THE DWELLINGUP HYGIENE LOGGING TRIAL

Prepared by Officers of

The Northern Region Group
Forests Department
Como

1980

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PART I

INTRODUCTION

1.1 AIM

The objective of the trials is to determine whether logging with conventional equipment can be used in Dieback-free forest at Dwellingup without introduction or spread of dieback.

The trials are located in Amphion and Taree forest blocks, south-east of Dwellingup. They will involve operations in the four seasons, over a period of three years, followed by a period of evaluation.

1.2 BACKGROUND

A time lapse (usually of more than 1 and possibly up to 3 years) occurs between infection and development of dieback symptoms in susceptible forest species. Consequently, effective dieback hygiene can be hampered by ignorance of the exact location of the disease.

To overcome this problem, forest areas are "quarantined". This involves control of access to dieback-spreading agencies (mainly vehicles and machines). After a period of quarantine, existing infections become manifest. These are defined using aerial photography and field reconnaissance, and form the basis for production of dieback free forest maps.

To these maps can be added :

(i) details of quarantine breaches, thus allowing classification of Areas Not Effectively Quarantined (N.E.Q.) and

(ii) contours which highlight natural drainage patterns and allow delineation of dieback risk categories.

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1.3 NEED FOR TRIALS

Trials are seen as essential to test whether the post-quarantine dieback-free forest maps can provide a basis for planning and conducting truly hygienic operations in the forest.

Logging is selected for initial trials because of its wide-ranging nature and capacity to readily move soil from infected dieback-free areas. It is expected that further trials of logging and of different operations (e.g. mining) in other areas will follow.

1.4 DIEBACK TERMINOLOGY

Terminology in these notes complies with the 1979 Interim Glossary of Dieback Terms - refer to Appendix 1.

PART II PLANNING

2.1 SUMMARY OF STEPS INVOLVED

Planning steps in the development of the Dwellingup Logging Trials have been :

i) Quarantine
ii) Selection of Amphion and Taree for trial logging operations
iii) Aerial photography, interpretation, field checking and production of dieback-free maps
iv) Definition of dieback risk categories
v) Definition of cutting coupes
vi) Sawlog inventory
vii) Review of Quarantine effectiveness and classification of areas N.E.Q.
viii) Experimental design
ix) Preparation of hygiene prescriptions, roading and logging plans
x) Consultation with Timber Industry, and special advisors within F.D.
xi) Definition of review and evaluation procedures.

These are elaborated on in the following sections.

2.2 ACTIVITIES

The trial logging operations will encompass the following activities on the ground :

i) Definition of dieback risk categories
ii) Road re-location and/or upgrading to minimise risks of infected soil movement.
iii) Tree-marking in logging coupes aimed at improving the quality and vigour of the residual forest.

iv) Concurrent harvest of sawlogs and poles, when pole cutting is required
v) Evaluation of hygiene effectiveness.
vi) Post-logging silvicultural treatment, including prescribed environmental protection, regeneration and fire control measures.

Dieback hygiene practices aimed at preventing the introduction or spread of the disease, are fundamental to every aspect of every operation.

The key activity of the trial is evaluation of hygiene effectiveness.

2.3 LAND USE

Amphion and Taree blocks are designated equal priority for Timber Production and Water Productionin the Land Use Management Programme. Ensuring a full stocking of deep-rooted native vegetation on the area is considered a key management strategy to enhance this land use allocation.

Both blocks are on sub-catchments (Amphion: Swamp Oak, Taree: Long Gully) of the Murray River, which is unharnessed due to its high salinity.

2.4 PROJECT PERIOD AND BASIC DESIGN

The logging operation has been planned to cover three years with four seasons in each year.

The four seasons will cover the four main soil conditions which are believed to affect the spread of Phytophthora cinnamomi, namely :

Dry/hot (Summer) - December, January, February, early March (approx.)

Limited Moist/cool (Autumn) - Late March, April, May (approx.)

Wet/cold (Winter) - June, July, August (approx.)

Moist/warm (Spring) - September, October, November (approx.)

The four seasons which affect soil conditions will be defined by a quantitative index such as Mounts Soil Dryness Index and not related to a particular calendar month. This technique is still to be developed.

The project has aimed at a greater activity of logging during the limited moist/cool (Autumn) and moist/warm (Spring) periods, as these are the most variable in soil moisture and have the greatest effect on disease spread.

This higher logging activity in Spring is for the purpose of the project only and would not be the norm for future operations. The reverse is true in that spring logging when Phytophthora activity is at a peak, is more likely to be nil, brought about by log stockpiling during dry soil conditions.

2.5 PROJECT STRATIFICATION

The project could not be designed on a statistical basis because of the many replications that would be required to satisfy interactions between sites, soil conditions, logging and roading activities, disease interpretation and the practical problems of undertaking a logging operation. Consequently there is a risk that results may not clearly show the relationship between activities, season and methods of undertaking activities and the introduction or spread of disease.

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To minimise this risk the area has been stratified.

Stratification was based on :

1. Known illegal entry by season :- no entry, entry during dry soil conditons and entry under wet soil conditions.

2. Topography :- lateral drainage and degree of undulation.

Control areas have been set aside where logging will not take place. The controls will provide the opportunity to assess whether disease patterns are related to logging activity or to other factors.

Controls cover 10% of the logging area with 2 copues in each strata.

See Appendix 2.

2.6 MAJOR PLANNING FACTORS

The following constraints were considered in the planning process and dealt with as described :

2.6.1 Coupe Selection

Coupes are defined by single risk category, namely dieback-free protectable and dieback-free non-protectable. Dieback areas have been omitted from the trials although these areas can be logged as part of the overall project provided dieback-free forest en route to mill is not infected.

Dieback forest in Amphion and Taree is entirely located in gully systems. Consequently, all cutting coupes are dieback-free and Protectable Forest.

2.6.2 Coupe Boundaries

Coupe boundaries are based on drainage patterns so that drainage (surface or sub-surface) does not flow between coupes. Coupe boundaries are either gullies, dieback boundaries above gullies, watersheds or at right angles to the contour.

Some doubt as to the reliability of self-draining coupes exists where the terrain is gently undulating. In these cases, buffer areas have been designated.

2.6.3 Log Supply

Logs from the trial area will be milled at Bunnings (Dwellingup) Sawmill or the F.D. Dwellingup Sawmill.

Logging will be carried out by Bunning Bros.

Total volume available in the Amphion and Taree coupes is approximately 70,000m3. Approximately 23,000m3 will be cut each year for the 3 years of the trial.

2.6.4 Logging

Coupes to be cut under moist soil conditions were chosen close to major haul routes to minimise travel on poorer roads under high risk conditions.

It is aimed to complete the logging of each coupe in one "season". Some practical logging problems are expected if soil moisture conditons change rapidly within a season.

The falling and preparation of poles need not necessarily be done during sawlog operations (so long as hygiene is not compromised) but pole snigging, loading and hauling must be concurrent with the

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sawlog operation.

No initial allowance is made for sawlog salvage operations behind Bunnings in order to recover sawlogs unacceptable to Bunnings. This decision will be reviewed if resource wastage occurs.

Split phase logging is to be used with the snigging phase ahead of the hauling phase to eliminate contact between snig machines and log hauling, thereby reducing the risk of disease introduction and spread throughout a coupe from the bush landing.

2.6.5 Roading

Roads are to be low in the terrain following gullies or above dieback gullies and to be low cost with minimum earth works.

Logging within dieback-free coupes with no crossing into dieback areas has necessitated the construction of some new roads above the dieback boundary.

Road intensity and land construction will be minimum, aimed at an average snig distance of approximately 200m with maximum of 4 00 to 500m. Some longer snigs may be required.

2.6.6 General Hygiene

Hygiene is the most important constraint. All operations will be considered in relation to the reduction of disease spread.

The project has been designed using the best hygiene methods currently known. The only compromises are those associated with the aims of the project, as described above, e.g. spring logging.

Specific logging precautions are detailed in Part IV.

The "Hygiene Planner" used to cross-check steps in the planning phase is Appendix 3.

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PART III THE LOGGING PLAN

The following sets down data for the trial logging operation.

N.B. · Poles not covered separately
· Volumes are estimates
· Refer to plans for coupe and road location.

3.1 COUPE SUMMARY

Block/Coupe	Area (ha)	Estimated Volume (m3)	Remarks
Amphion 1	158	3320	Dieback-free
" 2	134	3350	" "
" 3	75	1350	" "
" 4	115	1840	" "
" 5	90	2250	Control
" 6	Re-planted eucalypts on		dieback site
" 7	180	2880	50% allocated as Control.
" 8	70	1260	Control
" 9	82	1480	Dieback-free
" 10	115	2300	" "
Total Amphion	1019	20030	
Taree 1	34	700	Dieback-free
" 2	195	3900	" "
" 3	Re-planted eucalypts on		Dieback area
" 4	160	4000	Dieback-free
" 5	200	5600	" "
" 6	155	4300	" "
" 7	112	2800	Control
" 8	81	2025	Dieback-free
" 9	100	2300	" "
" 10	200	4600	" "
" 11	280	5040	" "
" 12	110	2640	" "
" 13	155	2790	" "
" 14	205	4510	" "
" 15	230	4980	" "
" 16	145	4350	" "
" 17	170	2550	" "
Total Taree :	2532	58085	

* : Total controls = 10.2% by area

3.2 LOGGING TIMETABLE

Logging coupes by time/soil conditions (Soil Dryness Index limits to be introduced when developed)

SOIL CONDITIONS	DRY SOIL				WET SOIL			
SEASON	Summer Dry/hot		Autumn Limited Moist/ Cool		Winter Wet/Cold		Spring Moist/Warm	
Months	Months D J F		Approx M A M		Approx J J A		Approx S O N	
	Coupe	Vol.	Coupe	Vol	Coupe	Vol	Coupe	Vol
AMPHION	-	-	1	3320	2	3350	4	1840
	10	2300	7	1440				
			9	1480				
				6240				
TAREE	6	4300	1	700	8	2025	4	4000
	11	5040			9	2300	5	5600
	12	2640			10	4600	2	3900
			13	2790			15	5980
			14	4510				
			16	4350				
			17	2550				
TOTAL VOLUME (m3)		14280		21140		13625		21320

NOTE : (Controls. Amphion 5, Pt. Amphion 7, Amphion 8, Taree 7) (have been excluded from the above summary)

3.3 LOGGING TIMETABLE OVER THREE YEARS

YEAR	SUMMER		AUTUMN		WINTER		SPRING	
	Coupe	Vol.	Coupe	Vol.	Coupe	Vol.	Coupe	Vol.
1980	-	-	T14 Pt A7	5950	T10	4600	T5	5600
1981	A10 T12	4940	A1 T16	7670	A2 T9	5650	T4 T2	7900
1982	T11	5040	A9 T1 T13 T17	7520	A3 T8	3375	T15 A4	7820
1983	T6	4300	-	-	-	-	-	-
TOTAL		14280		21140		13625		21320

Total Volume to be logged = 70365m3

3.4 VOLUME OF SAWLOGS REQUIRED FOR BUNNINGS (DWELLINGUP) AND F.D. MILL OVER 3 YEAR PERIOD

P/I Bunnings : 36,000m3 per year

P/I F.D. Mill : 5,000m3 per year

Logging Timetable	Total Vol. Required	From Inside Quarantine	From Outside Quarantine	Remarks
	m3	m3	m3	
1980				
Autumn	17675	5950	11725	7000m3 stockpile
Winter	7305	4600	2705	
Spring	6665	5600	1065	
	31645	16150	15495	
1981				
Summer	13650	4940	8665)	8500m3 stockpile
Autumn	14925	7670	7255)	
Winter	5650	5650	Nil	
Spring	6820*	7900*	Nil	*1080m3 excess reduces next summer logging outside quarantine
1982				
Summer	15105	5040	8985)	11500m3 stockpile
Autumn	16425	7520	8905)	
Winter	3375	3375	Nil	
Spring	6095*	7820*	Nil	*1725m3 excess reduces next summer logging outside quarantine
	41000	23755	17890	
1983				
Summer	15105	4300	9080	
TOTAL	128750	70365	58385	

1. Volumes required based on annual permissible intake of 36000m3 for Bunnings Mill and 5000m3 for F.D. Mill giving total P.I. of 41000m3/annum.

2. Stockpile made up of 2500m3 (6 months P.I.) for F.D. mill for each year, and a minimum of 4500m3 (6 weeks P.I.) for Bunnings for first year, 1980, 6000m3 (8 weeks P.I.) for 1981 and 9000m3 (12 weeks P.I.) for 1982.

This results in combined stockpile of :

7000m3	1980
8500m3	1981
11500m3	1982

The stockpile will be logged in dry soil conditions (late summer, early autumn) and cut in the mill in moist/warm (Spring) conditions in order to limit logging during the moist/warm conditions when disease spread is at the most risk.

3. Note that the winter and spring logging from within the project area has resulted in no winter or spring logging required outside of Quarantine during 1981 and 1982 -for either mill.

There is a slight surplus of logs allocated to mills in Spring of 1981 and 1982 over the volume required. This has resulted from increasing stockpiling and increasing Spring logging within the project area.

This Spring surplus can be carried over and will reduce the logging required in the following summer.

In a normal logging operation this would not occur but has arisen as one of the special constraints of the project.

3.5 PROJECT ROADING

Roading programmes for each year's cutting is to be jointly agreed upon between F.D. and Industry, as regards to :

Specification
Location
Construction method
Construction programme
Hygiene precautions

The 1980 programme is as follows:

AMPHION ·

Road No.	Coupe Served	Season Used	When Spatially Safe	Distance	Comments
1	10	Su	Dry weather	2.0km	Road exists, widen, re-align bends, patch gravel.
2	10	Su	Dry weather	1.1km	Road exists, widen, re-align bends, patch gravel.
5a	10	Su	Dry weather	1.1km	Road exists, widen, re-align bends, patch gravel.
11	10	Su	Dry weather	0.8 km	Road exists, widen, re-align bends, patch gravel.
7	7	Au	Dry weather	1.5 km	Road exists, widen, re-align bends, patch gravel.
9a	7, 10	Su, Au	Dry weather	1.4km	Road exists, widen, re-align bends, patch gravel
9b	7, 10	Su, Au	Dry weather	2.1km	Road exists, partially through dieback, gravel to lift road profile. Stabilise by water binding.

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TAREE

ROAD PROGRAMME 1980

Road No.	Coupe Served	Season Used	When Spatially Safe	Distance	Comments
1a	10, 12 14	Su,Au,W	All weather	0.2km	Existing road, through dieback stabilise by water binding 200m. Culverts required.
1b	10	W	All weather	3.4km	Existing road, profile grade, gravel, improve drainage + culverts required.
1c	10	W	All weather	0.6km	Existing road, profile grade, gravel, improved drainage + culverts.
2	12	S	Dry weather	2.0km	New construction summer only.
4	12,14	Su, Au	Dry weather	2.5km	Existing road, widen, realign bends, patch gravel.
7a	5, 14	Sp, Au	All weather	0.6 km	Existing road, through dieback, gravel to lift road profile, stabilise by water binding, improve drainage + culverts.
7b	5, 14	Sp, Au	All weather	3.7km	Existing road, profile grade, gravel section serving coupe 5. Widen re-align bends.
8	14	Au	Dry Weather	1.6km	New const. summer only

PART IV PRESCRIPTIONS

Prescriptions included in this section are :

1. Cutting and Regeneration
2. Roadwork
3. Hygiene Requirements
4. Logging

Any of these may be upgraded or amended, or other prescriptions may be included as the project develops.

4.1 Cutting and Regeneration Prescription - Amphion/Taree Blocks

4.1.1 Land Use Priority

Designated in the L.U.M.P. as Catchment Protection and Timber Production.

Incompatible Uses

Any activity which introduces disease, removes native cover without provision for successful regeneration or increases the risks of erosion or pollution.

The basic aim is to maintain the productive capacity of the forest in terms of timber and water quality and quantity.

4.1.2 Objective

The objective of the logging operation in Amphion-Taree is to improve forest productivity and to facilitate effective regeneration in accordance with the land use plan.

4.1.3 Dieback Hygiene

1. Detailed operational hygiene constraints for the planning, roading, logging and subsequent operation phases are laid down in a separate document - see DFO Dwellingup or NRL Operations.

2. The following Dieback Management categories have been identified in the area :

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Dieback forest
Non-protectable forest
Dieback-free forest

Harvest and regeneration prescriptions for these forests follow.

4.1.4 Dieback Forest

1. Harvest

Remove all marketable jarrah sawlogs and poles.
Retain and Protect : Marri, blackbutt, bullich
Implement : erosion control and soil rehabilitation measures.

2. Regeneration

Programme regeneration/tops disposal fire according to overall requirements for trial area.

After b urn, assess regeneration of Dieback-tolerant species. Where gaps are present interplant with W.A. indigenous dieback-tolerant eucalypts in 1st and 2nd winter after burn.

Protect from fire for 10 years, or until regeneration can withstand hazard reduction burn.

4.1.5 Dieback-free and Non-protectable Forest

1. Harvest

i) Tree marker to note presence and stocking of poles or advance growth. Where areas of 1 ha or more carry a stocking of less than 500 stems per ha (or J and/or M) advance growth, he will ensure that a seed source (J or M) is retained.

ii) All jarrah trees greater than 70cm dbh to be tree-marked for removal.

iii) Below 70cm dbh, retain and protect future crop trees (defect-free sawlog trees, piles or poles) to ensure an approximate future crop tree spacing of 6m x 6m.

Retain and protect marri, blackbutt and bullich.

iv) Remove saleable poles which are in excess of future crop tree requirements.

v) Implement erosion control and soil rehabilitation measures.

2. Regneration

i) Top disposal to be carried out on all future crop trees.

ii) Where possible either during logging or immediately after, bulldoze all mature Banksia (i.e. > 6 years old).

iii) Carry out regeneration/tops disposal burn after one full summer's drying. Soil must be dry at time of burn.

iv) Assess regeneration and infill by planting where necessary.

v) Protect from fire for 10 years, or until regeneration is old enough to survive hazard reduction burning.

(Note : Operations listed under (2) may be postponed in the project area until reassessment for dieback is completed).

3. Stand Improvement

Consider subsequent operations (e.g. thinning, cull-felling, understorey modification, etc) to improve timber and water

production after trial logging project assessed and according to research findings.

4.1.6 Influence Zones

In the study area these are recognized as :

i) 100m strip both sides of Marradong Road.

ii) 20m strip both sides of streams that normally run in winter.

Dieback-free forest within these influence zones will be retained uncut. Dieback forest will be treated as under 4.1.4(1) and 3.1.4(2).

4.1.7 Safety

For detailed prescription refer to D.F.O. Dwellingup.

4.2 Prescription for Road Work - Amphion/Taree Quarantine Logging Trials

4.2.1 General

Amphion and Taree Block are within the forest quarantine area. Consequently, persons employed on roadwork will require a permit to operate, and will need to follow the conditions laid down in the permit by the Forests Department.

Permits will be issued to :

i) F.D. staff for supervision.
ii) Bunnings employees for supervision and works.

Machinery to be allowed to operate under the permit is D7 dozer, grader, backhoe, gravel trucks, loader, compactor, light vehicles. Each item will be specified on the quarantine permit.

4.2.2 Permit Conditions

1. All road work to be done under dry soil conditions. Work

will cease after rain. Work will be allowed to commence following rain once dry soil conditions have been achieved, or when activity of P. cinnamomi in the soil is to be non-existent.

2. Access to roadwork, and the roadworks themselves, is to be restricted to specific and defined roads. Access routes will define on a map attached to the permit, and the onus is on permit holders to limit their activities accordingly.

3. All vehicles and machines associated with the road works will be required to wash-down at specific points within the project area.

   i) All vehicles and machines will be required to be clean prior to entry into quarantine, or washed down. Vehicles regarded as not requiring wash-down will need to be inspected at F.D. Dwellingup. Wash-down facilities are available at Dwellingup F.D. Headquarters.

   ii) Machinery working across coupe boundaries will require wash-down prior to leaving a coupe. Wash-down point to be specified by F.D., and will be located in a gap in the forest, on the downslope side of a logging road.

   iii) Machinery working across a dieback boundary will be required to wash-down at a point on the boundary - specified by F.D.

   Note :

   1. Wash-down to be done to standard required by F.D.
   2. Sodium hypochlorite to be added to water used in wash-down.
   3. 'Wash-down' includes brush-down with stiff broom, blowing off dust and dirt using a compressor, as well as application of water.

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4.2.3 Roadwork Specifications

Road design will vary according to the logging plan.

i) dry soil conditions (summer/autumn logging). Specifications for these roads will be minimal - a five metre clearing with a four metre road surface - shallow side drains, culverts only in areas where surface run-off is defined e.g. creek beds.

ii) wet soil conditions (winter/spring logging). Specifications for these roads will include stabilisation on steep slopes, tight corners and dieback areas (operated on in wet soil conditions), well defined drainage on roadside, gravelled surface, culverts every 200m, where slopes exceed 1:15.

Note :
Road stabilisation specifications available from Dwellingup. In general they involve :

1. Construction of a 10-15cm thick layer of gravel (dieback free) on a well drained, crowned road.
2. Application of water (with fungicide) to the road surface.
3. Use of loaded trucks and vibrator to compact the moist road surface.

4.2.4 Roadwork Specifications

1. Clear and Form

Extremeties of the cleared road surface to be demarcated by blazed trees. Trees blazed by F.D. (two blaze to indicate tree can be removed, one blaze indicates tree to be retained). Width of clearing to be minimal on roads used for a short period. Roads destined for heavy use to have allowances for corners to be straightened, removal of overhanging trees. Debris from cleared areas to be pushed into natural gaps on edge of the road. Mill logs pushed in clearing to be cut, and debris from these pushed in prior to D7 leaving the area.

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2. Gravelling

Where gravel required for roads, the gravel is to come from pits within the coupe that the section of road is located, where possible. Dieback-free gravel is to be used at all times. Gravel pit boundaries to be demarcated by blazing. D7 dozer used to push gravel at the time road clearing is being done in the same coupe. Following gravelling, the D7 dozer is to be used to heap deb ris within the pit boundary, prepare it for rehabilitation before roading work in the area is completed, i.e. prior to winter rains.

3. Culverts

F.D. to supply pipes for roads of long term value to the Department. Installation of pipes by dozer or back-hoe. Where moist soil accumulates on machinery during the culvert digging operation, it should be washed off prior to the machine leaving the culvert.

4. Maintenance Grading

i) Allowed under dry or moist soil conditions as determined by DFO Dwellingup for each grading proposal.

ii) Constrained by activity of P. cinnamomi in the soil.

iii) Constrained by possibility of imminent rain.

iv) All roads to be pegged for dieback before grading commences.

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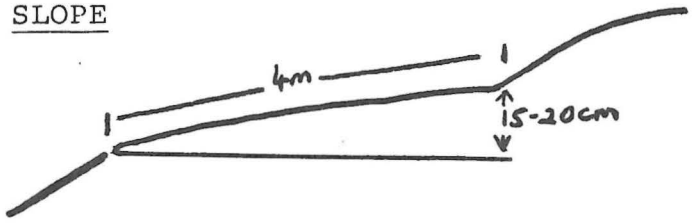
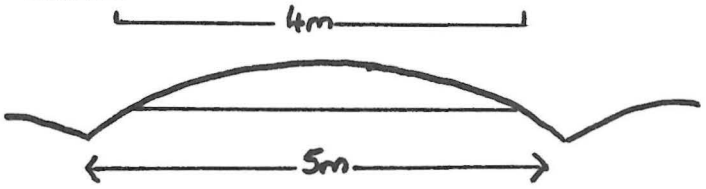
ROAD SPECIFICATIONS

1. SUMMER/AUTUMN (Dry and Moist Soil)

1.1 SLOPE

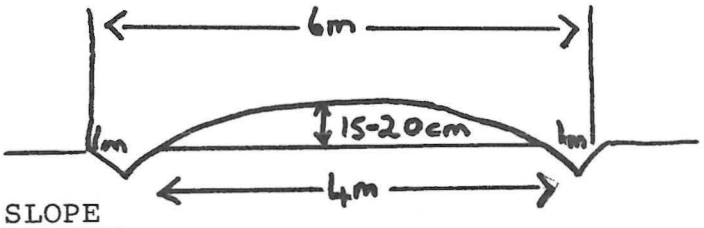


1.2 FLAT



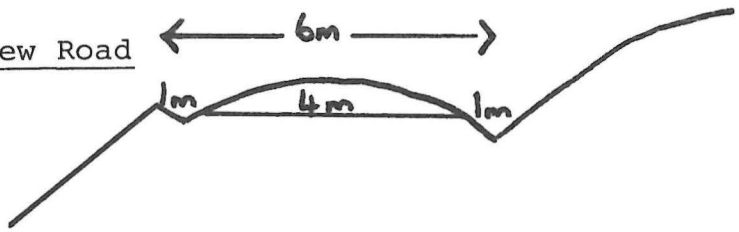
2. WINTER/SPRING (Wet Soil)

2.1 FLAT TERRAIN

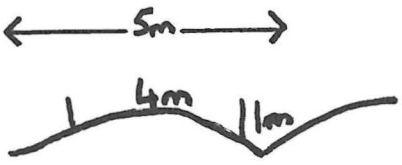


2.2 SLOPE

2.21 New Road



2.22 Existing Road



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4.3 Hygiene Requirements

1. Planning Phase

Includes log removal for access, access for planning, demarcation of dieback risk categories, coupe boundaries, log roads, gravel pits and landings.

FACTORS	HYGIENE REQUIREMENTS
1.1 Quarantine permit conditions.	1. Issued OIC Division. 2. Access minimal, restricted to specific roads. 3. Dry weather access, in autumn on spatially safe roads only. 4. Light vehicles. Craine or loader permissible only to remove large trees across roads. 5. Vehicles to be washed down before entry.
1.2 Demarcation	1. Clear and accurate demarcation of risk category boundaries. Boundaries to be demarcated by survey using I & P plans and continued field checking. Feedback to I & P interpretation group on doubtful boundaries. 2. Clear and accurate demarcation of coupe boundaries, log roads, gravel pits, log landings. 3. Coupe boundary following dieback boundary is to be 50m above dieback boundary. 4. Existing roads not less than 25m above dieback boundary will be used as coupe boundary and for hauling.
1.3 Operational Control	1. Planning which minimises chances of dieback spread, with adequate fail safe methods. 2. Training of staff and employees in hygiene. 3. Drawing up prescriptions. 4. Strict supervision of implementatic of prescriptions.

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2. Roading Phase

Includes upgrading of existing roads and construction of new roads to condition that is related to time of year which road is used. Also includes upgrading mill access roads and mill landings currently planned for construction at time of snigging.

FACTORS	HYGIENE REQUIREMENTS
2.1 Quarantine permit conditions	1. Issued by OIC Division to bona-fide Departmental and Industry personnel, and contractors. 2. Control movement by allowing access along specific roads. Other roads to be closed off. 3. Allows work to be done on specified roads, clearing of gravel pits and landings, moving gravel. 4. Dry weather access in autumn.
2.2 Minimising of soil disturbance	1. Roading intensity to be kept to minimum. Log roads to provide access for other activ ities, e.g. falling. 2. On roads used in dry soil condition maintenance grading of existing roads only to be carried out for safety reasons. 3. Road widening to be minimal but allow for passing bays and, where possible, to be done by hand and rubber tyred loader. Dozer to be used in new construction work or clearing of gravel pits, landings, and widening if required. 4. Use existing roads unless they are not suitably located - see factor 2.3 1+2. 5. Landings intensity kept to a minimum, located in natural openings where possible, not larger than necessary for safety reasons. Landings to be used as turnarounds for log trucks and other vehicles. Aim for average snig distance of 200m with maximum of 400-500m. 6. New roads to be constructed on specifications that are minimal yet meet requirements for safety and hygiene.

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FACTORS	HYGIENE REQUIREMENTS
2.3 Log road location	1. Existing roads required for in-coupe logging and which pass through dieback are to be re-located 50 metres up-slope from dieback boundary. 2. In coupe roads which pass through dieback can only be used if made spatially safe by gravelling and stabilising. 3. Roads are to be located as low in profile as possible. 4. All weather roads which do not conform with items 1 and 3 should upgraded to a spatially safe condition.
2.4 Use of spatially safe roads	1. All weather roads are to be upgraded to spatially safe conditi by : i) profile grading ii) gravelling to raise road surface iii) Improve drainage by sufficien off-cut drains, and upgrading culverts. iv) stablilising of sections that are likely to deteriorate in wet weather, e.g. flats, slopes greater than 1 in 10 + tight bends. Stabilising to be mainly water binding and compaction. v) stabilisation of sections which pass through dieback. This includes access roads to the mill landing, and the mil landing itself. Mill landing to be sealed where truck access is planned.
2.5 Washdown	Note : This includes blowing down with a compressor and brushing down with a wire brush when soil condition is dry, and washing down with water when soil adhering to vehicle is wet. 1. All vehicles to be washed down prior to entry into Quarantine, and when travelling from dieback infected areas into disease free forest if not on a spatially safe road. (Wash-down on the edge of the disease free forest, on designated wash down point).

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FACTORS	HYGIENE REQUIREMENTS
	2. Machinery working in one coupe, and requiring to move into the next coupe must be washed down before entering the next coupe.
2.6 Use of fungicides	1. All water used for washdown and road stabilisation work to have fungicide added. 2. Mill landings, and newly constructed bush landings to be disinfected by addition of fungicide prior to access by log trucks. Mill landings to be disinfected annually. Seal for truck access, improve drainage of remaining area. 3. No vehicle may be permitted to transport soil from the mill landing to dieback-free forest.
2.7 Use of dieback-free gravel	1. Gravel for log roads within a coupe is to come from that coupe, where possible. 2. Clean gravel to be used on roads which pass through dieback free forest.
2.8 Operation Control	1. Training of bonafide personnel in Forests Department and Industry, and contractors in hygiene. 2. Drawing up of prescription. 3. Strict supervision of implementation of prescriptions.

3. Logging Phase

Includes access for tree-marking, falling, construction of bush landings, snigging, loading and hauling of poles, piles, mill logs.

FACTORS	HYGIENE REQUIREMENTS
3.1 Quarantine permit conditions	1. Issued by OIC Division. 2. Access to be minimal for all Departmental and Industry personnel and contractors. 3. Allow access along specific roads to specific areas (coupes) under specified soil conditions.

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FACTORS	HYGIENE REQUIREMENTS
3.2 Operations confined to specific areas (coupes)	1. Coupes limited to specific time (one month's cutting), soil condition (dry and moist) and season, as defined. 2. Coupes self-draining. Boundaries located to minimise dieback spread with breakdown in hygiene. 3. Coupes cut under moist soil conditions located with shortest haul distance. 4. Coupe to be of one disease risk category. 5. Volume of timber on coupes to be assessed to allow efficient planning
3.3 Logging technique used.	1. Pole/pile/mill log operations to be carried out jointly. 2. Salvage operator not currently planned to be used; however option open of using operator if resource shown to be wasted. 3. Snigging to be separated from loading/hauling in time (split phase logging). 4. Landings located low in profile. 5. Pre-planned snigging pattern to minimise activ ity through a coupe. 6. Use of rubber tyred vehicles. 7. Use of large log trucks to reduce volume of traffic. 8. 40 metre buffer between coupes where lateral drainage is indistinct
3.4 Washdown	1. Log trucks daily at Divisional or Industry washdown ramp, and upon entering new coupe. 2. Snigging machine and loader upon entering new coupe, on boundary of coupe at a designated washdown point. 3. When a breakdown in hygiene is suspected, at nearest designated washdown point. 4. Fungicide to be added where water used in washdown.

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FACTORS	HYGIENE REQUIREMENTS
3.5 Control of Operations	1. Training of all personnel in Forests Department and Industry, and contractors. 2. Drawing up of prescriptions. 3. Strict supervision of implementatio of prescriptions.

4.4 Logging Operations

4.4.1 General

Amphion and Taree Blocks are within the forest quarantine area. Consequently, persons employed on logging will require a permit to operate, and will need to follow conditions laid down in the permit by the Forests Department.

Permits will be issued to :-
(i) F.D. staff for supervision
(ii) Bunnings employees for supervision and works.

4.4.2 Permit Conditions

1. Access to individual coupes for the logging operation will be according to the conditions laid down in the logging plan and quarantine permit.

2. Access is to be restricted to specific and defined roads. Access routes will be defined on a map attached to the permit, and the onus is on the permit holders to limit their activities accordingly.

3. All vehicles and machines associated with the logging operation - with the exception of log trucks - see (4) below - will be required to be free of soil prior to passing specific points within the project area.

(i) all vehicles and machines will be required to be in a clean conditin prior to the entry into quarantine. Vehicles requiring washdown may do so at Forests Department Dwellingup, or at a designated washdown point adjoining the quarantine area.

(ii) log loaders, skidders are to be washed down prior to leaving a coupe within which a logging operation is under way or has just been completed. Wash down is to be undertaken at specified wash down points - nominate by the Forests Department.

4. Log trucks need not be washed down on a trip basis, but should be washed down once a day to keep mud accumulating on the truck body to a minimum.

NOTE : 1. washdown is to be done to a standard required by the Forests Department.
2. sodium hypochlorite is to be added to the water used in wash down.
3. 'wash down' is to include brush down with a stiff broom, blowing off of dust using a compressor, as well as the application of water.
4. This assumes the mill landing is dieback-free.

4.4.3 Logging Operations

Falling :

1. Treemarkers and fallers access to a coupe to be limited to roads listed on the permit.

2. To only fall trees marked by the treemarker, unless he can show sufficient reason for not falling any tree.

3. Fallers to be instructed to achieve maximum utilisation of millable timber provided damage to future crop trees and dieback resistant eucalypts is kept to a minimum, and safety requirements are met.

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Snigging :

1. Access to a coupe to be limited to roads listed on the permit. Once within the coupe, the activities of the skidder to be strictly controlled within sub-coupes.

2. Machinery to work systematically from one landing to another, commencing on a new landing only after sub-coupe supplying current landing is completed. Landings to be worked in a coupe so that most distant landing is worked first.

3. Landings to be constructed with a loader prior to commencement of snigging operations. Care to be taken that landing is located to upslope of haul road, includes a turn-around for log trucks, is large enought to carry all the timber from the sub-coupe it services, is located where possible in a natural forest opening and has overhanging trees removed. Landings to be constructed under dry soil conditions, or loader to be washed down following the construction of each landing within a coupe.

4. Machinery to avoid damaging, where possible, future crop trees and dieback resistant eucalypts, to make use of old snig tracks and natural gaps in the forest. The removal of tops around crop trees is to be encouraged.

5. Machinery to avoid log roads within the coupe boundary when operating within a coupe or when travelling from one sub-coupe to commence work in the adjoining sub-coupe.

6. Approval of the senior treemarker is required for the machinery to move to a new landing, following a joint inspection between treemarker and bush boss of the recently cutover sub-coupe.

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7. Prior to the departure of machinery from a sub-coupe, erosion control work is to be done on the snig tracks. This work includes cutting the snig tracks diagonally with the blade every fifty metres downslope so that water will not wash down the snig track. These cut offs are to be located, where possible, so that they run into logging debris or dense vegetation. Cut offs are to be at least 150 cms. deep.

8. Care is to be taken that when field maintenance is carried out on machinery, oil is not allowed to spill onto the ground.

Load and Haul

1. Access to loaders and trucks to coupes is to be limited to roads listed on the permit.

2. Loading of logs onto a log truck at any landing will only take place once the snigging operation onto the landing has been completed. The loader used for loading will restrict its activities to log landings and haul roads.

3. The loader will be used to snig and load logs from trees retained and not fallen for safety reasons while the haul road and landing is being used (i.e. trees on immediate edge of landings and haul roads) or logs pushed over in the roading operation.

4. Following completion of loading of logs from a landing, before moving to the next landing, the loader is to put all long butts into the centre of the landing and to rip the remainder of the landing across the contour.

5. Oil spillage - see item 8. snigging.

Permit Control : The senior treemarker is directly responsible for all operations within the coupe, and he should liaise with Bunnings bush boss to ensure that the requirements of this prescription are met.

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PART V PROJECT ASSESSMENT & EVALUATION

5.1 MAPPING UPDATE

Information on the location of dieback may be updated from time to time in the project area. This could result from :

i) Development of symptoms in areas N.E.Q.

ii) Development of symptoms from new infections, either as a result of logging or some other factor.

iii) Development of dieback symptoms in an area previously free of symptoms.

As the project progresses, the dieback-free forest maps will be reviewed each 12 months and any updating considered.

5.2 INCIDENT MONITORING

DFO Dwellingup will maintain a daily Dairy of Events for the life of the project. He should record :

- when road work is done and where.
- when logging is done and where.
- information on weather and soil condition.
- unplanned incidents (e.g. hygiene failure)
- decisions made and reasons for.

5.3 COUPE & ROAD CLOSURE

When cutting in coupes is suspended or completed, roads into them will be closed.

The whole trial area will be fully quarantine following competion of logging operations.

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5.4 EVALUATION

Reassessment of dieback can commence after logging is completed and a sufficient further period has elapsed to allow development of dieback symptoms.

The aim will be to :

i) Compare dieback distribution pre and post-logging.

ii) Identify any "new" or "enlarged" dieback infections.

iii) Relate these to logging or other factors likely to have be a casual agent.

iv) Review and report on findings.

APPENDIX I

INTERIM GLOSSARY OF DIEBACK TERMS

1. Dieback symptoms : Deaths of indicator species in a location and/or pattern strongly suggestive of presence of Phytophthora cinnamomi.

2. Dieback : (also "Dieback forest"): Forest in which dieback symptoms are present.

   2.1 Proven Dieback : forest where deaths of indicator species are associated with recovery of Phytophthora cinnamomi.

   2.2 Suspect Dieback : forest in which the evidence for dieback presence is inconclusive.

   2.3 Incipient Dieback : forest in which Phytophthora cinnamomi is present or suspected, but dieback symptoms are yet to appear.

3. Infection : The presence of Phytophtora cinnamomi in a particular locality, as revealed either by recovery of the fungus and/or development of dieback symptoms.

4. Diebackfree Forest: Forest apparently free of dieback.

5. Dieback-tolerant Forest : Forest in which site factors and/or species combine so that tree deaths will not occur if Phytophthora cinnamomi is introduced.

   Note : (i) lack of deaths does not infer no effects
   (ii) a dieback tolerant forest can have a susceptible understorey.

6. Dieback Spread : An increase in the area of forest in which dieback symptoms occur.

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6.1 Natural Dieback Spread : the growth of the fungus through the soil, or its dessemination by natural agencies such as gravity of water.

6.2 Artificial Dieback Spread : transport of the pathogen by man or animals, into diebackfree forest. This can involve expanding the area of existing infection, and/or the creation of new infections at a point or points removed from the original source of infected material.

7. Dieback Intensification : the build-up of fungal activity in a locality, leading to decline and death of susceptible species.

7.1 Terminal Expression : the end-point of intensification of the disease at a particular site. Can range widely, fro death of single understorey species to "graveyard".

7.2 "Graveyard" : Where P.C. has caused death of most plant species in a community.

8. Dieback Susceptibility : An expression of the ease and rapidity with which the pathogen is able to bring about the decline and death of species in the forest.

Note : strictly speaking, susceptibility refers only to species, and not to sites.

9. Dieback Hazard : An expression of the degree to which site factors combine to favour infection by the fungus and intensification of the disease.

10. Dieback Risk : The likelihood of Phytophthora cinnamomi introduction by either natural or artificial spread.

Can therefore have : Natural dieback risk or artificial dieback risk (see definitions 6.1 and 6.2).

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11. Biological Impact : the implication of the disease to the plant and animal communities of the forest.

12. Management Implications : the implication of the disease to forest management and land use.

13. Site Sensitivity to Dieback : an expression which combines the degree to which a site/species combination favours infection and intensification (hazard), the likelihood of infection (risk) and disease effects (biological and management implications).

14. Safe Road : A road on which it is not possible for a given machine or vehicle to pick up and transport Phytophthora cinnamomi

14.1 Unsafe Road : A road on which it is possible that Phytophthora cinnamomi can be picked up and transported.

Note : any definition of roads or access must be qualified by further definition of such factors as surface, season/weather and type of unit using it.

15. Protectable Forest : Dieback free forest upslope from dieback or suspect dieback infection.

In protectable forest the risk of natural dieback spread is considered to be nil or low.

16. Non-Protectable Forest : forest downslopes from dieback or suspect dieback infection in which the risk of natural dieback spread is high.

Note : The expressions "protectable" and"non-protectable" refer only to risks from natural spread of the fungus. They imply nothing about disease impacts or rate of disease intensification.

APPENDIX II

STRATIFICATION OF LOGGING AREA

Amphion and Taree have been stratified into two strata as follows :

Table showing coupe number classified into 2 strata based on Quarantine effectiveness and topography.

	Known Effectiveness of Quarantine		
Topography	No known entry into Quarantine	Entry in dry soil conditions	Entry in wet soil conditions
Definite lateral drainage	T4, 6, 7*, 9 10, 11, 12, 13, 16, 17, A1, 3		A7* T1, 2, 15
Gently undulating	T5, 8, 14 A2, 8*	A4	A5*, 9, 10

* Control coupe not to be logged

Stratum 1	Stratum 2
Dieback behaviour predictable	Dieback behaviour doubtful

Quarantine records show the following illegal entries into quarantine.

1. Taree Block.

1.1 George Road (Ref. DA 7458) 21 entries. The eventual destination of these entries is not known. George Road drains away from the logging area and it is assumed there is no effect.

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1.2 Lemercier Road (Ref DC 7596) - 2 entries on 25.9.78 with 30mm of rain in the preceding 3 days and 9.4.79 with no rain preceding entry. Lemercier Road drains into coupes 1, 2 and 15.

2. Amphion Block

2.1 Chadora Road. This road has remained as unrestricted access and passes through dieback. Adjacent coupes are therefore at risk mainly coupes 5, 7, 9 and 10.

2.2 Ref. CY 7112. Illegal entry recorded on 27.4.76 with no recorded rain in previous 7 days.

HYGIENE REQUIREMENTS - QUARANTINE PERMIT 3266B

This road construction programme inside the Amphion and Taree logging coupe is to be carried out exclusively under dry soil and dry weather conditions.

In the event of rain being received, all movement of plant and vehicles inside the designated quarantine area will have to cease until dry soil conditions again prevail, or when activity of P. cinnamomi in the soil is considered to be non-existent.

All plant and vehicles are required to be clean and free from dirt and mud prior to entering any of the aforementioned Quarantine area, and Permit holders are to strictly adhere to the following hygiene conditions :

1. Prior to departure, all vehicles and heavy plant will require washing down at the Dwellingup Wash-down Station, and then subjected to an F.D. officer inspection or alternatively if the vehicle or plant is considered clean, then only an F.D. officer inspection would be warranted.

2. Heavy machinery working on an operational basis across, or around, specific logging coupes will require a hygiene clean-up at designated wash-down points (as indicated on the attached plan) prior to moving across the boundary into the next logging coupe.

3. Heavy machinery operating through a demarcated dieback area will be subject to a thorough hygiene clean-up at the designated wash-down station before continuing over the dieback boundary to operate through a specified "green area".

4. Within the perimeter of the Amphion and Taree logging coupes, no other roads or tracks are to be traversed upon other than those designated on the attached plans.

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NOTE :

1. All wash-downs or other alternative cleaning operations are to be carried out in accordance with those standards required by the Forests Department.

2. With wash-downs using water, the fungicide Sodium Hypochlorite is to be added at concentrations specified by the Forests Department.

3. Other machinery cleaning operations includes b rush down with stiff broom or blowing off dust and dirt with an air compressor.