062041

PRESCRIPTION FOR HYGIENIC BAUXITE MINING IN STATE FOREST

1. Introduction

1.1 The western high rainfall zone is potentially the most productive area for water and timber in the Northern Jarrah forest. A large proportion of this zone has been classified as dieback affected or dieback non-protectable.

1.2 The imposition of bauxite mining onto this disease situation has compounded the problem. In the past, hygiene within areas to be mined was regarded as a waste of time, and Drilling occurred throughout the forest in all seasons of the year.

1.3 Recent research into the biology of Phytophthora cinnamomi has shown it to be an ephemeral pathogen on freely drained upland sites. There is a possibility that the environment can be manipulated against P. cinnamomi on these sites which are predominantly dieback-free.

1.4 Experience and knowledge gained as a result of the 70mm mapping and interpretation has shown that indicator species deaths are caused by many factors including P. cinnamomi. Not all areas once called "dieback" are infected with the disease, particularly in the western jarrah forest.

1.5 More positive disease management is now required in the western high rainfall zone aimed at minimizing the spread of P. cinnamomi and the impact of mining in the jarrah forest.

1.6 In order to achieve this aim, it is necessary to implement dieback hygiene in mining areas. Hygiene will be designed to protect both the mined areas and the surrounding unmined forest from dieback infection.

..../2

1.7 These guidelines form the basis for developing detailed hygiene prescriptions for all mine associated operations.

1.8 Responsibilities - See appendix.

2. Factors which Contribute to Spread of Disease

2.1 Geographic Dispersion

The pattern of mining is a mosaic of mine pods scattered through the forest with indented boundaries resulting in a high pit/forest interface. Pits and minesites/refineries are linked by a massive network of roads, conveyors and powerlines.

Mine pods are situated mainly on the middle and upper slopes of the forest.

The potential disease impact on the unmined forest is therefore very severe.

2.2 Access

2.2.1 Haul Roads

Haul roads have a high potential for dieback spread because of:

(a) Infected gravel movement during construction and maintenance and the movement of infected vehicles.

(b) The large runoff from haul roads due to rain and artificial watering increases the moisture in the adjacent forest resulting in favourable moist conditions for pathogen survival.

(c) Location which can place at risk large areas of forest below the haul road.

(d) The dense network of haul roads.

(e) Operations during wet soil conditions.

2.2.2 Conveyor Lines

The impact on adjacent forest can be severe as a result of:

(a) The introduction of diseased gravel during construction.

(b) Wet soil operations.

(c) Movement of infected vehicles.

(d) Location which can place at risk large areas of forest below the conveyor line.

2.3 Scale

The scale of operations and activity is massive with large numbers of contractors, machinery and vehicles dispersed through the mining area with a high degree of vehicular movement through a dense access network, at all times of the year in all weather.

2.4 Production

Specific mining operations are undertaken on the basis of production. Company planning does not consider hygiene constraints other than at the most superficial level.

2.5 Season

Access construction and mining is continuous regardless of wet soil conditions.

2.6 Topsoil movement during rehabilitation. There is a high probability of disease spread with uncontrolled movement of topsoil.

..../4

2.7 Removal of Forest Produce. Timing of the clearing applications has resulted in most of the forest produce removal taking place during moist soil conditions. Hygiene is not being practised within the area to be cleared.

3. The Objective of Hygienic Mining

The objective is to undertake mining and associated activities in a manner which does not spread P. cinnamomi into dieback-free forest.

4. Disease Management Proposals

Hygienic mining operations will be introduced on the following basis:

4.1 Priority Areas for Disease Management

It is recognised that hygiene in mining is a long term objective with many problems to be overcome before effective implementation.

Priority areas are the large areas of dieback-free protectable forest high in the landscape. When these areas are fully protected, other dieback categories may be considered.

Steps to be undertaken are:

4.1.1 Within each 5 year mining envelope define the major areas (>10ha) of dieback-free protectable forest before mining.

4.1.2 Superimpose approved mine pods, conveyors, access roads and contours to reveal major areas of dieback-free protectable forest likely to remain after mining.

4.1.3 Negotiate to protect the major unmined dieback-free protectable forest - for example by changing boundaries of pits, re-routing conveyors, haul roads etc.

..../5

The aim is to minimise the impact of mining and access in the unmined dieback-free protectable forest.

4.1.4 Consequently, identify:

PRIORITY 1... (i) Areas which must be protected by excluding mining activities. ie. Dieback-free protectable stands.

PRIORITY 2... (ii) Areas which can be protected if hygienic mining succeeds.

4.2 Principles of Disease Control

The four main principles to consider in limiting disease spread are:

1. Hygiene units (referred to as "coupes" in logging)
2. Access
3. Cleanliness
4. Timing

The first step is to classify the area.

4.3 Classification

Classify the area to be mined.
Use 1:25,000 Topographic plans with contour print as base map.

4.3.1 Identify Land Use Priority Area Boundaries, from LUMP.

4.3.2 Identify Disease Distribution, from latest Dieback maps and aerial photos updated by road traverses, ground survey and other relevant information so as to locate major areas of dieback-free forest.

Dieback Location Map

Further mapping effort must be concentrated into the predominantly dieback-free forest areas to produce a Dieback Location Map.

The "ground truth" information is delineated as follows:

-- Dieback-free protectable
-- Dieback
-- Suspect
-- Uninterpretable
-- Downslope of dieback or suspect.

4.4 Complete the Operation Map

Subdivide the Dieback Location Map into operation units and select access.

4.4.1 Hygiene Unit Selection

Each unit is a single dieback category namely;

-- Dieback
-- Suspect
-- Uninterpretable
-- Diebackfree Downslope of dieback
-- Diebackfree Downslope of suspect
-- Diebackfree protectable
-- parts of a single dieback category.

Subdivide areas of diebackfree forest into single microcatchments by using natural drainage and catchment boundaries.

4.4.2 Access System

This covers all access including haul roads, access for support vehicles and conveyor lines. Design the basic access system and mark on plan.
Observe these guidelines:

(i) Use as few access routes as possible;
(ii) Access routes to be as low in the profile as possible with minimum area of dieback-free forest below the road.
(iii) Categorise type of access e.g. haul road, light access.
(iv) Define unwanted access for closure;

(v) Avoid crossing dieback categories;

(vi) Work through the "Dieback Hygiene Guide" to cross-check decisions taken.

It is accepted that conflicts will frequently arise in this area. In this case point (ii) should take priority.

4.4.3 Identify and quantify dieback-free forest put at risk by mining and associated access. When testing alternatives, this figure can be used as a criterion.

4.5 Vehicle and Machinery Cleanliness

Plant cleanliness is required between hygiene units as follows:

Hygiene Unit	Status of Plant on entry	Status of Plant on exit
Diebackfree protectable	Must be clean	Need not be clean
Diebackfree downslope of Dieback	Must be clean	Must be clean
Suspect	Must be clean	Must be clean
Diebackfree downslope of Suspect	Must be clean	Must be clean
Dieback	Need not be clean	Must be clean at entry to Dieback-free forest
Uninterpretable	Must be clean	Must be clean

The Dieback Hygiene Guide must be used to cross-check each decision taken for each area.

Where cleanliness is prescribed on entry to or exit from a coupe, or sub-coupe, this applies to all plant and vehicles.

Washdown must be at the point of entry, if there is any risk of dieback pick-up en route to the forest.

If roads deteriorate, or free water lies on the road so that

.../8

there is a risk of soil pick-up and transport, travel through dieback-free forest must cease or a washdown at entry to dieback-free forest must be done.

4.6 Timing

Operations must be carried out when there is:

1. Least probability of spreading infected overburden.
2. Least amount of viable inoculum in the soil.

These conditions prevail during dry soil conditions following extended rain free periods in summer.

5. Mining Operations

Mining operations which require hygiene are those which are in contact with or affect the zone where Phytophthora is harboured ie. overburden or area above the lateritic layer.

The mine associated operations of most concern are:

-- Drilling and associated exploration activities prior to clearing.
-- Removal of forest produce
-- Clearing
-- Overburden stripping and replacement.
-- Access construction - roads and conveyor lines.
-- Rehabilitation
-- Access through unmined forest.

The system of hygiene units and access chosen on the Operation Map must be maintained throughout the mining phase.

Hygiene units and correct access location will form the basic control in limiting the impact of disease spread.

Cleanliness and timing will be aimed at limiting the amount of disease inoculum.

..../9

5.1 Drilling and Exploration

5.1.1 A comprehensive prescription covering hygiene in drilling and surveying has been drawn up. See Dieback Hygiene Prescription for Alcoa's Field Operations.

5.1.2 Control of implementation and review is required.

5.1.3 A pre-requisite to hygiene being implemented in subsequent mining operations is the capability for drilling results to be available a number of years in advance of mining.

It is accepted that Alcoa are presently incapable of achieving this target. However, a priority for drilling in advance should be chosen to fit into the predominantly diebackfree areas planned to be mined in each approved 5 year mining plan.

5.2 Removal of Forest Produce - poles, mill logs, minor forest produce.

5.2.1 All operations are to follow the specific hygiene guidelines contained in Jarrah 81 and as modified by the Dieback Hygiene Guide.

This phase is solely the responsibility of the Forests Department.

5.2.2 Applications for clearing are required sufficiently in advance of mining to allow dry soil operations when applicable in order to minimise disease spread.

5.3 Clearing

5.3.1 Clearing follows closely behind the logging operations and involves pushing, windrowing and burning.

5.3.2 Hygiene restrictions are to be similar to the logging

..../10

restrictions. Use the same hygiene map showing hygiene unit boundaries, cleandown points, access and timing of operations.

See 4.5 for vehicle and machinery cleanliness.

5.4 Overburden (includes topsoil)

5.4.1 Stripping and replacement of overburden must be based on the same hygiene units and hygiene restrictions for forest produce removal and clearing to ensure that:

a) there is no movement of infected material into previously dieback-free areas.
b) there is minimal movement of overburden over distances.
c) cleanliness of machinery and minimal movement of machinery.
d) season of operation must be concentrated in dry soil conditions.

5.4.2 Stockpiling of overburden to ensure the replacement area is the same as the area of origin results in the least probability of disease spread. Disease consideration should have a higher priority over maintaining a viable natural seed source.

Alcoa's objective at present is to maintain a maximum similarity of species after mining as existed before mining. This involves the immediate replacement of the entire overburden (direct whole return) or the top 5cm (double stripping). This in turn necessitates the geographical movement of overburden between pits. There is a high probability of disease spread inherent in this procedure and includes the return of susceptible species eg., banksia.

The Forests Department on the other hand favours dieback hygiene over species diversity and prefers to see minimum topsoil movement around the forest.

5.5 Access Construction

5.5.1 Roads and conveyor lines are to follow the access

system indicated in the Operation Plan.

5.5.2 Initial road or conveyor formation using dozers, scrapers and graders must be restricted in movement with cleandown when required based on hygiene units.

5.5.3 Work to be restricted to dry soil conditions.

5.5.4 Gravel sources and movement to be controlled by dieback category and hygiene units.

Infected gravel not to be used in dieback-free forest.

5.5.5 Water used for watering of haul roads must be sterilised to ensure spread of zoo-spores in free water is prevented.

5.5.6 Drainage to be designed to enable rapid run-off to naturally occurring moist sites ie. gullies.

5.5.7 Specific operation prescriptions are required.

5.6 Rehabilitation

Engineering works which involve the use of machinery - ripping, sumps and contour banks must be planned to fit the original hygiene coupes based on dieback category and catchment, ie. no movement across coupes boundaries without clean down if required.

Specific operation prescriptions are required.

5.7 Access Through Unmined Forest

5.7.1 Aim is to (i) minimise or eliminate access into unmined forest other than haul roads or conveyor lines, and (ii) minimise impact on the unmined forest.

5.7.2 Divisional O.I.C., Alcoa and M.W.S. agree to the required access network based on the approved 5 year mining plan and related to individual crusher sites topography and dieback location.

.../12

5.7.3 Guidelines for basic access system

-- Identify the diebackfree forest requiring protection
-- Maximise use of haul roads, conveyor lines
-- Do not allow access for convenience
-- Roads to be as low in the profile as possible
-- Unwanted roads to be closed to all of Alcoa's and F.D. vehicles.
-- Nominate dry soil access required for fire protection
-- Entry other than along nominated access routes requires specific consideration such as drilling
-- Training of all personnel
-- Long term control of unwanted access.

IMPLEMENTATION OF PRESCRIPTION FOR HYGIENE BAUXITE MINING IN STATE FOREST

AREAS OF RESPONSIBILITY

TASK	F.D.	ALCOA	REMARKS
A. Planning			
1. Dieback Location Map	X		
2. Operation Map			
2.1 Hygiene Unit Selection	X		
2.2 Selection of Access system	X	X	
2.3 Washdown points	X	X	
3. Vehicle and Machinery clean-liness requiremts.	X	X	
4. Timing of operations.	X	X	
B. Operations			
1. Drilling and Exploration			
Prescription	X		
Implementation		X	
2. Removal of Forest Produce			
Prescription	X		
Implementation		x	
3. Clearing			
Prescription	X		
Implementation		X	
Overburden Removal			
Prescription & control of movement	X		
Implementation		X	
Access Construction			
Prescription	X		
Implmentation		X	

TASK	F.D.	ALCOA	REMARKS
Rehabilitation			
Prescription	X		
Implementation	X	X	
Unmined Forest			
Prescription	X		
Implementation	X	X	