APPENDIX N

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APPENDIX N1

Draft dust management plan (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Dust Management Plan (interim draft)

April 2011

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NOTE:

This draft Dust Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 CONTEXT AND PURPOSE

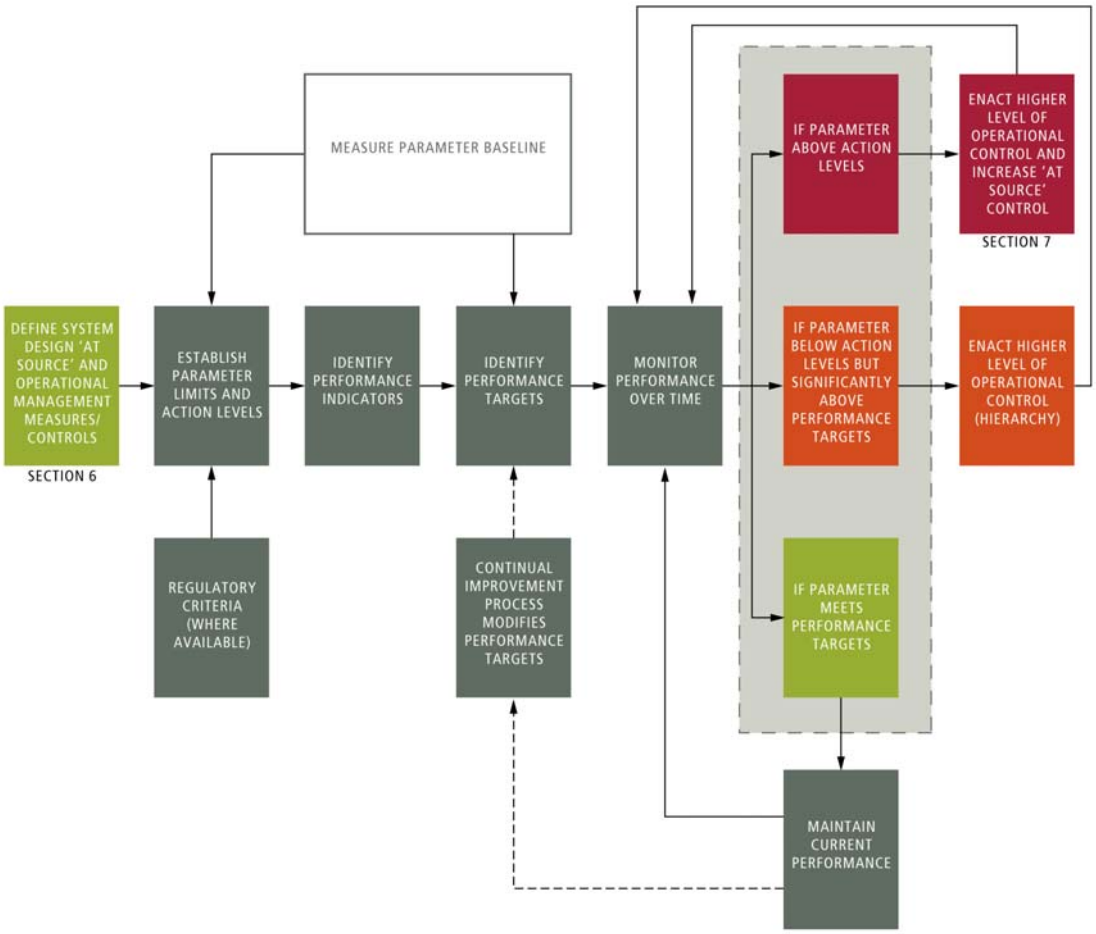
BHP Billiton Olympic Dam operates in accordance with an ISO14001 certified Environmental Management System. Management Plans, as part of the Olympic Dam Environmental Management System (EMS), are developed as technical (operational and adaptive) documents informing the EM Program and the measures and actions put in place for achieving objectives. Management Plans provide background information commensurate to the Plan's application, compiled from various sources such as published literature, studies/surveys undertaken and Codes of Practice and guideline documents.

The Draft EIS and Supplementary EIS for the proposed expansion to the Olympic Dam operation assessed and reported on the potential impacts associated with the emission of particulates. The assessment established that ground level concentrations of particulates at sensitive receptors around the expanded operation would meet criteria for all indicators except the 24-hour criterion for the PM_{10} particulate size fraction. The assessment predicted that, without control, this criterion would be exceeded at Roxby Downs and Hiltaba Village between five and ten days per year. The EIS proposed that operational control via a dust management system would be implemented to ensure that particulate ground level concentrations were within the criteria at Roxby Downs and Hiltaba Village.

The purpose of this plan is to detail the management measures and operational controls to be implemented by BHP Billiton to meet the compliance criteria and achieve environmental performance objectives.

2 ENVIRONMENTAL PERFORMANCE MANAGEMENT

Figure 1 illustrates the process embedded into the draft EMPs developed for the expansion project. The process includes the establishment of parameter limits and action levels based on legal compliance requirements and baseline assessments. Monitoring of performance against targets set would be undertaken, and where monitoring indicates that measured parameters are above set targets, higher levels of operational control would be enacted. For example, when operational controls fail to reduce salinity at the desalination plant, discharge would cease to achieve target levels). An increased level of control would be required as the action level is approached. Where the action level is exceeded, more advanced 'at source' controls would be implemented. 'At source' controls would generally be contingency measures, for example at the rock storage facility, relocating haul truck dumping locations where application of controls fails to achieve dust emission criteria. Where monitoring indicates that the parameter levels meet performance targets, no modification to management and monitoring would be required, with the exception of modifications for the purpose of continuous improvement.



3 SCOPE

The Draft EIS and subsequent Supplementary EIS identified the proposed operation of the open pit mine and associated Rock Storage Facility (RSF) as the major contributors to site fugitive particulate emissions and resultant ground level concentrations at the nearby sensitive receivers. As a consequence, this draft Dust Management Plan focuses on the control of emissions originating from these two operations.

The draft Dust Management Plan consolidates the management measures provided within the Draft EIS and Supplementary EIS, details the proposed monitoring regime and identifies contingency measures that may be implemented to ensure compliance with the applicable environmental performance criteria.

This document, like all draft management plans for the proposed Olympic Dam expansion, is a 'live document', and as such will be revised and updated as necessary.

4 TRAINING, ROLES AND RESPONSIBILITIES

At the appropriate time a training, roles and responsibilities matrix will be developed and included in this section of the plan. The matrix will detail those BHP Billiton employees and contractors that have specific responsibilities under this plan and those responsibilities, including training requirements, will be clearly defined and communicated.

5 OBJECTIVES AND ASSESSMENT CRITERIA

The Environmental Management Program, developed for the expanded Olympic Dam operation and presented in Appendix U of the Draft EIS, provided the objectives and assessment criteria for the various environmental aspects related to the project for which a moderate (or greater) residual impact was predicted. The following table provides the relevant objective and assessment criteria for the management of dust-related impacts.

EM Program	Objective	Assessment criteria
Operation of industrial systems		
Fugitive particulate emissions	No adverse impacts to public health as a result of fugitive particulate emissions from BHP Billiton's expansion activities at Olympic Dam.	Average annual operational-contributed PM_{10} concentration of less than 30 µg/m^3 and a 24-hour average operational-contributed PM_{10} concentration of less than 50 µg/m^3 at sensitive receivers.

6 MANAGEMENT OF DUST IMPACTS

The Draft EIS for the proposed expansion of Olympic Dam assessed the potential impacts associated with the emission of fugitive particulate, defined management measures to avoid or reduce these impacts and categorised the residual impacts. This section lists the management measures presented within the Draft EIS and any additional measures that were provided in the subsequent Supplementary EIS. Based on the successful implementation of these measures, the residual impact for predicted ground level dust concentrations to sensitive receivers around the Special Mining Lease (SML) was categorised as 'moderate'.

6.1 Strategy

Management of fugitive particulate in mining operations is typically achieved in one of two ways, either through 'at source' minimisation of emissions, or through active operational control to ensure ground level particulate concentrations at nearby sensitive receivers do not exceed the criteria. Such active operational control would be based around managing the scale of dust-generating activities and the timing of such activities. The management response would consist of a hierarchy of control measures of increasing effect, such as:

- relocating some or all blasting, loading and unloading activities to points more distance from the sensitive receivers
- redirecting mine rock haulage activities
- increasing the frequency of dust suppression activities
- cessation of operations

The proposed expanded Olympic Dam will use a combination of 'at source' mitigation for major particulate emission sources and active operational control. The availability of water, the primary method

of ‘at source’ emission control, and the vast scale of the proposed expansion limit the potential for the cost-effective implementation of ‘at source’ control, however there is also cost associated with the implementation of operational control. Ultimately, the method of dust management would depend upon a social, environmental, and economic benefit analysis.

6.2 Management

The over-riding commitment proposed in the Draft EIS and Supplementary EIS was to ensure that the National Environment Protection (Ambient Air Quality) Measure 2003 criteria, when applied to operationally-contributed particulate, is achieved at Roxby Downs and Hiltaba Village through design and operational control of the expanded operations at Olympic Dam. Community perceptions related to air quality would be managed through the provision of education and information to members of the nearby communities.

6.2.1 ‘At source’ emission control

To minimise the generation of particulate emissions from the expanded Olympic Dam operations, the following management measures were proposed in the Draft EIS and Supplementary EIS as a basis for the project proposal.

Issue	Residual impact rating	Management measures
Ground-level dust concentrations to sensitive receivers around the Special Mining Lease	Moderate	▪ Good quality haul roads would be installed and maintained with regular application of saline water and/or the application of suitable dust suppressants. ▪ The borrow pits excavated to provide material for the construction of the additional on-site roads would use water carts and mobile sprinklers to suppress dust during construction and operation to prevent adverse impacts on the sensitive receivers. After excavation of the borrow pit was finished, the pits would be ripped and left to revegetate. ▪ All conveyor transfer points at Olympic Dam would contain fully enclosed spoon chutes, with dust curtains at entry and exit points. Dust suppression mist sprays would be located within the skirts after the loading point and could cover the full width of the conveyed material. ▪ Dry materials would be transferred using covered or otherwise enclosed conveyor systems, with baghouses at transfer points, and intermediate storage bins to minimise dust emissions. Differential pressure indicators would be fitted to alert operations personnel to a potential bag failure. ▪ Dust suppression capabilities would be installed on the ore conveyor stacker to control dust.

6.2.2 Operational control

A fully integrated real-time management system for air quality (an air quality control system or AQCS) would be developed for the Olympic Dam site comprising a predictive and a reactive component. The predictive system would use a model to provide advance warning of adverse meteorological conditions that may be conducive to elevated dust concentrations at nearby sensitive receivers. Mining activities may then be planned based on forecast prevailing meteorological conditions. The reactive component utilises real-time measured meteorological and particulate monitoring data to provide early warning of elevated dust concentrations, allowing the implementation of an operational response to ensure ground level particulate concentrations do not exceed the criteria at nearby sensitive receivers.

To ensure that the particulate ground level concentrations at nearby sensitive receivers are met, the following management measures were proposed in the Draft EIS and Supplementary EIS.

Issue	Residual impact rating	Management measures
Ground level dust concentrations to sensitive receivers around the Special Mining Lease	Moderate	▪ A real-time dust and meteorological metering system would be installed at Olympic Dam to predict dust concentrations, and would provide information for operational control of dust. Such a system would include: – a network of real-time dust meters, which may include TSP, PM10 and PM2.5 monitors, around the mining operation, at the sensitive receivers and at intervals between these receivers and the mining operation. These would be integrated within the mining process control system as an early warning of rising particulate concentrations at the sensitive receivers – a real-time meteorological system, integrated with the real-time dust monitors, which would permit mining operations to be planned and adjusted to ensure particulate criteria would not be exceeded at the sensitive receivers – additional monitoring sites placed north, east and west of the operation to determine the concentration of particulates contributed by the expanded operation. ▪ BHP Billiton would meet regulatory dust limits at Roxby Downs and Hiltaba Village through operational controls and would conduct monitoring of dust levels to confirm this. ▪ The provision of a 500 m separation between the RSF and Arid Recovery to minimise direct impacts from particulate matter.

6.2.3 Management of perception

The Draft EIS recognised that community perceptions of air quality do not necessarily correlate to a specific particulate ground level concentration, rather they are more likely to be influenced by their perception of existing air quality and its rate of change as the expanded operations commence. To ensure that the community remains informed and educated regarding particulate emissions, the following management measures were proposed in the Draft EIS and Supplementary EIS.

Issue	Residual impact rating	Management measures
Ground-level dust concentrations to sensitive receivers around the Special Mining Lease	Moderate	▪ To assist in fostering a greater understanding of impacts of particulates on community amenity and health, BHP Billiton would provide information to residents of Roxby Downs and Hiltaba Village on dust and dust emissions through: – information packs for all new and existing residents – a web-based system that enables the community to have access to dust monitoring results – feedback to the community about on-site and off-site environmental performance through the Annual Environmental Management and Monitoring Report.

7 MANAGEMENT OF DUST RISKS

Chapter 26 of the Draft EIS identified the key environment and health and safety risks associated with the proposed expanded Olympic Dam. The following identified key risks and proposed contingency measures for the management of dust risks were proposed in the Draft EIS and Supplementary EIS. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable.

As such, the preventative measures, monitoring, and contingency measures will continue to be developed, reviewed and revised as appropriate.

Risk	Monitoring	Contingency options	
Ground-level dust concentrations in excess of criteria at sensitive receivers	Compliance monitoring, likely consisting of real-time PM_{10} monitors, would be undertaken, where practicable, at the closest residence to the proposed expanded operation in both Roxby Downs and Hiltaba Village. Local dust monitoring of the dust associated with individual activities may be undertaken to determine the effectiveness of contingency options, if implemented.	The implementation of the operational control system hierarchy of control, up to and including the cessation of operation, would ensure that the particulate criteria at the nearest sensitive receiver would not be exceeded. As previously discussed, the nature of the economics associated with the interruption of the operation in order to meet compliance criteria may make the implementation of further 'at source' contingency measure favourable. Such 'at source' contingency measures vary by emission source and may include:	
		Drilling	▪ fitting drill rigs with dust capture ▪ keeping drill cuttings wet to avoid emissions becoming airborne
		Blasting	▪ restricting blast sizes ▪ locating blasts with consideration to prevailing meteorology ▪ wetting blast area
		Wind erosion	▪ installing wind barriers ▪ revegetating/regenerating long-term exposed areas ▪ additional watering, including the use of chemical suppressants, potentially linked to an automatic system linked to dust levels or wind speeds ▪ using surface covers, such as mulch
		Materials handling	▪ water sprays and/or fogging systems used during loading and unloading operations ▪ limiting drop distances
		Crushing	▪ installing dust extraction/capture systems to crushers, including the use of negative pressure enclosures ▪ using water sprays and/or fogging systems ▪ limiting drop distances
		Conveying	▪ enclosing conveyors ▪ installing dust capture systems at transfer points ▪ prompt clean-up of spillages
		Hauling	▪ using water carts, including chemical suppressants ▪ adding surface treatments (such as bitumen sprays) to bind surface ▪ paving roads ▪ reducing haul truck speeds ▪ using haul truck stopping points to drop collected dust ▪ installing wind barriers

Risk	Monitoring	Contingency options	
		Stockpiling	▪ locating stockpiles in sheltered areas ▪ restricting the height and slope angle of the stockpiles ▪ installing wind barriers around and on top of stockpiles ▪ revegetating/regenerating long-term exposed areas ▪ additional watering, including the use of chemical suppressants, potentially linked to an automatic system linked to dust levels or wind speeds ▪ using surface covers, such as mulch ▪ using telescopic chutes to minimise fall distances (if using conveying/stacking systems) ▪ using bunds to reduce drop distances (if truck end-dumping)

8 REFERENCES

National Environment Protection Council 2003, *National Environment Protection (Ambient Air Quality) Measure*, NEPC, Adelaide.

APPENDIX N2

Draft emergency response plan (Upper Spencer Gulf facilities) (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Emergency Response Plan (Upper Spencer Gulf Facilities) (interim draft)

April 2011

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CONTENTS

1 INTRODUCTION

1.1 Statement of intent

This Emergency Response Plan (ERP) provides a framework to communicate how BHP Billiton would respond to incidents and emergencies within the broader BHP Billiton Crisis and Emergency Management (CEM) policy for facilities located in Upper Spencer Gulf. This document has been prepared for the purposes of the Environmental Impact Statement and the need to communicate BHP Billiton's approach to emergency response in Upper Spencer Gulf.

This plan could also be used for planning and communication, and for training purposes. Training would be conducted at regular periods so that the understanding and capability required to manage incidents and emergencies in Upper Spencer Gulf is tested and reviewed.

1.2 Purpose

The purpose of this ERP is to provide:

- a structure and appropriate emergency response to any incident involving BHP Billiton activities in Upper Spencer Gulf at the:
  - landing facility, located southwest of Port Augusta
  - desalination plant, located at Point Lowly
- a framework of guidance that ensures all relevant personnel, federal and state authorities and support agencies understand and adopt a consistent approach in response to incident situations arising in Upper Spencer Gulf
- the processes and procedures for personnel involved in managing an emergency response at an operational level
- a document for planning, communication and training, to be adopted and continuously improved following the approval of the EIS.

1.3 Definition of incident and emergency

An **Incident** is any event that has the potential to impact on BHP Billiton employees and contractors, neighbours, the environment or the business and which, if not controlled, can escalate into an emergency.

An **Emergency** is defined as any abnormal, dangerous or threatening situation needing a prompt and coordinated action to prevent or minimise the impact. Examples of emergencies include (but are not limited to):

- explosions
- significant fire
- significant asset damage
- situations involving malicious intent
- structural failure requiring the evacuation of personnel
- events likely to cause harm to the environment or community
- collision
- critical injury and loss of life.

1.4 BHP Billiton crisis and emergency management systems

The BHP Billiton Crisis Emergency Management (CEM) structure (illustrated below in Figure 1: Emergency Management at Olympic Dam) consists of:

- a Crisis Management Team, which is responsible for the company level response
- Emergency Management teams at the customer sector group level, which in this case is the Uranium group, which is responsible for managing emergency situations such as those listed above
- Incident Management Teams (IMT) at the asset level, (in this case at the Olympic Dam team level) which are responsible for coordinating the tactical and strategic asset response to an incident and providing direction in resolving the incident
- Field Response Teams, which function at the site level and are responsible for physically controlling incidents in the field and communicating known facts to the IMT.

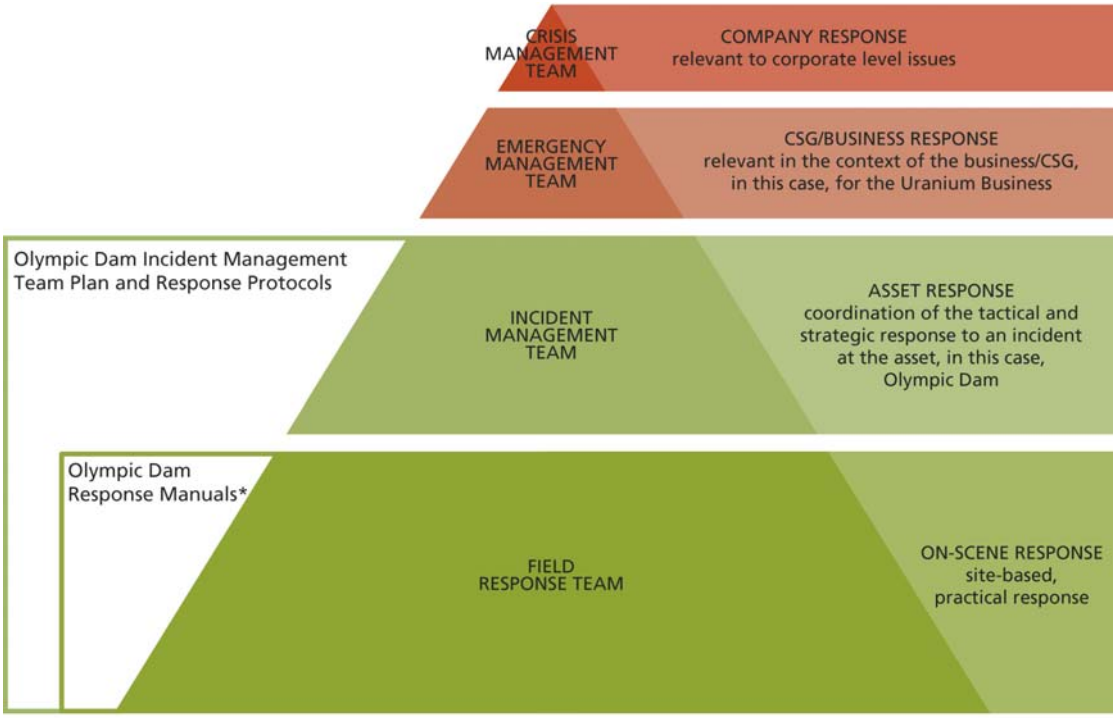

Figure 1: Emergency management at Olympic Dam

An Emergency and Crisis Centre (ECC) functions as the central point of contact for crisis management, emergency response alerts and callout management. It operates 24 hours a day, 365 days a year.

Currently, due to its remote location, Olympic Dam maintains a Memorandum of Understanding (MOU) with the SA Country Fire Services (CFS), the SA Ambulance Service (SAAS), and other mining operations in the area in which Olympic Dam is located, to provide an emergency response capability, which supplements BHP Billiton's capability. The MOUs would be extended to include mutual assistance with relevant and willing parties for Upper Spencer Gulf.

A framework is in place within which Olympic Dam can manage an incident, and create clear and defined objectives for recovery. The framework assists the operational response to site-based incidents and emergencies. As part of the framework an IMT would be formed for all assets of the expansion project, including for the landing facility and desalination plant located in Upper Spencer Gulf. The framework would include the requirement for personnel and tactical resources (including capabilities outside of BHP Billiton via MOUs) for the marine based activities and liaison with internal and external emergency services.

The Emergency Management Team (EMT) Plan provides clear guidelines for classifying incidents, and team call-out procedures, and defines team and team member roles in responding to and resolving an incident. The EMT Plan also sets out the appropriate audit trail and administrative processes for incident response.

Response Protocols for the marine environment would be developed and appropriate provisions included in the EMT Plan once the expansion project has been approved. The Response Protocols are developed based on risk assessments of activities to be undertaken at the asset.

Existing Response Protocols (contained within the Olympic Dam EMT Plan) are relevant for the assets to be located in Upper Spencer Gulf. Existing Response Protocols considered relevant to assets located in Upper Spencer Gulf (in relation to environmental incidents and emergency situations) include:

- chemical or biological contamination
- chemical spill or release
- critical equipment failure
- earthquake
- electrical supply failure
- fire/explosion
- flood.

Risk assessments have identified the following additional situations:

- natural event altering dispersion of outfall waters (causing unfavourable salinity conditions for marine life) (desalination plant)
- marine accident (shipping)
- loss of equipment/cargo overboard (shipping).

Marine pollution in Upper Spencer Gulf within the three nautical mile coastal waters limit is in South Australia's jurisdiction, and hence, the South Australian Government is responsible for responding to marine spills through the National Plan State Committee, with assistance from the Australian Maritime Safety Authority (AMSA) as required. The requirements of the National Plan (to combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances) would be incorporated into the spill response protocols, as well as into training for emergency response personnel.

1.5 Document scope

The scope of this document covers activities and services that BHP Billiton and its operations control in relation to the construction and operation of the landing facility and desalination plant.

All BHP Billiton personnel and the appointed organisations involved in constructing and operating the landing facility and desalination plant are responsible for following and complying with BHP Billiton's Policies and Procedures as they relate to this plan.

1.6 Document overview

This document consists of the following sections:

- Introduction – this section
- Parties involved in an emergency response – description of the parties and their roles in dealing with an emergency response situation
- Classification of an incident – provides a description of incident types for activities at the landing facility and desalination plant
- Preparedness – outlines roles, responsibilities and arrangements for the planning and associated activities of the parties to deal with an emergency response
- Initial response, containment and recovery – an overview of the three phases and associated actions of an incident response
- Review and maintenance of the Plan.

This plan recognises the importance of integrating the responses of Federal and State response agencies and with service providers associated with activities at the landing facility or desalination plant. The format of their Emergency Response Plans would vary according to their own organisational

requirements. The format of this document is at the discretion of BHP Billiton and the following should be noted:

- This is an operational document that may be required in an incident response and emergency situation.
- This document does not re-state procedural and administrative information that is located in the BHP Billiton Crisis and Emergency Response plans.
- This is a 'live' document, subject to change during reviews, as a result of incidents and as part of BHP Billiton's commitment to continuous improvement.

1.7 Reference standards

The following list references various Acts and Regulations and BHP Billiton internal procedures that were relevant at the time the Draft ERP was prepared.

Any activities carried out in Upper Spencer Gulf must comply with all Acts and Regulations, standards and procedures in force at the time of constructing and operating the landing facility and desalination plant.

BHP Billiton

- BHP Billiton Asset Protection Standard
- BHP Billiton, Uranium Australia
  - Incident Management (IMT) Team Plan
  - Emergency Management Team (EMT) Plan
  - Crisis and Emergency Management Framework
  - Media Policy.

Commonwealth of Australia

- Australian Dangerous Goods (ADG) Code 7th Edition
- Australia's National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances
- Australian National System for the Prevention and Management of Marine Pest Incursions
- *Maritime Security Act 2005*
- International Convention for the Control and Management of Ships' Ballast Water and Sediments
- National Ballast Water Management System
- *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* and Anti-fouling systems Convention
- *Quarantine Act 1908.*

South Australia

- *Environment Protection Act 1993*
- *Environment Protection (Water Quality) Policy 2003*
- *Fire and Emergency Services Act 2005*
- Emergency Response to a Leakage or Spillage of a Hazardous Material during Transportation, Storage or Handling Aug 1997 (commonly referred to as the Blue Book).
- *Dangerous Substances Act 1979* and Dangerous Substances (Dangerous Goods Transport) Regulations 2008.

2 PARTIES INVOLVED IN AN INCIDENT RESPONSE

2.1 Introduction

Any incident that may occur is likely to be outside BHP Billiton's direct responsibility. BHP Billiton therefore recognises that control and coordination of the incident response would likely rest with the South Australian State Emergency Services.

This section provides an overview of the parties who would be involved in providing the emergency response. If, and when, the Olympic Dam expansion is approved, liaison with relevant agencies would occur to refine this plan and to ensure there is a consistent understanding by all parties of their roles in an emergency in Upper Spencer Gulf.

2.2 Emergency services

An incident would require the South Australian (SA) Police as the coordinating authority to be in attendance. Similarly a maritime incident may require the Australian Maritime Safety Authority (AMSA) and other SA Government agencies.

A spill or leakage, depending on the location, would require the relevant Emergency Services (either career or volunteer units) such as:

- SA Police, SA Ambulance Service, SA State Emergency Services (SES), SA Country Fire Service (CFS)
- Australian Maritime Safety Authority (AMSA) for all shipping incidents.

The support from other relevant federal or state government agencies would also be required.

2.3 BHP Billiton

To prevent incidents occurring in Upper Spencer Gulf as part of the proposed expansion, activities would be undertaken to ensure that:

- engineering design of the facilities incorporates specific features to mitigate the risk of incidents
- environmental management plans for construction and operation are developed and implemented to manage the environmental aspects and potential impacts associated with activities to be undertaken
- activities and associated operating procedures are designed and implemented in accordance with appropriate environmental and safety legislation and regulations
- activities involving the handling and storage of hazardous material are carried out in accordance with corresponding legal requirements.

BHP Billiton is committed to achieving excellence in every aspect of its operations as outlined in the BHP Billiton Charter, which includes responding to company incidents that threaten people, environment, and property.

Upon being advised of an incident, BHP Billiton would:

- provide specific advice and technical support related to the incident. This includes mobilising appropriate BHP Billiton personnel to assist onsite Emergency Services response to the incident
- manage, provide relevant information and inform external stakeholders on aspects of the activities, equipment, material and/or cargo associated with the incident
- manage and coordinate the recovery of any leaking or spilt material, lost cargo, damaged infrastructure/equipment.

In addition, BHP Billiton would also access support and resources from other organisations that have entered into Mutual Aid Agreements (see Section 4.5 – Mutual Aid Agreements).

2.4 External stakeholders

External stakeholder(s) include but are not limited to Members of Parliament (state and federal), general public, federal, state and local government authorities, interest groups such as local community groups etc., and media organisations.

Any enquiries made by external stakeholders must be managed in accordance with the BHP Billiton Uranium Australia External Affairs Policy. This Policy, which seeks to ensure that all enquiries are managed professionally and efficiently, assists BHP Billiton in building and maintaining positive relationships at all times. All incoming enquiries must be directed to the authorised contact [details yet to be inserted].

Statements and media releases to be made on behalf of BHP Billiton would be approved by the authorised contact. BHP Billiton would focus on managing the incident at the site when dealing with external stakeholders.

At the incident site, external stakeholder(s) requiring information relating to the incident would be directed to the Emergency Services and/or their Incident Controller.

3 CLASSIFICATION OF AN INCIDENT

3.1 Introduction

This section provides an overview of the types of incidents that might occur during the construction and operation of the landing facility and/or desalination plant.

3.2 Emergency classification and response level

There are numerous types of incidents that could be faced in the construction and operation of the landing facility and desalination plant. Emergency Services would be responsible for managing the actual incident. BHP Billiton's responsibilities would primarily relate to handling and recovery and the associated issues related to equipment damage, spills and leaks, and the loss of cargo at the incident scene.

Table 1 – Types of Incidents, can be used to classify an incident and subsequent crisis classification (if applicable). It delineates responsibilities for activating and mobilising the BHP Billiton Uranium Australia Incident Management Plan (IMP) and/or Emergency Management Plan (EMP).

The effectiveness of the initial response and that of any subsequent immediate support would reflect the time and effort taken in accurately assessing the situation and gathering the appropriate and relevant facts.

Table 1: Types of incidents

Incident type	Event type	Description
Type 1	Minor	Incidents that do NOT involve any loss of materials into the marine environment. Low level safety, environment, social impacts or minor maritime issues which cause minor disruption to operations and be managed under normal site emergency response procedures.
Type 2	Serious/Crisis	Incidents that may potentially result in environmental harm, injury and/or loss of containment (leakage or spillage) of oils, fuels, loads, equipment into the marine environment. A coordinated response beyond normal site emergency response procedures would be required.

Incident type	Event type	Description
Type 3	Serious/Crisis	Incidents resulting in major health effects/fatalities, serious environmental harm, requiring response beyond normal site emergency response procedures with involvement of corporate response teams.

Given any of the above scenarios, the nature and characteristics of any material losses or equipment damage would not itself create or place either BHP Billiton personnel or anyone else present at the incident scene in any immediate or imminent danger.

A decision making process to be used by BHP Billiton personnel as a guide to assist in an emergency situation would be developed following consultation internally and with external parties.

An Emergency Response Action Plan (ERAP) Card would be developed and finalised. The Plan would provide a summary of incident types that might occur at Upper Spencer Gulf sites and assist with the assessment and development of an action plan for each incident type.

4 POTENTIAL INCIDENTS

The following sections identify examples of potential incidents that may occur at BHP Billiton sites or as a result of BHP Billiton activities in Upper Spencer Gulf. This section would be reviewed and updated as required. This ERP is in draft form and intended to provide an overview of the framework for responding to incidents in Upper Spencer Gulf and an indication of the detail to be provided in the finalised document.

4.1 Potential loss of containment incidents

For the unloading, storage and transfer of bulk materials and imported equipment, the potential incidents where a loss of containment could result include:

- fire
- extreme weather event (i.e. storms, earthquakes)
- situations of malicious intent
- spills and leaks from ships, and uncontrolled releases from sites.

4.2 Shipping incidents resulting in potential loss of containment

BHP Billiton would work closely with relevant state and local authorities and AMSA (expand) in the event of a shipping incident involving a BHP Billiton controlled vessel that could include:

- grounding or collision resulting in:
  - loss of containment of:
    - bulk materials, equipment
    - vessel bunkers, fuel oil
  - fatalities
  - vessel fire.

4.3 Others

Risk assessments, discussions with other relevant authorities or other companies undertaking activities in Upper Spencer Gulf would provide further information on potential incidents to be covered by the ERP.

5 PREPAREDNESS

5.1 Introduction

In the event of an incident involving BHP Billiton in Upper Spencer Gulf, incident response plans, which have been developed in conjunction with SA Emergency Services and federal agencies, would be initiated. These incident response plans would ensure any response is effective and appropriate.

This section outlines the arrangements and BHP Billiton's preparedness to deal with an incident or emergency, and the responsibilities of the respective SA emergency services, and relevant national agencies and authorities in those events.

5.2 Responsibility for preparedness

The relevant emergency service organisations and other service providers appointed by BHP Billiton have a responsibility to be prepared in the event of an incident in the marine environment of Upper Spencer Gulf, as a result of BHP Billiton activities.

To be prepared, the respective state emergency service organisations and service providers appointed by BHP Billiton would ensure that:

- appropriate local, regional and state level plans are in place to facilitate an effective response to an incident
- the operational capability to respond is maintained by:
  - developing and maintaining systems, tools and processes for effective command, control and coordination of an emergency response
  - conducting suitable training in emergency response operations.

BHP Billiton has a robust Crisis and Emergency Management framework. The framework provides a means for BHP Billiton to escalate response and recovery protocols across all levels of the organisation. BHP Billiton's preparedness is achieved by ensuring that:

- strong relationships are developed with respective Federal and State emergency services organisations
- appropriate support and technical information on the activities, materials handled and operations involved in the incident are available to relevant persons/organisations organisations, site commanders etc.
- reliable and credible information concerning possible impact issues to the marine environment associated with an incident is available to relevant persons/organisations
- all relevant personnel are trained as outlined in *Section 5.6 – Readiness and training* in the appropriate emergency response procedures for incidents in the marine environment.

5.3 Coordination of plans

Preparing a plan, and developing measures to take when an incident occurs in Upper Spencer Gulf to achieve a safe, effective and coordinated recovery is an important aspect of preparedness.

Each of the parties involved in the construction and operation of facilities in Upper Spencer Gulf as outlined in *Section 0* –

PARTIES INVOLVED IN AN incident RESPONSE would have individual plans and would coordinate their respective plans in the event of an incident in the marine environment for:

- initial response
- situation assessment
- declaration of emergency activation levels
- deployment of resources
- liaison and assistance provided to/from external companies and emergency authorities.

Individual plans would contain sufficient detail to enable those involved, either individually or a coordinated response to effectively carry out their respective responsibilities and duties in response to an incident in the marine environment. All plans would be distributed to personnel with responsibilities in the safe operation of the facilities in Upper Spencer Gulf to ensure they understand both the individual and the organisational responsibilities and roles within the plan.

Each of the parties involved in the construction and operation of the landing facility and desalination plant would be responsible for updating their respective plans on a regular basis and informing others of any alterations.

5.4 Resources

In the event of an emergency involving BHP Billiton in Upper Spencer Gulf it is critical that resources can be located and deployed quickly to control the incident.

BHP Billiton would work with relevant federal and state emergency service organisations to establish appropriate preparedness, response and recovery resources to assist in such instances. Resources include but are not limited to:

- specialist personnel (i.e. marine spill experts, environmental and transport specialists and other such personnel as required)
- incident management centres
- communication equipment
- in-field materials and equipment
- recovery plant and equipment.

Where appropriate, equipment pools would be established with other operators in Upper Spencer Gulf, such as national and state marine pollution agencies and emergency service organisations. An inventory list of emergency equipment would be developed and included in the ERP.

5.5 Mutual aid agreements

In the event of an incident escalating into a major or prolonged emergency response, additional resources may be required beyond what BHP Billiton might initially be able to supply.

The intent of mutual aid agreements is to maximise support between BHP Billiton and other organisations in the event of an emergency. The aim of such agreements is to ensure that sufficient support can be provided through BHP Billiton business units, local emergency service organisations and external organisations in the vicinity of the incident site.

BHP Billiton would enter into suitable agreements (such as a Memoranda of Understanding) to provide a range of support activities including:

- access to Emergency Response teams and associated equipment from other operators in Upper Spencer Gulf
- personnel or equipment to assist in the incident response
- specialist support (i.e. marine spill response)
- office facilities, administrative support, and staging locations for response teams and equipment.

Such agreements would be planned in advance and support agreements would be put in place with relevant entities.

Such agreements would ensure that a maximum response capability is available at all times.

All Mutual Aid Agreements would be reviewed regularly.

5.6 Readiness and training

Individual organisations involved with the construction and operation of the landing facility and desalination plant in Upper Spencer Gulf would maintain readiness and undertake regular training activities.

BHP Billiton maintains a layered approach to readiness and training. This entails:

- **individual** – understand emergency procedures, their roles and responsibilities and how to activate them in an emergency situation
- **team** – response teams have a detailed understanding of their roles, how to support each other, mobilise and work together to resolve the emergency situation
- **organisational** – response procedures are common and understood by the organisation to ensure a clear understanding of the importance of emergency response and recovery procedures.

All personnel who have an active role in the plan for an incident response would be trained in key aspects of the response plan. This could include participation in:

- internal organisational training exercises including:
  - mock call outs
  - desktop simulations and coaching sessions
  - in-field training scenarios and mobilisation to remote locations to simulate complexity and realism
  - testing mutual assistance and key business protocols.
- multi-agency exercise and drills such as:
  - mock call outs
  - desktop simulations and coaching sessions
  - in-field training scenario's and mobilisation to remote locations to simulate complexity and realism.

Such participation would ensure that all personnel would maintain the skill levels necessary to undertake their roles and responsibilities should an incident occur.

It is expected that BHP Billiton would undertake regular training exercises and information sessions with service providers, emergency service organisations, and federal and state regulators. It is assumed that agencies would be sufficiently trained in the specific requirements relating to emergency response in the marine environment. This would be an ongoing requirement and would provide feedback and input regarding the best way to contain spills, recover loads and equipment, safety procedures, the use of specialised methodologies/equipment where appropriate, and how to protect the immediate environment, valuable resources, environmental values and the community.

BHP Billiton would undertake a minimum of one emergency drill, incorporating an environmental component, each year and a full scale training exercise every three to five years with all parties involved.

5.7 Investigation

Following an environmental or emergency response associated with an incident in the marine environment of Upper Spencer Gulf a full investigation shall be conducted.

5.8 Community Information

The BHP Billiton Vice President External Affairs has overall responsibility for liaising with, and releasing any information to external parties seeking information in relation to any incident involving BHP Billiton. This would be done in close cooperation with South Australia's emergency management services involved in responding to an incident in Upper Spencer Gulf.

6 EMERGENCY PROCEDURES

6.1 Introduction

The response actions to an incident in the marine environment can be divided into three phases namely:

- the initial response phase
- the containment (or control) phase
- the recovery phase.

An overview of each of these phases is discussed in this section.

6.2 Initial response phase

The BHP Billiton person responding to the incident should determine the type of incident. Personnel at the scene then need to make an immediate initial assessment (ensuring personnel are safe at all times putting in any actions required to prevent the incident from spreading further) before calling for Emergency Services assistance.

An initial visual assessment of the incident scene would determine the emergency actions that would be directed towards:

- saving lives
- attending to any injured person(s), which could involve enlisting help or assistance from other persons not directly involved in the incident in order to gain some form of control of the situation
- isolating the location
- preventing or extinguishing fires
- identifying additional hazards
- determining the actions necessary to prevent further threat to human life, property or environment
- calling for the appropriate help.

The important facts and issues should be identified and prioritised so that emergency services or BHP Billiton personnel can gain a clear understanding of the situation. This would be most important when emergency services, or BHP Billiton personnel relay information onto persons who would be arranging for external help and assistance.

An Incident Assessment Checklist would be developed to provide a summary of the information that should be provided in an initial call to emergency services, nominated contacts and BHP Billiton.

6.3 Containment (or control) phase

6.3.1 Prior to the arrival of emergency services

Having completed the initial assessment of the incident as outlined in *Section 5.2 – Initial Response Phase* and before the emergency services arrive, additional resources and actions should be directed towards:

- continuing to provide first aid assistance to injured person(s)
- where possible, placing warning indicators (i.e. flashing lights, breakdown triangles etc) to warn approaching vessels of the impending incident site. This may involve enlisting help or assistance from other persons not directly involved in the incident
- restricting access to the incident site by maintaining a safe distance for all person(s) including members of the general public
- if required and where safe to do so, initiating actions to prevent further threat to human life, property or the environment
- collecting details of other person(s) involved, time line logging of incident details and other related information in readiness for the arrival of emergency services.

Most importantly:

- do not panic – remember there is no need to rush
- unless there is an immediate hazard situation, there is no need to handle or move any leaking or spilt materials.

6.3.2 Emergency services response

Once emergency services arrive they would assume responsibility for managing the incident. This would include assuming the initial command and control responsibilities when they arrive at the incident site.

In some instances, the capability of local emergency services to handle an incident in the marine environment may be limited It is expected that emergency services would have procedures and methodologies for handling Hazardous Material (HAZMAT) in the marine environment.

BHP Billiton staff and/or appointed service providers would fully cooperate with emergency services, and provide:

- an initial briefing of the events up to their arrival
- relevant documentation and information.

This would assist emergency services to:

- assess the situation
- identify hazard(s) that exist at the incident site
- formulate an initial response plan to the incident by identifying what resources or specialised assistance is required
- contact and coordinate the mobilisation of additional resources to respond to the incident, which may also include contacting BHP Billiton directly.

Once command and control responsibilities have been assumed by the emergency services, all personnel including BHP Billiton personnel would follow and adhere to all directions and instructions issued by the appointed emergency services Incident Controller.

6.3.3 BHP Billiton containment response

During the containment phase, BHP Billiton would, as required:

- establish an open line of communications with emergency services

- support, mobilise and activate resources, security, environmental (including spill management) or other specialist skills and assistance to the incident site
- coordinate with other BHP Billiton CSGs to support the incident response requirements
- maintain effective communications with:
  - the local community in the vicinity of the incident site
  - national, state and local government authorities and agencies and
  - BHP Billiton media response (see Section 2.5 – External Stakeholders)
- facilitate or assist with the recovery phase.

6.3.4 Recovery phase

The recovery phase would occur under the direction of emergency services and, where appropriate, as instructed by the either federal or state government authorities or agencies. BHP Billiton would be most likely to assume responsibility to coordinate activities to recover any spills or loss of equipment/cargo.

In the event of a maritime incident, ship owners would have their own plans and procedures to deal with the recovery of cargo and container(s) and associated hazardous materials such as diesel, oils and lubricants at the incident site. It is envisaged that BHP Billiton, stevedoring operators and ship owner(s) would work closely together in the recovery phase to minimise any ongoing delays or inconvenience to the community resulting from the incident.

It is important to restrict access to the incident site by members of the public or unauthorised personnel until the recovery activities have been completed to an acceptable level.

6.3.5 Recovery phase activities

The recovery phase activities would be focused on:

- re-establishing normal activities in the vicinity of the incident site
- collecting and appropriately managing:
  - leaked or spilt materials
  - damaged equipment or cargo
  - collecting any contaminated items (i.e. personal protection equipment (PPE) items such as clothing, spill response equipment consumables, etc).

Australian Dangerous Goods (ADG) procedures for handling dangerous goods (i.e. labelling, placarding and documentation) and requirements stipulated under the Environment Protection Act 1993 would apply to any vehicle involved in collecting and transporting contaminated materials, water and associated equipment at the incident site.

As part of spill response activities, arrangements would be made to deliver suitable equipment to enable collection taking into consideration the type of spill and the extent and the risks posed by the spill to a receiving environment.

Under the direction of the relevant South Australian agencies, all recovered material including damaged equipment, loads lost and related clean up equipment would be managed in accordance with relevant regulatory requirements.

7 REVIEW AND MAINTENANCE OF THE ERP

The ERP is subject to regular review and revision, which should occur annually, and/or when:

- the EIS has been approved and following liaison and discussion with relevant government agencies

- enhancements have been identified during the normal course of business
- desktop training and real-time exercises have been completed to incorporate any lessons learnt
- independent review and audit has identified areas for improvement
- in-house reviews have been completed
- an organisational restructure, or an employee change occurs which may have a significant effect of the emergency response capability
- details on stakeholder contact lists change
- changes to legislation or industry standards occur.

8 CONTROLS AND PREVENTATIVE MEASURES

As lessons are learnt from incident response at other similar facilities and at those in Upper Spencer Gulf, including at the landing facility and the desalination plant in the future, appropriate controls and measures would be implemented to reduce the risk of an incident occurring.

Controls and preventative measures that would be implemented based on current information include:

- requiring commercial vessels to have pilot guidance with onboard pilots with extensive local experience and knowledge of relevant waters
- scheduling commercial shipping movements to avoid the most popular times of small pleasure craft operation as far as possible
- applying speed limits for commercial vessels
- communicating regulations for commercial vessel operation, including speed limits, ballast water exchange and procedures if small craft stray into their path
- establishing an exclusion zone around cargo exchange locations
- establishing an exclusion zone around the facility excluding all other vessels and people when barge operations are occurring
- establishing response resources and equipment for rapid response in the event of fuel or oil spill.

The review of controls and preventative measures would be ongoing, as is the review of the Emergency Response Plan.

APPENDIX N3

Draft greenhouse gas and energy management plan (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Greenhouse Gas and Energy Management Plan (interim draft)

April 2011

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NOTE:

This draft Greenhouse Gas and Energy Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 CONTEXT AND PURPOSE

BHP Billiton Olympic Dam operates in accordance with an ISO14001 certified Environmental Management System. Management Plans, as part of the Olympic Dam Environmental Management System (EMS), are developed as technical (operational and adaptive) documents informing the EM Program and the measures and actions put in place for achieving objectives. Management Plans provide background information commensurate to the Plan's application, compiled from various sources such as published literature, studies/surveys undertaken and Codes of Practice and guideline documents.

The Draft EIS and Supplementary EIS for the proposed expansion to the Olympic Dam operation assessed and reported on the energy requirements of the expanded Olympic Dam and the volume of greenhouse gases likely to be emitted as a result of this energy demand. Environmental performance objectives and assessment criteria were also developed and communicated.

The purpose of this plan is to detail the management measures, operational controls and contingency measures that may be implemented by BHP Billiton to achieve environmental performance objectives.

2 ENVIRONMENTAL PERFORMANCE MANAGEMENT

Figure 1 illustrates the process embedded into the draft EMPs developed for the expansion project. The process includes the establishment of parameter limits and action levels based on legal compliance requirements and baseline assessments. Monitoring of performance against targets set would be undertaken, and where monitoring indicates that measured parameters are above set targets, higher levels of operational control would be enacted. For example, when operational controls fail to reduce salinity at the desalination plant, discharge would cease to achieve target levels). An increased level of control would be required as the action level is approached. Where the action level is exceeded, more advanced 'at source' controls would be implemented. 'At source' controls would generally be contingency measures, for example at the rock storage facility, relocating haul truck dumping locations where application of controls fails to achieve dust emission criteria. Where monitoring indicates that the parameter levels meet performance targets, no modification to management and monitoring would be required, with the exception of modifications for the purpose of continuous improvement.

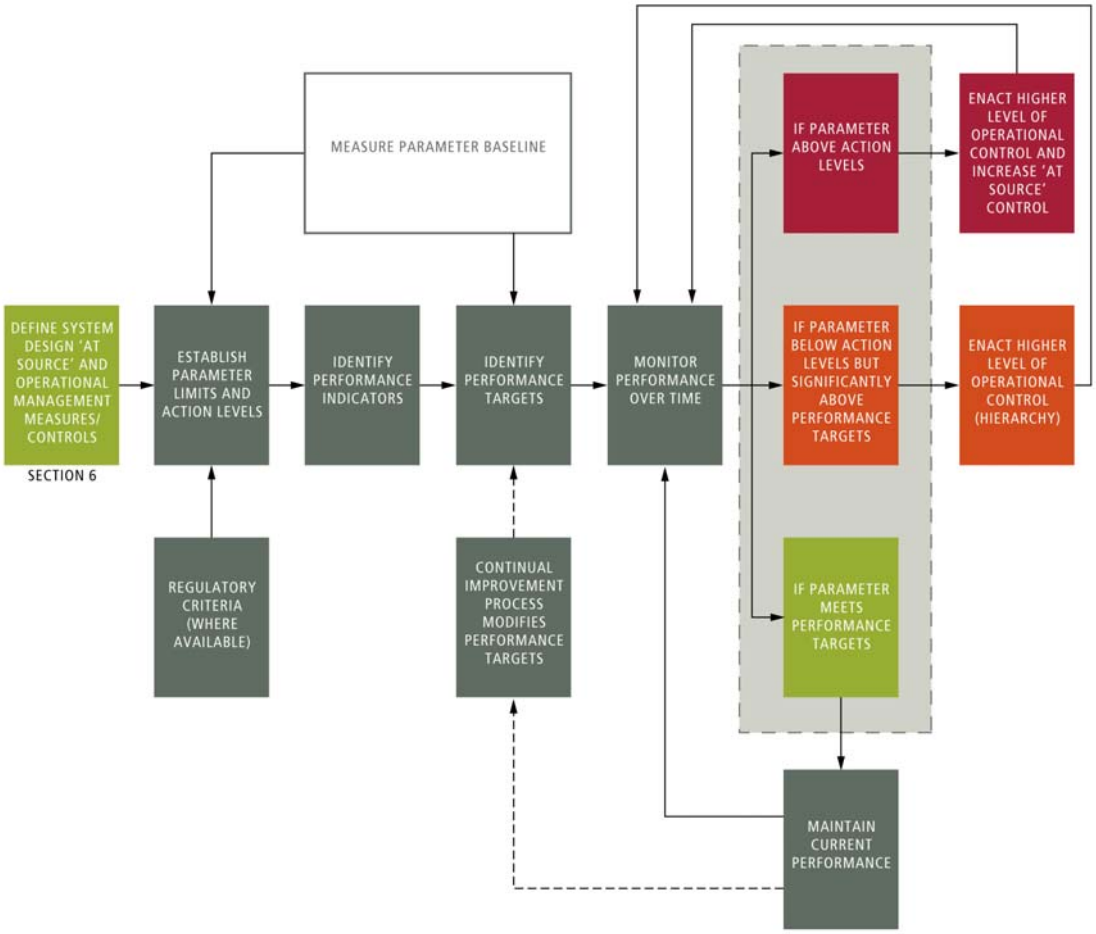

Figure 1: Identification of appropriate parameter limits and action levels to monitor performance of management measures/controls and, where action levels are triggered, enacting higher levels of control/contingency measures

3 SCOPE

The Draft EIS described the boundaries of the greenhouse gas assessment, summarised as follows:

- the direct and indirect emissions associated with the proposed expanded Olympic Dam as reportable under the National Greenhouse and Energy Reporting (NGER) Act (2007), including:
  - direct fuel usage emissions
  - indirect electricity usage emissions
- the direct and indirect emissions associated with the proposed expanded Olympic Dam currently not reportable under the National Greenhouse and Energy Reporting (NGER) Act (2007) but which were considered to be attributable to the expanded operations, including:
  - emissions related to metallurgical processing
  - emissions related to acid neutralisation within the tailings storage facility (TSF)
  - emissions associated with the use of explosives
  - life cycle emissions associated with on-site fuel usage
  - life cycle emissions associated with off-site electricity generation

– materials transport fuel usage emissions.

The Supplementary EIS expanded this scope to include embedded emissions associated with the major materials used in the construction of the expanded Olympic Dam infrastructure, including:

- steel
- pipework
- concrete
- electrical cabling.

The draft Greenhouse Gas and Energy Management Plan consolidates the management measures provided within the Draft EIS and Supplementary EIS in accordance with the above-mentioned scope, details the proposed monitoring regime and identifies contingency measures that may be implemented to ensure compliance with the applicable environmental performance criteria.

This document, like all draft management plans for the proposed Olympic Dam expansion, is a 'live document', and as such will be revised and updated as necessary.

4 TRAINING, ROLES AND RESPONSIBILITIES

At the appropriate time a training, roles and responsibilities matrix will be developed and included in this section of the plan. The matrix will detail those BHP Billiton employees and contractors that have specific responsibilities under this plan and those responsibilities, including training requirements, will be clearly defined and communicated.

5 OBJECTIVES AND ASSESSMENT CRITERIA

The Environmental Management Program, developed for the expanded Olympic Dam operation and presented in Appendix U of the Draft EIS, provided the objectives and assessment criteria for the various environmental aspects related to the project for which a moderate (or greater) residual impact was predicted. The following table provides the relevant objective and assessment criteria for the management of greenhouse gas and energy-related impacts.

EM Program	Objective	Assessment criteria
Operation of industrial systems		
Greenhouse gas emissions	Contribute to stabilising global atmospheric greenhouse gas concentrations to minimise the environmental impacts associated with climate change.	Apply a management goal of reducing greenhouse gas emissions (reportable under the National Greenhouse and Energy Reporting (Measurement) Determination 2008) to an amount equivalent to at least a 60% reduction (to an amount equal to or less than 40%) of 1990 emissions, by 2050.

6 MANAGEMENT OF ENERGY AND GREENHOUSE GAS EMISSIONS

The Draft EIS for the proposed expansion of Olympic Dam assessed the potential impacts associated with the consumption of energy and associated generation of greenhouse gases, defined management measures to avoid or reduce these impacts and categorised the residual impacts. This section lists the

management measures presented within the Draft EIS and any additional measures that were provided in the subsequent Supplementary EIS. Based on the successful implementation of these measures, the residual impact for predicted greenhouse gas emissions was categorised as 'high', representing a long-term statewide impact.

6.1 Strategy

The Greenhouse Gas and Energy Management Plan, when finalised, would:

- establish modelling to project the likely emissions from the expanded Olympic Dam operation from commencement to 2050
- establish targets and timelines for greenhouse gas reduction
- identify greenhouse gas reduction strategies and projects.

Potential emissions reduction initiatives were categorised into demand or supply-side projects within the Draft EIS, and the Greenhouse Gas and Energy Management Plan would aim to gather sufficient details regarding emissions reduction projects to allow further assessment against the following implementation hierarchy:

- reduce the demand for energy through energy efficiency initiatives
- meet the energy demand from low-emission or renewable sources
- offset emissions
- purchase emission credits.

6.2 Management

The management measures proposed with regards to energy reduction and greenhouse gas mitigation associated with the proposed expansion of Olympic Dam were detailed in the Draft EIS and subsequent Supplementary EIS and are described in the following table.

Issue	Residual impact rating	Management measures
Energy consumption associated with the expanded Olympic Dam	High	▪ Constructing an on-site co-generation power station utilising waste heat from the burning of elemental sulphur to provide up to 250 MW of electricity for the expanded operation.
Greenhouse gas emissions associated with the expanded Olympic Dam	High	▪ Installing solar hot water and solar photovoltaic within the new airport, Hiltaba Village and the expanded areas of Roxby Downs ▪ Sourcing renewable energy (35 MW) for the coastal desalination plant via the National Electricity Market (NEM) ▪ Sourcing renewable energy (22 MW) for the pumping stations between the coastal desalination plant and Olympic Dam from the National Electricity Market (NEM).

6.3 Potential energy demand and greenhouse gas emission reduction projects

The Draft EIS suggested a number of projects and initiatives that would, if implemented, contribute towards achievement of the assessment criteria, and ultimately the environmental performance criteria. These are summarised in the following table. The finalised Greenhouse Gas and Energy Management Plan would review this project list annually, and aim to quantify the potential abatement opportunities

and costs associated with any newly identified projects, plotting them on emissions abatement curves similar to those previously presented in the Draft EIS.

Project
Demand-side projects
▪ Using waste engine oil in blasting ▪ In-pit ore crushing and conveying to the surface ▪ Conveying mine rock to surface ▪ Trolley-assist haulage ▪ Alternative power/fuel supply for haul truck (LNG) ▪ Hybrid light vehicles ▪ More efficient crushing/grinding ▪ Reducing water usage through increasing recycling of TSF liquor ▪ Low intensity leaching ▪ Energy efficient township, accommodation camp and administration building design
Supply-side projects
▪ On-site CCGT ▪ Off-site CCGT ▪ On-shore wind power ▪ Geothermal power ▪ Concentrated solar thermal power (with waste heat recovery plant) ▪ Concentrated solar thermal power (stand-alone) ▪ Solar photovoltaic ▪ Biodiesel ▪ Coal carbon capture and storage (CCS) ▪ Biomass power

7 REFERENCES

BHP Billiton (2009) Draft Environmental Impact Statement for the Olympic Dam Expansion 2009, BHP Billiton, Adelaide.

BHP Billiton (2011) Supplementary Environmental Impact Statement for the Olympic Dam Expansion 2011, BHP Billiton, Adelaide.

APPENDIX N4

Draft land disturbance control (administrative process) (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Land Disturbance Control (Administrative Process) (interim draft)

April 2011

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NOTE:

This draft Land Disturbance Control (Administrative Process) (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 PURPOSE

The purpose of this plan is to provide an outline of internal Olympic Dam site administrative and approvals processes for activities involving clearance and land disturbance activities. Administrative controls are in place at Olympic Dam to ensure items of environmental and/or indigenous heritage significance are managed appropriately.

This document forms a component of the management measures and controls to be adopted by BHP Billiton Olympic Dam employees and contractors to meet agreed environmental performance objectives in relation to native vegetation management at the Olympic Dam site. These performance objectives are as detailed in ID 1.1 of the Draft Environmental Management Program (EM Program) for the Olympic Dam Expansion Project (as identified under Appendix U of the Draft EIS (BHP Billiton 2009)).

BHP Billiton Olympic Dam operates in accordance with an ISO14001 certified Environmental Management System. Management Plans, as part of the Olympic Dam Environmental Management System (EMS), are developed as technical (operational and adaptive) documents informing the EM Program and the measures and actions put in place for achieving objectives. Management Plans provide background information commensurate to the Plan's application, compiled from various sources such as published literature, studies/surveys undertaken and Codes of Practice and guideline documents.

2 SCOPE

The scope of this document is as follows:

- describe the management polices and procedures employed by Olympic Dam to minimise, permit, manage and identify rehabilitation liabilities for native vegetation
- describe the management policies and procedures employed by Olympic Dam to account and report on land disturbance and SEB offset liabilities to the State Government, including disturbance to native vegetation associated with the current operation and the future expansions.

This plan is limited to BHP Billiton activities that require the clearance of native vegetation. This plan does not include:

- clearances related to pastoral station activities
- non BHP Billiton activities that affect native vegetation
- any guidance for construction or trenching
- identification of underground services
- assessment of, or management of heritage sites
- management of SEB areas
- management of rehabilitation works

Specific management plans would be developed for activities undertaking clearance and/or land disturbance activities. This document, like all draft management plans for the proposed Olympic Dam expansion, is a 'live document', and as such will be revised and updated as necessary. These updates would include the provision of contingency measures that could be implemented in the event that monitoring programs identify that stated performance outcomes are not being achieved.

3 OBJECTIVES AND ASSESSMENT CRITERIA

The EM Program provides the agreed objectives and assessment criteria for the expansion of Olympic Dam. The following provides the relevant objective and assessment criteria for the management of clearance and land disturbance activities.

EM Program	Objective	Assessment criteria
Use of natural resources		
Land disturbance	No significant adverse impact to listed threatened species (South Australia, Northern Territory, Commonwealth) populations in the expansion project area as a result of BHP Billiton's construction activities. This will be achieved by: ▪ Minimising the area of land disturbed by the operations activities and identifying rehabilitation requirements. ▪ Managing activities to minimise the impact of pest plants and animals on the environment. ▪ Identifying and reporting land disturbance and SEB offset liability as a result of clearing native vegetation.	No significant adverse impacts on the Ampurta as a result of BHP Billiton activities. No significant adverse impacts on an important population of Pernatty Knob-tailed Gecko*, Dusky Hopping-mouse or Plains Rat as a result of BHP Billiton activities. *Note that this species has been de-listed by the EPBC Act.

4 MANAGEMENT MEASURES (ADMINISTRATIVE)

4.1 Commitment to sustainable development

The BHP Billiton Charter as the highest-level policy statement includes a commitment to Safety and the Environment, and a high level commitment to sustainable development. This commits the organisation to the aspirational goal of 'Zero Harm' to health, safety, environment and the community. This policy includes an explicit statement to "enhance biodiversity protection by assessing and considering ecological values and land-use aspects in investment, operational and closure activities".

It is the responsibility of each asset within the organisation to implement this policy. BHP Billiton Olympic Dam Corporation has adopted this same commitment and developed plans and procedures to uphold the commitment and achieve its aim.

4.2 Management of native vegetation disturbance

BHP Billiton has a variety of obligations regarding the preservation of environmental and Indigenous Heritage items/sites. An Environmental/Indigenous Heritage Clearance Permit (EIHCP) process has been developed to ensure that no significant native plants, animals or indigenous sites are disturbed as a result of Olympic Dam related activities. The process also ensures that all native vegetation clearances are recorded and, where required, a Native Vegetation Management Plan (NVMP) has been approved that applies to the clearance area and activity.

This system requires an EIHCP to be obtained prior to the commencement of any ground disturbing activity, which includes any works carried out by or for the Olympic Dam Asset. The EIHCP system aims to:

- control development to minimise its environmental impact
- protect Indigenous Heritage sites
- account for areas of disturbance for reporting purposes
- allow for the provisional planning of rehabilitation works.

All disturbances are recorded in the EIHCP database and a Geographic Information System (GIS) program and used for reporting.

Greenfield ground disturbing activities include any activity that has the potential to disturb or destroy any previously undisturbed surface soil, rock, plant or animal (dead or alive). Applying for an EIHCP ensures that minimal disturbance to significant environmental and/or Indigenous Heritage aspects is achieved during all works conducted by/for the Olympic Dam Asset.

The Works Supervisor or BHP Billiton Project Manager is responsible for lodging, with the Environment Section, an EIHCP Application Form for each individual disturbance. An Environmental Officer responsible for the issuing and management of the EIHCP is responsible for ensuring that all relevant information and data is obtained in order to undertake an assessment of the disturbance. In most circumstances an inspection of the proposed disturbance area is required in addition to a desk-top assessment of the GIS data for environmental and Indigenous Heritage sites. Following the assessment, the EIHCP Officer will determine and advise the Works Supervisor if an EIHCP is required. If so, the permit will be drawn up with various attachments as part of the document. An electronic EIHCP accompanied by detailed environmental and/or Indigenous Heritage conditions and a map showing the approved disturbance area are then produced. The assessment is complete and works can commence when the original EIHCP is signed by the Project Manager and issuing Environmental Officer. It is the responsibility of the BHP Billiton Project Manager to approve and sign the EIHCP before the works can commence. To ensure accountability by BHP Billiton, contractors are allowed to apply for permits but only the relevant BHP Billiton Project Manager is eligible to sign for the approved permit.

The EIHCP is likely to have conditions pertaining to the management of works to ensure that environment/Indigenous Heritages sites are maintained and to describe any post works rehabilitation that may be required. Sign-off of most EIHCPs will be required to ensure that specific conditions have been met.

4.3 Assessment of native vegetation clearance requests

In order to undertake an effective EIHCP assessment the following information/data, in addition to the information provided in the application form, are likely to be required from the applicant (other requirements will be valid in some circumstances):

- coordinates of disturbance location (preferably in GDA 1994)
- full disturbance extent/boundary (checked on ArcGIS and/or in field)
- reason for disturbance and flexibility in its location
- longevity of disturbance i.e. short, medium, long-term (life of mine) to determine if/what type of rehabilitation is required
- location and extent of any access tracks, turn around points or service routes required in addition to the main disturbance area.

4.3.1 Environmental aspects

While undertaking the desk-top assessment (prior to field investigations), the proposed disturbance is checked against data for land ownership/management (various conditions apply on different land leases), an applicable NVMP, existing environmental monitoring sites/equipment, heritage sites, significant species habitat and weed infestations (linked and mapped to GIS). This information is then verified and investigated further during the field investigations where the following aspects are considered:

- location of disturbance site
- vegetation disturbance minimisation
- vegetation status, (Significant Environmental Benefit (SEB) score 1 to 10, where applicable)
- presence of significant flora species
- presence of known significant fauna communities particularly Ampurta, Dusky Hopping-mouse or Plains Rat
- landform impacts

- presence of weed infestations
- presence of environmental monitoring sites/equipment
- topsoil management
- impact of any disturbance features e.g. potential for erosion or fauna entrapment.

If an applicable NVMP does not exist, written approval from the Native Vegetation Council would be sought.

4.4 Sign-off requirements

Any conditions for the protection of significant environmental/Indigenous Heritage sites or aspects and requirements for rehabilitation should be stated on the EIHCP under 'Environmental Conditions', 'Heritage Conditions' and/or 'Rehabilitation Conditions' respectively. If any conditions are set (unless very basic), the tick-box for 'Sign-off Required' must be checked.

In addition to conditions pertaining to aspects set out here, a number of general conditions are usually set:

- vegetation disturbance must be kept to a minimum
- all vehicles must stay to established roads/tracks
- all rubbish must be removed from site
- any extension to the disturbance area detailed in the EIHCP that may be required in the future must be re-applied for.

Rehabilitation requirements will vary depending on the extent and longevity of the disturbance. Olympic Dam has rehabilitation plans and techniques detailed in technical reports.

Where the tick-box for "Sign-off Required" has been marked the Environmental Officer must ensure that all conditions have been met prior to signing-off the permit. This will usually require a final site inspection. Where rehabilitation requirements may result in a reduction to a required SEB, the reduction in SEB will not be applied until "Sign-off" has occurred and it has been established that the rehabilitation has been successful.

4.5 Non-compliance

Failure to apply for and obtain an EIHCP for any works, or failure to comply with all conditions set under an obtained EIHCP is subject to BHP Billiton disciplinary measures.

Unauthorised land disturbances are treated in the same fashion as if the disturbance occurred under an EIHCP, in that the same issues need to be considered, the same data collected and stored. A post disturbance assessment is carried out of the area of land that has been disturbed to try to establish if any significant environmental/Indigenous Heritage sites have been damaged. The extent of the disturbance is captured (using GPS or assessment on an aerial image) and all information reported appropriately.

Any breaches of the EIHCP procedure are treated as an environmental incident and dealt with in accordance with Environmental Incident Management policy.

5 MONITORING AND REPORTING

As detailed, the EIHCP process begins the information management in relation to native vegetation clearances and reporting. It allows the company to minimise and manage land disturbance and rehabilitation requirements. However, calculation of annual land disturbance is undertaken through annual change analysis using disturbance data digitised from aerial photography. Following this, a check/audit of compliance with the EIHCP system can be undertaken and breaches recognised and action taken. These processes are detailed in the Land Disturbance Analysis and Reporting procedure.

The Environmental Management and Monitoring Report (EMMR), the Olympic Dam Closure Plan, the Federal Government NPI Report and the corporate BHP Billiton HSEC Questionnaire all require information regarding land disturbance and land use of BHP Billiton Olympic Dam land holdings. It is the EMMR, provided to Government in October each year, which will report on land disturbance (native vegetation clearance) and account for the required SEB and the depletion of any approved SEB credit.

5.1 Information management

5.1.1 Change analysis

The extent of physical land disturbance is measured using GIS technology. Geo-referenced aerial photographs of the Special Mining Lease and Municipal Lease are analysed using change mapping for physical disturbance during the period since the previous photographs were taken. Evidence of disturbance is cross-referenced against the EIHCP system records for the same period. For land disturbance occurring in areas where there is no capture of aerial photography, the area is calculated from the EIHCP database. Disturbance/change figures are digitised and calculated from annual aerial images.

The new disturbance areas are digitised and categorised by description, facility, HSEC category, year disturbed, SEB ratio and NPI category. This is achieved through cross-reference with EIHCP data and knowledge of the zone where the disturbance has occurred. This data is used for all land clearance reporting purposes including the EMMR.

5.1.2 Environment clearance permit (EIHCP) compliance audit

Through conducting the change analysis and digitising the disturbances on aerial photography, a check/audit of compliance with the EIHCP system can be undertaken. This is undertaken annually by overlaying the EIHCP clearance areas and any violations with the disturbance areas on ArcGIS. Any newly disturbed area without an allocated EIHCP or violation number or outside an EIHCP area can be identified and investigated.

Any breaches of EIHCP or unauthorised land disturbance are investigated and reported through the Environmental Incident Management procedure. This represents a lag indicator in the Monitoring Program.

Following completion of the Change Analysis an area of annual disturbance is calculated. Following the EIHCP compliance audit, the annual disturbance figures should equate with the EIHCP data.

5.1.3 Calculating annual SEB debt

As detailed above, the EIHCP database includes details of the SEB ratio that applies to each disturbance with applicable deductions for any rehabilitation. This, together with the area of each disturbance determines the SEB for each disturbance and the sum of these is the annual SEB debt. This SEB debt is then deducted from any remaining (approved) SEB credit.

5.2 Annual reporting of native vegetation management

The EMMR is completed annually at the end of the fiscal year. Reporting requirements are detailed in the Land Disturbance Section of the Flora Monitoring Program. It requires data on all disturbances created by Olympic Dam regardless of where this disturbance takes place. Generally, this includes the Special Mining Lease, the Municipal Lease and the wellfields. This does not include any general disturbances on pastoral leases, as this is dealt with separately. It may, however, include mining related activities on Olympic Dam and/or private pastoral leases.

5.2.1 Land disturbance

The annual disturbance figure and cumulative disturbance figures are detailed by 'Facility'. The annual SEB debt and cumulative SEB debt are also recorded, and any remaining SEB credit after subtracting the SEB debt is also shown.

Maps of the disturbances are also generated for the report. The report is written for the EMMR submitted to Government in October each year.

5.2.2 SEB implementation

Implementation of the Significant Environmental Benefit projects will be as directed in the Native Vegetation Management Plans to be approved by Government.

APPENDIX N5

Draft noise management plan (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Noise Management Plan (interim draft)

April 2011

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NOTE:

This draft Noise Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 CONTEXT AND PURPOSE

BHP Billiton Olympic Dam operates in accordance with an ISO14001 certified Environmental Management System. Management Plans, as part of the Olympic Dam Environmental Management System (EMS), are developed as technical (operational and adaptive) documents informing the EM Program and the measures and actions put in place for achieving objectives. Management Plans provide background information commensurate to the Plan's application, compiled from various sources such as published literature, studies/surveys undertaken and Codes of Practice and guideline documents.

The Draft EIS and Supplementary EIS for the proposed expansion to the Olympic Dam operation assessed and reported on the potential impacts associated with the generation of noise and vibration. The assessment established compliance criteria and environmental performance objectives at sensitive receivers adjacent to infrastructure associated with the proposed expansion.

The purpose of this plan is to detail the management measures and operational controls to be implemented by BHP Billiton to meet the compliance criteria and achieve environmental performance objectives.

2 ENVIRONMENTAL PERFORMANCE MANAGEMENT

Figure 1 illustrates the process embedded into the draft EMPs developed for the expansion project.

The process includes the establishment of parameter limits and action levels based on legal compliance requirements and baseline assessments. Monitoring of performance against set targets would be undertaken, and where monitoring indicated that measured parameters were above set targets, higher levels of operational control would be enacted. For example, when operational controls fail to reduce salinity at the desalination plant, discharge would cease to achieve target levels).

An increased level of control would be required as the action level is approached. Where the action level was exceeded, more advanced 'at source' controls would be implemented. 'At source' controls would generally be contingency measures. For example, at the rock storage facility, relocating haul truck dumping locations where application of controls fails to achieve dust emission criteria. Where monitoring indicates that the parameter levels meet performance targets, no modification to management and monitoring would be required, with the exception of modifications for the purpose of continuous improvement.

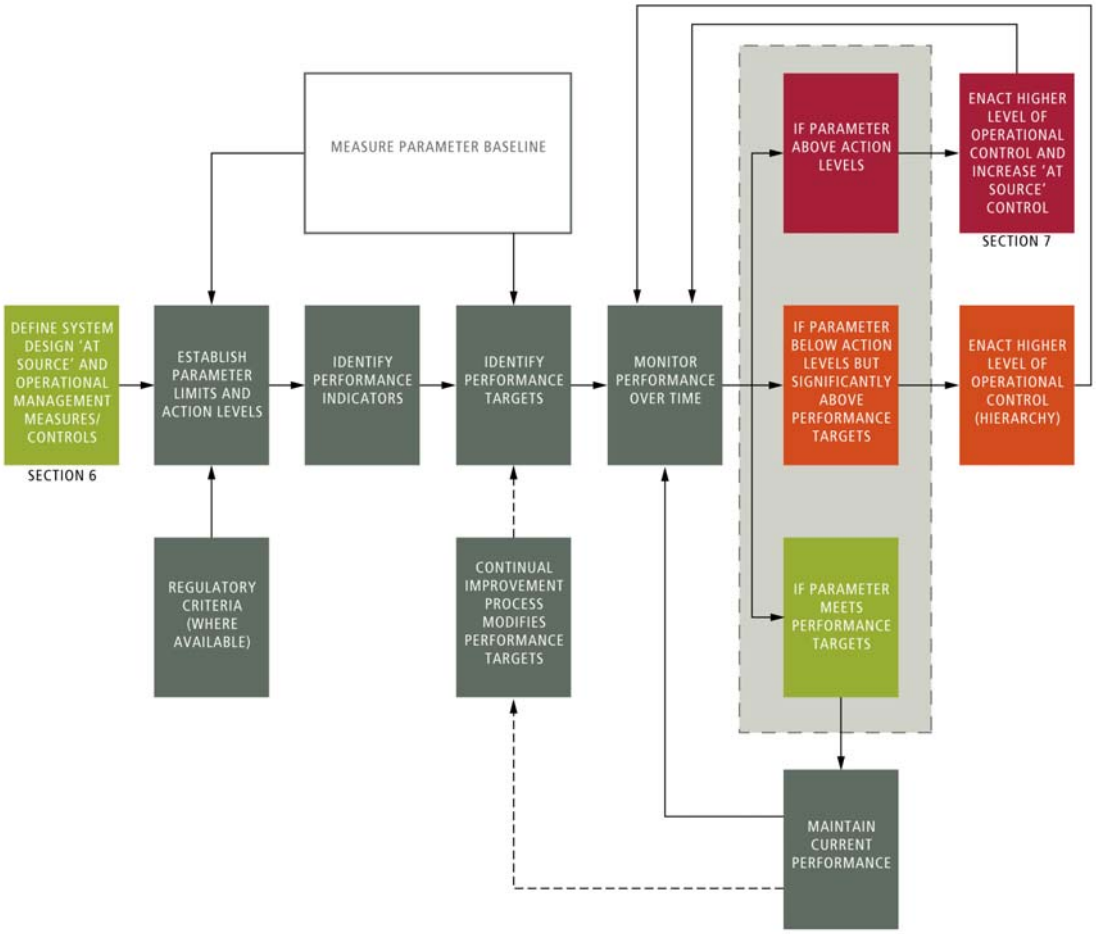

Figure 1: Identification of appropriate parameter limits and action levels to monitor performance of management measures/controls and, where action levels are triggered, enacting higher levels of control/contingency measures

3 SCOPE

The Draft EIS and subsequent Supplementary EIS identified the proposed operation of the following infrastructure as having potential for noise and vibration impacts:

- arising from construction and operations of expanded facilities at Olympic Dam
- arising from construction and operation of the desalination plant at Point Lowly
- arising from construction and operation of the landing and pre-assembly facilities at Port Augusta
- arising from construction and operation at the sulphur handling facility at Outer Harbor
- arising from construction and operation of the concentrate handling facility at Darwin
- arising from construction and operation of the Pimba intermodal facility.

The draft Noise Management Plan consolidates the management measures provided within the Draft EIS and Supplementary EIS, details the proposed monitoring regime and identifies contingency measures that may be implemented to ensure compliance with the applicable environmental performance criteria.

This document, like all draft management plans for the proposed Olympic Dam expansion, is a 'live document', and as such will be revised and updated as necessary.

4 TRAINING, ROLES AND RESPONSIBILITIES

At the appropriate time a training, roles and responsibilities matrix will be developed and included in this section of the plan. The matrix will detail those BHP Billiton employees and contractors that have specific responsibilities under this plan and those responsibilities, including training requirements, will be clearly defined and communicated.

5 OBJECTIVES AND ASSESSMENT CRITERIA

The Environmental Management Program, developed for the expanded Olympic Dam operation and presented in Appendix U of the Draft EIS, provided the objectives and assessment criteria for the various environmental aspects related to the project for which a moderate (or greater) residual impact was predicted. The following table provides the relevant objective and assessment criteria for the management of noise and vibration-related impacts.

EM Program	Objective	Assessment criteria
Operation of industrial systems		
Noise (and vibration) emissions	No adverse impacts to public health as a result of noise emissions from BHP Billiton's expanded operations.	Maintain noise from the expanded operations at Olympic Dam, the desalination plant, the sulphur handling facility and the landing facility to less than 30 dBL_{Aeq} (24 hour) within residential dwellings.
Employment and accommodation of people		
Community interactions	Communities in which BHP Billiton operates value our citizenship.	Community concerns are tracked and all reasonable complaints are addressed.

6 MANAGEMENT OF NOISE AND VIBRATION IMPACTS

The Draft EIS for the proposed expansion of Olympic Dam (BHP Billiton 2009) assessed the potential impacts associated with the generation of noise and vibration, defined management measures to avoid or reduce these impacts and categorised the residual impacts.

This section lists the management measures presented within the Draft EIS and any additional measures that were provided in the subsequent Supplementary EIS. Based on the successful implementation of these measures, the residual impact for predicted noise and vibration levels to sensitive receivers around the Special Mining Lease (SML) was categorised as 'moderate' as a result of the increase in traffic in and around the receivers, and 'low' as a result of the industrial operations at the expanded Olympic Dam. Around the landing facility the residual impact was determined to be 'low'. At all other receivers, the residual impact was determined to be low-to-negligible.

6.1 Strategy

Management of noise generation in mining operations is typically achieved in one of two ways, either through 'at source' minimisation of noise generation, or through the implementation of noise mitigation controls at the receivers to ensure that internal noise criteria are met within dwellings.

The proposed expanded Olympic Dam would preferentially implement 'at source' noise minimisation including avoiding noise generating activities, installation of noise mitigating design features and operational control including the relocation or rescheduling of noise-generating activities. The implementation of 'at receiver' noise mitigation would only be undertaken where 'at source' noise minimisation was impractical or would be ineffective.

6.2 Management

The management measures proposed with regards to noise and vibration impacts associated with the proposed expansion of Olympic Dam were detailed in the Draft EIS and subsequent Supplementary EIS and are described in the following sections.

6.2.1 'At source' noise minimisation

To minimise the generation of noise and vibration from the expanded Olympic Dam operations, the following management measures were proposed in the Draft EIS and Supplementary EIS as a basis for the project proposal.

Issue	Residual impact rating	Management measures
Noise levels at Roxby Downs and Hiltaba Village	Moderate-to-low	▪ Restrict the use of haul truck air horns whilst trucks are operating on the Rock Storage Facility (RSF) ▪ Design the location and orientation of the proposed airport to broadly align with the prevailing wind direction while avoiding overflying Roxby Downs and Hiltaba Village
Noise levels at other sensitive receivers	Moderate-to-negligible	▪ Enclose the reverse osmosis section of the coastal desalination plant and the seawater intake pumping station ▪ Tunnelling of the desalination plant outfall pipeline to minimise the potential for trench construction noise ▪ Limit landing facility operations to between 7am and 7pm ▪ Noise generating activities from the operation of the concentrate handling facility (such as train shunting and unloading) would be undertaken within buildings and enclosures

6.2.2 'At receiver' noise mitigation

To ensure that noise associated with the expanded Olympic Dam operations and associated activities, the following 'at receiver' mitigation measures were proposed in the Draft EIS and Supplementary EIS as a basis for the project proposal.

Issue	Residual impact rating	Management measures
Noise levels at Roxby Downs and Hiltaba Village	Moderate-to-low	▪ Relocate Olympic Village and the existing heavy industrial estate to reduce potential workforce and residential exposure to high noise levels ▪ Position Hiltaba Village approximately halfway between Roxby Downs and Andamooka to maximise the distance between the noise sources and residents
Noise levels at other sensitive receivers	Moderate-to-negligible	▪ Locate the proposed landing facility to minimise the number of properties that may be affected

6.2.3 Management of perception

The Draft EIS recognised that community perceptions of noise and vibration do not necessarily correlate to a specific noise level, rather they are more likely to be influenced by their perception of existing acoustic amenity and its rate of change as the expanded operations commence and their understanding regarding the source of the noise and/or vibration. The following management measures were proposed in the Draft EIS and Supplementary EIS.

Issue	Residual impact rating	Management measures
Noise levels at other sensitive receivers	Low	• Notice of significant noise and vibration-generating activities, including tunnelling, would be provided to the community around the desalination plant prior to undertaking these activities

7 MANAGEMENT OF NOISE AND VIBRATION RISKS

Chapter 26 of the Draft EIS identified the key environment and health and safety risks associated with the proposed expanded Olympic Dam. The following identified key risks and proposed contingency measures for the management of noise and vibration risks were proposed in the Draft EIS and Supplementary EIS. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable. As such, the preventative measures, monitoring, and contingency measures will continue to be developed, reviewed and revised as appropriate.

Risk	Monitoring	Contingency options
Noise and vibration levels at Roxby Downs and Hiltaba Village in excess of the assessment criteria	The monitoring of noise and vibration levels at Roxby Downs and Hiltaba Village would take the form of both calibrated modelling and compliance monitoring. The basis of this system would be to: ▪ develop a refined and validated acoustic model based on the as-built mining and metallurgical operations ▪ install a meteorological system that incorporates climatic conditions such as wind speed and direction (which may also record temperature inversions). into the acoustic model so that noise levels contributed during operations at Roxby Downs and Hiltaba Village could be predicted ▪ monitor sound at key receptor locations to assess compliance with the adopted criteria and to ensure the reliability of the acoustic model.	The Draft EIS identified some situations, in particular night-time inversions, where the assessment criteria at Hiltaba Village may be exceeded, largely the result of the use of haul trucks. The following contingency measures may be implemented to ensure the assessment criteria are met: ▪ modify the design and use of surface equipment air horns and reversing alarms (e.g. restricted use, use of horns and alarms of different frequencies and use of ambient noise-sensing horns and alarms) ▪ relocate mobile noise sources (e.g. haul trucks) to areas further away from sensitive receivers ▪ attenuate noise on mobile equipment by fitting acoustic shielding. The Draft EIS identified the increase in vehicle traffic on major roads within Roxby Downs as having the potential to be perceived negatively by the community. The following contingency measures may be implemented to manage this perception and ensure the assessment criteria are met: ▪ using low-noise road surfaces at strategic locations (e.g. open graded asphalt or stone mastic asphalt) ▪ installing noise attenuation barrier(s) on the main feeder road (Olympic Way) ▪ installing residential acoustic shielding on local residences.

Risk	Monitoring	Contingency options
Noise and vibration levels at Point Lowly in excess of the assessment criteria	Monitoring of noise and vibration levels at Point Lowly would be undertaken during construction and operation of the desalination plant to confirm the predictions of the acoustic models.	The Draft EIS and Supplementary EIS indicated that the assessment criteria for noise and vibration would be met during construction and operation of the proposed desalination plant. Local acoustic shielding may be required around some construction activities. The need for this would be determined by the noise monitoring undertaken during construction.
Noise and vibration levels at the landing facility in excess of the assessment criteria	Monitoring of noise and vibration levels at Point Lowly would be undertaken during construction and operation of the landing facility to confirm the predictions of the acoustic models.	The Draft EIS indicated that the noise assessment criteria would be exceeded at the nearest 12 residences to the proposed landing facility. The location of this facility and the associated residences presents challenges in terms of the ability to implement acoustic mitigation, however some contingencies that may be considered include: ▪ installing underwater exhausts and additional acoustic shielding to landing barges and vessels using the landing facility ▪ installing acoustic shielding to surface vehicles and the restriction of the use of horns and reversing alarms ▪ installing acoustic shielding between residences and the landing facility, which could take the form of fencing or earthen bunds ▪ installing additional insulation in residences and the double-glazing of windows.
Noise and vibration levels at Outer Harbor and Port of Darwin receivers in excess of the assessment criteria	Monitoring of noise and vibration levels at Outer Harbor, North Haven and the Port of Darwin would be undertaken during construction and operation of the sulphur and concentrate handling facilities to confirm the predictions of the acoustic models.	The Draft EIS indicated that the assessment criteria for noise and vibration would be met during construction and operation of both the proposed sulphur and concentrate handling facilities. The detailed design of the proposed facilities would consider: ▪ installing skirting and completely enclosing gantries ▪ orientating away from sensitive receivers ▪ limiting noise from idler/belt contact by using polyurethane-filled rollers or rubber bushes ▪ minimising transfer height and appropriate chute design ▪ installing idler frames from conveyor gantry steelwork with rubber isolation mounts ▪ installing a sound-absorptive surface lining and using cladding on buildings and conveyor systems ▪ enclosing the conveyor or using shielding ▪ installing vibration isolation ▪ using panel dampening coatings ▪ using noise barriers.
Noise and vibration levels at Pimba receivers in excess of the assessment criteria	Monitoring of noise and vibration levels at Pimba would be undertaken during construction and operation of the intermodal facility to confirm the predictions of the acoustic model.	The Supplementary EIS indicated that the assessment criteria for noise and vibration would likely be met during construction and operation of the intermodal facility. In order to ensure that the assessment criteria was met at Pimba, the following contingencies could be considered: ▪ installing an earthen mound or other acoustic shielding at the southern end of the facility ▪ installing acoustic shielding adjacent to affected residences ▪ installing additional insulation in residences and the double-glazing of windows at affected residences.

8 REFERENCES

BHP Billiton 2009, Draft Environmental Impact Statement for the Olympic Dam Expansion 2009, BHP Billiton, Adelaide.

BHP Billiton 2011, Supplementary Environmental Impact Statement for the Olympic Dam Expansion 2011, BHP Billiton, Adelaide.

APPENDIX N6

Draft operational general waste and used tyres management plan (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Operational General Waste and Used Tyres Management Plan (interim draft)

April 2011

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NOTE:

This draft Operational General Waste and Used Tyres Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 CONTEXT AND PURPOSE

This draft General Waste and Used Tyres Management Plan has been developed specifically for general waste and used tyres arising during construction, operation and closure of the mining area of the Olympic Dam expansion.

It is recognised that a number of activities associated with the expansion of Olympic Dam would generate other specialised waste and other management plans will cover these activities. Similarly, the landfill to be operated for the township for municipal related waste will be managed by the Roxby Downs Council or private waste management company, under licence from EPA. Waste generated on sites outside the Olympic Dam mining area, such as at the desalination plant at Point Lowly, would be managed separately.

These are to meet agreed environmental performance objectives, minimise the associated potential environmental impacts and maximise the use of resources at the Olympic Dam site. These performance objectives are as detailed in ID 4.6 of the Draft Environmental Management Program (EM Program) for the Olympic Dam Expansion Project (as identified under Appendix U of the Draft EIS (BHP Billiton 2009)).

BHP Billiton Olympic Dam operates in accordance with an ISO14001 certified Environmental Management System (EMS). Management Plans, as part of the Olympic Dam EMS, are developed as technical (operational and adaptive) documents informing the EM Program and the measures and actions put in place for achieving objectives. Management Plans provide background information commensurate to the Plan's application, compiled from various sources such as published literature, studies/surveys undertaken and Codes of Practice and guideline documents.

The Draft EIS and Supplementary EIS for the proposed expansion to the Olympic Dam operation assessed and reported on the waste generation rates associated with the expanded Olympic Dam and the potential management measures to be undertaken in order to successfully achieve the environmental performance objectives and assessment criteria.

The purpose of this plan is to consolidate the management measures, operational controls and contingency measures that may be implemented by BHP Billiton to achieve environmental performance objectives as described in the Draft EIS and Supplementary EIS.

2 ENVIRONMENTAL PERFORMANCE MANAGEMENT

Figure 1 illustrates the process embedded into the draft EMPs developed for the expansion project. The process includes the establishment of parameter limits and action levels based on legal compliance requirements and baseline assessments. Monitoring of performance against set targets would be undertaken, and where monitoring indicates that measured parameters are above set targets, higher levels of operational control would be enacted. For example, when operational controls fail to reduce salinity at the desalination plant, discharge would cease to achieve target levels.

An increased level of control would be required as the action level is approached. Where the action level is exceeded, more advanced 'at source' controls would be implemented. 'At source' controls would generally be contingency measures, for example at the rock storage facility, relocating haul truck dumping locations where application of controls fails to achieve dust emission criteria. Where monitoring indicates that the parameter levels meet performance targets, no modification to management and monitoring would be required, with the exception of modifications for the purpose of continuous improvement.

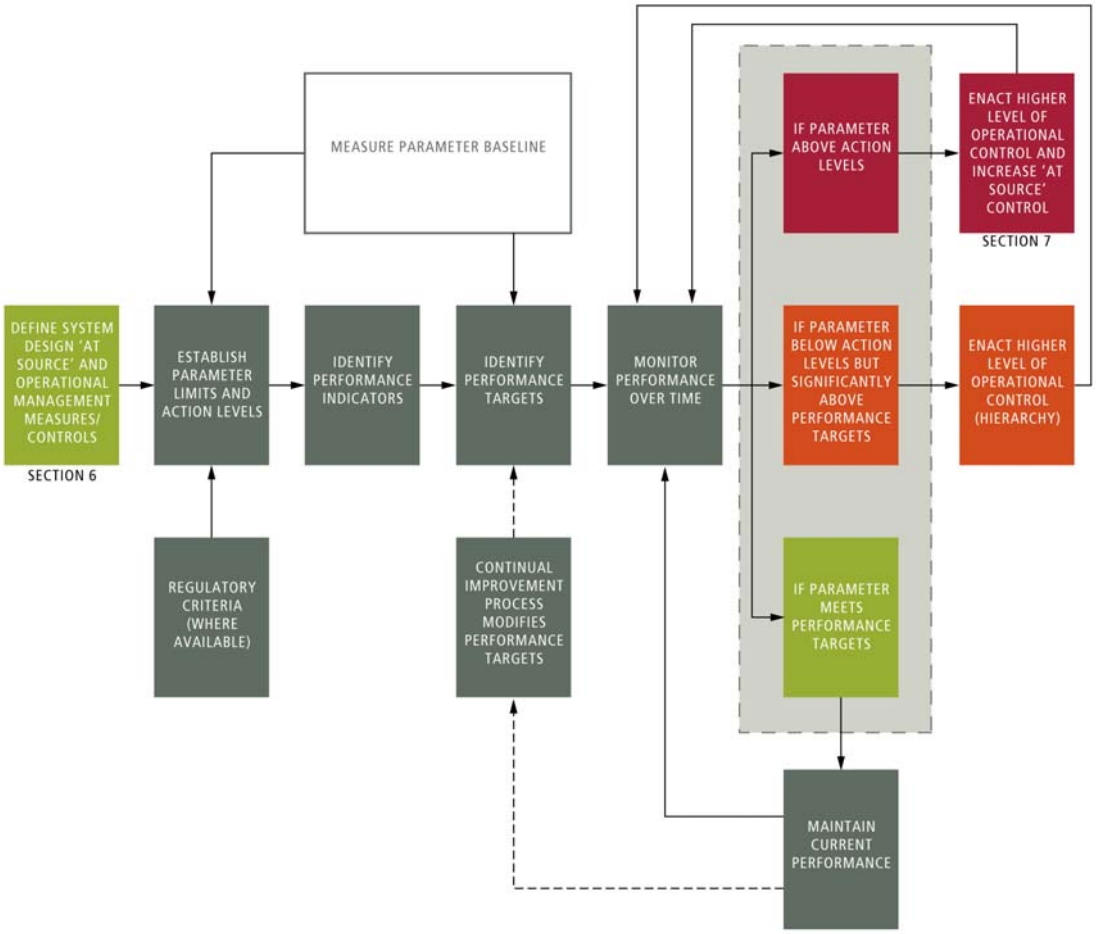

Figure 1: Identification of appropriate parameter limits and action levels to monitor performance of management measures/controls and, where action levels are triggered, enacting higher levels of control/contingency measures

3 SCOPE

This document, like all draft management plans for the proposed Olympic Dam expansion, is a 'live document', and as such will be revised and updated as necessary. These updates would include the provision of contingency measures that could be implemented in the event that monitoring programs identify that stated performance outcomes are not being achieved.

4 TRAINING, ROLES AND RESPONSIBILITIES

At the appropriate time a training, roles and responsibilities matrix will be developed and included in this section of the plan. The matrix will detail those BHP Billiton employees and contractors that have specific responsibilities under this plan and those responsibilities, including training requirements, will be clearly defined and communicated.

5 OBJECTIVES AND ASSESSMENT CRITERIA

The EM Program provides the agreed objectives and assessment criteria for the expansion of Olympic Dam. The following provides the relevant objective and assessment criteria for this Plan.

EM Program	Objective	Assessment criteria
Use of natural resources		
Spread of pest plants and animals*	No material increase in the abundance or area of infestation of pest species as a result of BHP Billiton's expansion activities* in the expansion project area (as defined).	No material increase in abundance of existing declared pest species. No introduction of new self-sustaining declared pest populations.
Generation of industrial Waste		
General waste disposal	Minimise general waste generated by BHP Billiton's expansion activities and maximise the reuse of general waste, where practicable.	Increase the proportion of general waste reuse/recycling.

* As it relates to the management /storage/transfer of general waste at the expanded Olympic Dam mine operation, in this case

6 MANAGEMENT OF WASTE AND USED TYRES IMPACTS

The Draft EIS for the proposed expansion of Olympic Dam (BHP Billiton 2009) assessed the potential impacts associated with general waste and used tyre generation and disposal, defined management measures to avoid or reduce these impacts and categorised the residual impacts. This section collates the management measures presented within the Draft EIS and any additional measures that were provided in the subsequent Supplementary EIS.

6.1 Strategy

Waste will be managed on site in accordance with requirements set by the *Environment Protection Act 1993*. The hierarchy of avoid, reduce, reuse, recycle, as part of Olympic Dam's ISO14001 certified Environmental Management System, would continue to be implemented for expansion activities.

Strategies have been developed specifically to support cost-effective processes to improve the reuse and recycling of used tyres, or recover energy from used tyres, for the proposed Olympic Dam expansion. In the event that a recycling solution for the volume of Olympic Dam used tyres is not available, and disposal in the RSF is required, appropriate management practices would be applied to mitigate the associated risks.

The following strategy is anticipated for the expanded Olympic Dam operation.

Avoidance and reduction

Procurement procedures will place greater responsibility on suppliers to reduce materials that contribute to waste. Potential waste reduction measures associated with purchasing may include minimisation of packaging materials, selection of products containing recycled content, and replacement of disposable products with reusable ones.

Measures would be investigated to extend the operational life of used tyres. This would include repair and retreads where feasible. Measures would be developed as part of improvement programs.

Reuse and recycling

The Olympic Dam expansion project will place a high emphasis on reuse and recycling. The existing Olympic Dam transfer station facility may continue to be used, and will be up-graded to accept the greater volumes of waste as a result of the expansion allowing increased reuse and recycling to occur. A recyclable material store for the new processing plant will be located near the railhead.

Purchasing procedures will assist the recycling process through the purchase of recycled content or secondary materials providing that the goods or materials are practical, functional and price competitive.

Improved 'at-source' sorting into appropriately placed and colour-coded bins and skips will be evaluated as a means to separate reusable and recyclable materials. This measure could be complemented with innovative methods for clearly delineating wastes unlikely to be contaminated (with audit protocols to determine the effectiveness of this strategy).

Additional equipment (such as conveyor drives, shredders, compactors and the like) will be considered for incorporation into the waste transfer facility where appropriate in order to improve the efficiency of its operation.

One of the major impediments to the recycling of materials from Olympic Dam Operations is the remoteness from established markets in Adelaide (Waste Management Strategy Olympic Dam, 2004). All recycled materials sent off the Special Mine Lease are currently back-loaded on trucks. Options for future use of the proposed rail-spur to Olympic Dam in terms of improving financial viability of recycling will be investigated.

The feasibility of an on-site recycling process for used tyres (by mechanical and thermal means) would be assessed during the Definition Phase of the expansion project. Known options for recycling and reuse of tyres consist of:

- reuse in civil engineering applications (e.g. demarcation of roads, as barriers or berms)
- recycled as rubber crumb for use in new tyres, new rubber/plastic products, playground surfaces etc.
- reuse as a tyre derived fuel (tyre chips have a 25% higher energy value than coal).

Recovering

The feasibility of establishing a composting facility on-site to accept food waste and other organic material will be evaluated during the definition phase of the expansion project for implementation during operations.

A new landfill facility would be developed for disposal of general wastes. The new landfill facility will meet the following requirements:

- it will be located adjacent to the tailings storage facility (TSF) so there would be no further land disturbance as a result of the landfill development
- landfill cells will be constructed against stable TSF embankments without the need to generate voids.

It is anticipated that each cell would be sized to accommodate around 12–24 months disposal requirements and incorporate the following elements:

- lining with select compacted in-situ soils (site generated clayey material)
- waste rock protection layer (if determined to be required to maintain lining under traffic loads of operational plant and equipment)
- surface runoff diversion away from cells
- grading of cells to stormwater retention/evaporation pond(s) to prevent ponding and contain run-off
- soil capping layer (using recovered topsoils) with waste rock protection layer for wind and water erosion control.

BHP Billiton would apply for a licence from the SA EPA under the Environment Protection Act for the construction and operation of the new landfill facility.

Wastes to be generated during the decommissioning phase would be assessed and managed with consideration to the following measures:

- Existing operational waste management practices as defined in this General Waste Management Plan will apply to domestic and office waste generated during this phase
- Reusing the assets and recycling redundant material will be a priority during decommissioning. Redundant material will either be removed from the site by rail (if benign) or buried on-site in an appropriate facility
- Where feasible, scrap materials such as steel will be made available for recycling
- Contaminated soils associated with process ponds and other work sites will be assessed and options determined for its treatment, reuse and/or disposal, in according to applicable legal requirements
- Waste chemicals and other hazardous substances generated during decommissioning will be recovered and disposed of following applicable legal requirements.

In the absence of a cost-effective reuse or recycling option, used tyres will be disposed of in the rock storage facility (RSF). The locations and volumes of disposed waste tyres would be tracked.

6.2 Management

The over-riding commitment proposed in the Draft EIS and Supplementary EIS is to ensure that the management of waste and the planning, design, operation and closure of the landfill facility proposed for the Olympic Dam site is commensurate to the relevant guidelines and expectations set by the SA EPA; and more specifically with conditions set in the EPA licence for the site.

Issue	Residual impact	Management measure
Impact to the surrounding environment from generated general wastes	Low	Management of waste is to comply with the *Environment Protection Act 1993*, relevant associated regulations and be commensurate with EPA guidelines and expectations; and more specifically with conditions set in the licence (EPA).
Impact to the surrounding environment from disposal of waste tyres to the RSF	Low	Management of waste is to comply with the Environment Protection Act 1993, relevant associated regulations and be commensurate with EPA guidelines and expectations; and more specifically with conditions set in the license (EPA).

7 MANAGEMENT OF WASTE AND USED TYRES RISKS

Chapter 26 of the Draft EIS identified the key environment and health and safety risks associated with the proposed expanded Olympic Dam. The following identifies contingency measures for the risks associated with the management of general waste at the Olympic Dam site. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable. As such, the preventative measures, monitoring, and contingency measures will continue to be developed, reviewed and revised as appropriate.

Risk	Monitoring	Contingency
Excess generation of general waste and waste tyres	Waste monitoring program to ascertain volumes of waste of each waste type generated and the volumes of waste avoided/reduced and recycled (as part of monitoring performance of utilising the waste hierarchy). Amount of reused tyres vs. tyres encapsulated in the RSF. Bench marking waste volumes, in particular waste tyres, against other comparable mining operations within Australia and overseas, where possible.	Review and update programs/procedures and funding/resources for projects/initiatives for waste avoidance, reduction and/or reuse.
Inappropriate management of general waste or waste tyres	Audits of waste management on site as part of ISO 14001 EMS internal audit program.	Review and update programs/procedures and funding/resources to ensure management of waste comply with any licence conditions and the Environment Protection Act 1993.
Inappropriate design, operation and closure of the landfill facility at Olympic Dam site	Audit of design against BHP Billiton requirements (yet to be devised). Continuous auditing and reporting of the landfill facility against the requirements set by the Landfill EMP (yet to be prepared in accordance with EP Act requirements as part of licensing the facility) for operational and closure phases.	Review and update programs/procedures and funding/resources to ensure management of waste comply with any licence conditions and the Environment Protection Act 1993. Instigate and allocate committed funding to environmental improvement projects for landfill design, operation or closure to ensure that compliance with any licence conditions and the Environment Protection Act 1993 is achieved.
Impact to RSF design criteria with disposal of waste tyres	Amount and disposal location of used tyres on site Processes, procedures and operational practices regularly reviewed against current research and legal requirements and RSF design criteria.	Alter procedures for disposal of waste tyres to the RSF.

8 REFERENCES

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APPENDIX N7

Draft radiation management plan (interim draft)

OLYMPIC DAM PROJECTS
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Draft Radiation Management Plan (interim draft)

April 2011

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This draft Radiation Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 PURPOSE

Radiation exposures to workers at the BHP Billiton Olympic Dam operation have been well controlled since commencement of operations in the 1980s. The operation has an existing operational Radiation Management Plan (RMP) which undergoes regular audits, reviews and updates, with any changes subject to approval by the appropriate South Australian regulator.

The proposed expansion will introduce new processes and facilities to the existing operations and the purpose of this document is to outline management measures and controls to be adopted by BHP Billiton Olympic Dam which are described in the Draft Environmental Impact Statement (EIS) and the Supplement EIS. This document should be considered in conjunction with ID 2.2 and ID 3.5 of the Draft Environmental Management Program (EM Program) for the Olympic Dam Expansion Project (as identified under Appendix U of the Draft EIS (BHP Billiton 2009)).

The basis of the existing operational RMP is the Code of Practice and Safety Guide for Radiation Protection and Waste Management in the Mining and Mineral Processing 2005 (the Mining Code). The requirements outlined in the Mining Code are considered to be international best practice and are based on the recommendations of the ICRP and the more detailed requirements of the IAEA.

The fundamental ICRP philosophy of radiation protection through: justification, optimisation and limitation are outlined in more detail in the Draft EIS (specifically Appendix S).

Radiation is one of the hazards associated with the operations at Olympic Dam and the company also operates in accordance with group health, safety and environment standards and ISO14001 certified Environmental Management System, which provides quality assurance and systems management.

This interim draft Radiation Management Plan has been developed specifically for construction, commissioning and subsequent operation of the open pit mine and associated areas for the proposed Olympic Dam expansion.

2 SCOPE

Management at Olympic Dam maintain an effective RMP for the current operations (including underground operations and the processing facilities) and it is not intended that this interim document replace the current RMP. The existing RMP has been approved by the appropriate regulatory authorities in South Australia.

This document is intended to complement the existing RMP and cover the following proposed aspects:

- open pit mine and associated facilities
- the operations at Darwin.

Radiation exposure pathways considered are:

- irradiation by gamma radiation
- inhalation of radionuclides in airborne dust
- inhalation of radon decay products (RDPs).

3 TRAINING, ROLES AND RESPONSIBILITIES

All personnel working at Olympic Dam have some radiation protection responsibilities and receive appropriate training as required. Personnel involved directly in radiation control mechanisms receive specific training.

Responsibilities are documented in an individual's position description and regular performance reviews of individuals occur.

As part of standard workforce management practices, individuals and their roles are assessed to determine the type and level of training required and these requirements are documented. Regular review of the adequacy of the training occurs.

BHP Billiton has statutory obligation to appoint a suitably qualified radiation safety officer who has specific responsibilities.

4 OBJECTIVES AND ASSESSMENT CRITERIA

The Environmental Management Program developed for the expanded Olympic Dam operation and presented in Appendix U of the Draft EIS provided the objectives and assessment criteria for the various environmental aspects related to the project for which a moderate (or greater) residual impact was predicted. The following table provides the relevant objectives and assessment criteria for the management of radiation impacts.

EM Program	Objective	Assessment criteria
Storage, transport and handling of hazardous material		
Radioactive process material spillage	No adverse impacts to the health of employees or the public from exposure to radiation from BHP Billiton's expansion.	Radiation doses to members of the public less than 1 mSv/y above natural background and 20 mSv/y above natural background for designated workers.
Operation of industrial systems		
Radioactive emissions	No adverse impacts to the health of employees or members of the public from exposure to radiation from BHP Billiton's expansion activities.	Radiation doses to members of the public less than 1 mSv/y above natural background and 20 mSv/y above natural background for designated workers.

5 MANAGEMENT OF RADIATION IMPACTS

Management of radiation for the proposed expanded operations will be based on systems and controls outlined in the existing approved RMP. The Draft EIS identified radiation aspects for the proposed additional works only and assessed the potential impacts, defined management measures to avoid or reduce these impacts and categorised the residual impacts by comparing predicted radiation doses with current standards.

This section collates the proposed additional measures for the additional works.

5.1 Overall approach

The overall approach to radiation protection is based on the existing systems of control at Olympic Dam. The systems are based on the requirements of the Mining Code 2005, which itself is based on IAEA guidelines and the recommendations of the ICRP. This approach has been proven to be effective in controlling and minimising doses.

The ICRP philosophy of radiation protection is based on three key principles and these are integral to the proposed expanded facilities and are described below.

5.1.1 Justification

The overall EIS process is consistent with the process of justification where stakeholders, including the company decide if the benefits of a proposal outweigh the costs of the proposal. BHP Billiton through the Draft EIS and Supplementary EIS provide adequate information for the decision to be made.

5.1.2 Optimisation

The principle of optimisation or ALARA (as low as reasonably achievable) is consistent with the BHP Billiton overall goal of 'Zero Harm'.

5.1.3 Limitation

BHP Billiton has committed to a goal of maintaining doses to all workers at less than 50% of the accepted limit (currently 20 mSv/y).

5.2 Management measures

5.2.1 System of radiological protection

Issue	Management measures
ALARA in design	▪ Radiation protection design criteria have been established and are mandatory for all design personnel ▪ An optimisation study would be conducted in the detailed design stage of the proposed expansion ▪ Design engineers undergo specific radiological training relevant to the areas in which they work
Radiation protection system	▪ Current site management processes have been proven to work effectively and will be utilised for the expanded operation, unless upgraded through proven and tested improvements in environmental innovation and technology ▪ ongoing monitoring of radiation levels on site ▪ dose assessment for radiation workers
Assurance that facilities are design appropriately	▪ Design engineers and personnel have completed formal radiation protection training relevant to their position and activities ▪ All designs would undergo a detailed radiation risk assessment

5.2.2 Radiation control in the open pit

Issue	Management measure
Monitoring of workers in the pit	▪ New technology would be employed and installed on mining equipment to monitor radiation levels for equipment operators ▪ Where workers are not in equipment, personal monitoring would be undertaken to determine exposures

Issue	Management measure
Dust concentrations in the pit	▪ Dust suppression in the pit would be mandatory ▪ Haul roads would be built to a standard and maintained to minimise dusting ▪ Drop distances would be minimised to reduce the generation of dust. ▪ A dust management plan would be developed (including particulate monitoring programs)
Protection of workers operating equipment in the pit	▪ Air conditioned cabins will be installed on all mining equipment ▪ Equipment would be purchased with appropriate air conditioning systems to filter dust and RDP. ▪ A routine and audited maintenance program would be established to maintain the air conditioning units in mining equipment ▪ Regular testing of the atmosphere in the cabins would ensure that the maintenance program is effective
Radon levels in the during inversion conditions	▪ Radon monitoring equipment would be installed to monitor the concentrations during inversion conditions (mainly at night during the colder months of the year)

5.2.3 Radiation control in Darwin

Issue	Management measure
Control of dust during concentrate transfer operations	▪ Installation and maintenance of enclosed conveyor transfer system ▪ Routine monitoring of effectiveness of enclosed transfer system ▪ Strict cleanup procedures for any spillages
Operation of plant facility at Port of Darwin, containing radioactive concentrate	▪ Establishment of strict radiation controls as already in place at Olympic Dam ▪ Installation of automatic wagon unloading system in an enclosed sealed shed to eliminate escape of dust ▪ Workers to be radiation workers ▪ Installation of decontamination procedures and wash down facilities for all equipment and materials exiting the site
Spillage of concentrate during transport causing contamination	▪ Use of specially design rail wagons with air tight lids ▪ Tested and audited emergency response plan

6 MANAGEMENT OF RADIATION RISKS AND MONITORING

Chapter 26 of the Draft EIS outlined the results of the risk assessment process undertaken for the Draft EIS. The following table provides the key radiation related risks and provides the proposed contingency measures. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable. As such, the preventative measures, monitoring, and contingency measures will continue to be developed, reviewed and revised as appropriate.

Risk event/situation	Monitoring	Contingency options
Elevated radiation exposures to workers due to failure of dust/fume control systems.	Real-time monitoring of airborne contaminants in smelter building. Routine radiation monitoring and dose assessments.	PPE for immediate use in the event of failure.
Increased radiation exposures for mine workers (from radon decay products) due to adverse atmospheric conditions.	Real-time radon in air monitoring station installed in the pit. Establishment of alert levels for RDP levels. In cabin real-time monitoring of RDP and dust levels.	Restricted access to the pit. Evacuation of the pit.
Elevated radiation exposure to members of the public due to adverse atmospheric conditions.	Real-time monitoring of radiation levels in Roxby Downs.	Active control of dust sources in mining. Cessation of mining activities to eliminate dust during adverse atmospheric conditions.
Elevated radiation exposure to members of the public due to failure during transport of concentrate.	Radiometric test of rail wagons prior to leaving Olympic Dam or Darwin.	Review operational controls, including emergency response plans.

7 REFERENCES

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APPENDIX N8

Draft radioactive waste management plan (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

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Draft Radioactive Waste Management Plan (interim draft)

April 2011

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NOTE:

This draft Radioactive Waste Management Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 PURPOSE

The operation at Olympic Dam produces a series of radioactive waste streams that are managed in accordance with international standard practice. These streams primarily include tailings and low level radioactive waste from the operations and, in the past, have included large volumes of non-mineralised rock from underground. The existing operation maintains an Environmental Management System (EMS) that outlines the approach and systems for management of these radioactive waste streams. This plan is currently integrated within the Environmental Protection Management Plan and approved by the State Government under Clause 7 of the Roxby Downs (Indenture Ratification) Act, 1982 in accordance with the Code of Practice for the Mining and Milling of Radioactive Ore 2005.

The proposed expansion will introduce new processes and facilities to the current operations, and the purpose of this document is to outline management measures and controls to be adopted by BHP Billiton Olympic Dam management, employees and contractors which have been described in the Draft EIS and the Supplemental EIS. This document should be considered in conjunction with management plans IDs 4.2, 4.3 and 4.6 of the Draft Environmental Management Program (EM Program) for the Olympic Dam Expansion Project (as identified in Appendix U of the Draft EIS (BHP Billiton 2009)).

The existing operational EMS is developed in accordance with Code of Practice and Safety Guide for Radiation Protection and Waste Management in the Mining and Mineral Processing 2005 (the Mining Code) The requirements outlined in the Mining Code are considered to be international best practice and are based on the recommendations of the ICRP and the more detailed requirements of the IAEA.

The BHP Billiton approach to radiological protection is consistent with the philosophy of the ICRP in particular, the underlying principles of: justification, optimisation and limitation are outlined in more detail in the Draft EIS (specifically Appendix S).

Radiation is one of the environmental aspects associated with the operations at Olympic Dam and is managed, along with other environmental aspects of the operation, within the ISO14001 certified EMS.

This draft Radioactive Waste Management Plan has been developed specifically to complement the existing operational EMS and covers the construction, commissioning and subsequent operation of the open pit, rock storage facility (RSF), processing plant and tailings storage facility (TSF).

2 ENVIRONMENTAL PERFORMANCE MANAGEMENT

Figure 1 illustrates the process embedded into the draft EMPs developed for the expansion project. The process includes the establishment of parameter limits and action levels based on legal compliance requirements and baseline assessments. Monitoring performance against set targets would be undertaken, and where monitoring indicates that measured parameters are above set targets, higher levels of operational control would be enacted. For example, when operational controls fail to reduce salinity at the desalination plant, discharge would cease to achieve target levels.

An increased level of control would be required as the action level is approached. Where the action level is exceeded, more advanced ‘at source’ controls would be implemented. ‘At source’ controls would generally be contingency measures, for example at the rock storage facility, relocating haul truck dumping locations where application of controls fails to achieve dust emission criteria. Where monitoring indicates that the parameter levels meet performance targets, no modification to management and monitoring would be required, with the exception of modifications for the purpose of continuous improvement.

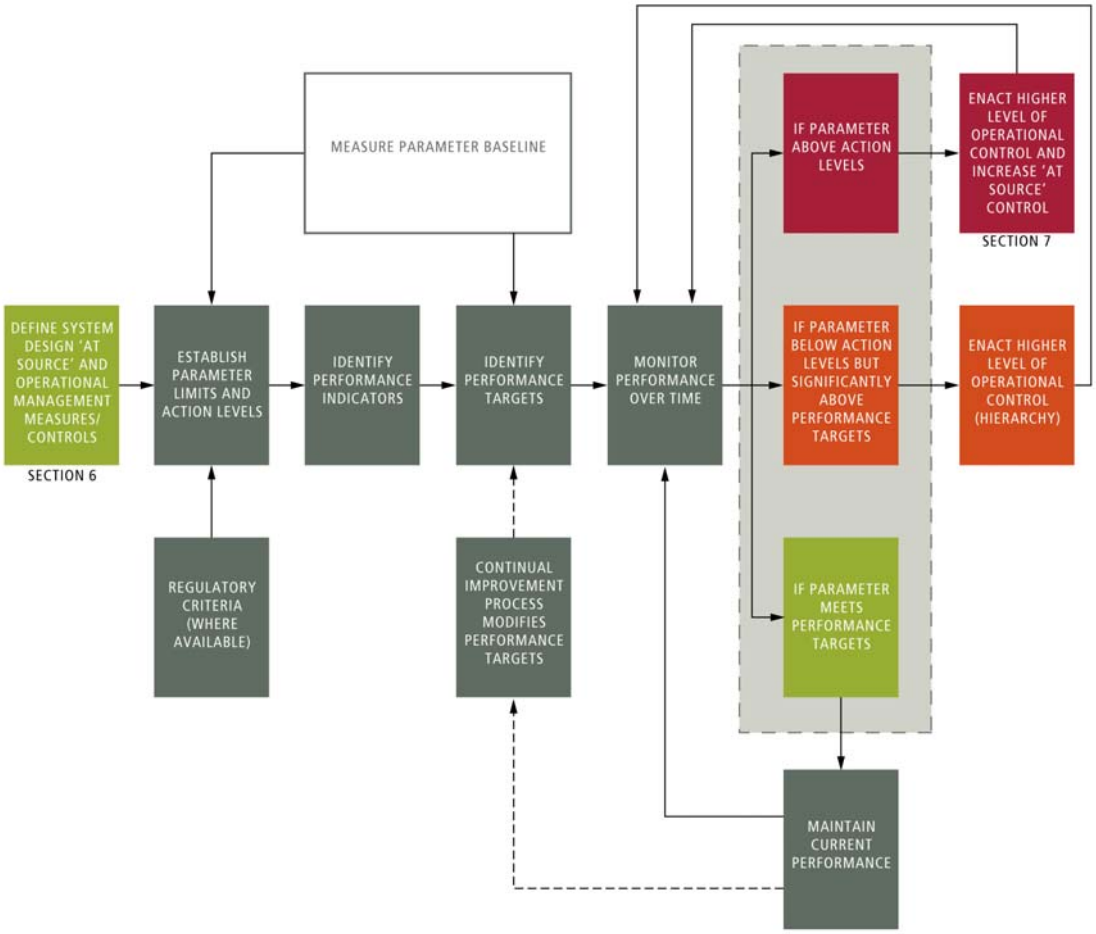

Figure 1: Identification of appropriate parameter limits and action levels to monitor performance of management measures/controls and, where action levels are triggered, enacting higher levels of control/contingency measures

3 SCOPE

Management at Olympic Dam maintain an effective radioactive waste management system for the current operations (which includes the underground operations, the processing facilities and the existing TSF). It is not intended that this document replace the current system.

This document is intended to complement the existing radioactive waste management system and cover the facilities proposed in the following table. It is noted that the new facilities consist of some components that are present in the existing operations and that management controls would therefore be similar to the exiting controls.

The following table outlines the proposed new facilities that would be affected by this RWMP.

Waste management facility	Facility description	Waste stream/s
New tailings storage facility	Seven cells, plus one for contingency, totalling 4,000 ha in area with a final height of 65 m (starting with two cells).	Tailings slurry from the process plant. Excess acidic liquor recirculated from other TSF cells. Low-level radioactive wastes (approx. 48 m^3 per annum – 8 m^3 laboratory waste and 40 m^3 PPE).

Waste management facility	Facility description	Waste stream/s
Balance ponds	Four of an area of 60 ha and 10 m in depth (starting with two ponds and reaching four by Year 11).	Excess acidic liquor from the TSF and the process plant.
RSF	At Year 40 stored mass of 12,700 Mt with an estimated final footprint of 6,720 ha and final height of 150 m above ground level.	Waste mine rock comprising low grade, basement material, and overburden.
New waste management centre	Landfill (an area of 56 ha, to a total of 15 m height plus 1.5 m cover – volume of 7.5 million m^3).	Industrial and general wastes that are not practicable or cost effective to salvage or recycle that may be contaminated with low level radioactivity or contain low levels of radioactivity.
	Transfer station.	Reusable materials (once decontaminated).

4 TRAINING, ROLES AND RESPONSIBILITIES

All personnel working at Olympic Dam including contract personnel have specific responsibilities related to environmental protection and receive appropriate training as required. Personnel involved directly in waste disposal receive specific training.

Responsibilities are documented in an individual's position description and regular performance reviews of individuals occur.

As part of standard workforce management practices, individuals and their roles are assessed to determine the type and level of training required and these requirements are documented. Regular review of the adequacy of the training occurs.

BHP Billiton has statutory obligation to appoint a suitably qualified radiation safety officer who has specific responsibilities.

5 OBJECTIVES AND ASSESSMENT CRITERIA

The Environmental Management Program developed for the expanded Olympic Dam operation and presented in Appendix U of the Draft EIS provided the objectives and assessment criteria for the various environmental aspects related to the project for which a moderate (or greater) residual impact was predicted. The following table provides the relevant objectives and assessment criteria for the management of radiation impacts.

EM Program	Objective	Assessment criteria
Storage, transport and handling of hazardous material		
Radioactive process material spillage	No adverse impacts to health of employees or the public from exposure to radiation from BHP Billiton's expansion.	Radiation doses to members of the public less than 1 mSv/y above natural background and 20 mSv/y above natural background for designated workers.

EM Program	Objective	Assessment criteria
Operation of industrial systems		
Radioactive emissions	No adverse impacts to health of employees or members of the public from exposure to radiation from BHP Billiton's expansion activities.	Radiation doses to members of the public less than 1 mSv/y above natural background and 20 mSv/y above natural background for designated workers.
Generation of industrial waste		
Containment of tailings and mine rock	Maintain structural integrity of the RSF and expanded TSF.	No unplanned structural failures to the TSF or RSF.
Major storage seepage	No significant adverse impacts to ecological communities as a result of seepage from the RSF and expanded TSF.	No loss of native vegetation outside bunded TSF area as a result of seepage from the TSF.
Radioactive waste	No adverse impacts to health of employees or members of the public from exposure to radiation from BHP Billiton's expansion activities.	Radiation doses to members of the public less than 1 mSv/y above natural background and 20 mSv/y above natural background for designated workers.

Note: It should be noted that BHP Billiton has committed in the Draft EIS to a goal of maintaining workers dose at less than 50% of the limit (i.e. 10 mSv/y).

6 MANAGEMENT OF RADIOACTIVE WASTE IMPACTS

Management of radioactive waste for the proposed expanded operations will be based on the existing operational EMS. The Draft EIS and Supplementary EIS identified radioactive waste aspects for the proposed additional works and assessed the potential impacts, defined management measures to avoid or reduce these impacts and categorised the residual impacts (mainly emissions) by comparing predicted radioactivity concentrations with current standards.

This section collates the proposed additional measures for the additional works.

6.1 Overall approach

The overall approach to the management of radioactive waste is based on the existing systems of control at Olympic Dam, which are outlined in the current operational EMS. The systems are based on the requirements of the Mining Code 2005, which itself is based on IAEA guidelines and the recommendations of the ICRP. This approach has been proven to be effective in controlling radioactive wastes. In regards to radioactive waste, in particular, emissions from the expanded operation, consideration is given to the impacts on non-human biota.

The ICRP approach is based on three key principles and each of these principles have been considered for the proposed expanded facilities and are described below.

6.1.1 Justification

The overall EIS process is consistent with the process of justification where stakeholders, including the company, decide if the benefits of a proposal outweigh the costs of the proposal. BHP Billiton through the Draft EIS and Supplementary EIS provide adequate information for the decision to be made.

6.1.2 Optimisation

BHP Billiton will conduct an 'optimisation study' of the proposed expansion during the detailed design stage, which would identify further opportunities for dose reduction and control.

6.1.3 Limitation

BHP Billiton has committed to a goal of maintaining doses to all workers at less than 50% of the accepted limit (currently 20 mSv/y), and doses to members of the public at less than the accepted limit of 1 mSv/y.

6.2 Management measures

6.2.1 System of radiological protection

Issue	Management measures
ALARA in design	▪ Radiation protection design criteria have been established and are mandatory for all facilities ▪ An optimisation (ALARA) study would be conducted in the detailed design stage of the proposed expansion ▪ Design engineers undergo specific radiological training relevant to the areas in which they work
Radiation protection system	▪ Current site management processes have been proven to work effectively and will be utilised for the expanded operation, unless upgraded through proven and tested improvements in environmental innovation and technology ▪ Ongoing monitoring of radiation levels on-site and in the environment ▪ Dose assessment for radiation workers ▪ Dose assessment for members of the public ▪ Appropriate training and education for operational personnel
Assurance that facilities are design appropriately	Design engineers and personnel have completed formal radiation protection training relevant to their position and activities

6.2.2 Radiation control in TSF

Issue	Management measure
Radiation control in design	▪ The tailings deposition is such that tailings are able to consolidate to form a hard mass with low dusting, and therefore low radon emanation ▪ Seepage protection on the tailings' cells would include installing a 1.5 mm HDPE liner over an area approximately 400 m by 400 m, allowing an additional 100 m of liner outside the area covered by the central decant pond ▪ A layer of dune sand on top of the HDPE liner would form a base drain that would assist in consolidation of fine tailings and provide an effective low permeability layer above the liner ▪ A filter drain would be installed above the liner to act as a permanent drain to recover liquor back to the decant ponds prior to transfer to the balance ponds ▪ The design ensures that all water inputs can be contained within the TSF with no potential for overtopping. More than 4 m freeboard above the level of the Probable Maximum Flood event would be available at any time ▪ Seepage control measures would be implemented during commissioning of each cell to minimise the ponding of liquor on bare ground until such time as the tailings consolidated to form an effective barrier. These measures would include constructing temporary divider walls to enable rapid covering of the TSF floor, and infrastructure to remove decant liquor from the edges of the temporary area to the lined central decant area ▪ The geotechnical stability of the design would be assessed using methods described in ANCOLD standards, taking into account the necessary safety factors for high pool (exceeding the minimum freeboard requirements), earthquake loading and normal operation ▪ Establishment of specific design criteria and contractor audits
Radiation control and operation of TSF	▪ During operation tailings would be deposited to all but one of the TSF cells at any given time (with one cell off-line for wall raising) ▪ Liquor that does not evaporate on the beaches would be directed to the decant pond and either be directed to the covered balance ponds and recycled into the metallurgical plant or recirculated back to the TSF cells to obtain additional evaporation ▪ The water balance for the TSF would be calculated annually ▪ An audit of operational procedures for the TSF would be conducted annually ▪ A register of industrial and general waste disposal and recovery would be maintained ▪ A register of hazardous waste disposal (for wastes disposed of within the Special Mining Lease) would be maintained ▪ Groundwater levels in the Andamooka Limestone aquifer would be monitored ▪ Groundwater levels in the Arcoona Quartzite aquifer would be monitored ▪ Radionuclide content (U238 and Ra226) of water used for dust suppression would be monitored

Issue	Management measure
Radiation control during design and operation of tailings pipeline	▪ The pipeline corridor for tailings delivery will be designed, constructed and demarcated as per the piping design procedure used for current operations, applying relevant Australian Standards ▪ Bunded corridors would run for the entire length of the pipeline and would be constructed according to the existing standard, with traverse bunds constructed at intervals along the length of the pipeline to capture any release from disturbed pipe ▪ Pressure drop across the pipeline flow would be monitored via the process control system

6.2.3 New waste management centre (including landfill)

Issue	Management measure
Control of low-level radioactive waste	▪ Low-level radioactive waste (laboratory waste and used personal protective equipment from workers in the uranium packing area) would continue to be disposed of to the TSF ▪ The landfill would be designed in accordance with EPA guidelines. Further work on design would occur during the definition phase (detailed design) of the Olympic Dam Expansion Project ▪ A Landfill Environmental Management Plan (LEMP) will be developed during the Definition Phase

6.2.4 Rock storage facility

Issue	Management measure
Radiation control in design	The design would aim to minimise emissions by: ▪ minimising radon emanation by encapsulating mineralised mine rock within the inert rock in the RSF ▪ ensuring the long-term stability of the facility to ensure that the protective outer layer is not eroded. The design would aim to minimise seepage by: ▪ including a traffic compacted layer of non-reactive rock at the base of the RSF ▪ using traffic to compact subsequent layers, which would reduce infiltration of rainfall ▪ using non-reactive rock to construct the outermost walls and covers ▪ selectively placing mineralised mine rock in the RSF.
Radiation control in operation	▪ A Fleet Management System would be employed during operations to ensure each haul-truck load would be categorised into one of the rock classes and would be tracked to the tip-head to ensure proper encapsulation of reactive material.

Issue	Management measure
Radiation control in rehabilitation and closure	▪ Once completed, the RSF would remain as a permanent landform that would resemble natural mesas near Coober Pedy and Port Augusta ▪ Safety measures such as signage would be adopted to restrict access to the site ▪ Reactive materials would be contained by: – establishing nodes of suitable native vegetation on 5–10% of the top of the RSF – the steep rocky slopes would be innately resistant to erosion and would not require revegetation to enhance stability – using mechanical seeding at some locations.

7 MANAGEMENT OF RADIOACTIVE WASTE RISKS AND MONITORING

Chapter 26 of the Draft EIS outlined the results of the risk assessment process undertaken for the Draft EIS. The following table provides the key risks related to radioactive waste and provides the proposed contingency measures. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable. As such, the preventative measures, monitoring, and contingency measures will continue to be developed, reviewed and revised as appropriate.

Risk event/situation	Monitoring	Contingency options
Inadequate design and construction of the TSF leading to release of tailings material from the facility.	Continuous monitoring during design and construction of the facility and verification that design criteria are being achieved.	Redesign and re-engineering to manage risks.
Inadequate operation of the TSF leading to release of material from the facility.	Continuous monitoring of tailings placement, water balance and physical properties of tailings during operation of the facility and assurance that tailings behaves as predicted.	Modify management procedures to manage risks.
Excessive dust and radon release from the RSF during operation due to poor rock placement or failure of capping material.	Monitor for rock type placement as per RSF design specification. Environmental dust and radon monitoring at receptor locations.	Modify rock placement strategy to ensure reactive rock is encapsulated. Use of abundant inert rock to problematic areas. Addition to cover where necessary.
Excessive seepage of contaminants from the RSF during operation due to poor rock placement or failure of capping material.	Monitor for rock type placement as per RSF design specification. Groundwater monitoring.	Modify rock placement strategy to ensure reactive rock is encapsulated. Monitor to confirm negligible environmental impacts. Re-engineer capping to shed water and subsequent infiltration.

7.1 Radiation dose assessment

As part of the RWMP and Radiation Management Plan (RMP), doses to members of the public are assesses in accordance with recognised procedures. This monitoring would encompass any radiological impacts associated with the additional proposed facilities.

Non-human biota dose assessment has been carried out for the expansion in accordance with the recommendations of ICRP 2007 and the practical methodologies provided by the ERICA software tool. As further data is collected, further non-human dose assessments would be undertaken as part of routine operations.

8 REFERENCES

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APPENDIX N9

Draft rehabilitation and closure plan (interim draft)

OLYMPIC DAM EXPANSION
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Draft Rehabilitation and Closure Plan (interim draft)

April 2011

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NOTE:

This draft Rehabilitation and Closure Plan (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 PURPOSE

This draft Rehabilitation and Closure Plan (interim draft) is intended to ensure that all commitments made for closure planning for the Olympic Dam Expansion Project, as presented in the Draft Environmental Impact Statement (EIS) and the Supplementary EIS are incorporated into the site Rehabilitation and Closure Plan. In particular this document:

- provides the preliminary closure strategy and context
- defines completion criteria, at this point in time, for closure
- captures closure management commitments made in the Draft and Supplementary EIS for eventual adoption in risk management processes for input into the Olympic Dam Rehabilitation and Closure Plan
- captures closure residual risks identified in the Draft and Supplementary EIS
- provides the basis for the ongoing review of closure assumptions and residual risks
- provides a tool for the input of interested parties and the development of agreed post-operational completion criteria and/or land use objectives.

As discussed in the Draft EIS, the current Olympic Dam Rehabilitation and Closure Plan will be reviewed and updated to include the expansion project, with information from this interim plan, once the expansion project receives approval and the detailed design phase of the project is complete.

The Olympic Dam Rehabilitation and Closure Plan for the current operation is subject to annual and triennial reviews. Once incorporated into the Olympic Dam Plan, items relating to the expansion project will also be subject to this review.

It should also be understood that the information in this interim plan will undergo further development and review during the further project phases (definition and execution).

2 SCOPE

This document applies to all activities and infrastructure identified as requiring closure management as per the Draft EIS.

The scope of the Rehabilitation and Closure Plan for the Olympic Dam expansion project will apply to all activities and infrastructure identified in this interim plan and is shown in Figure 1 below:

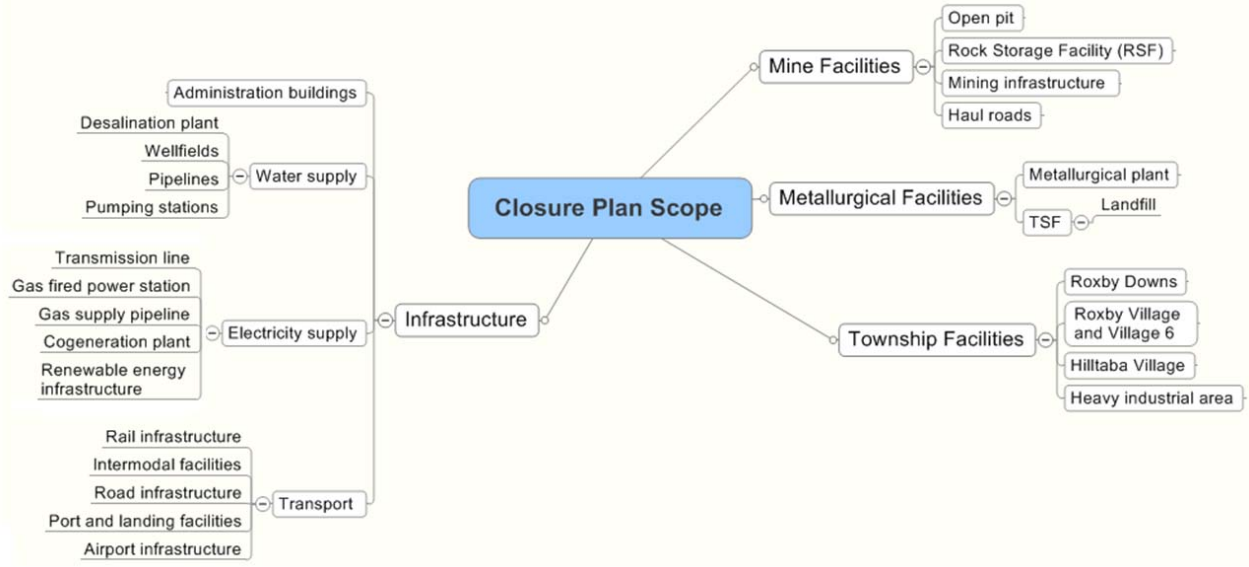

Figure 1: Closure plan scope

3 OBJECTIVES AND ASSESSMENT CRITERIA

The objectives and assessment criteria below can be considered as the completion criteria for the Expansion Project. At the time of incorporation into the current site Rehabilitation and Closure Plan, these criteria will be reviewed for consistency and added to the existing Olympic Dam Rehabilitation and Closure Plan, if not already addressed by the existing plan.

The Draft EIS provides an outline of objectives and assessment criteria for rehabilitation and closure (refer to Table 23.1 of the Draft EIS), which are considered secondary to the overall closure objectives and assessment criteria presented below. Secondary objectives and assessment criteria would be developed further as closure options are defined and undergo risk assessment and management processes during the planning phase of closure.

EM Program	Objective	Assessment criteria
Use of natural resources		
Land disturbance	Rehabilitation provides a geotechnically and geochemically stable and safe environment to reduce the need for long term monitoring and maintenance	Rehabilitation of sites and its integration into adjacent land uses occurs as soon as reasonably practical and in accordance with the Leading Practice Sustainable Development Program for the Mining Industry. Erosion resistant landforms achieved such that post closure remediation works are not required. Contaminated areas assessed and remediated in accordance with NEPM 1999 and SA EPA requirements under the Environment Protection Act, or relevant criteria at the time of closure. Monitoring (e.g. ecosystem function analysis) shows satisfactory rehabilitation progress with diversity and structure approaching that observed at appropriate reference areas.
Marine disturbance	Rehabilitation of any marine areas provides a stable and safe environment and agreed marine values are maintained to reduce the need for long term monitoring and maintenance.	Water quality commensurate with appropriate reference areas of the marine environment achieved during and following. decommissioning of infrastructure No long-term adverse impacts on the breeding success of the Australian Giant Cuttlefish or any other identified species of significant value to the marine environment during and following decommissioning of infrastructure.

EM Program	Objective	Assessment criteria
Spread of pest plants and animals	No material increase in the abundance or area of infestation of pest species as a result of rehabilitation and closure activities.	No material difference in abundance of declared pest species compared to appropriate reference areas. No introduction of new self-sustaining declared pest populations post-closure as a result of BHP Billiton activities.
Aquifer level drawdown	No significant adverse impacts to the availability and quality of groundwater to existing third party users as a result of groundwater drawdown following rehabilitation and closure activities. No significant adverse impacts to groundwater dependent ecosystems following rehabilitation and closure.	Groundwater quality and reserves to show no material impact that will compromise agreed post-closure land use.
Operation of industrial systems		
Fugitive particulate emissions	No adverse impacts to public health as a result of fugitive particulate emissions from the final landforms achieved.	OH&S dust limits or the relevant criteria at the time of closure. NEPM (ambient air) limits for public exposure or the relevant criteria at the time of closure.
Radioactive emissions	No adverse impacts to health of employees or members of the public or flora and fauna from exposure to radiation from final landforms.	Radiation dose to members of the public less than 1 mSv/y above natural background.
Generation of industrial waste		
Containment of tailings and mine rock	Final landforms geotechnically stable.	No unplanned structural failures of the TSF or RSF
Major storage seepage	No significant adverse impacts to ecological communities or third party users as a result of seepage from the RSF and expanded TSF post closure.	Surface and groundwater quality commensurate with agreed future land use (for third party users).
Stormwater discharge	No significant adverse impacts to environmental receptors as a result of stormwater discharges to soil, surface water (freshwater and marine) or groundwater associated with the final landform.	All contact stormwater maintained within designated stormwater management areas.
Waste disposal	No significant adverse impacts to surface water, groundwater or air from the management of wastes following closure.	Relevant criteria at the time of closure, for surface water and groundwater and for air quality. Landfill facility decommissioning and/or rehabilitation in accordance with SA EPA landfill guidelines and requirements.

EM Program	Objective	Assessment criteria
Radioactive waste	No adverse impacts to health of employees, the public or flora and fauna from exposure to radiation, from decommissioning activities and from final landforms achieved.	Radiation doses to the public less than 1 mSv/y above natural background .
Employment and accommodation of people		
Community interactions and workplace interactions	Communities in which BHP Billiton operates value our citizenship.	Safe conditions and controls to restrict inadvertent access to unsafe environments following rehabilitation (such as the open pit).

4 CLOSURE STRATEGY

The closure strategy described below is divided into general activities that apply irrespective of project component (Section 4.1) and those that apply only to certain components (specific to the TSF, for example – refer to Section 4.2).

All activities presented in this draft document are as identified in the Draft EIS (refer to Chapters 23 and 28, respectively for further detail). As previously mentioned, the actions described below are preliminary, and will undergo further development through the remaining Project phases.

The closure strategy would be reviewed and updated to incorporate principals outlined in the Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure and Completion, Department of Industry, Tourism and Resources (2006).

4.1 General

4.1.1 Operating for closure

The existing Environmental Management System (EMS) will be updated to incorporate closure issues in relevant Environmental Management (EM) Programs and ensure that closure will be considered during the Operation phase. The EM Program will be annually reviewed and subjected to government approval, allowing government engagement and continuous improvement of the closure strategy and practices.

For the Expansion, the Draft EM Program (Appendix U of the Draft EIS) will be updated to include closure objectives in relevant EM Program ID.

4.1.2 Topsoil management

Topsoil and cleared vegetation would be managed as follows:

- Stripped topsoil and vegetation would be temporarily stockpiled adjacent to short-term disturbed areas along the north and south Infrastructure corridors and subsequently respread to promote revegetation.
- Where the options for progressive rehabilitation are limited the strategy would be to allow to natural reseeding. Topsoil would be stockpiled only when appropriate. The following criteria provide when it is considered appropriate (Department of Industry, Tourism and Resources 2006):
  - topsoil is required for use in the following six to twelve months
  - topsoil collected at the time of the year when the soil seed bank is likely to be highest

- topsoil collected is not saturated by rainfall
- created stockpiles are of lower height (1 to 3 m)
- surface (usually the top 50 mm of the soil profile) and subsoil material are stockpiled separately.

4.1.3 Progressive rehabilitation

Given the dynamic of the future operation, opportunities for progressive rehabilitation on site are limited to areas of short term and temporary facilities, such as laydown areas, access tracks, borrow pits and parts of infrastructure corridors.

These project components include (schedules are indicative and follow Draft EIS Figure 5.7):

- water and gas supply pipelines, including laydown areas and trenches for the underground portions of the pipeline
- transmission line, including the cleared stringing easements and the sites of temporary facilities
- rail and road infrastructures, including temporary laydown facilities and borrow pits.

Progressive rehabilitation activities will be monitored in order to assess the effectiveness of the rehabilitation measures. Monitoring results will be used to modify the plan throughout the life of the mine in a process of continual improvement.

4.2 Specific project components

A summary of the conceptual closure measures for specific project components is presented in Figure 2.

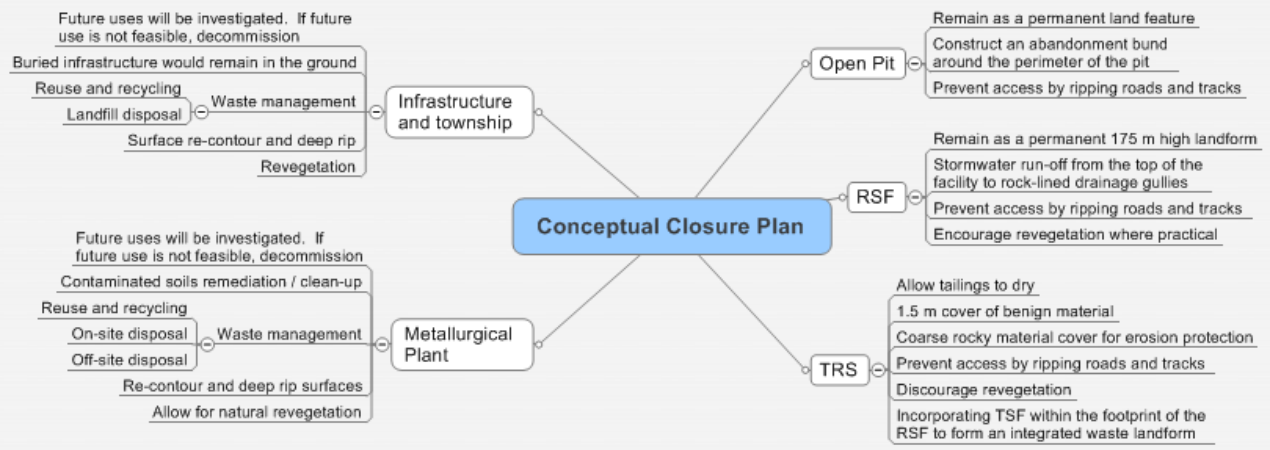

Figure 2: Conceptual closure plan

The conceptual closure plan for each component is covered in the following sections.

4.2.1 Infrastructure and township

Decommissioning and closure

Future re-use of energy, rail and water infrastructure will be determined prior to closure. If improvements associated with the township were not required, infrastructure would be decommissioned. Groundwater wells no longer required would be plugged with concrete and decommissioned as per regulatory requirements. All above ground infrastructure would be removed and recycled or disposed of to landfill. Buried infrastructure of a benign nature would remain. All infrastructure sites would be recontoured and access tracks ripped and revegetated.

4.2.2 Metallurgical plant

Decommissioning and closure

The potential for using the metallurgical plant for research, as an educational facility or for tourism would be investigated prior to closure. The inclusion of haul trucks as part of the tourist facility would be considered.

If these options prove not feasible, the facilities (including haul trucks) would be decommissioned and demolished. Salvaging recoverable material would be a priority during decommissioning. Redundant material would either be removed from the site or buried on-site in an appropriate facility (i.e. within the rock storage facility (RSF), tailings storage facility (TSF) or landfill facilities.)

Contaminated soils associated with process ponds and other work sites would be assessed and remediated as specified in the amended site contamination provisions (2007) of the *Environment Protection Act 1993*, the Assessment of Site Contamination NEPM 1999 and other relevant legislation.

All surfaces would be recontoured and deep ripped to facilitate natural revegetation.

The base case for the current Olympic Dam Rehabilitation and Closure Plan (BHP Billiton 2007) is to demolish all structures and footings to a depth of 500 mm, remove above ground services and leave services that are below a depth of 500 mm. All materials to be disposed to on-site landfill. All contaminated soil and hardstand to 500mm to be disposed of in the TSF. Ripping and recontouring of the site is allowed for, with natural seeding.

4.2.3 Open pit

Decommissioning and closure

Based on the result of geotechnical studies conducted during the latter stages of operation, abandonment bund and / or fencing would be constructed around the perimeter of the pit outside the zone of potential pit-wall subsidence.

Access roads and tracks in and around the open pit would be ripped to prevent or limit ease of use. One access track to the viewing platform would be maintained if tourism were to be encouraged.

Signs warning the public of exposure to radiation and possible subsidence would be erected around the edge of the open pit.

4.2.4 RSF

Decommissioning and closure

The outermost slopes would be left at their constructed slope angles (30 to 37 degrees) to minimise the length of slope that would be susceptible to erosion

The upper surfaces would be covered with a coarse mulch layer that is stable and resilient over time and counters the erosive effects of wind and water. It can be conducive to plant colonisation through provision of germination niches and favourable microclimates.

Access roads and tracks adjacent to the RSF would be ripped to prevent access.

Signs warning the public of exposure to radiation and possible rock falls would be erected around the edge of the RSF.

Rehabilitation

Topsoil containing viable seeds of appropriate plants associated with the foot-slopes of rocky hills may be used at strategic locations (e.g. around the base of the RSF) to promote the natural regeneration of vegetation.

Seeds of appropriate native (local) species would be spread at strategic locations to take advantage of rain events. A high proportion of hard or dormant seeds may be appropriate so that seeds could survive

until favourable rain events. The choice of species would be influenced by soil properties such as pH, salinity, water retention and plant-available water.

Establishing nodes of suitable native vegetation on 5–10 % of the top of the RSF may provide a seed source that would enhance the creation of a self-sustaining system.

Dominant local trees such as cypress pine and mulga may be established within depressions, drainage lines or gullies at the base of batter slopes.

4.2.5 TRS

Decommissioning and closure

The outermost rock on slopes and top surfaces will be armoured with durable rock (preferably limestone or durable sandstone/ quartzite).

The outer embankments of the TSF would be left at their angle of repose to minimise the length of slope that would be susceptible to erosion.

Specially armoured sections of the TSF wall such as valley release structures may be provided to accommodate run-off from extreme storm events.

The upper surfaces would be covered with a coarse mulch layer that is stable and resilient over time and counters the erosive effects of wind and water.

Tailings cells would be capped when they reached their target design height, and when it was safe for vehicles to access the TSF surface (i.e. when the tailings are sufficiently dry).

Rainfall infiltration into the tailings would be minimised by constructing a low permeability capping layer of a sufficiently thick benign material (nominally 0.5 to 1.5 m, depending on the type of material). The most suitable cover would be defined by future test work.

The cap would be covered with a layer of coarse rocky material to ensure it resisted erosion by wind and water.

5 RESIDUAL RISKS

The Draft EIS for the proposed expansion of Olympic Dam (BHP Billiton 2009) identified potential risk events related to rehabilitation and closure, established the likelihood of these events occurring, the consequence should they occur and then categorised these events to establish a risk rating. This section of the plan collates the risks that were rated as ‘high’ and ‘moderate’. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable. As such, the contingency measures will continue to be developed, reviewed and revised as appropriate.

5.1 Key project risks (decommissioning and closure)

Residual impact	Project phase	Project component	Event	Cause
High erosion landforms	Post-closure	All	Impact on flora and fauna	Failure to rehabilitate/stabilise
Weed infestation		All	Impact on flora and fauna	Failure of decontamination procedures
Seepage to groundwater from the TSF and/or RSF		TSF	Decrease in vertical permeability of Arcoona quartzite increases lateral flow	Chemical reaction from seepage changes hydro-geological characteristics of shallow aquifer

Residual impact	Project phase	Project component	Event	Cause
			Increased lateral conductivity through Andamooka limestone	Chemical reaction from seepage changes hydro-geological characteristics
			Acid seepage through base of tailings	Failure to neutralise the seepage water through the ground
Long-term harm to fauna		Pit	Impact on fauna	Hazardous levels of contaminants in pit water
Seepage of contaminants to groundwater and surface expression		TSF and RSF	Reactive materials enter the environment via runoff	Failure (via erosion) of the RSF and TSF side walls and cover

Risks that will be reviewed with future planning and update of the Rehabilitation and Closure Plan include:

- loss of opportunities in salvageable items resulting in increase of landfill
- lack of local material to conduct rehabilitation resulting in rehabilitation delays
- failure of erosion protection in TRS and/or RSF resulting in non compliance with closure criteria.

(Note: These are not new, but are risks identified as part of the Selection Phase Study.)

5.2 Contingency options

5.2.1 Decommissioning incidents

Contingency plans for acute incidents are detailed in site procedures. Site procedures for incident management would be reviewed and updated in order to ensure their applicability to the nature of decommissioning works.

5.2.2 Groundwater seepage

Contingency plans would be developed to address the post-closure risk of seepage to groundwater resulting in migration of contaminants off-site. Contingency options may consider a series of intercept groundwater wells will be utilised to aid in maintaining seepage on-site by enhancing the connection between the Andamooka limestone and Arcoona quartzite aquifers until such time as drawdown, *due to dewatering of the open pit*, ensures local groundwater migrates back towards the pit.

5.2.3 Surface water run-off impacts

Hydrogeological aspects of the Closure Plan would be reviewed and assessed; and where required, engineered surface water controls installed to mitigate impacts to the surrounding environment.

6 MONITORING PLAN

The table below shows the long term monitoring plan for rehabilitated areas. Trends in rehabilitation with respect to analogue sites or baseline conditions will be determined. Periodic analysis of monitoring results will be performed in order to identify gaps in information or issues requiring more detailed assessment or remediation.

Long-term monitoring will be undertaken until rehabilitation criteria have been met. A detailed post-closure monitoring program will be defined during the closure phase of the expansion project. These monitoring actions are consistent with post closure monitoring proposed in the current Olympic Dam Rehabilitation and Closure Plan (BHP Billiton 2007).

Item	Frequency
Ecosystem Function Analysis (EFA)	Annually the first three years, then every two years
Groundwater	Annually
Slope stability/Erosion	Annually
Weed/Feral animal control	Quarterly the first year, then annually
Dust and Radionuclides	Annually

7 REFERENCES

Department of Industry, Tourism and Resources 2006, Leading Practice Sustainable Development Program for the Mining Industry, Mine Closure and Completion, Commonwealth of Australia.

Department of Industry, Tourism and Resources 2006, Leading Practice Sustainable Development Program for the Mining Industry, Mine Rehabilitation Handbook, Commonwealth of Australia.

SRK Consulting 2009, Supplemental *Geochemical Investigations*, Prepared for BHP Billiton Expansion Project Adelaide.

APPENDIX N10

Draft silt and sediment management plan (offshore works associated with desalination plant) (interim draft)

OLYMPIC DAM EXPANSION
SUPPLEMENTARY EIS

bhpbilliton
resourcing the future

Draft Silt and Sediment Management Plan (Offshore Works Associated with Desalination Plant) (interim draft)

April 2011

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NOTE:

This draft Silt and Sediment Management Plan (Offshore Works Associated with Desalination Plant) (interim draft) has been prepared as information to support the Environmental Impact Statement for the proposed Olympic Dam Expansion Project, and is not to be relied on as final or definitive. It will continue to be developed and will be subject to change.

CONTENTS

1 CONTEXT AND PURPOSE

This draft Silt and Sediment Management Plan has been developed specifically to minimise turbidity and silt deposition associated with the installation of the near-shore section of the offshore intake pipe (approximately 100 m section) for the desalination plant at Point Lowly. The potential for silt and sediment generation is restricted to the intake pipeline because BHP Billiton has committed to installing the outfall pipe via a tunnelling method.

The purpose of this plan is to detail the management measures and controls to be adopted by BHP Billiton Olympic Dam employees and contractors to meet agreed environmental performance objectives in relation to management of silt and sediment in the marine environment during construction of the desalination plant for the Olympic Dam project. These performance objectives are as detailed in ID 1.2 of the Draft Environmental Management Program (EM Program) for the Olympic Dam Expansion Project (as identified under Appendix U of the Draft EIS (BHP Billiton 2009)).

BHP Billiton Olympic Dam operates in accordance with an ISO14001 certified Environmental Management System. Management Plans, as part of the Olympic Dam Environmental Management System (EMS), are developed as technical (operational and adaptive) documents informing the EM Program and the measures and actions put in place for achieving objectives. Management Plans provide background information commensurate to the Plan's application, compiled from various sources such a published literature, studies/surveys undertaken and Codes of Practice and guideline documents.

2 ENVIRONMENTAL PERFORMANCE MANAGEMENT

Figure 1 illustrates the process embedded into the draft EMPs developed for the expansion project. The process includes the establishment of parameter limits and action levels based on legal compliance requirements and baseline assessments. Monitoring of performance against targets set would be undertaken, and where monitoring indicates that measured parameters are above set targets, higher levels of operational control would be enacted. For example, when operational controls fail to reduce salinity at the desalination plant, discharge would cease to achieve target levels.

An increased level of control would be required as the action level is approached. Where the action level is exceeded, more advanced 'at source' controls would be implemented. 'At source' controls would generally be contingency measures, for example at the rock storage facility, relocating haul truck dumping locations where application of controls fails to achieve dust emission criteria. Where monitoring indicates that the parameter levels meet performance targets, no modification to management and monitoring would be required, with the exception of modifications for the purpose of continuous improvement.

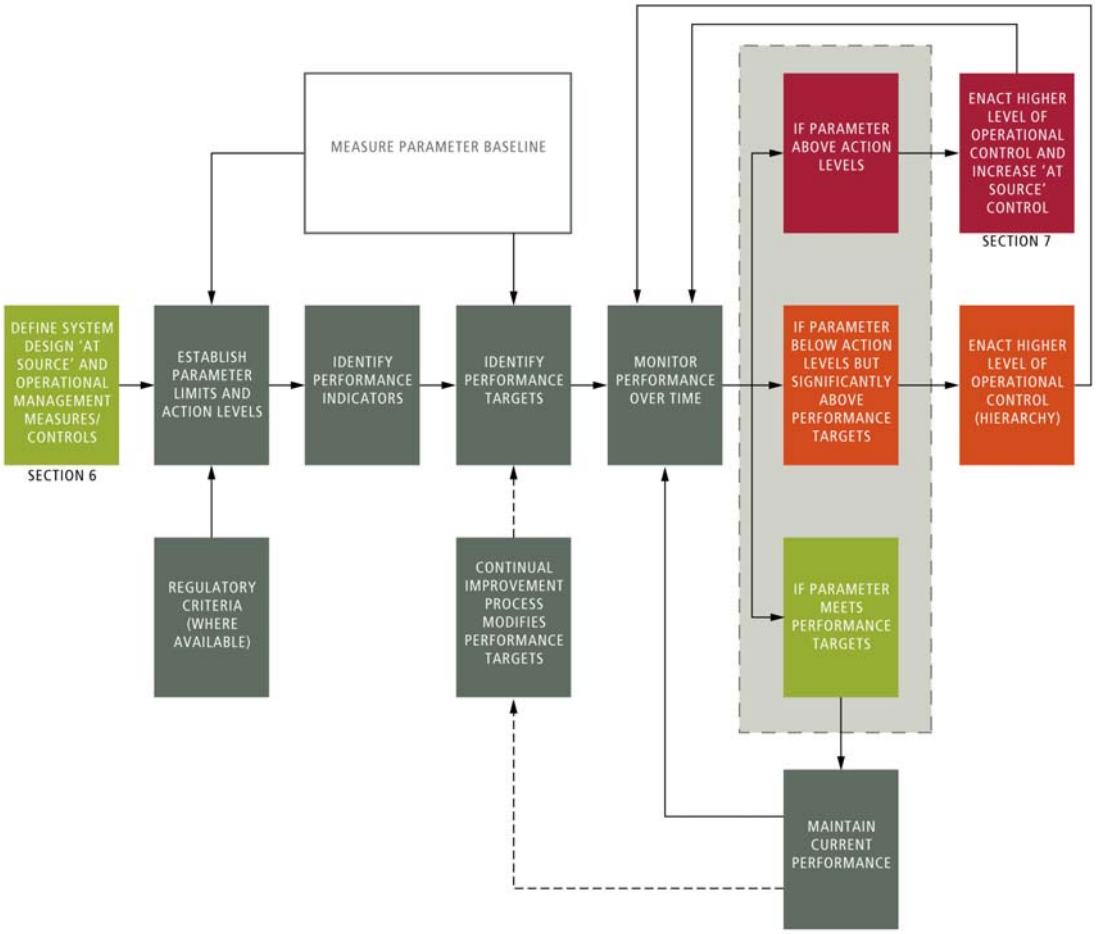

Figure 1: Identification of appropriate parameter limits and action levels to monitor performance of management measures/controls and, where action levels are triggered, enacting higher levels of control/contingency measures

3 SCOPE

This document applies to construction activities associated with off -shore intake pipeline instalment work to be conducted at the desalination plant. The plan outlines mitigation measures to manage silt and sediment impacts in the marine environment and monitoring measures proposed to identify risks associated with silt and sediment emissions.

This document, like all draft management plans for the proposed Olympic Dam expansion, is a 'live document', and as such will be revised and updated as necessary. These updates would include the provision of contingency measures that could be implemented in the event that monitoring programs identify that stated performance outcomes are not being achieved.

4 TRAINING, ROLES AND RESPONSIBILITIES

At the appropriate time a training, roles and responsibilities matrix will be developed and included in this section of the plan. The matrix will detail those BHP Billiton employees and contractors that have specific responsibilities under this plan and those responsibilities, including training requirements, will be clearly defined and communicated.

5 OBJECTIVES AND ASSESSMENT CRITERIA

The EM Program provides the agreed objectives and assessment criteria for the expansion of Olympic Dam. The following provides the relevant objective and assessment criteria for this Plan.

EM Program	Objective	Assessment criteria
Use of natural resources		
Marine disturbance	No significant adverse impacts to specified marine environmental values of Upper Spencer Gulf from constructing the desalination plant (at Point Lowly) or the landing facility *(south-west of Port Augusta).	No long-term adverse impacts on the breeding success of Australian Giant Cuttlefish caused by the construction of the desalination plant.

* Note that this component of the EM Program objective is not relevant to this Plan.

6 MANAGEMENT OF SILT AND SEDIMENT DURING INSTALLATION OF OFFSHORE PIPE SECTION

The Draft EIS for the proposed expansion of Olympic Dam (BHP Billiton 2009) assessed the potential impacts associated with the generation of silt and sediment as a result of the installation of offshore pipe work for the desalination plant. Subsequent to the publication of the Draft EIS, BHP Billiton committed to installing the outfall pipe via a tunnelling method rather than a 'cut and cover' trenching method. Management measures to avoid or reduce silt and sediment impacts and control residual impacts associated with the intake pipe installation are presented in this section.

Based on the successful implementation of these measures, the residual impact for silt and sediment in the Upper Spencer Gulf was categorised as 'moderate' for the period of time that construction is underway, and specifically when pipe installation work is being undertaken. The residual impact is expected to be limited to the construction phase and would dissipate significantly once the installation of infrastructure was completed.

6.1 Strategy

Mitigation of the potential impacts associated with silt and sediment during installation of the offshore pipes during construction of the desalination plant would be managed through implementation of a construction environmental management plan. Specific management measures outlined below would be adopted during construction (with the exception of where a better method could be adopted for the same environmental outcome) for the smaller section of intake pipe that would be installed by trenching.

6.2 Management

The over-riding commitment proposed in the Draft EIS and Supplementary EIS is to ensure that construction activities are undertaken in compliance with the Environment Protection Act 1993 and that turbidity levels observed during construction do not cause impact to identified environmental values of the Upper Spencer Gulf.

Issue	Residual impact rating	Management measure
Generation of excess silt and sediment during trenching	Moderate	**Design of intake pipelines** Characterise marine sediment material in the work area and to be removed, particularly particle size, potential contaminants and acid sulphate soil potential, to implement appropriate operational controls during construction. Review sediment and plume modelling as it relates to construction of the intake pipeline to implement appropriate controls during construction
		Drill and blast activities (if required) Construction schedule to incorporate consideration that if blasting within the rocky reef breeding habitat of the Australian Giant Cuttlefish was required for the installation of the intake pipe, this would not occur within the breeding season for the Australian Giant Cuttlefish (May to September each year) If blasting was to be used, the following measures would be considered: • Offshore sediment migration and erosion control minimisation by using numerous small charges rather than fewer larger charges ▪ test blasts would be undertaken to ensure that charge sizes were the minimum required to fracture rock, minimizing the generation of silt.
		Removal of surplus material from blast areas (if required) Barge is equipped with appropriate containment design and incident response measures including suitable bunding of the spoil area to ensure excavated marine material is suitably contained.
		Placement, spreading and grading of bedding for pipe placement within the trench Construction schedule to incorporate consideration that no marine construction activities within the rocky reef breeding habitat would occur within the breeding season for the Australian Giant Cuttlefish (May to September each year). A pipe and barge system may be used for delivering the bedding material with the assistance of divers (where suitable) to control overspill and the resulting impact on the marine habitat.
		Pipe and trench backfilling Construction schedule to incorporate consideration that no marine construction activities within the rocky reef breeding habitat would occur within the breeding season for the Australian Giant Cuttlefish (May to September each year). A pipe and barge system may be adopted for delivering the backfill (and where practical the rock armouring) with the assistance of divers where suitable, to control overspill and the resulting impact on the marine habitat.

Issue	Residual impact rating	Management measure
		Trenching and preparation works for intake offshore screens Construction schedule to incorporate consideration that no marine construction activities within the rocky reef breeding habitat would occur within the breeding season for the Australian Giant Cuttlefish (May to September each year). Trench spoil assessment (geotechnical, acid sulphate soils and magnetometer investigations) for determining options for trench management will be undertaken. Removed material is to be managed in accordance with appropriate regulatory requirements. The screen system may be lowered and installed via mechanical placement from the barge and guidance using divers to control disturbance to the seabed.
Release of silt and sediment with return waters during tunnelling	Moderate	**Seawater release during tunnelling** A suitable sized cofferdam (or similar) would be constructed on land to store, treat and manage the controlled release of sweater to the marine environment.

7 MANAGEMENT OF SILT AND SEDIMENT RISKS AND MONITORING

Chapter 26 of the Draft EIS identified the key environment and health and safety risks associated with the proposed expanded Olympic Dam. The following identifies contingency measures for the risks associated with the management of silt and sediment as a result of pipe installation for the desalination plant. It is noted that the management of risks is an iterative approach, which aims to eliminate or reduce the likelihood and/or consequence of events to a level considered to be as low as reasonably practicable. As such, the preventative measures, monitoring, and contingency measures will continue to be developed, reviewed and revised as appropriate.

Risk	Monitoring	Contingency
Silt and sediment plumes result in impact to environmental values (such as seagrass and Australian Giant cuttlefish)	Turbidity monitoring program during construction (expected to be daily continuous monitoring). Continuous audits of infrastructure construction and final built form against design specifications. Marine flora and fauna monitoring program. Marine water quality monitoring program. Vibration/ Noise monitoring during blasting activities. Inspection and maintenance programs for equipment used for sediment control.	Review trenching and excavation techniques if silt plumes are higher than expected. Where possible, undertake the trenching and maintenance works of the sediment layer as close to the offshore drilling and blasting activities to minimise sand migration back to the blast zone. Offshore excavation material may be placed onshore using a coffer dam or similar method to manage decant water. Consider the use of silt curtains in the marine environment and on land, sediment traps and possibly bund walls with sediment containment screens. Investigate techniques adopted by other Australian desalination plant projects for similar conditions.

8 REFERENCES

Arup Risk Consulting 2008, Arup 2008 Technical Supplement to the Olympic Dam Development Study — Risk Assessment, (Amended) June 2009.

BHP Billiton 2009, Proposed Port Bonython Desalination Plant Marine Offshore Works – Interim Construction Plan, SKM, August 2009.

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