



Appendix 2

PIRSA guidelines for preparing a ML or MARP

Retention Lease Proposal

On

Mineral Claim 4280

for a

Uranium In-situ Recovery Field Trial

Owner/Operator: Gingertom Resources Pty Ltd
(a wholly owned subsidiary of UraniumSA Limited)

Contact Person: Alistair Muir

32 Beulah Road, Norwood, SA 5067

Phone 08 8132 0577, Fax 08 8132 0766

5 August 2011



Minerals Regulatory Guidelines | MG2

Guidelines for miners: preparation of a mining lease proposal or mining and rehabilitation program (MARP) in South Australia



Government of South Australia
Primary Industries and Resources SA

Mineral Resources Group

Division of Minerals and Energy Resources

Primary Industries and Resources South Australia

Level 7, 101 Grenfell Street, Adelaide

GPO Box 1671, Adelaide SA 5001

Phone +61 8 8463 3000

Fax +61 8 8463 6518

Email PIRSA.CustomerServices@sa.gov.au

www.minerals.pir.sa.gov.au

© **Government of South Australia 2011**. This work is copyright. Apart from any use as permitted under the *Copyright Act 1968* (Cwlth), no part may be reproduced by any process without prior written permission from the Government of South Australia available through Primary Industries and Resources South Australia. Requests and inquiries concerning reproduction and rights should be addressed to the Executive Director, Division of Minerals and Energy Resources, PIRSA, GPO Box 1671, Adelaide SA 5001.

Disclaimer. The information contained in this guideline has been compiled by the Department of Primary Industries and Resources South Australia (PIRSA) and originates from a variety of sources. Although all reasonable care has been taken in the preparation and compilation of the information, it has been provided in good faith for general information only and does not purport to be professional advice. No warranty, express or implied, is given as to the completeness, correctness, accuracy, reliability or currency of the materials.

PIRSA and the Crown in the right of the state of South Australia does not accept responsibility for and will not be held liable to any recipient of the information for any loss or damage however caused (including negligence) which may be directly or indirectly suffered as a consequence of use of these materials. PIRSA reserves the right to update, amend or supplement the information from time to time at its discretion.

Alternative formats. This publication is available in other formats, including translation. Direct requests to the Mineral Resources Group (see contact details above).

Cover photo. Kanmantoo Mine. (Photo 407190)

Preferred way to cite this publication. Primary Industries and Resources South Australia 2011. *Guidelines for miners: preparation of a mining lease proposal or mining and rehabilitation program (MARP) in South Australia*, Minerals Regulatory Guidelines MG2, Mineral Resources Group. V 4.11. Department of Primary Industries and Resources South Australia, Adelaide.

Revision history

Version	Date	Comment
4.0	05/12/06	Initial draft; major rewrite of Version 3 MARP guidelines.
4.1	05/2/07	Major revision to all sections; split MARP content from lease process.
4.2	26/02/07	MARP / mining proposal difference; closure plan requirements.
4.3	23/03/07	Added land use and amenity to environment description; MARP/proposal content table added; map requirements; leading indicator criteria; extensive minor revisions to all sections.
4.4	02/04/07	Restructure of description of operation and environmental aspects sections.
4.5	10/05/07	Major revision to mine closure section; added list (App. 2) of construction (extractive) materials.
4.6	16/05/07	Extensive minor editing and revisions to all sections.
4.7	17/05/07	Minor revisions to all sections; environmental assessment flowchart added (Section 8.1).
4.8	13/06/07	Minor revisions to all sections; added hierarchy of controls (Section 8.6); revised contacts list for other government agencies; revised MARP/proposal and Section 8.1 flowchart.
4.9	28/01/09	Minor amendments and edits, changes to mine completion; definitions, management systems; reviewed by the Commonwealth Department of the Environment, Water, Heritage and the Arts (Environment Assessment Branch).
4.10	22/07/10	Minor changes: contacts updated to include Natural Resources Management Council and boards; text updated to reflect new agency names (i.e. Department of Environment and Natural Resources, and Department for Water).
4.11	31/12/10	Added information relating to inclusion of exploration activities; other minor updates.

Contents

SHORTENED FORMS	6
1 INTRODUCTION	7
2 GENERAL PRINCIPLES FOR THE PREPARATION OF DOCUMENTS	8
3 CONTENT OF THE MINING LEASE PROPOSAL OR MARP	9
4 DESCRIPTION OF THE NATURAL, SOCIAL AND ECONOMIC ENVIRONMENT	12
4.1 Local community	13
4.2 Land use	13
4.3 Proximity to infrastructure and housing	13
4.4 Amenity	14
4.5 Noise, dust, air quality	14
4.6 Topography and landscape	14
4.7 Climate	14
4.8 Geohazards	14
4.9 Hydrology	15
4.10 Groundwater	15
4.11 Vegetation/weeds / plant pathogens	15
4.12 Fauna	17
4.13 Topsoil and subsoil	17
4.14 Heritage (Aboriginal, European, geological)	17
4.15 Proximity to conservation areas	18
4.16 Pre-existing site contamination and previous disturbance	18
5 DESCRIPTION OF THE OPERATION	18
5.1 General description and summary	18
5.1.1 General	18
5.1.2 Project alternatives	18
5.2 Reserves, products and market	19
5.2.1 Geological environment	19
5.2.2 Reserves and resources	19
5.2.3 Production rate, products and market	19
5.3 Mining plan	19
5.3.1 Type or types of mining operation to be carried out	19
5.3.2 Sequence of mining and rehabilitation operations	19
5.4 Mining operations	20
5.4.1 Modes and hours of operation	20
5.4.2 Workforce	20
5.4.3 Use of explosives	20
5.4.4 Underground ventilation systems and raise bores	21
5.4.5 Underground fill	21
5.4.6 Type of equipment	21
5.4.7 Stockpiles	21
5.4.8 Exploration activities	21
5.5 Crushing, processing and product transport	22
5.5.1 Crushing plant	22
5.5.2 Processing plant	22
5.5.3 Hours of operation	22

5.5.4 Type of mobile equipment	22
5.6 Wastes	23
5.6.1 Overburden and tailings	23
5.6.2 Processing wastes	23
5.6.3 Industrial and domestic wastes	23
5.6.4 Silt control and drainage	24
5.7 Supporting surface infrastructure	24
5.7.1 Access	24
5.7.2 Accommodation and offices	24
5.7.3 Public roads, services and utilities used by the operation	24
5.7.4 Visual screening and site security	24
5.8 Resource inputs	25
5.8.1 Workforce	25
5.8.2 Energy sources	25
5.8.3 Water sources	25
5.9 Mine completion	25
6 DESCRIPTION OF POTENTIAL BENEFITS	25
6.1 Social	25
6.2 Economic	26
6.3 Environmental	26
7 RESULTS OF STAKEHOLDER CONSULTATION	26
8 MANAGEMENT OF ENVIRONMENTAL, SOCIAL AND ECONOMIC ASPECTS	27
8.1 Requirements	27
8.2 Supporting resources	28
8.3 Describe the context and stakeholder views	29
8.4 Applicable legislation and standards	29
8.5 Potential impact/events	29
8.6 Control and management strategies	30
8.7 Likelihood and severity of consequence risks associated with the aspect	31
8.8 Justification for acceptance of residual risk	32
8.9 Outcomes	32
8.10 Outcome measurement criteria	33
8.11 Leading indicator criteria	33
8.12 Company compliance monitoring plan	34
8.13 Summary table of environmental outcomes and criteria	34
8.14 Ongoing community engagement plan	34
9 MINE CLOSURE AND COMPLETION PLAN	34
9.1 Context	36
9.2 Stakeholder involvement and issues	36
9.3 Scope and description of closure domain	36
9.4 Potential environmental, economic and social impacts of mine closure	37
9.5 Outcomes and completion criteria	37
9.6 Sustainable closure strategies (control measures)	37
9.7 Closure plan maps and sections	38
9.8 Completion risk assessment	38
9.9 Closure cost estimate	39
9.10 Mine closure schedule	40
9.11 Summary table of mine closure outcomes and criteria	40

10 MANAGEMENT SYSTEMS AND CAPABILITY	40
10.1 Commitment and leadership.....	41
10.2 Policies and objectives	41
10.3 Organisation, resources and documentation.....	42
10.4 Risk evaluation and management	42
10.5 Planning.....	43
10.6 Implementation, recording and monitoring	43
10.7 Audit and review	44
10.8 Previous experience of operator.....	44
10.9 Lease conditions.....	44
11 FORMAT OF SUBMISSIONS	44
11.1 General	44
11.2 Hard copy requirements	45
11.3 Digital requirements.....	45
11.4 General requirements for maps, plans and sections.....	46
12 DELIVERY ADDRESS	46
12.1 Mining lease applications	46
12.2 MARPs.....	47
13 REFERENCES AND RESOURCES.....	47
13.1 Legislation.....	47
13.2 PIRSA publications	47
13.3 Standards Australia	48
13.4 Leading Practice Sustainable Development Program for the Mining Industry	48
13.5 Minerals Council of Australia	48
13.6 Ministerial Council on Minerals and Petroleum Resources.....	48
13.7 Plant pests and diseases.....	49
13.8 United Nations Environment Programme	49
13.9 International Council on Mining & Metals	49
13.10 Department of Primary Industries (NSW).....	49
13.11 Australasian Joint Ore Reserves Committee	49
13.12 Department of the Environment, Water, Heritage and the Arts (Cwlth)	49
14 CONTACTS	49
14.1 PIRSA	49
14.2 Other South Australian Government contacts.....	49
14.3 Commonwealth Government contacts	51
APPENDIXES	
Appendix A1 Definitions (for the purpose of these guidelines)	52
Appendix A2 Standard mineral commodities.....	55
Appendix A3 Examples of environmental, social and economic aspects	58
Appendix A4 Example of environmental impact or event risk assessment — aspect: dust.....	60
Appendix A5 Methodology for evaluating risk	63
FEEDBACK FORM.....	64

Shortened forms

ALARP	as low as reasonably practicable
EPA	Environment Protection Authority (SA)
JORC	Joint Ore Reserves Committee (Australasian)
MARP	mining and rehabilitation program
OHS	occupational health and safety
PIRSA	Primary Industries and Resources South Australia
SEB	significant environmental benefit (offset for native vegetation clearance)
TSF	tailings storage facility

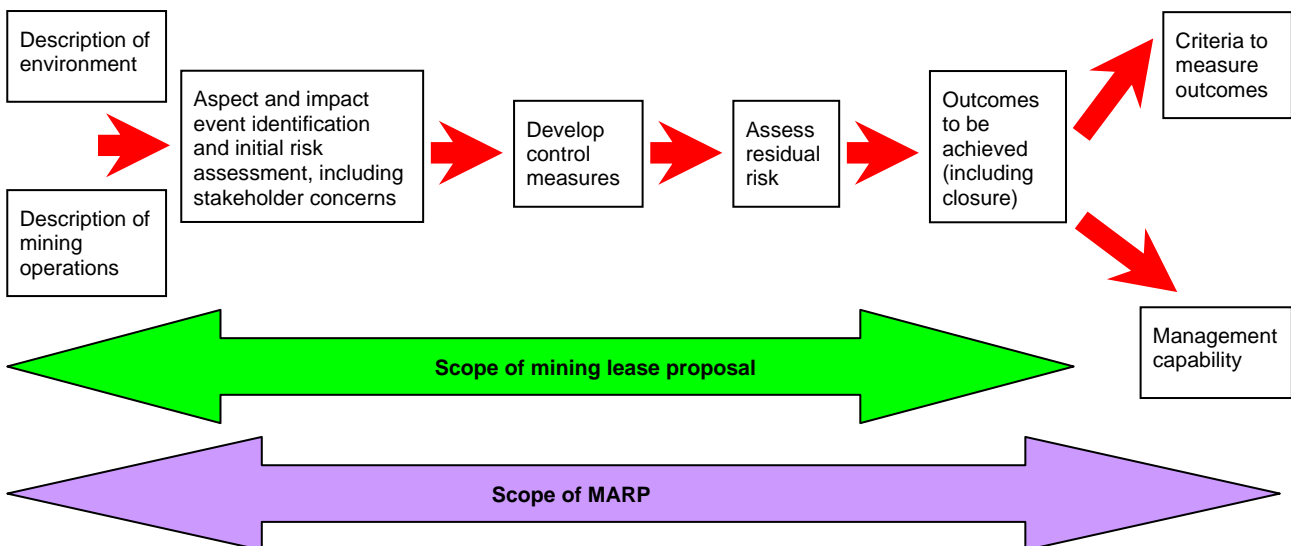
1 Introduction

These guidelines have been prepared by the Department of Primary Industries and Resources South Australia (PIRSA) to assist you through the process of preparing documentation to apply for a new mining lease, retention lease or miscellaneous purposes licence (**mining lease proposal**), or to prepare or review a **mining and rehabilitation program (MARF)**, for approval under the *Mining Act 1971*.

The aim of the **mining lease proposal** (hereafter referred to as the proposal) is to facilitate consultation across a wide stakeholder base to identify the risks inherent in the proposal, and propose a set of credible outcomes that are likely to be acceptable to the majority of stakeholders, and at least demonstrate a net public benefit if the proposal were to proceed.

The aim of the **MARF** is to demonstrate that the outcomes proposed as part of the lease application (and endorsed by the PIRSA lease grant) can be achieved. More detail is required on control measures, the development of measurable criteria to demonstrate clear and unambiguous achievement of the outcomes, and to demonstrate the management capability of the mining operator. These guidelines have been approved by the Director of Mines and are required to be complied with if your lease or licence has a condition requiring the MARF be prepared in accordance with approved guidelines. If your lease is an extractive minerals lease, Minerals Regulatory Guidelines MG6, *Guidelines for miners: preparation of a mining and rehabilitation program (MARF) for extractive mineral operations in South Australia*, is more appropriate for these types of operations.

The diagram below illustrates the conceptual assessment process you are required to follow in developing the proposal and MARF and hence what is expected to be documented in each of these — this process is explained in more detail under Section 8.1. The key differences between the content of the mining proposal and the MARF are highlighted below (a detailed checklist of the differences is provided in Section 3).



Minerals Regulatory Guidelines MG1, *Guidelines for miners: mining approval processes in South Australia*, provides further explanation of the difference between the documentation required to support a mining lease application, and the MARF, and details on the legislative and policy context for these guidelines.

Appendix 1 provides some definitions of terms used in this guideline.

For further assistance and advice on preparing lease application documentation or a MARF, please contact the appropriate PIRSA person listed in Section 14.

For larger scale operations, PIRSA would recommend that you consider engaging a specialist with experience in preparing these documents in South Australia. Failure to adequately resource the development of these documents may result in significant delays to your project. PIRSA is able to provide contact details of suitable local consultants and their past experience in preparing documentation; however, PIRSA cannot endorse any particular consultant as suitable for your proposal.

Submissions that closely follow the process outlined in these guidelines will be expedited through the assessment process and avoid requests for further information or revision to documentation.

2 General principles for the preparation of documents

The regulatory approach that underpins these guidelines is a risk–performance-based process and this should be considered when preparing the documents. The aim is to identify on an individual mine site basis the key environmental, social and economic risks associated with the proposal or mine, and to develop publicly acceptable outcomes that the miner is prepared to deliver. The focus is on **what** should be achieved (outcomes), not **how** it should be achieved. Those companies already working under an ISO 14000 type environmental management system should find producing these documents relatively straightforward.

The most important principle that should be followed in preparing documentation is clarity. It should be understood that the proposal or MARP may be read by a wide range of stakeholders with varying levels of understanding of environmental issues and mining operations. Clear presentation of complete information, free from industry jargon, will assist stakeholders in understanding your proposed or ongoing operation and allow meaningful comment.

You should aim to have documents that:

- contain complete, relevant, accurate, balanced and concise information on the mining proposal, the surrounding environment, and the environmental, social and economic risks and benefits of the proposal
- present information in a way that allows the person assessing the document to clearly understand how conclusions about risks have been reached, including assumptions made in developing models of environmental aspects
- where insufficient information has been included to fully understand risks, this is made clear and adequately justified.

PIRSA expects that the main text will largely stand alone as a summary of firm commitments or conclusions, and significant detail of commitments or conclusions should not be exclusively left to appendices.

Examples of approved mining lease proposals, MARPs and PIRSA assessment reports can be found on the mining environmental documents database on PIRSA's Minerals website¹.

Other South Australian government agencies that you may need to contact as stakeholders in developing documentation, or to obtain other licences, approvals and permits, are listed in Section 15.

Once approved, the operation must be managed in accordance with the lease conditions and the MARP. A change in the operation (size, scope or mining techniques) or a new awareness of an aspect of the environment that significantly alters the environmental risks associated with the operation will require a revised MARP to be submitted for approval, and if significant, may require changes to existing lease conditions (including a new round of public consultation).

1 <www.minerals.pir.sa.gov.au> Go to Licensing and Regulation, Mining Operations.

The document (nor any attached consultant report) must not include a disclaimer on the reliability of information and conclusions in the document, nor assert copyright on making copies of the report. The lease applicant or leaseholder must take full responsibility for the content.

3 Content of the mining lease proposal or MARP

Note: This is not a mandatory list, and it is expected that the document submitted will include only those items relevant to the proposal or mining operation

Section	Mining lease proposal	MARP	Map/Plan required	Guidelines reference
Title page	✓	✓		
Mineral claim number or tenement name(s) and number(s) of the mine	✓	✓		
Name(s) of the applicant or mine owner and mine operator and contact person	✓	✓		
Name of the mining operation	✓	✓		
Commodity to be mined	✓	✓		Appendix 2
Date of preparation of document	✓	✓		
Table of contents	✓	✓		
The contents of all volumes showing section headings	✓	✓		
All figures, tables, plates, plans, maps and their sequential numbers and scales	✓	✓		
All appendixes (with meaningful titles, including sub-appendixes if any). If an appendix contains a collation of data (e.g. drillhole logs) then a summary of the contents of the appendix must be included	✓	✓		
Digital files submitted with the report should be listed with their name, file size and file type in the table of contents	✓	✓		6.3
Each subsequent volume to the first must have its own volume contents list	✓	✓		
Introduction/executive summary	✓	✓		
A general description of the project or mine	✓	✓		
Background to the proposal	✓	✓		
Summary of the land and environment description	✓	✓		
Summary of existing operations	If applicable	✓		
Summary of proposed operations	✓	✓		
Key environmental impacts and management strategies	✓	✓		
Proposed post mine land use	✓	✓		
Mine closure and rehabilitation strategies	✓	✓		
Proposal or mine details	✓	✓		
Mineral claim number or tenement type (ML, MPL) and number(s) and other existing associated tenements	✓	✓		
Name of the mining operation (e.g. 'XYZ Mine')	✓	✓		
Location of the proposed operation; direction and distance from the nearest town	✓	✓	✓	
Land tenure (freehold title / perpetual lease / pastoral lease / crown land, native title owner or claimant group, easements, other mining tenements). Quote relevant certificate of land title etc.	✓	✓	✓	
Exempt land — waivers obtained or required	✓	✓	✓	
Name(s) of the (proposed) mine owner and mine operator and contact person address, contact numbers: phone, fax, mobile numbers	✓	✓		
District council/corporation	If applicable	If applicable		

Section	Mining lease proposal	MARP	Map/Plan required	Guidelines reference
Description of the environment	✓	✓		4
Local community	✓	✓		4.1
Land use	✓	✓	✓	4.2
Proximity to housing and infrastructure	✓	✓	✓	4.3
Amenity	✓	✓	✓	4.4
Noise, dust and air quality	✓	✓		4.5
Topography and landscape	✓	✓	✓	4.6
Climate	✓	✓		4.7
Geohazards	✓	✓	✓	4.8
Hydrology	✓	✓	✓	4.9
Groundwater	✓	✓	✓	4.10
Vegetation, weeds and plant pathogens	✓	✓	✓	4.11
Fauna	✓	✓	✓	4.12
Topsoil and subsoil	✓	✓	✓	4.13
Heritage	✓	✓	✓	4.14
Proximity to conservation areas	If applicable	If applicable	✓	4.15
Pre-existing site contamination and disturbance	✓	✓	✓	4.16
Description of the operation	✓	✓		5
General description and summary	✓	✓		5.1
General description	✓	✓	✓	5.1.1
Project alternatives	✓			5.1.2
Reserves, product and market	✓	✓		5.2
Geological environment	✓	✓	✓	5.2.1
Reserves and resources	✓	✓	✓	5.2.2
Production rate, products and market	✓	✓	✓	5.2.3
Mining plan	✓	✓		5.3
Type or types of mining operation to be carried out	✓	✓		5.3.1
Sequence of mining and rehabilitation operations	Conceptual	Specific	✓	5.3.2
Mining operations	✓	✓		5.4
Modes and hours of operation	✓	✓		5.4.1
Workforce	✓	✓		5.4.2
Use/storage of explosives	If applicable	If applicable	✓	5.4.3
Underground ventilation systems and raise bores	If applicable	If applicable	✓	5.4.4
Underground fill	If applicable	If applicable	✓	5.4.5
Type of equipment	Conceptual	Specific		5.4.6
Stockpiles	✓	✓	✓	5.4.7
Exploration activities	✓	✓	✓	5.4.8
Crushing, processing and product transport				5.5
Crushing plant	Conceptual	Specific	✓	5.5.1
Processing plant	If applicable	If applicable	✓	5.5.2
Modes and hours of operation	✓	✓		5.5.3
Type of mobile equipment	Conceptual	Specific		5.5.4
Wastes	✓	✓		5.6
Overburden and tailings	✓	✓	✓	5.6.1
Processing wastes	If applicable	If applicable	✓	5.6.2
Industrial and domestic waste	✓	✓	✓	5.6.3

Section	Mining lease proposal	MARP	Map/Plan required	Guidelines reference
Silt Control and drainage	✓	✓	✓	5.6.4
Supporting surface infrastructure	✓	✓		5.7
Access	✓	✓	✓	5.7.1
Accommodation and offices	✓	✓	✓	5.7.2
Public roads, services and utilities to be used	✓	✓	✓	5.7.3
Visual screening and site security	Conceptual	Specific	✓	5.7.4
Resource inputs	✓	✓		5.8
Workforce	✓	✓		5.8.1
Energy sources	✓	✓		5.8.2
Water sources	✓	✓	✓	5.8.3
Mine completion	✓	✓		5.9
Description of benefits	✓			6
Social	✓			6.1
Economic	✓			6.2
Environmental	✓			6.3
Results of stakeholder consultation	✓	✓		7
For each stakeholder consulted:				
Name of stakeholder or group	✓	✓		
Type of stakeholder (resident, council etc.)	✓	✓		
Issues raised	✓	✓		
Response	✓	✓		
Environmental, social and economic aspects	✓	✓		8
For each Environmental, social or economic aspect:				
Context and stakeholder views	✓	✓		8.3
Applicable legislation or standards	✓	✓		8.4
Potential impact events	✓	✓		8.5
Control and management strategies	Conceptual	Specific	As required	8.6
Likelihood and severity of consequence, risk	✓	✓		8.7
Risk acceptance	✓	✓		8.8
Outcomes	✓	✓		8.9
Outcome measurement criteria	Conceptual	Specific	As required	8.10
Leading Indicator criteria	Conceptual	Specific	As required	8.11
Company compliance monitoring plan	Conceptual	Specific	As required	8.12
Summary table of outcomes and criteria	✓	✓		8.13
Community engagement plan	Conceptual	Specific		8.14
Mine closure and rehabilitation plan	✓	✓		9
Context	✓	✓		9.1
Stakeholder Involvement and issues	✓	✓		9.2
For each closure domain				
Scope and description of domain	✓	✓	✓	9.3
Potential environmental and social impacts of mine closure	✓	✓		9.4
Outcomes and completion criteria	✓	✓		9.5
Sustainable closure strategies (control measures)	✓	✓		9.6
Closure plan maps and sections	✓	✓	✓	9.7
Completion risk assessment	✓	✓		9.8
Closure cost estimate (spreadsheet model)		✓		9.9
Mine closure schedule		✓		9.10

Section	Mining lease proposal	MARP	Map/Plan required	Guidelines reference
Summary table of closure outcomes and criteria	✓	✓		9.11
Management systems and capability		✓		10
Commitment and leadership		✓		10.1
Policies and objectives		✓		10.2
Organisation, resources and documentation		✓		10.3
Risk evaluation and management		✓		10.4
Planning		✓		10.5
Implementation, recording and monitoring		✓		10.6
Audit and review		✓		10.7
Previous experience	✓	✓		10.8
Lease conditions		✓		10.9
References	✓	✓		
Appendixes	✓	✓		

The following sections provide detailed guidance on the information required under each section for either the proposal or MARP.

4 Description of the natural, social and economic environment

In this section, information is required on the general natural physical, biological, social, economic and cultural environment of the proposed area and the surrounding region that may be affected by the mining operation. This information is necessary to assess the direct and indirect impacts the proposed operation may have on the physical environment, wellbeing and amenity values of the public; it provides a context for the rest of the document.

Depending on the significance of the environmental aspect, the extent of existing information and the potential risks to those particular aspects of the environment, the level of qualitative detail and baseline environmental data required is similar for both a proposal and a MARP. The document should include as minimum the spatial layout of the immediate and surrounding landscape features. Quantitative baseline data required in a MARP should be sufficient to provide a basis for proposed measurement criteria, particularly closure criteria.

The process should aim to ensure that all aspects of the environment and stakeholder interests are identified so that the potential impacts of the proposed operation can be fully assessed. While PIRSA may be able to provide broad guidance and advice regarding this requirement, it is your judgement as to how much detail will be required in describing the existing environment, based on your knowledge of the proposed operation and any issues or risks arising from the engagement with stakeholders. The lease application is more likely to proceed smoothly and suffer less delay if you undertake an appropriate level of stakeholder engagement at an early stage to ensure that you address all issues in your proposal prior to the statutory consultation.

The document should include a location plan that shows the mining lease or claim in a regional context showing the:

- claim/lease/licence boundaries, including adjoining tenements
- regional air photo background
- regional drainage
- location of existing roads, railways, transmission lines, towns, pipelines
- location and extent of any adjacent conservation reserves, heritage sites or any other environmentally significant areas.

Note: The following topics are only provided as a starting point and a guide to assist you prepare your description of the environmental, social and economic aspects of your proposal or MARP. These should not be taken as limited to these or as requiring all of these in every circumstance.

4.1 Local community

Summarise key aspects of the local communities that may be positively or negatively impacted by the mine. This should include population, the local economy, (e.g. wheat, tourism, rural services), demographics (age, cultural backgrounds, educational qualifications, average income), local services and employment. Information on local area demographics may be obtained from Planning SA or the local council.

Potential stakeholders include the local council (or Outback Areas Community Development Trust if outside of local council areas), Planning SA, and local residents and businesses.

4.2 Land use

Describe the land use (historical, current and potential) for the lease (or application) area and the surrounding areas (up to 2 km) from the proposed mine. The existing (or proposed if known) planning restrictions and guidelines for the land should be described. This should include state and local government planning instruments, including council development plans and out of councils situations). Known plans for future land use changes by other parties (e.g. conversion of farmland to residential) and the proposed land use post mining should also be included. Productive capacity or value of the land and associated resources should also be considered.

The Woomera Protected Area may apply to some mining proposals, and permission must be obtained from the Department of Defence to open a mine in this area.

Potential stakeholders include the local council (or Outback Areas Community Development Trust, if outside of local council areas), Planning SA, Department of Defence (Woomera Protected Area), immediate and adjacent landholders (including the relevant government department for crown land) and owners of infrastructure easements.

A map may be required to support this section.

4.3 Proximity to infrastructure and housing

Information is required to determine if existing infrastructure (both public and private) may be affected by the operation, and to determine the extent of impact on the public from noise/dust etc. Information and maps relating to residences near to the mine area and other human infrastructure (such as schools, hospitals, commercial or industrial sites, roads, sheds, bores, dams, ruins, pumps, scenic lookouts, roads, railway lines, fences, transmission lines, gas and water pipelines, telephone / buried communication lines) should be considered if relevant. (Note that blasting is not permitted within 1 km of a gas pipeline.)

This section should also include details on any applicable exempt land under section 9 of the Mining Act, and if any waivers have been obtained or are intended to be obtained prior to mining commencing.

Potential stakeholders include the local council, Planning SA, Transport SA, immediate and adjacent landholders (including the relevant government department for crown land) and owners of infrastructure easements.

A map is required to support this section.

4.4 Amenity

Describe any areas regarded by local communities or others as being of scenic or aesthetic value. This may include caves or karst features.

Potential stakeholders include the local council (or Outback Areas Community Development Trust, if outside of local council areas), Planning SA, and local residents.

A map may be required to support this section.

4.5 Noise, dust, air quality

Summarise the existing levels of dust, noise and contributors to air quality (both natural and industrial).

4.6 Topography and landscape

Describe and map the topography of the general area as well as the lease and surrounding areas. The presence of caves in karst (limestone) areas should be considered and a survey for the presence of caves may be required.

Potential stakeholders include the local council, local district ranger (if located in or adjacent to a reserve), Planning SA, the immediate and adjacent landholders, the general public (public amenity issues) and, if applicable, the Cave Exploration Group of South Australia.

A map is required to support this section.

4.7 Climate

Summarise rainfall and temperature patterns, wind directions and speed (for dust impacts). This data may be derived from the nearest meteorological station. If relevant to the specific mine design, also include other meteorological events that may impact on your operation such as evaporation rates, high winds, flood events, frost events and maximum rainfall events (duration/magnitude).

Climate change should also be considered, particularly for long-term projects.

4.8 Geohazards

Potential natural geohazards may be:

- structural instability (slips, faults, karst features or geological unit boundaries)
- minerals hazardous to human health (e.g. radioactive minerals, asbestos)
- minerals that may pollute the environment (e.g. sulfide minerals that may generate acid in waste material).

Maximum historic seismic events and frequency should be considered if significant plant or other structures are to be constructed.

Potential stakeholders include the Radiation Protection Branch of the Environment Protection Authority (SA) (EPA), landholders, immediate and adjacent landholders, special interest community groups and the general public.

A map may be required to support this section (structural stability issues only).

Natural radioactive materials. Where radioactive ores are to be mined, pre-operational monitoring is required to determine background levels of radionuclides in the environment. These measurements are required to ensure that the mining operation does not significantly increase exposure of the environment to radiation as a result of mining activities. It is important that the program commence early enough (generally 12 months prior) to allow seasonal variations in pre-existing conditions to be evaluated. Other issues of relevance to the proposed mining of radioactive ores are pre-existing site contamination, soil, fauna, hydrology, groundwater and topography. Stakeholders who should be consulted before the background monitoring program is established include the Radiation Protection Division of the EPA.

4.9 Hydrology

Summarise current drainage patterns including the location of creeks, rivers, drains and dams and the direction of drainage. Indicate the ultimate downstream outfalls of creeks and if watercourses are permanent or ephemeral (i.e. usually dry and only run after significant rainfall). Consider if the area is within water protection areas, including areas under the *River Murray Act 2003*.

Potential stakeholders include landholders using water from creeks in the area, the relevant natural resources management board, and the Department for Water.

A map is required to support this section.

4.10 Groundwater

Assess if mining is likely to intersect groundwater, or mine dewatering will be required. If mining is likely to intersect groundwater, provide an overview of the regional and local geology, hydrogeology and groundwater dynamics (flow directions, relative pressures/levels, interconnection, quality, recharge zones and size) as well as detail on aquifers that may be affected by the proposed operation.

For each aquifer that may be affected by mining operations (e.g. ore body aquifer, water supply aquifer) provide accurate detail of water quality and pressure, recharge areas, aquitards, aquifer details, water gradient (include seasonal fluctuations if known) flow directions/rates and discharge areas. Detail is also required on the level of connectivity between the ore body and water supply aquifers and lateral, overlying or underlying aquifers and surface water (including areas remote from the mining site if relevant).

Include a description of the present water quality and current or potential use of this water by the landowner (e.g. stock use) and environment (e.g. natural springs), both in the proposed mining area and areas remote from the mining site that may be affected by the operation, taking into account the natural flow directions/flow rate of the aquifer. Consider if the area is within a water protection area (e.g. River Murray) or if it is a prescribed water resource under the *Natural Resources Management Act 2004*.

Potential stakeholders include the landholders using bores in the areas, the relevant natural resources management board, and the Department for Water.

A map is required to support this section.

4.11 Vegetation/weeds / plant pathogens

Describe and map the existing flora in the mine and surrounding area (native and introduced). Include items such as floristic associations, conservation status and habitat value.

The extent the area is affected or potentially affected by pathogens and weeds (e.g. *Phytophthora* or broomrape) should be determined.

A history of land use may assist in providing some context to the existing vegetation. Is the existing native vegetation the result of deliberate cultivation (e.g. planting of native pasture grasses), or is it natural regrowth arising from previous clearance?

A vegetation survey undertaken by a suitably qualified person may be required if large areas of remnant native vegetation are proposed to be cleared or impacted on by the proposed mining activity. The survey should include a description of the dominant vegetation communities (e.g. blue gum woodland), including a list of the common species of trees, shrub layer species, understorey species, groundcovers, grasses and identification of weed species and their extent of infestation.

Where clearing of the native vegetation is proposed, the proposal or MARP should also include panoramic photographs of the site showing all vegetation types and a plan of the proposed lease location showing:

- the extent of the proposed vegetation clearance
- proximity to all other native vegetation up to a 5 km radius from the proposed mining site
- the number of 'scattered trees', 'significant trees' or area (in hectares) of vegetation to be cleared
- height and size of the dominant vegetation layer
- density and age of the vegetation, i.e. regrowth, mature or 'old growth'
- health of vegetation, e.g. previous disturbances such as clearing, grazing, thinning, logging, burning, existence of weeds, feral animals or disease
- presence of any tree hollows or other habitat values
- the likelihood of the presence of threatened flora.

Potential stakeholders include the landholder, Department of Environment and Natural Resources, special interest community groups and the relevant natural resources management board.

A map and aerial photograph is required to support this section.

Note: Clearance, in relation to the Native Vegetation Act 1991, means:

- the killing or destruction of native vegetation
- the removal of native vegetation
- the severing of branches, limbs, stems or trunks of native vegetation
- the burning of native vegetation
- any other substantial damage to native vegetation, including the draining or flooding of land, or any other act or activity that causes the killing or destruction of native vegetation, the severing of branches, limbs, stems or trunks of native vegetation or any other substantial damage to native vegetation.

Generally speaking the damage to vegetation must be substantial rather than trivial in nature; however damage to a single tree may be enough to be considered 'clearance'.

Clearance of intentionally revegetated land

In some circumstances operators may need to re-clear land that has previously been intentionally revegetated with native vegetation, for example, as part of a lease condition. Significant environmental benefit (SEB) will not be required for the clearance of that vegetation as long as it has not been planted as a condition to consent to clearance granted under the Native Vegetation Act, or as an order of a court under the Native Vegetation Act.

Clearance of vegetation for rehabilitation purposes

If an operator requires the clearance of vegetation in order to undertake rehabilitation activities, for example, clearing native vegetation as part of the process to batter down a quarry face, then SEB will be required for the removal of that vegetation as that clearance is part of the overall operations.

Clearance of natural regrowth native vegetation

SEB requirements will still apply where a proponent wishes to clear native vegetation that has naturally re-established itself after clearance or grazing activities.

Clearance for exploration purposes

Clearance of native vegetation resulting from exploration activities is permitted without payment of SEB provided they are rehabilitated within 6 months of completion of the exploration operations.

Alternatively, if impacts from exploration activities can be accurately identified and are not likely to be rehabilitated within 6 months, then impacts resulting from the clearance of native vegetation should be included within SEB calculations.

SEB requirements

Refer to Minerals Regulatory Guidelines MG8, Guidelines for a native vegetation significant environmental benefit policy for the clearance of native vegetation associated with the minerals and petroleum industry, (September 2005).

4.12 Fauna

Identify all native and introduced fauna currently in the area, noting conservation status of all species, for example, endangered, threatened, feral, domestic pets and livestock. It may be necessary to undertake a fauna survey by a suitably qualified person, particularly if native vegetation is proposed to be cleared.

Potential stakeholders include the Department for Environment and Natural Resources, and special interest community groups.

A map may be required to support this section.

4.13 Topsoil and subsoil

Describe and map the profile (type and depth) and the characteristics (e.g. cracking clays, light red soils, red/brown earth — including productivity) of all soils on the proposed mine site. Identify any soil aspects that may be an issue for disturbance or rehabilitation (e.g. acid sulfate, non-wettable)

Potential stakeholders include PIRSA, landowners and the relevant natural resources management board.

A map is required to support this section.

4.14 Heritage (Aboriginal, European, geological)

Details should be given of known Aboriginal or European cultural or archaeological sites, objects or remains. It may be necessary to undertake a heritage survey by a suitably qualified person. Some rock formations contain fossils that may be regarded as of significant scientific value. Some geological features such as volcanoes or caves are also protected under heritage legislation.

Potential stakeholders include the Aboriginal Affairs and Reconciliation Division, the Department of Environment and Natural Resources, the South Australian Museum, native title owners and claimants, the Aboriginal Legal Rights Movement and local Aboriginal associations.

Refer to PIRSA Earth Resources Information Sheet M29, Aboriginal Heritage Act 1988 and Aboriginal site avoidance guidelines, particularly with respect to confidentiality issues.

Also refer to PIRSA Mineral Exploration Data Package 17, Geological monuments in South Australia, which describes 432 geological heritage sites.

Aboriginal heritage sites should not be included on maps, however European heritage sites should be included to support this section.

4.15 Proximity to conservation areas

Affects on areas such as national parks, private conservation areas, heritage agreement areas and geological monuments should be considered. Consideration needs to be given to the likelihood that the proposed mine site acts as a linkage/habitat corridor to other nearby habitat areas, whether or not those areas are currently protected.

Potential stakeholders include the Department of Environment and Natural Resources, special interest community groups, local councils, Native Vegetation Council and the Geological Society of Australia Inc.

A map may be required to support this section.

4.16 Pre-existing site contamination and previous disturbance

Details should be given of any known contamination of the site and of any disturbance by previous mining operations or other activities. This should include any previous exploration activities whether or not they have been conducted by the present licensee.

A detailed plan and cross-sections may be required to support this section.

5 Description of the operation

A detailed description of the activities and infrastructure planned for the mine are required for both a proposal and MARP. For a proposal, this description may be more conceptual, but must include details about mining method, size and location of infrastructure and processing methodology. If significant changes to the proposed mining operation occur after the lease is granted, further formal public consultation may be required to change lease conditions, resulting in delays to the project. If the final mining and processing concepts have not been finalised, it may be possible to present alternatives in the proposal.

5.1 General description and summary

5.1.1 General

Provide:

- background to the mining proposal
- description and maps of the overall operation including location of the proposed operation
- description, maps and precise location of all site disturbance activities and structures to be built or modified, including access roads (total environmental footprint).

5.1.2 Project alternatives

Provide details of any feasible alternatives to the overall proposal (or any specific aspects), including:

- a comparative description of the alternative

- detail on why the favoured approach was chosen.

5.2 Reserves, products and market

5.2.1 Geological environment

Provide a general description of mine site geology including:

- location, dimensions and attitude of the deposit
- ore composition
- waste and proportion of waste
- description and results of any exploration work carried out
- typical cross-sections and map.

5.2.2 Reserves and resources

Provide:

- current published reserve estimates (Australasian Joint Ore Reserves Committee compliant <www.jorc.org>).
- known resources or potential for resources in lease area above known reserves.

5.2.3 Production rate, products and market

Note: Some of the information in this section may be held confidential if required.

Provide information on:

- standard commodity to be mined and marketed (refer to App. 2 for list of standard commodities)
- mine gate product (e.g. metal, concentrate, crushed ore)
- mining, production and sales rates
- expected mine life
- products to be marketed
- intended market for the products, and evidence that material can economically mined and sold into this market.

5.3 Mining plan

5.3.1 Type or types of mining operation to be carried out

Provide information on the type or types of mining operation to be carried out, such as:

- the mining method to be adopted (open cut, underground, in situ or surface leach etc.)
- indicate if any chemical beneficiation will be undertaken
- ongoing exploration or resource drilling.

5.3.2 Sequence of mining and rehabilitation operations

The following information on the sequence of operations must be provided:

- indication of starting point and direction of mining
- planned commencement date of operations
- timing and description of progressive work stages
- proposed scheduling of progressive rehabilitation
- estimated production schedules (ore and overburden removal)

- estimated annual production of mine gate product(s)
- expected mine life, including scope for extension (e.g. due to switch from open cut to underground working).

Details of progressive rehabilitation activities should include:

- use of overburden
- management of disturbed areas caused by mining to limit the need for extensive rehabilitation
- battering of mining faces and other earthworks
- topsoil management
- revegetation
- core and non-core rehabilitation activities (refer to *Extractive Areas Rehabilitation Fund: guidelines for operation* — being updated as Minerals Regulatory Guidelines MG10)
- effectiveness of previous rehabilitation activities on the site, where relevant.

The sequence of previous and/or proposed mining operations and progressive rehabilitation should be shown on a map/plan (or a series of maps/plans).

5.4 Mining operations

5.4.1 Modes and hours of operation

Provide information on the modes and hours of operation to be carried out, such as:

- is mining going to be worked continuously or periodically? (e.g. only during certain months or to meet market demands)
- actual proposed hours of mining (e.g. from 7.00 am until 5.00 pm; consider week days, weekends and public holidays)
- the proposed hours of ore haulage and stockpiling (e.g. from 7.00 am until 5.00 pm; consider week days, weekends and public holidays)
- how will ore and waste be stockpiled (e.g. conveyor, truck).

Note: If it is proposed to work the lease for less than 100 hours per month, a request to vary the working conditions will need to be made under Regulation 50(3).

5.4.2 Workforce

The following information should be provided on the workforce:

- how operations on the site will be managed
- size of workforce.

5.4.3 Use of explosives

A description of the following items is required:

- type of explosives that will be used on the site
- proposed frequency of blasting
- storage of explosives (amount, type, detailed location and method of storage).

For a MARP, a copy of the licence issued by SafeWork SA should be included.

5.4.4 Underground ventilation systems and raise bores

If the operation is underground and raise bores are to be used, indicate number, location and size of bores/shafts, if the bores are to be lined and if any saline aquifer emissions will result at the surface.

A map is required to support this section.

5.4.5 Underground fill

Indicate the following:

- type of fill to be used (e.g. hydraulic and cement aggregate)
- the volume % of underground void to be filled
- sequence of filling
- source and proportion of fill (tailings, waste rock surface mining etc.).

Scale drawings are required to be included to support this section.

5.4.6 Type of equipment

Describe the equipment to be used in the mining process and in ore haulage and stockpiling in terms of:

- type, size and capacity of machines
- noise, vibration and exhaust outputs
- ignition sources (e.g. exhausts)
- approximate number of units.

5.4.7 Stockpiles

The following information must be provided on stockpiles:

- location, size, shape and height of ore, product, subsoil and topsoil stockpiles
- method of placement
- method of stabilisation and erosion control of all stockpiles
- water movement through stockpiles
- slope stability assessment to demonstrate acceptable safety.

A map must be included to support this section.

5.4.8 Exploration activities

Information that details all activities to be undertaken as a part of mining operation, inclusive of exploration activities, must be included. Exploration activities may include, but not be limited to:

- types of drilling, e.g. rotary air blast, aircore, reverse circulation, rotary mud, diamond core
- geophysical techniques likely to be used, e.g. downhole surveys, magnetics, gravity, seismic etc.
- earthworks required to conduct exploration activities, e.g. sumps, track construction etc.
- equipment required to conduct exploration activities.

The proposal must also document the rehabilitation status of all previous exploration impacts prior to the granting of the mining lease. Any exploration impacts not rehabilitated when the mining lease is granted must be included within SEB calculations and captured within the mine closure and completion plan (including the determination of the maximum rehabilitation liability costs).

5.5 Crushing, processing and product transport

5.5.1 Crushing plant

The following information must be provided on the specifications of the crushing plant:

- area, size, type of construction and location of crushing plant
- provide a description of ore preparation for processing (e.g. crushing, washing, drying, grinding, milling, concentration)
- the grind size of the ore
- noise sources
- dust sources and composition
- ignition sources.

5.5.2 Processing plant

The following information must be provided on the specifications of the processing plant:

- number, area, size, type of construction and location of processing plant, and associated structures (concrete batching plant, wheel wash facilities, silos, fuel tanks, water tanks, chemical storage, reverse osmosis plants, borefields heap leach etc.) to be used for processing the minerals on site
- the type(s) of processing/value adding to be used on the raw material (e.g. flotation, smelting, separation, drying)
- if beneficiation chemicals are to be used, describe the nature of the chemicals to be used and their reactions with ore and processing water
- if processing water is to be used, provide a water balance and approximate water volumes required
- heap leach pads and liquor ponds – details of size, location, lining/drainage system, chemicals used
- a water balance (if a wet circuit is used) with consideration of any purge requirements
- heat duties in MW for all drying, calcining or other heating operations in the plant
- a mass balance for the plant
- noise sources
- dust sources and composition
- ignition sources
- other potential air emissions (including odour) and their composition.

Note: EPA licences are required for mineral processing plants.

Maps/construction plans must be included to support this section.

5.5.3 Hours of operation

The proposed hours of crushing and processing activities (e.g. 24 h/d) must be provided.

5.5.4 Type of mobile equipment

Indicate the following for mobile equipment to be used in crushing and processing ore and in transporting the mine product to the point of sale:

- type, size and capacity of machines
- noise, vibration and exhaust outputs
- ignition sources (e.g. exhausts)
- approximate number of units.

5.6 Wastes

5.6.1 Overburden and tailings

The following information must be provided on mine waste storage facilities:

- location, size, shape and height of permanent and temporary mine waste storage facilities
- method of placement
- method of stabilisation and erosion control of storage facilities
- slope stability assessment to demonstrate acceptable safety
- size and location of the tailings storage facility (TSF), supported by appropriate water balance modelling considering inputs and outputs
- surface water runoff control on disturbed and rehabilitated areas
- design and construction specifications (as well as linings) of the TSF, including slope stability assessment
- operating specifications of the TSF, including assessment of seepage and need for lining monitoring.

Note: All TSFs will be required to comply with Minerals Regulatory Guidelines MG5, Guidelines for miners: tailings and tailings storage facilities in South Australia, and engineering and geotechnical design will be required to be certified.

A map/construction plan must be included to support this section.

5.6.2 Processing wastes

The following information must be provided on any processing wastes generated:

- estimated volumes of waste processing water, water content of residues, and method of disposal or recycling
- disposal and management of any toxic material within the residue.

5.6.3 Industrial and domestic wastes

The following information must be provided on any industrial and domestic wastes generated:

- putrescible waste disposal number, size, location, construction details
- oil
- brine from reverse osmosis plants
- other on-site waste disposal or recycling, for example, workshop waste, tyres, drums, oil filters
- offsite disposal
- describe and state the type, area and layout of sewage systems to be installed at the site, and if the system has been approved (or will be approved) by the relevant authority.

A map/construction plan is required to support this section.

Note: The method of disposal for wastewater (not from industrial processes) must comply with the Standard for the construction, installation and operation of septic tank systems in South Australia, or be to the satisfaction of the Department of Health. Prior to installing a septic tank system it is mandatory to submit an application to, and receive approval from, the local council in the area in which the system is to be installed, or the Department of Health for areas of the state not under local government control.

5.6.4 Silt control and drainage

The following information must be provided on silt control and drainage:

- location and design of silt management structures (e.g. silt retention dams)
- runoff control on disturbed and rehabilitated areas
- storage, diversion and disposal of clean water (discharge water must comply with the applicable EPA water policy).

Note: Certified engineering and geo-technical design may be required for silt retention structures (if considered necessary).

A plan showing the surface water movement for the whole mine site must be included to support this section.

5.7 Supporting surface infrastructure

5.7.1 Access

The following information must be provided on mine site access:

- describe the proposed access route to the site
- indicate if any new roads are to be constructed, or if existing roads are to be upgraded
- airport/airstrips to be constructed.

A map must be included to support this section.

5.7.2 Accommodation and offices

The following information must be provided on mine site personnel accommodation and offices:

- number, area, size, type of construction and location of accommodation buildings or camp and associated structures (e.g. car parks, office buildings water tanks, reverse osmosis plants) to be used for processing the minerals on site.

5.7.3 Public roads, services and utilities used by the operation

The following information must be provided on public roads, services and utilities to be used to support the mining operation:

- a description of the sources of external services that are to be supplied to the mine, such as power, water, telephones
- if new connections to public infrastructure are required, the proposed routes for connection
- a description of and the effects to any existing surface infrastructure that may be affected by the proposed mining operations
- public roads to be upgraded or constructed and the transport system(s) used to and from the mine, including details on the estimated number of vehicle movements per day.

A map must be included to support this section.

5.7.4 Visual screening and site security

The following information must be provided on visual screening and site security:

- describe any proposed vegetation (i.e. species and density of plantings) or other type of screening
- provide a general description of infrastructure and measures that will be adopted to prevent unauthorised access by the public including, fencing, signage etc.

A map must be included to support this section.

5.8 Resource inputs

5.8.1 Workforce

The following information must be provided on the proposed workforce:

- number and workforce breakdown by job type (e.g. operators, maintenance)
- source of employees.

5.8.2 Energy sources

The following information must be provided on energy sources and usage:

- estimates of total annual energy usage (from all sources, including personnel transport and ore transport to point of sale)
- expected sources of energy (e.g. coal-fired electricity, gas-fired electricity, diesel, wind)
- potential for efficiency gains
- amount and % of zero emission energy to be utilised
- equivalent annual CO₂ generated
- any carbon offsets proposed.

5.8.3 Water sources

The following information must be provided on the source(s) of water to be used at the mine, expected usage and any discharge:

- expected annual water usage by source (e.g. local groundwater, mains, wastewater, rainwater)
- indicate if any water usage by source will be more than 5% of the total annual water withdrawal for that source
- % of water that will be recycled
- water discharge by quality and destination.

5.9 Mine completion

This section should describe the mine as it will be at completion (and after all progressive rehabilitation has been completed):

- describe the mine site at completion (landforms, vegetation cover)
- anticipated post mine land use
- summarise proposed progressive rehabilitation strategies.

A map must be included to support this section.

6 Description of potential benefits

This information is not required for MARP reviews, but is required for all new mining lease proposals.

6.1 Social

The following information must be provided:

- number of full-time employee positions to be directly created by the proposal (not to include existing positions)
- if the operation is fly-in-fly-out, or local community based

- source of the new labour (e.g. sourced from existing regional communities, South Australia or interstate/overseas)
- any programs to target and assist Indigenous or local employment at the mine
- training to be provided to employees and potential employees
- approximate timelines for creation of the positions
- assistance or provision of infrastructure to isolated communities (e.g. provision of grid electricity to isolated communities, provision of an airstrip, medical facilities)
- public health benefits (e.g. clean water to an Aboriginal community)
- addressing local unemployment
- tourism or recreation opportunities.

6.2 Economic

The following information must be provided:

- revenue to be generated
- full breakdown of operating expenditures (between local community, state and external to state)
- wages and other employee benefits
- total value of land acquisition or other landholder compensation
- potential for value adding of a mined commodity and flow-on economic effects
- economic benefits derived from local employment and local suppliers of material or services
- potential to bring forward development of other mines in the area by utilising this mine's infrastructure
- approximate royalty payments and other direct state government taxes profile
- value of South Australian Government financial benefits, for example, royalty reductions, assistance with infrastructure, exploration assistance (Plan for Accelerating Exploration, *PACE*).

6.3 Environmental

The following information must be provided:

- voluntary, non-core environmental benefits associated with the proposal (e.g. removal of stock from a pastoral lease, capping of existing free-flowing bores)
- acquisition of new baseline environmental data
- potential benefits associated with the proposal (e.g. restoration of previously mined site to a better standard than the present state, removal of pests)
- environmental benefits over and above rehabilitation activities to be paid or made in association with native vegetation clearance
- carbon offsets.

7 Results of stakeholder consultation

Stakeholder consultation by the proponent prior to submission to PIRSA is a key aspect of the development of the documentation.

This section should summarise the results of any consultation that has been undertaken on the proposal for a new mine, or existing operation. The summary should list:

- the individual (or, if not practical, the groups of stakeholders)
- type of stakeholder (resident, council, government agency etc.)
- the concerns/issues raised

- the response to those concerns.

If appropriate, this information may be summarised in a table.

For existing operations, stakeholder concerns may be summarised by reviewing complaints received about the operation since the last review of the MARP, or issues arising from ongoing community consultative committee meetings (if relevant) or ongoing one-on-one meetings with neighbours.

8 Management of environmental, social and economic aspects

8.1 Requirements

This section is perhaps the most important in the document, and therefore warrants the application of considerable effort and resources on behalf of the proponent. It will form the basis of how the operation will be regulated, including the circumstances where PIRSA will take appropriate enforcement action.

PIRSA has adopted a performance or objective based approach to regulation (focus on the outcomes to be achieved), rather than the traditional prescriptive approach (focus on the control measures). This approach allows for more freedom on the part of the mine operator, and will provide for increased trust by stakeholders through a clear demonstration that the environmental, social and economic impacts of the mining operation are being managed appropriately.

Both the proposal and the MARP should identify all of the environmental, social and economic impacts or events (inclusive of nuisances) that are likely to be created by the mining operation, and how each of the identified impacts will be managed. Appendix 4 provides some examples of the types of aspects that may occur in relation to mining projects.

Details of the environmental risks associated with exploration activities must be considered as a part of the risk assessment, including control and management strategies. This must also include impacts that previous exploration activities might pose on mining operations, for example, open drillholes under tailings dams and waste rock dumps acting as migration pathways for potential acid mine drainage fluids into aquifers.

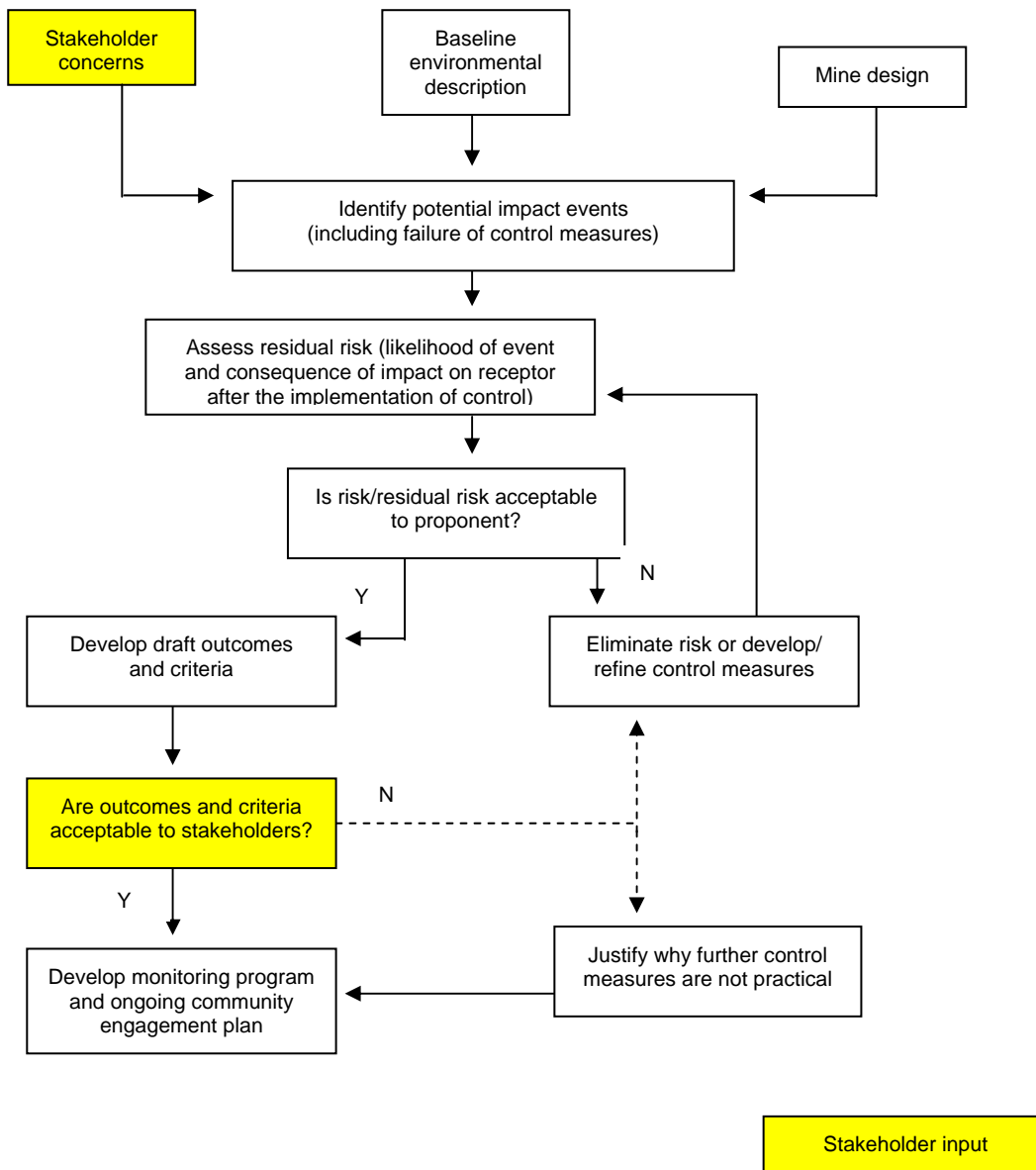
Outcomes and measurement criteria will need to take into account previous impacts from exploration activities as well as proposed exploration activities. For example, outcomes might need to be developed to address potential impacts to groundwater contamination as a result of drilling activities, and death or injury to fauna from open exploration drillholes and excavated sumps etc.

The level of detail required is the same for both the proposal and the MARP in regards to the identification of all impacts, the assessment of significance (risk) and the desired outcome to be achieved. For a proposal, the control measures, measurement criteria and monitoring program may be described in more conceptual terms and subject to further refinement; for the MARP these must be described in detail and finalised in the document.

For each aspect identified, a management program should be developed and as a minimum contain the elements described in Sections 8.3 to 8.11. Appendix 4 is an example of how this process should be documented for a single aspect.

The process to be followed in developing these sections is summarised in the flowchart below.

Process flowchart



8.2 Supporting resources

The process required in this section in general follows key elements of the ‘planning’ part of ISO 14001 Standard for environmental management systems (section 4.3 of the standard). Other parts of the ISO 14000 Standards (sections 4.2, and 4.4, 4.5 and 4.6) are addressed under Section 10 of this document.

The process of identifying and assessing the significance of aspects in general follows the Australian and New Zealand standard for risk assessment (AS/NZS 4360:1999). HB203:2000 from Standards Australia also provides a clear guide to environmental risk assessment, and the application of AS/NZS 4360.

The Leading Practice Sustainable Development Program for the Mining Industry handbooks (see Section 13.4) and the Minerals Council of Australia Enduring Value resource database (see Section 13.5) are also useful resources for developing risk management strategies for various aspects of mining operations.

8.3 Describe the context and stakeholder views

This section should describe the context of the aspect being considered and include consideration of existing environment (e.g. is the site remote, what is the stakeholders perception of the site?), the concerns of external stakeholders and the scope for investment in control measures given the economics of the mining operation or occupational health and safety (OHS) hazard management.

8.4 Applicable legislation and standards

This section should identify all applicable legislative or other standards (e.g. EPA noise or water quality policies). This may be other state-based legislation (e.g. *Environment Protection Act 1993*) or Commonwealth legislation, standards and guidelines (e.g. *Environment Protection and Biodiversity Conservation Act 1999*, *National Environment Protection Council Act 1994* — National Environment Protection Measure standards).

8.5 Potential impact/events

Identify and describe the actual and/or credible potential impact events associated with proposed mining activities that could pose a threat to the:

- natural environment (including air quality, surface and underground water supplies, flora, fauna, landform stability etc.)
- social environment (including public health, amenity, nuisance, fires, heritage, use of public resources etc.)
- economic environment (including regional economy, individual landholder incomes, land values etc.).

Events associated with construction should be considered as well as events associated with operation of the mine, where these may differ.

Consider the particular complexity posed by environmental and social risk assessment (opposed to conventional risk analysis) as that may apply to some events such as:

- the difficulty, due to lack of data, of realistically estimating risk factors, and corresponding issues of perceptions of risk by stakeholders, and difficulty in determining the appropriate outcome
- the potential long timeframes associated with environmental events, or conversely, where they can be rehabilitated, the short timeframes given that mining is usually a temporary activity
- cumulative effects of the event being repeated many times, possibly by other industries or operators in the area
- the inherent resilience of the natural environment to cope with impacts
- potential for some impacts to be irreversible.

The impact event analysis should identify the:

- source/event
- pathway
- barrier
- receptor (human, fauna, flora etc.)
- impact/consequences (scope, ability to remediate, duration, cumulative effects etc.).

The basis for the determination of these issues should be described in some detail.

Many of these impact events will have been identified through preliminary survey work and stakeholder consultation. For major project proposals, you are strongly encouraged to conduct a workshop at which key

stakeholders are invited to participate (including PIRSA and other government agencies) to identify aspects and impacts/events, and to initially assess the significance of each of these events.

The effect of impacts may often be usefully demonstrated by the use of numerical modelling. If a model is constructed, this may also be used to demonstrate the effect of proposed control measures. The description of the model must clearly state the assumptions used to build the model, and evaluate the effects these assumptions (or alternately valid assumptions) may have on the conclusions reached.

Major issues arising from public consultation, even if not technically justified, should be considered as a social impact event and appropriately addressed.

Note: Identification of impact events should not include health and safety risks to workers at the mine (which are regulated under other legislation), but should include any risks posed by the operation to public health and safety.

If **native vegetation** is proposed to be cleared the following should be included:

- an appraisal of the condition and significance of the vegetation
- an appraisal of the impacts of the clearance
- the estimated SEB to be provided in exchange for the proposed clearance.

Refer to Minerals Regulatory Guidelines MG8, Guidelines for a native vegetation significant environmental benefit policy for the clearance of native vegetation associated with the minerals and petroleum industry (September 2005).

8.6 Control and management strategies

A description of any proposed control and management strategies to reduce environmental impacts should be included here. The strategies should implement best practice in mining and environmental management, should be technically and economically achievable, and they should reflect progressive rehabilitation wherever possible.

The risk should be addressed using an accepted hierarchy of controls approach, applied in the following order:

- *Elimination.* Redesign so as to eliminate the risk.
- *Substitution.* Replace the material or process with a less hazardous one. For example, replace cyanide in processing with xanthates.
- *Design engineering (physical) controls.* Install barriers to control the risk (e.g. high-density polyethylene, HDPE, liner to protect groundwater).
- *Management system (procedure) controls.* Manage the risk through procedures and the way the activity is conducted by personnel, for example, induct and provide training to new employees to ensure awareness of Aboriginal heritage to avoid unauthorised disturbance.

The description of the control strategies should clearly state if it is a **design** (physical) based measure (e.g. enclosure of crusher) or if it is a **management system** (procedure) based measure (e.g. induction and training of contractors regarding appropriate techniques) and how it avoids or reduces the **likelihood** of the event occurring or the **consequences** of an event, should it happen.

As noted in the previous section, the effect of control strategies may often be usefully demonstrated through numerical modelling, showing the effect of the impact after the control strategy has been implemented.

Where **native vegetation** is proposed to be cleared, the control and management strategy will be the SEB that is proposed to offset the native vegetation clearance (e.g. at the site of the operations or within the same region of the state). Some possible ways SEB may be provided are:

- acquiring land, protecting and funding ongoing management of those areas (may include the donation to organisations for conservation), and/or undertaking revegetation/restoration activities on that land to re-establish habitats
- supporting research into rehabilitation of ecosystems/habitats
- supporting regionally based natural resources management projects with a biodiversity focus
- removal of threats/management of existing vegetation (e.g. weed management on roadsides)
- working with local government or other bodies to undertake environmental remediation or revegetation in areas under the control of such bodies (e.g. re-establish roadside vegetation)
- fund/undertake projects in crown estate parks and reserves in the region
- rehabilitation, protection and management of salt-affected habitats
- targeted feral animal reduction programs aimed at assisting the recovery of specific species
- any other approved activities as identified by the proponent that are likely to have a SEB

If none of the above can be provided, payment into the Native Vegetation Fund may need to be made.

Where SEB is to be provided off the mining lease or mineral claim, then the SEB proposal must include evidence of consultation with the relevant land owner and any holder of a tenement under the Mining Act or *Petroleum Act 2000* that covers the proposed SEB offset area.

Details of the proposed SEB should be provided, including timing of the provision of the SEB.

Further guidance may be found in the Minerals Regulatory Guidelines MG8, Guidelines for a native vegetation significant environmental benefit policy for the clearance of native vegetation associated with the minerals and petroleum industry (September 2005).

8.7 Likelihood and severity of consequence risks associated with the aspect

In order to determine the level of risk associated with various impact events, both the likelihood and severity of the consequences of impact events have to be separately considered. Risk should be evaluated and documented both before and after proposed control strategies have been taken into consideration.

Qualitative measure of likelihood. The likelihood of each event occurring should be determined based on information such as past experience, known environmental data, and modelling data. The likelihood can be classified using a system such as follows, or another recognised risk assessment methodology.

Qualitative measure of consequences. The consequences of each event occurring should be determined based on information such as the potential scale of the event, the range of stakeholders who may be affected, the duration of the event, and the difficulty in remediating the impact.

Appendix 5 provides an example of an environmental risk classification methodology for mining operations.

There should be an evaluation of the uncertainty of the final risk determination due to factors such as:

- lack of data/knowledge of the environment, the event or the consequences on the receptor
- use of novel or innovative control measures

- natural climate variations.

Where appropriate, the potential for the risk to be greater than that stated should be documented.

8.8 Justification for acceptance of residual risk

This section should justify that the residual risks (i.e. after control measures have been implemented) associated with credible events will be managed to as low as reasonably practicable (ALARP).

Where the risk has not been eliminated, you will need to provide justification that either the risk:

- Is such that there are no practical control measures available, and the risk is considered acceptable in context of the mining industry and surrounding environment and given the other benefits that will arise from the mining operation, which will outweigh the risk.
- Is such that the cost of implementing further control measures is grossly excessive compared to the benefit obtained. In this case there should be included in this section a description and evaluation of these alternate control measures.

8.9 Outcomes

A set of **outcomes** (with associated measurable assessment **criteria**) must be developed for each of the identified environmental **impacts**. In general these will be based on the residual **risk** identified in the previous section, that is they indicate the expected **impact** on the **environment** caused by the proposed or current mining activities subsequent to control strategies being implemented.

The **outcomes** should be a commitment on the extent to which your operation will limit **impact** on the **environment** (natural, social and economic). These **outcomes** should be reasonable and realistically achievable, acceptable to **affected parties** and meet other applicable legislative requirements, to maintain an amiable co-existence.

PIRSA will consider the extent to which the **outcomes** are acceptable to **affected parties** and balance these with the practicality of the mining operation when deciding to approve the **outcomes**.

Not all **impacts** identified will require an **outcome** to be developed. If the **risk** can be demonstrated to be very low probability or trivial in consequence without the use of control measures, an **outcome** and measurement **criterion** may not be needed. However, where the **risk** is such that specific control measures are required to eliminate the **risk**, or there are strong public perceptions, or there is uncertainty in the **risk** level, an **outcome** and **criterion** are required.

Certain, but reasonable and realistically achievable **outcomes** need to be proposed. It is important relevant **criteria** can be applied to demonstrate achievement of an **outcome** with certainty (see Section 6.2). Use of words such as 'minimise', 'avoid' 'manage' are generally not appropriate as they will lead to **outcomes** that are ambiguous and arguable rather than clear, certain and capable of assessment. **Outcome** statements that begin with words such as 'no', 'all', 'maintain' 'increase/decrease', 'no more than..' 'are preferred.

Where new operations may clear **native vegetation**, the **outcome** should state a commitment to compliance with the Native Vegetation Act and Regulations (e.g. 'No native vegetation clearance unless in accordance with the Native Vegetation Act, Regulations and **SEB** policy').

These outcomes must be fully developed for both the proposal and the MARP.

8.10 Outcome measurement criteria

Clear and measurable **criteria** should also be set to demonstrate the achievement of **outcomes**. The **criteria** should be described in specific terms that clearly define the achievement of the **outcomes**. They may be expressed in quantitative or qualitative terms, but the former are preferred (where practical). The criteria included in the MARP should demonstrate clear and unambiguous achievement of the environmental outcomes by:

- including the specific parameters to be measured and monitored by the lessee
- specifying the locations where the parameters will be measured, or how these locations will be determined
- clearly stating the acceptable values for demonstrating achievement of the outcome, with consideration of any inherent errors of measurement
- specifying the frequency of monitoring by the lessee
- identifying what background or control data are to be used, or specify how it will be acquired (if necessary).

For example, a water quality criterion might mention the contaminants to be measured, and state the acceptable levels. If the outcome is to be measured against background levels, these must be already acquired and stated in the MARP, or if in relation to control points, provide a clear process about how this data will be acquired during operations. For proposals, measurement criteria may be stated in more conceptual terms, if background data are still to be acquired.

Criteria will form the basis for regulation of the operation by PIRSA, and you should be careful in developing these that you are confident that you will be able to meet the criterion stated. If you feel that you may not be able to deliver the criterion in all circumstances, the wording should reflect this. For example, a blasting criterion might be '95% of blasts less than 115 dB in any one year'.

Where appropriate, recognised industry standards, codes of practice or legislative provisions from other Acts can be used as criteria (e.g. noise limits set by the EPA Noise Policy).

The measurement criteria should drive development of your monitoring plan.

All point-related criteria, such as water bores, sampling points and visual amenity photo points, should be included on a map and in a table of GPS locations of the points.

Where native vegetation is proposed to be cleared, the criteria will be demonstration of the successful implementation of the SEB plan.

8.11 Leading indicator criteria

For each aspect where there is a high consequence event that relies significantly on a control strategy to reduce the risk, leading indicator criteria should be developed. These should, if monitored, give early warning that the control measure is failing and the outcome is potentially at risk of not being achieved. These may relate to the proposed control measures (e.g. audits of the management system), near misses, or trends in environmental data.

Detection of unexpected results should lead to immediate action being taken.

The leading indicator criteria should be included in your monitoring plan.

8.12 Company compliance monitoring plan

A company driven (internal, not reliant on PIRSA inspections) monitoring program to measure the achievement of each outcome and the effectiveness of each strategy should be described in the MARP. For a mining lease proposal this section need not be included.

The monitoring program will be built from the outcome measurement criteria and leading indicator criteria identified in the previous sections.

The monitoring program should state in some detail:

- what will be measured
- the accuracy of measurements (if applicable)
- who will measure (responsibility)
- where will it be measured (including controls and baseline)
- how will it be measured
- frequency of measurement
- record keeping
- frequency of reporting to management and external stakeholders.

8.13 Summary table of environmental outcomes and criteria

A summary table of all environmental outcomes and their criteria should be included.

8.14 Ongoing community engagement plan

A process should be developed to enable open dialogue with stakeholders on compliance issues associated with the operation.

The plan may include a complaints hotline, ongoing community consultative meetings and regular personal visits with adjacent landholders. The plan should include a process to report on compliance with lease conditions and the MARP, even in cases where the operation is in compliance with regulatory requirements, not just in cases where noncompliance has occurred.

The frequency of reporting should reflect the perceived importance by stakeholders or actual risk.

The plan may also address opportunities for further community development, such as ongoing training, support for local enterprises and infrastructure development.

9 Mine closure and completion plan

It is expected that for most mining operations, progressive rehabilitation of mined out areas will occur and this should be described as part of the description of normal operations. The completion plan should also summarise the progressive rehabilitation process and what measures will be taken in the form of final rehabilitation. This plan is required for both a proposal and MARP, but the post mine land use and completion criteria may be more conceptual in nature for a proposal.

The plan should follow the objectives and principles outlined in *Strategic framework for mine closure (2000)* developed by the Minerals Council of Australia and the former Australian and New Zealand Minerals and Energy Council (now the Ministerial Council on Mineral and Petroleum Resources), and further developed in *Mine closure and completion*, Leading Practice Sustainable Development Program for the Mining Industry, Handbook 4 (2006; see Section 13.5). These are:

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

The underlying methodology is a 'risk-based closure planning process'.

Use of the International Council on Mining & Metals (ICMM) *Planning for integrated mine closure: toolkit* may also assist in preparing this plan <www.icmm.com>.

The mine site could be divided into domains, as appropriate, with a separate plan for each (e.g. underground workings, tailings storage facility, processing plant).

The plan must demonstrate that the site will be progressively rehabilitated (where practical) to a stable condition and use, consistent with the land use at the time mining operations commenced, or to a post-mining land use as agreed with stakeholders (including the landowner).

The plan should also describe existing disturbance of the site, including that caused by former mining and other development, and identify opportunities to address the legacy issues as part of the rehabilitation of the current operations.

The mine closure and completion plan should aim to achieve the following standards. *These and the specific standards set for each mining activity will need to be met before relinquishment will be approved or granted.*

General economic standards

These include:

- the community and future generations are left with no residual liability for site rehabilitation or maintenance
- any additional adverse economic effects are minimised
- provision is made for reasonable access for future mining (or reprocessing) of any remaining resource.

General social standards

These include:

- demonstration of effective ongoing community engagement
- closure is planned to minimise the disruption/impact on the community, for example, that caused by reduction in access to infrastructure
- development of programs, driven by the needs of the community, that contribute to the sustainability of the community
- future public health and safety are not compromised.

General environmental and rehabilitation standards

The return of disturbed land — a stable, productive and self-sustaining condition, after taking into account the beneficial uses of the site and the surrounding land. This includes:

- physical, geochemical and ecological stability
- the protection of the quality of the surrounding water resources
- a condition where the risk of adverse effects to people, livestock, other fauna and the environment in general has been reduced as far as practicable to a level acceptable to all stakeholders.

The establishment to the satisfaction of the community and government of:

- clearly defined realistic beneficial and sustainable post-mining land use (taking account of both the capability of the land and practicalities)
- monitoring and reporting criteria for successful final and progressive rehabilitation; these criteria may include reference to —
 - appropriate mechanisms for formal ‘sign-off’ of rehabilitation as completed
 - Australian Standards as they apply at the time the rehabilitation is ‘signed-off’
 - comparative measures, for example, reference photographs
 - agreed times for the proving of rehabilitation actions
 - requirements under other legislation, for example, Environment Protection Act
- arrangements for post-surrender action and funding.

9.1 Context

The section should describe the context of mine closure; this may include summarising baseline information from Section 4 relevant to mine closure. This will guide appropriate post mine land uses (if different from the existing land use) and identify potential opportunities to leave the site in a better state than existing. Issues to consider are former mining legacies, pre-existing soil, water contamination, existing reduced vegetation cover, visual amenity and applicable legislative or other standards (e.g. EPA water quality policies).

9.2 Stakeholder involvement and issues

Stakeholders may also have an interest in the site after mine closure, and it is important to recognise that these stakeholders may be different to those identified regarding ongoing operations of the mine. It is important to acknowledge that the stakeholders relevant to closure and their level of interest may change over time, particularly for long timeframe mines.

This section should summarise the consultation undertaken with stakeholders and the issues that have arisen from this consultation, including acceptable post mine land uses.

In some cases it may be appropriate to divide the mine lease into closure domains, where post mine land use and closure objectives differ across the mine site. If this approach is taken, the following Sections 9.3 to 9.10 should be completed for **each domain**.

9.3 Scope and description of closure domain

Describe (and include on a map) the domain to be considered, describing why this area is to be considered separately for closure purposes from the other parts of the mining lease.

Detail must be provided of progressive rehabilitation of exploration activities, including (but not limited to) backfilling of drillholes, backfilling of mud pits, disposal of drill samples and cuttings, and new access tracks. Appropriate closure measurement criteria addressing the rehabilitation of past (for the previous exploration

licence held by the lessee) and new exploration activities conducted under the lease must be included within the rehabilitation and closure plan.

9.4 Potential environmental, economic and social impacts of mine closure

Summarise from impact events described in Section 8.5. The focus should be on issues that may remain after mine closure (e.g. contaminated land, open pits) and should include a risk assessment. Potential opportunities to improve the environment of the mine site, post mine closure (e.g. concurrent rehabilitation of a former mine site) should also be discussed in this section.

9.5 Outcomes and completion criteria

State outcomes and completion criteria for the site post mine closure (environmental, social and economic), as per the process described under Sections 8.9 and 8.10.

As a guide the following outcomes would normally be expected to be included as a minimum:

- The external visual amenity of the site is in accordance with the reasonable expectations of relevant stakeholders, including removal of all mine-related infrastructure (unless otherwise agreed with the landowner).
- The risks to the health and safety of the public and fauna are as low as reasonably practical.
- Ecosystem and landscape function is resilient, self-sustaining and indicating that the pre-mining ecosystem and landscape function will ultimately be achieved.
- The site is physically stable.
- There is no compromise of the quality and quantity of ground- and or surface-water to existing users and water dependent ecosystems.
- All waste materials left on site are chemically and physically stable.
- All other legislative requirements have been met (e.g. Environment Protection Act).

The outcomes should be developed in consultation with stakeholders and written as clear and unambiguous statements. The words 'minimise/maximise', 'as far as practical', 'monitor' or words that describe the management process (e.g. 'avoid' 'prevent', 'control', 'manage') should not be used in developing outcome statements. Outcome statements should ideally begin with 'no', 'all', 'maintain' or 'increase/decrease'.

Clear and measurable criteria should also be set to demonstrate the achievement of outcomes. These must be explicit and, as far as practical, quantifiable. The criteria will form the basis for relinquishment of the lease and you should be careful in developing these that you are confident that you will be able to meet the criterion stated.

Where appropriate, recognised industry standards, codes of practice or legislative provisions from other Acts can be used as criteria.

The measurement criteria should drive development of your completion monitoring plan.

9.6 Sustainable closure strategies (control measures)

A description of the proposed closure strategies to achieve stated closure outcomes should be included here. The strategies should implement best practice in mining and environmental management, should be technically and economically achievable and sustainable with minimal ongoing maintenance, and they should reflect progressive rehabilitation wherever possible.

In the case of closure, control strategies should avoid a reliance on ongoing maintenance or monitoring, and should be focused on stable physical measures. This is due to the difficulty in ensuring ongoing responsibility and adequate resources for the site in the long term once the miner has relinquished the mining lease.

As noted in the previous section, the effect of control strategies may often be usefully demonstrated through numerical modelling, showing the effect of the impact after the control strategy has been implemented.

9.7 Closure plan maps and sections

Include plans and maps that incorporate the proposed rehabilitation and closure strategies and clearly indicate the following:

- natural contours of land proposed not to be disturbed by the mining operations
- existing, undisturbed native vegetation
- mining infrastructure that will remain on site (i.e. will become the responsibility of another party)
- conceptual location of emplacement areas
- conceptual location of active residues disposal areas
- conceptual location of reshaped and rehabilitated areas showing proposed surface contours, and revegetation.

Also include a series of cross-sections that show:

- pre-mining natural surface
- emplacement areas, tailings disposal areas and rehabilitated areas
- conceptual final rehabilitated surface.

9.8 Completion risk assessment

Include a risk assessment that considers the risks that the proposed closure strategy may fail. The risk analysis should follow the process outlined in Section 8.7 and 8.8 above. The risk analysis needs to consider that the timeframes are much longer than for the operating phase. For instance, 1 in 100 year rainfall events may be considered appropriate for assessing risks during the operational phase, but 1 in 1000 year events may be more appropriate for assessing the risk post mine closure.

Closure risks may include:

- financial (see Section 8.11)
- sudden closure due to market changes
- poor management of rehabilitation activities
- experimental or novel rehabilitation techniques
- ongoing maintenance requirements for protective structures
- unexpected or unusual climatic conditions
- changes in legislative requirements or community expectations (if the mine has a long life)
- changes to surrounding land use
- inadequate understanding of the existing environment and the impacts of the operations.

This section should also describe how these risks might be controlled (e.g. by contingency proviso in cost estimates, or by additional monitoring) and demonstrate that these risks have been managed to as low as reasonably practical (see Section 8.8)

In some cases, where there is significant reliance on engineered protective structures to reduce post-closure risks, an independent third party audit of the closure design and modelling may be required to demonstrate that the structure is likely to meet agreed outcomes.

9.9 Closure cost estimate

Include an estimate of maximum third party rehabilitation and decommissioning costs at any time during the mine life in the MARP (this is not required for the proposal). Note the maximum liability may not be at mine closure, but may be very early in the mine life.

A comprehensive spreadsheet type calculation model should be developed and included. The NSW Rehabilitation Cost Calculation tool (V1.7) can be used <www.dpi.nsw.gov.au>.

The model should include, where applicable:

- the decommissioning domain or component
- an estimate of the area, volume, machinery type, personnel, material and/or time (as appropriate) as a measure of the rehabilitation effort required, and how these estimates were derived
- the rehabilitation costs per unit of rehabilitation effort, and how these costs were derived (including a breakdown of all unit costs)
- any costs for ongoing maintenance and management
- survey and design
- project management, administration (normally 10–25% of total costs)
- provision for normal project variation (10–20%)
- provision for contingency costs (see Section 9.10 below)
- allowance for inflation.

The cost should be calculated on the basis that a third party contractor would undertake the rehabilitation work. Unprocessed material and salvage costs may not be deducted due to the likelihood that as an unsecured creditor, the government would not be able to access these assets.

In some cases it may be desirable to avoid large up front bonds and in this case a staged bond schedule could be proposed that reflects the increasing liability as mining progresses, and gradually reduces the bond as rehabilitation progresses. If this option is chosen, the staging frequency can be no more than annual, and the stages must reflect the maximum liability at any time during the forward year.

There will always be some financial risk associated with uncertainty in estimating rehabilitation and closure costs, and contingency costs are a critical element of the mine closure cost estimate.

Key risks are:

- residual risk (Section 9.8)
- the potential to underestimate the costs or effort required to rehabilitate
- planned rehabilitation may fail (and hence will require further effort or redesign to achieve the agreed outcomes)
- sudden (unplanned) closure
- temporary closure (care and maintenance).

The closure plan must document closure cost uncertainty.

The cost estimates determined from the preceding may be used by PIRSA to calculate and set an appropriate bond for the operation.

For the MARP, you should also describe how provision will be made in the company's accounts for the rehabilitation liability (in accordance with AASB137: Provisions, Contingent Liabilities and Contingent Assets), how this liability will be reviewed during the life of the project, and how the liability will be provided for as the mine progresses to ensure that sufficient funds are left at mine close to fully fund rehabilitation without recourse to the statutory Mining Act bond.

Public liability insurance will be required for all leases and licences, and you should summarise the major provisions of your policy; in particular, the types of events that will be covered (e.g. sudden and accidental pollution, collapse of underground workings).

9.10 Mine closure schedule

A rehabilitation and closure schedule should be outlined in the MARP, with clear milestones and timeframes. This may be presented as a Gantt type chart.

The schedule should clearly indicate:

- human resources/responsibility for implementation
- other resources needed to ensure compliance
- progressive and final rehabilitation activities
- any ongoing maintenance and monitoring requirements after closure of the operation
- monitoring and survey requirements (remaining structures and areas of contamination)
- documentation/reporting/records.

The plan should not state fixed time periods for post-closure monitoring, but commit to monitoring for as long as necessary to demonstrate that the completion criteria have been met.

The plan should focus on progressive rehabilitation activities where practical — this is considered good practice and will reduce your financial liability (which may be reflected in early return of, or reduced, rehabilitation bonds) but will also build community confidence by demonstrating that rehabilitation can be successfully completed, and reduces the day-to-day footprint of the mining operation.

9.11 Summary table of mine closure outcomes and criteria

A summary table of all closure outcomes and their criteria should be included.

10 Management systems and capability

The MARP should provide a demonstration that the proposed lessee or operator has the capability to operate the lease in a manner that ensures public safety and protection of the environment. The proposal should include at least a summary of the previous experience and past compliance record of the applicant.

Use of *A tool for the self-assessment of health, safety and environment management systems* (see Section 13.2) is strongly encouraged.

This process broadly follows elements found in quality management systems standards (such as the AS/NZS ISO 9000) and, in particular, the environmental management systems standard (AS/NZS ISO 14001) and compliance programs standard (AS 3806). Some operators may already have quality

management systems in place equivalent to these requirements and hence should have no difficulty in providing adequate documentation to demonstrate that they have the appropriate capability.

PIRSA will not be approving the management system and does not want or expect that the documentation for the whole system be submitted, but rather wishes to have some confidence that the operator has in place sufficient systems to ensure compliance at the time the MARP is approved (whether for a new or an existing operation). It is also recognised that evidence relating to this demonstration may change with time, but it is not required that changes to management systems will require a review of the MARP. PIRSA will use this information to assess the risk of noncompliance by the mine operator and to plan surveillance activities.

Evidence should be provided that the mine operator has in place systems to address the following assessment factors. This may be provided by a third party audit or by use the self-assessment tool referenced above.

10.1 Commitment and leadership

Standards: AS/NZS ISO 14001 (4.1, 4.2.), AS 3806 (3.1, 3.2, 4.3)

Evidence should be provided that the highest level of company management publicly expresses a commitment to:

- protect the natural environment, public safety and amenity
- compliance with regulatory requirements and with relevant legislation
- achievement of agreed environmental and social outcomes.

Evidence should be provided that there is a commitment to continuous improvement and the prevention of noncompliance. There should be evidence that a compliance culture is encouraged.

Demonstration may be provided by:

- managers aware of high-priority areas for improvement
- adequate resources made available for achievement of environmental objectives
- published values and commitment to compliance, for example, annual reports
- demonstration of a visible reward and punishment system for compliant or noncompliant behaviour that is consistent at all levels of the organisation
- demonstration that compliance performance is part of all job descriptions
- induction program emphasises compliance and values.

10.2 Policies and objectives

Standards: AS/NZS ISO 14001 (4.2), AS 3806 (3.2)

Evidence should be provided that demonstrates the company has developed and communicated environmental policies and objectives that are consistent with, and at least equal with, other business aims.

Demonstration may be provided by:

- the company's published environmental policy
- policies explained at induction training
- performance objectives set and assessed.

10.3 Organisation, resources and documentation

Standards: AS/NZS ISO 14001 (4.4.1, 4.4.2, 4.4.3), AS 3806 (3.3, 4.1, 4.2, 5.1.2), AS 4269

Adequate resources are required to ensure that a compliance system will work. Documentation is often in place, but without resourcing the system is susceptible to failure.

Demonstration may be provided by:

- a personnel or management chart showing the proposed supervision structure, including job titles and summary of duties
- nominating who will be responsible and accountable for compliance (monitoring, reporting, corrective action, system auditing, system review etc.) in various parts of the operation, and the expected proportion of these people's workload to be spent on these activities
- a statement of the financial position of the company.

An operator's management may be aware of the necessary regulatory requirements, however, it is important that management disseminates this information downwards to ensure that employees (including contracted employees) are aware of their responsibilities in maintaining regulatory compliance.

This assessment factor relates to educating employees and contractors about the important issues. For example, employees do not need to know the specific requirements of the Mining Act, however, as part of the induction, it may be useful to mention that there are lease conditions and MARP outcomes covering protection of the social and natural environment, and as such this is why procedure X should be followed exactly.

Demonstration may be provided by:

- a copy of the induction booklet given to employees and contractors that not only addresses job-specific issues, but also addresses the site-specific issues, and includes environmental as well as health and safety issues
- a description of the training program provided to employees
- a copy of an induction program that is suitable for site visitors (if different from employee induction)
- if appropriate, a description of any plans for refresher training of employees and/or contractors (for longer term activities).

A process of openly communicating with external stakeholders should be established to build trust and respond appropriately to complaints from the public about the operation. This is particularly important when the mine is located near to an urban community.

Demonstration may be provided by:

- establishing a complaints hotline or record system, and showing how complaints are dealt with
- establishing a community consultative committee to discuss the ongoing operations of the mine
- the process of notification of significant incidents to regulatory agencies, the public and other interested parties.

10.4 Risk evaluation and management

Standards: AS/NZS ISO 14001 (4.3.1), AS 3806 (3.5, 4.4)

A comprehensive and effective ongoing risk management system is a critical part in ensuring that outcomes and criteria in the MARP remain appropriate.

Demonstration may be provided by:

- evidence that the operator and/or its lead contractor has a system to continuously evaluate and refine environmental and social risks associated with the activity, including site-specific risks
- a demonstration of the specific risk management systems in place (e.g. job hazard analysis, permit to work system, management of change system)
- evidence that there is a system to maintain and service plant and equipment, and to assess their ongoing fitness-for-purpose as per their original design.

10.5 Planning

Standards: AS/NZS ISO 14001 (4.4), AS 3806 (4.1, 4.2, 4.4)

Manuals or guidelines that outline the safe and environmentally sound operation of all activities associated with mine operation are required to ensure all staff and contractors undertake activities in way that will ensure compliance with lease conditions and the environmental and social outcomes agreed in the MARP.

Demonstration may be provided by:

- any document that provides a clear outline and description of the system and its components to be utilised by the licensee or operator to ensure compliance with the Mining Act, in particular the environmental objectives stated in the MARP and lease conditions (e.g. operations manuals, construction guidelines, procedures)
- the submitted document if it addresses regulatory requirements and the MARP objectives — both directly (in a statement of intended adherence to the Mining Act, lease conditions and the MARP objectives) and indirectly (in the described method of operation of the activity).

Note: Complete procedure manuals are not required or appropriate as evidence to support this section, rather there should be a summary of the scope of procedures covered. An example of a procedure may be included to demonstrate the format of procedures.

A comprehensive and effective response plan ensures that if an environmental incident should occur, the system is in place to take action to minimise the effect of the incident, to remediate as far as practical and the management system is modified to prevent a recurrence.

Serious environmental incidents may include fire, flood, tailings dam collapse or spills.

Demonstration may be provided by:

- demonstration that site-specific or incident-specific response plans are in existence. This should at least outline the incidents that are covered by the plan, and the anticipated response, should the incident occur
- Where a contractor response plan is to be used, a 'bridging document' must be provided which identifies the site and activity-specific response plan details and their connection to the operator's system.

10.6 Implementation, recording and monitoring

Standards AS/NZS ISO 14001 (4.5.1, 4.5.2), AS 3806(3.5, 5.1, 5.2)

A key element of an operator's capability to comply with the Act is having a system to monitor, audit and assess compliance against lease conditions and the environmental outcomes agreed in the MARP.

Demonstration may be provided by:

- evidence of a system such as the use of a legislative compliance register or checklist; a checklist alone is not enough — the frequency with which this checklist will be utilised and when it is planned to be audited and assessed must also be specified
- evidence of an incident management system, to correct both the specific noncompliance and the potential for recurrence
- evidence of the process to monitor and evaluate performance (e.g. against MARP outcomes and criteria).

10.7 Audit and review

Standards: (AS/NZS ISO 14001(4.5.4, 4.6), AS 3806 (6)

A process of audit, review and continuous improvement of the whole compliance system should be in place and be driven by senior management.

Demonstration may be provided by:

- system audit process, including how results are reported and actioned
- how often and who conducts a review of the compliance system
- who is responsible.

10.8 Previous experience of operator

Ideally, there should be evidence of a good long-term compliance record for similar operations conducted in this state. If not, at least the recent record should show good or improving compliance. Any previous convictions for environmental noncompliance must be included.

As a minimum, experience should be provided for managing this type of operation anywhere in Australia or elsewhere, and in operating in this particular type of environment.

If there is no record for the operator or lessee, the use of an experienced contractor or staff with a good record may give confidence that regulatory objectives will be achieved.

10.9 Lease conditions

Where your lease includes specific lease conditions under Schedule 1 and 2, the MARP should include a section that demonstrates where these have been addressed in the MARP (if relevant) or demonstrates otherwise that they have, or will be, complied with.

11 Format of submissions

11.1 General

Three hard copies and an electronic version of the draft should be submitted; the information in all should be identical. Each page, plan or other separate sheet should include the tenement number, date of the report and sequential page numbering.

11.2 Hard copy requirements

Hard copy reports should be presented such that:

- They are bound as one or more volumes using bindings that can be easily removed and replaced for copying and scanning purposes if required (e.g. ring binders or re-useable spined plastic binding).
- Data is of sufficient size and clarity to allow clear and legible reproduction from original-scale scanned images.
- Text is typed on white A4 paper with adequate margins and sequential page numbering throughout.
- Non-A4 size material and multiple figures, plans and tables are included together at the end of the bound report, rather than interspersed throughout the text, and are sequentially numbered. Maps and plans should be in folders or pockets (not loose) and be folded so that the title, tenement number and date are visible. All items of this type should be listed in the report contents page.

11.3 Digital requirements

The complete report (text, figures and appendixes) is to be supplied as a single unlocked Adobe Acrobat PDF file. The PDF document is to be bookmarked as a minimum to the major components (e.g. contents, main report and appendixes), although a fully bookmarked version is preferred.

In order to keep file sizes to an acceptable level for distribution via the web, please note the following when creating PDF files from native formats:

- Plans and photographs either as separate pages or embedded into text are to be down-sampled to 200 dpi or 150 dpi, respectively. Rather than down-sampling individual images it is much more efficient to down-sample the finished document when the final document is converted to PDF.
- Plans generated from GIS applications create large file sizes and are to be saved as JPEG format at 200 dpi and then converted to PDF. An alternative to this method is to save the plan in GIS as a PDF, then convert to a postscript file (.ps) in Acrobat, open the .ps file in PhotoShop and down-sample to 200 dpi at A4.
- Any hard copy documents are to be scanned at 300 dpi (black and white text/plans) or 200 dpi (colour plans/photographs).

As a guide to an acceptable size for digital files using the above procedures, average file sizes should be in the range of 30–70 kB per page.

However, where this is not possible, PIRSA will accept the following formats of any individual components that may be available. Where individual digital components are supplied please provide a file list and the corresponding report reference, for example, text, appendix or plan number.

Electronic data will be accepted via email or on CD or DVD format.

Data type	Description	Format	Suffix
Text	Report text (documents, figures, tables etc.)	Adobe Acrobat PDF Word	.pdf .doc
Tables		Excel	.xls
Maps, plans, figures and photographs not embodied in report text	Individual files of maps, plans etc.	Adobe Acrobat PDF TIFF JPEG EPS	.pdf .tif .jpg .eps
Scanned documents	Black and white text and plans Colour plans and photographs	TIFF, at 300 dpi JPEG, at 200 dpi	.tif .jpg

A digital back-up copy of all digital information submitted to PIRSA should be kept by the lessee for a period of at least 1 year to cover the possibility of information corruption during transfer to PIRSA.

11.4 General requirements for maps, plans and sections

All maps and sections should conform to the following standards.

Scale. An appropriate standard metric scale should be chosen to best represent the information required (e.g. 1:25 000, 1:10 000, 1:5000, and 1:4000 for larger mines).

Datum. Plans and cross-sections should refer to AHD, GDA94.

Title block. Plans should have a title block in the lower right hand corner of the sheet with the following information:

- name and number of the mine
- author
- scale
- title and number of the plan
- date
- tenement number and mining approval number (where applicable).

Legend. Plans should have a clear and comprehensive legend to identify the symbols and colours used.

Maps, plans, figures, images and sections should also:

- use metric measurements throughout
- show graphic bar scale
- show any local grid lines and standards
- have a north point or orientation of sections.

12 Delivery address

12.1 Mining lease applications

Submissions should be titled 'Application for mining lease', and be accompanied by mineral claim applications (if not already applied for) and Statutory Forms 10 and 11.

Submissions should be forwarded to:

Mining Registrar

Post PIRSA, Mineral Tenements Branch
GPO Box 1671
ADELAIDE SA 5001

Courier Level 7, 101 Grenfell St., ADELAIDE SA 5000
Attention: Tracy Carpentieri

Email Tracy.Carpentieri@sa.gov.au

12.2 MARPs

Submissions should be titled 'Application for approval of MARP', with the **tenement number(s)** that the MARP relates to clearly labelled beneath this title.

Submissions should be forwarded to:

Chief Inspector of Mines

Post PIRSA, Mining Regulation and Rehabilitation Branch
GPO Box 1671
ADELAIDE SA 5001

Courier Level 7, 101 Grenfell St., ADELAIDE SA 5000

Email PIRSA.MiningRegRehab@sa.gov.au

13 References and resources

13.1 Legislation

www.legislation.sa.gov.au

Copies of the Mining Act and Regulations and other legislation are available at cost from ServiceSA, EDS Centre, 108 North Terrace, Adelaide SA 5000, phone 13 23 24, or for free download from the South Australian Legislation website (Attorney-General's Department).

13.2 PIRSA publications

www.minerals.pir.sa.gov.au/

PIRSA's Minerals Regulatory Guidelines (MG numbers) and Earth Resources Information Sheets (M numbers) can be obtained from the PIRSA Customer Services Centre or from the PIRSA Minerals website. Related publications are listed below.

Guidelines for miners: mining approval processes in South Australia, MG1.

Guidelines for miners: tailings and tailings storage facilities in South Australia, MG5.

Extractive Areas Rehabilitation Fund: guidelines for operation — being updated as Minerals Regulatory Guidelines MG10

Prospecting and mining for minerals, M6.

Aboriginal Heritage Act 1988 and Aboriginal site avoidance guidelines, M29 — refer to confidentiality issues in particular.

Guidelines for proposed activities on native title land — part 9B of the Mining Act 1971, M31.

Mineral exploration within the Woomera Prohibited Area and Woomera Instrumented Range, M32.

Guidelines for a native vegetation significant environmental benefit policy for the clearance of native vegetation associated with the minerals and petroleum industry, MG8, (September 2005).

Geological monuments in South Australia, Mineral Exploration Data Package 17.

A tool for the self-assessment of health, safety and environment management systems (2006; joint publication by PIRSA, Department of Primary Industries Victoria, Northern Territory Government and National Offshore Petroleum Safety Authority).

13.3 Standards Australia

www.standards.com.au/

HB203:2000 environmental risk management — principles and process.

AS 3806:2006 compliance programs.

AS/NZS 4360:1999 risk management.

AS/NZS ISO 14001:1996 environmental management systems — specification with guidance for use.

13.4 Leading Practice Sustainable Development Program for the Mining Industry Department of Resources, Energy and Tourism (Cwth)

www.ret.gov.au

(This program was initiated under the former Department of Industry, Tourism and Resources; handbooks 12–15 are still to be developed.)

- 1 *Overview* (2007)
- 2 *Community engagement and development* (2006)
- 3 *Mine rehabilitation* (2006)
- 4 *Mine closure and completion* (2006)
- 5 *Stewardship* (2006)
- 6 *Biodiversity management* (2007)
- 7 *Managing acid and metalliferous drainage*
- 8 *Tailings management*
- 9 *Working with Indigenous communities*
- 10 *Cyanide management*
- 11 *Water management*
- 12 *Hazardous materials management*
- 13 *Particulate, noise and blast management*
- 14 *Monitoring, auditing and performance*
- 15 *Risk assessments and management.*

13.5 Minerals Council of Australia

www.minerals.org.au/

Enduring Value: the Australian mineral industry framework for sustainable development: guidance for implementation (2005).

Enduring Value resource database.

13.6 Ministerial Council on Minerals and Petroleum Resources Department of Resources, Energy and Tourism (Cwth)

www.ret.gov.au

Strategic framework for mine closure (2000).

Strategic framework for tailings management (2001).

Principles for engagement with communities and stakeholders (2005).

Baseline environmental guidelines for new and existing mines, ANZMEC Report 95.02 (1995).

Strategic water management in the minerals industry (2005).

13.7 Plant pests and diseases

Department of Environment and Natural Resources

www.environment.sa.gov.au/

Code — Control of branched broomrape (2003).

Phytophthora management guidelines (2003).

13.8 United Nations Environment Programme

www.unep.org

APELL for mining - guidance for raising awareness and preparedness for emergencies at local level, Technical Report No 41 (2001).

13.9 International Council on Mining & Metals

www.icmm.com

Planning for integrated mine closure: toolkit (2008)

Metals environmental risk assessment guidance (2007)

13.10 Department of Primary Industries (NSW)

www.dpi.nsw.gov.au

ESB26: DPI-MR Rehabilitation Cost Calculation Tool (V 1.7)

13.11 Australasian Joint Ore Reserves Committee

www.jorc.org

The JORC Code: Australasian code for reporting of exploration results, mineral resources and ore reserves (2004)

13.12 Department of the Environment, Water, Heritage and the Arts (Cwlth)

www.environment.gov.au

National Environment Protection Council

14 Contacts

14.1 PIRSA

Mining Regulation and Rehabilitation Branch

Level 5, 101 Grenfell Street, Adelaide SA

GPO Box 1671, Adelaide SA 5001

Phone: +61 8 8463 3105

Email: PIRSA.MiningRegRehab@sa.gov.au

14.2 Other South Australian Government contacts

Department of Environment and Natural Resources

www.environment.sa.gov.au/

Senior Environmental Officer Mining
Land Management Branch
Phone: +61 8 8124 4774

Executive Officer, Native Vegetation Council Secretariat
Native Vegetation Section
Phone: +61 8 8124 4755

Aboriginal Affairs and Reconciliation Division
www.premcab.sa.gov.au/dpc/department_aard.html
Department of Premier and Cabinet
Phone: +61 8 8226 8900
Email: enquiries.aard@sa.gov.au

Department for Water
Water resources
Manager Resource Planning
Water Resources Branch
Phone: +61 8 8463 6949

River Murray Act
Phone: +61 8 8463 6930

Water licence inquiries
Phone: +61 8 8463 6815

Environment Protection Authority (SA)
www.epa.sa.gov.au
Manager, Technical Support
Operations Division
Phone: +61 8 8204 2019

Radiation Protection Branch
Phone: +61 8 8130 0705

Department of Planning and Local Government
www.planning.sa.gov.au
Policy and Assessment Branch
Phone: +61 8 8303 0649

Department for Transport, Energy and Infrastructure
www.dtei.sa.gov.au
Transport Services
Phone: +61 8 8343 2745

Department of Health
www.health.sa.gov.au
Regional Services Section
Phone: +61 8 8226 7146

SafeWork SA
www.safework.sa.gov.au

Natural Resources Management Council

www.nrm.sa.gov.au/council

Phone: +61 8 8463 6851

South Australian regional Natural Resources Management boards

Adelaide & Mount Lofty Ranges – www.amlnrm.sa.gov.au

Alinytjara Wilurara – www.awnrm.sa.gov.au

Eyre Peninsula – www.epnrm.sa.gov.au

Kangaroo Island – www.kinrm.sa.gov.au

Northern and Yorke – www.nynrm.sa.gov.au

South Australian Arid Lands – www.saalnrm.sa.gov.au

South Australian Murray-Darling Basin – www.samdbnrm.sa.gov.au

South East – www.senrm.sa.gov.au

14.3 Commonwealth Government contacts

Department of the Environment, Water, Heritage and the Arts (Cwith)

Environment Assessment Branch

Director, Mining Section

Phone: +61 2 6274 1933

Appendix A1 Definitions (for the purpose of these guidelines)

Affected party. An individual or group of people who will be directly or indirectly affected by the mining operation. These may include landowners, neighbours, the local council or the wider community.

Baseline environmental study. A study undertaken to identify the state of the environment prior to any disturbance from mining. It aims to give a pre-mining inventory of factors such as the diversity of flora and fauna and quality of air or water. The values established during the study can be used as a benchmark for final mine rehabilitation.

Closure. A whole-of-mine-life process which typically culminates in tenement relinquishment. It includes decommissioning and rehabilitation

Community (including local and affected community). A community is a group of people living in a particular area or region. In mining industry terms, 'community' is generally applied to the inhabitants of immediate and surrounding areas who are affected by a company's activities.

The term 'local' or 'host community' is usually applied to those living in the immediate vicinity of an operation, being Indigenous or non-Indigenous people, who may have cultural affinity or claim, or direct ownership of an area in which a company has an interest.

'Affected community' refers to the members of the community affected by a company's activities. The effects are most commonly social (resettlement, changed services such as education and health), economic (compensation, job prospects, creation of local wealth), environmental and political. Whilst the economic and associated social impacts of a company may be extensive and operate at provincial, state or national levels, these broader impacts would not typically be used to define the affected community.

Community stakeholders. Are those within the community that have an interest in a particular decision, either as individuals or representatives of a group. This includes people who do or can influence a decision, as well as those affected by it. They might include:

- Local or host community members, i.e. those in the immediate vicinity who may have a cultural affinity with, a claim to, or direct ownership of, an area affected by an operation.
- Affected community members, i.e. members of the community affected by a company's activities in regards to social, economic, environmental and political issues. Broader provincial, state or national impacts are not used to define an affected community.
- Others, for example, non-government organisation, shareholders and employees.

All these groups may include individuals with differing value systems, protocols and customs.

Completion. The goal of mine closure. A completed mine has reached a state where mining lease ownership can be relinquished and responsibility accepted by the next land user.

Completion criteria. An agreed standard or level of performance which demonstrates successful closure of a site.

Conservation status. As defined in the *National Parks and Wildlife Act 1972*.

Consultation. The act of providing information or advice on, and seeking responses to, an actual or proposed event, activity or process.

Criterion/criteria. Agreed clear and specific measurable targets or standards that demonstrate achievement of an agreed outcome. They state what is to be measured, where it is to be measured, when (or how often) it will be measured, the measurement technique or standard and the acceptable result.

Engagement. At its simplest, engagement is communicating effectively with the people who affect and are affected by a company's activities (its stakeholders). A good engagement process typically involves identifying and prioritising stakeholders, conducting a two-way dialogue with them to understand their particular interest in an issue and any concerns they may have, exploring with them ways to address these issues, and providing feedback to stakeholders on

actions taken. At a more complex level, engagement is a means of negotiating agreed outcomes over issues of concern or mutual interest.

Environment. Extends to all areas potentially affected by mining operations and includes:

- land (including soil, geology and landforms), air, water (including both surface and underground water), organisms and ecosystems
- residences, buildings, public or private infrastructure, and cultural artefacts
- existing or potential land use and productive capacity
- public health, safety and amenity
- the aesthetic and cultural values of an area.

Environmental component. An element of the environment that may be affected by mining activities.

Floristic association. A plant community characterised by definite floristic and sociological (organisational) features that shows, by the presence of diagnostic species, a certain independence.

Geological monument. A site that shows features of such outstanding geological or geomorphological significance that it is considered by the community of earth scientists to be worthy of conservation.

Impact. Any change to the environment wholly or partially, directly or indirectly, caused by mining operations.

Impact event. A specific event that may result in an impact (may be natural, e.g. rainfall, earthquake, wind), by third party activities or caused by normal or abnormal operations.

Karst formation. Found where most of the drainage is underground, due to greater solubility of certain rocks in natural waters. The dissolving actions of water on limestone results in a distinctive landscape defined by depressions such as sinkholes, caves, holes and solution pipes.

Native vegetation. Vegetation that occurs naturally in an area, but does not include vegetation intentionally planted by another person.

Noise. Sound, especially of a loud or harsh kind, which also includes vibration (Environment Protection Act).

Nuisance. (a) any adverse effect on an amenity value of an area that:

- (i) is caused by noise, smoke, dust, fumes or odour
- (ii) unreasonably interferes with, or is likely to interfere unreasonably with, the enjoyment of the area by persons occupying a place within, or lawfully resorting to, the area.

(b) any unsightly or offensive condition caused by waste (Environment Protection Act).

Old growth vegetation. Vegetation community that contains significant amounts of its oldest growth stage, usually senescing trees in the upper stratum, and has been subject to negligible disturbance.

Outcome. An outcome is a statement of the acceptable impact on the environment (which may be no impact) caused by the proposed mining activities. Outcome statements must be accompanied by measurable assessment criteria which are designed to demonstrate that the outcome has been achieved. PIRSA will regulate the operation against the approved criteria

Overburden. Material overlying a mineral ore deposit up to, but not including, the topsoil.

Risk. The possibility of an impact event occurring that impacts negatively on the environment, taking into account the natural resilience of the environment or proposed management strategies. Risk is a combination of likelihood of the event occurring and the consequence should it occur.

Scattered trees. Naturally occurring indigenous trees (commonly eucalypts), usually 2 m or more in height, that occur over little or no native understorey, and with a spatial arrangement varying from that considered to be close to the original distribution (pre-European settlement) to that which is highly altered and very sparsely distributed or, less

frequently, crowded in unnaturally dense even-aged patches due to extensive clearance and/or past land management activities. In certain circumstances, trees less than 2 m may be considered to be scattered trees (e.g. mature mallee trees); conversely, some species may be considered saplings at greater than 2 m.

Significant environmental benefit (SEB). Unless clearance is of a very minor nature, an approval must be subject to conditions that will result in an SEB. This may include establishing a 'set aside' area — an area that is fenced and managed, including the exclusion of stock, where natural regeneration of native vegetation may take place or which is replanted with native vegetation (using local native plant seeds suitable for the site involved). Alternatively, there may be a condition for an existing area of bushland on the property to be fenced and protected, possibly under a heritage agreement. If it is not possible to achieve an SEB on a property, a landowner has the option of making a payment into the Native Vegetation Fund. Any payment will be used by the Native Vegetation Council to achieve a SEB elsewhere in the region.

Significant trees. Under the Development Act, trees that occur in a designated area (usually metropolitan areas) and meet specified circumference and height criteria, or have been specifically identified as significant within a local council development plan.

Stakeholder. At Earth Summit 2002, stakeholders were defined as 'those who have an interest in a particular decision, either as individuals or representatives of a group. This includes people who influence a decision, or can influence it, as well as those affected by it'. Stakeholders might include local community members, non-government organisations, governments, shareholders and employees.

Subsoil. The soil encountered between topsoil and overburden that is capable of maintaining vegetative growth.

Topsoil. The surface soil of land in its natural state, containing carboniferous material, distinguishable from subsoils and overburden.

Waste (excluding waste rock, overburden and the contents of tailings dams). Any solid, liquid or gas (or combination thereof) that is a left over, surplus or unwanted by-product from any business or domestic activity, whether of value or not.

Weed species. Any invasive plant that threatens native vegetation in the local area or any species recognised as invasive in South Australia.

Appendix A2 Standard mineral commodities

If the mineral you propose to mine and market is not on this list, please discuss with PIRSA prior to preparing your submission.

Metallic minerals

Cobalt
Copper
Gold
Iron
Lead
Silver
Uranium
Zinc

Industrial minerals

Alunite
Andalusite
Anatase
Barite (use either industrial or drilling)
Celestite
Cement shale
Diamond
Dolomite (use either industrial or agricultural)
Diatomite
Feldspar
Garnet
Graphite
Gypsum (use either plaster, cement or agricultural)
Heavy mineral sands
Ilmenite
Kaolin
Kyanite
Leucoxene
Lime sand (calcareous dune sands; use either chemical, agricultural or flux)
Limestone (use either chemical, agricultural, cement, flux or whiting)
Magnesite
Mica
Marble (use either chemical, agricultural, cement or flux)
Mica
Micaceous hematite
Monazite
Palygorskite
Peat
Phosphate
Potash
Rutile
Salt
Shell grit (use either industrial or agricultural)
Silica (rocks containing mainly silica-quartzite, flint, vein quartz etc.)

Silica sand (use either filter, foundry or glass)

Sillimanite

Talc (use either pharmaceutical or filler)

Vermiculite

Wollastonite

Xenotime

Zircon

Gems and semi-precious stones

Amethyst

Calcite

Chrysoprase

Diamond

Jade

Opal

Quartz

Sapphire

Scholzite

Staurolite

Topaz

Energy minerals

Coal

Uranium oxide

Construction materials

Basalt

Calcrete (field or paddock stone)

Dolerite

Dolomite

Gabbro

Gneiss

Granite

Gravel (natural) (creek or river gravel including buried deposits)

Ironstone (lateritic soils and ironstone cappings)

Limestone

Marble

Norite

Pegmatite

Quartzite

Rhyolite

Sandstone

Schist

Siltstone

Slate

For each of the above commodities the following uses are applied:

Ballast (railway ballast)

Concrete aggregate (crushed rock used in concrete)

Crusher dust (crushed rock used as a sub base for paving and slab fill etc.)

Decorative stone (landscaping stone and aggregate, and exposed aggregate in concrete or wall panels)
Dimension stone (cut or block stone used for monumental and building stone, walling and paving, roofing, bench tops etc.)
Filling (crushed rock and rubble used for general filling including lower specification base)
Road base (crushed rock used for road construction)
Road seal aggregate (crushed rock used for road seal)
Spalls (rip rap and breakwater stone)
Specification sand (manufactured sand).

Shale (unknown colour)
Shale (white or cream, pale-firing weathered shale)
Shale (coloured red-firing or other darker coloured-firing weathered shale)

For each of the above commodities the following uses are applied:

Road base
Filling
Fired (bricks).

Clay (natural clay products only — minerals for refractory bricks, e.g. sillimanite, fire clay are industrial minerals).
Clay - white plastic
Clay - red plastic

For each of the above commodities the following uses are applied:

Filling
Fired (bricks).

Sand, concrete sand
Mortar, plaster, bricklaying sand
Specification filling sand for pipeline trenches etc.
General filling, garden sand, loam

For each of the above commodities the following uses are applied:

Concrete
Building
Packing
Garden/filling.

Appendix A3 Examples of environmental, social and economic aspects

Note: This list is provided for guidance only and is not intended to be exhaustive. Each proposal will need to be assessed individually to ascertain its potential environmental and social consequences.

Aspect of environment	Category of impact	Type of event	Likely consequences	
Natural environment	Soil impact	Removal and stockpiling of topsoil.	Reduction in visual amenity of area. Increased erosion.	
		Change of soil quality (e.g. contamination due to spills, salinisation).	Reduction in soil fertility, public health risk.	
	Landscape stability	Initiation of landslides.	Flooding, damage to waterways and ecosystems.	
	Air impacts	Emissions to air (e.g. dust, smoke, greenhouse gases).	Damage to flora and fauna.	
			Greenhouse effect.	
	Surface and groundwater impacts	Water extraction.	Water shortage to local community, agriculture and ecosystem.	
			Spills into water bodies (e.g. oil or chemical spills, tailings dam overflow, silt).	Inconsumable water to the local community and ecosystem.
			Altering drainage patterns.	Reduced water capacity of natural water bodies. Ecological damage. Increased soil erosion.
	Fauna impacts	Disturbing terrestrial or aquatic species.	Endangering or displacing species.	
		Disturbing animal habitats.	Changes to fauna patterns. Barriers to fauna movements.	
	Flora impacts	Disturbing native flora.	Threaten biological diversity.	
		Clearing native vegetation.	Destroy fauna habitats. Threaten biodiversity.	
Sensitive area impacts	Disturbance of national or conservation parks.	Loss of conservation value.		
	Disturbance of World Heritage areas.	Loss of World Heritage value of area.		
	Disturbance of areas under national or international registers or conventions.	Loss of register or convention values		
Social environment	Community resource impacts	Use of public resources.	Degradation of public infrastructure and resources (e.g. road or water supplies).	
		Change in land use.	Reduces economic capacity of local community. Loss of recreational amenity of a region.	
	Dust, visual amenity	Change visual attributes of area.	Reduction in aesthetic and recreational value of area.	
	Fires	Uncontrolled fire escapes lease area.	Deaths or injuries to public; widespread economic loss.	
	Noise and vibration	Blasting and other noise causes disturbance to nearby residents.	Reduced public amenity and health.	
	Heritage impacts	Disturbance to natural or man-made features of an area.	Changes to aesthetic value of area. Changes to historical value of area.	
		Disturbance to Aboriginal sites (both archaeological and cultural).	Loss of Aboriginal affiliation with an area.	
	Community health impacts	Air emissions.	Health problems in the community.	
		Noise and vibration.	Discomfort to local community.	
		Water contamination.	Health risk to local community.	
Slope stability.		Damage to public property.		
	Potentially hazardous operations (e.g. underground excavations,	Health and safety risk to local community.		

Aspect of environment	Category of impact	Type of event	Likely consequences
Economic environment	Natural resource impacts	hazardous substance storage, traffic). Disturbance of natural resources of other industries in the region (e.g. fish habitats associated with local fishing industry). Altering existing land use.	Changes in employment levels. Changes in level of viability of other industries. Changes to land value and industry types within region.

Appendix A4 Example of environmental impact or event risk assessment — aspect: dust

Context

Environment

The mine is located in a relatively remote area, with only one residence located near the mine (15 km from the site). Part of the mine abuts a large area of intact remnant native vegetation, which provides habitat for a range of native reptiles, mammals and birds. Dust is naturally part of the area, as the climate is arid and the vegetation cover sparse.

Stakeholders

Stakeholders have expressed concern over potential dust impacts from this site and include the nearby residents (nuisance and amenity) and the Department of Environment and Natural Resources (flora and fauna impacts).

Industry

The mine is a large-scale copper–gold mine with a large onsite residential workforce and given the OHS issues associated with dust, this will require investment in significant control measures to manage the OHS impacts to acceptable levels. As a consequence other, non-OHS impacts may be indirectly controlled.

Applicable legislation and standards

Dust impacts are regulated both by the South Australian Mining Act and the Environment Protection Act. The Native Vegetation Act may also be applicable, if dust damages native vegetation.

The EPA does not have guidelines relating to allowable dust concentrations. However, the Commonwealth National Environment Protection Council Act defines National Environment Protection Measures, including a standard for ambient air quality.

Potential impact event

Dust generated may harm flora, fauna or public health and amenity.

The mine has the potential to increase dust emissions over and above those naturally occurring as vegetation is cleared and the land surface disturbed for pit development. Dust is also likely to be generated during the operation of the project.

The primary sources of dust generation from the operation are:

- clearing of vegetation for infrastructure and mine development
- crushing and screening of mine ore and waste rock
- ore and waste rock loading operations
- hauling ore to run of mine (ROM) stockpile or crusher
- hauling and unloading waste rock to waste dump areas
- unloading ore at the ROM stockpile or directly to the crusher
- blasting
- drilling
- wind erosion from exposed stockpiles and waste rock dumps
- general mine traffic movements on unsealed roads.

The dust composition is non-toxic and contains no minerals of particular concern to human health.

Failure to control dust emissions effectively could conceivably result in the following consequences:

- deposition of dust on nearby buildings and vegetation reducing visual amenity
- deposition of dust on native vegetation resulting in damage to flora and habitat, disturbance to fauna
- respiratory system irritation and nuisance to members of the public and residents.

Control and management strategies

The impact cannot be practically avoided, however the severity and likelihood of any consequences will be reduced by implementation of the following control strategies:

- the amount of disturbed area will be minimised; progressive rehabilitation will be undertaken to reduce the area available for wind erosion
- coarser material will be stockpiled on the outer slopes of stockpiles
- dust control devices (such as sprinklers) will be installed adjacent to trafficked areas and exposed stockpiles
- water trucks will be utilised on a regular, or as required basis, to control fugitive dust emissions within construction areas, pits and on internal roads
- where dust suppression using water is not effective, the use of chemical dust suppressants and/or wetting agents will be considered
- enclosing conveyors and conveyor transfer points
- vehicle movements will be limited to areas where dust control methods can be utilised
- vehicle speeds will be limited to speeds that will not generate excessive dust
- ore transport will be containerised
- monitoring and implementing corrective actions to improve management techniques
- training of staff to improve awareness of dust management.

Likelihood and severity of consequences

The probability of some dust being generated from these activities is high and will be generated for the duration of the project (~10 years). Dust emissions that are generated are likely to be inherently of a fine nature, so it is likely that dust emissions will travel beyond the operations area if not managed effectively. Significant control measures will be used to minimise the risk of dust extending beyond the operations area.

The nearest residence is approximately 15 km southwest of the operations area. From information taken from the nearest weather station, the highest average wind speeds are 16 km/h. Due to the distance and wind speeds it is unlikely that the residence will be affected by dust from the project, even in extreme conditions.

As the mine is located in a remote area away from the view of the public it is unlikely that public amenity or health will be affected by dust generated.

Some damage to flora and habitat is likely, but this will be localised and temporary and hence not significant in the context of the wider vegetation coverage.

(Likelihood, severity and overall risk assessment of above consequences occurring are assessed according to section 4.8.7.)

Risk levels

The results of this analysis for the above-identified risk events are:

Risk event	Risk prior to implementation of controls		Primary control measures	Residual risk after to implementation of controls		Level of risk	ALARP?
	Likelihood	Consequence		Likelihood	Consequence		
Flora/habitat	Almost certain	Moderate	Dust control measures as outlined above	Likely	Insignificant	Moderate	YES
Public health	Possible	Minor	Dust control measures, remote location of mine	Rare	Minor	Low	YES
Visual amenity	Almost certain	Insignificant	Remote location of mine	Rare	Insignificant	Low	YES

Justification for risk acceptance

From the above risk analysis, it would appear that the most significant risk from dust is to the native vegetation in the area. Given the significant OHS controls, no further specific control measures or avoidance is practical for vegetation, and it is considered that while there may be an impact during operations, the impact will be of a temporary and very localised nature (due to the dust control measures), and is similar to impacts naturally occurring from time to time in the area. It is expected that the vegetation/habitat in affected areas will recover once operations have ceased. As a consequence of this analysis, vegetation will be monitored for dust impacts, and the risk and control measures reviewed during the operation of the mine.

Outcome

The mine operator will commit to, in constructing and operating the mine, the following outcome:

- 'No permanent loss of vegetation will occur as result of dust generated by the mining operations'

Measurement criteria

Adopt the OHS criteria:

- PM₁₀ (i.e. particulate matter — fine particles — of 10 µm or less) will not exceed the National Environment Protection Measures standard of 50 µg/m³/d in accommodation areas
- dust deposition will not exceed 4 g/m²/month in operational areas.

Photo monitoring of vegetation adjacent to operational areas will show similar vegetation abundance and diversity to corresponding vegetation control points within 2 years after operations have ceased.

Monitoring program

PM₁₀ will be measured and recorded on a daily basis by the onsite OHS officer, at a single monitor site located in accommodation areas.

Dust deposition gauges will be located at five operational sites (as specified in Figure X) and measured monthly, by the onsite environmental officer.

Vegetation photo monitoring points (as specified in Figure Y) and corresponding vegetation control points (as specified in Figure Z) will be initially monitored and recorded by the on site environmental officer on a 2-monthly basis, and after 1 year, provided no significant impacts are recorded, monitoring will be on an annual basis thereafter.

Appendix A5 Methodology for evaluating risk

The risk estimation methodology should follow that outlined in AS 4360. The following describes one methodology for qualitative risk assessment that is applicable to environment risks associated with mining operations.

Qualitative measure of likelihood

Almost certain. Will occur, or is of a continuous nature, or the likelihood is unknown.

Likely. Will probably occur during mine lifetime.

Possible. Could occur in most mines.

Unlikely. Could occur in some mines, but is not expected to occur.

Rare. Has almost never occurred in similar mines but conceivably could.

Qualitative measure of consequences

Insignificant. Possible impacts but without noticeable consequence.

Minor. Very local consequence with no significant long-term changes; may be simply rehabilitated or alleviated at some cost without outside assistance; not of significant concern to wider community.

Moderate. Significant local changes, but can be rehabilitated or alleviated with difficulty at significant cost and with outside assistance.

Major. Substantial and significant changes; will attract significant public concern; only partially able to be rehabilitated or alleviated. May be doubtful that can be successfully rehabilitated; major costs involved. Changes will be substantial if cumulative effects are considered.

Catastrophic. Extreme permanent changes to social or natural environment (not able to be practically or significantly rehabilitated or alleviated); deaths or widespread health and economic effects on public; major public outrage or the consequences are unknown.

Risk

The risk associated with each event can be classified for comparative purposes using the following matrix.

			Likelihood of consequence				
			E	D	C	B	A
			Rare	Unlikely	Possible	Likely	Almost Certain
Severity of consequence	5	Insignificant	Low	Low	Low	Moderate	High
	4	Minor	Low	Low	Moderate	High	High
	3	Moderate	Moderate	Moderate	High	High	Extreme
	2	Major	High	High	Extreme	Extreme	Extreme
	1	Catastrophic	High	Extreme	Extreme	Extreme	Extreme

Feedback form

PIRSA aims to continuously improve this document to ensure that it meets the needs of industry. Your comments and suggestions for improvement would be much appreciated. Please send completed forms to:

Mineral Resources Group

Division of Minerals and Energy Resources
Primary Industries and Resources South Australia
GPO Box 1671, Adelaide 5001
Fax: +61 8 8463 6518
Email: PIRSA.CustomerServices@sa.gov.au

What did you use this document for?

- Retention licence Mineral licence Miscellaneous purposes licence
 Mining and rehabilitation program (MARP) review General information

Other (please specify):.....
.....

Which parts of this document did you find *most* useful?
.....

Which parts of this document did you find *least* useful?
.....

Do you have any suggestions for improvement? Yes No

If yes, please reference the section number, and summarise your suggestion for improvement:
.....
.....
.....
.....

Optional

We appreciate your time in completing this form. So that we may better understand your suggestions, it would be helpful if you could include contact information:

Name

Position

Company

Address.....

Phone Email.....