METROPOLITAN COAL

REHABILITATION MANAGEMENT PLAN

















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All	RMP-R01-A	Original	SCA, DECCW, NSW Office of Water, NSW I&I (Fisheries), DoP and NSW I&I (Mineral Resources)	14 May 2010
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TABLE OF CONTENTS

Section			<u>Page</u>	
1	INTRODUCTION			
	1.1	PURPOSE AND SCOPE	1	
	1.2	STRUCTURE OF THE RMP	1	
2	RMP RE	EVIEW AND UPDATE	4	
	2.1	DISTRIBUTION REGISTER	4	
3	STATUTORY REQUIREMENTS			
	3.1	EP&A ACT APPROVAL	5	
	3.2	LICENCES, PERMITS AND LEASES	7	
	3.3	OTHER LEGISLATION	7	
4	AREAS	REQUIRING REHABILITATION OR REMEDIATION MEASURES	8	
	4.1	SURFACE DISTURBANCE AREAS	8	
	4.2	STREAM POOLS AND ROCK BARS	12	
	4.3	OTHER NATURAL OR BUILT FEATURES IMPACTED BY SUBSIDENCE	14	
5	REHAB	ILITATION OBJECTIVES AND PERFORMANCE INDICATORS	14	
	5.1	SURFACE FACILITIES AREA	15	
	5.2	WARATAH RIVULET AND EASTERN TRIBUTARY	16	
	5.3	CLIFFS	16	
	5.4	OTHER LAND AFFECTED BY THE PROJECT	16	
	5.5	BUILT FEATURES	16	
	5.6	COMMUNITY	17	
6	BASELI	NE DATA	17	
7	REHAB	ILITATION AND REMEDIATION MEASURES	22	
	7.1	REHABILITATION OF SURFACE DISTURBANCE AREAS	23	
		7.1.1 Pre-Disturbance Planning	23	
		7.1.2 Removal of Equipment of Infrastructure 7.1.3 Erosion and Sediment Control Measures	23 24	
		7.1.4 Weed Management Measures	24	
	7.0	7.1.5 Natural Regeneration/Revegetation Measures	24	
	1.2	7.2.1 Pre-disturbance Vegetation Management	20 25	
		7.2.2 Pre-disturbance Aboriginal Heritage Management	27	
		7.2.3 Waratah Rivulet Stream Pool/Rock Bar Remediation	29	
		7.2.4 Eastern Fributary Stream Remediation 7.2.5 Fracture Characterisation	32 33	
		7.2.6 Stream Grouting Techniques	33	
		7.2.7 Site Layout	34	
			35	

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E		Page i		
Document ID: Rehabilitation Management Plan				

TABLE OF CONTENTS (continued)

8	MONIT	ORING		39
	8.1	SURFA	CE DISTURBANCE AREAS	39
		8.1.1 8.1.2	Monitoring of Rehabilitation Measures Assessment against Performance Indicators and Rehabilitation Objective	39 40
	8.2	STREA	M POOL/ROCK BAR REMEDIATION	41
		8.2.1	Monitoring of Pool Water Levels	41
		8.2.2 8.2.3	Monitoring of Stream Remediation Measures Assessment against Performance Indicator and Rehabilitation Objective	42
	8.3	OTHER	NATURAL OR BUILT FEATURES IMPACTED BY SUBSIDENCE	44
9	CONTIN	NGENCY I	PLAN	45
10	ANNUA	L REVIEV	V AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE	45
11	INCIDE	NTS		46
12	COMPL	AINTS		46
13	NON-C	OMPLIAN	CES WITH STATUATORY REQUIREMENTS	47
14	REFER	ENCES		48

LIST OF TABLES

Table 1	Management Plan Requirements
Table 2	Summary of Rehabilitation Objectives and Relevant Management Plans

LIST OF FIGURES

Figure 1	Project Gener	al Arrangement
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- Figure 2 Environmental Management Structure
- Figure 3 Metropolitan Coal Meteorological and Surface Water Monitoring Equipment Sites
- Figure 4 Groundwater Monitoring Equipment Sites
- Figure 5 Subsidence Monitoring Equipment Locations
- Figure 6 Waratah Rivulet and Eastern Tributary Pools
- Figure 7 Mapped Vegetation Communities
- Figure 8 Threatened Flora Recorded During Metropolitan Coal Surveys (current as at January 2010)
- Figure 9 Threatened Fauna Recorded During Metropolitan Coal Surveys (current as at January 2010)
- Figure 10 Aboriginal Heritage Sites

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E Page ii				
Document ID: Rehabilitation Management Plan				

TABLE OF CONTENTS (continued)

LIST OF APPENDICES

- Appendix 1 Rehabilitation Management Plan Surface Disturbance Register
- Appendix 2 Rehabilitation Management Plan Stream Remediation Register
- Appendix 3 Waratah Rivulet and Eastern Tributary Stream Mapping
- Appendix 4 Stream Remediation Plans
- Appendix 5 Example Activity Checklists, Duty Cards and Forms
- Appendix 6 Example Erosion and Sediment Control Plan
- Appendix 7 Grouting Products and Injection Activities Management
- Appendix 8 Bushfire Preparedness Plan
- Appendix 9 Spill Response Procedure

LIST OF ATTACHMENTS

- Attachment A 2014 Remediation Schedule
- Attachment BDesk Top Risk Assessment of a Polyurethane Injection Resin Product Spetec H100
for Waratah Rivulet Remediation at the Metropolitan Colliery

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E		Page iii		
Document ID: Rehabilitation Management Plan				

1 INTRODUCTION

Metropolitan Coal is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd. Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) under Section 75J of the New South Wales (NSW) *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009 (the Approval). A copy of the Project Approval is available on the Peabody website (<u>http://www.peabodyenergy.com.au</u>).

The Project comprises continuation, upgrade and extension of underground coal mining operations and surface facilities at Metropolitan Coal. The Approved underground mining Project layout is shown on Figure 1.

1.1 PURPOSE AND SCOPE

This Rehabilitation Management Plan (RMP) has been prepared for the Project in accordance with Condition 4 of Schedule 6 of the Project Approval.

The Project Approval defines rehabilitation and remediation as follows:

Rehabilitation: The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment.

Remediation: Activities associated with partially or fully repairing or rehabilitating the impacts of the project or controlling the environmental consequences of this impact.

The relationship of this RMP to the Metropolitan Coal Environmental Management Structure is shown on Figure 2. Of particular relevance (Figure 2):

- the Metropolitan Coal Rehabilitation Strategy required by Condition 2 of Schedule 6 of the Project Approval will describe the Rehabilitation Strategy for the mine's Major Surface Facilities Area (Figure 1) and the two ventilation shaft sites;
- a Construction Management Plan will be prepared for surface construction works (excluding rehabilitation and remediation works) in the Woronora Special Area in accordance with Condition 11 of Schedule 3 of the Project Approval; and
- a number of detailed management plans have been prepared for the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans, including a Water Management Plan, Biodiversity Management Plan, Land Management Plan, Heritage Management Plan, Built Features Management Plan and Public Safety Management Plan in accordance with Condition 6 of Schedule 3 of the Project Approval. A number of rehabilitation and remediation measures are included in these detailed plans.

1.2 STRUCTURE OF THE RMP

The remainder of the RMP is structured as follows:

- Section 2: Describes the review and update of the RMP.
- Section 3: Outlines the statutory requirements applicable to the RMP.

Section 4: Describes the areas requiring rehabilitation or remediation activities.

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E		Page 1		
Document ID: Rehabilitation Management Plan				



MET-08-AD7 RMP_101B



- Section 5: Details the rehabilitation objectives and performance indicators that will be used to assess the Project.
- Section 6: Provides the detailed baseline data.
- Section 7: Describes the rehabilitation and remediation measures.
- Section 8: Describes the monitoring program.
- Section 9: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.
- Section 10: Describes the annual review and improvement of environmental performance.
- Section 11: Outlines the management and reporting of incidents.
- Section 12: Outlines the management and reporting of complaints.
- Section 13: Outlines the management and reporting of non-compliances with statutory requirements.
- Section 14: Lists the references cited.

2 RMP REVIEW AND UPDATE

In accordance with Condition 4, Schedule 7 of the Project Approval, this RMP will be reviewed within three months of:

- the submission of an audit under Condition 8 of Schedule 7;
- the submission of an incident report under Condition 6 of Schedule 7;
- the submission of an annual review under Condition 3 of Schedule 7; and

if necessary, revised to the satisfaction of the Director-General of the NSW Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy (DRE) to ensure the RMP is updated on a regular basis and to incorporate any recommended measures to improve environmental performance.

The RMP will also be reviewed within three months of approval of any Project modification and if necessary, revised to the satisfaction of the Director-General of DRE.

Consistent with Condition 4 of Schedule 6 and Condition 12 of Schedule 2, the RMP will be updated as new areas requiring rehabilitation and remediation works arise to the satisfaction of the Director-General of the DRE. Prior to the completion of mining operations, the RMP will be reviewed and revised to include details of the final rehabilitation works and post-closure maintenance and monitoring requirements.

The revision status of this RMP is indicated on each copy. The distribution register for controlled copies of the RMP is described in Section 2.1.

2.1 DISTRIBUTION REGISTER

In accordance with Condition 10, Schedule 7 'Access to Information', Metropolitan Coal will make the RMP publicly available on the Peabody website. A hard copy of the RMP will also be maintained at the Metropolitan Coal site.

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E Page 4				
Document ID: Rehabilitation Management Plan				

Metropolitan Coal recognises that various regulators have different distribution requirements, both in relation to whom documents should be sent and in what format. An Environmental Management Plan and Monitoring Program Distribution Register will be established in consultation with the relevant agencies and infrastructure owners that indicates:

- to whom the Metropolitan Coal plans and programs, such as the RMP, will be distributed;
- the format (i.e. electronic or hard copy) of distribution; and
- the format of revision notification.

Metropolitan Coal will make the Distribution Register publicly available on the Peabody website.

Metropolitan Coal is responsible for maintaining the Distribution Register and for ensuring that the notification of revisions is sent by email or post as appropriate.

In addition, Metropolitan Coal employees with local computer network access will be able to view the controlled electronic version of this RMP on the Metropolitan Coal local area network. Metropolitan Coal will not be responsible for maintaining uncontrolled copies beyond ensuring the most recent version is maintained on Metropolitan Coal's computer system and the Peabody website.

3 STATUTORY REQUIREMENTS

Metropolitan Coal's statutory obligations are contained in:

- (i) the conditions of the Project Approval;
- (ii) relevant licences and permits, including conditions attached to mining leases; and
- (iii) other relevant legislation.

These are described below.

3.1 EP&A ACT APPROVAL

Condition 4 of Schedule 6 of the Project Approval requires the preparation of a RMP for the Project. Approval Condition 4 states:

Rehabilitation Management Plan

4. The Proponent shall prepare and implement a Rehabilitation Management Plan for the project to the satisfaction of the Director-General of the DPI. This plan must be prepared in consultation with the relevant stakeholders, and submitted to the DPI for approval prior to carrying out any second workings in the mining area.

Note: In accordance with condition 12 of schedule 2, the preparation and implementation of Rehabilitation Management Plans is likely to be staged, with each plan covering a defined area (or domain) for rehabilitation. In addition, while mining operations are being carried out, some of the proposed remediation or rehabilitation measures may be included in the detailed management plans that form part of the Extraction Plan. If this is the case, however, then the Proponent will be required to ensure that there is good cross-referencing between the various management plans.

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E		Page 5		
Document ID: Rehabilitation Management Plan				

For the purpose of this RMP, relevant stakeholders are considered to include the Sydney Catchment Authority (SCA), the NSW Office of Environment and Heritage (OEH), NSW Office of Water (part of the Department of Primary Industries (DPI)), DPI (Fisheries) and the NSW Department of Planning and Infrastructure (DP&I). This RMP has been prepared to the satisfaction of the Director-General of the DRE.

In addition, Condition 12 of Schedule 2 of the Project Approval indicates strategies, plans or programs required by the Project Approval may be submitted on a progressive basis. As described in Section 2, the RMP will be updated as new areas requiring rehabilitation and remediation works arise to the satisfaction of the Director-General of the DRE.

Condition 2 of Schedule 7 of the Project Approval outlines management plan requirements that are applicable to the preparation of the RMP. Table 1 indicates where each component of the condition is addressed within this RMP.

		Project Approval Condition	RMP Section
Со	nditi	on 2 of Schedule 7	
2.	The app	e Proponent shall ensure that the management plans required under this proval are prepared in accordance with any relevant guidelines, and include:	
	a)	detailed baseline data;	Section 6
	b)	a description of:	
		 the relevant statutory requirements (including any relevant approval, licence or lease conditions); 	Section 3
		any relevant limits or performance measures/criteria;	Section 5
		 the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; 	Section 5
	c)	a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 7, 8 and 9
	d)	a program to monitor and report on the:	Sections 7, 8 and 10
		 impacts and environmental performance of the project; 	
		effectiveness of any management measures (see c above);	
	e)	a contingency plan to manage any unpredicted impacts and their consequences;	Section 9
	f)	a program to investigate and implement ways to improve the environmental performance of the project over time;	Sections 8 and 10
	g)	a protocol for managing and reporting any;	
		incidents;	Section 11
		complaints;	Section 12
		 non-compliances with statutory requirements; and 	Section 13
		exceedances of the impact assessment criteria and/or performance criteria; and	Section 9
	h)	a protocol for periodic review of the plan.	Section 2

Table 1Management Plan Requirements

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E Page			
Document ID: Rehabilitation Management Plan			

3.2 LICENCES, PERMITS AND LEASES

In addition to the Project Approval, all activities at or in association with Metropolitan Coal will be undertaken in accordance with the following licences, permits and leases which have been issued or are pending issue.

- The conditions of mining leases issued by DRE, under the NSW *Mining Act, 1992* (e.g. Consolidated Coal Lease [CCL] 703, Mining Lease 1610, Coal Lease 379, Mining Purpose Lease 320 and Authorisation 200).
- The Mining Operations Plan 1 October 2012 to 30 September 2019 approved by DRE.
- The conditions of Environment Protection Licence (EPL) No. 767 issued by the OEH under the NSW *Protection of the Environment Operations Act, 1997.*
- The prescribed conditions of new mining leases issued by DRE, under the NSW *Mining Act, 1992* for the two Mining Lease Application areas to the west of CCL 703 and specific surface access leases within CCL 703 for the installation of surface facilities as required. An application for the mining leases has been lodged and their grant is pending.
- Water extraction licences issued by the NSW Office of Water under the NSW Water Act, 1912.
- Mining and occupational health and safety related approvals granted by NSW T&I and WorkCover NSW.
- Supplementary approvals obtained from the SCA for surface activities within the Woronora Special Area (e.g. existing stream remediation approvals for the WRS3 [Pool A] and WRS4 [Pool F] rock bars).

3.3 OTHER LEGISLATION

Metropolitan Coal will conduct the Project consistent with the Project Approval and any other legislation that is applicable to an approved Part 3A Project under the EP&A Act.

The following Acts may be applicable to the conduct of the Project (HCPL, 2008):

- Coal Mine Health and Safety Act, 2002;
- Contaminated Land Management Act, 1997;
- Crown Lands Act, 1989;
- Dams Safety Act, 1978;
- Dangerous Goods (Roads and Rail Transport) Act, 2008;
- Energy and Utilities Administration Act, 1987;
- Fisheries Management Act, 1994;
- Mining Act, 1992;
- Noxious Weeds Act, 1993;
- Protection of the Environment Operations Act, 1997;
- Rail Safety (Adoption of National Law) Act, 2012;
- Roads Act, 1993;

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E Page 7			
Document ID: Rehabilitation Management Plan			

- Threatened Species Conservation Act, 1995;
- Sydney Water Catchment Management Act, 1998;
- Water Act, 1912; and
- Water Management Act, 2000.

Relevant licences or approvals required under these Acts will be obtained as required.

4 AREAS REQUIRING REHABILITATION OR REMEDIATION MEASURES

4.1 SURFACE DISTURBANCE AREAS

Project surface disturbance areas requiring rehabilitation will include those associated with surface exploration activities, vehicular access tracks, environmental monitoring activities (e.g. locations where monitoring equipment has been installed) and other minor Project-related surface activities.

Consistent with the Metropolitan Coal Construction Management Plan, surface works will be sited, where practicable, to minimise the amount of disturbance and vegetation clearance required (e.g. the positioning of sites to avoid the removal of trees or the siting of infrastructure in previously disturbed areas such as the slashed verges of existing SCA roads/tracks).

Existing or currently proposed surface disturbance areas include Metropolitan Coal's surface exploration activity sites and monitoring equipment sites.

The location of existing or currently proposed sites containing Metropolitan Coal monitoring equipment is shown on Figures 3, 4 and 5. Metropolitan Coal monitoring equipment includes pluviometers, an evaporimeter, stream flow monitoring equipment, pool water level monitoring equipment and groundwater bores. Some of the groundwater bores also represent surface exploration activity sites.

A Rehabilitation Management Plan – Surface Disturbance Register will be used to progressively monitor surface disturbance areas requiring rehabilitation (Appendix 1). The Rehabilitation Management Plan – Surface Disturbance Register will be made available to the SCA and DRE upon request.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 8		
Document ID: Rehabilitation Management Plan		









4.2 STREAM POOLS AND ROCK BARS

Metropolitan Coal is required to achieve the rehabilitation objective specified in Table 11 of Condition 1, Schedule 6 of the Project Approval for Waratah Rivulet and the Eastern Tributary.

Table 11: Rehabilitation Objectives

Domain	Rehabilitation objective
Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir	Restore surface flow and pool holding capacity as soon as reasonably practicable
Eastern Tributary, between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir	

Metropolitan Coal is also required to achieve the subsidence impact performance measures specified in Table 1 of Condition 1, Schedule 3 of the Project Approval in relation to watercourses.

Table 1: Subsidence Impact Performance Measures

Watercourses	
Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)	Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases)
Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26	Negligible environmental consequences over at least 70% of the stream length (that is no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining and minimal gas releases)

Section 7.2 describes the stream remediation that will be conducted on Waratah Rivulet and the Eastern Tributary in accordance with Condition 1, Schedule 6 of the Project Approval.

A Rehabilitation Management Plan – Stream Remediation Register will be used to progressively monitor pools/rock bars on Waratah Rivulet and the Eastern Tributary requiring remediation (Appendix 2). The Rehabilitation Management Plan – Stream Remediation Register will be made available to the SCA and DRE upon request.

The location of pools/rock bars along the Waratah Rivulet and Eastern Tributary are shown on Figure 6 and in the detailed mapping on Figures 3-1A to 3-1D and 3-2A to 3-2E in Appendix 3, respectively. Figure 6 shows the location of the pools/rock bars in relation to Longwalls 20-22, which are the first series of Longwalls that will be mined.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 12		
Document ID: Rehabilitation Management Plan		





4.3 OTHER NATURAL OR BUILT FEATURES IMPACTED BY SUBSIDENCE

In addition to the remediation of stream pools and rock bars described in Section 4.2, rehabilitation or remediation measures may be required for impacts to other natural or built surface features resulting from subsidence.

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, these rehabilitation and remediation measures are described in the detailed management plans prepared for the Metropolitan Coal Longwalls 20-22 Extraction Plan, *viz.* the Water Management Plan, Biodiversity Management Plan, Land Management Plan, Heritage Management Plan, Built Features Management Plan and Public Safety Management Plan. These management plans will be revised for future longwalls and included in future Extraction Plans.

In summary:

- The Land Management Plan describes measures for cliffs and associated overhangs, steep slopes and land in general.
- The Water Management Plan describes measures for aesthetic values and excessive stream bank erosion and sedimentation.
- The Biodiversity Management Plan describes measures for impacts on upland swamps and other vegetation (e.g. riparian vegetation).
- The Built Features Management Plan describes measures for infrastructure items.
- The Public Safety Management Plan describes measures for subsidence impacts that are deemed to present a safety hazard.

5 REHABILITATION OBJECTIVES AND PERFORMANCE INDICATORS

The Project Approval requires Metropolitan Coal to achieve the rehabilitation objectives outlined in Table 11 of Condition 1, Schedule 6, detailed below. An additional column has been added to Table 11 from the Project Approval to outline the relevant Metropolitan Coal management plan in which each rehabilitation domain is covered in more detail.

The rehabilitation objectives for each domain detailed in Table 11 of Condition 1, Schedule 6 of the Project Approval are discussed below.

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E Page 14			
Document ID: Rehabilitation Management Plan			

Domain	Rehabilitation objective	Relevant Plan(s)
Surface Facilities Area	Set through condition 2 below	Metropolitan Coal Rehabilitation Strategy
Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir Eastern Tributary, between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir	Restore surface flow and pool holding capacity as soon as reasonably practicable	Metropolitan Coal Rehabilitation Management Plan
Cliffs	Ensure that there is no safety hazard beyond that existing prior to mining	Metropolitan Coal Longwalls 20- 22 Public Safety Management Plan
Other land affected by the project	 Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: comprised of local native plant species; with a landform consistent with the surrounding environment 	Metropolitan Coal Rehabilitation Management Plan
Built features	Repair/restore to pre-mining condition or equivalent	Metropolitan Coal Longwalls 20- 22 Built Features Management Plan
Community	Minimise the adverse socio-economic effects associated with mine closure including the reduction in local and regional employment	Metropolitan Coal Longwalls 20- 22 Rehabilitation Strategy and/or Metropolitan Coal Public Safety Management Plan
	Ensure public safety	

Table 11: Rehabilitation Objectives

5.1 SURFACE FACILITIES AREA

The rehabilitation objective for the surface facilities area is set through Condition 2 of Schedule 6 of the Project Approval, which states:

Rehabilitation Strategy – Surface Facilities Area

- 2. By the end of October 2011, the Proponent shall prepare a Rehabilitation Strategy for the surface facilities area to the satisfaction of the Director-General. This strategy must:
 - (a) be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Director-General;
 - (b) be prepared in consultation with relevant stakeholders, including WCC and the CCC;
 - (c) investigate options for the future use of the area upon the completion of mining;
 - (d) describe and justify the proposed rehabilitation strategy for the area; and
 - (e) define the rehabilitation objectives for the area, as well as the proposed completion criteria for this rehabilitation.

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E Page 15			
Document ID: Rehabilitation Management Plan			

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, the rehabilitation objective for the surface facilities area will be addressed in the Metropolitan Coal Rehabilitation Strategy (Figure 2).

5.2 WARATAH RIVULET AND EASTERN TRIBUTARY

The rehabilitation objective for Waratah Rivulet (between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir) and the Eastern Tributary (between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir), *viz. Restore surface flow and pool holding capacity as soon as reasonably practicable*, is addressed in Sections 7.2 and 8.2.

Metropolitan Coal will assess the progress of the stream remediation measures in achieving the rehabilitation objective for Waratah Rivulet and the Eastern Tributary against the following performance indicator:

Analysis of water level recession rates for a pool indicates a similar pool behaviour to that which existed prior to being impacted by subsidence.

5.3 CLIFFS

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, the rehabilitation objective for cliffs, *viz. Ensure that there is no safety hazard beyond that existing prior to mining*, will be addressed in the Metropolitan Coal Public Safety Management Plan (Figure 2).

5.4 OTHER LAND AFFECTED BY THE PROJECT

The rehabilitation objective for other land affected by the Project, *viz.* Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: comprised of local native plant species; with a landform consistent with the surrounding environment, is addressed in Sections 7.1, 8.1 and 8.3 of this RMP.

Metropolitan Coal will assess the progress of the rehabilitation and remediation measures in achieving the rehabilitation objective for other land affected by the Project against the following performance indicators:

Redundant equipment/infrastructure items have been removed.

The site is neat and tidy (i.e. it does not contain any rubbish).

No weed management measures are required.

No erosion or sediment control measures are required.

Where appropriate, native vegetation is naturally regenerating or active revegetation is establishing.

No further active revegetation measures are required.

5.5 BUILT FEATURES

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, the rehabilitation objective for built features, *viz. Repair/restore to pre-mining condition or equivalent*, will be addressed in the Metropolitan Coal Built Features Management Plan (Figure 2).

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 16		
Document ID: Rehabilitation Management Plan		

5.6 COMMUNITY

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, the rehabilitation objective for the community, *viz. Minimise the adverse socio-economic effects associated with mine closure including the reduction in local and regional employment*, will be addressed in the Metropolitan Coal Rehabilitation Strategy (Figure 2).

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, the rehabilitation objective for the community, *viz. Ensure public safety*, will be addressed in the Metropolitan Coal Public Safety Management Plan for the underground mining area and surrounds and in the Metropolitan Coal Rehabilitation Strategy for the Major Surface Facilities Area (Figure 2).

6 BASELINE DATA

Baseline data of relevance to areas requiring rehabilitation or remediation activities includes:

Ecological Information

- Vegetation community mapping by Bangalay Botanical Surveys (2008) (Figure 7).
- Threatened flora species recorded in the Project Underground Mining Area and surrounds (Figure 8).
- Endangered Ecological Communities recorded in the Project Underground Mining Area and surrounds (Figure 7), namely:
 - Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion (vegetation community 5a shown on Figure 7).
 - O'Hares Creek Shale Forest Endangered Ecological Community (vegetation communities 5b and 5r shown on Figure 7).
- Threatened fauna recorded in the Project Underground Mining Area and surrounds (Figure 9).
- Terrestrial and aquatic ecology data and baseline information described in the Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan.
- Terrestrial and aquatic ecology data and information included in the Metropolitan Coal Project Environmental Assessment (HCPL, 2008).

Aboriginal Heritage Information

- Known Aboriginal heritage sites recorded in the Project Underground Mining Area and surrounds (Figure 10).
- Aboriginal heritage site data and baseline information described in the Metropolitan Coal Longwalls 20-22 Heritage Management Plan.
- Aboriginal heritage data and information included in the Metropolitan Coal Project Environmental Assessment (HCPL, 2008).

Land Information

- Information on cliffs and associated overhangs, steep slopes and land in general provided in the Metropolitan Coal Longwalls 20-22 Land Management Plan.
- Land information included in the Metropolitan Coal Project Environmental Assessment (HCPL, 2008).

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E Page 17			
Document ID: Rehabilitation Management Plan			









Water Information

- Detailed stream mapping and photographic records of the Waratah Rivulet, Eastern Tributary, Tributary A and Tributary B provided in the Metropolitan Coal Longwalls 20-22 Water Management Plan.
- Watercourse data (e.g. surface and groundwater quantity and quality data) referred to in the Metropolitan Coal Longwalls 20-22 Water Management Plan and Catchment Monitoring Program.
- Watercourse information included in the Metropolitan Coal Project Environmental Assessment (HCPL, 2008).

As described in Section 7.1.1, the Metropolitan Coal Construction Management Plan will describe the management measures that will be implemented for surface construction works (excluding remediation or rehabilitation works) for future surface disturbance areas in the Woronora Special Area. This includes pre-disturbance planning activities such as the identification of specific flora characteristics of the areas proposed to be disturbed and identification of specific management measures to minimise impacts on flora, prior to, during and/or following the completion of the surface works including natural regeneration and/or rehabilitation measures. Such baseline information will be available for any new surface disturbance sites addressed by the Construction Management Plan.

For previously established surface disturbance areas, reports such as Environmental Management Plans and Review of Environmental Factors submitted to the SCA contain relevant baseline information for the existing surface disturbance sites.

7 REHABILITATION AND REMEDIATION MEASURES

This section describes the measures that will be implemented to rehabilitate and/or remediate Project impacts, including impacts associated with surface activities in the underground mining area and surrounds (Section 7.1) and impacts associated with subsidence impacts on stream pools and rock bars (Section 7.2).

As described in Section 4.3, other rehabilitation and remediation measures will be described in the detailed management plans prepared for the Metropolitan Coal Longwalls 20-22 Extraction Plan including the Water Management Plan, Biodiversity Management Plan, Land Management Plan, Heritage Management Plan, Built Features Management Plan and Public Safety Management Plan, and future revisions of these plans.

Rehabilitation and remediation measures will be implemented, as appropriate, to comply with the relevant statutory requirements and the Project rehabilitation objectives.

Monitoring of the performance of the rehabilitation and remediation measures against the rehabilitation objectives and performance indicators is described in Section 8.

Rehabilitation and remediation activities will be reported in the Annual Review (Section 10).

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 22		
Document ID: Rehabilitation Management Plan		

7.1 REHABILITATION OF SURFACE DISTURBANCE AREAS

In accordance with Table 11 of Condition 1, Schedule 6 of the Project Approval, Metropolitan Coal is required to achieve the following rehabilitation objective for other land affected by the Project:

Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems:

- comprised of local native plant species; with
- a landform consistent with the surrounding environment.

A Rehabilitation Management Plan – Surface Disturbance Register will be used to manage the implementation of rehabilitation measures (Appendix 1). Monitoring of the performance of the rehabilitation measures is described in Section 8.

Sections 7.1.1 to 7.1.5 outline the measures that will be implemented to rehabilitate surface disturbance areas.

7.1.1 Pre-Disturbance Planning

The Metropolitan Coal Construction Management Plan will describe the management measures that will be implemented for surface construction works (excluding remediation or rehabilitation works) for future surface disturbance areas in the Woronora Special Area.

The management of vegetation clearance/surface disturbance activities will include:

- Detailed site inspections to identify the specific flora characteristics of the areas proposed to be disturbed.
- Identification of areas in which specific surface works involving vegetation clearance will be avoided or limited (e.g. within swamps, Endangered Ecological Communities (EECs) and areas where threatened flora species are present).
- Final site selection and works design so as to minimise the amount of vegetation clearance required.
- Identification of management measures to minimise impacts on flora, prior to, during and/or following the completion of the surface works including natural regeneration and/or rehabilitation measures.
- Identification of management measures to minimise impacts on terrestrial fauna and their habitats.

This information will be used to inform the rehabilitation of each site.

7.1.2 Removal of Equipment or Infrastructure

Equipment and infrastructure items that are redundant will be removed. The surface disturbance area will be inspected to identify the measures required to rehabilitate the site, such as those described in Sections 7.1.3 to 7.1.5. Some equipment/infrastructure items may be removed during the life of the Project in accordance with the relevant Metropolitan Coal management plan(s), while other equipment/ infrastructure items are likely to remain in place until after the completion of mining operations.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 23		
Document ID: Rehabilitation Management Plan		

As described above, the RMP will be reviewed and revised to include details of the final rehabilitation works and post-closure maintenance and monitoring requirements prior to the completion of mining operations.

7.1.3 Erosion and Sediment Control Measures

Temporary erosion and sediment controls (e.g. silt fences and sediment control structures) may be required to be installed prior to the commencement of surface disturbance activities. Erosion and sediment control measures will be designed in general accordance with applicable erosion and sediment control principles and guidelines (e.g. *Managing Urban Stormwater: Soils and Construction, Volume 2E Mines and Quarries* [Department of Environment and Climate Change, 2008]) in accordance with the Metropolitan Coal Construction Management Plan. Erosion and sediment controls will remain in place until such time as ground disturbed by the works has been stabilised.

7.1.4 Weed Management Measures

Where weeds are found to occur specifically in areas subject to mine-related surface activities, weed management measures will be implemented to limit the spread and colonisation of noxious and environmental weeds.

In accordance with the Metropolitan Coal Construction Management Plan, Metropolitan Coal will limit activities that cause soil disturbance.

Weed management of surface disturbance areas will include:

- Inspections of mine-related surface disturbance areas to identify areas requiring weed management measures to be implemented.
- Implementation of weed management measures (e.g. mechanical removal and application of approved herbicides in authorised areas). Prior to the use of any chemical controls, the chemicals will be approved by the relevant landholder and the Material Safety Data Sheet for the chemical obtained prior to spraying.
- Follow-up inspections to assess the effectiveness of the weed management measures implemented and the requirement for any additional management measures.
- Consultation with the SCA and other relevant landholders in relation to weed management activities.
- The implementation of measures that favour the restoration of native vegetation (where appropriate) is also considered an effective method of weed management.

The weed management activities will be reported in the Annual Review (Section 10).

7.1.5 Natural Regeneration/Revegetation Measures

It is anticipated that the majority of surface disturbance areas required by the Project will be of a size that revegetation of the disturbed area would occur naturally from adjacent native vegetation. In other disturbance areas, measures may need to be implemented to encourage natural regeneration (e.g. placing stockpiled vegetative material over cleared areas).

Active revegetation of native vegetation (e.g. planting and/or direct seeding) will be implemented in the event natural regeneration is not considered to be progressing satisfactorily.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 24		
Document ID: Rehabilitation Management Plan		

The selection of species for active planting and/or direct seeding will be determined in consideration of the site characteristics (e.g. slope, elevation and soil) and vegetation communities at, or in the vicinity of, the disturbance area. Active revegetation will utilise endemic plant species. Specifically, any active revegetation in the Woronora Special Area will utilise seed collected from the Woronora Special Area. Active revegetation gand/or planting of upper, mid and lower storey native species. Metropolitan Coal will consult with the SCA and DRE prior to the conduct of any active revegetation in the Woronora Special Area.

The overriding objective of both natural regeneration and active revegetation is to establish selfsustaining vegetation appropriate to the landforms.

7.2 STREAM POOL/ROCK BAR REMEDIATION

Metropolitan Coal is required to achieve the rehabilitation objective specified in Table 11 of Condition 1, Schedule 6 of the Project Approval for Waratah Rivulet and the Eastern Tributary.

Table 11: Rehabilitation Objectives

Domain	Rehabilitation objective
Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir	Restore surface flow and pool holding capacity as soon as reasonably practicable
Eastern Tributary, between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir	

Sections 7.2.1 and 7.2.2 describe the vegetation and Aboriginal heritage management measures that will be implemented at a stream remediation site prior to the commencement of remediation activities.

Sections 7.2.3 and 7.2.4 describe the stream remediation that will be conducted on the Waratah Rivulet and Eastern Tributary, respectively.

Section 7.2.5 describes the fracture characterisation activities that will be implemented at rock bars requiring remediation and Section 7.2.6 describes the stream grouting techniques that will be used. Section 7.2.7 describes the site layout of stream remediation activities at each rock bar and Section 7.2.8 describes the environmental management measures that will be implemented during the conduct of the stream remediation activities.

A Rehabilitation Management Plan – Stream Remediation Register will be used to manage the implementation of stream remediation measures (Appendix 2). Monitoring of the performance of the stream remediation measures is described in Section 8.

7.2.1 Pre-disturbance Vegetation Management

Vegetation clearance activities (i.e. the removal, lopping or slashing of vegetation) may be required for stream remediation activities. Management measures will be implemented at sites where vegetation clearance is necessary. The vegetation management of proposed stream remediation sites is described below.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 25		
Document ID: Rehabilitation Management Plan		

Threatened Flora Surveys

Prior to disturbance, surveys for threatened flora species will be conducted within the proposed stream remediation area. Works will be relocated, where feasible, to avoid or minimise impacts on any threatened species population.

In the event field inspections identify individuals of a threatened flora species within a proposed stream remediation area that are not practicable to avoid, the potential impacts of the proposed works on the population of the threatened flora species will be assessed by a suitably qualified and experienced ecologist.

In the event the proposed stream remediation activities are considered likely to have a significant impact on a population of the threatened species listed under the TSC Act or EPBC Act, the proposed works will be modified to avoid such an outcome.

It is anticipated that the majority of activities will be able to avoid disturbance to individuals of a threatened flora species.

The outcomes of the threatened flora surveys will be recorded in the Rehabilitation Management Plan – Stream Remediation Register (Appendix 2).

Site Inspection

An inspection of the proposed stream remediation area will be conducted to identify management measures to be implemented to minimise impacts on flora, prior to, during and/or following the completion of the stream remediation works. Potential management measures include:

- Restricting vegetation clearance to the slashing of vegetation (i.e. leaving the lower stem and roots *in-situ* to maximise the potential for natural regrowth), rather than the removal of trees.
- Lopping of branches, rather than the removal of trees.
- The use of existing fire trails to access sites to minimise the disturbance of soils.
- Limiting the amount of soil disturbance to the minimum required for the mobilisation, placement and operation of equipment and for maintaining access to equipment.
- The use of rubber lattice matting or other measures to delineate work areas and to minimise disturbance to soils and vegetation.
- Identification of specific management measures to minimise impacts on terrestrial fauna and their habitats (e.g. avoiding the removal of trees or branches containing hollows, the placement of lopped branches in the general vicinity etc.).
- Identification of specific rehabilitation measures (e.g. placing stockpiled vegetative material over cleared areas to encourage natural regeneration).

The outcomes of the site inspection will be recorded in the Rehabilitation Management Plan – Stream Remediation Register (Appendix 2).

Final Site Selection and Works Design

The results of the surveys/assessments will be used to inform final site selection and works design to minimise the amount of vegetation clearance required.

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E Page 26			
Document ID: Rehabilitation Management Plan			

7.2.2 Pre-disturbance Aboriginal Heritage Management

Pre-Clearance Surveys

In accordance with the Metropolitan Coal Heritage Management Plan, pre-clearance surveys will be undertaken to identify the most appropriate location for stream remediation activities. Pre-clearance surveys will involve the following:

- 1. Developing an inventory of surface infrastructure and conducting an initial desktop risk assessment based on the location of known sites.
- 2. Undertaking a pre-clearance survey of the proposed stream remediation site(s).
- 3. Assessing potential impacts to nearby Aboriginal heritage site(s) based on the results of the preclearance surveys and determining the most appropriate location for stream remediation activities.
- 4. Where practicable, stream remediation activities will be located so as to avoid or minimise impacts to Aboriginal heritage sites. If impacts cannot be avoided, appropriate management and/or mitigation measures will be undertaken in accordance with the Metropolitan Coal Heritage Management Plan.

Where Aboriginal heritage sites are located close to required stream remediation works, the surface disturbance protocol described below will be conducted.

Surface Disturbance Protocol

The surface disturbance protocol aims to avoid accidental damage to Aboriginal heritage sites located close to surface disturbance works. As described above, pre-clearance surveys will be undertaken to identify the most appropriate location for stream remediation activities.

This protocol will apply to surface disturbance works (e.g. exploration works, installation/operation/ maintenance of surface infrastructure, construction/maintenance of access tracks, monitoring and stream restoration) proposed to be located close to any known Aboriginal heritage site(s).

Stream remediation activities will be undertaken in consideration of the following:

- 1. Avoidance of impact to Aboriginal heritage sites will be the primary management measure, where practicable.
- 2. To avoid accidental damage to Aboriginal heritage sites located close to stream remediation activities works, appropriate demarcation will be implemented (e.g. fencing, sign-posting or temporary flagging).
- 3. Where avoidance is not practicable, a comprehensive baseline record will be developed and consideration of salvage will be undertaken in consultation with Aboriginal stakeholders prior to disturbance.

Recording and Registering New Aboriginal Heritage Sites

Any previously unrecorded Aboriginal heritage sites identified during fieldwork (e.g. pre-clearance surveys) will be recorded using the standard OEH site card. This information will be submitted to the OEH for registration on the OEH Aboriginal Heritage Information Management System (AHIMS) database. Any previously unrecorded sites will also be subject to archaeological and cultural significance assessment, in consultation with Aboriginal stakeholders. Any previously unrecorded sites will be managed in accordance with the requirements of the Metropolitan Coal Heritage Management Plan.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 27		
Document ID: Rehabilitation Management Plan		

Aboriginal Stakeholder Participation

The number of participants in an effective field team is governed by a number of safety, logistic and access considerations, including:

- **Safety:** a large group can be difficult to keep together when moving through dense vegetation in steep terrain. Large groups move slowly (especially through dense vegetation and in steep terrain) and can prevent a rapid response (i.e. evacuation) to imminent dangers that can often be encountered (e.g. bush fire warnings and electrical storms).
- **Logistics:** Participant numbers are limited by vehicle availability and safety restrictions. The remote nature of the area requires the use of vehicles for efficient field work.
- Access Restrictions: The area is within an SCA Schedule One special area. Public access is controlled in this area to protect water quality and ecological integrity (SCA, 2007). Excessive access into this area is not consistent with the SCA's Special Areas Strategic Plan of Management (SCA, 2007).

Aboriginal stakeholders will be invited to attend relevant scheduled fieldwork in consideration of the above and also in accordance with relevant OEH consultation guidelines. In accordance with the Metropolitan Coal Heritage Management Plan, scheduled fieldwork to which Aboriginal stakeholders will be invited to attend includes:

- Aboriginal heritage monitoring;
- supplementary fieldwork and pre-clearance surveys; and
- the planning for and/or implementation of management and mitigation measures.

Invitations to attend scheduled fieldwork will be provided in writing with at least four weeks notice where possible. Dates for undertaking fieldwork will be subject to consultation with Aboriginal stakeholders and archaeologists. Prior to undertaking fieldwork, all participating Aboriginal stakeholders and archaeologists will be required to provide copies of current relevant insurances (i.e. public liability and workers compensation). Participating stakeholders and archaeologists will also be required to meet standard occupational health and safety requirements (i.e. appropriate personal protection equipment and random drug and alcohol testing).

Metropolitan Coal will maintain a consultation log to record all correspondence with Aboriginal stakeholders (e.g. emails, telephone calls, letters, meeting minutes, etc.).

Aboriginal stakeholders will be invited to comment on relevant draft documentation regarding the management of Aboriginal cultural heritage, if and when required.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 26		
Document ID: Rehabilitation Management Plan		

7.2.3 Waratah Rivulet Stream Pool/Rock Bar Remediation

In accordance with Condition 1, Schedule 6 of the Project Approval, surface flow and pool holding capacity is required to be restored on the Waratah Rivulet between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir.

The Project Approval also requires Metropolitan Coal not to exceed the subsidence impact performance measures outlined in Table 1 of Condition 1, Schedule 3. The subsidence impact performance measure specified in Table 1 of Condition 1, Schedule 3 in relation to the Waratah Rivulet watercourse is:

Table 1: Subsidence Impact Performance Measures

Watercourses	
Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)	Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases)

Sections 7.2.3.1 to 7.2.3.3 describe stream remediation on the Waratah Rivulet at pools/rock bars overlying the completed mining area, at pools/rock bars downstream of the completed mining area to the Longwall 23 maingate, and pools/rock bars downstream of the Longwall 23 maingate to the full supply level of the Woronora Reservoir, respectively. A remediation schedule for 2014 is provided as Attachment A.

The subsidence impact performance measure described above relates to the pools/rock bars described in Section 7.2.3.3.

7.2.3.1 Completed Mining Area (Downstream of Flat Rock Swamp to Longwall 20 Tailgate)

Pools A, B, C, E, F, G, G1, H and I on the Waratah Rivulet are situated in the completed mining area (i.e. overlying Longwalls 1 to 13) between Flat Rock Swamp and the tailgate of Longwall 20 (Figure 6). As described in Section 8.2, Pools B, C, E, G, G1, H and I will be manually monitored on a daily basis, while Pools A and F will be monitored continuously with a data logger.

As a result of previous mining, the water levels in pools upstream of Pool G1 have been impacted by mine subsidence. Metropolitan Coal will restore surface flow and pool holding capacity at these pools as soon as reasonably practicable.

Stream remediation activities have commenced at Pools A and F in accordance with approvals obtained from the SCA under Part 5 of the EP&A Act. The rock bars at Pools A and F are considered to largely control the pools located upstream of these rock bars. As a result, Metropolitan Coal anticipates that the restoration of surface flow and pool holding capacity at Pools A and F will restore the surface flow and pool holding capacity of pools between Flat Rock Swamp and Pool F. Metropolitan Coal will assess whether stream remediation is required at any additional pools/rock bars between Flat Rock Swamp and Pool F once stream remediation activities at Pools A and F have been completed.

In the event stream remediation activities are required at any additional pools/rock bars between Flat Rock Swamp and Pool F once stream remediation activities at Pools A and F have been completed, Metropolitan Coal will prepare stream remediation plans in consultation with the SCA and DRE and include the plans in Appendix 4 of the RMP. Metropolitan Coal will also provide the SCA and the DRE with 14 days notice of their intention to commence stream remediation activities at each pool/rock bar.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 29		
Document ID: Rehabilitation Management Plan		

Stream remediation will be triggered at Pools G1, H or I on the Waratah Rivulet if the water depth in a pool falls below the water depth required for continuous flow over the corresponding downstream rock bar (i.e. stops overflowing), except if as a result of climatic conditions. The control pools on Woronora River will be inspected (for a similar response). Note that since this reach of the Waratah Rivulet will experience subsidence, the absolute water RLs in mAHD will reduce with the RLs of the rock bars (notwithstanding any non-systematic subsidence effects). Surveys of the rock bars relative to the pool water levels has been conducted to assess the depth of water at which point the overflow of the downstream rock bar would cease. The water depth is directly measured by the water level sensor and will be assessed against the relevant 'cease to overflow' value. If water monitoring sensors indicate that the depth of water has reached a level at which point water will cease to overflow the relevant rock bar, then visual inspection of the pool will be conducted.

Metropolitan Coal will advise the SCA, OEH, NSW Office of Water, DPI - Fisheries, DP&I and DRE that the stream remediation process has been triggered. Stream remediation plans for rock bars G, G1, H and I are provided in Appendix 4 and the stream remediation activities are described in Sections 7.2.5 to 7.2.8. Metropolitan Coal will also provide the SCA and the DRE with 14 days notice of their intention to commence stream remediation activities at each pool/rock bar. Stream remediation activities will commence at Pools G/G1 following the completion of remediation activities at Pool F.

Metropolitan Coal is committed to stream remediation at the earliest opportunity which will be influenced by a number of factors. These include the subsidence regime, stream flow conditions and status of current remediation works. These are described below.

Subsidence Regime

Stream remediation activities will not occur during periods when subsidence is more than 20 mm/month. More than one remedial effort may be required at an individual pool/rock bar given that additional impacts may be associated with successive longwalls. That is, additional stream remediation activities may need to be conducted following further subsidence following mining of the subsequent longwall.

Stream Flow

The specific timing of stream remediation activities will also be influenced by practical considerations, such as the amount of stream flow. Generally, the volume of stream flow is required to be such that surface flow over the respective rock bar is absent.

Status of Current Remediation Works

It is anticipated that remediation activities would generally follow mining in a downstream direction however as indicated previously, additional remediation measures may be required in some areas.

7.2.3.2 Downstream of Completed Mining Area (Longwall 20 Tailgate to Longwall 23 Maingate)

Pools J, K, L, M, M1, N and O on the Waratah Rivulet are situated downstream of the completed mining area, between the Longwall 20 tailgate and Longwall 23 maingate (Figure 6). Pools J to O will be monitored continuously with a data logger (Section 8.2).

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 30		
Document ID: Rehabilitation Management Plan		

Stream remediation will be triggered at Pools J, K, L, M, M1, N or O on the Waratah Rivulet if the water depth in a pool falls below the water depth required for continuous flow over the corresponding downstream rock bar (i.e. stops overflowing), except if as a result of climatic conditions. The control pools on Woronora River will be inspected (for a similar response). As described for the pools above, as this reach of the Waratah Rivulet will experience subsidence, the absolute water RLs in mAHD will reduce with the RLs of the rock bars (notwithstanding any non-systematic subsidence effects). Surveys of the rock bars relative to the pool water levels has been conducted to assess the depth of water at which point the overflow of the downstream rock bar would cease. The water depth is directly measured by the water level sensor and will be assessed against the relevant 'cease to overflow' value. If water monitoring sensors indicate that the depth of water has reached a level at which point water will cease to overflow the relevant rock bar, then visual inspection of the pool will be conducted.

Metropolitan Coal will advise the SCA, OEH, NSW Office of Water, DPI - Fisheries, DP&I and DRE that the stream remediation process has been triggered. Stream remediation plans for rock bars J, L and N are provided in Appendix 4 and the stream remediation activities are described in Sections 7.2.5 to 7.2.8. Stream remediation plans for rock bars K, M, M1 and O are discussed below. Metropolitan Coal will also provide the SCA and the DRE with 14 days notice of their intention to commence stream remediation activities at each pool/rock bar. As described above, Metropolitan Coal is committed to stream remediation at the earliest opportunity, however the conduct of activities will be influenced by a number of factors.

The water level in Pool K is considered to be substantially controlled by the rock bar of Pool L, while Pools M and M1 are considered to be substantially controlled by Rock Bar N. As a result, Metropolitan Coal anticipates that the restoration of surface flow and pool holding capacity at Pools L and N will restore the surface flow and pool holding capacity of Pools K, M1 and M. Metropolitan Coal will assess whether additional stream remediation works are required at Pools K, M1 and M once stream remediation activities at Pools L and N have been completed. In the event stream remediation activities at Pools K, M1 and M once stream remediation activities at Pools L and N have been completed, Metropolitan Coal will prepare stream remediation plans in consultation with the SCA and DRE and include the plans in Appendix 4 of the RMP.

The water level in Pool O is considered to be substantially controlled by the water level in Pool P. As described in Section 7.2.3, the Project Approval requires Metropolitan Coal not to exceed the subsidence impact performance measure for the Waratah Rivulet watercourse outlined in Table 1 of Condition 1, Schedule 3 of the Project Approval (i.e. no diversion of flows or change in the natural drainage behaviour of Pool P). If stream remediation works are required at Pool O, Metropolitan Coal will prepare a stream remediation plan in consultation with the SCA and DRE and include the plan in Appendix 4 of the RMP.

7.2.3.3 Downstream of Longwall 23 Maingate

Pools P, Q, R, S, T, U, V and W on the Waratah Rivulet are situated between the Longwall 23 maingate and the full supply level of the Woronora Reservoir (Figure 6). Pools P to W will be monitored continuously with a data logger (Section 8.2).

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 31		
Document ID: Rehabilitation Management Plan		
Although not anticipated to be required, stream remediation will be triggered at Pools P, Q, R, S, T, U, V or W if the assessment of monitoring results indicates the subsidence impact performance measure:

negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools,) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)

has been exceeded. Exceedance of the subsidence impact performance measure will be assessed as a component of the Metropolitan Coal Longwalls 20-22 Water Management Plan and revisions of the Water Management Plan for future longwalls.

7.2.4 Eastern Tributary Stream Remediation

In accordance with Condition 1, Schedule 6 of the Project Approval, surface flow and pool holding capacity is required to be restored on the Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir.

The Project Approval also requires Metropolitan Coal not to exceed the subsidence impact performance measures outlined in Table 1 of Condition 1, Schedule 3. The subsidence impact performance measure specified in Table 1 of Condition 1, Schedule 3 in relation to the Eastern Tributary watercourse is:

Table 1: Subsidence Impact Performance Measures

Watercourses	
Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26	Negligible environmental consequences over at least 70% of the stream length (that is no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining and minimal gas releases)

Pools ETAF to ETAU on the Eastern Tributary are situated between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir (Figure 6).

Stream remediation will be triggered at Pools ETAF, ETAG, ETAH, ETAI, ETAJ, ETAK, ETAL, ETAM, ETAN, ETAO, ETAP, ETAQ, ETAR, ETAS, ETAT or ETAU if the assessment of monitoring results indicates the subsidence impact performance measure:

negligible environmental consequences over at least 70% of the stream length (that is, no diversion of flows, no change in the natural drainage behaviour of pools,) on the Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26

has been exceeded.

As described in the Metropolitan Coal Longwalls 20-22 Water Management Plan, Pool ETAF is situated approximately 925 m downstream of the Longwall 22 maingate. The subsidence impact performance measure for the Eastern Tributary watercourse will be assessed as a component of future Extraction Plans and revisions to the Metropolitan Coal Longwalls 20-22 Water Management Plan.

Stream remediation activities will commence when subsidence is less than 20 mm/month. As described above, more than one remedial effort may be required at an individual pool/rock bar given that additional impacts may be associated with successive longwalls. That is, additional stream remediation activities may need to be conducted when subsidence again drops to less than 20 mm/month following mining of the subsequent longwall.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 32		
Document ID: Rehabilitation Management Plan		

The specific timing of stream remediation activities will also be influenced by practical considerations, such as the amount of stream flow. Generally, the volume of stream flow is required to be such that surface flow over the respective rock bar is absent.

In the event stream remediation activities are required at Pools ETAF, ETAG, ETAH, ETAI, ETAJ, ETAK, ETAL, ETAM, ETAN, ETAO, ETAP, ETAQ, ETAR, ETAS, ETAT or ETAU, Metropolitan Coal will prepare stream remediation plan(s) in consultation with the SCA and DRE and include the plans in Appendix 4 of the RMP. Metropolitan Coal will also provide the SCA and the DRE with 14 days notice of their intention to commence stream remediation activities at each pool/rock bar.

7.2.5 Fracture Characterisation

Fracture characterisation activities will be conducted to measure the depth and lateral extent of the sub-surface fracture network at each rock bar requiring stream remediation, extending up to 20 m up the bank of the watercourse. Fracture characterisation activities will include the drilling of cored holes to a depth of approximately 20 m, or to 5 m below the deepest identified fracture, whichever is deeper, to:

- determine the depth of fracturing;
- measure the relative volume of fine versus large void spaces; and
- determine the horizontal connectivity between fractures.

A borehole calliper will be used to identify the location of individual fractures intersecting the drill holes.

The stream remediation plans provided in Appendix 4 detail the location of the fracture characterisation activities at rock bars F, G, G1, H, I, J, L and N on the Waratah Rivulet.

7.2.6 Stream Grouting Techniques

The principal management measure that will be used to restore surface flow and pool holding capacity is the injection of polyurethane (PUR) grouting products into the fracture network. The grouting product that will be used in the remediation activities is Spetec H100, which is a single component, inert, potable water compatible product used for consolidation, stabilisation and/or sealing of strata. A desktop risk assessment review of Spetec H100 has been prepared by Dr Barry Noller of the Centre for Mined Land Rehabilitation. The review is provided as Attachment B.

A grout curtain will be constructed across a rock bar by drilling a line of holes at regular intervals (approximately 2 m) and progressively injecting PUR at a range of depths (approximately 20 m to surface). The injection of PUR grout reduces the permeability of the overall rock mass by filling voids and thereby reducing sub-surface flow pathways.

Other potential stream remediation techniques and their possible application to different situations include:

- Hand grouting the sealing of cracks exposed on the surface using hand applicators.
- Shallow pattern grouting drilling shallow holes using small hand held drilling equipment and low pressure injection of a grout using a portable pump.
- Deep pattern or curtain grouting drilling deeper holes using traditional air and or reverse circulation drilling rigs. Higher pressure grouting techniques can also be used.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 33		
Document ID: Rehabilitation Management Plan		

• Deep angle hole cement grouting – remote directional drilling techniques can be used to access otherwise inaccessible sites. The same grouting methods as deep pattern/curtain grouting outlined above can be used.

The full range of available techniques will be considered in the design of stream remediation programs for individual rock bars.

The RMP currently includes management measures applicable to the use of PUR grouting products. In the event an alternative stream remediation technique is proposed to be used, the RMP will be revised in consultation with the SCA, OEH, DPI - Fisheries and the DP&I, and to the satisfaction of the Director-General of the DRE.

7.2.7 Site Layout

The remediation activities will primarily involve the drilling of holes and injection of grout into subsurface fractures. Associated activities include the mobilisation, placement and operation of equipment and the implementation of a variety of environmental management measures.

The detailed plans included in Appendix 4 for rock bars F, G, G1, H, I, J, L and N on the Waratah Rivulet illustrate the location of the grout injection zone, as well as the positioning of major equipment and controls. Drilling equipment will include a diesel-operated Fraste Multidrill PL rubber tracked minidrill rig, drill rods and a Dingo. Injection equipment will include a pneumatic PUR injection pump, portable air compressor, grout injection hoses, grout header, injection tubes and inflatable packers. A temporary shelter may also be erected at the injection site and/or pump site to provide personnel with shelter.

The detailed plans included in Appendix 4 also show the approximate location of equipment for drilling and grout injection activities. The positioning of some equipment (such as the drill rig, compressed air pumps, hoses, bunded pumps, geofabric straw bale filters, first aid kits etc.) will change during the conduct of activities. The environmental controls pertaining to the drilling location will be moved according to the change in the position of the drill rig.

Barriers (i.e. tape) will be erected at access points to the remediation area to establish the area as a restricted entry area. All non-essential personnel will be restricted from the injection area during the pumping process.

Access to rock bars and pools on the Waratah Rivulet between Pool G and Pool O by Metropolitan Coal personnel and contractors will be via a single track along the Waratah Rivulet. Access to the drilling and grout injection work area for track mounted machinery (drill rig and mini tipper) may occur along areas of exposed rock outcrop within the bed of the Waratah Rivulet. Where sudden changes in bed level occur, access will be facilitated by use of temporary steel ramps or sand bags as necessary. Rubber track or lattice matting will also be used in areas to minimise impacts. A helicopter will be used to access areas/deliver drilling equipment not accessible by tramming the drill rig. Equipment that is unable to be carried in by hand (e.g. settling tanks, drill rig etc.) will be transported by helicopter to the remediation site. Remediation activities at Pools L and N will also involve the placement (and checking) of delivery hoses from the pumping station located on Fire Road 9C to the remediation site.

Checks relevant to site layout will be conducted, similar to the example Activity Checklists provided in Appendix 5. The example Activity Checklists provided in Appendix 5 have been developed for stream remediation activities at the Pool A rock bar.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 34		
Document ID: Rehabilitation Management Plan		

7.2.8 Environmental Management Measures

A range of environmental management measures will be implemented during the conduct of stream remediation works including:

- management of any soil and vegetation disturbance;
- erosion and sediment controls to minimise the potential for any downstream effects;
- stream flow diversion and reduction of sub-surface flows during the application of PUR grouting products;
- drill cuttings containment and disposal;
- fuel management;
- management of grouting products and injection operations;
- waste management; and
- transport and handling of equipment and materials.

These environmental management measures are described in detail in Sections 7.2.6.1 to 7.2.6.10.

7.2.8.1 Soil and Vegetation Management

The disturbance of soils will be limited to the minimum required for the mobilisation, placement and operation of the drilling and injection equipment and for maintaining access to equipment.

Where possible, existing fire trails will be utilised for the siting/delivery of equipment and for access to remediation sites. The positioning of equipment and controls will be site specific, as detailed in Appendix 4 for each rock bar that is anticipated to require stream remediation works.

Vegetation disturbance will be kept to a practical minimum. To minimise impacts on terrestrial vegetation, vegetation clearance will generally be restricted to the slashing of vegetation (i.e. leaving the lower stem and roots *in-situ* to maximise the potential for re-growth) and lopping of branches, where practicable, rather than the removal of trees. Any lopped branches will be left on the site in a random pattern. Rubber lattice matting will be used to minimise vegetation disturbance in high traffic areas.

Vehicles and equipment will be maintained to suitable standards to minimise the risk of the introduction of weeds. Weed control measures will be implemented where required.

A checklist of tasks relating to the implementation of soil and vegetation management measures will be completed on a regular basis similar to the example Metropolitan Coal Environmental Coordinator Checklist provided in Appendix 5.

7.2.8.2 Erosion and Sediment Management

An Erosion and Sediment Control Plan will be developed for each stream remediation site, similar to the example provided in Appendix 6 for stream remediation activities at the Pool A rock bar. The Metropolitan Coal Environmental Coordinator will oversee the implementation of the Erosion and Sediment Control Plan and will have authority to cease drilling or injection activities if erosion or sediment controls are not working effectively.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 35		
Document ID: Rehabilitation Management Plan		

A checklist of tasks relating to the implementation of erosion and sediment control measures will be completed on a regular basis similar to the example Metropolitan Coal Environmental Coordinator Checklist provided in Appendix 5.

7.2.8.3 Drilling Method, Drill Cuttings Containment and Disposal of Drill Core

Drill holes will be drilled during forecast dry weather, where practicable. Only cored holes will be drilled. Water will be used to clear the fine drill cuttings from the holes. Drill core runoff will be contained using sediment management controls described in the Erosion and Sediment Control Plan to be developed for the site.

Drill core will temporarily be stored in drill core trays high on the bank of the stream in an elevated equipment storage area. The drill core trays will be removed from the site at the completion of the remediation activities.

A checklist of tasks relating to drill core management will be completed on a regular basis, similar to the example Metropolitan Coal Environmental Coordinator Checklist provided in Appendix 5. As described in Section 7.2.6.2 and Appendix 5, the Metropolitan Coal Environmental Coordinator will also conduct checks relevant to erosion and sediment control.

7.2.8.4 Stream Flow Diversion and Reduction of Sub-Surface Flows

The objective of stream flow diversion is to divert as much water as practicable from the sub-surface fracture network if required. In the event that stream flows are above the rockbar, PUR injection activities will not be undertaken.

Prior to and during grout injection activities, sub-surface flows in the vicinity of the grout injection hole(s) may be reduced to allow accurate placement of PUR product below surface by using pumps to reduce the standing water level. The pump inlets will vary according to the stream remediation site, however, will typically include the pool subject to remediation activities and existing boreholes in the vicinity of the injection activities.

Water extracted from the pool subject to the remediation activities and the existing boreholes will be conveyed downstream of the site sediment controls (back into Waratah Rivulet) via hoses. 'Lay flat' hoses will potentially be used for ease of handling, however, if abrasion damages the lay flat hoses, then rubber hoses will be used.

The number of pumps and the type of pump (petrol or compressed air) for the transfer of water will be determined on the basis of the flows encountered and the ability of the PUR to be placed without compromise to the quality of injection. If an additional air compressor is required to power the pumps, then it will be located consistent with the detailed site plans provided in Appendix 4 and will be bunded separately. Bunding will be constructed around diesel operated compressors and petrol pumps as described in Section 7.2.8.5.

Stand-by pumps will be stored in the elevated equipment storage area designated on the detailed plans in Appendix 4.

If pumping cannot reduce sub-surface flows sufficiently to allow the controlled injection of PUR, then grouting activities will cease until a suitable flow regime can be established.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 36		
Document ID: Rehabilitation Management Plan		

A checklist of tasks relating to the stream flow diversion and reduction of sub-surface flows will be completed on a regular basis, similar to the example Metropolitan Coal Environmental Coordinator Checklist provided in Appendix 5.

7.2.8.5 Fuel and Spill Management

The use of fuels and oils will be managed to minimise the risk of spills or leaks as described below.

Large quantities of fuel will not be stored on-site. Small amounts of fuel will be required for equipment and will be transported by vehicle and carried in by hand to the drilling site. Fuel will be transported/carried in a closed container (e.g. jerry can) and re-fuelling will be undertaken using an appropriately sized funnel.

Equipment (e.g. drill rigs, compressors, pumps) will be regularly inspected for leaks of oil/fuel/coolant, as described in the example Activity Checklists and Duty Cards provided in Appendix 5.

Bunding will be installed around all diesel operated equipment. Diesel compressors will be bunded using a purpose built 'drive-in bund' which has been custom made by Absorb Environmental Solutions Pty Ltd or alternatively, the bunds will be lined with a solid continuous plastic liner draped over the straw bales and covering the entire floor of the area inside the bunding in one continuous sheet. The bunds will have sufficient capacity to contain in excess of 10% above the maximum fuel/oil storage capacity of the equipment.

Bunding will also be installed around petrol pumps. Bunding will comprise continuous straw bale bunding lined with a solid continuous plastic liner draped over the straw bales and covering the entire floor of the area inside the bunding in one continuous sheet. The bunded area will have sufficient capacity to contain in excess of 10% above the maximum fuel/oil storage capacity of the pump.

Spill containment/treatment resources (i.e. spill kits) will be provided and personnel will be trained in their use. The spill kits will include: absorbent material 40 litre bag of Organic Oil/Fuel absorbent; absorbent pads: 20 of 480 X 430 mm pads; garbage bags; shovel; and bag of rags.

The spill kits will be located:

- In each vehicle transporting the grouting products. These spill kits will remain with the vehicles at all times. The vehicle spill kits will also service the PUR pump site during grouting activities.
- At the bunded air compressor.
- At the injection/drilling site.

Any spill that occurs will be immediately cleaned up and reported to the:

- Site Supervisor;
- Metropolitan Coal Technical Services Manager;
- SCA (via their Incident Management Number 1800 061 069); and
- DRE.

The Site Supervisor and the Metropolitan Coal Technical Services Manager (or delegate) will investigate any spills.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 37		
Document ID: Rehabilitation Management Plan		

Metropolitan Coal will train personnel in the containment and treatment of spills and the use of spill kits.

7.2.8.6 Management of Grouting Products and Injection Operations

A series of Duty Cards will be developed which identifies the responsibility of each key operator involved in the stream remediation activities including the PUR transport driver, nozzle operator, pump operator, Site Supervisor and Metropolitan Coal Environmental Coordinator. Example Duty Cards are provided in Appendix 5.

A series of Activity Checklists will also be developed to manage the transport of PUR, set-up, start-up (pre-injection), and clean-up activities to check that all controls are in place and working effectively. Each operator will have clearly identified Activity Checklist(s) to work through. Example Activity Checklists are provided in Appendix 5.

Formal inspections by the Site Supervisor will be conducted: a) prior to the commencement of daily activities; b) during the conduct of daily activities; and c) at the completion of daily activities. In addition, site personnel will be required to regularly inspect/observe the management measures and controls whilst undertaking their duties.

A number of Activity Checklists will be countersigned by the Site Supervisor to provide an additional layer of control (refer to the examples in Appendix 5).

Management controls overlap between Activity Checklists, for example, inspection of the hose couplings is conducted by three people to provide additional layers of risk mitigation.

The Metropolitan Coal Environmental Coordinator is authorized to cease the remediation activities if handling or injection operations or Activity Checklists are identified as not being undertaken in accordance with the RMP.

Appendix 7 provides additional information on the management of grouting products and injection activities that will be implemented to prevent or minimise impacts on the environment.

7.2.8.7 Contingency Plans in the Event of Wet Weather

In the event of imminent heavy rain, drilling will cease and equipment will be moved to high ground on the bank of the stream at the equipment storage area(s) shown on the stream remediation plans in Appendix 4. In addition, drilling and pumping equipment will be moved to high ground at the end of each day. Also at the end of each day, the runoff capture dam will be dewatered, the geotextile straw bale filters and the runoff capture dam will be cleared of accumulated sediment (using hand tools) and the sediment disposed of into the two 2,500 L tanks positioned on the stream bank.

7.2.8.8 Waste Management

Rubbish will be collected daily for disposal off-site. On completion of the remediation activities, equipment and all waste (such as litter, used materials, etc.) will be removed from the site.

A portable chemical toilet will be located on a nearby fire road. Personnel will be instructed to use the facility. Sewage wastes will be removed from the site by a registered contractor and disposed of in an appropriate manner.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 38		
Document ID: Rehabilitation Management Plan		

7.2.8.9 Transport Management

Measures will be implemented to minimise the potential impacts of vehicles. These include:

- Only 4WD vehicles are permitted.
- Vehicles movements will be kept to the minimum necessary.
- Vehicles will be required to observe the 40 km/hr speed limit on all roads within the catchment.
- The remediation areas will be accessed by two locked gates from the Princes Highway using existing fire trails. All gates will be kept locked at all times.
- Vehicles will be parked along adjacent fire roads.
- No vehicles are permitted within the bed of the Waratah Rivulet to the drilling and grout injection work area.
- The use of a helicopter to access areas/deliver drilling equipment not accessible by tramming the drill rig.
- Access to the drilling and grout injection work area for track mounted machinery (drill rig and mini tipper) may occur along areas of exposed rock outcrop within the bed of the Waratah Rivulet. Where sudden changes in bed level occur, access will be facilitated by use of temporary steel ramps or sand bags as necessary.
- Access to the catchment area will not occur after 10 mm of rain has been received in any 24 hour period or at the discretion of the SCA Manager Catchment Operations South East.
- Vehicles will not be used in the catchment unless they have been serviced and maintained to an acceptable standard. No servicing or maintenance of vehicles will be conducted in the catchment.

7.2.8.10 Bushfire Preparedness and Management

A Bushfire Preparedness Plan will be developed for each stream remediation site. An example Bushfire Preparedness Plan is provided in Appendix 8.

Hot work will be carried out in accordance with the SCA Hot Work Policy for the Bushfire Season and no hot work will occur without an SCA Hot Work Permit.

8 MONITORING

8.1 SURFACE DISTURBANCE AREAS

8.1.1 Monitoring of Rehabilitation Measures

The Rehabilitation Management Plan – Surface Disturbance Register (Appendix 1) will be used to monitor the performance of the measures implemented to rehabilitate surface disturbance areas.

Some surface disturbance areas will be able to be rehabilitated during the life of the Project (e.g. monitoring sites no longer required), while other surface disturbance areas will likely remain until after the completion of mining operations.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 39		
Document ID: Rehabilitation Management Plan		

Once a surface disturbance area is no longer being utilised, monitoring will be conducted to assess:

- where appropriate, whether equipment/infrastructure items have been removed;
- whether the area is tidy or rubbish removal is required;
- whether erosion and sediment controls are required and if so, the effectiveness of those installed;
- the presence of weeds and the need for the implementation of weed control measures;
- where appropriate, whether vegetation is re-establishing naturally or whether active revegetation is required; and
- if active revegetation is conducted, whether vegetation is establishing.

The frequency of monitoring of surface disturbance areas subject to rehabilitation will be largely driven by the status of the site. For example, sites that are identified as requiring the implementation of further rehabilitation measures (e.g. weed control or erosion and sediment control) will be inspected on a more frequent basis to assess whether the measures have been effective. The dates on which individual site inspections are conducted will be recorded in the Rehabilitation Management Plan – Surface Disturbance Register, along with the findings of the site inspection (Appendix 1).

Rehabilitation measures will be reported in the Annual Review (Section 10).

8.1.2 Assessment against Performance Indicators and Rehabilitation Objective

Metropolitan Coal will assess the progress of the rehabilitation measures against the following performance indicators:

Redundant equipment/infrastructure items have been removed.

The site is neat and tidy (i.e. it does not contain any rubbish).

No weed management measures are required.

No erosion or sediment control measures are required.

Where appropriate, native vegetation is naturally regenerating or active revegetation is establishing.

No further active revegetation measures are required.

The progress of the rehabilitation will be recorded in the Rehabilitation Management Plan – Surface Disturbance Register (Appendix 1).

When appropriate, an assessment of the site will be made against the rehabilitation objective for other land affected by the Project, *viz. Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: comprised of local native plant species; with a landform consistent with the surrounding environment.*

The rehabilitation objective will be considered to have been met if:

- the site contains self-sustaining native vegetation (i.e. the vegetation is able to sustain itself, without the implementation of any management measures);
- the vegetation is healthy;

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 40		
Document ID: Rehabilitation Management Plan		

- the native vegetation is comprised of local native plant species, as assessed by a suitably qualified botanist;
- ecosystem function is considered to have been restored (i.e. ecosystem processes [water cycle, nutrient cycle and energy interception]¹ at site scale are functioning well); and
- the landform is consistent with the surrounding environment.

The assessment will be recorded in the Rehabilitation Management Plan – Surface Disturbance Register (Appendix 1).

The rehabilitation objective will be met prior to lease relinquishment. It is anticipated that many of the minor surface disturbance areas will meet this rehabilitation objective during the life of the Project, however, other areas will require a greater period of time for Metropolitan Coal to achieve the rehabilitation objective.

8.2 STREAM POOL/ROCK BAR REMEDIATION

8.2.1 Monitoring of Pool Water Levels

The water level in Pools B, C, E, G, G1, H and I on Waratah Rivulet will be manually monitored daily, while Pools A, F, J, K, L, M, N, O, P, Q, R, S, T, U, V and W on Waratah Rivulet will be monitored using a continuous water level sensor and logger (Figure 6).

Pools ETAF, ETAG, ETAH, ETAI, ETAQ and ETAU, downstream of maingate 26 on the Eastern Tributary will also be monitored using a continuous water level sensor and logger (Figure 6).

Continuous water level sensors and loggers will also monitor water levels in control Pools WRP1, WRP2, WRP3 and WRP4 on the Woronora River.

Data from these devices will be downloaded monthly.

Stream remediation will be triggered:

- at pools/rock bars on Waratah Rivulet between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir; or
- at pools/rock bars on the Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir;

as described in Sections 7.2.3 and 7.2.4.

Stream remediation activities will commence when subsidence is less than 20 mm/month. More than one remedial effort may be required at an individual pool/rock bar given that additional impacts may be associated with successive longwalls. That is, additional stream remediation activities may need to be conducted when subsidence again drops to less than 20 mm/month following mining of the subsequent longwall.

Energy flow considerations (e.g. how much sunlight falls on green leaves and gets turned into food for the ecosystem? How much is wasted striking dead growth or bare ground?).

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 41		
Document ID: Rehabilitation Management Plan		

¹ Water cycle considerations (e.g. does the water cycle provide adequate moisture through infiltration into the soil or does it run off the land causing erosion?).

Nutrient cycle considerations (e.g. are nutrients available to living things?).

The specific timing of pool restoration activities will also be influenced by practical considerations, such as the amount of stream flow (refer Section 7.2.3). Generally, the volume of stream flow is required to be such that surface flow over the respective rock bar is absent.

8.2.2 Monitoring of Stream Remediation Measures

8.2.2.1 Stream Remediation Measures and Environmental Controls

The Site Supervisor will be responsible for ensuring the work is undertaken in a safe manner and together with the Metropolitan Coal Environmental Coordinator that the environmental management undertakings and commitments are implemented.

The duties and responsibilities of each role will be outlined in Duty Cards (examples are provided in Appendix 5). An inspection and reporting system will be used during the activities to check that all controls are in place and working effectively. A copy of the example inspection checklists are provided in Appendix 5. The checklists reflect the various phases of the remediation activities and the specific environmental controls to be performed according to each task. Each operator responsible for a given task, for example transportation of PUR, will be required to complete a checklist and the Site Supervisor will confirm that all checklists comply with the necessary controls.

8.2.2.2 Water Monitoring Program

During Grouting Activities

Daily surface water quality will be monitored at two sites upstream and at two sites downstream of the remediation works. Field-based parameters will include pH, electrical conductivity (EC), turbidity and total organic carbon (TOC). pH, EC and turbidity will be sampled in the field using hand-held meters. TOC will be sampled in the field and analysed at the Metropolitan Coal site within approximately 4 hours of sampling.

Should field samples indicate values at the downstream sites outside the baseline water quality data have occurred, samples will be collected and sent for laboratory testing.

Laboratory-based parameters will include pH, EC, turbidity, Oxidation Reduction Potential (Eh), TOC, dissolved organic carbon (DOC), major ions (calcium [Ca], magnesium [Mg], sodium [Na], potassium [K], chloride [Cl], sulphate [SO₄] and bicarbonate [HCO₃]) and trace metals (aluminium [AI], iron [Fe] and manganese [Mn]). Samples collected for laboratory cation, anion and metal analysis will be field filtered.

Data Analysis

Field based water quality results obtained during the conduct of grout injection activities will be compared to baseline water quality data immediately upon receipt of the results. Where monitoring results at the downstream sites indicate values outside (i.e. higher or lower) baseline water quality data for Waratah Rivulet, the values will be compared to the results (for the same sampling time) for the upstream sites. If any field test result of a downstream site is above (outside) baseline limits and is also above (outside) values obtained from testing at an upstream site on that day, drilling and injection activities will cease and the water quality samples will be sent to the laboratory for analysis.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E Page 42		
Document ID: Rehabilitation Management Plan		

In the event laboratory testing confirms the downstream results are outside baseline water quality data and the results for the upstream sites, an investigation will be triggered and drilling and injection activities will immediately cease. The SCA will be notified immediately via the Incident Number 1800 061 069.

Water Quality Data Investigation

An investigation will be undertaken in the event the laboratory testing of monitoring results at the downstream sites indicate values outside the baseline water quality data for the Waratah Rivulet/Eastern Tributary and the results for the upstream sites. The investigation will include but not be limited to the following:

- Review of any trends in the data.
- Consideration of the site activities being undertaken at the time (e.g. drilling versus grout injection).
- Consideration of the prevailing and preceding meteorological conditions.
- Consideration of any other significant events that may have an influence on water quality (e.g. bushfires).

As a result of the investigation, a specialist assessment will be made of whether the water quality variation is being caused by the remediation activities and could potentially result in a significant impact on aquatic ecology or downstream water supplies.

Further grout injection works will not be undertaken unless the specialist assessment concludes that it is safe to do so without resulting in a significant impact on aquatic ecology or downstream water supplies. The results of the investigation will be reported to the SCA and DRE.

8.2.3 Assessment against Performance Indicator and Rehabilitation Objective

Metropolitan Coal will assess the progress of the stream remediation measures against the following performance indicator:

Analysis of water level recession rates for a pool indicates a similar pool behaviour to that which existed prior to being impacted by subsidence.

The progress of the stream remediation will be recorded in the Rehabilitation Management Plan – Stream Remediation Register (Appendix 2).

The water level recession rates performance indicator will be considered to have been met if data analysis indicates there is not a statistically significant change in pool water level recession rates after stream remediation, compared to pool water level recession rates prior to the triggering of stream remediation.

The rehabilitation objective for the Waratah Rivulet between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir and the Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir, *viz. Restore surface flow and pool holding capacity as soon as reasonably practicable*, will be assessed using the results of the assessment of performance indicator.

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E Page 43				
Document ID: Rehabilitation Management Plan				

8.3 OTHER NATURAL OR BUILT FEATURES IMPACTED BY SUBSIDENCE

In accordance with Condition 4 of Schedule 6 and Condition 12 of Schedule 2 of the Project Approval, rehabilitation and remediation measures for impacts to other natural or built surface features resulting from subsidence are described in the detailed management plans prepared for the Metropolitan Coal Longwalls 20-22 Extraction Plan. The relevant management plan for subsidence impacts on natural or built surface features is outlined in Table 2.

Table 2 Summary of Rehabilitation and Remediation Measures included in Other Management Plans

Potential Subsidence Impact	Relevant Plan(s)
Impacts on streams including aesthetic values, stream bank erosion and cliff falls	Metropolitan Coal Longwalls 20-22 Water Management Plan
Impacts on upland swamps and vegetation	Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan
Cliffs and associated overhangs, steep slopes and land in general	Metropolitan Coal Longwalls 20-22 Land Management Plan and Metropolitan Coal Longwalls 20-22 Public Safety Management Plan
Aboriginal heritage items	Metropolitan Coal Longwalls 20-22 Heritage Management Plan
Built features	Metropolitan Coal Longwalls 20-22 Built Features Management Plan

In relation to the rehabilitation objective for other land affected by the Project, *viz. Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: comprised of local native plant species; with a landform consistent with the surrounding environment,* Metropolitan Coal will monitor rehabilitation and remediation measures implemented in accordance with the Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan and revisions of the plan for future Extraction Plans. The results of the monitoring will be used to assess whether this rehabilitation objective has been met.

Metropolitan Coal – Rehabilitation Management Plan					
Revision No. RMP-R01-E Page 44					
Document ID: Rehabilitation Management Plan					

9 CONTINGENCY PLAN

In the event the rehabilitation objectives for either:

- Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir *Restore surface flow and pool holding capacity as soon as reasonably practicable*,
- Eastern Tributary, between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir *Restore surface flow and pool holding capacity as soon as reasonably practicable*, or
- Other land affected by the Project Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: comprised of local native plant species; with a landform consistent with the surrounding environment,

are not met, Metropolitan Coal will implement the Contingency Plan described below.

Contingency Plan

- Metropolitan Coal will report the reasons the objective has not been met to DRE.
- Metropolitan Coal will identify an appropriate course of action with respect to the rehabilitation objective, in consultation with specialists and relevant agencies, as necessary. For example:
 - proposed contingency measures; and
 - a program to review the effectiveness of the contingency measures.

Potential contingency measures include:

- The implementation of additional stream remediation measures, either using PUR or alternative remediation techniques.
- The implementation of additional management measures for other land affected by the Project including erosion and sediment control, weed management measures and revegetation measures.
- Metropolitan Coal will submit the proposed course of action and a program to review the effectiveness of the contingency measures to DRE for approval.
- Metropolitan Coal will implement the approved course of action to the satisfaction of DRE.

10 ANNUAL REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

In accordance with Condition 3, Schedule 7 of the Project Approval, Metropolitan Coal will conduct an Annual Review of the environmental performance of the Project by the end of October 2010, and annually thereafter.

The Annual Review will specifically address the environmental performance of the RMP and will:

- describe the works carried out in the past year, and the works proposed to be carried out over the next year;
- include a comprehensive review of the monitoring results and complaints records of the Project over the past year, including a comparison of these results against the:
 - relevant statutory requirements, limits or performance measures/criteria;

Metropolitan Coal – Rehabilitation Management Plan					
Revision No. RMP-R01-E Page 45					
Document ID: Rehabilitation Management Plan					

- monitoring results of previous years; and
- relevant predictions in the Environmental Assessment, Preferred Project Report and Extraction Plan;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the Project;
- identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the Project.

As described in Section 2, this RMP will be reviewed within three months of the submission of an Annual Review, and revised where appropriate.

11 INCIDENTS

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the Project Approval.

The reporting of incidents will be conducted in accordance with Condition 6, Schedule 7 of the Project Approval. Metropolitan Coal will notify the Director-General of the DP&I and any other relevant agencies of any incident associated with the Project as soon as practicable after Metropolitan Coal becomes aware of the incident. Within seven days of the date of the incident, Metropolitan Coal will provide the Director-General of the DP&I and any relevant agencies with a detailed report on the incident.

12 COMPLAINTS

A protocol for the managing and reporting of complaints has been developed as a component of Metropolitan Coal's Environmental Management Strategy and is described below.

The Environment and Community Manager is responsible for maintaining a system for recording complaints.

Metropolitan Coal will maintain public signage advertising the telephone number on which environmental complaints can be made. The Environment and Community Manager is responsible for ensuring that the currency and effectiveness of the service is maintained. Notifications of complaints received are to be provided as quickly as practicable to the Environment and Community Manager.

Complaints and enquiries do not have to be received via the telephone line and may be received in any other form. Any complaint or enquiry relating to environmental management or performance is to be relayed to the Environment and Community Manager as soon as practical. All employees are responsible for ensuring the prompt relaying of complaints. All complaints will be recorded in a complaints register.

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E Page 46				
Document ID: Rehabilitation Management Plan				

For each complaint, the following information will be recorded in the complaints register:

- date and time of complaint;
- method by which the complaint was made;
- personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- nature of the complaint;
- the action(s) taken by Metropolitan Coal in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by Metropolitan Coal, the reason why no action was taken.

The Environment and Community Manager is responsible for ensuring that all complaints are appropriately investigated, actioned and that information is fed back to the complainant, unless requested to the contrary.

In accordance with Condition 10, Schedule 7 of the Project Approval, the complaints register will be made publicly available on the website and updated on a monthly basis. A summary of complaints received and actions taken will be presented to the Community Consultative Committee as part of the operational performance review.

13 NON-COMPLIANCES WITH STATUATORY REQUIREMENTS

A protocol for the managing and reporting of non-compliances with statutory requirements has been developed as a component of Metropolitan Coal's Environmental Management Strategy and is described below.

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with Metropolitan Coal, and will be developed through promotion of Metropolitan Coal ownership under the direction of the General Manager.

The Technical Services Manager and/or Environment and Community Manager will undertake regular inspections, internal audits and initiate directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance.

As described in Section 11, Metropolitan Coal will notify the Director-General of the DP&I and any other relevant agencies of any incident associated with Metropolitan Coal as soon as practicable after Metropolitan Coal becomes aware of the incident. Within seven days of the date of the incident, Metropolitan Coal will provide the Director-General of the DP&I and any relevant agencies with a detailed report on the incident.

A review of Metropolitan Coal's compliance with all conditions of the Project Approval, mining leases and all other approvals and licences will be conducted prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the Peabody website.

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E Page 47				
Document ID: Rehabilitation Management Plan				

Additionally, in accordance with Condition 8, Schedule 7 of the Project Approval, an independent environmental audit will be conducted by the end of December 2011, and a minimum of once every three years thereafter. A copy of the audit report will be submitted to the Director-General of the DP&I and made publicly available on the Peabody website. The independent audit will be conducted by an appropriately qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General of the DP&I.

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Metropolitan Coal – Rehabilitation Management Plan					
Revision No. RMP-R01-E Page 48					
Document ID: Rehabilitation Management Plan					

ATTACHMENT A

2014 REMEDIATION SCHEDULE

Metropolitan Coal – Rehabilitation Management Plan					
Revision No. RMP-R01-E					
Document ID: Rehabilitation Management Plan					

ID	Task	Task Name	Duration	Start	Finish	June July	August September October November December January February N
1	Mode	Waratah Rivulet Grouting Works	204 days	Mon	Fri 20/02/15	-1 Week 1 Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Week 8 W	3 Week 9 Week 10Week 11Week 12Week 13Week 14Week 15Week 16Week 17Week 18Week 19Week 20Week 21Week 22Week 23Week 24Week 25Week 26Week 27Week 28Week 29Week 30Week 31Week 32Week 33Week 35Week 35Week 36Week 37Week 38Week 39Week 40Week 42Week 42Week 42Week 42Week 42Week 29Week 29Week 10Week 11Week 12Week 11Week
		Waratan Nivulet Grouting Works		12/05/14			
	_						
2	Þ	Grouting Works - WRS4	77 days	Mon 12/05/14	Tue 26/08/14	¢r	
3	3	Mobilisation	1 day	Mon 12/05/2	14 Mon 12/05/14		
4	3	Site Establishment	3 days	Tue 13/05/1	4 Thu 15/05/14		
_					TI 10/06/11		
5	*	Ground Characterisation	20 days	Fri 16/05/14	Thu 12/06/14		
6	3	Drilling and Grouting Works	45 days	Fri 13/06/14	Thu 14/08/14		
7	3	Rehabilitation of work site	5 days	Fri 15/08/14	Thu 21/08/14		
8	-	Demobilisation	2 days	Eri 22/08/14	Tue 26/08/14		
	4	Demobilisation	Juays	111 22/00/14	100 20/08/14		
9	3	Grouting Works - Flatrock Crossing	64 days	Wed 27/08/14	Mon 24/11/14		
10	3	Mobilisation	1 day	Wed 27/08/2	14 Wed 27/08/14		
11	_	Site Ectablichment	3 davs	Thu 28/08/1	4 Mon 1/09/14		
	4	Site Establishment	5 0075	1110 20/00/1	4 1000 1/03/14		
12	*	Ground Characterisation	20 days	Thu 28/08/1	4 Wed 24/09/14		
13	3	Drilling and Grouting Works	35 days	Thu 25/09/1	4 Wed 12/11/14		
14	-	Rehabilitation of work site	5 days	Thu 13/11/1	4 Wed 19/11/14		
	-						
	_						
15	₽	Demobilisation	3 days	Thu 20/11/1	4 Mon 24/11/14		
16	₽	Grouting Works - WRS5	62 days	Tue 25/11/1	4 Wed		♥
					,,		
17	3	Mobilisation	1 day	Tue 25/11/1	4 Tue 25/11/14		
18	_	Site Establishment	3 days	Wed 26/11/	14 Fri 28/11/14		
	4		5 4475				
19	*	Ground Characterisation	20 days	Mon 1/12/14	1 Fri 26/12/14		
20	₽	Drilling and Grouting Works	50 days	Mon 1/12/14	4 Fri 6/02/15		*
21	3	Rehabilitation of work site	5 days	Mon 9/02/15	5 Fri 13/02/15		
22	-	Demohilisation	3 days	Mon 16/02/	15 Wed 18/02/15		
	~		,-				
Project:	Waratah Rivule	Grouting Task	Mileston	e 🔸	•	ary External Milestone 🔶	Inactive Milestone 🗄 Manual Task 🖬 Manual Summary Rollup Start-only 🖬 Deadline 🗣
Date: W	ed 30/04/14	Split	Summary	y u	· · · · · ·	Inactive Task	Inactive Summary V Duration-only Manual Summary V Finish-only Duration
							Page 1

Project: Waratah Rivulet Grouting	Task	Milestone	٠	Project Summary	External Milestone	\$ Inactive Milestone	\$	Manual Task	Manual Summary Rollup Start-only	C
Date: Wed 30/04/14	Split	Summary	÷	External Tasks	Inactive Task	Inactive Summary	$\bigtriangledown \qquad \bigtriangledown$	Duration-only	Manual Summary Finish-only	3
							Page 1			

ATTACHMENT B

DESK TOP RISK ASSESSMENT OF A POLYURETHANE INJECTION RESIN PRODUCT SPETEC H100 FOR WARATAH RIVULET REMEDIATION AT THE METROPOLITAN COLLIERY

Metropolitan Coal – Rehabilitation Management Plan					
Revision No. RMP-R01-E					
Document ID: Rehabilitation Management Plan					

Desk Top Risk Assessment of a Polyurethane Injection Resin Product Spetec H100 for Waratah Rivulet Remediation at the Metropolitan Colliery

Report By Barry Noller

Principal Research Fellow Centre for Mined Land Rehabilitation The University of Queensland QLD 4072

14 January 2014

For

Golders Associates Pty. Ltd. 124 Pacific Highway St Leonards NSW 2065 Australia





SMICMLR

Centre for Mined Land Rehabilitation

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Centre for Mined Land Rehabilitation (CMLR)

CMLR (<u>www.cmlr.uq.edu.au</u>)

At the forefront of research, education and technical expertise, the Centre for Mined Land Rehabilitation (CMLR) is leading the way we think about mining environmental management.

CMLR is involved in a broad range of research and training projects with mining companies, industry bodies and government departments from across Australia and the world.

As a part of one of the largest universities in the world, the CMLR has a team of highly skilled professionals focusing on the key issues facing modern mining and minerals processing industries.

A member of the Sustainable Minerals Institute (previously the Sir James Foots Institute of Mineral Resources), the Centre was established at The University of Queensland in 1993 and has built on more than twenty years involvement with the mining and minerals industries.

CMLR and the Sustainable Minerals Institute (<u>www.smi.uq.edu.au</u>)

The Sustainable Minerals Institute (SMI) was established in 2001 as a joint initiative between the Queensland Government, The University of Queensland and the Minerals Industry. The proposed development was to build upon the existing expertise within the various centres and departments and provide and overarching framework for progressing Minerals Industry Research, Education and Training activities.

The CMLR is the sole provider of environmental mining management within the University and has established for itself and the SMI a reputation of national and international significance.

Our Location

The CMLR is situated on the 5th floor of the Sir James Foots Building (No 47A) at the University of Queensland, St Lucia campus (<u>www.uq.edu.au</u>).

Table of Contents

1.0 Scope of Work	5
2.0 Materials and Method2.1 Metropolitan Colliery2.2 Review Objectives2.3 Risk-based Approach	6 6 6 6
3.0 Review of information 3.1 Spetec H100	8 8
4.0 Discussion	12
5.0 Conclusions	13
6.0 Limitations	14
7.0 References	15
8.0 Appendices	17

1. Scope of Work

CMLR was commissioned by Golders Associates Pty Ltd to undertake a desk top risk assessment of a polyurethane injection resin product for remediation activities on Waratah Rivulet at the Metropolitan Colliery, NSW. The details of the consultant are given in Appendix 1.

This report gives a summary of the review of information undertaken on the polyurethane injection resin product Spetec H100 using a risk-based approach. The desk-top risk assessment takes into account potential concerns that injection products may affect the Waratah Rivulet with respect to: (i) water supply; and (ii) ecological health. The report also makes comparison with the polyurethane injection resin product previously used at Waratah Rivulet.

2.0 Background

2.1 Metropolitan Colliery

Metropolitan is a coal mine with extensive underground workings and is located 31 km north of Wollongong, New South Wales, Australia. The Metropolitan mine is operated by Peabody Energy Australia Pty Ltd.

An artifact of the underground coal mining has been subsidence of creek beds that are located within or proximal to the mining area (NSWDP 2007). These impacts may affect the hydrology of creeks (e.g. sub-surface flow and water quality) and subsequently the ecology. Techniques to repair cracks in creek beds were investigated and trials undertaken (Noller 2007a; Noller 2007b; Noller and Edraki 2008). An alternative polyurethane injection resin product, Spetec H100, is now being considered and compared with the previously used products.

2.2 Review Objectives

This report considers the risks associated with use of Spetec H100 polyurethane injection resin product for grouting application to seal cracks generated by subsidence from underground mining.

The use of the polyurethane injection resin product needs to be undertaken in a manner which precludes or minimises deleterious effects on the environment and human health during application and from their long term placement.

2.3 Risk-based Approach

The risk assessment procedure, which is generally adopted (eNHealth 2012), considers the following steps:

- Hazard identification
- Dose response assessment
- Exposure assessment

Risk characterisation then enables the estimation of any adverse effect to be identified and to provide a means of devising risk management if appropriate. Risk management can then be applied on the basis of the assessments given below.

Risk assessment is a process that enables management and communication tools to be developed to aid controlling any adverse effects of chemical applications (Ricci 2006). It comprises the discrete steps of identification of source and hazard, dose response, exposure and calculation of risk (ISO 2009). There are acceptable risk management concepts that will apply to public health and the environment arising from exposure to grouting materials when applied under controlled conditions as pure or mixed formulations.

In the risk assessment process, exposure studies of biota may need to take into account formulation of the grouting compounds and their bioavailabilities. The risks to the environment need to take into account effects on: (i) terrestrial species; and (ii) aquatic species (ANZECC/ARMCANZ 2000; Suter II 1995). Other key areas at Waratah Rivulet include exposure assessment from drinking water as this creek system lies within a water supply catchment of the Sydney Catchment Authority. Assessment of drinking water quality is undertaken by following the procedures outlined by the Australian Drinking Water Guidelines (ADWG 2011).

The currently accepted procedures in Australia of the Department of Health and Aged Care for human health (eNHealth 2012) and the USEPA of ecological health (USEPA 1998) enable the formalized approach of risk assessment to be applied when required. Calculation of dose, if applicable, enables recommendations to be made regarding safe criteria for public health and the environment. The understanding of risk assessment and implementation and management are two sequential steps where assessment is first undertaken followed by development of the management tool based on identified risks. In many cases a complete risk assessment may not be undertaken for practical reasons. For this reason decision making tools are developed to provide a risk-based approach that acts as a framework. The first step of risk assessment is hazard identification.

At Waratah Rivulet the important end points from any grouting application are considered to be the effects on the ecosystem health and to the downstream drinking water catchment area. Lower aquatic life forms such as macroinvertebrate species, algae, lichens and microbial species are likely to be most significant in Waratah Rivulet because species such as fish are relatively few.

The desk-top assessment takes into account potential concerns that grouting materials may affect the Waratah Rivulet with respect to: (i) water supply; and (ii) ecological health.

3.0 Review of Product Information

Resiplast NV (RP Industries) is a Belgium company located at Gulkenrodestraat 3,2160, Wommelgem, Belgium. Since its inception in 1963 RP Industries has developed a large number of resin systems for various industrial applications. With more than 40 years' experience and brand names including Spetec®, RP Industries is an established global market leader in the manufacture and development of synthetic resins and in special techniques for industry.

The polyurethane injection resin product manufactured by RP Industries and the subject of this desk top assessment is Spetec® H100.

3.1 Spetec H100

3.1.1 Composition and properties

Spetec H100 is a 'single component' universal PUR H100 which uses PU H100 and PU H100 ACC mixed *in-situ* to give a solvent-free polyurethane pre-polymer for single-shot injection for water cut-off in geological and other structures and filling of water bearing cavities (Appendix 2). Spetec H100 is specifically designed for rapid water stopping and ground stabilisation. This resin is designed for control of high volume water ingress, stabilisation of fractured rock, sands and gravels and land-fill materials, void filling and repair of concrete structures. The end product polyurethane that is harmless to the environment and resistant to biological attack; i.e. it is biologically inert.

Spetec H100 is comprised of two parts, PU H100 (Appendix 3), uncured and PU H100 ACC (Appendix 4), which are mixed in an injection pump that can pump the mixture into an appropriate single-shot injection system. Spetec PU H100, uncured and PU H100 ACC, accelerator for PU 100 are very hygroscopic and are packed under a dry atmosphere. They are stored at 20° C in their original unopened containers with a suggested shelf-life of at least 12 months. Before using PU H100 ACC is always shaken well to make sure the mixture is homogenous in the chosen ratio (from 2% - 10%). Once opened containers should be used as soon as possible.

Spetec PU H100 is a liquid with <50% of 4,4'-dimethylmethanediisocyanate which is appears to be the same as 4,4'-diphenylmethanediisocyanate (MDI) as both names are used (Appendix 3); it is a brown in colour with a viscosity of 150-250 mPas and density of 1.05-1.15 kg/m³ at 20^oC. The MDI is considered to be harmful by inhalation, irritating to eyes, respiratory system and skin. The MDI has limited effect on aquatic and terrestrial biota in the environment (European Communities 2005, World Health Organisation [WHO] 2001) because of MDI's virtual insolubility in water (< 0.02 mg/L) and its high reactivity in water (lifetime less than 1 minute) (European Communities 2005, WHO 2001). The mixed polyurethane resin penetrates the

structure to be sealed and the major part of water is displaced due to the hydrophobicity and the viscosity of the resin. Traces of water make the resin foam. The cured resin is resistant against many acids, alkalis, salt brines as well as organic solvents and 1 year of storage in air, water, sulfuric acid and sodium hydroxide solution showed no swelling nor shrinking.

Spetec PU H100 ACC is a pale yellow liquid with >20% of 1-dodecamin-N,N'dimethyl and an odour of ammonia; it has a viscosity of 10-15 mPas at 25° C, a density of 0.95 kg/m³ at 20°C and is not soluble in water (Appendix 4). PU H100 ACC is an accelerator for PU H100 and should be handled in a wellventilated area. The product can penetrate the skin and if not removed at once will cause local burns after its removal. Contact with the eye may cause severe damage if not treated at once. The acute effect of ingestion is mainly due to the corrosive properties of the product. Long-term and continuous exposure may cause sensibility by skin contact.

3.1.2 Effect on water supply

Leaching experiments with cold water on the resin were undertaken by Hygiene-Institut des Ruhrgebiets (1998) (Appendix 5). Test plates coated with Spetec LH/H100 polyurethane resin were brought in contact with cold water according to the UBA (Umweltbundesamt - German Federal Environment Agency) - guideline for the hygienic assessment of organic coatings in contact with drinking water and met all requirements (Hygiene-Institut des Ruhrgebiets 1998). Test plates coated with Spetec LH/H100 resin in contact with water at 20^oC showed maximum total organic carbon (TOC) (12 mg/m²xd) and free chlorine (15 mg/m²xd) removals following Days 1-3 and were at similar levels following Days 7-9 (Hygiene-Institut des Ruhrgebiets 1998). The value for organic migrations on 3 samples had a value of 0.01 mg/m²xd. Formaldehyde, phenol and primary aromatic amine all showed removals at detection limits (Hygiene-Institut des Ruhrgebiets 1998) and were insignificant in the context of hazards in drinking water.

The test water samples were examined according to the following parameters: appearance (colour, transparency, odour, taste and tendency to foam) and total organic carbon (TOC) (Hygiene-Institut des Ruhrgebiets 1998).

Additional tests were undertaken on Spetec H100 test polyurethane material leaching in water (Universiteit Gent, 2003; Appendix 6) for odour (nil), taste (nil), colour (nil) turbidity (0 FNU), COD (after 72 hours was <10 mg O_2/L the norm) and global migration of organic compounds (3.82 mg/dm² and < norm of 10 mg/dm²).

The results indicate:

- Examination of the leachate showed that odour was nil to slight.
- Colour, transparency, turbidity and tendency of the test water samples to foam were unaffected.

- The release of organic compounds determined as TOC was still evident at Days 7-9 and may have reflected a background level of TOC in the test water. COD and global migration of organic compounds on more recent testing were less than the norm values.
- The test water was additionally checked for aromatic amines and were not detected.
- The lack of any apparent leaching indicates that the current approach recommended by the *Australian Drinking Water Guidelines* (ADWG, 2011), based on the identification of hazards and having barriers in place to minimise dispersion, is unlikely to cause any risks from grouting application with application of Spetec H100 in the Waratah Rivulet, provided proper application procedures are followed.

3.1.3 Ecological effects

The influence of Spetec H100 polyurethane resin in water was evaluated for ecological effects by the response of coliforms (Universiteit Gent, 2003). The material did not control the stimulation of bacteriological growth.

The aquatic toxicity of Spetec H100 to both bacterial (EC50) and fish (LC50) are reported to be >300 mg/L (Appendix 3).

The results for the available aquatic toxicity test date for Spetec H100 is similar to earlier studies (Noller 2007a) and implies that the lower life forms in the Waratah Rivulet will be most significant with respect to any toxicity effects if Spetec H100 resin is to be used for grouting purposes.

For an average flow of 210 L/sec and depth of 250 mm in Waratah Rivulet contact with the surface of a typical grout (10mX300mm) will require a volume of 840 L to achieve the safe dilution of 1:4 found for aquatic test species (Noller 2007a). This volume compares with 2500 L needed to dissolve the MDI from a 1mm thickness of the grout and indicates that the actual dilution in creek water required is low (Noller 2007a). Flowing stream conditions favour degradation of leached grout constituents by bacterial degradation and are clearly different to those for laboratory tests.

3.1.4 Hazards associated with application

Reference should be made to the Material Safety Data Sheets (Appendices 3 and 4) for safety measures. Avoid contact with skin and eyes by using the required personal protective equipment, such as overalls, gloves and eye goggles. If contact with skin occurs, wash thoroughly using soap and water. If contact with eyes occurs, rinse thoroughly with running water and seek medical advice. The cured products are harmless. Uncured products should be prevented from entering local drainage system and water courses. Spillage must be collected using absorbent materials such as sawdust and sand, and dispose of in accordance with local regulations.

Because of the potential occupational health hazard of handling Spetec PU H100, suitable protective clothing, gloves and eye/face protection must be

worn. Medical advice must be sought in case of an accident. Before processing the product should be stored at the temperature of the site of application. Storage, shelf life is at least 6 months from the date of delivery. Liquid residues should be disposed of properly.

4.0 Discussion

The test results for the Spetec H100 polyurethane injection resin product indicate that some initial ecotoxicity exists. However the toxicity is not considered to be a major response. It appears that the toxicity is arising from other additives than the 4,4'-diphenylmethane diisocyanate (MDI) in the formulation, as the isocyanate component has a short lifetime in water as indicated in Section 3.1.

Comparison of the test results for the previously used grouting materials (Noller 2007a) with those for the Spetec H100 polyurethane injection resin product shows little difference.

Estimations of the dilutions achieved from leaching of grouts, typically 10mX300mm, by average creek flow of 210 L/sec show that volumes of 640-840 L, depending on the product used, will achieve safe dilution. In the absence of creek flow there is no downstream impact.

Once cured, the polyurethane resins and filling foam are very inert and are considered to be useful materials.

5.0 Conclusions

The desk-top assessment of the Spetec H100 polyurethane injection resin product, proposed for sealing cracks in Waratah Rivulet at the Metropolitan Colliery, NSW, concludes that the use of this material requires adherence to its specific handling procedures in order that it can be applied properly. Spetec H100 polyurethane injection resin product gives similar test results to the grouting material previously used at Waratah Rivulet.

An impact on downstream water supply from polyisocyanate compounds is unlikely as these compounds break down rapidly. The impact of creek waters passing over grouts on downstream aquatic biota is also unlikely as sufficient dilution is achieved by average creek flow exceeding the dilutions necessary to avoid toxic responses.

6.0 Limitations

CMLR has prepared this report for the use of Golders Associates Pty Ltd. It is prepared in accordance with the scope of work.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

The methodology adopted and sources of information used by CMLR are outlined in this report. Our conclusions are based upon the analytical data presented in this report and our experience. Opinions and recommendations presented herein apply to the information available at the time of our investigation and cannot necessarily apply to matters of which CMLR is not aware and has not had the opportunity to evaluate. ADWG (2011) Australian Drinking Water Guidelines - National Water Quality Management Strategy. The National Health and Medical Research Council Canberra.

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Appendix 1 Experience of Consultant

Associate Professor Noller has a PhD (1978) in Environmental Chemistry from the University of Tasmania. He worked as a Research Fellow at the Australian National University (1978-1980), Senior Research Scientist at the newly created Alligator Rivers Region Research Institute, Jabiru, Northern Territory (1980-1990) and then as Principal Environmental Chemist for the Department of Mines and Energy, Darwin Northern Territory (1990-1998). From 1998-2006 Professor Noller has been Deputy Director of the National Research Centre for Environmental Toxicology (ENTOX) – The University of Queensland, Coopers Plains, Qld. ENTOX has a strong involvement with the utilisation of the risk assessment process to deal with toxicological hazards, including in environmental systems. Since November 2006 Professor Noller has been appointed as Honorary Consultant and Associate Professor at the Centre of Mined Land Rehabilitation (CMLR) a centre of the University of Queensland based at St Lucia. The CMLR is part of the Sustainable Minerals Institute.

Professor Noller has been working and publishing in the field of environmental chemistry and industrial toxicology for the past 40 years and has presented 350 conference papers and published 170 papers. His professional activities undertaken at 4 different centres have covered processes and fates of trace substances in the environment, particularly in tropical environmental systems with special reference to risk management associated with their application and studies of the bioavailability of toxic elements in mine wastes, including waters. He has undertaken a number of consulting activities in Queensland, Tasmania, New South Wales, Western Australia and the Northern Territory and has undertaken a number of investigations at the Metropolitan Colliery since 2007. He was appointed in 2007 as Lead Author of the Australian Government Leading Practice Sustainable Development Program for the Mining Industry Handbook on Cyanide Management and was Project Leader for the Lead Pathways Study conducted at Mount Isa on behalf of Glencore Xstrata 2007-2013.

Appendix 2 Spetec Single component universal PUR H100





SINGLE COMPONENT UNIVERSAL PUR H100 water cut-off grout –cavity filling

DESCRIPTION

• Solvent-free Polyurethane prepolymer for single-shot injection.

APPLICATIONS

- Injection resin for water cut-off in concrete, masonry structures and sandy soils, even when strong seepage or gushing water is encountered.
- Filling of water bearing cavities rapidly.
- Adaptable reaction velocity by varying accelerator content from 2% to 10%.
- Reaction with water results in formation of a rigid polyurethane foam that forms, with the substrate, a hydrophobic and chemically resistant conglomerate.
- Good compression strengths are obtained in a very short time without neither shrinking nor swelling.
- Solvent-free system: the end product is harmless to the environment and resistant to biological attack.

REACTION TIME VS TEMPERATURE



Spetec

SINGLE COMPONENT UNIVERSAL PUR H100

1

PROPERTIES

PU H100, uncured			
Appearance	and the second second	brown liquid	
Viscosity at 25°C	ASTM D4878-98	160 ± 20	mPa.s
Flashpoint	ASTM D1310-86	>150	°C
Relative Density at 25°C	ASTM D3505-96(2000)	1.08 ±0.005	
PU H100 ACC, Accelerator for F	PU H100	-	
Appearance		yellow clear liquid	-
Viscosity at 25°C	ASTM D4878-98	15±5	mPa.s
Flashpoint	ASTM D1310-86	>150	°C
Relative Density at 25°C	ASTM D3505-96(2000)	0.995 ± 0.003	
PU H100 + Accelerator cured		100	
Compressive Strength (confined)	ASTM D4219-93a	6,5	MPa
Tensile Strength	ASTM D1623-78	>2	MPa

AVAILABILITY

Density (confined)

PU H100 and PU H100 ACC are very hygroscopic, therefore they are packed under dry atmosphere.

ASTM D-3574

Stored at 20 °C in the original unopened containers, shelf life is at least 12 months. Once opened, containers should be used as soon as possible.

PU H100 comes packed in either 200-kg steel drums or 20-kg metal pails.

PU H100 ACC comes packed in either 20-kg metal pails or 2-kg polyethylene bottles.

PROCEDURE

Before using PU H100 ACC always shake well to make sure the mixture is homogeneous. Mix PU H100 and PU H100 ACC in the chosen ratio (from 2% to 10%). Normal injection pumps can pump the mixture into an appropriate single-shot injection system.

SAFETY PRECAUTIONS

Avoid any contact with skin or eyes. Follow safety precautions as indicated on our separate "Safety Data Sheet". REACH complaint



Kg/dm³

The information in this data sheet has been given in good faith but without warranty. The application, use and processing of the products are beyond our control and therefore entirely your responsibility. Should, in spite of this, liability be established for any damages, it would be limited to the value of the foods delivered by us and used by you. We will of course provide products of consistent quality. Date: 31/01/2013

Gulkenrodestraat 3 B-2160 Wommelgem RESIPLAST N.V. (0)3 320 02 03 +32 (0)3 322 63 80

www.spetec.com E-mail: info@spetec.com

Appendix 3 Spetec PU H100 Safety Data Sheet

	Safety Data Sheet according 1907/2006/EG, Artikel 31		Date of issue: 20-02-2013
Spetec 5	SPET	EC PU H1	00
Identification of substance and manufactu	urer/Supplier		
. Product details			20
rade name :	SPET	TEC PU H10	0
Application of the substance/preparation :	Poly	urethane Resin	
RESIPLAST N.V.	Tel : + 32-(0	0)3 320 02 03	
Gulkenrodestraat 3	Fax : + 32-(0	0)3 322 63 80	
. Information :	nttp : <u>www.sp</u>	etec.com apter 16	
I. Emergency telephone number :	+ 32-(0)3 320 02 04	1
Hazards identification		La materi	
iazaru designation	X ^X ⁿ	Harmful	
nformation pertaining to particular danger	s for man and environment :		
larmful by inhalation			(R48/20)
imited evidence of carcinogenic effect.			(R40)
lay cause sensisation by inhalation and skin con	ntact.		(R42/43)
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RESIPLAST NV

Trade name: PU H100



SPETEC PU H100

5 Fire-fighting measures

a. Suitable extinguishing media :

CO2 , dry chemical powder. Larger fire with alcohol resistant foam. b. For safety reasons unsuitable extinguishing agents :

Water jet (reacts with MDI)...

c.Special exposure hazards and combustion products :

May generate carbon monoxide (CO) and Nitrogenoxides (Nox).

Under certain fire conditions, traces of other toxic gases cannot be excluded.

d. Special fire-fighting procedures :

Wear full protective suit and a self-contained breathing apparatus.

e.Additional information:

Retain expended liquids from fire fighting for later disposal. Prevent spilled product from entering streams, drinking water supplies or drains. Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.

6 Accidental release meassures

a. Person related safety precautions : Wear protective equipment. (see chapter 8)

All personnel remain upwind of the spill. Keep unprotected persons away.

Avoid contact with eyes and skin. Ensure sufficient ventilation.

b. Measures for environmental protection :

Do not allow to enter drainage system, surface or ground water. Inform the local authorities if the product has entered the sewage system.

Try pumping the product in an open barrel.

c. Methods for cleaning/collecting :

Provide sufficient ventilation.

Absorb with liquid-binding material (sand, earth, diatomite, silica gel, universal binder).

Avoid using solvents. Place in metal containers for recovery or disposal. Place leaking containers in a marked drum. Scrub the contaminated surface with a diluted soap solution. Consider the cleaning water as contaminated waste.

Take care of large quantities by damming and pumping.

Contaminated materials should be removed as waste, according to item 13.

7 Handling and storage

HANDLING Handling below 50°C.

a. Information for safe handling :

Use this product in a well ventilated area.

Take notice of the MAC values while working.

b. Information concerning fire and explosion hazards :

Keep away from ignition sources. Don't smoke.

STORAGE

a. Demands concerning storage rooms and tanks :

Sufficient ventilation in the storage rooms and working areas. Prevent contact with water and strong alcalines or acids.

b. Information about storage in a common storage facility :

May produce violent reactions with bases and numerous organic substances specially amines.

c. Further information about storage conditions :

Protect containers against physical damage. Store in a cool, dry and well ventilated place, in tightly closed container.

Do not store in full sun nor near sources of heat. At these conditions shelflife is 6 months.

Sexposure controls /personel protection a. Additional information about design of technical systems : Do not spray b. Substances with exposure limits : CAS-No. Substance 101-68-8 4,4'-dimethylmethanediisocyanate 0,2 mg/m³ 0,1 mg/m³

Page: 3 / 5 Date of issue: 20-02-2013

spece	SPETEC PU H10	0
PERSONAL PROTECTI	VE EQUIPMENT :	
a. Breathing	Do not inhale dust or spray. If necessay wear appropriate dust filter mask.	
b. Hands	Rubber (butyl caoutchouc, nitril) or plastic gloves (with cufffs to prevent spread of material to area above the wrists) should be worn whenever the possibility of skin contact arises.	
c. Eyes	Tightly sealed safety glasses.	
d.Body	Wear suitable, long sleeved protective work clothing. Under normal conditions, cotton overalls or working suits of cotton/synthetic fibre are suitable. Heavy duty rubber or plastic-covered aprons can be worn.	R
	Wear impermeable shoes.	
e. Personal hygiene	Remove all contaminated clothing immediately. Keep working clothing away from food and drinks. Wash hands before breaks and at the end of the work. Use a skin protecting onguent as preventive measure. Handle in accordance with good industrial bygiene and safetey practice.	
f. In general	Avoid breathing of vapours, gases and aërosols.	

Appearance		liquid	
Colour	100	brown	
Odour	1.111	weak musky	
Melting point		<-20°C	
Boiling point		>200°C	
Flashpoint	1.1	>150°C	DIN 51758
Ignation temperature		>200°C	
Decomposition temp.		not determinated	
Explosion limits	6.14	n.a.	
Vapour pressure	Hite -	0,00001 mbar bij 25°C	
Density	1.11	1,05 -1,15 g/cm3 @20°C	DIN 52217-02
Solubility in water	1.00	not soluble	
PH-value	No. 1	neutral	DIN 16916
Viscosity	- HİH -	150-250 mPas @ 25°C	DIN 53015
Vapor density	1221	8,5 @ 20°C (air=1)	

10 Stability and reactivity a. Thermal decomposition conditions to avoid : No decomposition if used according to specifications. Keep away from strong alcalines. b. Dangerous reactions : May produce violent reactions with bases and numerous organic substances including amines. Exothermic polymerisation. c. Dangerous products of decomposition : Corrosive gases/vapours, carbonmonoxide, nitrogenoxide

RESIPLAST NV

Trade name: PU H100



SPETEC PU H100

		oral LD50	dermal LD50	inhalation LC50/4h
4,4'-diphenylmethanediisoc	yanate	>8000 mg/kg rat	>5000 mg/kg rabbit	>490 mg/m3 aerosol rabbit
b. Primary irritant e	ffect :			
On the skin :	Irritant to the skin	and the mucous membrane	2.	
On the eye :	Irritant effect.			
After ingestion :	May cause irritation			
Sensibility :	Long term and cont	inuous exposure may caus	e sensibility by skin contact	
c. Additional toxicol	ogical information :			
The product shows the	following dangers acc	ording to the calculation m	ethod of the General EC.	
Classification Guidelin	es for Preparations as is	sued in the latest version.		
Sidooning Cion Oundenni	and the second			
Harmful				
Harmful d. Chronical irritant	effect:			

 12 Ecological information

 Biological degradability : Not easy biodegradable - formation of insoluble solids.

 Aquatic toxicity:
 Fish toxicity (LC50) > 300 mg/l
 Bacterial toxicity (EC50)

General information: Product reacts with water to form insoluble polyurethanes.

13 Disposal considerations

a. Product :

Recommendation: remove according to local authority recommendations, e.g. convey to a suitable incinerator. b.Uncleaned packagings :

Recommendation: disposal must be made according to official regulations..

c. European waste catalogue :

The waste code classification is to be carried out according to the European waste catalogue (EWC) specifically for each branch of industry and each type of process.

a. Land transport ADR/RID (trai	isboundary)	
ADR class	Not classified	
UN number		
Packaging group		-
Classification code		
Hazard index number		
Proper shipping name	Diphenylmethane-4,4'-diisocyanate	
b. Maritume transport IMDG :		
IMDG class	Not classified	
UN number		
Packaging group		
Classification code		
Hazard index number		
Proper shipping name	Diphenylmethane-4,4'-diisocyanate	
c. Air transport IATA :		
IATA class	Not classefied	
UN number		
Packaging group		
Classification code		
Hazard index number		
Dropor chipping pama	Diphonylmethana 4.4' diisegyapata	



Spetec

SPETEC PU H100

<u>15 Regulatory information</u> a. <u>Code. let</u>ter and hazard designation of product :

Xn : Harmful

b. Hazardous ingredients : Diphenylmethane-4,4'-diisocyanate

c. R-phrases :	
R 48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R 36/37/38	Irritating to eyes, respiratory system and skin.
R 40	Limited evidence of a carcinogenic effect.
R 42/43	May cause sensitization by inhalation and skin contact.
R 84	Contains isocyanates, consult information presented by the manufacturer.
d. S-zinnen :	
S 36/37/39	Wear suitable protective clothing, gloves and eye/face protection.
S 26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 23.3	Do not breath gas/vapour/aerosol.

f. Additional regulations : Document of APME: " Polyurethane resins and curing agents (Toxicology, health, safety and evironmental aspects)"

16 Other information

This information considers above mentioned product alone and is not necessarily valid if used in combination with other products or in a process. This data is based on our present state of knowledge and is provided in good faith, however without guarantee. It remains the responsibility of the user to ensure himself that this information is appropriate and complete for his special use. It shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

* Relevant R-phrases :

H317	May cause an allergic skin reaction.	
H319	Causes serious eye irritation.	
H332	Harmful if inhalated.	
H334	May cause allergy or asthma symptoms or breathing difficulties if inhalated.	
H335	May cause respiratory irritation.	
H351	Suspected of causing cancer.	
H373	May cause damage to organs through prolonged or repeated exposure.	

* Telephone number by distress :' 0032(0)3 320 02 04

Felix Verstraeten Prepared by:

For more information visite our website : http://www.spetec.com

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Trade name: PU H100

Appendix 4 Spetec ACC H100 Safety Data Sheet

			Safety Data She according to 1907/2006/E0	G, Art. 31		Page: 1 / 5 Date of issue: 20-02-2013
Spe	ete	C. 25		SPET	EC ACC I	1100
1 Identifica	tion of sul	bstance and of th	e company/entreprise			
a. Product d	letails			1.1.1.1	1.1.1.1.1	6.02
Trade name :				SPET	EC ACC H	100
Application of	f the substa	ance/preparation :		Accele	rator for PU	H100
RESIPLAST N	I.V.	Jilei .		Tel : + 32-(0)3 320 02 0	3
Gulkenrodest	traat 3	1		Fax : + 32-(0)3 322 63 8	30
2160 Womme	elgem (Bel	gium		http: www.sp	etec.com	
d. Emergen	ion : cv telepho	ne numer :		+ 32-0	0)3 320 02	04
	-,					
lazards id	gnation :	on	C Corros	sive	¥	N dangerous for
	mantalala	a to posticulos de			1	the environment
larmful if sw	allowed.	ig to particular da	ingers for man and envir	onment :		(R22)
Causes burne	25.					(R34)
/ery toxic to	aquatic org	ganismes				(R50)
3 Compositi Chemical ch	on/Data (aracteriza	on components ation:	Accelerator for po	wurathana cra	k injection (uctors
<u>3 Compositi</u> Chemical ch a. Designati b. Hazardou	ion/Data (haracteriza ion : us ingredie	on components ation: ents :	Accelerator for pol	yurethane crac	ck injection s	ystem
3 Compositi Chemical ch a. Designati b. Hazardou CASnr J 1728.92.0 22	ion/Data (haracteriza ion : is ingredie EINECS	on components ation: ents : Definition	Accelerator for pol	yurethane crad	k injection s	ystem <u> B-phrases</u> 20. 26/37/39 - 42/43
3 Compositi Chemical ch a. Designati b. Hazardou CASnr J 51788-93-0 20 (Relevant H-p	on/Data of aracterization : Is ingredie EINECS 63-020-0 phrases : s	ents: Definition 1-dodecamin-N,N'-dir ee chapter 16)	Accelerator for pol	yurethane crao <u>%</u> >20	ck injection s <u>Symbol</u> C	ystem - <mark>12 - 12 - 12 - 12 - 12 - 12 - 12 - 12</mark>
3 Compositi Chemical ch a. Designati b. Hazardou ASnr. J 1788-93-0 20 Relevant H-p	on/Data (aracteriza ion : is ingredie <u>EINECS</u> 53-020-0 phrases : s	ents : Pefinition 1-dodecamin-N,N'-dir ee chapter 16)	Accelerator for pol	yurethane crac <u>%</u> >20	ck injection s <u>Symbol</u> C E	ystem - <mark>R-phrases</mark> 20 - 36/37/38 - 42/43
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SPETEC ACC H100

5 Fire-fighting measures a. Suitable extinguishing media :

Water, CO2, dry chemical powder. Larger fire with alcohol resistant foam.

b. For safety reasons unsuitable extinguishing agents:

Strong water jet.

c. Special exposure hazards and combustion products: May generate carbon monoxide (CO) and Nitrogenoxides (Nox).

Under certain fire conditions, traces of other toxic gases cannot be excluded.

d. Special fire-fighting procedures:

Wear full protective suit and a self-contained breathing apparatus.

e. Additional information:

Retain expended liquids from fire fighting for later disposal. Prevent spilled product from entering streams, drinking water supplior drains. Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.

6 Accidental release measures

a. Person related safety precautions :

Wear protective equipmet. (see chapter 8). All personnel remain upwind of the spill. Keep unprotected persons away. Avoid contact with eyes and skin.

Ensure sufficient ventilation.

b. Measures for environmental protection :

Do not allow to enter drainage system, surface or ground water. Inform the local authorities if the product has entered the sewage system.

Try pumping the product in an open barrel.

c. Methods for cleaning/collecting :

Provide sufficient ventilation.

Absorb with liquid-binding material (sand, earth, diatomite, silica gel, universal binder).

Avoid using solvents. Place in metal containers for recovery or disposal. Place leaking containers in a marked drum.

Scrub the contaminated surface with a diluted soap solution. Consider the cleaning water as contaminated waste.

Take care of large quantities by damming and pumping.

Contaminated materials should be removed as waste, according to item 13.

7 Handling and storage HANDLING

a. Information for safe handling :

Use this product in a well ventilated area. Take notice of the MAC-values while working.

b. Information concerning fire and explosion hazards :

Keep away from ignition sources. Don't smoke.

STORAGE

a. Demands concerning storage rooms and tanks :

Sufficient ventilation in the storage rooms and working areas.

Prevent contact with copper, aluminium and zinc or their amalgamates.

b. Information about storage in a common storage facility :

May produce violent reactions with acids

c. Further information about storage conditions :

Protect containers against physical damage. Store in a cool, dry and well ventilated place, in tightly closed containers.

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Page: 3 / 5 Date of issue: 20-02-2013



SPETEC ACC H100

Keep a solution of 0,5% b. Substances with exp	acetic acid at hand on the osure limits :	e job location.	
CAS-No	substance	MAC	MAC (TRGS 900
61788-93-0	1-dodecamin-N,N'-dimethyl	n.a.	n.a.
PERSONAL PROTECTI a. Breathing	IVE EQUIPMENT : Do not inhale dust or sp If necessary wear gas n	aray. nask - filter K (gre	en, ammonia).
b. Hands	Rubber (butyl caoutchou to prevent spread of ma be worn whenever the p	ux, nitril latex) or aterial to area abo possibility of skin o	plastic gloves (with cuffs ve the wrists) should contact arises.
c. Eyes	Tightly sealed safety gla	isses.	
d. Body	Wear suitable, long slee Under normal conditions of cotton/synthetic fibre Heavy duty rubber or pl	ved protective wo 5, cotton overalls are suitable. astic-covered apri	rk clothing. or working suits ons can also be worn.
	Wear impermeable shoe	25.	
e. Personal hygiene	Remove all contaminate Keep working clothing a Use a skin protecting or Handle in acoordance w	d clothing immedi way from food an iguent as preventi ith good industrial	ately. d drinks. ve measure. hygiene and safety practice
f In general	Avoid breathing of duct	and aërosols	

Appearance	1	liquid	
Colour	:	pale yellow	
Odous	1	ammonia	
Melting point	;	-10°C	
Boiling point	:	>200°C	
Flashpoint	1	135°C	DIN 51758
Ignition temperature	1	>200°C	
Decomposition temp.	10	n.a.	
Explosion limits	:	n.a.	
Vapour pressure	4	n.a.	
Density	1	0,95 g/cm ³ @ 20°C	DIN 52217-02
Solubility in water	1	not soluble	
pH-value	÷.	14	DIN 16916
Viscocity	£	10-15 mPas @ 25°C	DIN 53015
Vapour density	1	>1 @ 20°C (air)	

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Page: 4 / 5 Date of issue: 20-02-2013



SPETEC ACC H100

Contact with the eyes may cause severe damage if not treated at once.

Long term and continuous exposure may cause sensibility by skin contact.

Long term and continuous exposure may cause sensibility by skin contact.

The acute effect of ingestion is mainly due to the corrosive properties

10 Stabilitty and reactivity a. Thermal decomposition/conditions to avoid :

Stable under normal conditions.

No decomposition if used according to specifications. Keep away from strong acids.

b. Dangerous reactions: May produce violent reactions with acids.

Exothermic polymerisation.

c. Dangerous products of decomposition :

Corrosive gases/vapours, carbonmonoxide, nitrogenoxide.

11 Toxicological information

a. Acute toxicity: LD50/LC50-values that are relevant for classification				
Components	oral LD50	dermal LD50	inhalation LC50/4h	
1-dodecamin-N,N'-dimethyl	>2000 mg/kg rat	n.a.	n.a.	

b. Primary irritant effect : On the skin :

On the eye :

The product penetrates the skin. If not removed at once, local burns may develop after removal of the produc

of the product.

After ingestion :

Sensibility : c. Chronical irritant effect :

12 Ecological information Biological degradability : Aquatic toxicity :

Biodegradable - formation of insoluble solids. Toxic for aquatic organisms.

General information : Avoid release to the environment.

13 Disposal considerations

a. Product : vuilverbrandingsinstallatie vervoeren.

b. Uncleaned packagings:

Recommendation: disposal must be made according to official regulations.

c. European waste catalogue :

The waste code classification is to be carried out according to the European waste Catalogue (EWC) specifically for each branch of industry and each type of process.

a. Land transport ADR/RID (transboundary)	(L.		
ADR class	8		
UN number	2735	AN	
Packaging group	III		
Classification code	C7		
Hazard index number	80		
Proper shipping name	Amines, li (1-dodeca	uid, corrosive, n.o.s. nin-N,N'-dimethyl)	

RESIPLAST NV

Page: 5 / 5 Date of issue: 20-02-2013

-		SPETEC ACC H100		
. Maritime trar	sport IMDG :			
MDG class		8 ^		
IN number		2735		
ackaging group				
lassification code	9	C7		
		53,c		
roper shipping n	ame	Amines, liquid, corrosive, n.o.s.		
		(1-dodecamin-N,N'-dimethyl)		
Air transport	ICAO- TI and IATA- DG	R :		
ATA class		8		
N number		2735		
ackaging group				
lassification code	2	C7 0		
azard index nun	nber	Page 8103		
roper shipping n	ame	Amines, liquid, corrosive, n.o.s.		
5 Regulatory in . Code, letter a	nformation nd hazard designation :	(1-dodecamin-N,N'-dimethyl)		
5 Regulatory in . Code, letter a . Code, letter a . Hazard ingree -dodecamin-N,N . R-phrases : 22	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow	(1-dodecamin-N,N'-dímethyl)		
5 Regulatory in Code, letter a	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe bur	(1-dodecamin-N,N'-dímethyl) N : Dangerous to the environment Ved. rns.		
5 Regulatory in Code, letter a Letter a . Hazard ingree -dodecamin-N,N . R-phrases : 22 34 50	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe bur Very toxic to aqua	(1-dodecamin-N,N'-dimethyl) (1-dodecamin-N,N'-dimethyl) N : Dangerous to the environment N : Dangerous to the environment tic organisms.		
5 Regulatory in Code, letter a Letter a Letter a Hazard ingree -dodecamin-N,N R-phrases : 22 34 50 S-zinnen :	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe bur Very toxic to aqua	(1-dodecamin-N,N'-dimethyl) (1-dodecamin-N,N'-dimethyl) N : Dangerous to the environment N : Dangerous to the environment wed. rns. tic organisms.		
5 Regulatory ii Code, letter a Letter a Hazard ingree dodecamin-N,N R-phrases : 22 34 50 S-zinnen : 36/37/39	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe bur Very toxic to aqua	(1-dodecamin-N,N'-dimethyl) (1-dodecamin-N,N'-dimethyl) N : Dangerous to the environment N : Dangerous to the environment red. rns. tic organisms. tective clothing, gloves and eye/face protection.		
5 Regulatory ii Code, letter a Letter a Hazard ingree dodecamin-N,N R-phrases : 22 34 50 . S-zinnen : 36/37/39 26	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe bu Very toxic to aqua Wear suitable prot In case of contact	(1-dodecamin-N,N'-dimethyl) (1-dodecamin-N,N'-dimethyl) N : Dangerous to the environment N : Dangerous to the environment N : Dangerous to the environment tective clothing, gloves and eye/face protection. with eyes, rinse immediately with plenty of water and seek medical advice		
5 Regulatory in Code, letter a Letter a Hazard ingree dodecamin-N,N R-phrases : 22 34 50 . S-zinnen : 36/37/39 26 45	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe buy Very toxic to aqua Wear suitable prot In case of contact In case of acciden (show the label with	(1-dodecamin-N,N'-dimethyl) (1-dodecamin-N,N'-dimethyl) N : Dangerous to the environment N : Danger		
5 Regulatory in Code, letter a . Code, letter a . Hazard ingree -dodecamin-N,N . R-phrases : . 22 . 34 . 50 . S-zinnen : . 36/37/39 . 26 . 45 . 57	nformation nd hazard designation : C : Corrosive dients : '-dimethyl Harmful if swallow Causes severe bur Very toxic to aqua Wear suitable prot In case of contact In case of acciden (show the label wi Use appropriate co	(1-dodecamin-N,N'-dimethyl) (1-dodecamin-N,N'-dimethyl) N : Dangerous to the environment contamination.		

Page: 5 / 5 Date of issue: 20-02-2013

Maritime transp MDG class IN number ackaging group ilassification code roper shipping nam	port IMDG :		
IMDG class JN number Packaging group Classification code Proper shipping nam			
UN number Packaging group Classification code Proper shipping nam			
Packaging group Classification code Proper shipping nam		2735	
Classification code			
Proper shipping nam		7	
Proper shipping nam			
Air transport TC	ne	Amines, liquid, corrosive, n.o.s. 1-dodecamin-N,N'-dimethyl)	
	AO- TI and IATA- DGR :		
IATA class			
UN number		2735	
Packaging group			
Classification code		7	
Hazard index number	or	Dage 8103	
Drapar chinging		aye oros	
Proper snipping nam	ie .	Animes, ilquid, corrosive, n.o.s.	
5 Regulatory info	ormation d hazard designation : C : Corrosive	N : Dangerous to the environm	nent
15 Requiatory info a. Code, letter and 	ormation 1 hazard designation : C : Corrosive ents : limethyl	N : Dangerous to the environm	ient
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases :	ormation d hazard designation : C : Corrosive ants : limethyl	N : Dangerous to the environm	hent
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 24	ormation d hazard designation : C : Corrosive ents : limethyl Harmful if swallowed.	N : Dangerous to the environm	ient
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 R 34 R 50	ormation d hazard designation : C : Corrosive ants : fimethyl Harmful if swallowed. Causes severe burns. Very toxic to aquatic ord	N : Dangerous to the environm	ient
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 R 34 R 50 d. S-zinnen :	ormation d hazard designation : C : Corrosive ants : fimethyl Harmful if swallowed. Causes severe burns. Very toxic to aquatic org	N : Dangerous to the environm	nent
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 R 34 R 50 d. S-zinnen : S 36/37/39 S 26	ormation d hazard designation : C : Corrosive ents : fimethyl Harmful if swallowed. Causes severe burns. Very toxic to aquatic org Wear suitable protective In case of contact with e	N : Dangerous to the environm	nent medical advice.
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 R 34 R 50 d. S-zinnen : 5 36/37/39 S 26 S 45	ormation d hazard designation : C : Corrosive ents : Jimethyl Harmful if swallowed. Causes severe burns. Very toxic to aquatic org Wear suitable protective In case of contact with e In case of accident or if (show the label where n	N : Dangerous to the environm	nent medical advice.
15 Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 R 34 R 50 d. S-zinnen : 5 36/37/39 5 26 5 45 5 57	ormation d hazard designation : C : Corrosive ents : Jimethyl Harmful if swallowed. Causes severe burns. Very toxic to aquatic org Wear suitable protective In case of contact with e In case of accident or if (show the label where p Use appropriate contain	N : Dangerous to the environm	nent medical advice.
LS Regulatory info a. Code, letter and b. Hazard ingredie 1-dodecamin-N,N'-d c. R-phrases : R 22 R 34 R 50 d. S-zinnen : S 36/37/39 S 26 S 45 S 57 S 60	ormation d hazard designation : C : Corrosive ents : Jimethyl Harmful if swallowed. Causes severe burns. Very toxic to aquatic org Wear suitable protective In case of contact with e In case of accident or if (show the label where p Use appropriate contain This material and its con	N : Dangerous to the environm N : Dangerous to the environm isms. othing, gloves and eye/face protection. is, rinse immediately with plenty of water and seek r u feel unwell, seek medical advice immediately. sible) to avoid environment contamination. iner must be disposed of as bazardous waste.	medical advice.

* telephone number by distress : '0032(0)3 320 02 04 Prepared by: Felix Verstraeten Visit our website for additional information : http://www.spetec.com

RESIPLAST NV

Appendix 5 Hygiene – Institut des Ruhrgebeits, Gelsenkirchen

Hygiëne Institut Gelsenkirchen 05/09/2013

Rough translation of the report of the Workgroup "Potable water department of Institut

Submitted: Tecinvest NV Contents: Cold water test Product: Spetec LH/H100 Sample: plate of 200 mm x 200 mm x 5 mm Start leaching/emission test: 03.02.1998

Research

Sample plates coated with Spetec LH/H100 have been tested by the division "Potable water " of the Plastics commission of the health department following their testing method.

Cold water test

The coated sample plates are washed for 24 hours at 20 °C with water and another 2 hours with potable water.

For the migration (leaching) tests demineralised water was used at 20°C. For determining the Chloride evaporation CI, demineralised water (CI content of 0,6 mg/l free CI) at 20°C is used.

The test results are in enclosed table (see table in German certificate).

The test water was checked for colour, clarity ,foaming, smell and taste. No effect was measured (test method for sealant with large surface area).

The emission of organic products(TOC) on 3 samples after 7-9 days gives $12 \text{ mg/m}^2 \text{ x day}$ (maximum allowed for large surface sealants is $60 \text{ mg/m}^2 \text{ x day}$)

The CI vaporation-emission shows an diminishing value. This for 3 samples (7-9 days) with value of 13 mg/m² x day free CI (maximum allowed for large sealant surface is 75 mg/m² x day).

The value for organic migrations on 3 samples has a value of 0,01 mg/m² x day. The value is primary aromatic amines and they are clearly under the allowable value. Formaldehyd and Phenols are not detected.

Signed by the director of the Institute.

Testreport of 18,03,1998 Hygiene-Dir.Tgb,-Nr: C436/98/st

Hygiene-Insitute des Ruhrgebiets, Gelsenkircen

Test results

requested by : Tecinvest NV, Belgium

Product: Spetec LH/100

Test sample surface:	migration test: 3320 cm ² Chloride test: 210 cm ²
Test water volume:	migration test: 3080 ml Chloride test: 3630 ml

Test in cold water, as for large en small surface seals, like glues (O/V = 1:25)

	1-3 days	4-6 days	7-9 days	7-9 days (large size seals)
color	colorless	colorless	colorless	v,d,n,e
transparency	clear	clear	clear	v,d,n,e
foaming	no	no	no	v,d,n,e
odor treshold 20°C	1	1	1	< 2
taste treshold 20°C	nt	nt	1	<2
organic bonded Carbons (TOC)				
mg/m² x day	12	9	12	< 60
free Cl2				
mg/m² x day	15	12	13	< 75
Phenol				
mg/m² x day	<0,02	<0,02	<0,02	<6,25
Aromatic Amine				
mg/m² x day	0.002	0.001	0.001	<0,12
Formaldehyd				
mg/m² x day	< 1	< 1	< 1	< 25
Organotin				
mg/m² x day	0.06	0.02	1	*

v,d,n,e, = value does not effect nt = not tested

Gelsenkirchen 18-03-2013

Director of the Insitute



Institut für Umwelthygiene und Umweltmedizin Direktor: Dr. rer. nat. E. Schrammeck

Hygiene-Institut Postfach 101255 - 45812 Gelsenkirchen



Rotthauser Straße 19 45879 Gelsenkirchen Telefon (0209) 9242-0 Telefon Durchwahl (0209) 9242- 210 / 211 Telefax (0209) 9242- 212

45879 Gelsenkirchen. 18.03.1998 Dir.Tgb.-Nr.: C 436/98/st Sachbearbeiterin: Frau Stefanski Durchwahl: 270/271

PRÜFBERICHT

gemäß KTW-Empfehlung der Arbeitsgruppe "Trinkwasserbelange" der Kunststoff-Kommission des Bundesgesundheitsamtes

Antragsteller:

TECINVEST NV Neteweg 4

B-2850 Boom BELGIEN

Auftrag vom:

Inhalt des Prüfauftrages:

Kaltwasserprüfung großflächige Dichtungen (Kategorie D1) kleinflächige Dichtungen und Klebstoffe (Kategorie D2)

08.10.1997 (eingegangen am: 05.11.1997)

Art und Bezeichnung der Proben:

SPETEC LH/H100 auf Polyurethan-Basis

Prüfkörper:

Prüfplatten der Abmessungen:

200 mm x 200 mm x 5 mm

Probenehmer:

überbrachte Proben

Probeneingang:

05.11.1997

Beginn der Migrationsprüfung:

03.02.1998



HYGIENE-INSTITUT DES RUHRGEBIETS, GELSENKIRCHEN	A
Institut filr Umwelthygiene und Umweltmedizin	Seite 2

Untersuchungsmethoden:

Prüfplatten, beschichtet mit SPETEC LH/100 wurden nach dem von der Arbeitsgruppe "Trinkwasserbelange" der Kunststoff-Kommission des Bundesgesundheitsamtes veröffentlichten Verfahren untersucht ("Gesundheitliche Beurteilung von Kunststoffen und anderen nichtmetallischen Werkstoffen im Rahmen des Lebensmittel- und Bedarfsgegenständegesetzes für den Trinkwasserbereich", Bundesgesundheitsblatt 20. Jahrg., 1977, S. 124 ff.).

Kaltwasserprüfung:

Als Vorbehandlung wurden die Prüfkörper 24 Stunden bei 20°C vorgewässert und 2 Stunden mit Trinkwasser gespült.

Für den Migrationsversuch wurde als Prüfwasser entmineralisiertes Wasser verwendet; die Prüftemperatur betrug 20°C.

Die Bestimmung der Chlorzehrung wurde mit gechlortem, entmineralisiertem Wasser (Chlorgehalt 0,6 mg/l freies Chlor) bei 20°C durchgeführt.

Die Prüfergebnisse sind in der Anlage tabellarisch zusammengestellt.

Die äußere Beschaffenheit der Prüfwässer hinsichtlich Farbe, Klarheit, Neigung zur Schaumbildung, Geruch und Geschmack wird in der dritten Versuchsstufe bei dem für die Prüfung von großflächigen Dichtungen festgelegten O/V-Verhältnis von 1:25 nicht nennenswert beeinflußt.

Die Abgabe organisch-chemischer Verbindungen, erfaßt durch den Summenparameter 'organisch gebundener Kohlenstoff'' (TOC), wurde in der maßgeblichen 3. Versuchsstufe (7,-9, Tag) mit 12 mg/m² x Tag bestimmt (Grenzwert für großflächige Dichtungen: 60 mg/m² x Tag). Die Chlorzehrung zeigt einen abnehmenden Verlauf; der Materialflächenwert hierfür erreicht in der zur Beurteilung maßgeblichen 3. Versuchsstufe (7,-9, Tag) einen Wert von 13 mg/m² x Tag freies Chlor (Grenzwert für großflächige Dichtungen: 75 mg/m² x Tag).

Die Abgabe von Organozinn liegt in der 3. Migrationsstufe bei 0,01 mg/m² x Tag. Die Abgabe von primären aromatischen Aminen liegt deutlich unter dem Grenzwert. Formaldehyd und Phenole werden nicht an das Prüfwasser abgegeben.

DE Der Direktor des Instituts C: G (Dr.rer.nat. H. Schössner) S 1 Anlage

HYGIENE-INSTITUT DES RUHRGEBIETS, GELSENKIRCHEN Institut für Umwelthygiene und Umweltmedizin Anlage zum Prüfbericht vom 18.03.1998 zur Dir.Tgb.-Nr.: C 436/98/st

- Untersuchungsergebnisse -
TECINVEST NV
Neteweg 4
B-2850 Boom
BELGIEN
SPETEC LH/100
(wurde uns bekanntgegeben)
Migrationstest: 3320 cm ² ; Chlorzehrungstest: 210 cm ²
Migrationstest: 3080 ml; Chlorzehrungstest: 3630 ml

Prüfergebnisse im Kaltwasserbereich, Einsatzbereich "groß- und kleinflächige Dichtungen sowie Klebstoffe" (O/V = 1:25)

Art der Prüfung				Anforderungen an "groß- flächige Dichtungen" 3. Extraktion
	13. Tag	46. Tag	79. Tag	(79. Tag)
Farbe	farblos	farblos	farblos	n.n.b.
Trübung	klar	klar	klar	n.n.b.
Neigung zur Schaumbildung	keine	keine	keine	n.n.b.
Geruchsschwellen- wert (20°C)	1	1	1	< 2
Geschmacksschwellen- wert (20°C)	n.u.	n.u.	8	< 2
organisch gebundener Kohlenstoff (TOC) mg/m ² x d	12	9	12	≤ 60
Chlorzehrung (freies Cl ₂) mg/m² x d	15	12	13	<u><</u> 75
Phenole mg/m ² x d	<0,02	< 0,02	<0,02	<u><</u> 6,25
aromatische Amine mg/m² x d	0,002	0,001	0,001	<u>≤</u> 0,12
Formaldehyd mg/m² x d	<1	<1	<1	≤ 25
Organozinn mg/m² x d	0,06	0,02	0,01	
n.n.b. = nicht nennenswert n.u. = nicht untersucht	beeinflußt	S all states	FUHRO Derl	Direktor des Instituts
Gelsenkirchen, 18.03.1998		OTAL OTA	EB (Dr.4	fCl.En rer.nat. H. Schössner)

Appendix 6 Laboratium voor levensmiddelentechnolgie en – proceskunde. Faculteit Landbouwkundige en Toegepaste Biologische Wetenschappen. Universiteit Gent, Belgium



FACULTEIT LANDBOUWKUNDIGE EN TOEGEPASTE BIOLOGISCHE WETENSCHAPPEN

VAKGROEP LEVENSMIDDELENTECHNOLOGIE- EN VOEDING LABORATORIUM VOOR LEVENSMIDDELENTECHNOLOGIE EN -PROCESKUNDE PROF. DR. IR. KOEN DEWETTINCK

> Tecinvest Gulkenrodestraat 3

2160 Wommelgem

Date 16th December 2003

REPORT OF ANALYSIS

	Identificati	on code: MS 7478/1	
Type sample	Polyurethane	Date delivery	27/08/03
Sampling by	Tecinvest	Date start Analysis	01/09/03
Delivered by	Tecinvest	Type packaging	plastic
Requested analysis	NBN S29-001		1. 60
Remarks			

RESULTS

1. Organoleptic analysis and analysis of the migration of organic compounds

Analusia	Our ref.	MS 7478/1	
& units	Your ref.	SPETEC H100	
Odour	1	No odour	
Taste		No taste	
Colour		No colour	
Turbiditity (FNU)		0	
COD (mg O ₂ /l) after 72 hours		< 10	

Both of the materials are conform the norm.





Laboratorium voor levensmiddelentechnologie en -proceskunde

Prof. dr. ir. K. Dewettinck

2. Global migration

1.11.11	Our ref.	MS 7478/1
Analysis & units Your ref.		SPETEC H100
Global mig	gration (mg/dm²)	3.82

The global migration is below the norm (10 mg/dm²).

3. Control of the stimulation of microbiological growth.

Analysis &	Our ref.	blanco	MS 7478/1
units	Your ref.		SPETEC H100
Start			
Coliforms (/1	100 ml) at 37°C	9,3	
Total plate c	ount (/ml) at 21°C	1,7.10 ³	
Total plate c	ount (/ml) at 37°C	1,6.10 ³	
After 3,5 day	<u>s</u>		
Coliforms (/1	100 ml) at 37°C	2,3	2,3
Total plate c	ount (/ml) at 21°C	2,6.104	9,8.10 ⁴
Total plate c	ount (/ml) at 37°C	4,1.104	1,4.10 ⁶
After 7 days	Contraction of the		1
Coliforms (/1	100 ml) at 37°C	Absent	Absent
Total plate c	ount (/ml) at 21°C	1,2.106	1,9.10 ⁵
Total plate count (/ml) at 37°C		1,8.10 ⁵	7,6.10 ⁴
After 10,5 da	VS		
Coliforms (/1	100 ml) at 37°C	Absent	Absent
Total plate c	ount (/ml) at 21°C	5,1.10 ⁴	1,3.104
Total plate c	ount (/ml) at 37°C	6,6.10 ⁴	1,2.10 ⁴
After 14 day	<u>s</u>		In the second
Coliforms (/	100 ml) at 37°C	Absent	Absent
Total plate o	ount (/ml) at 21°C	3,5.104	1,1.104
Total plate o	ount (/ml) at 37°C	2,2.104	1,4.10 ⁴
After 17,5 da	iys		1. 1
Coliforms (/	100 ml) at 37°C	Absent	Absent
Total plate c	ount (/ml) at 21°C	2,3.104	9,8.10 ³
Total plate o	ount (/ml) at 37°C	1,2.104	1,1.104

Page 2 / 2 – identificationnumber MS 7478/1 Coupure Links 663, B-9000 Gent Belgium tel. +32 (0)9 264 61 67 fax +32 (0)9 264 62 18 e-mail : An.Witters@UGent.be



Laboratorium voor levensmiddelentechnologie en -proceskunde

Prof. dr. ir. K. Dewettinck

Analysis &	Our ref.	blanco	MS 7478/1		
units	Your ref.		SPETEC H100		
After 21 days	5				
Coliforms (/1	100 ml) at 37°C	Absent	Absent		
Total plate c	ount (/ml) at 21°C	1,2.104	1,9.104		
Total plate c	ount (/ml) at 37°C	1,8.104	3,6.10 ³		
After 24,5 da	γs				
Coliforms (/1	00 ml) at 37°C	Absent	Absent		
Total plate c	ount (/ml) at 21°C	1,1.104	7,9.10 ³		
Total plate c	ount (/ml) at 37°C	9,8.10 ³	1,2.10 ³		
After 28 days	i i i i i i i i i i i i i i i i i i i				
Coliforms (/1	00 ml) at 37°C	Absent	Absent		
Total plate co	ount (/ml) at 21°C	1,8.10 ³	8,2.10 ³		
Total plate co	ount (/ml) at 37°C	1,5.10 ³	9,6.10 ²		
After 31,5 da	iys				
Coliforms (/1	00 ml) at 37°C	Absent	Absent		
Total plate co	ount (/ml) at 21°C	1,4.10 ³	4,9.10 ³		
Total plate co	ount (/ml) at 37°C	1,7.10 ³	7,5.10 ²		
After 35 days	3	1			
Coliforms (/1	100 ml) at 37°C	Absent	Absent		
Total plate c	ount (/ml) at 21°C	1,7.10 ³	2,4.10 ³		
Total plate c	ount (/ml) at 37°C	1,5.10 ³	9,9.10 ²		
After 38,5 da	<u>ys</u>		1		
Coliforms (/1	00 ml) at 37°C	Absent	Absent		
Total plate c	ount (/ml) at 21°C	1,2.103	1,9.10 ³		
Total plate c	ount (/ml) at 37°C	1,1.103	7,6.10 ²		

The material does not stimulate bacteriological growth.

This report may not be reproduced, if not in its complete form, without the written permission of the analysing laboratory. The results of the analysis to relate exclusively to the samples analysed.

Plot. dr. ir. K. Dewettinck Technical-Manager

6.0.C 7

ing. A. Writers Technical responsible

Page 3 / 3 - identificationnumber MS 7478/1

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APPENDIX 1

REHABILITATION MANAGEMENT PLAN SURFACE DISTURBANCE REGISTER

Metropolitan Coal – Rehabilitation Management Plan								
Revision No. RMP-R01-E	Revision No. RMP-R01-E							
Document ID: Rehabilitation Management Plan								

Register	Site Name ²	Site Type ³	Site Co-c	ordinates ⁴			Descriptio	n of Rehabilitation	Requirements ⁶		
Number ¹			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	A Reve Rec (Ye
Monitoring E	Equipment										
Meteorologica	al Monitoring Equi	pment		1	1	1			1		
1-1	PV1	Pluviometer, Evaporimeter									
1-2	PV2	Pluviometer									
1-3	PV5	Pluviometer									
1-4	PV6	Pluviometer									
1-5	PV7	Pluviometer									
Surface Wate	er Flow Monitoring	Equipment									
2-1	GS300016	Streamflow									
2-2	GS300017	Streamflow									
2-3	GS	Streamflow									
2-4	GS	Streamflow									
Pool Water L	evel Monitoring E	quipment									
3-1	Pool A	Water level sensor and logger									
3-2	Pool F	Water level sensor and logger									
3-3	Pool J	Water level sensor and logger									
3-4	Pool K	Water level sensor and logger									
3-5	Pool L	Water level sensor and logger									
3-6	Pool M	Water level sensor and logger									
3-7	Pool N	Water level sensor and logger									
3-8	Pool O	Water level sensor and logger									

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

	Assessment of Performance									
ctive getation juired? es/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)								
	1	ı I								

Register	Site Name ²	Site Type ³	Site Co-o	ordinates ⁴	Description of Rehabilitation Requirements ⁶						Assessment of Performance		
Number'			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Active Revegetation Required? (Yes/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)
3-9	Pool P	Water level sensor and logger											
3-10	Pool Q	Water level sensor and logger											
3-11	Pool R	Water level sensor and logger											
3-12	Pool S	Water level sensor and logger											
3-13	Pool T	Water level sensor and logger											
3-14	Pool U	Water level sensor and logger											
3-15	Pool V	Water level sensor and logger											
3-16	Pool W	Water level sensor and logger											
3-17	Pool ETAF	Water level sensor and logger											
3-18	Pool ETAG	Water level sensor and logger											
3-19	Pool ETAH	Water level sensor and logger											
3-20	Pool ETAI	Water level sensor and logger											
3-21	Pool ETAQ	Water level sensor and logger											
3-22	Pool ETAU	Water level sensor and logger											

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

Register	Site Name ²	Site Type ³	Site Co-o	ordinates ⁴		Description of Rehabilitation Requirements ⁶						Assessment of Performance	
Number			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Active Revegetation Required? (Yes/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)
3-23	Pool ETF	Water level sensor and logger											
3-24	Pool ETJ	Water level sensor and logger											
3-25	Pool ETM	Water level sensor and logger											
3-26	Pool ETU	Water level sensor and logger											
3-27	Pool ETW	Water level sensor and logger											
3-28	Pool RTP1	Water level sensor and logger											
3-29	Pool RTP2	Water level sensor and logger											
3-30	Pool UTP1	Water level sensor and logger											
3-31	Pool UTP2	Water level sensor and logger											
3-32	Pool UTP3	Water level sensor and logger											
3-33	Pool WRP1	Water level sensor and logger											
3-34	Pool WRP2	Water level sensor and logger											
3-35	Pool WRP3	Water level sensor and logger											
3-36	Pool WRP4	Water level sensor and logger											

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

Register	Site Name ²	Site Type ³	Site Co-o	ordinates ⁴			Descriptio	n of Rehabilitation	Requirements ⁶		
Number ¹			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Ad Reve Req (Ye
Groundwater	Monitoring Equip	ment									
4-1	S16/17	Piezometer									
4-2	S20	Piezometer									
4-3	S25	Piezometer									
4-4	S101	Piezometer									
4-5	WRSWAMP1	Piezometer									
4-6	SWGW1	Piezometer									
4-7	SWAMP1	Piezometer									
4-8	SWAMP2	Piezometer									
4-9	SWAMP3	Piezometer									
4-10	SWAMP4	Piezometer									
4-11	ETGW1	Piezometer									
4-12	FGGW1	Piezometer									
4-13	FGGW2	Piezometer									
4-14	FGGW3	Piezometer									
4-15	RTGW1A	Piezometer									
4-16	UTGW1	Piezometer									
4-17	UTGW2	Piezometer									
4-18	UTGW3	Piezometer									
4-19	WRGW1	Piezometer									
4-20	WRGW2	Piezometer									
4-21	WRGW3	Piezometer									
4-22	WRGW4	Piezometer									
4-23	WRGW5	Piezometer									
4-24	WRGW6	Piezometer									
4-25	WRGW7	Piezometer									
4-26	9DGW1B/ PM01	Piezometer									
4-27	9EGW1B	Piezometer									
4-28	9FGW1B	Piezometer									
4-29	9GGW1B	Piezometer									
4-30	9GGW2B	Piezometer									

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

	Assessment o	Assessment of Performance							
ctive getation juired? es/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)							
	I	I							

Register	er Site Name ² Site Type ³ Site Co-ordinates ⁴ Description of Rehabilitation Requirements ⁶							Assessment o	f Performance				
Number'			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Active Revegetation Required? (Yes/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)
4-31	9HGW0	Piezometer											
4-32	9HGW1B	Piezometer											
4-33	PM02	Piezometer											
4-34	PM03	Piezometer											
4-35	PHGW1	Piezometer											
4-36	9FGW2	Piezometer											
4-37	9EGW2	Piezometer											
4-38	9GGW3	Piezometer											
4-39	PHGW2	Piezometer											
4-40	PHGW3	Piezometer											
4-41	F6GW2	Piezometer											
4-42	F6GW3	Piezometer											
4-43	FanGW1	Piezometer											
Subsidence L	ines												
5-1	D Line	Survey Pegs											
5-2	Line 9C	Survey Pegs											
5-3	Line 9C West	Survey Pegs											
5-4	Line 9G	Survey Pegs											
5-5	Line 9J	Survey Pegs											
5-6	LW20 Longitudinal Line	Survey Pegs											
5-7	E Line (WRS3)	Survey Pegs											
5-8	WR Cross Line 1	Survey Pegs											
5-9	WR Cross Line 2	Survey Pegs											
5-10	WR Cross Line 3	Survey Pegs											
5-11	WR Cross Line 4	Survey Pegs											
5-12	WR Cross Line 5	Survey Pegs											
5-13	WR Cross Line 6	Survey Pegs											
						Metrop	oolitan Coal – Rehabilitat	ion Management Plan					
Revision No	. RMP-R01-E	Management Plan											

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

Register	Site Name ²	Site Type ³	Site Co-o	ordinates ⁴			Descriptio	on of Rehabilitation I	Requirements ⁶			Assessment of Performance		
Number'			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Active Revegetation Required? (Yes/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)	
5-14	WR Cross Line 7	Survey Pegs												
5-15	WR Cross Line 8	Survey Pegs												
5-16	WR Cross Line 9	Survey Pegs												
5-17	WR Cross Line 10	Survey Pegs												
5-18	WR Cross Line 11	Survey Pegs												
5-19	WR Cross Line 12	Survey Pegs												
5-20	WR Cross Line 13	Survey Pegs												
5-21	LW20-22 Cross Line 1	Survey Pegs												
5-22	LW20-22 Cross Line 2	Survey Pegs												
5-23	LW20-22 Cross Line 3 (WRS5)	Survey Pegs												
5-24	WR Rock bar P Cross Line	Survey Pegs												
5-25	WR Rock bar Q Cross Line	Survey Pegs												
5-26	Ridgetop 1	Survey Pegs												
5-27	Ridgetop 2	Survey Pegs												
5-28	Ridgetop 3	Survey Pegs												
5-29	Ridgetop 4	Survey Pegs												
5-30	Ridgetop 5	Survey Pegs												
5-31	Transmission Line Monitoring	Survey Pegs												
5-32	Princes Highway Line	Survey Pegs												
5-33	Freeway Line	Survey Pegs												
5-34	Freeway Bridge	Survey Pegs												

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

Register	Site Name ²	Site Type ³	Site Co-or	dinates ⁴			Descriptio	n of Rehabilitation F	Requirements ⁶			Assessment o	f Performance
Number ¹			Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Active Revegetation Required? (Yes/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)
Surface Expl	oration ⁹												
6-1	9DGW1B/ PM01	Surface exploration borehole											
6-2	9EGW1B	Surface exploration borehole											
6-3	9FGW1B	Surface exploration borehole											
6-4	9GGW1B	Surface exploration borehole											
6-5	9GGW2B	Surface exploration borehole											
6-6	9HGW0	Surface exploration borehole											
6-7	9HGW1B	Surface exploration borehole											
6-8	PM02	Surface exploration borehole											
6-9	PM03	Surface exploration borehole											
6-10	PHGW1	Surface exploration borehole											
6-11	9FGW2	Surface exploration borehole											
6-12	9EGW2	Surface exploration borehole											
6-13	9GGW3	Surface exploration borehole											
6-14	PHGW2	Surface exploration borehole											

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

Register	Site Name ²	Site Type ³	Site Co-c	ordinates ⁴		Description of Rehabilitation Requirements ⁶							f Performance
Number ¹	er'		Easting	Northing	Date of Inspection ⁵	Equipment/ Infrastructure Removal Required? (Yes/No)	Is the Site Neat and Tidy? (Yes/No)	Erosion or Sediment Control Measures Required? (Yes/No)	Weed Management Measures Required? (Yes/No)	Natural Regeneration? (Yes/No)	Active Revegetation Required? (Yes/No)	Have the Performance Indicators been achieved? ⁷ (Yes/No)	Has the Rehabilitation Objective been met? ⁸ (Yes/No)
6-15	PHGW3	Surface exploration borehole											
6-16	F6GW2	Surface exploration borehole											
6-17	F6GW3	Surface exploration borehole											
6-18	FanGW1	Surface exploration borehole											
Other													
7-1													

Notes:

1: Fill out all details in the Rehabilitation Management Plan – Surface Disturbance Register Assessment Form and record the register number here, according to whether the site is a monitoring equipment site, surface exploration site, vehicular access track, or other. [Note, stream remediation activities are to be addressed in the Rehabilitation Management Plan – Stream Remediation Register in Appendix 2.]

2: Record the name allocated to the site.

3: Record the type of site (e.g. pluviometer, stream flow monitoring equipment, water level sensor and logger, groundwater bore, survey pegs, vehicular access track, surface exploration borehole etc.)

4: Record the site's co-ordinates (Easting/Northing).

5: Record the date of the site inspection as recorded on the Rehabilitation Management Plan – Surface Disturbance Register Assessment Form.

6: Fill out the description of rehabilitation requirements according to the Rehabilitation Management Plan – Surface Disturbance Register Assessment Form. Yes/No

7: Has the performance indicators been met? (Yes/No). Based on the assessment recorded on the Rehabilitation Management Plan – Surface Disturbance Register Assessment Form.

8: When appropriate, assess whether the rehabilitation objective has been met? (Yes/No). Based on the assessment recorded on the Rehabilitation Management Plan – Surface Disturbance Register Assessment Form.

9: Note that some surface exploration sites are the same as some groundwater monitoring equipment sites.

	Metropolitan Coal – Rehabilitation Management Plan	
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

Rehabilitation Management Plan – Surface Disturbance Register Assessment Form

Date:

Observer (Name and position):

Register Number (i.e. Number 1, 2, etc.):

Site Name:

Site Type:

Site Co-ordinates (Easting/Northing):

Description of Rehabilitation Requirements

Equipment/Infrastructure Removal Required?

- Is there any equipment/infrastructure that needs to be removed?
- Type of equipment/infrastructure?
- Has the equipment/infrastructure been removed?

Is the Site Neat and Tidy?

- Is there any rubbish that needs to be removed?
- Type of rubbish requiring removal?
- Has the rubbish been removed?

Erosion or Sediment Control Measures Required?

- Is any erosion or sediment control required?
- Type of erosion or sediment control required?
- Are the existing erosion and sediment controls working effectively?
- Have the erosion or sediment controls been removed if no longer required?

Weed Management Measures Required?

- Are there any weeds that need to be controlled?
- List the weeds requiring control and estimate the area affected.
- Have previous weed control measures been effective?

Natural Regeneration?

- Is natural regeneration of native vegetation occurring from surrounding vegetation?
- What is the approximate height of the regenerating vegetation compared to the surrounding vegetation?
- Are any measures required to encourage natural regeneration?

Active Revegetation Required?

- Is active revegetation required (i.e. following the removal of the disturbance, the site does not appear to be naturally regenerating)?
- What is the surrounding vegetation community according to mapping by Bangalay Botanical Surveys (2008)?
- If active revegetation has been implemented, is the vegetation establishing?

Note: consultation with the SCA and DITRIS is required for any proposed active revegetation.

Rehabilitation Measures to be Implemented:

Attach photographs, where appropriate

Description of Photographs:

Have the Performance Indicators been achieved?

Redundant equipment/infrastructure items have been removed	
The site is neat and tidy (i.e. it does not contain any rubbish)	
No weed management measures are required	
No erosion or sediment control measures are required	
Where appropriate, native terrestrial vegetation is naturally regenerating or active revegetation is establishing	
No further active revegetation measures are required	

Has the Rehabilitation Objective been achieved?

The site contains self-sustaining native terrestrial vegetation (i.e. the vegetation is able to sustain itself, without the implementation of any	
management measures)	
The vegetation is healthy	
The native vegetation is comprised of local native plant species, as assessed by a suitably qualified botanist	
Ecosystem function is considered to have been restored (i.e. ecosystem processes [water cycle, nutrient cycle and energy interception] ¹ at site scale	
are functioning well	
The landform is consistent with the surrounding environment	
Actions Required: Rehabilitation Measures	
Contingency Plan Initiated	
Incident Notification	

Safety Measures/Public Safety
Management Plan Requirements

¹ Water cycle considerations (e.g. does the water cycle provide adequate moisture through infiltration into the soil or does it run off the land causing erosion?).

Nutrient cycle considerations (e.g. are nutrients available to living things?).

Energy flow considerations (e.g. how much sunlight falls on green leaves and gets turned into food for the ecosystem? How much is wasted striking dead growth or bare ground?).

APPENDIX 2

REHABILITATION MANAGEMENT PLAN STREAM REMEDIATION REGISTER

Metropolitan Coal – Rehabilitation Management Plan							
Revision No. RMP-R01-E							
Document ID: Rehabilitation Management Plan							
Pool/ Rock Bar ¹	Stream Remediation Initiated ²	Activity Checklists, Duty Cards and Forms ³ (Yes/No)	Erosion and Sediment Control Plan ⁴ (Yes/No)	Bushfire Preparedness Plan ⁵ (Yes/No)	Subsidence less than 20 mm/month ⁶	Water level recession rate similar to prior to subsidence ⁷	Rehabilitation Objective Met? ⁸
--------------------------------	--	--	--	--	--	---	---
Waratah Rivu	let						
Pool A							
Pool B							
Pool C							
Pool E							
Pool F							
Pool G							
Pool G1							
Pool H							
Pool I							
Pool J							
Pool K							
Pool L							
Pool M							
Pool N							
Pool O							
Eastern Tribu	tary						
Pool ETAF							
Pool ETAG							
Pool ETAH							

Rehabilitation Management Plan – Stream Remediation Register

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E				
Document ID: Rehabilitation Management Plan				

Pool/ Rock Bar ¹	Stream Remediation Initiated ²	Activity Checklists, Duty Cards and Forms ³ (Yes/No)	Erosion and Sediment Control Plan ⁴ (Yes/No)	Bushfire Preparedness Plan ⁵ (Yes/No)	Subsidence less than 20 mm/month ⁶	Water level recession rate similar to prior to subsidence ⁷	Rehabilitation Objective Met? ⁸
Pool ETAI							
Pool ETAJ							
Pool ETAK							
Pool ETAL							
Pool ETAM							
Pool ETAN							
Pool ETAO							
Pool ETAP							
Pool ETAQ							
Pool ETAR							
Pool ETAS							
Pool ETAT							
Pool ETAU							

Rehabilitation Management Plan – Stream Remediation Register

Notes:

1: Pool/Rock Bar on Waratah Rivulet or Eastern Tributary.

2: Record the date on which the pool water level data indicates stream remediation activities were triggered.

3: Have the Activity Checklists, Duty Cards and Forms been prepared for the specific remediation site? (Yes/No)

4: Has the Erosion and Sediment Control Plan been prepared for the specific remediation site? (Yes/No)

5: Has the Bushfire Preparedness Plan been prepared for the specific remediation site? (Yes/No)

6: Date subsidence is recorded less than 20 mm/month once subsidence is not predicted to increase above 20 mm/month as a result of subsequent longwalls.

7: Is the water level recession rate similar to that recorded prior to subsidence? (Yes/No)

8: When appropriate, assess whether the rehabilitation objective has been met? (Yes/No)

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E				
Document ID: Rehabilitation Management Plan				

APPENDIX 3

WARATAH RIVULET AND EASTERN TRIBUTARY STREAM MAPPING

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E				
Document ID: Rehabilitation Management Plan				



MET-08-AD7 RMP Appendix 3_101B



MET-08-AD7 RMP Appendix 3_101B



MET-08-AD7 RMP Appendix 3_101B



MET-08-AD7 RMP Appendix 3_101B



MET-08-AD7 RMP Appendix 3_102B



MET-08-AD7 RMP Appendix 3_102B







APPENDIX 4

STREAM REMEDIATION PLANS

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E				
Document ID: Rehabilitation Management Plan				



MET-08-AD7 RMP_111A





















APPENDIX 5

EXAMPLE ACTIVITY CHECKLISTS, DUTY CARDS AND FORMS

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E				
Document ID: Rehabilitation Management Plan				

CONTENTS

CHECKLISTS

- Set Up Checklist
- Pump Charging Checklist
- Set Up Checklist Injection Site
- Clean Up Checklist
- Spetec H100 Transport Checklist
- Site Supervisor Pumping Checklist
- Site Supervisor Mechanical Checklist
- Metropolitan Coal Environmental Coordinator Checklist

DUTY CARDS

- PUR Transport Driver
- PUR Pump Operator
- Nozzle Operator
- Site Supervisor
- Metropolitan Coal Environmental Coordinator

OTHER FORMS

- Injection Report
- Borehole Layout
- Toolbox Talk

Metropolitan Coal – Rehabilitation Management Plan				
Revision No. RMP-R01-E				
Document ID: Rehabilitation Management Plan				

SET UP CHECKLIST RIDGE SITE

,	,
 /	

- { } 1. Establish the First Aid Kits
- { } 2. Establish radio channel communication
- { } 3. Establish the location of the Fire Extinguisher
- { } 4. Clear the site of any unnecessary flammable materials
- { } 5. Site the pump according to EMP site layout plan
- { } 6. Park the Part B Ute on right side of pump, Part A Ute left side
- { } 7. Check presence of spill kits and contents
- { } 8. Erect barriers (i.e. tape) to establish the area as a restricted entry area
- { } 9. Utilise temporary steel ramps/sandbags, as required to facilitate access
- { } 10. Check Hoses and Fittings are clear
- { } 11. Fit Suction Hoses to Pumps
- { } 12. Fit Suction Hoses and By-pass hoses to product drums (BLACK to

BLACK, WHITE to WHITE)

- { } 13. Check By-pass valves on both A and B components are in **OPEN** position.
- { } 14 Check High Pressure Valves on both A and B component are **CLOSED**.
- { } 15. Fit high pressure hoses to both sides of the pump and fit with staples
- { } 16. Fit Shut Off valves to end of both A and B component lines.
- { } 17. Check air line is clear

 Operator:
 Date:
 /

 Supervisor:
 Date:
 /

PUMP CHARGING CHECKLIST Date

/ /

- { } 1. Connect Compressed Air supply to pump.
- { } 2. Start up pump until CarboPUR A and B components fill the suction lines.
- { } 3. Once product is recalculating to the product drums, stop pump.
- { } 4. CLOSE both A and B component Bypass valves.
- { } 5. Walk entire length of HP line and ensure all joins are correctly wrapped in absorbent cloth and plastic sheathing.
- { } 6. OPEN both High Pressure valves, and charge High Pressure Line, outlets to be held over spillage container.
- { } 7. Once both High Pressure lines are charged, close both HP shut off valves and check pump is By-passing.
- { } 8. Stop pump and walk entire length of HP line and check for leaks.
- { } 9. If leaks are discovered, dump pump pressure, repair leaks and re-test for leaks
- { } 10. Take CarboPUR sample

NOTE: IN THE EVENT OF PRESSURE BUILD-UP IN THE LINE, OPEN BALL VALVE AND DUMP PRESSURE

 Operator:
 Date:
 /.... /....

 Supervisor:
 Date:
 /.... /....

SET UP CHECKLIST INJECTION SITE

____/___/____

- { } 1. Establish communications between pump site and injection site
- { } 2. Ensure injection site is clear of all unnecessary materials
- { } 3. With the packer attached to a FIB/GRP fit the packer fully into the pre-drilled injection hole in line with site injection plan
- { } 4. Place apron of absorbent material around hole to catch any spills
- { } 5. Connect feed pipe/extension to packer-fully install
- { } 6. Fit the mixer into top of short feed pipe
- { } 7. Fit the "T" Piece onto the feed pipe
- { } 8. Set pump to by-pass on both the A and B Component sides
- { } 9. Turn on air and circulate the materials through the Pump and product drums.
- { } 10. When flowing correctly turn off air
- { } 11. Close both Bypass valves on a and B Component
- { } 12. Open both HP valves on HP line
- { } 13. Position Waste drum at injection site check waste drum has sufficient volume for waste product volume
- { } 14. Position spill pad under injection control tray
- { } 15. Connect flushing line to waste drum
- { } 16. Turn on air and monitor flow rates of both HP sides
- { } 17. When flowing correctly turn off air
- { } 18. Fit the high pressure hoses on to the tee piece and lock with staples
- { } 19. Final check on all hose connections from pump to adaptor
- { } 20. Turn on air

Operator:	Signature:	.Date:/ /
Supervisor:	Signature:	Date:/ /

CLEAN UP CHECKLIST

Date

	' I	
′	'	<u> </u>

- { } 1. Clear excess materials from product drums, pump and hoses into waste containers contained within larger drums
- { } 2. Place hose join over spill tray and disconnect coupling.
- { } 3. Fit end caps and replace staple, and place hoses high on stream bank
- { } 4. Check all appropriate equipment stored at the elevated storage area
- { } 5. Remove rubbish and leave site in tidy condition

Operator:Date:/ /

Supervisor:Date://.....

CarboPUR TRANSPORT CHECKLIST **Date**/ /

Check List to be completed whenever transporting product

Time	Time	Time	Time		
		<u> </u>			
{ }	{ }	{ }	{ }	1.	Check vehicle for fuel/oil leak
{ }	{ }	{ }	{ }	2.	Check pallet bund for water/materials affecting storage capacity of bund
{ }	{ }	{ }	{ }	3.	Check CARBOPUR pump for oil leaks
{ }	{ }	{ }	{ }	4.	Secure hoses and pump(s) for transportation
{ }	{ }	{ }	{ }	5.	Secure all tools, feed pipes, packers and equipment
{ }	{ }	{ }	{ }	6.	Check rubber matting in Ute is intact and positioned appropriately
{ }	{ }	{ }	{ }	7.	Ensure CARBOPUR 205L drums are placed on bund in Ute
{ }	{ }	{ }	{ }	8.	Test to ensure drum security and tailgate/sides are up and secure
{ }	{ }	{ }	{ }	9.	Sight Spill Kit and check contents
{ }	{ }	{ }	{ }	10.	Sight phone list
{ }	{ }	{ }	{ }	11.	Site product MSDS
{ }	{ }	{ }	{ }	12	Sight SCA gate key
{ }	{ }	{ }	{ }	13.	Lock SCA gate after passing through
{ }	{ }	{ }	{ }	14.	Engage 4WD
Operator:		Signat	ture:		Date://

1

MINOVA SITE SUPERVISOR PUMPING CHECKLIST

Time	Time	Time	Time		
{ }	{ }	{ }		1.	All Joint Connectors have safety clips
{ }	{ }	{ }	{ }	2.	Check pump remote shutoff working
{ }	{ }	{ }	{ }	3.	Check manual operator bypass working
{ }	{ }	{ }	{ }	4.	Check pressure gauges working adequately
{ }	{ }	{ }	{ }	5.	Ensure static mixer unit is located in the feed pipe
{ }	{ }	{ }	{ }	6.	Check hoses for damage and leaks at joiners
{ }	{ }	{ }	{ }	7.	Check fitting of the shut-off valve to high pressure hose
{ }	{ }	{ }	{ }	8.	Check air line is clear
{ }	{ }	{ }	{ }	9.	Check capacity of drums – do not use over 95% capacity of the
					product drums
{ }	{ }	{ }	{ }	10.	Confirm environmental controls OK from Environmental Coordinator

Site Supervisor:: Date:/ /

/ /

MINOVA SITE SUPERVISOR MECHANICAL CHECKLIST

 $\sqrt{}$ TASK Visual Check Piston seal area for previous leakage (PUR on guards) Water Trap Inline Oiler (Biotec HVX Oil) Product Drums (Clean) Minsup Fittings Air Isolation Valve High Pressure Ball Valves Pressure Gauge Strainers **Exhaust Filters** All Fittings All Hoses Air Motor **Guards & Cradle** Purge air lines for at least 30 seconds (hose length dependant) always use hose clips in air supply. Always check and fill if necessary inline oiler (Biotec HVX Oil). Run pump on return cycle before application for 5-10 minutes to ensure product is pumping at the required ratio/volume. If there is any difference rectify/troubleshoot before initial application On completion of use, flush clean oil through "A" component (Black) side into an empty drum and tag Seal pump inlets and outlets with staplelock/camlock plugs and caps NOTE: Check oiler every 4 hours if PUR Pump used for whole shift.

/ /

Date

Pre-Shift at Metropolitan Mine Site

- { } 1. Identify Minova Site Supervisor
- { } 2. Complete Tool Box Talk in conjunction with Minova Site Supervisor
- { } 3. Complete daily register of all Minova personnel, check that personnel have been inducted and that duty cards have been signed.
- { } 4. Check sign in/sign out board completed by all personnel
- { } 5. Check if more than 10 mm rain in last 24 hours.
- { } 6. Check weather forecast for heavy rain or bushfires. Check SCA Incident line if any smoke seen in the area.
- { } 7. Check if Total Fire Ban
- { } 8. Check that all personnel have received a copy and understand the Fire Evacuation Plan and Bushfire Preparedness Plan and have been instructed in the requirements for Hot Work
- { } 9. Check all personnel have conducted a dry-run of the second means of bushfire escape
- { } 10. Check emergency numbers have been provided to all personnel on a telephone list, including the SCA Fire Incident number (9751 1988)
- { } 11. Any hot work planned today (Y/N)? If "Y" ensure SCA hot work permit has been obtained
- { } 12. Check water testing kit adequately stocked
- { } 13. Physically check CARBOPUR drums secure in both vehicles.

Date

____/___/____

Pre-Shift at Metropolitan Mine Site (Cont.)

- { } 14. Check Ute rubber matting and bund in both vehicles transporting Part A and Part B PUR
- { } 15. Check own vehicle for fuel/oil leaks
- { } 17. Instruct all personnel to use chemical toilet situated on Fire Road 9H

Pre-Shift at Site Works

Site Layout and Set-Up

- { } 18. Check all vehicles parked in designated areas
- { } 19. Steel ramps/sandbags in place to facilitate access to the drill/injection site, where required?
- { } 20. Check spill kits at injection site (present and fully stocked)
- { } 21. Check spill kits in PUR Part A and Part B utes (present and fully stocked)
- { } 22. Sight fire extinguisher/first aid kit/eye wash bottle at pump site
- { } 23. Sight first aid kit/eye wash bottle at injection site
- { } 24. Check that equipment is positioned consistent with Figure 3 and Section 2.1 of the EMP

Soil and Vegetation Management

- { } 25. Check if lopping of branches is required for the mobilisation, placement or operation of equipment. Approx. number of branches: _____
- { } 26. If lopping required, check that lopped branches are left on the ground in random pattern

1	1	

Pre-Shift at Site Works (Cont.)

Soil and Vegetation Management (Cont.)

- { } 27. Check if slashing of vegetation is required for the mobilisation, placement or operation of equipment. Approx. area to be slashed: _____
- { } 28. If slashing required, check that slashing undertaken by cutting the vegetation at ground level and leaving the lower stem and roots intact
- { } 29. Check if rubber lattice matting in place in high traffic areas to minimise vegetation disturbance

Erosion and Sediment Control

{ } 30. Check erosion and sediment controls in place consistent with the Erosion and Sediment Control Plan (Attachment A of the EMP)

Stream Flow Diversion

- { } 31. Check pumps established in Pool A { } and/or existing boreholes { }
- { } 32. Check bunding established for all pumps
- { } 33. Check that pump hoses are appropriately situated so that water will be conveyed downstream of the site sediment controls (back into Waratah Rivulet)
- { } 34. If required, check that an additional air compressor is located next to compressed air site shown in Figure 1 of EMP and that it is separately bunded
- { } 35. Check presence of standby pumps in elevated equipment storage area
- { } 36. Are stream flows above intended injection site no PUR injection

Date

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/		

Pre-Shift at Site Works (Cont.)

Fuel and Spill Management

- { } 37. Check compressor bund (adequate to contain in excess of 10% above the maximum fuel/oil storage capacity of compressor)
- { } 38. Check all pump bunds (adequate to contain in excess of 10% above the maximum fuel/oil storage capacity of pump).
- { } 39. Check compressors, pumps and drill rig for leaks of oil/fuel/coolant
- { } 40. Check for spills evident inside bunded areas and arrange clean-up if required
- { } 41. Any spills outside bunded areas (Y/N)? If "Y" what remedial actions undertaken (specify – refer Section 7 of EMP)

Bushfire Preparedness and Management

{ } 42. Check vehicles are parked facing the primary means of escape

Water Quality Monitoring

- { } 43. Complete pre-shift water quality sampling field analysis
- { } 44. Complete pre-shift water quality sample collection for laboratory analysis

<u>Other</u>

- { } 45. Inspect all hoses/couplings for leaks (report to Minova Site Supervisor)
- { } 46. Report if environmental controls are okay to Minova Site Supervisor and if okay to proceed with work

HCPL ENVIRONMENTAL COORDINATOR CHECKLIST

____/___/____

During Shift

Erosion and Sediment Control

- { } 47. Complete integrity and effectiveness checks of all sediment controls
- { } 48. Complete regular inspections of water clarity downstream of Unnamed tributary.

Water Quality Monitoring

- { } 53. Complete water quality sampling field analysis in accordance with EMP
- { } 54. Complete water quality sample collection for laboratory analysis in accordance with EMP
- { } 55. Complete data analysis. Any downstream water quality results outside baseline water quality data and the results for upstream sites (Y/N)?
 If "Y" cease drilling/injection activities and commence investigation

End-Shift

- { } 56. Check appropriate equipment is stored in elevated equipment storage area
- { } 57. Check if drill core has been disposed of in previous drill holes
- { } 58. Check if drill core has been stored in core trays in equipment storage area
- { } 59. Check that completed drill holes have been covered using caps or solid rubber matting
- { } 60. Have 20 m sections of drill core been provided to the SCA to date (Y/N)?
- { } 61. Check that rubbish has been removed from site
- { } 62. Check toilet stocked adequately

End-Shift (Cont.)
HCPL ENVIRONMENTAL COORDINATOR CHECKLIST

____/___/____

- { } 63. Ensure all fuel containers accounted for
- { } 64. Check sign in/sign out board completed by all personnel
- { } 65. Field test results and lab results received today copied to SCA?

End of Project

- { } 66. Check all ground disturbed by the works been stabilised and rehabilitated, allowing the erosion and sediment controls to be removed
- { } 67. Check that drill core and equipment has been removed from the site
- { } 68. Complete water quality sampling field analysis in accordance with EMP
- { } 69. Complete water quality sample collection for laboratory analysis in accordance with the EMP
- { } 70. Field test results and lab results received and copied to SCA?
- { } 71. Contact SCA Manager Catchment Operations South East to arrange site inspection.

PUR TRANSPORT DRIVER DUTY CARD

____/___/____

Responsible for:	Transportation of CARBOPUR

Responsible to: Minova Site Supervisor

Minimum Training: Minova Level 1-CARBOPUR

Responsibilities:

1	Receive induction from HCPL	
2	Understand the bunding requirements for CARBOPUR transport	
3	Understand the transport rules in the catchment	
4	Obtain telephone list(s) and store in CARBOPUR transport vehicle	
5	Obtain SCA gate key from HCPL and sign key register	
6	Attend pre-shift meeting at Metropolitan mine site	
7	Assist with set-up, start-up and clean-up	

Complete Checklists/Forms

1	Sign-on/Sign Off Board
2	CarboPur Transport Checklist – to be completed whenever transporting product
3	Set Up Checklist
4	Clean Up Checklist

At all times in the catchment

1	SAFETY FIRST
2	Strictly 40km/hr maximum speed
3	Report spills immediately to site supervisor

Name:

Signed: _____ Date: _____

PUR PUMP OPERATOR DUTY CARD

____/___/____

Responsible for: PUR Pump Operator

Responsible to: Minova Site Supervisor

Minimum Training: Minova Level 2-PUR Operator

Responsibilities:

1	Receive HCPL induction
2	Receive training in walkie talkie
3	Obtain telephone list(s)
4	Attend pre-shift meeting at Metropolitan mine site
5	Assist with set-up, start-up and clean-up

Complete checklists/forms

1	Sign-on/Sign Off Board
2	Set Up Checklist
3	Pump Charging Checklist
4	Clean Up Checklist

At all times in the catchment

1	Safety First
2	Strictly 40km/hr maximum speed
3	Report spills immediately to Site Supervisor

Name:_____

Signed: _____ Date: _____

NOZZLE OPERATOR DUTY CARD

____/__/____

Responsible for: Operation of Injection Nozzle.

Responsible to: Minova Site Supervisor

Minimum Training: Minova Level 2-PUR Operator

Responsibilities:

1	Receive induction from HCPL	
2	Receive training in communications (Walkie Talkie)	
3	Experienced and competent nozzle operator	
4	Understand cease to inject triggers	
5	Obtain telephone list(s)	
6	Attend pre-shift meeting at Metropolitan mine site	
7	Assist with set-up, start-up and clean-up	

Complete checklists/forms

1	Sign-on/Sign Off Board
2	Set Up Checklist
3	Set Up Checklist – Injection Site
4	Clean Up Checklist

At all times in the catchment

1	Safety First
2	Strictly 40km/hr maximum speed
3	Report spills immediately to Site Supervisor

Name: _____

Signed:	Date:
olgilou	Bato:



MINOVA SITE SUPERVISOR DUTY CARD

____/__/____

Responsible for: Coordinate PUR remediation activities.

Responsible to: Project Manager

Responsibilities:

1	Liaise with HCPL Project Manager and Environmental Coordinator
2	Receive HCPL induction
3	Understand project objectives and coordinate daily activity
4	Ensure all Minova personnel receive HCPL induction
5	Ensure that Nozzle Operator, CarboPUR Transport Driver, and CarboPUR Pump Operator understand and sign duty cards.
6	Provide information as required to HCPL Environmental Coordinator
7	Assist with Job Safety Analysis
8	Facilitate pre-shift meeting at Metropolitan Mine Site in coordination with HCPL Environmental Coordinator

Complete check-lists/forms

1	Tool Box Talk
2	Sign-on/Sign Off Board
3	Set Up Checklist
4	Pump Charging Checklist
5	Set Up Checklist Injection Site
6	Minova Site Supervisor Pumping Checklist
7	Minova Site Supervisor Mechanical Checklist
8	Clean Up Checklist
9	Daily Injection Report
10	Borehole Layout

At all times in the catchment

1	SAFETY FIRST
2	Strictly 40km/hr maximum speed
3	Report spills immediately to Project Manager

Name: _____

Signed:

Date:	

HCPL ENVIRONMENTAL COORDINATOR DUTY CARD

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'		

Responsible for: Environmental Management.

Responsible to: Project Manager

Responsibilities:

1	Assist with induction for all contractors – includes providing a copy of the Bushfire Preparedness Plan and a dry-run of the alternative escape routes from the catchment
2	Install and maintain environmental controls according to EMP
3	Liaise with Minova Site Supervisor/Project Manager
4	Instruct personnel on environmental requirements
5	Conduct relevant monitoring and testing
6	Facilitate pre-shift meeting at Metropolitan Mine Site in coordination with Minova Site Supervisor

Complete checklists/forms

1	HCPL Environmental Coordinator Checklist

At all times in the catchment

1	Safety First
2	Strictly 40km/hr maximum speed
3	Report spills immediately to Project Manager

Name: _____

Signed:	Date:
0	

DAILY INJECTION REPORT

____/___/____

							HOLE #
							FLOOR
							ROOF
							RIB
							CHAINAGE CHOCK #
							FEED PIPE
							IRMA/ PACKER
							FIB/ EXTN
							DEPTH
							GRADE
							PUMP PRESSURE
							PODS USED
				 			COMMENTS
							TALLY BLACK
							TALLY WHITE
							TOTAL LITRES USED

A - Strata pressu B - Strata pressu	ıre, Good spread & lea ıre & leaks	aks C - Strata pressu D - Pre-grouted h	re & no leaks E- No strata pressure & leaks ole F- No strata pressure & no leaks	Pump No.	
PAGE TOTAL	# Holes Injected	Tally of Black Drums	Tally of white drums (show grade)	Total drums	Litres
CUMALATIVE TOTAL	# Holes Injected	Tally of Black Drums	Tally of white drums (show grade)	Total drums	Litres

Operator: Date:/ /

Supervisor: Date:/ /

BOREHOLE LAYOUT

____/__/____

COLLIERY:	LOCATION:	DATE:	//
	LOCATION OF BOREHO	LES	
	<u> </u>		
			<u> </u>

 Operator:
 Date:
 /

 Supervisor:
 Date:
 /

TOOLBOX TALK

____/___/____

JOB: WARATAH RIVULET WI	RS3 PUR INJECTION	
START TIME:: AM/	PM (please circle)	
Name:	Signature:	
HAZARDS OBSERVED:		
TOPICS DISCUSSED:		
SUPERVISOR: Name:	Signature:	
MINE:	DATE://	
MINE CONTACT:	JOB SITE:	
JOB:		

APPENDIX 6

EXAMPLE EROSION AND SEDIMENT CONTROL PLAN

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

EROSION AND SEDIMENT CONTROL PLAN

Erosion and sediment controls will be installed and maintained. The typical layouts of erosion and sediment controls that will be implemented for the drilling of holes within the stream and on the stream bank are shown on Figure 2a and 2b and are described below. All erosion and sediment controls will be in place prior to the commencement of construction.

A range of management controls will be implemented. These include:

- Geofabric/straw bale filters. The geofabric straw bale filters would be constructed by first laying down a sheet of geofabric, onto which straw bales will be placed, themselves wrapped in geofabric, consistent with the Landcom (2004) *Managing Urban Stormwater: Soils and Construction Vol 1* guidelines.
- A line(s) of geofabric filters will be positioned strategically downstream of the drilling activity (Figure 2a). The exact location will be assessed on the basis of actual conditions encountered, in particular the extent of sediment liberated from drilling and the location(s) at which sub-surface flow re-appears. These will be in place permanently during the conduct of drilling activities and weighed down with sand bags.
- Rubber matting for steel-tracked drill rigs.
- Drilling and grout injection will be ceased in the event of imminent heavy rain. Equipment (except the drill rig and drill rods) will be moved to higher ground on the bank of the stream. In addition, equipment will be moved to the elevated equipment storage area shown on Figure 2a at the end of each day.
- Regular inspections of erosion and sediment control structures for structural integrity and effectiveness will be conducted by the HCPL Environmental Coordinator as outlined in Attachment B.

The fine clay fraction that is not contained by the straw bale filters above will, depending on the extent of discoloration of the water, be managed through bush filtering. In this context, bush filtering means distributing the outlet water by means of perforated hoses (lay flat hose or similar) or multiple hose outlets so as to minimise erosion at the site of discharge. If required, discharge over a straw bale filter to further dissipate energy will be used. Discoloured water may be pumped from a range of sources. These include:

- adjacent drill holes;
- settling tanks;
- artificial sediment traps created by straw bale filters barriers; and
- downstream ponds.

The location and extent of pumping and distance into the bush for distribution of discoloured water will be determined on the basis of actual conditions encountered. The location and extent of pumping and distance into the bush for distribution of discoloured water from the work site shall be managed in such a way as to ensure that the discharged discoloured water does not return to the Waratah Rivulet in a condition worse than the background water quality of the Rivulet.

If discoloured water is observed to extend to Pool B, then drilling activities will cease and sediment controls will be upgraded and their performance re-assessed.

To minimise the erosion of the stream-bed associated with movement of the drill rig, rubber mats made from disused (and cleaned) conveyor belt will be used as well as the installation of sand bags into potholes or other surface irregularities.

All erosion and sediment controls will remain in place until such time as all ground disturbed by the works have been stabilised and rehabilitated.

APPENDIX 7

GROUTING PRODUCTS AND INJECTION ACTIVITIES MANAGEMENT

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

GROUTING PRODUCTS AND INJECTION ACTIVITIES MANAGEMENT

General

The PUR grouting products will be managed in accordance with the relevant product Material Safety Data Sheet (MSDS).

The equipment has been designed with features that assist in preventing or minimising potential impacts on the environment. These include:

- The hoses are designed to withstand four times the stall pressure of the pump to prevent rupturing.
- Hose joins and connections will be fitted with safety clips prior to filling the hoses with product.
- Hoses will be colour coded to minimise the risk of incorrect coupling.
- The accelerator and resin are mixed before entering the pump.
- The accelerator and resin are mixed before entering the pump. The pumping system is designed to withstand overpressure and in the event of a blockage, the pump is designed to automatically stall.
- The pump has a remote shut-off capability allowing pumping to be stopped remotely (e.g. at the injection site).
- Operators have the ability to manually stop grout injection by turning off the injection nozzle.

Equipment will be maintained and checked prior to use in accordance with the checklists to be developed for each stream remediation site. Example checklists are provided in Appendix 5.

In addition, prior to works commencing, the following actions will be conducted:

- Calibration of pumps.
- Proper function of all valves.
- Inspection of all hoses and fittings for any damage or obstructions.
- Proper function of shut-off valve to the high capacity pressure hose.

Hose couplings will be located within a notched plastic container containing absorbent material. The coupling will be wrapped in absorbent material and then wrapped in clear plastic to facilitate identification of any leaky couplings. Inspection of the hose couplings for leaks forms part of the checklist for three separate people.

Metropolitan Coal – Rehabilitation Management Plan			
Revision No. RMP-R01-E			
Document ID: Rehabilitation Management Plan			

Handling of Polyurethane Grouting Products

One container of Spetec H100 and one pallet of Accelerator ACC H100 will be transported to the Woronora Special Area, when required for injection, on a box trailer, ute tray, or truck. The box trailer, ute tray, or truck will be lined with a chemical resistant underlay. The containers of Spetec H100 and Accelerator ACC H100 will be bunded and sit on top of the underlay. That is, the bunded pallet will act as the primary containment mechanism, and the underlay as a secondary containment mechanism. The injection equipment will also be positioned on a bunded pallet in a box trailer, ute tray, or truck that has been lined with a chemical resistant underlay. The box trailer, ute tray, or truck will be positioned adjacent to the fire trail used to access the remediation site.

All of the above controls will be identified in the PUR Transport Driver's checklist which will be completed prior to leaving the Metropolitan Coal site and again prior to leaving the remediation site.

Set-Up

A set-up procedure checklist (example provided in Appendix 5) will be followed. The checklist includes the following major controls and management measures for safe handling and connection of product components:

- The connectors to and from the 205 L drums have special drip free chemical couplings.
- Accelerator ACC H100 is added to the single-component Spetec H100 in the drum, as required, determined on hole spacing, sequence of grout injection, discontinuity aperture etc.
- Product is transferred from the containers directly to the injection pump via braided delivery lines.
- The set-up checklist is countersigned by the Site Supervisor.

Injection

Start-up and pumping checklists will be completed (example provided in Appendix 5) and countersigned by the Site Supervisor. The checklists include the following major controls:

- Individual injection boreholes will be logged to detail hole injection pressure used and quantity injected. An injection record (example provided in Appendix 5) will be maintained to document the type of grout used and the quantity injected.
- Spill cleanup materials will be made available at both the pump site (spill kit in each PUR vehicle) and injection site. Should a spill occur, it will be reported immediately to the Site Supervisor, Metropolitan Coal Technical Services Manager, to the SCA via their Incident Management Number (1800 061 069) and to DRE. The Site Supervisor and Metropolitan Coal Technical Services Manager (or delegate) will investigate all spills and environmental incidents.
- The contents of the spill kits are listed in Section 7.2.6.2 and the spill response procedure is provided in Appendix 9.
- A pump operator will be present at the pump site and a PUR injection operator will be present at the injection site throughout the operations. In addition, a Site Supervisor will be present to oversee the drilling and grout injection activities.
- Walkie talkie communication between pump operator and injection site will be maintained at all times during the set-up and injection phases.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

- At the end of each injection phase a brief (few seconds) flush using a single component is required to prevent PUR curing within the injection nozzle. The flushed component will be directed to a sealed drum which itself is bunded within a larger drum.
- The injection levers are located within a purpose built (non-leak) metal tray which will act as a bund and in addition, the steel tray will rest on an absorbent fabric pad as a further control to mitigate against spills.
- Each injection hole will be covered with an apron of absorbent fabric to catch any spills during injection of that hole.

End-Shift

At the completion of daily grout injection activities, the hoses will be disconnected from the pump and injection sites and capped with purpose-built end caps. During hose disconnection, the hose will be located through a notched plastic container with absorbent material at its base, thereby absorbing any drips. The hoses will remain in place overnight (located at a distance from the stream bed and tied in places to suitable objects such as trees).

No PUR will be stored on site overnight (other than that remaining in the hoses).

Equipment malfunctions, failed or worn components, abnormalities or constraints to the system will be reported to enable modifications or amendments to be implemented.

The PUR Transport Driver, Site Supervisor, and Metropolitan Coal Environmental Coordinator each have a specific end of shift checklist (examples provided in Appendix 5) to ensure that all rubbish is removed, all PUR waste is removed, and the site is left in a tidy condition.

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

APPENDIX 8

EXAMPLE BUSHFIRE PREPAREDNESS PLAN

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		



HELENSBURGH COAL



Helensburgh Coal Pty Ltd

Bushfire Preparedness Plan

1. INTRODUCTION

This Bushfire Preparedness Plan (BRP) has been prepared in accordance with Approval Condition 15 'Bushfire Preparedness, Management and Hot Work' of the *Metropolitan Colliery Waratah Rivulet WRS3 Remediation Activities Review of Environmental Factors, Schedule 1.*

The BRP has been prepared by HCPL to ensure that HCPL personnel and contractors involved in activities within the Woronora Special Area are aware of procedures to:

- minimise the potential for bushfire
- respond to bushfire
- evacuate the area in case of emergency

Under no circumstances should any person working in the Woronora Special Area place their own or other's lives at risk to fight a bushfire.

The BRP should be read in conjunction with:

- Fuel management as outlined in this EMP
- SCA Standard Conditions of Entry
- Activity Checklists, Duty Cards and Forms (Attachment B).

2. BUSHFIRE PREVENTION

In accordance with the SCA Conditions of Entry, strictly no fires are allowed in the catchment at any time.

2.1 Hot Work Policy

No 'Hot Work' shall be carried out in the catchment without a 'Hot Work' permit issued via the designated HCPL environmental coordinator .

'Hot Work' shall be conducted in accordance with the HCPL, SCA approved, Hot Work Policy and permit

2.2 Fuel Management

When re-fuelling or transporting fuel by hand to machinery:

- Ensure the machinery is turned off.
- Strictly no smoking.
- Ensure that a fire extinguisher is located within easy reach.
- Ensure that a suitably sized funnel is used reduce risk of spills
- Clean up fuel spills (and report all spills)

2.3 Housekeeping

- Ensure that all rubbish is removed from site at the end of each shift in accordance with the Clean Up Checklist (Attachment B).
- Ensure that portable fuel containers are accounted for before leaving site in accordance with the Clean Up Checklist (Attachment B).

3. DURING A BUSHFIRE

- Remain calm.
- If a small fire is noticed and it is considered safe to do so, an attempt to put out the fire should be made. Bushfires can become out of control very rapidly so unless the fire can be put out very quickly, do not attempt to continue fighting the fire.
- If the fire cannot be controlled, evacuate the catchment immediately according to the Fire Evacuation Plan.
- Call 000 immediately.

The Flat Rock Crossing area can be described either by:

- Coordinates (E309620, N6214190 MGA Zone 56).
- Flat Rock Crossing on Fire Road 9H, nearest cross street is Princes Hwy.

3.1 Fire Evacuation Plan

If the fire's location is unknown, ring the SCA Incident Line (1800 061 069) and ask for direction of fire.

The Fire Evacuation Plan is attached. There are two means of egress:

- a. Travel south on fire road 9H and through the two gates (Outlined in Red) (usually the way you would have come in).
- b. Travel west on Fire Road 9H across the rivulet up the hill and go southwest (left) at intersection on Fire Road 9 and through gate and then south (left) on Fire road (Outlined In Green)

Bolt Cutters will not work on chains.

4. BUSHFIRE PREPAREDNESS CHECKLIST

The following checks are the responsibility of the HCPL Environmental Coordinator and are included in the checklists (Attachment B).

ITEM	Task	When
Evacuation Plan	Ensure that all personnel have received the	Pre-works
	Fire Evacuation Plan and provided a copy of	
	the Bushfire Preparedness Plan.	
	Accompany all personnel on a dry-run of the	
	second means of escape.	
	Emergency numbers are included on the	
	telephone list and SCA Fire incident number	
	(1800 061 069).	
Fire Extinguisher	Sight the fire extinguishers on site	Pre-shift
Parking	Ensure that vehicles are parked facing the	Pre-shift
	first means of escape.	
SCA Fire info	Check SCA Incident line if any smoke seen in	Pre-shift at mine site
	the area.	
	Check if total fire ban	Pre-shift at mine site
Housekeeping	Ensure that rubbish is removed from site	End-shift
Fuel Containers	Ensure that all portable fuel containers are	End-shift
	accounted for.	



APPENDIX 9

SPILL RESPONSE PROCEDURE

Metropolitan Coal – Rehabilitation Management Plan		
Revision No. RMP-R01-E		
Document ID: Rehabilitation Management Plan		

INTENT

To ensure that suitable control measures have been identified and implemented for the safe clean up and disposal of any spilt products.

AIM

To maintain site-specific Environmental, Quality, Safety and manufacturer's requirements.

PROCEDURE

- Obtain spill disposal kit
- Open absorbent bag
- Ensure product is dammed and contained from entering waterway
- Don any necessary PPE
- Liberally sprinkle absorbent onto spill ensuring enough to encapsulate spill
- Shovel spilt product and absorbent using steel shovel
- Place product into plastic bags provided in spill kit
- Seal bags with zip ties
- Remove waste product from site for correct disposal