals;
- unstable slopes (e.g. landslides, soil erosion);
- land subsidence;
- spontaneous combustion;
- inappropriate revegetation methods (e.g. introducing weeds);
- failure of revegetation (e.g. through drought or fire); and
- contaminated soil and groundwater.

Some mine features might present several hazards, for example:

- **Waste rock dumps** — stability, leachable contaminants, dust, acid rock drainage, vegetation sustainability;
- **Tailings containments** — stability of the containment wall and surface, leachate quality and quantity, final surface treatment, vegetation sustainability;
- **Pit voids** — pit wall stability, long-term pit water quality, potential for ground water contamination, safety;
- **General plant site** — soil contamination from workshop residues, ore stockpiles, process water ponds, hydrocarbon storage and refuelling areas, safety risk during removal of plant and equipment.

Hazards may cause environmental, social or economic impacts (i.e. consequences) such as:

- deterioration of surface and groundwater through contamination by metals, processing chemicals, hydrocarbons or acid mine drainage (which may have direct ecological or economic impacts or may indirectly cause further impacts);
- loss of biological diversity due to chemical contamination of soil or failure of rehabilitation;
- deterioration of land quality due to steep slopes, degraded drainage, erosion and chemical contamination, all of which may reduce the future beneficial use of the land;
- property damage from rockfalls and landslides; and
- human or wildlife death or injury from falls into mine workings or boreholes.

The probability of major consequences resulting from modern rehabilitation is relatively low compared to mines where no rehabilitation had been undertaken, which was common practice prior to the 1980s. Examples of major impacts are rare; however, where risks do exist, remedial action has been taken by the government, requiring considerable capital expenditure to resolve. An example where hazards have caused adverse impacts is in Croydon Shire where closure of local gold mines did not address contamination of groundwater that supplied the town. This resulted in the State Government constructing a new water supply dam for Croydon.

The probability of mining causing major impacts on biodiversity is relatively low compared with other land uses. This is because the total area disturbed by mining is much smaller, and because most of the mine disturbance can be returned to a useful ecosystem through well-planned rehabilitation programs.

Even with the best possible rehabilitation programs, there is likely to be a reduction in the productivity of many mined areas. This is currently addressed through compensation agreements between the mine operators and landowners under the MR Act.

6.2 Calculating the risks

Once a list of hazards is documented, the events that could result in the hazard causing an adverse effect (consequence) are identified. The probability of each of these events is estimated. The consequences of the events may be expressed in qualitative (e.g. low, medium and high) or quantitative measures (e.g. deaths per million, or dollars worth of damage). Similarly the probability may be expressed qualitatively (e.g. rare, unlikely, occasional, likely, almost certain) or quantitatively (e.g. once in 100 years). A risk matrix is commonly used to combine qualitative consequence and likelihood estimates into a risk classification (e.g. low, moderate and high risk). Quantitative estimates are multiplied to give a numerical estimate of risk (e.g. in occurrences per million per year, or annual average repair costs (in \$)).

The risk-cost approach may assist in establishing the quantum of residual risk after rehabilitation of a mine site. It requires comprehensive and transparent data gathering. The risk-cost approach should allow an appropriate amount of funds to be made available for issues that are likely to occur in the future. This approach has been applied overseas (BRS, 1999) and in Australia (Currey, 2003).

Laurence (2001) has developed a model that captures the mine closure issues and quantifies the individual and collective risks, allowing management and the regulator to appropriately allocate resources to the major issues. Oberholzer and Harrison (2003) developed a model to assess the risk posed by abandoned mines to prioritise where government-funded rehabilitation should occur. It is based on hazards resulting from mine cavities, impoundments and residues that might affect safety and health, physical stability, chemical stability, off-site effects and land use. Risk is given a numerical value based on standardised descriptors for consequence, exposure and probability.

6.3 How can risk be minimised?

There are many strategies available to mining companies to mitigate the risks associated with rehabilitation. Similarly governments wanting to ensure that the community is not unfairly burdened with liabilities as a result of mining have several ways to minimise the economic and social risks.

The strategies that mining companies can use to mitigate risks associated with mining include:

- **Risk assessment** — to identify the risks so that resources can be allocated in relation to their importance.
- Planning for closure from an early stage – Rehabilitation feasibility (within technical, economic and social constraints) should be assessed prior to project approval to ensure that the mine will not create unacceptable liabilities for either the company or the State (ANZMEC/MCA, 2000).
- **Avoiding the risks** — The QRC (QMC, 2001) advocates that “A proactive approach to managing risk concentrates on minimising potential sources of risk rather than just relying on mitigating or controlling outcomes after the event” and states that potential risks need to be understood prior to deciding on the most appropriate landform and post-mining land use. Natural events such as droughts, floods and fire should be considered and appropriate risk mitigation processes should be included in designs and management practices.
- **Progressive rehabilitation** — By commencing rehabilitation as soon as possible, the area of disturbance is reduced and actions are taken to stop or minimise further impacts from these disturbed areas.
- **Post-relinquishment land management** — Risk will be reduced where post-relinquishment management and monitoring activities and responsibilities are clearly defined prior to accepting relinquishment. These issues should be considered as early as possible in the environmental assessment process (Nichols, 2004). A related consideration is how to enforce appropriate management practices post-mining.

- **Sound engineering** — Balkau (1998) states that “*Sound engineering remains the basis of safe structures. Long-term stability is ensured by a design that is intrinsically stable, self-repairing, and low-risk, and able to stand up to weather and other local influences. The concept is more to design a permanent landscape feature than a short-term utility*”.
- **Adequate monitoring** — Adequate monitoring will help identify the post closure management requirements and facilitate adequate resourcing of closure liabilities (Nichols, 2004). Active large-scale progressive rehabilitation programs that provide evidence from many years of field-tested techniques can provide the necessary confidence for regulators who have to make decisions about potential future risks (Wilson, 2003). Balkau (1998) points out that monitoring and verification procedures are needed to ensure the long-term stability of engineered structures.
- **Emergency planning** — Emergency planning and preparedness also help mitigate risk. No matter how well tailings storages and other structures are designed and built, some failures will occur. The concepts of secondary security measures and emergency preparedness need to be incorporated into tailings storage management. Emergency preparedness approaches are already adopted in other industry sectors and need to become more commonplace in the mining industry (Balkau, 1998).
- **ISO 14001 compatible Environmental Management System (EMS)** — Nichols (2003) believes that mining companies can reduce risk associated with rehabilitation by developing and using an ISO 14001-compatible EMS and linking this to their rehabilitation and monitoring activities. An EMS must identify the environmental aspects of the organisation’s activities in order to determine those which have or can have significant impacts on the environment. Knowledge of these aspects will assist in assessment and understanding of risk.

6.4 Rehabilitation and financial assurance

The EP Act provides a range of tools for the EPA to manage the risks associated with rehabilitation. These include the ability to require an EIS; impose conditions relating to rehabilitation on the EA; the power to conduct inspections and audits or to require the company to do so; the requirement for a final rehabilitation report (FRR) and an audit statement to accompany a surrender application; and various enforcement actions ranging from environmental management programs and environmental protection orders to prosecution for several types of offence.

Most governments around the world require FA to ensure that if rehabilitation is not completed, there will be funds available to undertake any necessary rehabilitation. Reasons why FA is required for mining include the historically cyclic nature of the industry which has occasionally resulted in large companies becoming bankrupt or ceasing operations and the common legal situation where the mining company has no ongoing responsibility for the disturbed land. Where there are potential liabilities, a FA is required to ensure that the normal range of costs associated with rehabilitation will be paid by the mine owner without use of government funds if the mine ceases to operate. FA typically does not provide against catastrophic events.

The EP Act provides a head of power for the EPA to require a FA for any activity that requires an environmental authority, environmental management program or site management plan (i.e. contaminated land). The FA can be held to cover actual or likely costs or expenses that result from the EPA taking action to:

- prevent or minimise environmental harm;
- rehabilitate or restore the environment;
- remediate contaminated land; or
- secure compliance with the licence, authority, program or plan, or its conditions.

The method for calculating the amount of FA required is contained in EPA Guideline 17. The Guideline is based on *Environmental Management for Mining in Queensland 1992*, a policy developed by the then Department of Mines and Energy (DME). The amount of FA is based on the estimated maximum cost to rehabilitate disturbance on the land in each mining project within a planning period of not more than five years. The Guideline allows discounts ranging from 10 to 75 percent. The maximum discount requires two years operations consistent with the EA conditions, evidence that all EMOS commitments are being monitored and validated, there is stakeholder engagement in mine environmental performance and evidence of commitments towards continued improvement such as implementation of an environmental management system. The FA calculations do not consider the risk that mining activities may cause environmental harm or that rehabilitation may fail after it is signed-off.

The discount system was intended to reward mine operators by reducing their security deposit (i.e. FA) if they improved their environmental management. The criteria for the different levels of discount were defined in the 1992 DME policy. Completing various environmental and rehabilitation commitments in their EMOS and submitting appropriate PoO allowed progressively higher discounts. The discount was intended to provide an incentive to undertake progressive rehabilitation.

In addition to the rehabilitation reducing the area of disturbance, it would also assist in reaching a higher environmental performance category which provided a larger discount to all remaining and planned disturbance.

However, the discount has tended to work in the opposite direction, especially when an FA is held as a bank guarantee. The outlay of a certain amount for rehabilitation only provides a return of the service cost on the bank guarantee for that part of the FA related to the work, less the existing performance discount. Even when the FA is held in cash, the return is no more than the discounted amount held for that work.

The total cost of rehabilitating all mining disturbance that has occurred in Queensland is about \$2000 million. About one quarter of this has been rehabilitated, by mining companies. Very little of this rehabilitation has been certified as meeting rehabilitation requirements. The current spending by companies on rehabilitation is about \$50 million a year. It is probable that greater annual expenditure would occur if there was a certification process for progressive rehabilitation.

The State holds bank guarantees and a small amount of cash that total approximately half the amount of money that would be required to completely rehabilitate all current disturbance on mining tenements. However, the difference between what is held and the total rehabilitation cost is not a realistic estimate of the State's exposure, because the chance of all large mining companies failing to complete their rehabilitation requirements is extremely small.

There has been ongoing debate over the more general question of whether the liability of a mining lease holder ceases when rehabilitation is signed off. The extent of future liability is even more uncertain when the State Government "signs off" on progressive rehabilitation work for a site, perhaps decades before the mining tenement is relinquished. The QRC has agreed that a mining company should continue to be responsible for the areas that are signed off, until the tenement has been relinquished.

6.5 Use of existing contaminated land provisions

Areas disturbed by mining may cause environmental impacts such as acid mine drainage or leave the site contaminated with hazardous substances. These impacts may continue for decades or much longer periods after the site has been decommissioned. By that time the company that carried out the mine operations may no longer exist and any environmental harm from previously signed off rehabilitation will become the responsibility of the State Government or the landowner.

The EP Act contains very broad definitions of environmental harm and hazardous substances. The latter are linked to contaminated land provisions of the Act, which impose an enduring liability on the entity that caused the contamination for investigations and management of the site. Some aspects of this responsibility can be transferred to the landholder through a SMP.

Section 319 of the EP Act makes it an offence for a person to carry out an activity that causes environmental harm unless the harm is authorised under the Act. Mining activities require an environmental authority under the EP Act and many are also notifiable activities, triggering the contaminated land provisions of the Act.

The following notifiable activities require the lot on plan where they occur to be recorded in the environmental management register:

- storing hazardous mine or exploration wastes such as tailings dams, waste rock dumps that contain hazardous contaminants;
- mining or processing minerals that expose faces, or release ground water, containing hazardous contaminants;
- mineral processing or smelting; and
- explosives production and storage.

The ongoing use of the contaminated land provisions may be a source of concern to the mining industry.

Section 401 of the EP Act indicates that a SMP is intended to manage environmental harm from a contaminated site and section 402 describes the contents of a SMP. The purpose of SMPs is to manage the land by applying conditions on the use or development of or activities to be carried out on the site post-mining. This is further enhanced by stating how the objectives are to be achieved and maintained under the SMP, including monitoring and reporting.

Once the EPA is notified that a notifiable activity has occurred on a mining lease, the EPA advises the owner of the land that the site will be included in the environmental management register unless there are reasons why that should not happen.

A site investigation may be needed to assess whether the site poses an environmental or human health risk. The EPA would request an investigation if it were satisfied that the land is contaminated to such an extent that it could potentially cause serious environmental harm to a person or animal or another part of the environment. This investigation is generally paid for by the person who caused the contamination, but the responsibility could be transferred through a compensation agreement between the miner and the landowner.

A SMP is attached to the land title and its obligations apply to any subsequent owner. These obligations may include activities such as maintenance of fences around voids or monitoring water quality. A SMP may apply to the land for a short time, e.g. until monitoring shows the site no longer poses an environmental risk from acid mine drainage.

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7. Managing risk associated with progressive rehabilitation

7.1 *How would progressive rehabilitation change risk?*

The certainty provided to the mining industry by a certification system for progressive rehabilitation would be expected to encourage larger mines to commence their rehabilitation programs earlier in the life of their mines. It would benefit the mining companies by removing liabilities from their balance sheet and benefit the environment by reducing the amount of hazards that have the potential to cause environmental harm.

There are also several potential benefits for the government. These include:

- reducing the time period during which the land remains disturbed;
- potentially reducing the contingent financial exposure of the State;
- minimising the risk to the government or landowner associated with a mining company failing to complete rehabilitation;
- increasing the incentive for industry to invest in rehabilitation projects (and possibly in other mine developments);
- providing more jobs in the short term;
- increasing certainty about the performance of the rehabilitation, which should assist the administering authority to make a final decision; and
- providing more information on which an assessment of the residual risk can be made at final relinquishment.

However, progressive rehabilitation may introduce new risks. By signing-off early in the life of a mine:

- the rehabilitation criteria may not have been adequately refined;
- there may not be enough monitoring data to verify the long term stability of the rehabilitation; and
- the residual risks may not be fully appreciated.

An option is to ensure that the certification is only “provisional” and is subject to a further review at final relinquishment (against the same criteria as previously agreed).

Although the criteria should be agreed as part of the initial mine approval and should be based on a specific set of rehabilitation objectives, they are unlikely to have been validated (for the site under consideration or anywhere else if an innovative approach is suggested) when progressive rehabilitation commences. Several years of monitoring may be required to establish revegetation trajectories (i.e. the sequence of vegetation communities that develop during the rehabilitation process) which may form an essential part of the process to develop rehabilitation criteria for a site. Furthermore, the criteria are likely to be amended during the life of the mine in response to rehabilitation trials, research projects or in some cases in response to community expectations (especially if the mine has a particularly long life). The resulting rehabilitation may be a patchwork of different but steadily improving rehabilitation. Such variation needs to be taken into account when calculating the residual risk at relinquishment.

An application for certification of rehabilitation prepared early in the life of the mine can be supported by only a short period of monitoring data on the relevant area and any other rehabilitated areas. If the application is made when the lease is to be relinquished there would generally be information from a much longer monitoring period, assuming that some progressive rehabilitation had been undertaken. The longer period of monitoring would provide better evidence of the sustainability of the rehabilitation and a better understanding of residual risks.

There are also issues regarding how much of the FA should be refunded. It would be prudent for government to retain a proportion of the original FA. This contrasts with current practice of costing future rehabilitation for areas that have reached various stages of rehabilitation on the assumption that the work done is totally acceptable. A proper risk-based assessment of the residual risk associated with this incomplete rehabilitation will almost certainly result in a significant proportion of the FA being retained.

7.2 Sign-off and transfer of risk

The relinquishment of a mining tenement in Queensland clearly reduces the liability of the former holder. There are some provisions in the MR Act which appear to support that premise while others indicate a contrary position. In particular, s363(2)(h) of the MR Act appears to allow a claim for damages arising from a mining activity authorised under this Act. Section 309(g) of the MR Act allows the government to pursue any amounts owed under that Act after the surrender has taken effect or a tenement expires.

A clear exception to this removal of liability is contained in the contaminated land provisions of the EP Act. The administering authority may require the person who released the contaminant to conduct or commission a site investigation (s376), to remediate the land (s391) or to prepare or commission a SMP (s405). The EP Act also allows conditions of the EA to impose obligations on the former holder after the authority has ended (s305(3)) and to hold FA until the administering authority is satisfied that no claim is likely to be made against the assurance (s364(5)).

However, in regard to other situations, the relinquishment of the mining tenement is an indication that the tenement holder has transferred at least part of the liabilities for the future management of the site to the landowner (which could be the government or a private person). The opportunities to control future land use are limited under the EP Act to SMPs for contaminated land as these impose enforceable conditions on the land title. Nature refuges and other protected areas under the *Nature Conservation Act 1992* could also apply.

The transfer of liability is not necessarily an indication that the impacts have ceased. After rehabilitation has been completed, some impacts from mining can continue to affect the environment for a very long time. Impacts such as acid mine drainage, subsidence, collapse of a waste pile or failure of a tailings dam may not appear until decades after the rehabilitation was completed. Wilson (2003) notes that tailings storages that have been designed to cope with one-in-100 year rainfall events may fail during a less common event (i.e. one-in-500 year) and that could occur at any time. The calculation of residual risks is made more difficult because the monitoring evidence on which to base estimates of long term success of rehabilitation rarely covers more than 20 years and few mines have rehabilitation trial data covering more than 10 years.

Dobos (2003) points out that, in the case of mining operations involving disturbance of large volumes of sulfidic wastes, potentially contaminated water may take decades to move through large waste piles and tailings storages (especially where these are well encapsulated). He raises the question *“In terms of future risk, how well, and on what basis, can we predict the longevity of management methods that utilise encapsulation, realising that gravity, rain and hence erosion are here to stay? It is not that encapsulation does not work – it does, but it will not last forever without maintenance, and even then, may be subject to the rare extreme event. Extreme events are both impossible to predict, and impossible to design ‘against’ since the scale is open ended”*.

The *Draft Guidelines on Tailings Dam Design, Construction and Operation*, prepared by the Australian National Committee on Large Dams (ANCOLD, 1998), state that after-care of a tailings storage facility starts at the end of decommissioning and *“continues forever thereafter”* (Farrell, 1998).

Accordingly, acceptance of rehabilitation, no matter what the stage, has some inherent risk. It is important that all stakeholders in the rehabilitation sign-off process understand these risks and their consequences.

8. A framework for certifying progressive rehabilitation

Overall it is considered that the advantages of a new system that encourages progressive rehabilitation for large mines through a system of certification outweigh the risks and there are mechanisms which can manage these risks. The following framework summarises the steps that are being considered.

8.1 Defining goals at state level

To provide a clear policy position, the EPA is proposing to prepare a Guideline on rehabilitation requirements including the goals that the State is seeking from rehabilitation in general, and also an indication of the types of objectives that should be specifically developed for each individual mine site. These goals will also apply to progressive rehabilitation.

There have been suggestions that the previous DME rehabilitation policy goals are appropriate. Others have suggested adding social and economic goals. HLA (2004) suggest adding a requirement relating to vegetation so that the policy goals would be:

- landform stability;
- physical and chemical quality of surface and groundwater;
- composition and structure of vegetation communities; and
- sustainability of future land use.

The proposed Guideline would suggest a range of objectives that are consistent with achieving these goals and that should be considered for each mine site. Another component of the Guideline would be an indication of the type of information and amount of detail that would be expected from the EA holder. Some of this information is likely to be obtained from monitoring the rehabilitation. Methods to identify, quantify and agree on residual risk and liability associated with progressive rehabilitation would also be listed in the Guideline. Development of this risk assessment will be referred to a separate committee that is focussing on FA.

8.2 Establish objectives that are specific for a mine

There is general agreement that during the EIS process or the development of the EMOS/ EMP, the applicant for an EA for a mining project should identify:

- environmental values affected or likely to be affected by the mining activities;
- environmental protection commitments to protect the environmental values during the mining operations; and
- environmental protection objectives, measurable indicators and criteria to be met in protecting the environmental values after mining.

One issue that has not been finally resolved is which document would be most appropriate to record the rehabilitation objectives, indicators and criteria. There are three documents in the current Queensland regulatory system that could be used:

- EMOS/environmental management plan;
- EA; and
- PoO.

The current procedures for developing an EMOS are described in EPA Environmental Management of Mining Activities Guideline 8 (*Preparing an environmental management overview strategy (EMOS) for non-standard mining projects*²). An EMOS covers all environmental management activities, including rehabilitation. In the EMOS, the proponent is required to identify the environmental values to be protected. For each of these values, the applicant proposes environmental protection objectives, strategies, standards and measurable indicators (which should be auditable). Although this process is currently working, the EMOS is not a compliance document with the exception of its role in the application process as the basis for the EA conditions and at surrender where it sets the rehabilitation requirements.

The main compliance document is the EA which must be issued by EPA before NR&M can issue a mining lease (or other mining tenement). The EA contains the environmental management and rehabilitation conditions that the company must meet to limit environmental harm. The conditions imposed by the EPA within the EA are, as much as possible, based on the applicant's EMOS. There is a public objection period for mining (but not for exploration) projects. Any person may make a submission about the proposed conditions of the draft EA for mining. All properly made objections are referred to the Land and Resources Tribunal.

² Copy of Guideline 8 *Preparing an environmental management overview strategy (EMOS) for non-standard mining projects* is available on www.epa.qld.gov.au

Rehabilitation conditions in the EA generally include reference to completion criteria, which are to be achieved as part of the mining operations. In practice, some EAs do not specify completion criteria directly but instead require the companies to identify appropriate criteria (and obtain EPA approval of those criteria) within a set period. This practice is currently documented in EPA Guideline 8. EAs can also be amended if the EPA approves an application from the tenement holder. Both the delayed criteria and the amendment process reduce the certainty for industry, the landholder/community and the regulator as to what the final rehabilitation requirements will be.

The holders of all mining leases are required to submit a PoO to the EPA periodically. The PoO describes the actions and programs that the EA holder proposes to undertake to achieve compliance with the conditions of the EA and to implement the commitments and control strategies in the EMOS. The PoO applies for a period of not more than five years. The PoO must include a rehabilitation program, schedule and costings, as well as a plan showing where activities are to be carried out on the land. The PoO must be accompanied by an audit statement that identifies the extent to which the PoO complies with the conditions of the EA. There is no public review of a PoO. (See EPA Environmental Management of Mining Activities Guideline 9 Preparing a Plan of Operations and Audit Statement for non-standard mining projects³.)

The rehabilitation objectives could remain in the EA as that is the compliance document which contains the agreed conditions, unlike the EMOS which contains the applicant's proposals and the PoO which should not contain elements that differ from what is agreed in the EA. The EA is also the appropriate document for the indicators and criteria as they are compliance measures to be applied at surrender.

8.3 Selecting appropriate indicators and criteria

Setting indicators is an essential consequence of the objective setting process described in 8.2. There generally has to be at least one measurable parameter to establish that each objective has been achieved.

Although there needs to be a set of indicators to verify that the objectives have been met, there is a widely held view that there needs to be flexibility to allow for the continually improving knowledge about the site. This suggests that there needs to be an agreed method for amending indicators and criteria when rehabilitation trial or research results become available.

8.4 Consultation processes

The National Strategy for Ecologically Sustainable Development and the Code for Environmental Management for the Australian Mineral Industry advocate greater public involvement in decisions that involve them. Decisions about the post-mining land use would certainly fall into this category. At present the only process where this is assured is the public notification and objection process for new mining leases, mining claims and applications for additional surface area. Amendments to the environmental requirements in the EA for mining leases are only publicly notified if the EPA decides that there is likely to be a significant increase in environmental harm. Changes to an EMOS or PoO are not generally publicly notified. There is no public notification of EMPs for exploration or mineral development projects.

The applicant for a mining project will rarely have enough information to adequately predict what sort of rehabilitation will be required to achieve a set of rehabilitation outcomes (unless the applicant has worked a number of mines in the local area). The necessary additional information may be obtained by monitoring actual large-scale rehabilitation programs or research projects involving trial plots. That means that the initially proposed objectives, indicators and criteria may require changes. However, if this is done, there must be an appropriate opportunity for those who could be affected by the changes to comment. It could also affect compensation agreements.

One way to encourage more public participation in the sign off process is to involve the public in the risk assessment process. Other ways include requiring the Progressive Rehabilitation Report (PRR) to include details and outcomes of the consultation undertaken during its preparation or to legislate for public notification of all new and amended rehabilitation programs. While it is imperative that the land owner be involved in any changes to the rehabilitation requirements, the EPA should have the discretion to involve any other entity.

³ A copy of the EPA Guideline 9, Preparing a Plan of Operations and Audit Statement for Non-Standard Mining Projects, is available on www.epa.qld.gov.au

8.5 Timing of sign-off

The applicant may consider that they should be able to seek a surrender or sign-off certification as soon as the completion criteria are met. The regulator would usually require evidence that the rehabilitation will continue to meet its criteria through a range of climatic variations (e.g. drought and floods). The period that might be required to provide sufficient variation might range from 1 to 7 years or more, depending on the location. If the criteria are set very high, it could take centuries to meet the rehabilitation requirements or it may even be impossible.

The EPA would prefer the sign-off process to include a requirement that the tenement holder produce monitoring data for a specified period after completion criteria are met for the first time to ensure that the rehabilitation will survive the variability in natural conditions. This requirement could be incorporated into the agreed rehabilitation criteria.

8.6 Dealing with “old” disturbance

The QRC (QMC, 2001) identified the need for any new rehabilitation planning framework to consider existing as well as new mines. The obvious issue with an existing mine is how to deal with rehabilitation that was completed some time ago, but to past standards that may be very different from contemporary standards. There are also issues relating to rehabilitation that has commenced but is not completed and to disturbance that has not been rehabilitated.

Ideally the existing mining company could be offered the option to have completed or proposed rehabilitation certified under the new framework. Where that would add significantly to rehabilitation costs, the mining company might request that the new framework not be used, and seek to have the rehabilitation assessed for acceptability against the previous rehabilitation commitments. If a mine had no measurable indicators or clear criteria, the certification may have to rely on expert opinion. For example, rehabilitation can usually be easily categorised as:

- obviously performing well;
- obviously not performing well; or
- intermediate rehabilitation that would not achieve acceptable completion criteria (Nichols, 2004).

The regulator and the mining company may need to negotiate strategies for addressing any uncertainties regarding the standard of completed rehabilitation. The residual risk calculations should also be applied with some flexibility for completed rehabilitation, but that may not be appropriate for rehabilitation that has not been completed.

8.7 Applications for rehabilitation certification

The holder of an EA for non-standard mining activities may apply to the EPA at any time for certification of a rehabilitated area. This application may be in the form of a PRR. It may include a third party independent assessment consistent with the requirement for a FRR.

The independent assessment would include a thorough review of the PRR and assess whether the rehabilitation processes and progress at that date comply with the commitments in the EA and PoO. The submitted PRR would address all the environmental values and effects identified in the EMOS or environmental management plan, including current and future risks, and describe how environmental protection standards have been met.

8.8 Assessing the application and signing-off

The EPA should have a similar time frame to assess an application for progressive rehabilitation as they presently have to assess a surrender application (i.e. 40 business days). During this period, the EPA could request more information or seek advice from other entities. When the EPA is satisfied that an area applied for has achieved the nominated objectives by meeting the criteria, it would issue a certificate of progressive rehabilitation indicating that the rehabilitation was satisfactory.

EPA may also be given a power to issue a notice to repair rehabilitation that is observed to be failing or issue a notice requiring more rehabilitation in an area that was conditionally accepted, if there were defects in the information previously provided. Holders of EAs for non-standard mining activities could be given a right to seek a review of a decision or to appeal to the LRT in the case of a dispute over certification of progressive rehabilitation. The LRT jurisdiction would be revised to include disputes over certification of progressive rehabilitation.

Appropriate documentation would be required to clearly identify and record the area of rehabilitated land for which a certificate of rehabilitation is held, together with the objectives, indicators and criteria and ongoing maintenance and monitoring responsibilities for that land. These records could be attached to the EA or be recorded in each PoO. Use of the PoO for this purpose would require the audit statement to verify that the certified progressive rehabilitation from the previous PoO has been recorded accurately.

It is proposed that the PRR would incorporate a risk assessment that clearly identifies residual risks and financial liability associated with the progressive rehabilitation. The FA would be reviewed and/or amended following issue of a certificate of rehabilitation to reflect the reduced rehabilitation liability for that area. The EA holder would have responsibility for ongoing care, maintenance and monitoring activities and for any subsequent failures in rehabilitation, until final relinquishment of the tenement and EA.

The EPA would retain a proportion of the FA to cover the potential cost of monitoring and maintenance of land covered by the certificate of rehabilitation, in the event that the EA holder fails to do so. FA for the residual risk would be reassessed at final surrender. It would be necessary to develop changes to the FA system, to support a framework for certifying progressive rehabilitation. A separate consultative committee has been established to examine the FA system.

When a lease relinquishment application is received, EPA would reassess any areas that have previously received a certificate of rehabilitation to ensure that there has been no subsequent failure of the rehabilitation and also to determine residual risk.

8.9 Summary of proposed framework

The proposed framework to encourage progressive rehabilitation includes:

- new provisions in the *Environmental Protection Act 1994* (EP Act) for certifying progressive rehabilitation, recording details of the areas certified and verifying this at final relinquishment of the mining tenement.
- minor changes to the current process for setting and recording the rehabilitation objectives for each mining and exploration project and how progress towards those objectives will be measured;
- a Guideline on rehabilitation requirements and the criteria to assess the suitability of rehabilitation;
- a mechanism to assess the residual risk of a rehabilitated area; and
- changes to the FA system in the EP Act and Guidelines (which are being developed through a separate review).

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