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**DURALIE PROJECT**

**POTENTIALLY ACID FORMING (PAF) MATERIAL  
MANAGEMENT PLAN**

SEPTEMBER 2003

## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1 INTRODUCTION	1
2 PAF MATERIAL	1
3 PAF MATERIAL STORAGE	1
3.1 OUT OF PIT EMPLACEMENT	2
3.2 IN PIT EMPLACEMENT	3
4 WATER MONITORING	3
5 REFERENCES	3
<b>APPENDIX – Measurement of PAF Above Coal</b>	<b>4</b>

## LIST OF FIGURES

Figure 1	Insitu Location of NAF and PAF Wastes	5
Figure 2	Out of Pit Waste Dump Arrangement	5
Figure 3	In Pit Waste Dump Arrangement	5

## 1 INTRODUCTION

The Duralie Project Open Cut is being developed by Duralie Coal Pty Ltd (DCPL). The Duralie Coal Mine (DCM) is located in a secluded area of cleared grazing land east of the Bucketts Way, approximately 5 kilometres north of the village of Stroud Road and 8 kilometres south of the village of Wards River in the Gloucester Valley.

This Potentially Acid Forming (PAF) Material Management Plan (PAFMMP) describes the preferred storage and treatment method for PAF materials produced during the Duralie Project.

## 2 PAF MATERIAL

PAF material is one which when exposed to oxygen and water can result in the leaching of sulphuric acid. PAF materials contain sulphidic compounds (particularly pyrite) that are exposed during the mining process. The production of sulphuric acid during the oxidation process has the potential to mobilise heavy metals and metalloids into the environment. Downstream vegetative and aquatic ecosystems are at risk of being severely impacted through both acidification and heavy metal contamination.

The quantity of PAF material to be mined at Duralie has been estimated to comprise a relatively small proportion of the total amount of waste to be mined. PAF waste is located immediately above the coal seam and within the floor (beneath the coal seam) rock (refer Figure 1). The thickness of the waste band containing PAF material above the coal seam varies in thickness but is expected to be 4 to 6m.

Waste material is segregated and selectively handled. Segregation is determined in the field by the site geologist upon consideration of the working bench height, strata dip and thickness of the PAF band. Refer to “*Measurement of PAF Above Coal*” table within Appendix A. Confirmation of the thickness of the PAF band is periodically assessed by field sampling and laboratory analysis (utilising Net Acid Generation (NAG) testing).

Rock reject from the rotary crusher is considered to be PAF material and is emplaced along with other PAF waste.

## 3 PAF MATERIAL STORAGE

PAF material is to be stored in two distinct manners during the Duralie Project, viz:

- Out of pit emplacement; and
- In pit emplacement.

Out of pit emplacement will occur from the commencement of mining operations until the ability to store waste in pit is possible. It is anticipated that out of pit emplacement will occur during the initial 12 to 18 months of the mine's life. In pit disposal of PAF waste will then be the standard mode of PAF material storage for the remainder of the mine's life.

### 3.1 OUT OF PIT EMPLACEMENT

PAF material will be stored utilising the following strategy:

- Selection of an appropriate location for the emplacement area taking into account such factors as regulatory approvals, proximity to waterways, ability to provide sediment control and runoff containment, visual impacts, heritage issues etc.;
- Provision of adequate drainage and containment structures to manage surface water flows within the emplacement area;
- Tree and general vegetation clearing (refer Vegetation Clearance Protocol);
- Stripping and stockpiling of topsoil suitable for reuse in future rehabilitative works (refer Topsoil Stripping Management Plan);
- Removal of insitu tree stumps and significant remnant tree roots – reinstatement of subsoil/clay footprint;
- Construction of containment cell perimeter walls utilising non PAF (i.e. NAF) waste – the walls to be of a thickness whereby mine haul trucks provide compaction during waste placement;
- Placement of PAF material within the walled cell in lifts of not greater than four (4) metres thickness;
- Application of a layer of lime over each four (4) metre PAF waste lift at a rate of twenty (20) tonnes per hectare;
- Upon reaching design height for PAF storage, provision of a clay capping layer (NAF) with a minimum thickness of one (1) metre;
- Placement of as a minimum, an additional ten (10) metre layer of NAF; and
- Shaping, drainage construction, topsoil placement and revegetation.

Note that lime application to PAF lifts is to occur as soon as practical following the completion of an area of such a size as to make the liming operation efficient. It is desirable that a lift of PAF material not remain unlimed for a period in excess of three (3) weeks.

The non PAF cell walls and extensive non PAF material cover within the out of pit emplacement facility serve to restrict or prevent the movement of air (oxygen) and/or water through the PAF waste. This restriction/prevention reduces the rate of oxidation of PAF material and also limits the mobilisation of salts (which contribute to water salinisation). It should be emphasised that prompt sealing of PAF material is considered the prime control measure for preventing acid mine drainage (AMD).

Refer figure 2.

### **3.2 IN PIT EMPLACEMENT**

In pit emplacement is to be commenced as soon as practical at the Duralie Site.

The Duralie Project Environmental Impact Statement (EIS) states that disposal of PAF waste within mined out sections of the pit will be below RL35m. The level beneath which PAF waste is to be stored must be that below the post-mining recovered water table. Progressive evaluation of depth to water in advance of the pit is proposed to accurately predict the position of the post-mining recovered water table and hence to confirm the appropriateness of the EIS stated figure.

Where it is considered that there is likely to be an extended time between placement of PAF material within the mined out pit area and subsequent submersion, the waste material will be shaped in pit to allow lime addition at the same application rate as applied to the out of pit deposited PAF material.

On completion of placement of PAF material within the pit, a minimum twenty (20) metre layer of NAF material will be placed above the emplaced PAF material. Upon final placement of sufficient NAF material to construct the design profile for the given section of the emplacement area, shaping, drainage construction, topsoil placement and revegetation will be undertaken. It should be noted that where it is not practical to place twenty (20) metres of NAF material above the buried PAF material, an assessment of the risk posed by a lesser quantity of NAF material will be undertaken.

Refer figure 3.

## **4 WATER MONITORING**

Monitoring of surface water and groundwater is undertaken in order to determine whether mine activities are causing adverse impacts upon the surrounding environment. To this end, several key parameters (such as pH, sulphate concentration and target metals) within sampled water are assessed over time. Reference should be made to the Duralie Mine's *Surface and Groundwater Monitoring Plan*.

## **5 REFERENCES**

- Duralie Coal Pty Ltd (1996) *Duralie Coal Mine – Environmental Impact Statement*
- Duralie Coal Pty Ltd (2002) *Duralie Coal Mine – Surface and Groundwater Monitoring Plan*
- Duralie Coal Pty Ltd (2002) *Duralie Coal Mine – Vegetation Clearance Protocol*
- Duralie Coal Pty Ltd (2003) *Duralie Coal Mine – Topsoil Stripping Management Plan*

## APPENDIX A

# MEASUREMENT OF PAF ABOVE COAL

Measurement of PAF waste can be done on a horizontal bench by knowing the dip of the coal, the height of the face being worked and where the edge of coal is. Once the edge of coal is known measure the distance from the coal edge as indicated below

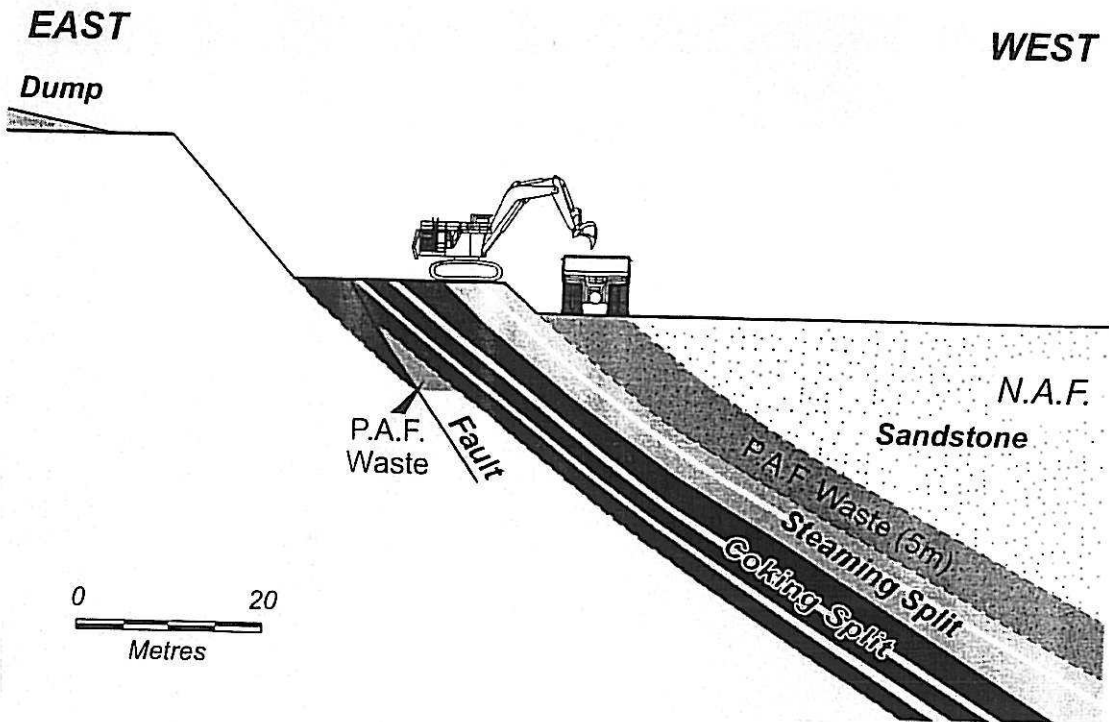
Assuming a 4m bench and using an average dip then:

DIP (Degrees) (Angle of coal roof from horizontal)	DISTANCE (m) (Horizontal distance from front edge of coal to PAF - NAF line)
5	103m
10	52m
15	35m
20	26m
25	20m
30	17m
35	14.5m
40	12.5m

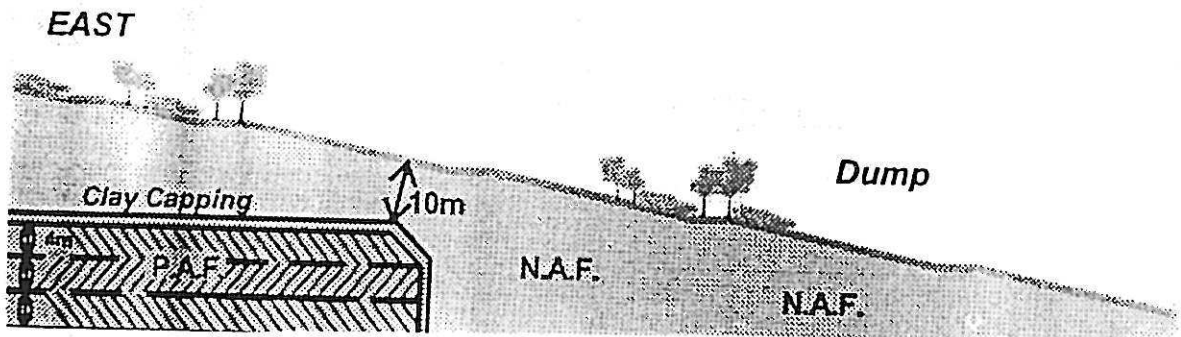
Dips in the Box-cut will generally be shallower than 25 degrees

FIGURES

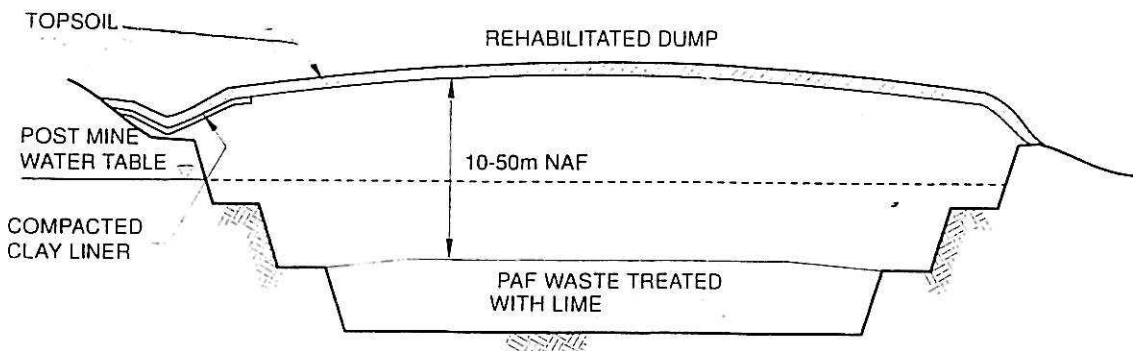
**Fig. 1 Insitu Location of N.A.F. and P.A.F. Wastes**



**Fig. 2 Out of Pit Waste Dump Arrangement**



**Fig. 3 In Pit Waste Dump Arrangement**



**TYPICAL EAST-WEST CROSS SECTION**