MANUAL OF LOGGING SPECIFICATIONS

For management of
Hardwood and Softwood Logging Operations
in the Southwest of Western Australia.

1st Edition 1 November 1987

2nd Edition 1 November 1989

3rd Edition 1 November 1990

DEPARTMENT OF
CONSERVATION AND LAND MANAGEMENT
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INTRODUCTION

The "Manual of Logging Specifications" contains detailed specifications necessary for the management of all logging operations, both hardwood and softwood, conducted on State forest and other Crown land under CALM control, in the three Forest Regions, the Wheatbelt Region and the South Coast Region. These specifications also apply to logging operations conducted by CALM on private property.

The Manual complements the Department's "Code of Logging Practice" (Nov. 1990 edition). Both documents form an integral part of all contracts between CALM and logging contractors to harvest and deliver log products, and of all forest produce harvesting or collection licences.

The Manual has been compiled by the Timber Production Branch of CALM and is updated annually, or more often if necessary, by arrangement between the Regional Managers of the three Forest Regions, Timber Production Branch and other Specialist Branch staff. Representatives of CALM-employed logging contractors are consulted as required during such updates.

Technical forestry terms used in the Manual are as defined in "Forestry Terminology in Western Australia", Technical Paper No. 1 by F.H. McKinnell, Forests Department, 1982.

A copy of the Manual should be available to every CALM officer involved in logging operations in the five Forest Regions and copies must be provided to all CALM-employed logging contractors. The Manual may also be sold to the public at $10 per copy.

This November 1990 edition incorporates, for the first time, rules and specifications applicable to softwood logging operations. In most cases, the rules governing softwood logging and hardwood logging are similar or the same. This Manual should therefore be read in this context. Where important differences exist, these are detailed in the Manual.

Any queries or suggestions for improvement to the Manual should be forwarded in writing to CALM's Timber Production Branch, Como, or the Regional Manager of the relevant Forest Region.

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SECTION 1 - PLANNING

SPECIFICATION 1.1 LOGGING PLANS

PART A - HARDWOOD

1. Responsibilities

Short and medium term hardwood logging plans are prepared by the Regional Inventory offices in the Northern and Central Forest Regions and by the Resource Planning Officer in the Southern Forest Region.

The plans are prepared for and on behalf of the Regional Manager.

Responsibilities for preparation of the long term integrated plan for hardwood logging is as stated above but the Regional Manager is the authority who is responsible for recommending the plan for approval by the Director of Forests.

In all cases, planners must produce fully integrated plans and consult with Regional staff, District staff, Specialist Branch staff and where relevant Timber Industry Representatives during plan preparation.

2. Plan Types

2.1 Long Term Integrated Plan

This is a strategic level (primary level) plan which at the time of preparation shows the most likely direction logging will take for the period of the plan.

Due to the long term nature of the plan (a minimum of 30 years) it is highly likely that circumstances will change during the plan period. Thus the plan should be considered indicative only.

One plan per supply area is produced and is completed by the end of the first week in May in the year of revision (at least once every 5 years).

Primary users of the plan are the Director of Forests, Managers Silviculture and Timber Production Branches, Regional Managers and logging planners.

2.2 Medium Term Integrated Plan

There is the secondary level integrated logging plan which shows in more detail the direction of logging over the next 7 years (NFR, CFR) and 7 to 12 years (SFR).

(Note shorter term medium term integrated logging plans may continue to be produced until sufficient staff time is available to produce the 7 & 12 year plans.)

One plan per supply area is produced and is issued by the end of the first week of September.

Primary users of medium term integrated logging plans are Districts, Regions, Inventory Branch, Timber Production Branch and logging planners. These plans shall contain the following information, as a minimum.

1. Contract of Sale details for each customer.

2. Regional summary of available resource.

3. Estimation of product yield in detail (show prescription area, production yield).

4. Silvicultural priority treatment status.

Maps:

1) a 1:250,000 (approx) plan showing approximate locations of proposed cutting areas for each year of the plan.

2) on 1:50,000 black plans show:

- name of block
- boundary of each logging year
- compartment number

Additional information should be shown as it becomes available eg., VRM zones, silvicultural status.

2.3 Short Term Integrated Logging Plan

This is the tertiary level integrated logging plan which shows in detail proposed logging areas over a 2 year period.

One plan per supply area is produced and issued during the first week of September in the Northern and CFR and the first week of January in the SFR.

Primary users of the plan are District staff, Regional staff, Timber Production Branch and Contractors.

These plans shall contain the following information as a minimum:

1) Contract of Sale details (ie., demand).

2) Predicted yield summary (gives a summary of the level of available resource by moist and dry soil categories and dieback).

3) Predicted yield details (gives level of available resource by moist and dry soil categories and dieback).

4) Reconciliation of Customer demand and Contractor commitments.

The plans shall show:

1) 1:250,000 overview plan showing the approximate location of all proposed logging areas for each year of the plan.

2) 1:50,000 block plan showing proposed logging boundaries and major access - also show CALM grid.

3) 1:25,000 plans showing:

Plan A - Operations plan

- boundary of proposed logging.
- moist soil logging areas (dieback - Jarrah areas).
- moist soil - no soil movement - logging areas (Jarrah areas).
- dry soil logging areas.
- CALM mapping grid.
- at least one major cross road.

- stream buffers if known; if not, streams to be highlighted and FOIC to determine stream order in field.
- VRM buffers as they become available.
- special care zones (eg., areas close to domestic dams - refer Section 4.1 of this Manual).
- research and inventory plots.
- strategic burning buffers.
- contours.
- areas previously cut over.
- no entry areas.

Plan B - Hygiene plan - Jarrah areas only

- secure dieback free.
- high potential risk.
- uninterpretable.
- not effectively quarantined.
- low potential risk.
- suspect.
- dieback.

Plan C - Predicted impact plan (formerly current impact) - Jarrah areas only

- low.
- moderate.
- high.
- very high.

Plan D - Landform/site vegetation - Jarrah areas only

- landforms as per system 6 study.
- vegetation site types as per field assessment by dieback interpreters.

Other plans may be used which show potential JSI areas, intensive inventory results.

3. Plan Amendment

Logging plans can only be amended by the logging plan officer. Amendments must be approved in writing by the Regional Manager.

4. Monitoring and Records

Logging cannot commence until an approved logging plan has been issued and CLM 109 has been signed by the Regional Manager (ref Part 6 of this Specification).

District staff must maintain up-to-date field records of areas cut over and silviculturally treated. This information must be ready when inventory officers visit Districts within one month of the close of the logging season (refer to revamped HOCS - issued from SOHQ on 14/8/90 and CLM 160 - Coupe silviculture report - Jarrah - refer Attachment 1.1.2).

5. Units of Cutting

The units of cutting in logging plans must conform to the following heirarchy :

i) Supply Area - specific name allocated by SOHQ
ii) District (if required) - specific name allocated by SOHQ
iii) Forest Block - specific name allocated by SOHQ
iv) Compartment - specific number allocated by Regional Inventory office
v) Coupe - specific number allocated by Regional Inventory office, or District Office if not already allocated
vi) Subcoupe or faller's block - specific name or number allocated by District.

6. Pre Operation Checklist

The pre operation checklist (CLM 109, Attachment 1.1.1) replaces the new outdated CLM 49B. This is the authority to ensure nothing is overlooked by planners or the FOIC. A minimum of one CLM 109 must be prepared for each forest block in which logging is planned.

Preparations for logging cannot commence until the relevant CLM 109 has been signed by the Regional Manager.

The planner completes and signs Part I of the form which is then issued with the logging plan to the FOIC. The FOIC completes and signs Part II of the form, returns it to the Regional Manager for his approval. The approved form is returned to the FOIC with a copy to the logging planner. Field operations may now commence.

7. Public Inspection

Short term plans are available for public inspection at relevant Regional and District offices. Plans are to be inspected in the presence of the FOIC and where relevant the District Manager (eg Collie) who will be available to answer any questions that arise.

Questions involving planning methodology should be referred to the Regional Manager.

Medium term and long term logging plans are available for public inspection at SOHQ - Timber Production Branch, or the relevant Regional office in the presence of the Regional Manager, R/L Operations or the logging planner.

In all cases inspections are by appointment only.

8. Field Plans and Checklists

In most operations it is necessary for the Forest Officer in Charge of the operation to prepare a checklist of work required in the field before and during logging, and to prepare a sketch diagram of the coupe (commonly referred to as a "blown-up HOCS sheet"). The sketch diagram is drawn sufficiently large to show the following information:

* individually numbered sub-coupes and/or faller's blocks.

* all access roads.

* all watercourses.

* all areas reserved from cutting.

* dieback hygiene boundaries.

* ridgelines.

* location of landings.

* major snig tracks.

* any other information considered necessary.

These sketch diagrams or plans are used to record the progress of cutting and extraction, and silvicultural treatment. The certification of completed logging areas (refer Spec. 4.5) should relate directly to these plans.

PART B - SOFTWOOD

1. Responsibilities

Softwood logging plans are prepared by Regions in consultation with Timber Production Branch, other specialist branches, and Districts.

2. Plan Types

Three levels of plans are produced:

2.1 20 year resource plan - a long term rolling plan, issued in January each year.

2.2 5 year plan - a medium term rolling plan issued in October each year. This plan includes landscape (VRM) considerations.

2.3 One year logging plan - issued in June each year. This plan details the following information

* areas to be cut
* cutting prescriptions (CLM 709 forms)
* reserve areas
* method of logging
* terrain information (flat, steep, winter, summer)
* contractor and customer information
* mill distances
* yield prediction

3. All cutting must be approved by the relevant Regional Manager.

4. The F.O.I.C. must discuss all proposed cutting areas with the relevant contractor's representative, and carry out joint site inspections prior to commencement of cutting.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
PRE-OPERATION CHECKLIST

Attachment 1.1.1

BLOCK/COMPARTMENT.....YEAR OF PLANNED CUT.....

OPERATION CODES(S)...../...../.....

THIS FORM MUST BE SIGNED BY THE PLANNER, THE FOIC AND THE REGIONAL MANANGER BEFORE FIELD PREPARATIONS FOR LOGGING COMMENCE

** PART 1 - REGIONAL PLANNERS RESPONSIBILITIES

ITEM	CHECKED YES/NO/NA	ACTION REQUIRED/IMPLICATIONS IF DO NOTHING
1).LAND TENURE State Land Tenure in comments column. Logging is permitted on State Forest, Timber Reserves & Executive Director Land.		
2).CONSERVATION 2.1 National Estate areas shown on plan. (Registered, Interim, nominated). No Logging in these areas without Executive Director Approval.		
2.2 Proposed Conservation Reserves in - CALM Management Plans - EPA systems Red Books - D.P.U.D Regional Plans No Logging		
2.3 Former M.P.A. buffer zones not included in 2.1 and 2.2		
3). SILVICULTURE 3.2 Silviculture Priority Plan referred to when preparing plan.		
4). ENVIRONMENTAL 4.1 River and Streams shown on plan		
4.2 Hygiene information shown on plan		
5). HIGHER LEVEL PLANS/CONTRACTS Plan checked against		
5.1 Timber Strategy Paper		
5.2 Long and Medium Term plans.		
5.3 Physically fragile areas		
5.4 Regionally held Contract of Sale list (eg. demand)		
6). E.P.A./W.A.W.A. 6.1 Catchment zone shown and restrictions on cutting listed.		
6.2 Gazetted catchments shown		
6.3 Harnessed catchments shown		
6.4 Salinity zone shown and restrictions on cutting listed		
6.5 Coupe size restriction listed and adhered to in plan.		
6.6 Do coupes conform to coupe dispersal requirements?		
7). AMENITY AND RECREATION 7.1 V.R.M. zones shown on plan.		
7.2 Recreation sites/walk trails.		

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
PRE-OPERATION CHECKLIST

ITEM	CHECKED YES/NO/NA	ACTION REQUIRED/IMPLICATIONS IF DO NOTHING
8). CULTURAL/ARCHAEOLOGICAL 8.1 Plan checked for aboriginal sites.		
8.2 Plan checked for European historical sites.		
8.3 Plan checked archaeological sites.		
9). SCIENTIFIC Locations of Research & Inventory plots noted, location of rare flora, endangered fauna noted.		
10) OTHER OPERATIONS 10.1 Mining plans checked		
11) LIAISON CHECK 11.1 During plan preparation did planners liaise with; District staff Regional Utilization Officer Regional Planning Officer Fire Protection Branch Silviculture Branch V.R.M. Planner Wildlife Branch Aboriginal site CALM contact		
11.2 Plan conforms with sensitivity management checklist.		
11.3 Draft Plan viewed by; a). Regional Manager and Planner b). Timber Production Branch c). Fire Protection Branch d). Silviculture Branch e). V.R.M. Planner		
11.4 Has Regional Utilization Officer prepared; a). Contract to Supply commitments (refer table 7.5). b). Logging Coupe Preparation priorities (refer table 7.6).		

Checks by logging plannner completed subject to the comments in the comments column and plan handed over to F.O.I.C.

..... LOGGING PLANNER

...../...../...../ DATE

** PART II - F.O.I.C. RESPONSIBILITIES

ITEM	CHECKED YES/NO/NA	ACTION REQUIRED/IMPLICATIONS IF DO NOTHING
1). CONSERVATION 1.1 National Estate Areas (check District sensitivity map and General Manager's sensitivity management matrix.		
1.2 Proposed Conservation Reserves - in CALM Management Plans - EPA systems Red Books - D.P.U.D. Regional Plans (check District sensitivity map and G.M. sensitivity management matrix)*		
1.3 Former M.P.A. buffers not included in 1.1 or 1.2 (*in 1.2 applies).		

ITEM	CHECKED YES/NO/NA	ACTION REQUIRED/IMPLICATIONS IF DO NOTHING
2). SILVICULTURE 2.1 Proposed logging areas checked for regeneration, seed trees, stand type (eg. shelterwood, gap etc).		
2.2 Silvicultural prescriptions for each stand type available?		
2.3 Cutting prescription prepared.		
2.4 Nominate officer responsbile for completing cutting and silviculture treatment and followup records (HOCS and CLM 160).		
3). ENVIRONMENTAL 3.1. Widths of river and stream buffer zones nominated and shown on logging plan.		
3.2 Disease boundaries demarcated in the field.		
3.3 7 Way Test completed and approved.		
3.4 Are soil erosion measures required?		
3.5 Are coupe size restrictions known? (if not refer to logging plan).		
3.6 Are special cutting prescriptions required (eg. if logging proposed low rainfall/intermediate zone, or catchment where normal prescriptions do not apply - gazetted & harnessed catch-ments).		
3.7 Coupe dispersal as shown in plan will be adhered to.		
3.8 Are there special care zones? (eg. slopes over 14 degrees).		
4). AMENITY/RECREATION 4.1 V.R.M. prescriptions available, understood and will be adhered to.		
4.2 Presence of recreation site, fragile areas, noted and considered during operational planning (includes special trees, fragile areas such as caves etc).		
4.3 Do neighbours need to be notified?		
4.4 Do local Shires need to be notified?		
4.5 Do local tourist committees need to be notified?		
4.6 Do local schools need to be notified (eg. school bus routes)?		
5). CULTURAL/ARCHAEOLOGICAL 5.1 Does local knowledge give rise to additional a). Aboriginal sites b). European historical sites (No logging in these areas)		
5.2 Do archaeological sites require protection?		

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
PRE-OPERATION CHECKLIST

ITEM	CHECKED YES/NO/NA	ACTION REQUIRED/IMPLICATIONS IF DO NOTHING
6). SCIENTIFIC 6.1 Position of Research plots noted (check with Research Branch if logging is permitted).		
6.2 Position of Inventory plots noted (check with required inventory office if logging permitted).		
6.3 Presence of rare, endangered or restricted flora checked.		
6.4 Presence of rare or endangered fauna checked.		
7). OTHER OPERATIONS 7.1 Logging compatible with a). mining b). your knowlege of public utility proposals (eg. dams, SEC lines, roads, Telecom). c). apiary sites/forest leases		
7.2 Advance burn required		
7.3 Roading - new, upgrading, closures required		
7.4 All weather/dry access requirements defined and demarcated on plan.		
7.5 Wash down points nominated		
8). ADMINISTRATION 8.1 Nominate the Officer who has to prepare the CLM 709.		

Checks by F.O.I.C. completed and operation

in .....block/cmpt is recommended

for approval.

....

F.O.I.C. DATE

Return to Logging Planner by Sept 30 (N & CFR), January 30 (SFR) for dry soil operations and by Dec 30 (N & CFR), Feb 28th (SFR) for moist soil operations.

I have reviewed the comments on this checklist and approve the commencement of operations in ..... block subject to the comments below:

.....

.....

.....

REGIONAL MANAGER

...../...../.....

DATE

RETURN SIGNED COPY TO FOIC & LOGGING PLANNER
FIELD PREPARATIONS MAY COMMENCE

COUPE SILVICULTURAL REPORT - JARRAH

A. DESCRIPTION

1. District _____ 5. Catchment Zone _____
2. Forest Block _____ 6. Catchment Name _____
3. Compartment No. _____ 7. Land Use Priority _____
4. Coupe Nos. _____ 8. Seven Way Test No. _____

Proposed cutting year _____

Proposed cut over area _____ha

Cutting will/will not continue in this coupe next year.

B. FOREST CONDITION PRIOR TO HARVESTING

1. Cutting history _____

_____

_____

_____

2. Forest Condition and Structure (Tick the categories which describe the forest before harvesting)

virgin	[ ]	overstocked	[ ]
uniform	[ ]	overmature	[ ]
grouped	[ ]	mature	[ ]
even aged	[ ]	regrowth	[ ]
Other - specify		disease affected	[ ]
_____		insect affected	[ ]
		Other - specify	[ ]

3. Status of Regeneration

Regeneration survey required YES / NO

Stocking _____SPH over _____% of area

Survey results _____

_____

4. Comments _____

_____

2

C. IMPACT ON HARVESTING

1. Silvicultural Objective (refer to Silviculture Specifications Manual)

_____

_____

_____

_____

_____

_____

2. Achieved as the result of commercial operation (see HOCS Print 10)

OBJECTIVE	AREA*
Gap creation	
Shelterwood #	
Thinning	
Selection	
No cutting - poor forest	
- uncut strips	
Other	
TOTAL	

Retained crop trees_____ m^2/ha.
(show a range)

* - To nearest 10 ha.

- Buds ARE/ARE NOT plentiful.
- Capsules ARE/ARE NOT plentiful.

D. PRODUCT INTEGRATION

Products as defined for hardwood log delivery note (CLM 823).
Enter volume per hectare.

Product	JSL	JSV	JUR	MSL	MSV	MCH						
Removed												
Available*												

* Where products are present in commercial quantities and are available (ie. not retained as crop trees) but have not been removed due to the lack of a market.

Comments: eg. Product on landing; Poles in NE corner: _____

E. FOLLOW-UP TREATMENT

Required ⟶	Area	Due Date
Completed ⟶	Area	Date

NOTE: This report relates to the required follow-up treatment shown on HOCS print 10. It is to remain in the Current Operations File until all treatment has been completed. Copies of interim annual reports are to be initialled, dated and retained to ensure that areas are not duplicated.

MARKING OBJECTIVE	TOTAL AREA	NIL	CULL/ THIN	SEEDING	SOIL DISTURB.	REGEN. BURN	CULL BANKSIA			
Gap creation					X					
Shelterwood			X							
Full thinning				X	X	X				
Individual crop tree release*				X	X	X				
No cutting										
Other										
TOTAL Required										
TOTAL Completed										

Other work required: _____

_____

* Residual stocking of crop trees _____ S.P.H.

	Initial	Date
Interim Report:		
Final Report:		

4

F. PROTECTION AND BURNING REQUIREMENTS

Shelterwood burning for existing seed best in _____

Tops burning required before _____

Protection from fire will be required at least until _____

G. POST BURN SHELTERWOOD ASSESSMENT

Date of burn _____ Date of Assessment _____

Stocking standard _____%

Actual stocking _____%

Predominantly seedlings/ground coppice/sapplings

	Y/N	WHEN
Further treatment required: Seeding/Planting		
Coppicing		
Create gaps		

H. CERTIFICATION

Treemarkers: _____ Date _____

_____ Date _____

Master Burning Plan amended: Date _____

Protection Officer _____

Treatments noted: Silviculture Officer _____

DISTRICT MANAGER/FOIC: _____ Date: _____

When all follow-up treatment has been completed this report is to be placed on the District HOCS Record File together with a 1:12,500 scale print showing the work done. A copy of the report and print is also to be given to the regional Inventory officer who visits at the end of the logging year. Until all work has been completed the report and HOCS print is to be retained in the Current Operations File. Initialled and dated interim reports are to be given to the Inventory officer annually.

SECTION 1 - PLANNING

SPECIFICATION 1.2 SEVEN WAY TESTS

1. The document "Operational Instructions for Dieback and Logging" (formerly Policy Statement No. 3, see Attachment 5.1.1) requires that, before the commencement of any operation in jarrah forest that has the potential to introduce or spread Phytophthora species, the risk is assessed by means of a "Seven Way Test". If the operational arrangements fail the Test then the operation cannot be started.

2. Guidelines for the preparation of Seven Way Tests are contained in "The Seven Way Test and Guidelines to its Use" (1990). The Seven Way Test evaluates the following seven factors of a proposed operation.

   * proposed activity
   * vegetation/landform type
   * land use
   * risk of introduction, spread, intensification
   * hazard
   * consequence of infection
   * hygiene required.

3. Seven Way Tests must be prepared for any proposed roadworks or logging operation. Seven Way Tests must be prepared by Districts in conjunction with the preparation of data for the first two years of the five year (or four year) logging plan.

4. The activity eg. roading and/or logging operation covered by an individual Seven Way Test should correspond to a discreet area. Such an area may correspond to a whole forest block, an individual compartment within a forest block, or a smaller area.

5. A Seven Way Test is prepared using form CLM781 and must include accompanying plans at scale 1:50,000 or larger. Attachment 1.2.1 is an example of a completed Seven Way Test on form CLM781 (excluding the maps that would accompany this test).

6. The levels of authority required to approve Seven Way Tests on different areas of forest are detailed in Administrative Instruction No. 46 (24/9/90). (See Attachment 1.2.2)

7. Attachment 1.2.3 is a guide to assist in assessing the level of consequences in a Seven Way Test.

Attachment 1.2.1

Note: this is example only. this form will be available for use early in 1991. Feedback on suitability of this amended form should be directed to Env. Prot. Bunbury. Old forms may be used until new form available.

SEVEN -WAY TEST AND HYGIENE PRESCRIPTION

EXAMPLE ONLY

DISTRICT MANJIMUP TEST NO 5/90 DATE: 3/3/90

THE PROPOSED ACTIVITY

THE PURPOSE AND LOCATION

Construction and upgrading of roads to facilitate logging of Barlee Block - Coupes 2, 3.

INITIATED BY: R. Roopaw MJF District.

TYPE AND EXTENT OF ACTIVITY (STATE AREAS/DISTANCES/INTENSITY): ATTACH MAPS

Clear, form and gravel 6km of arterial haul route - clearing width 10m.
gravel surface 8m.

Clear form and gravel 28.5km of in-coupe roads - clearing width 5m
- gravel surface 4m.

Clear win load and cart gravel - dieback for roads in dieback = 17911m^3
- dieback free for roads in dieback free = 9688m^3

ALTERNATIVE STRATEGIES CONSIDERED ? YES/~~NO~~

LIST THOSE CONSIDERED AND REASONS FOR REJECTION

1. Roading with direct access to resource - too much high profile roading with subsequent increase in areas put at risk.
2. Use existing road network with minimal construction of new roads - rejected as for 1. above.
3. Do not log - reduction in resource as allocated, Timber Strategy not implemented. Operating in other areas without hygiene info is not an option.

LAND USE

TENURE:
MANAGEMENT PURPOSE / ZONE:

VALUES	YES	NO	COMMENTS (Note secondary uses here)	# CONSEQUENCES OF INFECTION
CONSERVATION - ECOLOGICAL	✓		Habitats modified temporarily by logging.	Habitats may be lost. Species may be lost.
- CULTURAL		✓	No evidence in Heritage FMIS	Nil.
PRODUCTION - TIMBER	✓		Primarily a timber production area other potential uses of equal importance.	Some areas loosing increment due to disease already. Protect all other areas.
- WATER	✓		Barlee Brook not harnessed but used by rural dwellers for domestic purposes	Loss of quality Barlee Brook.
PROTECTION - HARNESSED CATCHMENT		✓	As above.	
- RAINFALL ZONE	✓		High rainfall zone - no salt problem.	High rainfall conducive to disease survival & spread.
RECREATION	✓		Area not presently used. Vasse Hwy & Dickson Rds previously infected	Further infection may cause loss of visual aesthetic and other recreational values for future use.
SCIENTIFIC - RESEARCH		✓	Not currently used for research.	Loss of benchmark of native uninfected forest ecosystem.
- EDUCATION		✓	Not currently used	
LANDSCAPE	✓		Views to scarp from Vasse Hwy and west.	Habitats, species lost major changes to views and vistas especially near scarp
OTHER - SPECIFY	✓		Part of State's remaining CO_2 sink.	Loss of CO_2 absorbing capacity of forest.

Guidelines for the assessment of consequences of infection are contained in Section 4 & 5 of the Guidelines for the Use of 7-Way Tests 1990.

HYGIENE PRESCRIPTION

DIEBACK MAPS: 230mm ☑ Ground Survey ☐ | 70mm ☐ Spacing ☐ | Roads & Creeks ☐ Not Available ☐

MAP QUALITY Accurate ☑ | Doubtful ☐ | Inaccurate ☐

DATE PREPARED / VERIFIED Feb 1990

DEMARCATION CATEGORIES (From Section 5)

Secure dieback free ☑ | LPR ☑

Dieback ☑ | HPR ☑

Suspect ☑ | Uninterpretable ☑

Not Available ☐ | NEQ ☑

SOIL CONDITIONS (From Section 5) Show areas on plan

DRY SOIL ☑ | MOIST WITH NO SOIL MOVEMENT ☐ | MOIST SOIL ☐

ACCESS ROUTES Show on plan

DRY – Access to dieback areas on existing tracks within dieback ~~MOIST~~ is approved.
. Access to all other areas upon washdown between hygiene categories and subcatchments.

OPERATIONAL SEGREGATION — DETAILED METHOD

- Sub- catchment segregation ☑ Yes for road construction.
- Split phase in time ☑ Yes for dieback free gravel pit
- Physical separation ☑ Yes for dieback free gravel pit.
- Not Applicable ☐

VEHICLE CLEANLINESS All vehicles and machinery to be cleaned when traversing hygiene boundaries and subcatchments except when totally in dieback.

SUPERVISION Forest officer and Contractor representative

WORKING ARRANGEMENT DOCUMENTS

MANAGEMENT PLAN ☑ | JOB PRESCRIPTION ☐

INTERIM PROTECTION PLANS ☐ | MANUAL OF HARDWOOD LOGGING ☑

DIEBACK HYGIENE MANUAL ☑ | OTHER (Specify) ☐

DRA PERMIT REQUIRED YES ☑ NO ☐

PERMIT NUMBER 1234 | EXPIRY DATE 6/6/91

MONITORING ARRANGMENT - No formal arrangements. Comparison of dieback distribution will be made at time of next mapping.

HAZARD, ACTIVITY, HYGIENE, CATEGORY, RISK - SUMMARY OF AREAS

ACTIVITY	EXTENT ha / km	HYGIENE CATEGORIES	EXTENT ha / km	AREA PUT AT RISK	VEGETATION LANDFORM	EXTENT ha	HAZARD RATING	SOIL CONDITION
Clear form and gravel haul route.	6 km	Dieback	3.2 km	N.I already infected	Mungardup	already	High	Dry
					Hester	infected	Low	Dry
					Stream 1		Low	Dry
		Uninterpretable	1.8km	24 ha	Hester	24 ha	Low	Dry
		H.P.R	1.0 km	already @ risk	Valley 2+3	N/A	Low	Dry
Clear form and gravel in-coupe roads (continued next page)	28.5 ha	Dieback	19.2 km	Nil	Mungardup		High	Dry
					Hester	N/A	Low	Dry
					Stream 1	already	Low	Dry
					Valley 2+3	infected	Low	Dry
					Angove		Low	Dry
		S.D.F.	4 km	32 ha	Hester	20 ha	Low	Dry
					Angove	4 ha	Low	Dry
					Stream 1	6 ha	Low	Dry
					Valley 2/3	2 ha	Low	Dry
TOTAL	/		TOTAL	/				

HAZARD, ACTIVITY, HYGIENE, CATEGORY, RISK - SUMMARY OF AREAS

ACTIVITY	EXTENT ha / km	HYGIENE CATEGORIES	EXTENT ha / km	AREA PUT AT RISK	VEGETATION LANDFORM	EXTENT ha	HAZARD RATING	SOIL CONDITION
Clear form and gravel in coupe roads (continued from previous page).		Uninterpretable	3 km	22 ha	Stream 1	13 ha	Low	Dry
					Valley 2+3	9 ha	Low	Dry
		LPR	1 km	10 ha	Stream 1	8 ha	Low	Dry
					Valley 2+3	2 ha	Low	Dry
		HPR	6.5 km	65 ha already @ risk	Stream 1	5 ha	Low	Dry
					Valley 2+3	60 ha	Low	Dry
Clear win lead gravel	3 ha	SDF	1 ha	N.I - dieback below	Hester	1 ha	Low	Dry
		Dieback	2 ha	N.I already infected	Hester	2 ha	Low	Dry
TOTAL	34.5 km 3 ha		TOTAL	153 ha				

EVALUATION

LEVEL OF APPROVAL REQUIRED REGIONAL MANAGER

APPROVALS AND RECOMMENDATIONS:

Signature & date

DISTRICT MANAGER 1/4/90 B Cadswallop

REGIONAL MANAGER 1/4/90 F. Archsouth.

DIV. MANAGER OPERATIONS

MANAGER ENVIRONMENTAL PROTECTION

DIRECTOR NATIONAL PARKS

DIRECTOR NATURE CONSERVATION

ALTERATIONS AND ENDORSEMENTS:

Signature & Date

Washdown pads to be controlled regards effluent runoff.
Inspection of washdown effectiveness to occur 2 times weekly.
Rainfall records of area to be recorded and filed
in operation file.

1/4/90 B Cadswallop.

DEPARTMENTAL PROCEDURES FOR THE APPROVAL OF 7-WAY TESTS

The table below sets out the Approving Officer for the 7-Way Tests applicable to the various tenures of land managed by the Department of Conservation and Land Management.

A Policy decision may still be required for certain 7 way tests for operations without precedent or having unusual circumstances. Examples would be where other agencies are concerned, where several districts or regions are involved such as SEC line maintenance projects, large scale mineral exploration proposals, or projects considered to pose severe hygiene risks.

Such proposals will still be referred by the Regional Manager to Environmental Protection Branch. Approval will either be given by the Manager, Environmental Protection Branch or, where appropriate, referred to the Corporate Executive.

District Managers should encourage staff to consider the 7-WAY TEST as a check list for all forest operations involving a hygiene risk. This does not mean that a written 7-WAY TEST is necessary in every case where established hygiene guidelines and prescriptions are available for routine operations. However, the guidelines and working drafts should be used as a training medium and be filed for future evaluation.

Regional Leaders (Environmental Protection) and Environmental Protection Branch staff will still be available to provide guidance, training and as a point of referral in the first instance.

This decision to delegate authority must not be taken to imply any relaxation of hygiene standards for operations on CALM land.

(Administrative Instruction No. 46 24 Sept. 1990).

Area Involved	**Approving Officer**	**Remarks**
1. State Forest outside Disease Risk Area.	District Manager	Separate file to be kept at District office for perusal by R/L Environment Protection and/or Environment Protection Branch Staff.
2. State Forest within Disease Risk Area.	Regional Manager (Recommendation by R/L Environmental Protection)	Separate file to be kept at Regional office for perusal by Environmental Protection staff or Policy Review Group
3. Parks and Reserves or any area where timber production is not a priority land use:		
3.1 Existing programs	Regional Manager	Kept on same file as 2 above.
3.2 New programs	District Manager	

SEVEN WAY TESTS
GUIDELINES FOR ASSESSMENT OF LEVEL OF CONSEQUENCES

Three factors need to be taken into account when making an assessment of levels of consequence for a Seven Way Test. They are:

1. Risk of introduction/spread.
2. Hazard
3. Land use.

They can be expressed as a factorial equation,

ie: level of consequences = f (risk) (hazard) (land use) (Acceptable/Unacceptable)

Assessment of Factors

1. Risk: rate as - very low, low, high, very high.

   Very Low: dry soil, 230mm maps, hygiene
   Low: moist soil, 230mm maps, hygiene
   High: moist soil, no 230mm maps, hygiene
   Very High: moist soil, no 230mm maps, no hygiene.

2. Hazard: rate as low, moderate, or high, on vegetation types or landforms. Refer to 7-Way Test Guidelines for categories.

   Low: few species susceptible, some individuals killed
   Moderate: most species susceptible, some individuals killed
   High: most species susceptible, most individuals killed.
   (see Seven Way Test Guidelines - Impact)

3. Landuse: rated as low, moderate, high.

   Low: water production
   Moderate: timber production, recreation
   High: catchment protection

   Secondary landuses must also be considered.

Examples of Acceptable Factorial Equations are:

Case 1: dry soil, all vegetation types, any land use.
L of C. = (very low) (low-high) (low-high)

Case 2: moist soil, lower impacting vegetation, any land use.
L of C. = (low) (low-moderate) (low-high)

NOTE: for moist soil operations in forest not infected with dieback, good maps and maximum hygiene are required.

Summary

Whenever a Seven Way Test is drawn up it is recommended that this method of assessment is attempted. A rough guideline is:

i) when risks are rated as very low or low, levels of consequence are only acceptable if hazard is rated as low or moderate, and

ii) when risks are rated as moderate or high, levels of consequence are only acceptable if hazard is rated as low, eg. in Karri forest types.

Specification 5.1 will help to determine acceptable operation constraints.

SECTION 1 - PLANNING

SPECIFICATION 1.3 ISSUE OF QUARANTINE ENTRY PERMITS

1. No vehicle, truck or logging machine may enter a quarantine area (Disease Risk Area) without a permit signed by a Forest Officer. This includes vehicles and trucks driven by CALM personnel.

2. All vehicles/machines operating inside a quarantine area must carry a quarantine entry permit at all times, and be prepared to show the permit to a Forest Officer on demand.

3. In situations where a number of vehicles/machines, belonging to or associated with a single logging contractor, need to enter a specific quarantine area, the local CALM District may issue a single quarantine entry permit to that logging contractor. A copy of this permit must be kept in every vehicle/machine, belonging to or associated with that logging contractor, that enters the quarantine area.

4. The driver or operator of every vehicle/machine entering quarantine under permit must be familiar with the conditions printed on the permit document.

SECTION 1 - PLANNING

SPECIFICATION 1.4 ROADING PLANS

PART A - HARDWOOD ROADING

1. The responsibilities for planning of hardwood forest logging roads are included in the listing of "Responsibilities for Logging Roads" below :

RESPONSIBILITIES FOR LOGGING ROADS

TASK	RESPONSIBILITY OF	ACTUAL WORK DONE BY	IDEAL TIMING
1. Planning 1.1 Nomination of strategic road alignments, after considering other roading requirements (eg. recreation, fire control, disease)	Regional Manager	Regional Roading Officer, after discussion with relevant District, Timber Production Branch, Environmental Protection Branch and logging/haulage contractor	Logging Year minus 2
1.2 Nomination of "in coupe" road alignments	District Manager	Roading contractor and District Manager	Logging Year minus 1
1.3 Nomination of class of roads (ie, major or minor) and whether roads are for (i) dry soil haulage only or (ii) all weather haulage, during consideration of overall logging plans	Regional Manager liaising with District Manager and logging/haulage Contractor	As in 1.1	Logging Year minus 1
2. Writing of standard roading specifications, ie, clearing widths, gradients, cambers, super-elevations drainage, hygiene, etc	Regional Manager	Regional Roading Officer, after consultation with logging contractors and experienced CALM staff	Logging Year minus 2
3. Selection of final road alignments in field	District Manager with Contractor	Contractor assisted by District staff with assistance from Regional Roading Officer	Logging Year minus 1
4. Nomination of gravel sources	District Manager	Road Contractor with assistance from District staff	Logging Year minus 1

TASK	RESPONSIBILITY OF	ACTUAL WORK DONE BY	IDEAL TIMING
5. Preparation of annual timetable for roadworks, including timetable for calling of tenders. Works to be combined or split as required in interests of efficiency	Regional Manager in consultation with Manager Timber Production Branch	Regional Roading Officer in consultation with District & Regional Managers.	Logging Year minus 1.5
6. Preparation of documents for calling of tenders	Manager Timber Production Branch	Timber Production Branch Contracts Officer	Logging Year minus 1.5
7. Approval of tender documents and advertising	Director Operations Division OR Regional Manager (as per circular 10/88)	Director Operations Division OR Regional Manager (as per Contract Tender Circular 10/88)	Logging Year minus 1.5
8. Awarding of tenders	As above	As above	Logging Year minus 1.5
9. Progress checking of work to ensure conformity with environmental aspects and Engineering standards	Regional Manager District Manager	District staff with assistance from regional or specialist staff as required	Logging Year minus 1 (All operations under dry soil)
0. Measure completed works, sign dockets authorising progress payments	District Manager	District staff	Logging Year minus 0.5
1. Checks on road work quality	District Manager	Regional Roading Officer	Logging Year minus 0.5
2. Road Maintenance	District Manager	Either Maintenance Contractor or CALM operations	Logging Year (Dry soil)

2. The relevant Regional Logging Planning officers are responsible for the preparation of rolling Short term (two year), Medium term (five year) and Long term (15 year) roading plans for each supply area :

2.1 Short Term Plan - on 1:25,000 scale, showing incoupe roading requirements.

2.2 Medium Term Plan - on 1:50,000 scale, showing major haul road requirements.

2.3 Long Term Plan - on 1:100,000 scale, showing likely requirements for major haul roads.

PART B - SOFTWOOD ROADING

1. Roading for softwood logging must be integrated with roading for hardwood logging whenever possible. Thus the principles in Part A of this specification will apply where applicable.

2. In addition, each District is responsible for the preparation of an annually updated five year programme of proposed road construction together with estimated costs. This plan must be prepared after consultation with the Regional Senior Forester, Softwood Logging. The plan will generally be based on the expectation that logging roads will be required for the first thinning of plantations when they reach 12 years of age.

3. After preparation of annual roading plans, the Regional S/F Softwood Logging and the Regional representative will amalgamate the Districts' submissions and set priorities for work to be done, up to the level of finance available each year.

Each Region will then submit its proposal to the Senior Procurement Officer - Softwood for setting of priorities and inclusion in annual estimate preparation.

4. Approved road works will normally be carried out by contractors. The FOIC must ensure that contractors are given adequate time and that specifications for the work comply with standard instructions for road contracts. A higher standard is required for roads required for winter use. For details on softwood plantation road standards refer to Section 5 of the Pine Management Guide.

5. Whenever possible, roadworks should be completed one winter prior to proposed logging activities. If it is necessary for roads to be used for winter operations immediately after completion, logging operations must then be planned so the road is "run in" by log trucks. Any weak spots exposed, prior to the onset of winter rains, will then need to be strengthened.

SECTION 2 - ROAD CONSTRUCTION AND MAINTENANCE

SPECIFICATION 2.1 SELECTION OF LOG HAUL ROUTES

PART A - HARDWOOD

1. The responsibilities for planning of log haul routes is covered under Spec. 1.4. Using this information, and subject to Seven Way Tests, the precise alignment of proposed logging routes is determined.

2. Guidelines to be followed in selecting logging routes include:

   * use low profile roads

   * avoid stream reserves, except for stream crossings

   * avoid new roading unless required to protect dieback-free forest

   * use roads in dieback-affected forest in preference to roads in dieback-free forest. Where roads in dieback-free forest must be used, minimise the crossing of dieback categories and minimise the areas of forest placed at risk.

   * where consistent with dieback hygiene practices, and economics, use systems of one-way roads.

3. The exact responsibility for the exact alignment of proposed new roads is covered under Spec. 1.4.

4. In instances where proposed new roads intersect Shire or MRD roads, Shire or MRD engineers must be consulted.

PART B - SOFTWOOD

Refer to Section 5, Pine Management Guide ("Engineering").

SECTION 2 - ROAD CONSTRUCTION AND MAINTENANCE

SPECIFICATION 2.2 ROAD CONSTRUCTION

PART A - HARDWOOD

1. The responsibility for road construction lies with CALM. The actual work of road construction is done by companies contracted to CALM.

2. Road construction should take place in dry soil conditions only.

3. Standard Specifications for new roads and upgrading of existing roads are listed in the table below.

   (Note: these specifications may be subject to amendment or alteration in particular roading tenders or particular areas of the South West.)

	Major Haul Roads		Other Roads Including InCoupe Roads	
	For dry soil use	For moist soil use	For dry soil use	For moist soil use
Minimum Clearing width	14m	14m	7m	7m
Road Formation width	8m	8m	4m	4m
Gravel thickness	Nil or as required	min 15cm	Nil or as required	min 15cm
Culvert spacing	see (a) next page	see (a) next page	see (a) next page	see (a) next page
Culvert size	see (b) next page	see (b) next page	see (b) next page	see (b) next page
Table drain depth	20cm	20cm	10cm	20cm
Major stream crossings	See (c) next page	See (c) next page	See (c) next page	See (c) next page
Off-shoots	See (d) next page	See (d) next page	See (d) next page	See (d) next page
Maximum grade	7^{o}	5^{o}	10^{o}	8^{o}
Curves - recommended radii should be > (m)	350	200	350	200
Design speed km/hr	80	60	80	60

	Major Haul Roads		Other Roads Including InCoupe Roads	
	For dry soil use	For moist soil use	For dry soil use	For moist soil use
Stopping Sight Distance to object (from 1.15m eye level to 0.2m object) (m)	115	75	75	115
Stopping Sight Distance to another oncoming vehicle (from 1.15m eye level to 1.15m object) (m)	160	150	160	150
Sight Distance to intersection (from 1.15m eye level to 1.15m object) (m)	175	115	175	115

(a) Culvert Spacing:

Culvert spacing depends on:

* grade
* erodibility of soil type
* catchment size
* time of concentration
* return period used in design.

The programme "Drainman" is available to all Districts and can be used to calculate culvert spacing and size for various situations. The table below is a "rule of thumb" approximation that can be used. It should be applied cautiously particularly on highly erodible soils.

Slope	On lateritic gravels	On all other soils
0 - 2°	As Required	As Required
3 - 5°	100m	100m
6 - 10°	50m	50m
11 - 15°	30m	30m
16° +	15m	15m

(b) Culvert size:

* The size of culvert required depends on the anticipated peak flow which is dependent on design return period, rainfall intensity and duration, and time of concentration. Time of concentration is dependant on catchment size and cover conditions and the amount of water already stored in the soil (field capacity). It must also be remembered that under full flow conditions culverts will only run at 1/3 of full capacity due to vacuation at the outlet end.

  The programme "Drainman" is available to all Districts and can calculate the culvert size required in various circumstances. The table below is a "rule of thumb" developed for fully forested catchments and should be applied with caution.

Pipe Diameter (mm)	**Maximum Catchment Size (ha)**
300	36ha
375	56ha
450	80ha
600	144ha
750	244ha
900	324ha

(c) Major Stream Crossing:

* Must be constructed with pipes or a bridge with a minimum design period of 1:50 years. Full earth/log fills are not permitted.

* Borrow areas must not be located within river or stream reserves.

* Water from borrow areas must be directed into silt trap or vegetative filter.

* Fill must be consolidated to minimise erosion of loose soil and risk of slumping.

* Embankments must be left rough surfaced or corrugated and at an angle at least equal to the natural angle of repose for the soil type (see also (e) below).

* Machine activity in the watercourse and disturbance of stream vegetation must be minimised.

* No heaps of debris to be created within 40m of watercourse.

* A compacted, gravel pavement must be created on both sides of a stream crossing (In some specific instances this may have to be sealed.)

(d) Off-Shoots:

* Off-shoots must be $< 1.5^{o}$ fall.

* Off-shoots must be sufficient in number to prevent table drain erosion. Spacing is the same as for culverts [see (a)].

* Off-shoots into dieback-free forest must be approved by the FOIC. These off-shoots should be at the lowest point in the topography.

* Off-shoots must have a level sill outlet into a vegetation filter strip or silt sump, so that water is not directed immediately into a stream.

* Care must be taken when locating off-shoots near stream zones, to ensure adequate vegetation filter to prevent stream siltation.

(e) Cut and Fill Slopes:

The gradient of cut and fill slopes will depend upon the soil type and the amount of established plant growth beside the area to be regraded. The reasons for sloping these banks are:

- to control erosion by minimising soil movement on the slope;

- assist the establishment of new plant cover;

- to make the grade alteration appear as natural as possible.

The following tables are offered as a guide to **maximum** cut and fill slopes. More gentle slopes are desirable.

CUT SLOPE

Material	**Maximum Slope (%)**
Sand	50
Wet clay, loose gravel	66
Loam, ordinary clay	100
Firm tough soil, compact gravelly soil, towards road, tight cemented gravel	133
Solid well-bedded rock	Vertical

FILL SLOPE

Material	**Maximum Slope (%)**
Loose sand and soft clay	25-50
Ordinary earth	66
Loose rock	80
Hand placed rock filling	100

$$\left(\text{Slope \%} = \frac{\text{rise}}{\text{distance}} \times \frac{100}{1}\right)$$

Where there is doubt about the stability of a proposed cut or fill, engineering advice should be sought.

The shoulders of cut and fill slopes should be rounded off so that the profile appears a natural as possible.

4. All road clearing debris must be neatly heaped in natural gaps alongside the road, at distances not less than 5m from crop trees, and burnt in suitable weather conditions.

5. The location and use of gravel pits must be approved by the FOIC. Gravel for use on roads in dieback-free forest must be obtained from uninfected gravel pits. Small stockpiles of suitable road surfacing materials should be established at the time of construction for later use in areas likely to cause problems and for gravel road maintenance.

6. If, during road construction, water is required to settle dust or bind the road surface, such water must be treated with sodium hypochlorite at the rate of 1:2000. (See also Specification 5.1, paragraph 3.4).

7. New gravel should be compacted with a vibrating roller prior to use by log trucks.

8. Road signposting must meet the requirements of the TIR Act and conform to MRD and CALM sign manual standards.

9. Road names must be approved by the Department's Geographic names Committee.

10. Appropriately timed rare and endangered flora and fauna surveys must be consulted as advised by specialist CALM staff.

PART B - SOFTWOOD

1. As with hardwood operations, the responsibility for road construction lies with CALM. The actual work of road construction is done by companies contracted to CALM.

2. Standard softwood plantation road specifications are detailed in the Engineering Section of the Pine Management Guide.

SECTION 2 - ROAD CONSTRUCTION AND MAINTENANCE

SPECIFICATION 2.3 ROAD MAINTENANCE

PART A - HARDWOOD

1. The responsibility for strategic road maintenance resulting from normal wear and tear lies with CALM. The actual road maintenance work may be done by companies contracted to CALM.

2. The cost of any necessary road maintenance resulting from unwarranted damage to roads will be borne by the road user, and may be recouped from the user, as decided and directed by the Forest Officer in Charge.

3. Road maintenance, using earth moving machinery, must conform with an approved 7 Way Test. Only dieback-free gravel may be used, in dieback-free forest.

4. A road that deteriorates suddenly should not be used until repairs are effected. By-passes must not be constructed to avoid boggy sections of road.

5. A failure in a wet weather road resulting in road closure should be investigated by CALM and relevant Contractor personnel to ascertain the cause and prevent repetition if possible.

6. Roadside scrub clearing must be carried out according to TIR Act requirements.

7. All roads must be pegged for dieback before any maintenance operation begins.

8. The edge windrow of gravel resulting from maintenance grading operations must be broken frequently to allow water entry to table drains, off-shoots, culverts or intacted vegetation.

9. All roads not in use should be signposted as being closed - particularly dry soil access roads.

PART B - SOFTWOOD

1. Each District is responsible for the maintenance of roads used by the logging contractor, (except for contracts prior to 1987). After discussion with the Regional S/F Softwood Logging each district must plan the timing of work and extent of maintenance to be done. For contractors responsible for their own maintenance, the District must advise which all weather logging roads require maintenance.

   (i) At the completion of the logging operation, the roads must be returned to the same condition as prior to logging commencing.

   (ii) This maintenance will generally consist of the removal of logging debris from the road and drains, grading the road; repair of culverts damaged during logging and limited patch gravelling where required.

(iii) Where applicable, (Contract 84/P1) it is not intended that the contractor be responsible for major reconstruction type work, particularly if the road was not initially handed over in "all weather" condition. Where logging is being carried out in a number of Districts concurrently, the contractor may not always be able to maintain all the roads in the ideal condition for each District. Nevertheless, if maintenance is unduly delayed, pressure must be exerted by the District concerned. If all else fails, the work may be carried out by the Department and charged to the contractor. This is an extreme step, and the concurrence of the Regional S/F Softwood Logging must be obtained prior to such work being carried out.

(iv) Prior to commencement of each logging operation, roads to be used for logging should be graded by the Department (if necessary), and any repair work required carried out.

2. Pine logging roads must not remain impassable for any extended period. The logs must be removed immediately, and debris or road damage of a major nature should be removed or repaired so the road is trafficable. This is of particular significance during the fire season.

3. Major through roads must be kept open at all times during the fire season. Logging along these access roads during winter will help to achieve this. It is the responsibility of the FOIC to inform the fire duty officer of any roads which are impassable and to ensure alternative through access exists and is known.

4. As many hill plantations are adjacent to dams and reservoirs, or follow major watercourses, timing and the extent of road maintenance are most important. Free water tends to accumulate on and near roads and may increase after logging. One aim of planning logging operations in general, and road maintenance in particular, is to slow the movement of water and dissipate it through the plantation, in order to reduce turbidity.

   Logging debris is an ideal filter, and the aim should be to divert water into the plantation by spoon drains across roads, etc. Debris can be left in drains for a period immediately after logging, but culverts must be clear and exit into logging debris where possible.

5. Traffic control signs must be displayed along log hauling routes as required by the FOIC or the TIR Act Inspectors. All signs must conform with MRD standards.

6. The contractor will, as a matter of course, heap up a considerable amount of logging debris on adjacent firebreaks. Close liaison and discussion with the contractor will ensure this is done in a manner which assists future protection requirements.

SECTION 2 - ROAD CONSTRUCTION AND MAINTENANCE

SPECIFICATION 2.4 GRAVEL PIT SELECTION WORKING AND REHABILITATION.

Note: The term "gravel" also applies to other basic raw materials such as sand, limestone and quartz.

1. The use of existing or new gravel pits for logging road construction and/or maintenance must be approved by the Forest Officer in Charge, and must conform with Policy Statement Number 2 (revised October 1989) a summary of which is attached (Attachment 2.4.1) and Guidelines for the Management and Rehabilitation of Gravel Pits - South West Forest Areas (1990) (Reproduced below).

GUIDELINES FOR THE MANAGEMENT AND REHABILITATION OF GRAVEL PITS - SOUTH WEST FOREST AREAS.

1. BACKGROUND

Quarrying on Conservation and Land Management (CALM) lands results in the loss of conservation and production values. It also impacts on aesthetics, recreational and water production values.

The aim of this document is to establish a consistent standard of management and rehabilitation to minimise these impacts.

This document is to be used for all CALM gravel leases and be included as contract conditions for CALM contractors.

Policy Statement No. 2 - Basic Raw Materials should be used in conjunction with this document.

This document is presented in two parts:

(i) The Guidelines which outline the principles of pit management. (Minimum criteria is in **Bold Type**).

(ii) The Checklists which are a mandatory agreement and are essentially a summary of the guidelines for approval to commence new and extend existing pits (Checklist A) and rehabilitation (Checklist B).

2. SITE SELECTION

2.1 Prospecting

Testing should be done in a systematic manner during dry soil conditions and subject to dieback controls (7 Way Test).

2.2 Dieback Status

- The dieback status of the pit must be ascertained before any work commences and a 7 Way Test completed.

- Dieback-free forest is a valuable resource.

Gravel	Gravel Destination
Dieback-free gravel	Dieback-free
	Uninterpretable
	Suspect
	NEQ
Dieback gravel	Dieback
	Immediately below dieback
	in high potential risk
	(where appropriate)

2.3 Alternative Sources

- Sites with low natural values should be utilized in preference to mining undisturbed ecosystems, eg., powerline easements, private property, pine plantations etc.

2.4 Resource Arrangement

- Avoid shallow resources. Try to maximise the resource available for every hectare cleared. A suggested minimum depth of gravel is one metre.

2.5 Water Conservation

Pits proposed in harvessed catchments must be discussed with Water Authority of WA. Sediment control structures may be required. Pits are not to be located within stream reserves.

As a minimum standard all second and third order (or higher) water courses within 3km of a catchment reservoir are to have a buffer of 100m from the drainage point of the pit.

For water courses in non harnessed catchments or outside the 3km zone the minimum buffer width is 50m.

2.6 Floristic Values

All sites are to be checked for DEF and priority listed species before any operation proceeds. This should preferably be carried out during spring.

2.7 Visual Impact

- This must be minimised by adequate screening (buffer) from public roads (150 metres is a suggested minimum), by dog legging the access roads into the pit and by avoiding sites in view of prominent observation points.

3. OTHER PLANNING REQUIREMENTS

No more than 2ha is to be cleared at any one time without the approval of the Regional Manager.

A pit management plan showing sequence of mining, access routes and topsoil management strategies is to be produced and attached to Checklist "A".

4. OPERATIONAL AND REHABILITATION PROCEDURES

4.1 Commissioning

4.1.1 Clearing:

Clearing boudaries are to be marked with white paint crosses facing the area to be cleared. In non-forest situations the boundary must be pegged with prominent white painted pegs flagged with white tape. All forest produce must be harvested at the users expense if less than 3 months notice is given to the District.

Debris, free of topsoil, must be cleared into heaps or windrows at a distance of no closer than 5m from standing trees and burnt.

4.1.2 Dieback Management:

- All earthmoving machinery must be clean of all dirt and root material to the satisfaction of the District Manager before entering or leaving the pit.

- Access to the pit must be properly formed and free draining. Drainage from access roads should not enter the pit.

- Dieback-free pits must be closed to unauthorised access whilst not in use. This should consist of a physical, immovable barrier.

- All vehicles entering the pit must be clean of soil and root material. This may require the establishment of a suitably located washdown facility in the field.

- Dieback-free pits should be worked under dry soil conditions.

4.1.3 Stripping Topsoil:

Topsoil Management is of critical importance. This is the only effective means of re-establishing a diverse vegetation.

- **A nominal 100 to 150mm of topsoil is to be stockpiled.** Immediate topsoil use should be encouraged by sequential operations if the pit is ongoing. Topsoil for the new 2ha cleared area should be used for rehabilitation for the previously mined 2ha. Subsoil below 150mm depth must be stored separately.

- Topsoil stockpiles will be on elevated, dry locations. The heaps will be kept low and not compacted. This will avoid heat build up and an aerobic conditions detrimental to seed survival.

4.1.4 Gravel Winning:

- Gravel should be won from the front of the pit first and progress to the back of the pit if possible. If material quality is patchy, mixing from various sites will be necessary.

- To increase pit life basement clay can be mixed with surface gravel.

- Gravel winning should be carried out by a bulldozer fitted with rippers in preference to a wheeled loader. The dozer should push up sufficient gravel and basement clay to allow mixing at the loading phase.

4.2 Pollutants

- No oil changes in the pit.

- Remove soil contaminated by spilt oil and fuel.

- Remove all rubbish.

- Rock crushing to improve utilization should be encouraged.

4.3 Rehabilitation

Landscaping:

- Batters must be no greater than **1 vertical to 4 horizontal** (14^{o}). Pit floors should have at least1:100 fall to avoid ponding and dieback intensification. Drainage should be constructed to avoid dieback spread on a broad front downhill from pit.

- Laterite floaters must be cracked, removed, or buried in the batters.

Ripping:

- Ripping should be carried out during summer months to maximise shatter zone.

- The pit **must be cross ripped.**

- Firstly the pit floor **must be cross ripped at 1m intervals to a depth of 0.8m prior** to return of overburden and then topsoil. Capacity to achieve this should be investigated prior to large scale operations.

  If ripping to depth is not possible the operator will be required to drill and blast the caprock. This will have a bearing on site selection and depth of excavation. Batters should be ripped one way on the contour.

  Winged tyne rippers must be used to increase the shatter zone.

Topsoil Return

- Topsoil return is not permitted until the site has been inspected and approved (Checklist B).

- Topsoil should be returned evenly. Final surface should be rough. Vegetation and debris are to be returned to the pit floor. Fresh topsoil should be used whenever possible.

Road Closure

- Closed access roads should be returned to original profile and ripped to 0.8m depth across the alignment.

- A windrow/ditch/log should be placed at the entry.

Seeding

- Seeding alone should be adequate if topsoil management has been adequate. Seeding should take place in May. **Indigenous species** only are to be used. (See lists appended). Rate : Min 1.5kg mixed seed/ha.

- Species used should reflect the pre-existing and surrounding species as much as possible.

- Planting may be required in the second year if a success criterion of less than 30 shrubs and 10 tree species per 10m square metres over 90% of the area is not achieved by year 2.

- Weed control may be required in year 3.

- Min 250kg/ha superphosphate is to be applied prior to seeding. If topsoil is insufficient or of low fertility. 400kg.ha should be applied.

  Seed bearing brush is a useful seed source.

CHECKLIST "A"

Approval for Clearing for Gravel Extractions

Planning	Initial to confirm check is completed	Comments
1 = CONFORMS WITH POLICY STATEMENT No. 2		
2 = ALTERNATIVES EXAMINED		
3 = OUT OF SITE OF PROMINENT OBSERVATION POINTS		
4 = 150m BUFFER FROM ROAD.		
5 = 50m BUFFER FROM OTHER WATER COURSES. < 100m IN HARNESS CATCHMENT.		
6 = SINGLE ACCESS.		
7 = DIEBACK STATUS AND PROPOSED USE OF MATERIAL		
8 = DIEBACK MANAGEMENT PLANS (7 WAY TEST)		
9 = PUBLIC ACCESS BARRIERS NEEDED.		
10 = DRF & OTHER CONSERVATION VALUES.		
11 = MAXIMUM OF 2ha (AT ANY ONE TIME)		
12 = CLEARLY DEMARCATED.		
13 = * SKETCH PLAN APPROVED (ATTACH)		
14 = TOPSOIL MANAGEMENT AGREED (ATTACH) - DEPTH - STOCKPILE LOCATION - IMMEDIATE USE ON EXISTING PIT?		
15 = REHAB BACKLOG ADDRESSED (ATTACH) (COMPLETION OF CHECKLIST B MAY BE NECESSARY)		
16 = TIMBER RECOVERY PLAN AGREED (ATTACH)		
17 = BRING UP DATE FOR COMPLIANCE INSPECTION (HOCS RECORD AND B.U. ON OFFICE FILES) 12 MONTHS FROM DATE OF AGREEMENT		
* SKETCH PLAN TO SHOW ACCESS, TOPSOIL STOCKPILE, SEQUENTIAL MINING PROPOSALS		

Signed: _____ _____

Operator District Manager

Date: _____

APPROVAL IS NOW GIVEN TO CLEAR ..... ha AS PROPOSED IN THE ATTACHED PLAN AND DEMARCATED IN THE FIELD.

CHECKLIST "B"

Rehabilitation Preparation

To be Completed before Topsoil can be returned

Planning	Initial to Confirm Check is completed	Comments
1 = IS FRESH TOPSOIL AVAILABLE FROM NEXT STAGE.		
2 = IS TOPSOIL AVAILABLE/ALTERNATIVES		
3 = LARGE FLOATERS BURIED/CRUSHED/REMOVED.		
4 = ENTIRE PIT [illegible] RIPPED TO 80cm @ 1m.		
5 = SIDES BATTERED TO 1:4 (14o)		
6 = SEED PRESCRIPTION AGREED (ATTACHED)		
7 = PLANTING PRESCRIPTION AGREED (ATTACHED)		
8 = FERTILIZER REGIME AGREED.		
9 = PIT CLOSURE PROCEDURES AGREED (IF APPLICABLE)		

Topsoil can now be returned.

Signed: _____ _____

Operator District Manager

Date: _____

SEED MIX PRESCRIPTIONS - SOUTH WEST FOREST AREAS

Selection can be made from the following list. Availability may be the major constraint.

A - Northern Jarrah Forest
B - Eastern Jarrah/Wandoo Forest
C - Southern Jarrah Forest
D - Southern Karri Forest

Tick (/) indicates suitability

	A	B	C	D
TREES				
Allocasuarina fraserana	/	/	/	
Allocasuarina humilis				
E. accedens		/		
E. calophylla	/	/	/	/
E. diversicolor				/
E. haematoxylon			/ (Busselton, Kirup, Collie)	
E. marginata	/	/	/	/
E. wandoo	/	/		
SHRUBS				
Ac alata	/	/	/	?
celastrifolia	/	/	/	?
drummondii	/	/	/	?
pulchella	/	/	/	?
browniana				
lateriticola				
microbotrya	/	/		
myrtifolia			/	/
saligna	/		/	
urophylla				/
Adenanthos barbigerus	/		/	
Bossiaea ornata	/	/		
Daviesia decurrens				
Dryandra nivea	/		/	
D sessilis	/	/	/	
Gastrolobium spinosum	/		/	
Grevillea brevicuspis			/	/
Hakea lissocarpha	/	/	/	/
Hakea trifurcata	/		/	
Hovea chorizemifolia	/		/	
Hovea elliptica			/	/
Isopogan sphaerocephalus	/		/	/
Kennedia coccinea	/	/	/	?
Kennedia prostrata	/	/	/	?
Melaleuca scabra	/		/	
Mirbelia dilatata	/	/	/	/
Petrophile diversifolia			/	/
Sollya heterophylla			/	
Xanthorhoea gracilis	/		/	

SUMMARY OF CALM POLICY STATEMENT NO. 2 (REVISED OCTOBER 1989)
BASIC RAW MATERIALS

AGENCY	TENURE	MINING TENEMENT	CALM LEASE	REHABIL. PITS	COMP. TO CALM	ROYALTY MD	ROYALTY CALM	APPROVALS	REMARKS
CALM	Use on CALM land	No	No	Yes	No	No	N/A	CALM District	Minimal pits on National Parks, Nature Reserves, and Flora, Fauna and Landscape conservation areas. All pits be rehabilitated after use.
2 CALM agents authorised works	Use on CALM land	No	No	Yes	No	No	N/A	CALM District	Minimal pits on National Parks, Nature Reserves, and Flora, Fauna and Landscape conservation priority areas. All pits be rehabilitated after use.
3 Shires, MRD or other authorised agencies	i)*Roads on or servicing State forest or Timber Reserve or within 5km. ii)*Roads on National Parks or Nature Reserves or "necessary" for management of the reserve.	No	Yes	Yes	No	No	N/A	CALM District	Minimum of new pits on National Parks, Nature Reserves or Flora, Fauna and Landscape conservation priority areas. Existing pits to be phased out and rehabilitated.
4 Shires, MRD or other authorised agencies	*Commercial use or land not servicing or more than 5km from State forest	Yes	No	Yes	Yes	Yes	No oppose	CALM would and Landscape mining tenements	No new pits on National Parks, Nature Reserves or Flora, Fauna conservation priority areas. Existing pits to be phased out and rehabilitated.
5 Contractors	For use on other tenures or on P.P.	Yes	No	Yes	Yes	Yes	No	CALM would oppose mining tenements	No new pits on National Parks, Nature Reserves or Flora, Fauna and Landscape conservation priority areas. Existing pits to be phased out and rehabilitated.
6 Private individuals -small lots	For use on P.P.	-	No	-	-	-	-	-	Obtain from contractors.

* Doubtful cases to be referred to General Manager.

Attachment 24.1

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NOTES

SECTION 3 - SILVICULTURE

SPECIFICATION 3.1 CURRENT SPECIFICATIONS

1. The compilation of silvicultural specifications is the responsibility of Silviculture Branch, Forest Resources Division.

2. A list of current and superseded hardwood silvicultural specifictions follows:

CURRENT SPECIFICATIONS

No	TITLE	ISSUED
1/88	REGENERATION OF TUART FOR CONSERVATION	FEB 88
2/89	TREEMARKING AND REGENERATION IN WANDOO WOODLANDS	AUGUST 89
3/89	TREEMARKING IN JARRAH FOREST AFFECTED BY Phytophthora cinnamomi IN THE CENTRAL AND NORTHERN FOREST REGIONS	AUGUST 89
4/89	REGENERATION IN FOREST AFFECTED BY Phytophthora cinnamomi	AUGUST 89
5/89	MAINTENANCE OF HABITAT FOR HOLE NESTERS IN TIMBER PRODUCTION AREAS OF THE JARRAH FOREST	AUGUST 89
6/89	LOGGING OF REGROWTH IN TWO-TIERED KARRI STANDS	AUGUST 89
7/89	TREEMARKING AND SILVICULTURAL TREATMENT IN MULTIPLE USE JARRAH FOREST	AUGUST 89
1/90	KARRI REGENERATION SURVEYS	JANUARY 90
2/90	KARRI THINNING	JANUARY 90
3/90	JARRAH REGENERATION SURVEYS	JANUARY 90
4/90	ESTABLISHMENT OF EUCALYPT PLANTATIONS	APRIL 90

SUPERSEDED SPECIFICATIONS

1/86	JARRAH THINNING
1/87	JARRAH THINNING AND REGENERATION
2/87	JARRAH SILVICULTURE IN THE PRESENCE OF Phytophthora cinnamomi

Copies of current silvicultural specifications may be obtained by contacting the Hardwood Silviculturalist, CALM, Manjimup.

3. For details of all current softwood silvicultural specifications, refer to the latest edition of CALM's "Pine Management Guide" or to the Softwood Silviculturalist, CALM, Bunbury.

4. The decision as to which silvicultural specification to use must be given careful consideration prior to the commencement of treemarking and harvesting. The decision made should be noted by the Forest Officer in Charge of the particular cutting area on any prelogging checklists or coupe plans and, for jarrah operations, on the Coupe Silvicultural Report form (CLM 160).

   All silvicultural work carried out during or immediately after logging must be accurately and promptly recorded on HOCS or POCS sheets.

SECTION 3 - SILVICULTURE

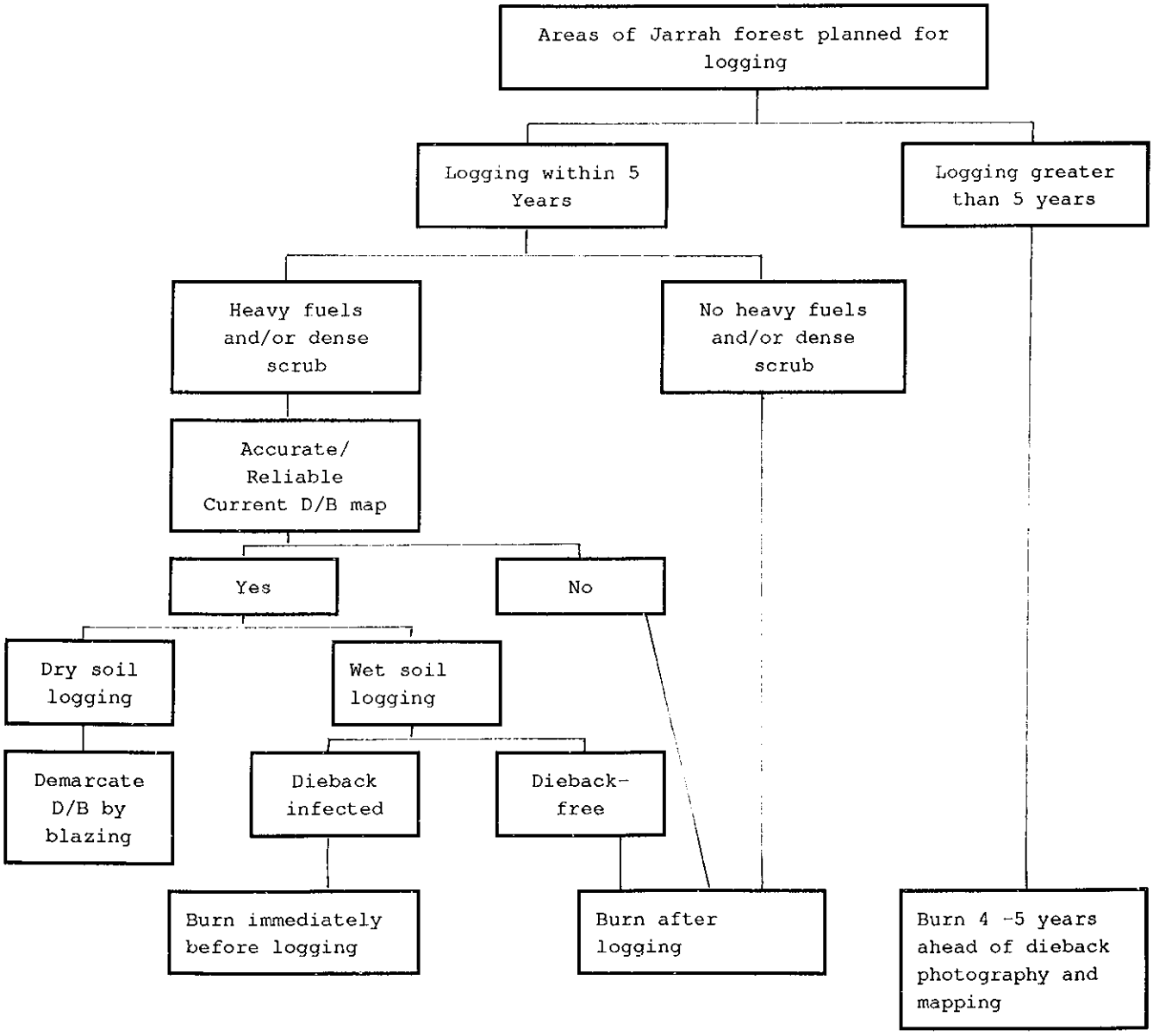
SPECIFICATION 3.2 ADVANCED BURNING

1. "Advanced burning" is the practice of carrying out controlled burning in advance of a harvesting operation. Such burning is usually conducted one season prior to the harvesting operation.

2. Advanced burning is beneficial to a harvesting operation if the density of scrub is effectively reduced by the burning, allowing easier access for treemarkers and fallers.

3. In normal circumstances, advanced burning must not be carried out in areas of jarrah forest due to be cut within the next three years. This ensures dieback indicator plants are available for interpretation. However, if current, reliable maps are available, advanced burning may be undertaken for reasons of access, safety and silviculture, in accordance with the "Decision Guide" below.

GUIDELINES FOR BURNING AREAS OF HEAVY FUELS, INCLUDING DENSE SCRUB IN ASSOCIATION WITH LOGGING OPERATIONS IN THE JARRAH FOREST:



SECTION 3 - SILVICULTURE

SPECIFICATION 3.3 KARRI SILVICULTURE

Karri silviculture guidelines and specifications are the responsibility of Silviculture Branch, Forest Resources Division. Existing specifications relevant to silviculture are included in the list under Specification 3.1 of this Manual.

For clearfelling operations the following guidelines apply:

1. Karri Regeneration Method

Regeneration of clearfelled karri areas will, whenever possible, be by the "Karri seed tree method". Regeneration by planting of seedlings or sowing of seed is second priority.

2. Seed Forecasting

Following receipt of the medium term logging plan, areas of karri to be logged must be inspected to ascertain their current and future seed cycle status. (See SFR Operations Manual, Item 4.12, for information about seed forecasting.) The result of the inspection will indicate whether or not the particular coupe will be regenerated by seed trees.

3. Karri Seed Collection

If mature karri seed is available in commercial quantities it is imperative that arrangements be made to pick this valuable resource as soon as possible. If the area is to be cut to seed trees, the seed trees will be marked prior to felling. (See Iten 13, SFR Operations Manual)

4. Planning

The sequence of falling operations, location of internal log haul and/or boundary roads, and scrub rolling by contractors during the logging phase, must be well planned. Well located roads can be used for fire management and regeneration, including planting, purposes. The falling sequence can allow the safe burning of portions of completed coupes after logging, and properly supervised scrub rolling during log extraction will allow a more effective regeneration burn.

5. Clearfelling without Seed Trees

Where an area is to be regenerated by hand planting or artificial seeding, the cutting prescription is to remove all merchantable stems within the demarcated coupe.

6. Clearfelling with Seed Trees

6.1 Cutting to Seed Trees

The aim of this operation is to retain and protect trees which will provide a seed source for regeneration.

6.1.1 Seed Tree Stocking:

Seed trees will be retained at a stocking of 4 trees per hectare. This corresponds to a spacing of about 50-60 metres between the boles.

Allowable Variation:

a) Up to 80m in high site quality pure karri stands (2 trees per hectare).

b) Down to 40m in severe fire damaged areas or MK stands (6 trees per hectare).

6.1.2 Seed Tree Specification:

The Seed Tree will be a windfirm dominant or codominant stem with a healthy spreading crown, of a good form and free from hereditary defect such as severe sweep and bends, forking or grain deviations.

Allowable Variation:
Retain any seed source (ie, cull tree) if no Seed Tree meeting the above specification is available at the prescribed spacing. Significant areas devoid of suitable Seed Trees will be clearfelled and planted.

6.1.3 Seed Tree Species:

Seed trees will be karri (and tingle if it is a tingle stand), but marri or blackbutt will be retained, in the absence of a suitable karri, at the prescribed spacing. Retention marking of Seed Trees is required before any trees are cut.

6.1.4 Seed Tree Protection:

Retain any tree which is likely to uproot or damage the crown of a Seed Tree when felled.

6.1.5 Marking Procedure:

Seed Trees will be marked with an orange painted line at head height around the tree, or an orange painted "S" on three sides. Temporary marking using orange flagging tape is permitted.

Additional Seed Trees may be retained during the initial cut to provide for losses due to windthrow or falling damage if there is reason to believe that this will be a problem.

6.2 Regeneration Burning:

Prior to the regeneration burn in karri seed tree areas it is essential that branches from retained trees be removed to allow sampling of the viability and numbers of seed per capsule.

The release of seed from capsules following the regeneration burn depends on:

* Time of year burnt
* Maturity of seed
* Intensity of burn
* Size, health and vigour of seed trees
* Time elapsed since logging commenced (exposure of crowns to wind and weather)
* Soil dryness index
* Weather conditions (especially temperature and rainfall) leading up to and during burn
* Viability and number of seeds per capsule.

6.3 Removal of Seed Trees:

The objective of the operation is to remove Seed Trees with the minimum of damage to seedlings and soil.

6.3.1 Seed trees which are burnt in the summer months (December to February inclusive) will be removed no sooner than 5 weeks after the burn to allow seed shed throughout the warm summer period. Autumn regeneration burns may allow the removal of Seed Trees within 3 weeks of the burn following approval by R/L Forest Resources. Seed Trees shall be removed within 2 years of the regeneration burn. Any extension to this period must be requested in writing and may only be approved by R/L Forest Resources.

6.3.2 In some cases the Industry may be left to complete the removal of Seed Trees with minimal supervision from Departmental staff. The Forest Officer will be mainly involved in monitoring utilisation and ensuring that environmental standards are maintained.

6.3.3 The primary cause of damage to regeneration and soil is uncontrolled movement by log hauling machines. The Forest Officer is to decide, in conjunction with the Contractor's bush foreman, the pattern of snig tracks and landings to be used. No <u>new</u> major snig tracks or log dumps will be constructed without authorisation from the Forest Officer.

6.3.4 The logging crew will be instructed by the Forest Officer with regard to the following points:

a) Maximum use of existing snig tracks should be made to minimise damage to soil and regeneration.

b) No unnecessary clearing of ground debris en route to logs. Logs blocking snig tracks to be cut and lifted, not pushed into regeneration.

c) The selection of routes off main snig tracks should aim to minimise damage to regrowth.

d) Machines will be reversed into butts and crowns at all times.

e) No rolling or skidding of logs is permitted to enable hook-up.

f) Where a log has to be moved it must be lifted and pivoted on the crown end.

6.3.5 Seed Tree removal will be carried out only under dry soil conditions. A nominal period from 15 November to 31 May each year is set and the operation may be suspended during wet weather during this time. Extensions to this period may be negotiated and requests will be in writing.

6.3.6 The Forest Officer will assess the likely impact of extracting small chiplogs from Seed Tree crowns. He may decide to leave merchantable logs in order to minimise soil disturbance.

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.1 COUPE DEMARCATION

1. Coupe boundaries must be identified prior to commencement of cutting using white painted crosses facing into the coupe. Unless already nominated on the approved logging plan a coupe boundary should correspond to (i) the boundary of a single "macro catchment" and/or (ii) roads, watercourses, reserve boundaries or dieback boundaries low in the profile. Accurate location of coupe boundaries is vital particularly when clear felling is involved. A known point (theodolite reference tree, surveyed road junction, private property boundary, etc.) should be used to locate a precise geographical location. Aerial photos will assist. Roads and other features plotted on Departmental maps cannot be assumed to be accurate.

2. Sub coupes, when applicable must be identified prior to cutting using red flagging tape, increasing to three red tapes on corners and defined junction points. Sub coupe boundaries must correspond to boundaries of individual, self-draining "Micro catchments" within a coupe, and/or dieback hygiene plan boundaries.

3. Sensitive boundaries including stream reserve, road reserve and amenity reserve boundaries must be identified prior to cutting in the same way as coupe boundaries, that is with white painted crosses facing the cutting area. The exact location of boundaries of stream, road and amenity reserves is as decided by the Forest Officer in Charge, using the following guidelines:-

3.1 River and Stream Reserves

General:

- The purpose of river and stream reserves is to protect the water body from sedimentation, siltation and turbidity caused by the erosion of soil from disturbed land surfaces. The undisturbed vegetation of the reserve reduces the energy of overland flows resulting in the deposition of undissolved solids before they enter the water body.

  Stream reserves also provide a wide variety of fauna habitat and act as corridors for fauna movement and recolonisation of disturbed areas.

  They also provide a softening of the visual impact of logging operations.

- The width of the river or stream reserve is dependant on vegetation type, slope, susceptibility of the soil to erosion, the intensity and duration of rainfall events and whether the watercourse is within a harnessed catchment.

- A river or stream reserve is measured from the outside edge of the stream zone vegetation.

In the area known originally as the Woodchip Licence Area:-

- Width of a river reserve must be at least 200m on each side of the river.

- Width of a stream reserve must be at least 100m on each side of the stream.

Elsewhere:-

- For all second or third order (or higher) watercourses within 3km of a catchment reservoir, the width of the stream reserve must be a minimum of 100m on each side of the watercourse, and a minimum of 50m for other streams. (See fig.4.1.1 for explanation of stream orders).

- For watercourses outside the 3km zone, but within harnessed catchments, the respective minimum widths must be 50m and 25m.

- For watercourses in non-harnessed catchments, stream reserve widths will be at the discretion of the Forest Officer in Charge.

3.2 Road Reserves

General:-

- The purpose of road reserves is to screen the unsightly aspects of logging operations from view on major roads and to act as habitat and movement corridors for fauna.

In the area known originally as the Woodchip Licence Area:-

- Width of road reserves must be at least 400m on both sides of major roads.

Elsewhere:-

- Width of road reserves must be 100 to 200m on both sides of major roads.

- Width of road reserves must be between 0 and 100m on both sides of other roads.

- Some selective cutting may be allowed within road reserves, as directed by the Forest Officer in Charge.

3.3 Amenity Reserves

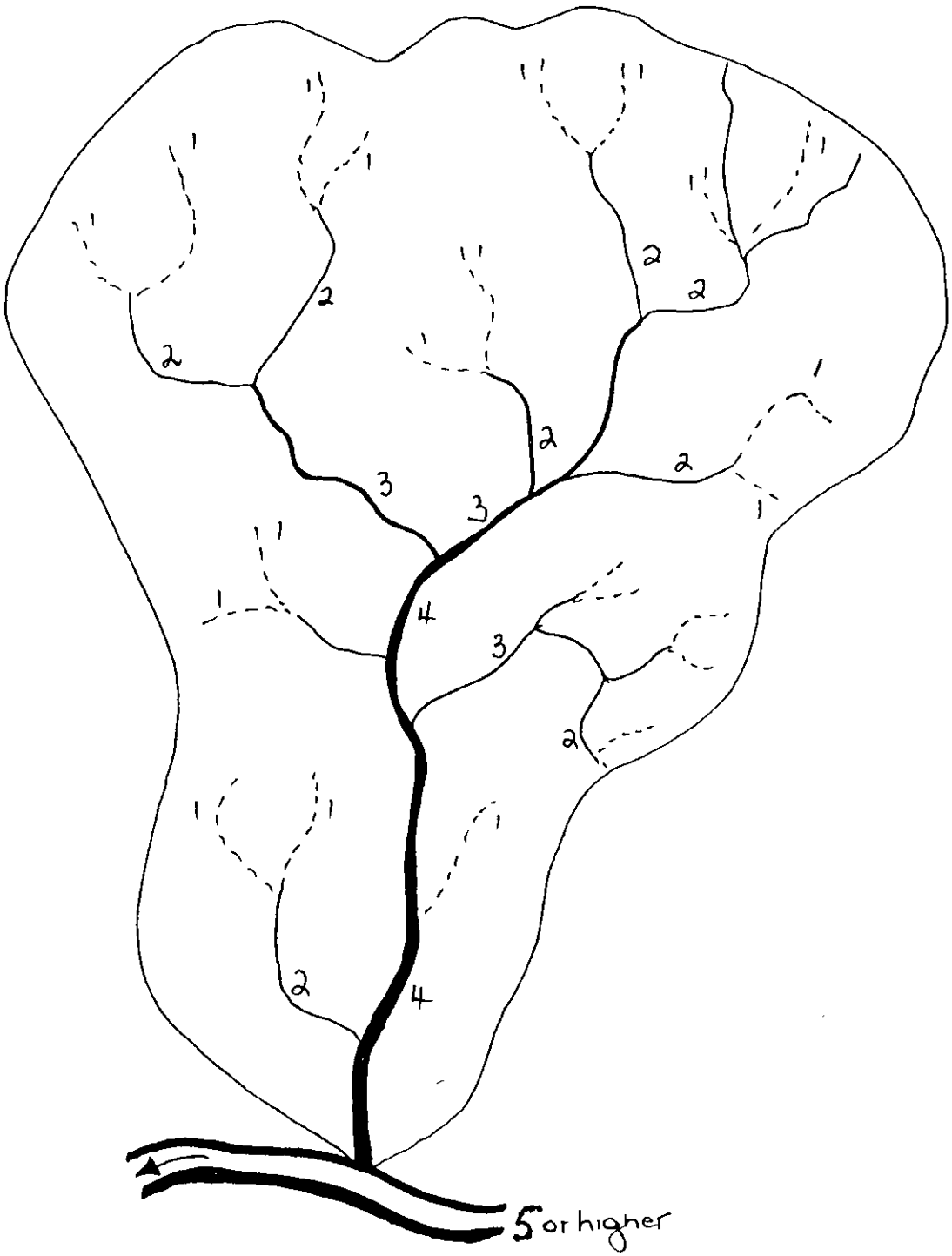
- These reserves should be demarcated to screen certain areas such as recreation sites from logging operations. A "line of sight" reserve may be necessary on steep slopes. Some selective cutting may be allowed within amenity reserves, as directed by the Forest Officer in Charge.

4. Coupe demarcation is the responsibility of the Forest Officer in Charge. However, as much of this task as possible is to be delegated to the contractor provided FOIC is satisfied that the contractor is suitably trained.

5. Demarcation of Karri Regrowth Permanent Increment Plots.

Over 230 permanent increment plots are located throughout the karri forest. These plots range in size from 30m by 30m to 70m by 70m and are identified in the field by five star pickets, one at the plot centre and one at each corner. All trees within the plot are tagged. Forest Officers and logging contractors must take care not to disturb these plots. Forest Officers are required to exclude these plots, and a suitable buffer zone of at least 25m width, from any cutting, using painted white crosses. Further information should be obtained from Manjimup Inventory Section.

Figure 4.1.1 Stream Orders



SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.2 FALLING (INCLUDING TREE MARKING TECHNIQUES)

PART A - HARDWOOD

1. Fallers' Blocks

- Control of falling is by the system of fallers' blocks i.e. the allocation of areas of forest (known as "fallers blocks") in approved coupes or subcoupes to individual registered fallers or individual tree harvesting machines. The areas must be demarcated by white tape prior to commencement of cutting.

- Fallers' blocks must be demarcated by the contractor's foreman or supervisor.

- The size and shape of a faller's block can vary, depending on the quality of forest, terrain, access or other factors, but must not be greater than about two weeks of cutting for the individual faller or tree harvesting machine.

- Normally, all timber on a faller's block will be extracted to a single landing, on the edge of that faller's block.

  A faller must not be allocated more than two faller's blocks at any one time. Unless specifically approved by the Forest Officer, a third faller's block must not be allocated until cutting in one of the first two blocks is completed.

2. Tree Marking

Trees to be removed from an area may be indicated to fallers by marking either those trees to be removed or those trees to be retained as crop trees. The Forest Officer in Charge will decide which method is to be used depending on the type of bush being cut and other practicalities. Once this decision is made, the tree marking method must not be changed within an individual coupe.

Tree marking will normally be carried out by Forest Officers. Occasionally, however, the Forest Officer in Charge may allow cutting to take place without tree marking. This may occur in "first thinning" of young, even-aged regrowth stands, and in "clear cutting" areas. In these cases the FOIC must ensure that:

i) silvicultural objectives are not compromised and

ii) protection of retained crop trees meets standards as per Specification 5.4.

2.1 Tree marking individual trees for removal: individual trees may be marked for removal using an axe only. Paint or tape is not acceptable.

Trees marked for removal with an axe must be blazed on two sides at a comfortable height and toemarked to indicate the desired direction of fall.

In areas where trees are marked for removal, no other trees may be felled.

2.2 Tree marking individual trees for retention: individual trees may be marked for retention using orange paint only.

Trees marked for retention with paint must be painted at least 1.5m above the ground, with a band about 4cm wide completely around the tree.

In areas where trees are individually marked for retention, fallers must cut any other tree containing usable produce under the terms of the relevant contract.

2.3 Tree marking groups of trees for retention:

A group of trees may be marked for retention by using orange tape tied around trees along the perimeter of the group. At least one tree in every 10m of perimeter must be marked, and the knots in the tape must face away from the centre of the group. The Bush Boss must be advised by a Forest officer of areas containing groups marked for retention.

3. Scrub Rolling

Scrub rolling prior to felling, if necessary, must be carried out by the logging contractor. Soil disturbance during scrub rolling must be minimised. Scrub should be rolled flat rather than bladed out. Limited blading out is acceptable close to trees to be felled. Dieback hygiene requirements must be observed during scrub rolling.

4. Stump Height

Stumps must be as low to the ground as possible, provided safety is not compromised. For a solid mature tree, the stump should not be higher than approximately 45cm above the ground at the base of the tree on the uphill side. 45cm is approximately "knee height". For solid regrowth trees, including trees cut for poles or mining timbers, the stump should not be higher than approximately 7cm above the ground at the base of the tree on the uphill side.

5. Trees leaning into road, stream or amenity reserves must not be felled unless specifically marked for removal by a Forest Officer using a tree marking axe.

6. In hardwood operations, all stumps, and all logs prepared by a faller, must be branded with the faller's brand immediately after cutting.

NOTE: (i) This rule is subject to change following current review of the Forest Regulations under the CALM Act.

(ii) This rule does not apply if felling is carried out by a tree harvesting machine.

7. All fallers must comply with safety requirements as directed by TIR Act (DOSHWA) District Inspectors.

PART B - SOFTWOOD

1. Whenever possible, the same treemarking rules applicable to hardwood should be used in softwood logging operations. In particular, only orange coloured treemarking paint should be used.

2. Tree markers must make regular sample counts to determine stocking, both before and during treemarking.

3. Treemarking should be in advance of logging, sufficient to allow for unforeseen conditions or the need to fill a particular order.

4. It is the responsibility of the Senior Procurement Officer Softwood from Timber Production Branch to give sufficient notice to Districts of impending operations in each area.

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.3 EXTRACTION

PART A - HARDWOOD

1. Extraction (or snigging) of logs is controlled by the system of fallers' blocks (or sub coupes) in the same way as falling. That is, an individual logging unit will be allocated two fallers's blocks (or sub coupes) and will not be allocated a third until extraction in one of the first two is completed.

2. Snig track patterns in individual faller's blocks or sub coupes must be planned, and may be physically demarcated, if necessary, by the contractor's foreman or supervisor. Snig tracks should adopt a herringbone pattern leading downhill whenever possible. Snig tracks may be indicated using a) red and white flagging tape together on individual trees or bushes, or b) axe blazes on trees or bushes.

3. When applicable the location of landings must be planned and marked at the time of road construction. This allows road drainage to be diverted and the avoidance of large table drains and batters which make loading away from landing sites difficult. It allows the landing to be located away from any disturbance caused by roading activity and so avoids cross contamination from road to landing of dieback.

4. Landings must use existing gaps in the forest whenever possible. Topsoil must be stockpiled to one side of a landing and clearing debris must be heaped at least 5m away from retained crop trees. One or two large heaps or windrows is preferred to a number of smaller heaps.

5. Whenever possible landings should be located on old landings from past logging activities, subject to dieback interpretation or natural openings.

6. Landings should be kept as small as possible and only one landing allocated to each fallers block or sub-coupe.

7. Landings must be planned and marked (using the same techniques for snig tracks) by the contractos foreman or supervisor, subject to approval by the Forest Officer in Charge.

8. Whenever applicable 100-150mm of topsoil must be stockpiled to one side of the landing. Any additional overburden must be stored separately. Topsoil and overburden must not contain slash and logging debris and must not impede drainage from the landing.

9. Clearing debris must be heaped at least 5m away from retained crop trees. One or two large heaps or windrows is preferred to a number of small ones.

10. Split phase logging:

In anything other than dieback infected jarrah forest, extraction of logs must conform to the techniques of "split-phase logging". This separates the snigging phase of logging from the loading and hauling phase. This is done to minimise the risk of introducing dieback fungus into a sub coupe from material that may be dropped at a landing by log trucks or other vehicles. There are four different techniques in "split-phase logging". These are, in recommended order of preference:-

10.1 Separation of extraction and loading in time: in this technique, extraction in a sub coupe or faller's block must be completed before loading and hauling commences. That is, once loading and hauling commences, a skidder must not return to the sub coupe or faller's block and all snig tracks must be blocked at the landing. If a skidder is required to return, it must be cleaned down before each trip into that sub coupe or faller's block. The number of times a machine is permitted to enter a sub-coupe of faller's block must be kept to a minimum. A Forest Officer may require a machine to be inspected prior to each entry.

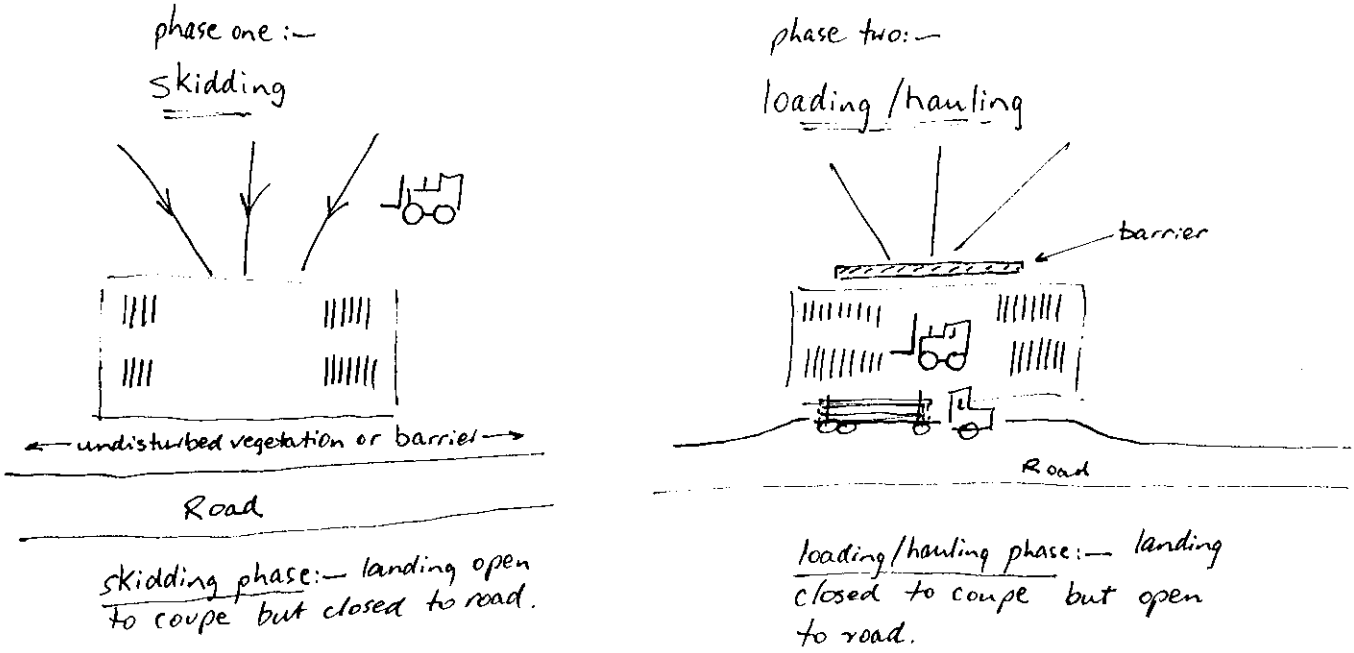
Advantages:

- very little chance of introducing disease to the coupe
- can be used under moist soil conditions
- planning of trucking requirements is well organized.

Disadvantages:

- landings can be large and/or numerous to cater for all products produced.
- produce can degrade on landings due to exposure.
- soil damage can be severe.

Figure 4.3.1: Split phase logging - Separation of extraction and loading in time.



10.2 Use of a stationary loading machine: in this technique, a stationary machine, such as a "heel-boom loader" is used to load trucks. Such machines are set up on the roadside below a landing, thus avoiding the transfer of any soil onto the landing. Skidding and loading can take place concurrently. A barrier to separate the area on which trucks can travel from the area on which the skidder works is required.

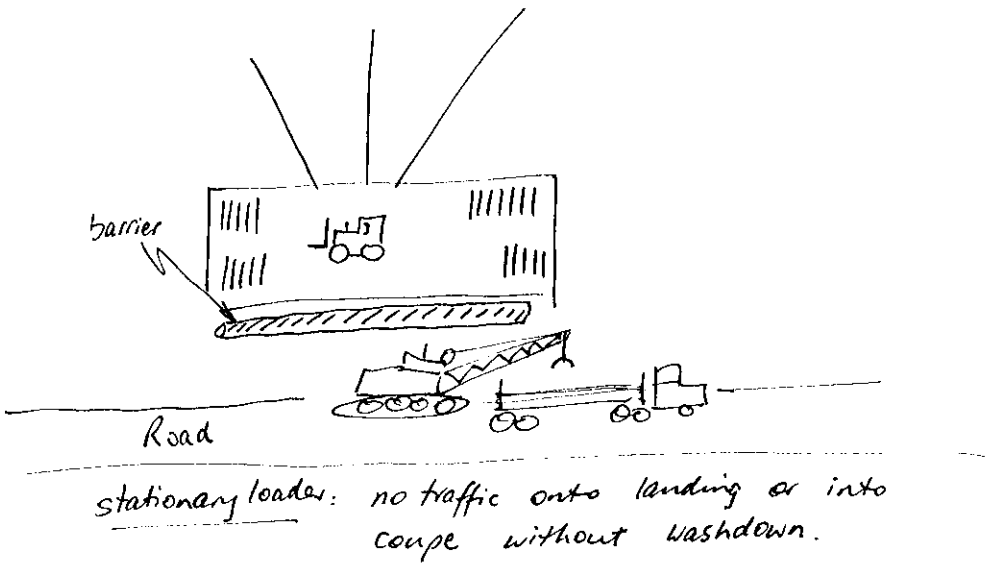
Advantages:

- no chance of cross contamination from road to landing or landing to coupe.
- landings can be relatively small as products are loaded out as they are skidded in.
- landings do not suffer very much soil damage.
- can be used under moist soil conditions.

Disadvantages:

- log size is limited to loader capacity.
- Requires a specialised machine for loading.
- loading machine is not readily transported between landings at short notice.
- landings are small due to reach of the loader and may need to be numerous.

Figure 4.3.2: Split phase logging - Use of stationary loading machine.



10.3 Separation of extraction and loading by a physical barrier at the rear of a landing: in this technique, a physical barrier such as a log is situated at the rear of the landing, and logs skidded to this landing are pushed, or preferably lifted over the barrier onto the landing proper. The skidder and loader are thus physically separated, avoiding the risk of transfer of innoculum, brought in by log trucks, into the coupe. The barrier must be substantial and secure so that it does not move forward during use. Skidding and loading can take place concurrently.

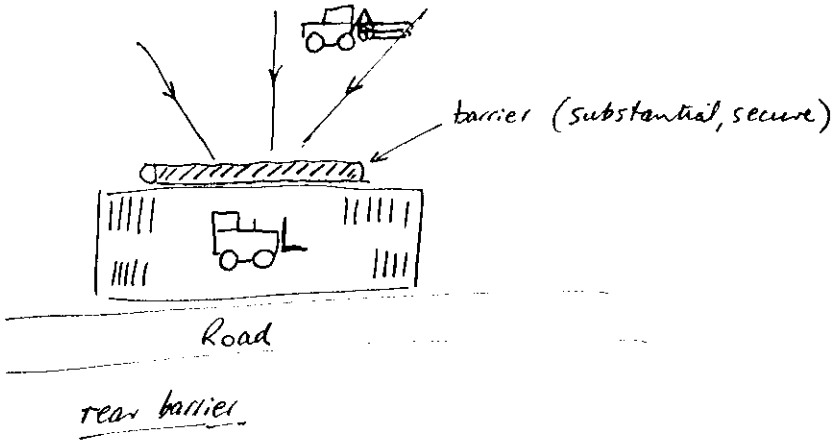
Advantages:

- no chance of contaminating the coupe from the landing.
- landing size is relatively small.
- one loading machine can be shared between concurrent landings.
- can be used under moist soil conditions.
- loader is not a specialised machine.
- maximises skidding time.

Disadvantages:

- requires two machines per coupe.
- landing can become infected from the road.
- soil damage is likely to be more severe due to mobile loader.
- can pose a danger to chainsaw operator if working on landing.
- skidding machine has to be able to push or lift logs over the barrier. This may require specialised equipment.

Figure 4.3.3: Split phase logging - Rear barrier.



10.4 Separation of extraction and loading by a physical barrier at the front of a landing: in this technique, a physical barrier such as a log is placed at the front of a landing, adjacent to where log trucks are parked for loading. This barrier separates the loader and skidder from the path of the log trucks, thus avoiding the risk of transfer of soil, brought in by the log trucks, into the sub coupe. Skidding and loading can take place concurrently.

The front barrier technique is the least preferred of all split phase logging techniques. When it is used, the barrier must not be allowed to shift from the landing onto the road or road batters and soil must not move over or around the barrier.

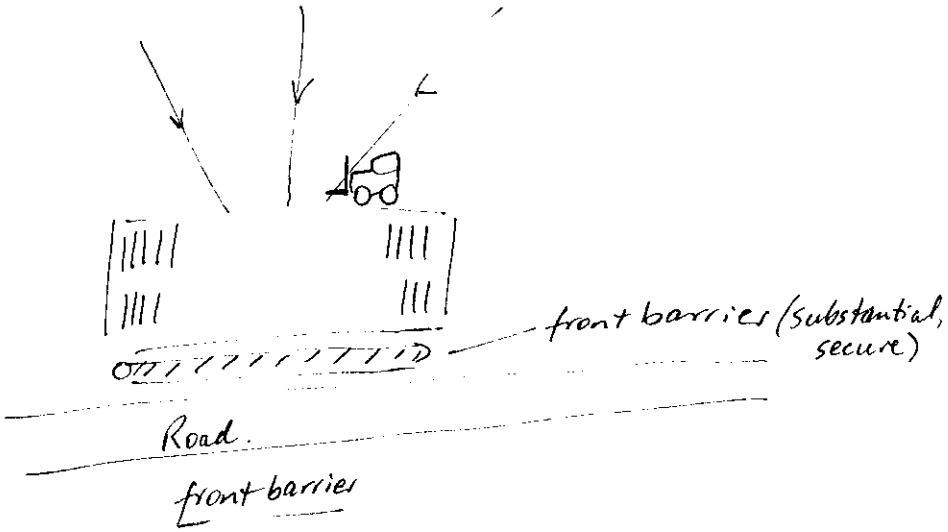
Advantages:

- cheap to implement.
- only one machine reuqired per coupe.
- landing size relatively small.
- soil damage can be less severe as landings are worked in dry soil conditions only.

Disadvantages:

- can only be used in dry soil conditions.
- movement of barrier onto road or road batters is possible resulting in cross contamination from road to landing and coupe.
- loading over a barrier is sometimes difficult.
- washdown required every time the machine re-enters the landing.

Figure 4.3.4: Split phase logging - Front barrier.



11. In anything other than dieback infected jarrah forest, extraction can take place only when the machinery used does not transport or move soil or vegetable matter. This means that the tyres of skidders must not pick up and move any soil or vegetable matter. If soil becomes wet following rain, and begins to stick to machinery tyres, the skidding operation must cease until the soil dries sufficiently. The decision as to when skidding ceases and recommences is the responsibility of the Forest Officer in Charge.

    In most cases the FOIC will delegate this responsibility to the forest representative or the Forest Officer in Charge of the particular operation. The FOIC may also delegate this responsibility to the contractor's supervisor or bush foreman if such person is suitably proficient in judging soil moisture status.

    The decision, whoever makes it, is a subjective one. However, to ensure reasonable objectivity, the following factors must be evaluated:

    * amount of recent rainfall at the site.
    * soil types.
    * soil drying characteristics.
    * previous and current soil moisture profile.
    * ability or otherwise of logging machinery to spread soil. Note that grains of sand adherring to machinery tyres is not considered to be soil movement in this context.

12. In dieback-infected forest, the extraction operation is subject to the rules detailed in Specification 5.2 (Protection of Soil).

13. At the completion of extraction, all major snig tracks in dieback-free forest must be blocked by a physical barrier such as a log.

14. No extraction machine may enter a road, stream or amenity reserve without the specific approval of a Forest Officer.

PART B - SOFTWOOD

1. Conventional Extraction

    The shortwood system of logging using conventional flat terrain equipment is used in most CALM controlled softwood logging operations. Under this system trees are delimbed and cut to length at the stump and extracted to plantation roadside using 6 or 8 wheel forwarders. The main advantages with the shortwood system over the alternative long length or whole tree system using skidders for extraction are:

    - minimal or no landings, important for steep country and forest adjacent to reservoirs.

    - minimal damage to remaining crop, important in thinning operations.

    - maximises loading efficiency of trucks, and

    - less sand and stones imbedded in the bark, which reduces saw damage.

2. To facilitate extraction and minimise damage to the remaining stems, a fifth row outrow is used whereby each fifth row is removed and the bays in between thinned.

3. Felling, delimbing and cutting to length is either done manually or mechanically. The manual system is more concentrated in mature stands for Third Thinning or Clear Felling.

Mechanical feller bunchers include John Deere 743, Kockum 880 or Bell Logger.

Mechanical delimbing and cutting to length include machines such as the Kockum Processor, John Deere 743, Logma or Denis stroke delimber.

Skyline (Cable) Extraction

1. On terrain with slopes which exceed 14° to 16° conventional equipment cannot be used and skylines are used instead. Trees are felled manually and extracted in multiples of log lengths by skyline. The skylines used in WA are in fact high lead systems with the logs dragging on the ground.

2. Logs are extracted to roadside, stacked in log lengths using a mounted knuckleboom loader and shifted by forwarder to the nearest road accessible by truck.

3. This type of operation requires rather different forward planning to conventional methods of extraction, even though a 5th row outrow arrangement still applies.

4. CALM officers with previous experience in skyline logging must be involved.

5. The ideal situation is to extract approximately half the trees in each direction (ie. uphill and downhill). The ideal extraction distance for this type of machine is between 150-250 metres. An inspection of the area to be logged and the measurement of distances through the longest axis must be part of the planning.

6. The contractor's representative, or the Skyline operator should take part in the inspection. The aims should be to complete the area without constructing internal tracks.

7. If the construction of internal roads becomes necessary, these should be planned well in advance. Internal roads will be constructed for summer operations only, and will be at the minimum standard to allow access for the Skyline unit and forwarder.

8. Internal roads or tracks should nearly follow the contour to maintain as flat a footing as possible. It may be necessary to costruct short shunts and pull the material on a fan layout.

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.4 LOADING AND HAULING

1. In anything other than dieback infected jarrah forest, hardwood loading operations must conform with the techniques of "split-phase logging", described in Specification 4.3.

2. The log hauling route or routes used on State forest must be approved by the Forest Officer in Charge. Traffic control signs must be supplied and erected along these routes by the contractor as required by the Forest Officer in Charge or the TIR Act (DOSHWA) Inspectors. All signs displayed must conform with M.R.D. standards. A list of standard signs, and their use follows:-

   a) **"TRUCKS ENTERING"** - 15cm letters, black on yellow background. These signs must be erected on major roads on either side of the junction of the major road and a lesser road used by log trucks. The signs must be removed immediately after the operation is complete, or if there is a break in carting exceeding five days.

   b) **"LOG TRUCKS ON ROAD"** - 15cm letters, black on yellow background. These signs must be erected at both ends of major roads used by log trucks. The signs must be removed immediately after the operation, or if there is a break in carting exceeding five days.

   c) **"FALLER AHEAD"** - 15cm letters, black on yellow background. These signs must be erected whenever falling is occurring near a roadway.

      Alternative :

      "TREE FELLING IN OPERATION" - 5cm black letters on fluorescent orange triangle; available from W.A. Forest Industries Training Council.

   d) **"GRADER AHEAD"** - 15cm letters, black on yellow background. These signs must be erected on both ends of the section of road being graded.

   e) **"ROAD PLANT AHEAD"** - 15cm letters, black on yellow background. These signs must be erected on both ends of the section of road being repaired.

   f) **"LOGGING OPERATIONS AHEAD"** - 15cm letters, black on yellow background. To be erected on roads whilst logging operations are occurring. Must be removed immediately after the operation is completed, or if there is a break in logging exceeding 5 days.

   All signs mounted on posts must be of diamond configuration. Signs placed temporarily on the ground must be rectangular.

3. The Forest Officer in Charge may stop haulage on any road in State forest in wet weather if, in his opinion, continued haulage is likely to result in damage to the road, excessive turbidity in adjacent streams or the spread of dieback into dieback free forest.

4. The Forest Officer in Charge must ensure all truck drivers know exactly the name of the coupe or "operation" from which their load of logs has been extracted. The recommended method to eliminate confusion is to erect professionally made signs at the entrance to the coupe or "operation", or on the log landing. These signs should be yellow painted, triangular with 400mm side, with 50mm black letters, erected on a steel star picket.

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.5 LOGGING OPERATION INSPECTIONS AND CERTIFICATION

PART A - HARDWOOD OPERATIONS

1. The contractor's foreman or supervisor must check logging standards periodically on a faller's block by faller's block (or sub-coupe by sub-coupe) basis to ensure falling and extraction standards are maintained. CALM's Forest Representative will periodically accompany the contractor's foreman or supervisor on these inspections to monitor standards.

   Aspects of logging to be inspected include:

   - stump height
   - stump and log branding
   - in-forest treatment of logs
   - trees indicated for removal but not felled
   - trees felled but not removed
   - damage to retained (crop) trees by falling and/or skidding
   - extraction pattern
   - soil damage
   - dieback hygiene
   - tops disposal
   - erosion control structures.

2. **Formal Inspections**

   There are two types of formal inspection of a logging operation:-

   i) General inspection of all aspects of a logging operation by senior staff, and

   ii) Inspection of a logging operation with the specific intention of certifying as complete one or more faller's blocks or sub-coupes in that operation.

   2.1 General Inspection - This inspection should be carried out as often as considered necessary by senior staff in a District or Region. This inspection should be carried out with at least the treemarker and the contractor's foreman or supervisor in attendance. At the completion of such an inspection a report must be completed on CLM 105 (see attachment 4.5.1).

   This form should provide a permanent record of the standards achieved at that particular logging operation for the benefit of the Region, the District and the logging contractor.

2.2 Faller's block (or sub-coupe) certification - this inspection must be regularly carried out on a systematic basis, by the contractor's foreman or supervisor, in order to formally certify to CALM that specific areas in an operation have been completed to CALM's standards. The unit area in these inspections is the faller's block or the sub-coupe. Inspections must be carried out with sufficient regularity to ensure a large backlog of non-certified faller's blocks or sub-coupes does not eventuate.

The progress of these inspections must be recorded on form CLM 104 (See Attachment 4.5.2). One of these forms must be kept by the contractor's foreman or supervisor in charge of each logging coupe. This form is the official permanent record of the progress of completed cutting.

3. During any inspection the Forest Officer must use only yellow lumber crayon to initial and date stumps, and cross out unmerchantable timber. The contractor's foreman or supervisor must use only white lumber crayon for the same purposes. These markings will indicate that the area has been inspected.

4. Yellow flagging tape must be used to indicate trees to be felled and logs to be cut and/or snigged.

PART B - SOFTWOOD OPERATIONS

1. Inspection of softwood logging operations should be carried out on a daily basis. This is especially important where sawlogs are being produced.

2. The Forest representative should try to arrange inspections accompanied by the contractor's representative. When this is not possible, a suitable time to suit both parties, at least at weekly intervals, should be arranged.

3. All instructions to contractors should be done through the nominated contractor's representative.

4. Instructions regarding utilisation of forest produce and which log lengths to cut for orders must be issued to the contractors representative and the faller or processor operator.

5. The FOIC must ensure that all fallers and machine operators and the contractors representative have been instructed and trained in log specifications and cutting requirements.

6. During a softwood logging inspection, Forest officers must be correctly attired and equipped for the job, (ie. hard hat, safety boots, tape, timber crayon, etc), and must be fully aware of the products required and the specifications of each product and the log length to be cut.

7. Aspects of the operation to be inspected include:

* the condition of the logging roads being used. (Bring to the contractor's attention any likely problems.)

* contract operations safety equipment and clothing.

* stump height, log lengths and crown diameters (measure a sample).

* Utilization. (All trees should be looked at for diameter class first, then cut to ensure the best possible utilization by log product required [highest value has highest priority]. ie. working from peeler logs down to particle board logs. Mill logs need to be cut to specific log lengths at any one time according to orders. The maximum mill log length possible should be aimed at with recovery short lengths. The Regional S/F Softwood Logging will co-ordinate the lengths and volumes and issue instructions to each District FOIC. Sweep is the main problem when trying to maximise length. Know your sweep specifications and ensure the fallers and processor operator follows them.)

* length of time logs are being left in the bush. (Watch for IPS attack and Blue stain developing.)

* correct loading of bin measured materials. (No cross logs, gaps etc.)

* crop tree stem damage.

* Trees left "hung-up".

* Check signs of excessive soil damage or erosion.

* adherance to requirements listed under the Code of Logging Practice relating to Fire Control (eg. fire attack pumper units and pack sprays available and working).

* warning signs to ensure a safe working environment.

7. Results of formal inspections should be recorded on the Softwood Logging Inspection and Action Sheet (CLM 106). See Attachment 4.5.3.

8. A sound knowledge of the Code of Logging Practice is essential to maintain a good standard of operation. Most problems can be resolved by using the Code as a guide. If disputes cannot be resolved, the Regional S/F Softwood Logging is the first contact.

Attachment 4.5.1

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT CLM 105 (1990)

HARDWOOD LOGGING INSPECTION AND ACTION SHEET

To be completed by Forest Officer following general inspection of logging operation. If inspection results in official certification of completion of all or part of operation, details to be recorded on CLM 104.

OPERATION:.....SUB COUPE OR FALLERS BLOCK (IF APPLICABLE).....

DIEBACK STATUS.....SOIL CONDITIONS.....

LOGGING CREW DETAILS (NAME EQUIPMENT).....

INSPECTION CARRIED OUT BY: CALM.....

CONTRACTOR.....

DATE.....

ASPECT OF OPERATION	COMMENTS/ACTION REQUIRED
1. COUPE PREPARATION	
1.1 DEMARCATION OF DIEBACK BOUNDARIES	
1.2 DEMARCATION OF COUPE, SUBCOUPES, FALLERS BLOCKS	
1.3 LOCATION AND PREPARATION OF LANDINGS	
1.4 COUPE (OPERATION) SIGN	
1.5 ROAD WARNING SIGNS	
2. FALLING AND EXTRACTION	
2.1 TREES NOT FELLED	
2.2 STUMP HEIGHT	
2.3 LOG PREPARATION AT STUMP	
2.4 LOG EXTRACTION	
2.5 LOGS NOT EXTRACTED	
2.6 LOG PREPARATION AND SEGREGATION AT LANDING	
2.7 STUMP AND LOG BRANDING	
3. ENVIROMENTAL CONTROLS	
3.1 DIEBACK HYGIENE PRACTICES	
3.2 PROTECTION OF CROP TREES	
3.3 TOPS DISPOSAL AROUND CROP TREES	
3.4 SOIL DAMAGE LEVEL	
3.5 EROSION CONTROL MEASURES	
3.6 LANDING AND TRACK REHABILITATION	
3.7 LITTER COLLECTION	
3.8 FIRE CONTROL	
4. LOG MEASUREMENT BY CONTRACTOR (IF APPLICABLE)	
4.1 METHOD	
4.2 ACCURACY	
5. LOADING AND HAULAGE	
5.1 STANDARD OF LOADING	
5.2 CONDITIONS OF ROADS	
5.3 MAINTENANCE OF ROADS	
6. SAFETY	
6.1 CREW ATTIRE	
6.2 EQUIPMENT	
6.3 PRACTICES	
7. COMPLETION OF D/NOTES	
8. OTHER	

SUMMARISING COMMENTS:CALM.....

.....SIGNATURE.....

CONTRACTOR.....

.....SIGNATURE.....

DISTRIBUTION: WHITE (ORIGINAL) CONTRACTOR; GREEN (DUPLICATE) CALM REGION OR DISTRICT; YELLOW (DUPLICATES) CALM REGION OR DISTRICT (STAYS IN BOOK AS FILES).

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

COMPLETION OF LOGGING OPERATION CERTIFICATION SHEET

OPERATION CODE CONTRACTOR

SUB-COUPE OR FALLERS BLOCK NO.	CONTRACTOR CERTIFICATION			CALM CERTIFICATION OR SPOT CHECKS		
	DATE	SIGNATURE	COMMENTS	DATE	SIGNATURE	COMMENTS
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
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No.....						
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No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						
No.....						
Landings						

DATE OPERATION COMPLETED _____ F.O.I.C. _____

(See inside book cover for instructions for use and distribution)

DEPARTMENT OF CONSERVATION & LAND MANAGEMENT

Attachment 4.5.3
CLM 106 (1990)

SOFTWOOD LOGGING INSPECTION AND ACTION SHEET

INSPECTION DATE: _____ OPERATION NUMBER & TYPE: _____

DISTRICT: _____ INDUSTRY REPRESENTATIVE: _____

PLANTATION: _____ CONTRACTOR: _____

1. **UTILISATION:**

UTILISATION OF TREES FELLED: _____

STUMP HEIGHT: _____

LOGS TO BE EXTRACTED: _____

TREES TO BE HARVESTED: _____

DAMAGED CROP TREES TO BE REMOVED: _____

PRODUCTS CUT TO SPECIFICATION: _____

FURTHER ACTION REQUIRED: _____

_____

2. **CONTROL:**

CROP TREE DAMAGE: [ ] ACCEPTABLE [ ] EXCESSIVE [ ] ASSESSMENT REQUIRED

CROP TREE PROTECTION: [ ] REQUIRED BY INDUSTRY [ ] DONE BY INDUSTRY

EROSION CONTROL & DRAINAGE: [ ] REQUIRED BY INDUSTRY [ ] DONE BY INDUSTRY

ACCESS ROADS - FIREBREAKS TRAFFICABLE: YES/NO

RUBBISH REMOVED: YES/NO

FURTHER ACTION REQUIRED: _____

_____

3. **SAFETY:** FALLING: _____ EXTRACTING: _____

LOADING: _____ CARTING: _____

4. **FIRE PRECAUTIONS:** _____

5. **COPY OF ACTION ITEMS GIVEN TO:** _____

6. **TARGET DATE FOR COMPLETION OF ACTION ITEMS:** / /

FIELD CHECK DATE: / /

COMMENTS: _____

7. FOREST OFFICERS SIGNATURE, COMMENTS: _____

_____

8. INDUSTRY REPS SIGNATURE, COMMENTS: _____

_____

9. FOIC SIGNATURE, COMMENTS: _____

_____

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.6 BUSH STOCKPILING

1. Bush stockpiling is the practice of stockpiling logs in the forest to supplement mill stockpiles and is important in hardwood logging operations. Bush stockpiles are not designed to replace mill stockpiles, but are to enable the logging contractor to continue log haulage during periods of the year when extraction is not permitted. Mill stockpiles will always be preferred to bush stockpiles.

2. The contractor must obtain permission for bush stockpiling from the Forest Officer in Charge. Bush stockpiling of hardwood sawlogs should not start before the onset of cooler weather in early autumn. This coincides with a reduction in activity of the Bardi grub (Phorocantha semipunctata).

3. The location of bush stockpiles must be approved by the Forest Officer in Charge. Bush stockpiles must be located in areas accessible in all weather conditions.

4. All hardwood sawlogs in bush stockpiles must be removed to a mill by 15 October in any year.

5. To prevent degrade, the ends of all high value logs should be painted with a sealing compound after placement in a bush stockpile. Once a prepared log is placed in a bush stockpile, no docking is permitted at any later date.

6. A firebreak of 4m width must be constructed around every bush stockpile.

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.7 IN-FOREST LOG TREATMENT AND LOG SEGREGATION ON BUSH LANDINGS

1. IN FOREST TREATMENT

1.1 "In-forest treatment" refers to the process of applying sawcuts to a felled hardwood tree in order to prepare logs ready for measurement, prior to the logs leaving the bush landing.

Terms used in this process include "crown cutting", "long butting", "queen cutting", "docking" and "trimming". Definitions of these terms may be found in the "Log Faults" booklet by Clarke and Ellis (1989).

1.2. Efficient utilization of the timber resource requires efficient in-forest treatment. This in turn requires knowledge of product specifications, the relative value or priority of different products, and the In-Forest Treatment policy. Logging contractors and supervising CALM officers alike must be well versed in these matters. Product specifications and the relative value of different products are detailed in Section 6. The In-Forest Treatment policy (for hardwood logging operations) is reproduced below:

IN-FOREST LOG TREATMENT (HARDWOOD) - POLICY (1987)

(REVISED 1989)

BACKGROUND

In integrated logging operations it is theoretically possible for over 20 different log product types to be produced by the one logging contractor from the one area at the one time.

It is therefore essential for logging contractors and CALM staff supervising logging operations to have a sound understanding of:

i) The specifications of the various log products.

ii) The relative priorities for production of the different log products.

iii) The basic rules to be observed in producing logs from trees that have the potential to produce more than one log product.

This policy addresses point (iii).

POLICY

i) At the stump, after falling a tree, the faller must attempt to crown cut the tree at a point either:

   a) where the crown end of the log displays 30% millable wood (this corresponds to the minimum standard for a second grade sawlog), or

   b) if the wood quality is better than the 30% millable limit, where the diameter under bark reaches the minimum crown end diameter specified in the applicable contract of sale, or

   c) where an unacceptable bend occurs beyond which there is insufficient log length to make a saleable product.

ii) At the stump, the butt end of a felled tree must not be docked, when the butt end face displays a minimum of 30% millable wood or more. If the butt end does not display a minimum of 30% millable wood, the faller must attempt to dock the butt end of the log at a point corresponding to 30% millable wood.

iii) No further docking of logs in the bush is permitted without the approval of the Forest Officer in Charge (FOIC).

   All logs meeting the above standard must be snigged to a landing before further treatment.

iv) On the bush landing, all docking will be the responsibility of the FOIC. This does not mean that he must be present every time the logging contractor wishes to dock a log. Rather, the FOIC must ensure the logging contractor's employees fully understand the difference between the various log products, and the value and importance of sensible docking to maximise length and minimise waste.

v) On the bush landing docking will be minimised, in an attempt to:

   a) maintain a greater average sawlog length, and

   b) reduce the volume of docked waste at log landings.

vi) If docking is thought to be necessary, the following rules shall apply with respect to the production of first grade and second grade jarrah sawlogs.

   a) For logs less than 4.5 metres in length:

   . Attempt to sell the log, unaltered, as a first grade sawlog. (A log with a minimum of 50% millable wood as assessed on the worst end face).

   . If the log cannot be sold as a first grade sawlog, consider docking up to 0.6m from one end only to produce a first grade sawlog.

   . If it is considered that more than 0.6m needs to be docked to produce a first grade sawlog, consider docking either 2.1m or 2.4m to produce a short first grade log and a short second grade log.

. If the demand for short logs (2.1m and 2.4m) is low, and docking of 0.6m from one end is unlikely to produce a first grade sawlog, sell the whole log as a second grade sawlog.

b) For logs greater than 4.5 metres in length:

. Attempt to sell the log, unaltered, as a first grade sawlog.

. If the log cannot be sold as a first grade sawlog, consider docking up to 0.6m from one end only to produce a first grade sawlog.

. If it is considered that more than 0.6m needs to be docked to produce a first grade sawlog, consider docking a minimum length of 2.1m or 2.4m to produce a short second grade sawlog and a longer first grade sawlog, or vice versa.

. If, by docking a minimum length of 2.1m or 2.4m, a minimum quality second grade log is likely to be produced, consider selling the whole log as a second grade log.

vii) If docking is thought necessary for karri and marri logs, the following rules apply:

(a) Karri first grade sawlogs - no docking is to be undertaken if the resulting second grade sawlog is less than 3.0m in length. The log length considered for the production of both first and second grade sawlogs should not be less than 6.0m prior to docking.

(b) Karri second grade sawlogs - where potential second grade sawlog is evident in otherwise chip or third grade logs, docking should be done to produce second grade sawlogs down to the minimum 2.4m length.

(c) Marri first grade sawlogs - the docking of marri logs to produce first grade sawlogs should be attempted if the lower grade product remaining is no less than 3.4m in length. The minimum log length considered for docking to produce a first grade log should be no less than 6.0m.

viii) Where log products of lower quality can be sold, the rules listed above should be adjusted to accommodate the minimum specification for those log products. For example, both the butt end and crown end of logs prepared at the stump will need to correspond to the minimum standard for the lowest quality log product, thereby replacing the 30% millable specification listed above.

ix) Regional procurement staff must ensure standards between District and Regions are consistent and maintained.

x) If any treatment of logs on a bush landing results in the removal of the faller's brand, the brand must be replaced on the treated log with white lumber crayon.

2. LOG SEGREGATION ON BUSH LANDINGS

2.1 "Log Segregation" is the practice of sorting or separating hardwood logs on a bush landing into different products prior to loading out.

Log segregation is an integral part of in-forest treatment, hence requires the same knowledge of product specifications and relative product values or priorities.

2.2 Log segregation is the responsibility of the logging contractor, after initial training and instruction by the Forest Officer in Charge.

During the initial training and instruction period, which may last up to six months, Forest Officers may be required to mark or brand doubtful logs prior to loading out.

2.3 If different grades of hardwood sawlogs need to be marked for identification purposes, either on the bush landing or on a truck, the following colour coding system is to be used :

- The letter "P" spray painted in orange on the end of a log to indicate a premium grade sawlog.

- The number "1" or "2" spray painted in orange on the end of a log to indicate a first grade or second grade sawlog respectively.

- The number "3" spray painted in pink on the end of a log to indicate a third grade sawlog.

SECTION 4 - COUPE MANAGEMENT

SPECIFICATION 4.8 SUMMARY OF BUSH SIGNS AND MARKINGS

1. White painted crosses on the side of a tree (permanent)

   - coupe boundary
   - road reserve
   - stream reserve
   - amenity reserve
   - gravel pit boundary
   - special care zone

2. Yellow painted blazes on three sides of a tree (permanent)

   - boundary between dieback-infected forest and dieback-free forest, with the third painted blaze facing the dieback infected forest. (Note: If considered necessary, the fourth side of the tree may be blazed and painted with a yellow cross. This may be necessary in situations where the dieback-free forest is logged prior to the dieback infected forest.)

3.* Red Flagging Tape (i.e. tape with ends able to move in breeze)

   - sub-coupe boundary

   - ridge line

4.* White Flagging Tape

   - faller's block boundary

5. Orange painted band around tree

   - tree marked for retention (crop tree or seed tree)

6.* Orange tape tied around a number of trees in a rough circle

   - a group of trees marked for retention (crop trees); the knots in the tape in this situation must all face away from the centre of the group of trees to be retained.

7. Axe blaze on two sides of a tree with a "toemark" cut into the base of the tree

   - tree marked for removal, the toemark indicating the desired direction of fall.

8.* Red flagging tape and white flagging tape tied, one above the other, around a tree or bush

   - landing extremity

   - major snig track

9.* Yellow flagging tape tied around a tree

- tree, missed by faller, which must be felled (if considered by faller to be safe.)

10.* Yellow flagging tape tied around a log, or stick or bush adjacent to a log

- log, missed by faller or skidder, which must be cut and/or extracted.

11. Yellow lumber crayon on a stump or log

- used by a Forest Officer to instruct contractor and/or record inspection of a logging operation. (Note: Green crayon may be used on light coloured species of wood such as pine.)

12. White lumber crayon on a stump, log or tree

- used by contractor supervisor or bush foreman to instruct bush crew and/or record inspection of a logging operation.

13.* "Dayglo" pink and black striped tape tied around a tree or bush

- danger sign, used to indicate presence of a dangerous situation such as a tree hung-up, "widow-maker", etc.

14. Orange painted "S" on three sides of a tree

- tree marked for retention as a seed tree.

15.* Dayglo orange flagging tape tied around a tree or bush, with knot facing dieback

- initial dieback line marked in field by interpreters.

16.* Blue flagging tape

- used by Forest Officer to indicate tree around which tops disposal is required.

17. Double blue painted bands around pine trees

- indication of boundaries of research plots; the bands are 150mm in width, 150mm apart, 2m above ground.

18. Large orange painted "H" on two sides of a tree or on a log

- tree or log marked for retention for fauna habitat.

* Whenever possible, biodegradable tape should be used.

SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.1 PROTECTION FROM JARRAH DIEBACK DISEASE

1. All CALM staff involved in hardwood logging must have a sound working knowledge of the biology and management of the dieback fungus, Phytophthora cinnamomi.

   All staff must be familiar with:

   (a) Dieback policy 3: "Phytophthora in the south west of Western Australia". (Publication imminent)

   (b) "Operational Instructions for Dieback and Logging". (Attachment 5.1.1). (formerly Policy Statement No. 3 - "Dieback and Logging".)

   and

   (c) The references listed below:

   - Forest Focus No 31
   - Landscope No 2
   - Information Sheet No 4
   - Research Papers Nos 3, 10, 40 and 65
   - Bulletins 84 and 85
   - Miscellaneous publication No 1 - "Jarrah Root Rot"
   - Tech Papers Nos 2 and 3
   - Dieback Hygiene Manual (July 1986)
   - Dieback 82
   - Seven Way Test Guidelines (July 1990 update)

2. The implications of jarrah dieback must be considered during all phases of a logging operation, in particular during:

   a) Planning (specifications 1.1, 1.2, 1.3 and 1.4)
   b) Roading (specifications 2.1, 2.2, 2.3 and 2.4) and
   c) Coupe Management (specifications 4.1, 4.3 and 4.4)

3. Machinery/vehicle cleandown

   3.1 A key part of forest management with respect to dieback is the cleaning down of vehicles and machinery prior to entering dieback free forest.

   3.2 The aim is to clean the vehicle or machine of all soil, mud, dust and vegetable matter, especially from wheels or tracks, and from underneath the chassis.

   3.3 Cleaning down may be carried out using a variety of equipment involving water, compressed air or brushes, either at a CALM District headquarters, at a contractor's headquarters or in the field. When conditions are dry, compressed air is the preferred cleaning down technique, provided a machine or vehicle can be cleaned by such technique.

3.4 If water is used, then the fungicide sodium hypochlorite may be added to the washdown water at the rate of 1:2000. Sodium hypochlorite is corrosive and must not be added to drinking water, nor used in excessive quantities. Sodium hypochlorite, when added to water, has an effective life of only 24 hours. A new dosage must therefore be added to washdown water in a tank as soon as any additional water is put in the tank.

3.5 Washdown sites in the field (that is sites involving water) must be approved by the Forest Officer in Charge. A washdown site must be on a well drained ramp or pad in dieback forest immediately adjacent to dieback-free forest. Such sites must be identified by a CALM Department "Washdown Site" sign. Avoid turbidity in nearby streams by leaving at least 50m vegetation buffer.

3.6 All vehicle/machine drivers/operators must ensure that their vehicle/machine is clean prior to entering dieback-free forest. Forest Officers must regularly check the standard of vehicle/machinery cleanliness.

4. Dieback Sampling

Dieback sampling is an integral part of the job of dieback interpretation, and is not normally a task of CALM hardwood logging operations staff. If sampling is necessary for any reason, a detailed prescription and assessment sheet may be found in the CALM booklet "Dieback Hygiene Manual" (July 1986).

5. Dieback Demarcation

5.1 The initial marking of dieback boundaries in the field is done by CALM specialist staff responsible for dieback interpretation using large scale aerial photography. These officers will mark dieback boundaries using dayglo orange flagging tape on trees or bushes. A Forest Officer is then responsible for the permanent marking of the dieback boundaries using yellow painted blazes on three sides of trees. Two blazes should face along the dieback boundary while the third blaze must face dieback or suspect. ie., on the "dieback" side of the tree. Interpreters will always demarcate with marking tape with the knot facing "dieback" bush. The blazed line must follow the dayglo orange tape marking, but discretion may be used to "smooth off" corners for practical purposes, provided the dieback line is shifted into dieback-free forest only. More detail on dieback demarcation procedures are contained in Attachment 5.1.2.

5.2 The Forest Officer may use wages employees to assist in the permanent marking of dieback lines. Close supervision must be carried out in such instances.

6. Demarcation of Vegetation Types

CALM specialist staff should be responsible for demarcation in the field of vegetation types, specifically those types that determine the separation of moist soil and dry soil logging areas.

OPERATIONAL INSTRUCTIONS FOR DIEBACK AND LOGGING (formerly "Policy Statement No. 3 - Dieback and Logging"; updated by Environmental Protection Branch, October 1990)

INTRODUCTION

Although our dieback knowledge is incomplete (eg, the terminal impact of the disease on all forest types is not yet clear) these Instructions and 7-Way Tests are still appropriate.

Operations on all Departmental lands must consider protection from dieback spread. However, the remainder of these instructions will focus on HARDWOOD LOGGING operations in State Forests.

IMPLEMENTATION

Guidelines for the implementation of CALM's dieback policies and 7-Way Tests for LOGGING different areas of hardwood forest are as follows:

1. Forests South of the Preston River (see attached map - area 3).

   1.1 Logging equipment will be cleaned down before entering and leaving a Karri dominant coupe. Current arrangements with respect to soil damage will continue, as prescribed in the Departmental Code of Logging Practice and Manual of Logging Specifications.

   1.2 Jarrah types will be logged using the most up-to-date hygiene prescriptions. On sites where disease hazard is rated as low to moderate, skidding under moist soil conditions with soil movement will be permitted. With respect to soil damage the criteria prescribed in the Manual of Logging Specifications must be met.

   On jarrah sites, dry soil logging only is permitted where :

   i) the disease hazard is high
   ii) the forest is uninterpretable
   iii) the consequences on the designated land uses are high

   On karri sites upslope of areas of high disease hazard dry soil logging only is permitted.

   These sites will be automatically identified in the evaluation of the 7-Way Test, and appropriate conditions laid down before the 7-Way Test is approved.

   Comment

   This decision is based on the fact that few areas in the Southern forest show signs of high impact, though some deaths in the understorey and of jarrah trees have occurred on some sites.

   Cessation of logging for a minimum of one month each year may be necessary to prevent soil disturbance and for hygiene in these vegetation types. These periods do not relate to specific calendar months.

2) Forests in the Sunklands - (see map - area 2)

Jarrah types will be logged using the most up-to-date hygiene prescriptions. On the low to moderate impact sites skidding under moist soil conditions with soil movement will be permitted. Arrangements with respect to soil damage will continue as prescribed in the Departmental Code of Logging Practice and Manual of Logging Specifications.

Comment

This decision recognizes that many areas of the Sunklands forest are dieback-free and that some are of high quality. Dieback hygiene, including dieback-free and hazard mapping is required. Logging with no soil movement is preferred.

Cessation of logging in the bush for 5-6 months each year may be necessary so as to prevent soil disturbance, and improve hygiene. These periods do not relate to specific calendar months.

3) Forests North of the Preston River (see map - area 1)

3.1 Logging machinery will be cleaned down before entering and leaving a wandoo dominant coupe. Current arrangements with respect to other environmental factors are prescribed in the Departmental Code of Logging Practice and Manual of Logging Specifications.

3.2 Jarrah types will be logged using the most up-to-date hygiene prescriptions. While the information on dieback hazard is imprecise, logging under dry soil conditions will be maximised.

Cessation of logging in the bush for a minimum of 4 months and a maximum of 6 months may be necessary. These periods do not relate to specific calendar months.

Logging of dieback areas in moist soil conditions with soil movement is approved.

In dieback free areas, logging of low and moderate impact types (including most S types) in moist soil conditions, without soil movement is approved, provided that:

i) the area is interpretable;

ii) the area is accessible without placing high hazard sites at risk;

iii) the area is not upslope of high hazard sites.

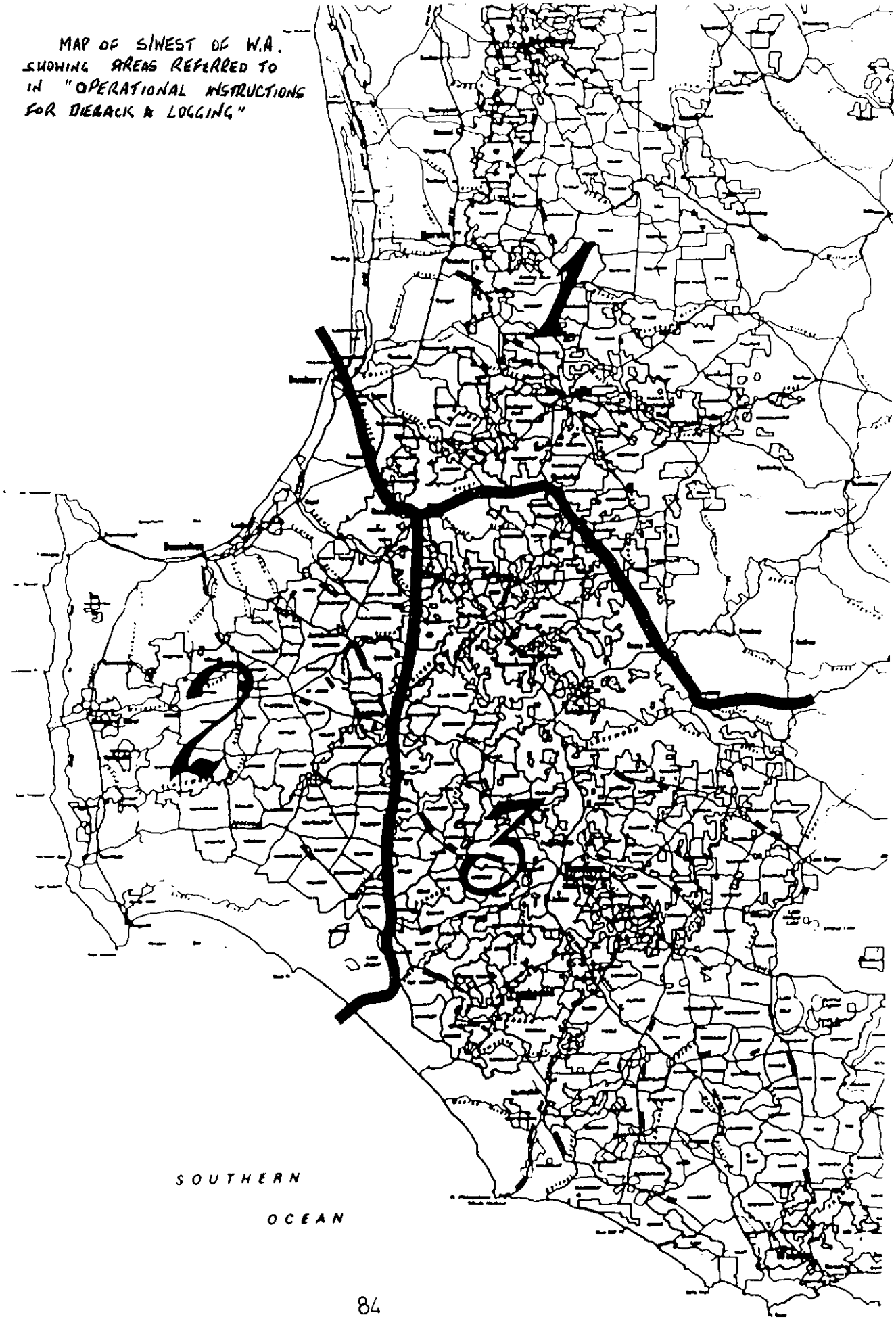
Moist soil logging will be directed to areas where dieback-free and hygiene maps are available, and where landform or site vegetation mapping has been completed. This applies both within and outside the Disease Risk Area.

Current arrangements with respect to other environmental factors are prescribed in the Departmental Code of Logging Practice and Manual of Logging Specifications.

Comment

These decisions recognize the sensitivity and importance of these forests, especially those on catchments in the zone of high salinity. Sensitive areas will be identified by the 7-Way Test and appropriate conditions laid down before the 7-Way Test is approved.

MAP OF S/WEST OF W.A.
SHOWING AREAS REFERRED TO
IN "OPERATIONAL INSTRUCTIONS
FOR DIEBACK & LOGGING"



DIEBACK DEMARCATION PROCEDURES (updated by Environmental Protection Branch, October 1990)

1. GENERAL

Interpreters should complete dieback demarcation within areas of forest for which Hygiene Maps have been prepared, as well as assisting Operations staff already involved in demarcation in forest outside D R A (where Hygiene Maps do not exist). It is desirable to have a standard procedure for the completion of this task.

2. TIMING

All forest classified as Dieback, or Suspect should be demarcated as close to the time of logging as possible. If it is imperative that forest be burnt prior to logging, demarcation must be completed before burning.

When an operation has not taken place within six months of demarcation, it will be necessary to recheck (and demarcate again) all areas of forest downslope from dieback or suspect, particularly on moderate to steep slopes (greater that 5^{o}). Areas of forest that have been mapped as secure dieback-free (ie, upslope from dieback, suspect, NEQ, uninterpretable) or that are relatively flat, should be rechecked after a period of twelve months. Checking should be done in spring or autumn if possible as disease expression is most obvious at these times.

3. DEMARCATION

Field demarcation of dieback or suspect is best achieved by blazing and painting non merchantable trees that occur at or near the boundary. All demarcation must be easily seen, even where dense scrub occurs. Trees should be blazed on three sides; two of the blazes should face along the boundary while the third blaze must face dieback or suspect. Blazes must be painted yellow.

The delineation of dieback or suspect should occur close to the visible disease symptoms. Officers should rationalise dieback or suspect boundaries when demarcating.

4. BUFFER ZONES

The system of mapping disease occurrence is based on visible symptoms that take varying periods of time, after infection, to manifest. As the most recent indicator plant deaths occur at or near the edge of disease infections, it is logical to conclude that P. cinnomomi may be in the soil, or root systems of both susceptible and resistant plants outside the visibly affected area, but that the susceptible plants may not have died. That is to say there may be some risk of transporting infected soil and root material from within a zone outside of but in close proximity to the infection. It is necessary therefore to have a zone which buffers forest operations from disease infections.

The buffer zones should be varied to account for the potential for disease to be present, but not manifest, under different vegetation, topographic, and edaphic situations. Two variables must be considered in varying buffer width - slope and disease impact. Where disease impact is low, it is often difficult to detect and interpret symptoms of the disease and the risk of incipient disease is greatest in this situation. The following table sets out the downslope buffer width under different slopes and impact situations.

DOWNSLOPE BUFFER WIDTH (m)

SLOPES (DEGREES)	LOW	MOD	HIGH
16-20	50M	50M	40M
11-15	50M	40M	30M
6-10	40M	30M	20M
0- 5	30M	20M	20M

IMPACT (CURRENT)

Buffer zones on the uphill side of the infections should not be less than 20m and increased to 30m in situations where the uphill gradient is small and disease impact is low.

Demarcation should preferably be done by interpreters working in liaison with Operations staff.

5. RISK CATEGORIES

When there is more than one risk category within an operational area, it is often necessary to separate them in order to achieve the hygiene requirements identified in the 7-Way Test.

It is necessary to firstly determine if the different risk categories need to be separated and then the most efficient method of demarcation.

The attached Table shows when adjoining risk categories require separation. For example, a moist soil coupe contains the following risk categories: Dieback, NEQ and Low Potential Risk, with the Dieback adjoining the NEQ and LPR, and the LPR adjoining the NEQ category. From the table Dieback (row 2) must be separated from both LPR and NEQ (columns 4 and 7 respectively). Similarly NEQ (row 7) and LPR (column 4) must be separated under moist soil conditions.

Where it is necessary to separate risk categories interpreters and district staff should be involved in all demarcation. The level of involvement will depend on the complexity of the area and the expertise of district staff. The most efficient method of demarcation is to use coupe or sub coupe boundaries. In the example above fallers block boundaries can be used rather than an additional blaze or tape line.

6. HAZARD CATEGORIES

Predicted impact (dieback hazard) is to be determined by trained staff (ie, interpreters, research, experienced district staff). Where it is necessary to separate operations in various impact (hazard) classes (as identified by the 7-Way Test) the demarcation is to be carried out by district staff, only under interpreter/research supervision or after training by the interpreters/research.

Coupe or sub coupe boundaries are the most efficient method of demarcation.

7. These guidelines give the minimum level of demarcation which is required. In many cases however, these lines can be integrated with other management lines such as faller's block, or subcoupe boundaries.

DECISION GUIDE FOR DEMARCATION OF BOUNDARIES BETWEEN RISK CATEGORIES IN THE JARRAH FOREST

RISK CATEGORY	ADJOINING RISK CATEGORY: Secure Dieback free	Dieback	Suspect	L.P.R.	H.P.R.	Uninterpretable	N.E.Q.
Secure Dieback Free		Yes (all ops)	Yes (all ops)	Yes (moist soil or old maps) No (new maps or dry soil)	Yes (all ops)	Yes (all ops)	Yes (all ops)
Dieback	Yes (all ops)		Yes (all ops)	Yes (all ops)	Yes (moist soil) No (dry soil)	Yes (all ops)	Yes (all ops)
Suspect	Yes (all ops)	Yes (all ops)		Yes (all ops)	Yes (all ops)	Yes (all ops)	Yes (all ops)
Low Potential Risk	Yes (moist soil or old maps) No (new maps or dry soil)	Yes (all ops)	Yes (all ops)		Yes (all ops)	Yes (LPR not below uninterpretable) No (LPR below uninterpretable)	Yes (moist soil or old maps) No (new maps dry soil LPR below NEQ).
High Potential Risk	Yes (all ops)	Yes (moist soil) No (dry soil)	Yes (all ops)	Yes (all ops)		Yes (all ops)	Yes (all ops)
Uninterpretable	Yes (all ops)	Yes (all ops)	Yes (all ops)	Yes (LPR not below uninterpretable) No (LPR below uninterp.)	Yes (all ops)		Yes (all ops)
N.E.Q.	Yes (all ops)	Yes (all ops)	Yes (all ops)	Yes (moist soil or old maps) No (new maps dry soil LPR below NEQ)	Yes (all ops)	Yes (all ops)	

SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.2 PROTECTION OF SOIL (INCLUDING REHABILITATION MEASURES)

PART A - HARDWOOD OPERATIONS

1. Soil Damage

1.1 Damaged soil is soil that has either:

a) had the A horizon (topsoil) removed,
b) had the A horizon (topsoil) mixed with the B horizon (subsoil usually containing clay)
c) suffered severe compaction (meaning compaction which will affect germination or growth of plants). This normally applies to all landings, and
d) been affected by all 3 of the above.

1.2 Soil is usually damaged during log extraction operations in wet soil conditions.

1.3 In selectively cut forest (ie, jarrah forest, karri thinnings) soil damage must not exceed 10% in area of any single faller's block or sub-coupe, including the landing. If a Forest Officer considers that damage is approaching 10% then he must:

a) survey the faller's block (compass and pace method), plot on graph paper and calculate total area,
b) measure the perimeter of the landing and calculate area,
c) plot four parallel lines at right angles to the general snigging direction, the four lines positioned to divide the faller's block into five approximately equal sections,
d) pace along each sample line, classifying each pace as damaged or undamaged soil, and
e) record all the above data on a "Field Assessment of Soil Damage" sheet (form CLM108), and calculate percentage of damaged soil.

If the total area of soil damage, including the landing, is greater than 10% then skidding in that fallers block must cease immediately. The logging contractor will then be asked to select the best area in the coupe to continue logging. If the damage levels are exceeded in the best area then the whole coupe will be closed.

Attachment 5.2.1 is an example of a "Field Assessment of Soil Damage" sheet, with accompanying plot of faller's block.

1.4 In clearfelling situations (ie, karri forest) the acceptable limits of soil damage are 5% with respect to landings and 20% overall. In clearfelling situations where a "partial cut" is allowed, the respective limits are 5% and 15%, thus allowing for additional damage during the final cut.

1.5 If skidding is stopped in a faller's block because of excessive soil damage then it cannot recommence in that block until the Forest Officer in Charge decides that the soil is dry enough. This decision cannot be made until the local Soil Dryness Index exceeds 500 in the Northern Jarrah Forest and 250 in the Southern Jarrah and Karri Forest.

1.6 Damaged soil must be rehabilitated by the logging contractor by the following first day of May, as directed by and to the satisfaction of the Forest Officer in Charge.

On clearfelled areas, rehabilitation will require the ripping and levelling of all damaged soil on affected snig tracks and landings. Ripping must be carried out to a depth of 500mm and at 1 metre spacing. The logging contractor must make available suitable machinery to carry out this work. On thinned forest areas, rehabilitation will require raking of damaged soil to promote germination. Ripping likely to damage crop tree roots should not be carried out.

2. Erosion Control

2.1 CALM staff and logging contractors must be aware of the potential for soil erosion along snig tracks during wet weather.

2.2 When skidding is completed in any faller's block, and prior to machinery leaving it, interceptor banks and drains must be constructed across all snig tracks with exposed soil, to the following standards:

a) Interceptor bank/drain spacing:

Slope	On lateritic gravels	On all other soils
0 - 2°	Nil	Nil
3 - 5°	200m	100m
6 - 10°	100m	50m
11 - 15°	60m	30m
16° +	30m	15m

b) Size of interceptor banks:
40cm high and 40cm thick, using soil or logging debris

c) Angle of interceptor banks:
0.3-0.5% from horizontal.

d) Dispersal of water from interceptor drains:
The interceptor banks/drains must be constructed so that water is directed into vegetation or silt traps without ponding. Water must not be diverted into another drainage line. Water must not be diverted into dieback free forest.

2.3 Erosion control work should be carried out at any time during the course of logging, if rainfall is imminent. Such work shall be to the standards listed in 2.2 above.

3. Rehabilitation of Landings

3.1 All landings must be rehabilitated by the logging contractor to the satisfaction of the FOIC. In jarrah forest, landings should be rehabilitated in conjunction with the completion of loading out. Elsewhere, rehabilitation must be completed by the first day of May following the completion of logging. Logging is deemed to be complete when the sub-coupe, including landings, has been certified complete via the form CLM104.

3.2 In areas where logging is carried out concurrently by more than one logging contractor, the task of rehabilitation of landings must be shared by the different logging contractors as directed by the FOIC.

3.3 In areas where a logging operation is carried out over an extended time period by more than one logging contractor, the task of rehabilitation of landings must be completed by each logging contractor at the completion of his operation.

3.4 Rehabilitation of landings will involve:

a) the heaping or windrowing of clearing and logging debris along the sides and rear of landings, such heaps or windrows to be no closer than 5m from crop trees.
b) replacement of topsoil.
c) in clearfelled areas, the ripping of any damaged soil to a depth of 500mm and a spacing of 1 metre, parallel to the natural contour of the land and replace topsoil.
d) in thinned areas the levelling and raking of any damaged soil (or ripping if necessary), again parallel to the natural contour of the land.

Note: in situations where reject material can or is likely to be sold, for example as firewood or charcoal logs or third grade sawlogs, then such material should not be heaped or windrowed at sides or rear of landing, but should be neatly stacked at the front of the landing before any soil rehabilitation work takes place. This enables such logs to be loaded out at a later date without unnecessary machine movement on the landing.

3.5 All rehabilitation must be carried out in strict accordance with dieback hygiene principles, as directed by the FOIC.

3.6 Any burning of debris considered necessary will be carried out by the relevant CALM District during the winter following rehabilitation.

3.7 Any seeding or planting or fertilizing considered necessary must be carried out by the logging contractor(s) during the winter following rehabilitation. Seeds, plants and fertilizer will be supplied by CALM.

PART B - SOFTWOOD OPERATIONS

1. Because of the relative areas planted on hills and in coastal plantations, it will be necessary to operate in some hill plantations in winter. Good planning of the timing and the siting of operations will minimise soil and environmental damage to plantations and firebreaks.

2. When operations are carried out in periods of very wet weather, most damage is generally caused in a relatively short period. With the general acceptance of a level of log stockpiling at mills, it is now possible to suspend operations for these short periods.

3. The FOIC should exercise his discretion in stopping, either all or part of, the operation until weather conditions improve. Until more quantifiable data is available, consideration should be given to stopping operations while there is free water running in the table drains of the road being operated on.

4. Any deep wheel ruts, or other damage which may occur, must be repaired during the ensuing summer period, as part of the overall firebreak maintenance programme. Particular attention needs to be paid to landing points.

5. Protection of soil adjacent to water reservoirs:

Plantations adjacent to reservoirs require special treatment to prevent turbidity, and care should be taken at all stages of logging.

5.1 Visible turbidity results from soil disturbance and surface erosion on either roads or outrows. Excessive soil disturbance can occur when the soil is saturated or when powdering of the soil occurs during summer.

5.2 A favourable time for logging can be late spring, when the ground is moist but not saturated. This prevents powdering of soil and subsequent turbid runoff.

5.3 The opportunity for surface erosion to occur is greatest immediately after the disturbance and decreases with time. Any control measures prescribed to minimise erosion must be well planned and implemented as soon as possible, following the disturbance.

5.4 Winter logging adjacent to reservoirs should be minimised or excluded where possible.

5.5 Undisturbed filter strips adjacent to the reservoir or major creeks are required to filter water runoff. Depending on topography, the filter strips may have to be a full compartment wide or just a strip between the lowest road and the reservoir.

5.6 Logging should cease within 40m of reservoirs at the first sign of excessive soils disturbance or erosion likely to cause turbidity.

5.7 Mechanical harvesters or processors leave a greater amount of debris on the outrows, reducing the potential disturbance by the forwarder.

5.8 Cross drains may be required on outrows adjacent to a haul road.

5.9 Winter haul roads which cross major creeks close to reservoirs must be:

(a) stabilised by water binding, or other suitable means, for 40m on either side of the creek.

(b) crowned and sufficiently drained, using adequate side drains and culverts with silt traps leading into vegetation filters.

5.10 Roads adjacent to reservoirs should not be used for hauling if they are likely to become heavily powdered during summer operations.

FIELD ASSESSMENT OF SOIL DAMAGE (HARDWOOD)

DISTRICT..... FALLERS BLOCK.....

BLOCK/CPT..... CONTRACTOR DETAILS.....

COUPE .....

CUTTING PRESCRIPTION .....

.....

PLOT OF FALLERS BLOCK (ATTACHED)

SURVEY SUMMARY

1. Total area of faller's block _____ m^2
2. Area of landing _____ m^2
3. Skidding damage:

E Line	Damaged	Undamaged	Total
1			
2			
3			
4			
Total	(a)	(b)	(c)

Skidding damage = $\frac{(a)}{(c)} \times 100$ = ...%

4. Total damage = 2) + 3) = ...%

RECOMMENDATION

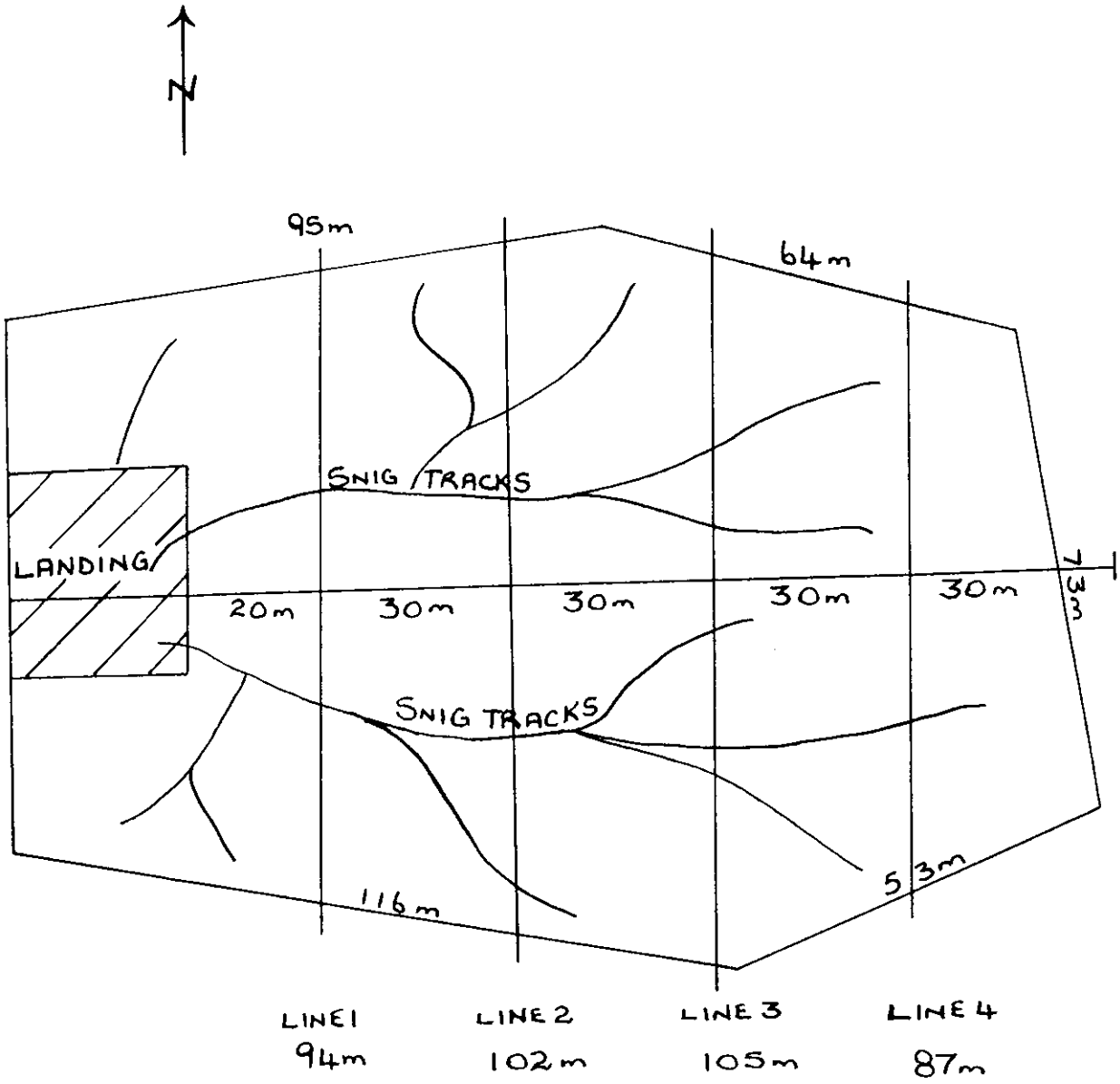
1. Operation can continue; survey to be repeated .....
or (nominated when)
2. Fallers block closed.

Date of assessment - .....

Officer compiling - .....

Distribution: 1. Logging Operator
2. R/L Procurement
3. District File

LOCATION PLAN (EXAMPLE - FIELD ASSESSMENT OF SOIL DAMAGE)



SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.3 PROTECTION OF WATER

1. Many catchments in State forest are harnessed, that is the water from such catchments is collected in man-made reservoirs for industrial and/or domestic use. It is therefore essential that effective water protection measures are undertaken during all phases of logging.

2. During logging operations measures must be taken to protect water from unnatural increases in:

   i) salinity (the salt content of water)
   ii) sedimentation (the deposition downstream from a source of disturbance, of material across the full range of particle size)
   iii) siltation (the deposition of particles larger than clay but smaller than sand)
   iv) turbidity (discolouration of water due to suspended silt, clay or organic matter)

3. Water protection measures are necessary during:

   a) planning (specification 1.1)
   b) road construction and maintenance (specifications 2.2 and 2.3)
   c) gravel pit working and rehabilitation (specification 2.4)
   d) coupe demarcation (specification 4.1)
   e) extraction (specification 4.3)
   f) haulage (specification 4.4)
   g) logging operation inspection and certification (4.5)
   h) protection from jarrah dieback (5.1)
   i) protection of soil (specification 5.2)

   CALM staff and logging contractors must be totally familiar with the requirements for protection of water as detailed in the above specifications.
   Details of river and stream buffer widths are contained in Specification 4.1.

4. No roading or logging may take place within 500m of the high water mark of any reservoir without prior notification to the relevant Water Authority.

SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.4 PROTECTION OF CROP TREES

1. Logging contractors must make every effort during all phases of logging to protect marked crop trees from physical damage. Physical damage is any damage resulting in one or more of the following:

   a) The exposure of more than 100cm^2 of cambium on the bole of a crop tree.
   b) The falling, breaking, or uprooting of a crop tree, or
   c) The removal of more than 30% of the crown of a crop tree.

2. Periodical assessments of crop tree damage must be carried out by a Forest Officer using the "Assessment of Crop Tree Damage" form. In carrying out these assessments, a Forest Officer must assess a sample of at least 100 crop trees in a given faller's block or sub-coupe or softwood operation. The sample should consist of at least three 10m wide assessment lines across the fallers block or sub-coupe in hardwood logging operations. In softwood operations the sample must include trees from at least 8 rows of trees. The results should be written on the CLM Form107 (Attachment 5.4.1).

3. If more than 5% of trees assessed are damaged, then the logging contractor may be charged for all damaged trees in that faller's block at rates determined from time to time by the Executive Director.

4. Copies of all crop tree damage assessments must be handed immediately to the relevant FOIC. Copies must be forwarded to the Manager of the relevant logging contractor, and the relevant Bush Supervisor.

5. Tops Disposal

   As well as avoiding physical damage, logging contractors must ensure that all logging debris created by a logging operation is removed from the base of crop trees. This task is commonly known as "tops disposal". and is designed to protect crop trees from fire damage. The debris to be removed includes all woody material greater than 75mm diameter. This material must be moved at least 1m away from the bole of a crop tree. Tops disposal must be completed before a faller's block or sub-coupe is certified complete. Bush Supervisors should encourage fallers and skidder drivers to carry out tops disposal during the course of a logging operation.

6. Trees that require tops disposal are to be highlighted by use of blue flagging tape.

FIELD ASSESSMENT OF CROP TREE DAMAGE

DISTRICT..... CONTRACTOR.....

BLOCK/PLANTATION..... LOGGING DETAILS.....

OPERATION .....

FALLERS BLOCK..... DATE OF ASSESSMENT.....

A. DAMAGE ASSESSMENT

Number of trees assessed .....(minimum sample of 100 trees)

Number of trees damaged .....

Percentage of trees damaged .....%

B. COMMENTS

.....

.....

C. RECOMMENDATIONS

.....

.....

Officer Compiling.....

Information re completing this form:

1. Damaged trees are those crop trees that:

   a) have more than 100cm^2 of cambium exposed,
   b) have been felled, broken in two or uprooted, or
   c) have more than 30% of crown removed.

2. In "Logging Details" specify type of machinery involved and names of faller and skidder driver.

3. In "Comments" write down:

   a) any environmental or other factors, if any, that may have affected the result of the assessment and
   b) whether this assessment has indicated an improvement or worsening of performance by the contractor.

4. If, in "Recommendations" it is recommended that the contractor be charged for crop tree damage, the total number of crop trees in the faller's block must be assessed and the total number of damaged crop trees determined.

5. Forward this form immediately to District Manager; copies to Bush Supervisor and Manager of Logging contractor.

SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.5 PROTECTION OF THE VISUAL RESOURCE (LANDSCAPE)

1. The visual quality of land is an important resource in its own right which can be identified, assessed and managed in much the same way as other resource values.

2. Visual Resource Management (VRM) must be consistent and, if necessary, a harvesting proposal must include a site inventory and analysis of landscape factors. An assessment of projected impact of the operation on scenic values is required.

3. Visual resource assessment must be guided by the Department's Visual Management System (VMS) where it is complete and operative.

4. Where the VMS is in place, if harvesting proposals attain the established visual quality objectives, no conflict with scenic resources is expected. Where predicted impact is greater than the desired visual objective either the proposal is modified or the scenic resource degradation is recognised and documented.

5. Where the VMS is in place, prescriptions and guidelines are written for each type of land alteration, eg., clearfelling, selection cutting, scrub rolling, road and landing location and prescribed burning. These should be understood and utilized.

6. Where the VMS is incomplete the following broad guidelines should guide harvest planning and operations :

   a) coupes should be selected and designed within the context of the total landscape. Cumulative impact must be predicted and evaluated in terms of a total zone or viewshed.

   b) coupe shape should be determined by factors inherent to the landscape such as topography, stream courses, ridgelines and vegetation patterns.

   c) primary factors which determine the ability of land to absorb change should be identified and assessed. These are slope, soil colours, erosion potential, vegetation pattern and vegetation density.

   d) in the most sensitive viewsheds, such as foreground and middleground areas seen from primary travel routes or use areas, special assessment studies or prescriptions may be required to ensure that visual values are protected.

   e) transition between harvesting areas and natural forest should be gradual and subtle. Gradational cutting methods should be employed in very sensitive visual zones.

   f) islands or corridors of trees within harvesting areas should be retained in a manner which borrows from naturally established form, line, colour and texture.

g) regrowth rates and screening potential should be evaluated and integrated into coupe harvest sequencing plans.

h) snig tracks and temporary roads should be reduced to a minimum. Tracks on the contour should be used in preference to vertical alignments.

i) landings should be located where topography or vegetation provides a screen from primary viewer positions.

7. Areas of past harvesting which do not meet desired levels of visual quality should have rehabilitation plans prepared and implemented at the earliest possible time.

8. Staff of the Visual Resource Management section of the Recreation, Landscape and Community Education Branch should be consulted by planning and operations staff for assistance in applying the Department's VRM policy.

A written policy, No. 34, dated Nov. 1989, is relevant to this subject and should be familiar to all planning and operations staff.

SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.6 PROTECTION OF DECLARED RARE FLORA

1. Operational Procedures

If declared (gazetted) rare flora is known to exist within a planned harvesting area or on a planned road alignment, or is discovered during the course of harvesting or roading, the FOIC must take the following steps :

a) Consult flora conservation research personnel for a decision on whether the activity will pose a threat to the status of the species.

b) Where the status of the species will be threatened, the species must not be damaged or destroyed. Specific steps to protect the species may include :

i) temporary and obvious demarcation of the location of the species.

ii) specific instructions to contractors on logging plans or job prescription sheets.

iii) a realignment of a proposed road or track.

iv) exclusion of an area from harvesting.

c) Where the status of the species is not threatened, a permit to "take" declared rare flora must be obtained before the operation may proceed. As Ministerial approval is required, a well argued case must be prepared. Contact with the Senior Clerk Flora is essential and he will prepare the appropriate permit.

2. Maintenance Grading

If declared rare flora invades a logging road subject to regular maintenance grading, a licence allowing such activity to continue may be issued. Again, contact with the Senior Clerk Flora is required before such a licence can be issued.

3. Staff Training

Each District and Region should maintain a field herbarium of declared rare flora known to occur in that area.

Each species should be represented by a mounted specimen, a coloured photo of the plant, and a description of its form and habitat. Permits to "take" flora as speciments, valid for the duration of employment, will be issued to nominated CALM officers.

Appropriate staff, especially the District Environmental Protection Officer, will be trained in the recognition of declared rare flora. This training will be arranged by Regional Managers using the appropriate contacts listed below.

4. Contacts

For advice on the status of declared rare flora, training, herbarium techniques and the effects of specific operations, please contact :

Dr Hopper	}	
Dr Coates	}	
Dr Keighery	}	Research Centre, Woodvale
Mr Sokolowski	}	

Mr McCutcheon — Bunbury

To secure a permit to take declared rare flora :

Mr O'Donoghue — Senior Clerk, Flora, Como

5. References

A recently published document entitled "Declared Rare Flora and Other Plants in Need of Special Protection in the Northern Forest Region" (Wildlife Management Programme No. 5, CALM, 1990) is a comprehensive reference for CALM officers involved in logging operations in that Region.

SECTION 5 - ENVIRONMENTAL PROTECTION

SPECIFICATION 5.7 PROTECTION FROM FIRE

1. The logging contractor has certain fire control requirements specified in the relevant Contract to Supply. They are also outlined in the Code of Logging Practice.

2. Each District, through its nominated FOIC, must ensure that the fire control provisions of the contract and the Code are strictly adhered to. This includes training of the contractors' personnel.

3. In softwood logging operations the FOIC may prohibit any, or all types of, logging operations at such times, and for such periods, as is necessary when, in the officer's opinion, such action is warranted by the CALM Fire Danger ratings. The following restrictions apply in softwood plantations:

	Chainsaws	Logging Equipment	Load on Cleared Break
HILLS PLANTATIONS	0-60m/hr No Restrictions 60m+ Cease Ops	0-60m/hr No Restrictions 60m+ Cease Ops	0-140m/hr No Restrictions 140m+ Cease Ops
COASTAL PLANTATIONS (a) Prescribed Burnt	0-140m/hr No Restrictions 140m+ Cease Ops	0-140m/hr No Restrictions 140m+ Cease Ops	0-140m/hr No Restrictions 140m+ Cease Ops
(b) Unburnt	0-60m/hr No Restrictions 60m+ Cease Ops	0-60m/hr No Restrictions 60m+ Cease Ops	0-140m/hr No Restrictions 140m+ Cease Ops

SECTION 6 - LOG SPECIFICATIONS AND MEASUREMENT

SPECIFICATION 6.1 GENERAL DESCRIPTION OF LOG PRODUCT TYPES

1. **Log Product Types**

A complete list of currently recognised species and log product types, both hardwood and softwood, may be found in Section 1 of the L.O.I.S. System Codes Manual. The most important types are explained below :

1.1 **Sawlogs**

Sawlogs are logs prepared in the bush for cutting at a registered sawmill into sawn products such as, for example, sleepers, boards or scantling. Any log that is considered to be merchantable, that is, worth cutting into sawn products, may be classed as a sawlog. For commercial purposes however, several types of sawlogs are recognised, the most important being :

(a) Hardwood sawlogs

. **Premium Grade Sawlogs** - these are the highest quality sawlogs that may be sold for specific end uses such as seasoned timber for furniture manufacture.

. **First Grade Sawlogs** (formerly General Purpose Sawlogs) - this is the most common type of sawlog cut. The minimum length and minimum crown diameter under bark of a First Grade Sawlog is generally 2.1m (or 2.4m) and 250mm (or 300mm) for jarrah (and karri) respectively, and the minimum amount of millable wood in such a log is generally set at 50% as assessed on the worst end.

. **Second Grade Sawlogs** (formerly Salvage Sawlogs) - these are sawlogs below the standard of First Grade Sawlogs. Unless otherwise indicated, the minimum standard of a second grade sawlog is 2.1m in length and 250mm in crown diameter under bark, with at least 30% of millable wood as assessed on the worst end.

. **Third Grade Sawlogs** - these are sawlogs, below normal Second Grade Sawlog quality, that may be sold by the Department. Third Grade Sawlogs have no minimum standard and selection of such logs from reject material on bush landings is the responsibility of the buyer.

. **Medium Sawlogs** - these are Karri sawlogs, of minimum length 2.4m, and between 200mm and 300mm crown diameter under bark, usually cut from regrowth forest.

. **Small Sawlogs** - these are sawlogs, either Karri or Jarrah, with diameters under bark, of 150-200mm for Karri and 200-250mm for Jarrah.

. **Short Sawlogs** - these are sawlogs, of a specific quality, and below a specific length, that may be sold for specific end uses.

(b) Softwood sawlogs

- **First Class Sawlogs** - these are high quality pine sawlogs at least 300mm in diameter under bark and 4.8m in length. First Class Sawlogs are obtained from plantations at least 25 years of age.

- **Second Class Sawlogs** - these are lower grade pine sawlogs of diameter down to 200mm and length down to 2.1m.

- **Third Class Sawlogs** - these are sawlogs, below Second Class Sawlogs in quality, selected by the buyer.

- **Small Sawlogs** - these are sawlogs of small end diameter under bark between 150 and 200mm.

1.2 Veneer Logs

Veneer or "peeler" logs are logs intended for slicing or peeling into sheets for the production of veneer or plywood. Veneer logs must be of a consistently high quality, with much less allowable defect than sawlogs.

Softwood peeler logs that are prepared in good faith to the set specification but are below standard are sold as "Second Class Peeler" logs.

1.3 Bridge and Jetty Timbers

Bridge and Jetty Timbers are hardwood logs intended for use in the construction of bridges, wharves and jetties. Like Veneer Logs, Bridge and Jetty Timbers must be of a consistently higher quality than sawlogs. Most Bridge Timbers are produced for use by the Main Roads Department. Most Jetty Timbers are produced for use by the Marine and Harbours Department. There are four types of Bridge and Jetty Timbers.

1.3.1) **Piles** - these are high quality, straight logs, driven into the ground, in bridges, wharves and jetties.

1.3.2) **Stringers** - these are high quality, straight logs, placed lengthwise on piles.

1.3.3) **Corbels** - these are short lengths of high quality log, placed lengthwise, on top of piles, to support stringers.

1.3.4) **Bedlogs** - these are logs placed lengthwise on the ground, used to support stringers.

Note: bridge and jetty timbers are originally produced from the forest as "unprocessed round timbers".

1.4 Poles

Poles are long, straight logs used in an upright position to support loads above ground. Poles are usually of smaller diameter than Bridge Timbers, but must be of a similar high quality. Most poles are produced for use by the State Energy Commission of WA in supporting transmission and other lines. The amount of defect allowable in poles can cary depending on whether or not the pole is to be treated with preservative. Species currently accepted by SECWA are jarrah, marri, blackbutt, karri, yellow stringybark, radiata pine and pinaster pine.

Note: poles are originally produced from the forest as "unprocessed round timbers".

1.5 Chip Logs

Chiplogs are marri, karri or globulus logs destined for conversion into woodchips at the Diamond Mill at Manjimup.

1.6 Mining Timbers

Mining Timbers are generally short, straight lengths of jarrah log, of crown diameter under bark between 125mm and 250mm, used to support underground coal mines at Collie. Three terms commonly used are :

a) **Props** - these are short lengths, say 2.4m or 2.7m used in an upright position in direct contact with the roof of a mine.

b) **Legs** - these are similar to props, but are used to support Bars.

c) **Bars** - these are longer lengths, say up to 5.1m, and are placed horizontally on top of Legs. They support the roof of a mine.

1.7 Charcoal Logs

Charcoal logs are jarrah logs destined for conversion into charcoal at Simcoa's plant at Kemerton.

1.8 Particle Board Logs

Particle board logs are radiata pine and pinaster pine logs, produced mostly from thinning operations, for conversion into particle board.

1.9 Industrial Wood

Industrial wood is the term used to describe pine logs produced for conversion into medium density fibreboard.

1.10 Pine Rounds for Treatment

Pine rounds for treatment are small diameter radiata or pinaster logs sold for preparation and preservative treatment then used in fencing and other applications.

1.11 Domestic Firewood Logs

Most firewood for domestic use is collected from the forest by the public free of royalty, or harvested by commercial firewood operators and transported from the forest in block form. Increasing amounts however are sold by CALM in log form. The predominant species is jarrah.

1.12 Minor Forest Produce

Minor Forest Produce is a general term used to describe a range of generally lower value products (including firewood) that may be harvested or collected from forests or plantations. In most cases the individual piece size, and total volume per unit area, of Minor Forest Produce is small. Specification 6.11 in this Manual lists the types of Minor Forest Produce that may be produced.

2. Log Defects

The assessment of defect or fault in the log product types listed above is a task that requires considerable knowledge, experience and judgement. The booklet "Log Faults - a glossary of defects and other characteristics of trees and logs in the South West of Western Australia" by Clarke and Ellis (1989) lists and explains all common log defects or characteristics.

SECTION 6 - LOG SPECIFICATIONS AND MEASUREMENT

SPECIFICATION 6.2 HARDWOOD LOG SPECIFICATIONS

Standard specifications for all hardwood log products are reproduced below. these specifications may be used as a general reference by Forest officers and contractors, however, because there may be small but significant variations to some log specifications in some Contracts to Supply and Contracts of Sale, the specifications included in those Contracts must be checked and used as the official specification in every case.

The standard hardwood log specifications reproduced below are:

(1) Premium grade sawlogs
(2) First grade sawlogs (jarrah, blackbutt and wandoo)
(3) First grade sawlogs (karri)
(4) First grade sawlogs.(marri)
(5) Second grade sawlogs (jarrah, blackbutt and wandoo)
(6) Second grade sawlogs (karri and marri)
(7) Veneer logs
(8) Bridge and jetty timbers
(9) Poles
(10) Mining timbers
(11) Chiplogs
(12) Charcoal logs
(13) Medium sawlogs (karri or marri for Moniers batten mill, Busselton)
(14) Regrowth sawlogs (karri or marri for Bunnings, Pemberton)
(15) Regrowth sawlogs (jarrah for Valwood)
(16) Sheoak sawlogs
(17) Non-engineering grade rounds ("fencing material")
(18) Domestic firewood logs

(1) **Premium Grade Sawlogs**

Species: Any hardwood species as nominated in Contracts to Supply and Contracts of Sale.

Dimensions :

length	- minimum 2.4m
diameter	- minimum 400mm underbark

Shape : logs will be straight

Quality : a maximum of 15% by volume of defective wood is permissible, as assessed on the worst end face, provided the defective wood is confined to the centre or heart of the log. No other defect is permissible.

General : logs must be delivered to mill landing for water spray storage within 5 days of felling.

(2) **First Grade Sawlogs** (jarrah, blackbutt and wandoo)

Species:jarrah, blackbutt and wandoo

Dimensions :

length	- minimum 2.1m
diameter	- minimum under bark 250mm

Quality : - minimum amount of millable wood - 50% as assessed by the FOIC.

(3) **First Grade Sawlogs** (karri)

Species:karri

Dimensions :

length	- minimum 2.4m
diameter	- minimum under bark 300mm

Quality : - minimum amount of millable wood - 50% as assessed by the FOIC.

(4) **First Grade Sawlogs** (marri)

Species:marri

Dimensions :

length	- minimum 2.4m
diameter	- minimum under bark 300mm

Quality : - minimum amount of millable wood - 50% as assessed by the FOIC.

Note: because assessment of quality in marri is difficult, the following guidelines may be used when producing marri first grade sawlogs:

* smooth bark usually indicates acceptable sawlog quality.
* cross cutting should be carried out on bends, kinks and swellings where gum and loose rings are likely to occur.
* tight gum rings are acceptable.
* no more than two separate loose rings or shakes should be permitted, provided their combined length does not exceed 20% of the circumference of the log.

Note: in recent Contracts, marri sawlogs are not graded, but are sold simply as "Marri Sawlogs" at buyers' choice.

(5) **Second Grade Sawlogs** (jarrah, blackbutt and wandoo)

Species:jarrah, blackbutt, wandoo

Dimensions :

length	- minimum 2.1m
diameter	- minimum under bark 250mm

Quality : - minimum amount of millable wood - 30% as assessed by the FOIC.

(6) **Second Grade Sawlogs** (karri and marri)

Species:karri and marri

Dimensions :

length	- minimum 2.4m
diameter	- minimum under bark 300mm

Quality : - minimum amount of millable wood - 30% as assessed by the FOIC.

Note: in recent Contracts, marri sawlogs are not graded, but are sold simply as "Marri Sawlogs" at buyers' choice.

(7) **Veneer Logs**

Veneer, or peeler, logs are prepared from high quality jarrah or karri logs according to the specification below:

a)

Diameter	Jarrah	Karri Old Growth	Karri Regrowth
Minimum:	310mm	500mm	350mm
Maximum:	650	1305	1305

b) Length
As nominated by the customer, with tolerance of +100mm. Ends to be cut square.

c) Rot - Not acceptable except at core. Specifications as for (e) below.

d) Heart - may be up to 120mm out of centre provided that the heartwood will be covered by the lathe chuck. Chuck sizes are 120mm for small logs and 210mm diameter for large logs.

e) Pipe - not permitted.

f) Borers, Pinholes - not permissible.

g) Shakes - Radial falling shakes, ring shakes and loose rings not acceptable. Star shakes acceptable so long as there is no associated rot and the shake diameter is not more than one half of the log diameter.

h) Shape - all logs to be reasonably cylindrical.

i) Limbs - sap limbs only are permitted.

j) Dry Sides - recent dry sides acceptable where the dry wood and checks are not more than 50mm in depth.

k) Gum - logs having large swellings indicating large pockets of gum not suitable. Gum rings are not acceptable but small gum pockets up to two per log face are acceptable.

l) End Coating - All logs to be coated both ends with petroleum jelly or some other suitable end coating to prevent end checking. Gang nail plates supplied by WESFI are to be fitted by the contractor to both ends of peeler logs immediately after preparation to assist in controlling end splitting.

(8) **Bridge and Jetty Timbers**

Species:jarrah, unless otherwise indicated.

(a) All Bridge Timbers prepared for sale to the Main Roads Department of WA must conform to the following specification:

"Specification for Supply of Untreated Round Timber" (MRD 1261, Oct 1986) for untreated jarrah bridge timbers. Forest officers should be familiar with this document. Bridge Timbers prepared for other orders may vary in specification depending on the requirements of the customer. All bridge timbers must be inspected and appropriately branded by a CALM round timber inspector prior to sale.

(b) All jetty timbers (piles) prepared for sale to Marine and Harbours must conform to the following specification. "Dept of Marine and Harbours Specification to Supply Timber Piles" (March 1986).

Again, Forest officers should be familiar with this document.

Measurement:

Bridge timbers are measured by recording

i) length rounded down to the nearest 0.1m
ii) crown diameter under bark rounded down to the nearest 10mm for piles.
iii) mid diameter under bark rounded down to the nearest 10mm for stringers and corbels.

(9) **Poles**

SEC Poles:

Poles prepared for sale to the State Energy Commission of WA (SEC poles) are classified according to:

i) length, and
ii) strength.

Nominated lengths increase in 1.5m increments from a minimum of 9.5m to a maximum of 21.5m. Strengths are specified in kiloNewtons and vary from a minimum of 2 to a maximum of 10, depending on diameter. All poles prepared for sale to SECWA are inspected by a qualified CALM round timber inspector. Only those poles passed, and identified by the inspector's brand and by the appropriate aluminium identification disc, may be sold to SECWA. The specifications for hardwood SEC poles are detailed in the following three documents:

* SEC of WA Specification No. ES/39/86 for jarrah poles for use without full length preservative treatment (1987 revision).

* SEC of WA Specification No. ES/37/86 for jarrah, marri and blackbutt poles for use after full length preservative treatment (1987 revision).

* SEC of WA Specification No. ES/8/89 for karri and yellow stringybark poles for use after full length preservative treatment.

Forest officers must be familiar with these documents.

Other Poles

Poles, other than for sale to the SEC may be prepared. There is no written specification for "other poles" because of the varying end use and hence standards of such poles. "Other poles" may be produced to any nominated length or diameter.

Measurement:

SEC Poles

SEC poles are measured by individual tally of poles in each length and strength (kilo Newton) class.

Other Poles

"Other Poles" are measured by recording:

i) length rounded down to the nearest 0.1m and
ii) crown diameter under bark rounded down to the nearest 10mm.

(10) **Mining Timbers**

General:

All timber supplied must comply with the Coal Mines Regulations Act 1946-76, Reg 70 (2) (b) and (c) which state:

(b) "Timber from which the bark has not been removed shall not be sent into the mine for any purpose.

(c) For the purpose of this regulation, timber which has a short grain shall not be suitable and on no account shall blackbutt be used as roof or side supports, nor shall red gum be used, except in the round for temporary props in pillar extraction."

Species: All timber supplied must be jarrah unless specific approval is obtained from the Superintendent of Underground Operations, Western Collieries Ltd (WCL).

Diameter : All timber supplied will be within the nominal crown diameter under bark sizes 125, 150 or 200mm. The allowable variation on each size is as follows:

125mm: - 12mm or +25mm
150mm: - 12mm or +50mm
200mm: - 12mm or +50mm

Crown size will be specified according to length and purpose of material ordered.

Note: (a) The most commonly required diameter is 125mm.

(b) Any variation in the nominal crown sizes specified will be the result of a special order from WCL.

Length :

All timber supplied will be within nominal lengths commencing at 1.8m and increasing in odd increments to a maximum of 6.0m. Lengths outside this range will be supplied by special order from WCL. Lengths will be supplied with ends sawn square. No under-length is accepted but up to 100m overlength will be accepted.

Note: The most commonly required lengths are 2.5 and 2.7m.

Quality :

All timber supplied must be green, that is, recently felled, and free from any bark, rot, cracks, splits or knots as far as practicable.

All timber supplied must be reasonably straight and must not deviate by more than half the crown diameter throughout the length of the prop, leg or bar.

Double heart will be accepted in the crown end provided heart centres are not separated by more than 33% of the diameter.

Insect and mechanical damage is acceptable provided it is confined to the sapwood.

Limbs, knots and branch stubs, must be trimmed flush with the sapwood surface. They must be sound and tight and not exceed 20% of the piece circumference measured immediately above the knot.

Tight gum rings are acceptable. Included sapwood and gum pockets must not exceed 12mm in radius, or 100mm in circumference.

To allow man-handling the surface of all timber supplied must be reasonably smooth and free of splinters.

Measurement:

Mining timbers are measured by recording:

i) length rounded down to the nearest 0.1m and
ii) crown diameter under bark rounded down to the nearest 10mm.

(11) **Chiplogs**

Species: marri and karri

(a) Old Growth

Dimensions :

Marri: length: minimum 3.4m
diameter: minimum under bark 230mm

Karri: length - minimum 2.1m
diameter - minimum under bark 150mm

Quality : The following defects are not permitted:

* charcoal in any form or quantity
* sharp kinks
* rot extending more than 50% of end face diameter
* saw cuts (test cuts) in logs greater than 900mm diameter

The following defects are permitted within the limits shown:

* double heart
* limbs which protrude less than 75mm from the stem
* curved logs provided the maximum deviation from straight does not exceed 150mm in any 3m length
* saw cuts (test cuts) in any log less than 900mm in diameter
* end face shatter of 50% in logs under 900mm in diameter.

(b) Regrowth, bark on

Dimensions :

Marri: length: minimum 3.4m
diameter - minimum under bark 230mm

Karri: length: minimum 2.1m
diameter - minimum under bark 75mm

Quality : Ditto old growth where applicable.

(c) Regrowth, bark off

Dimensions :

Marri: length: minimum 2.1m
diameter - minimum under bark 50mm

Karri: length: minimum 2.1m
diameter - minimum under bark 50mm

Quality :

* Ditto old growth where applicable
* At least 99% of bark removed.

(12) **Charcoal Logs**

Species: jarrah, bark on or bark off.

Moisture content : any moisture content, ie, "green" or "dry".

Dimensions :

length: minimum 1.8m
maximum as nominated by customer (currently 6.0m)

diameter : minimum underbark 150mm
maximum underbark 1200mm

Preparation : Lateral projections (branches, limbs, bumps) must not exceed 150mm.

Ends must be cut roughly square, and must consist of at least 50% by area of wood in one continuous piece.

Acceptable defects : The following log defects are acceptable, provided the log can be safely handled and transported.

* double heart
* charcoal
* pin holes
* shakes and splits
* dead wood
* gum in any form
* bends: up to a maximum of 200mm in any 3m length
* rotten wood up to a maximum of 25% as assessed by area of rot visible on worst end.
* pipe

Unacceptable defects : The following defects are not acceptable:

* visible evidence of termite activity
* shattered wood

(13) **Medium Sawlogs** (for Monier batten mill, Busselton)

Species: karri and marri

Dimensions :

length : minimum 2.4m
(Some logs of length greater than 7m may be supplied, but no logs between 5 and 7m may be supplied)

diameter : minimum under bark 200mm
maximum under bark 800mm
(Mostly between 200 and 300mm)

Quality : As set by the FOIC, but using the following quidelines:

* sweep - maximum 50mm in any 2.4m length
* rot - maximum 30% on worst end face
* limb stubs, bumps - maximum of one per lineal metre
* dryside - maximum of 50% of bole circumference
* pinholes - clean only, unacceptable if associated with rot
* swellings - large swellings unacceptable
* gum rings - maximum of one complete ring on end face.
* gum pockets - maximum of one per lineal metre
* logs greater than 300mm diameter must meet specification for karri first grade sawlog

(14) **Regrowth Sawlogs** (for Bunning's Pemberton mill)

Species: karri and marri

PART A:

Dimensions :
length : minimum 2.4m
diameter : minimum 200mm

Quality :

* sweep shall not exceed 30mm from log surface to the cord created by a straight edge or tight cord over the length of the log. Logs shall otherwise be of uniform shape.
* fungal decay not acceptable
* double heart, limbs, overgrowths, drysides, shatters and saw cuts other than superficial not acceptable
* borer damage, shakes and gum veins should be present to a negligible extent only.

PART B:

Dimensions :
length : minimum 2.4m
diameter : minimum 150mm

Quality :

* sweep shall not exceed 15mm from log surface to the chord created by a straight edge or tight cord over the length of the log.
* logs shall have smooth clean surface and be of uniform shape

* fungal decay not acceptable
* double heart, limbs, overgrowths, drysides, saw cuts other than superficial, borer damage, shakes, gum veins, shatters, epicormic growths and overgrowths are not acceptable

(15) **Regrowth Sawlogs** (For VALWOOD)

Species:	jarrah, karri and marri
Dimensions :	
length	minimum 0.9m
diameter	min. 200mm underbark max. 400mm underbark
Shape :	- bend are acceptable provided minimum of 0.9m of straight log available between bends and provided a maximum of 5% of any log is wasted when cutting out the bends at the mill.
Quality :	Defective wood will be limited to 20% of the large end and 10% of the small end.
General :	Logs will generally be supplied in bole lengths and must be delivered to mill landing for water spray storage within 5 days of felling.

(16) **Sheoak Sawlogs**

Species:	WA Sheoak (Allocasuarina fraseriana)
Dimensions :	
length	minimum 0.9m
diameter	minimum 200mm under bark
Shape :	bends are acceptable provided a minimum length of 0.9m of straight log is available between bends, and provided no more than 5% of any log is wasted when cutting out the bends at the mill.
Quality :	a maximum of 15% by volume of defective wood is permissable, as assessed on the worst end face.
General :	logs will generally be supplied in bole lengths and must be delivered to the mill landing within 5 days of felling.

(17) **Non-Engineering Grade Rounds** ("fencing material")

Species:	jarrah, marri, blackbutt, wandoo or any other hardwood species made available by CALM and acceptable to the buyer
Dimensions :	any dimension acceptable to the buyer but generally:
length:	minimum 1.8m maximum 6.0m
diameter:	minimum under bark 100mm maximum under bark 300mm
Quality :	any quality acceptable to the buyer, but generally:

* straightness - maximum deviation of 50mm in any 1.8m length
* double heart - acceptable
* deadwood - acceptable if not associated with decay
* pin holes - acceptable if not associated with decay
* decay - unacceptable
* shattered wood - unacceptable
* gum - acceptable

(18) **Domestic Firewood Logs**

Species:	jarrah, or any other species acceptable to the buyer
Moisture Content :	the logs will be predominantly "bush dry" ie. logs will be ex standing dead trees with most bark absent, or from logs that have been lying on the ground for at least three years.
Dimensions :	
length:	minimum 1.8m
diameter:	minimum under bark 150mm maximum under bark 1200mm
Unacceptable Defects :	

* decayed wood, if the proportion by volume is greater than 15%.
* shattered wood
* double heart or spiral grain likely to hinder manual splitting of sawn blocks

SECTION 6 - LOG SPECIFICATIONS AND MEASUREMENT

SPECIFICATION 6.3 SOFTWOOD LOG SPECIFICATIONS

Standard specifications for all softwood log products are reproduced below. These specifications may be used as a general reference by Forest officers and contractors, however, because there may be small but significant variations to some specifications in some Contracts to Supply and Contracts of Sale, the specifications in those Contracts must be checked and used as the official specification in every case.

The standard specifications reproduced below are:

(1) Peeler logs
(2) Particle board logs
(3) Industrial logs
(4) First class sawlogs
(5) Second class sawlogs
(6) Third class sawlogs
(7) Small sawlogs
(8) Rounds for treatment
(9) SEC poles

(1) **Peeler Logs**

Species:	Radiata or pinaster pine
Destination :	For supply to Wesfi Pty Ltd, Victoria Park.
Preparation:	Logs shall be freshly cut, square docked at both ends and have all branches flush trimmed.
Dimensions :	
length	Variable up to 2.56 metres and nominated by buyer. Tolerance will be nominal to +50mm.
diameter	Small end under bark not less than 35cm.
Defects :	The following log defects are not permitted:

* Blue stain
* Abrupt changes in diameter
* Massive knot whorls
* Individual dead knots exceeding 6cm in diameter

The following log defects are permitted to the limits shown:

Dead or decayed knots or knot holes up to 3 per whorl, biggest not to exceed 4cm in diameter on greatest axis.

No more than 1 whorl of cone holes in any length.

Sweep shall not exceed 20mm in any peeler length, measured from log surface to the chord created by a straight edge or tight cord.

Pith shall not be off centre at the small end by more than 20% or at the butt end by more than 25% of the smallest axis diameter.

Burnt bark provided the timber has not been affected.

End coating: logs shall be end coated promptly after preparation.

Identification: logs shall be end marked on one end with water based paint to identify the source of production. Colours will be allocated by the Department of Conservation and Land Management from time to time.

2nd Class Peelers : Logs prepared in good faith to the peeler specification but not to standard will be supplied as 2nd class peelers at a reduced stumpage.

(2) **Particle Board Logs**

Species: Radiata or pinaster pine

Preparation : Logs shall be freshly cut and have all branches flush trimmed. Logs shall be removed from the plantation within five days of cutting.

Dimensions : Diameter small end under bark: 10cm to 15cm with acceptance up to 30cm. If the 10cm diameter limit is reached beyond a length of 2.7m the length of that piece may be extended to 5.4m except that the minimum diameter shall not fall below 7.5cm. Large end diameter under bark shall not exceed 35cm.

Defects : The following log defects are not permitted:

* Blue stain
* Abrupt changes in diameter
* Sharp kinks
* Massive knot whorls

The following log defects are permitted to the limits shown:

Cone holes as they occur.

Bent or curved logs if they will pass through the barkers at Dardanup without interfering with production.

The moisture content of logs at the time of delivery shall not be less than 75%.

Burnt bark provided the timber has not been affected.

(3) **Industrial Logs**

Species:	Pinaster or radiata pine.
Preparation :	Logs shall be freshly cut and have all branches flush trimmed. Logs shall be removed from the plantation within five days of cutting.
Dimensions :	
length	A minimum of 4m ranging to a maximum of 5.4m.
diameter	Small end under bark not less than 75mm. Large end under bark shall not exceed 350mm.
Defects :	The following log defects are not permitted:

* Blue stain
* Abrupt changes in diameter
* Sharp kinks
* Massive knot whorls

The following log defects are permitted to the limits shown:

Cone holes as they occur.

Bent or curved logs if they will pass through the debarker without interfering with production.

Burnt bark provided the timber has not been affected.

(4) **First Class Sawlog**

Species:	Radiata or pinaster pine
Preparation :	Logs shall be freshly cut flush trimmed and square docked. Butts will be supplied as cut with sloven and withdrawn slivers but generally free from falling splits and shakes. The sloven will not be tallied in the length.
Dimensions :	
length	A minimum of 4.8m with increments of 0.3m plus overcut for board docking. Tolerance will be from +20cm to +50cm.
diameter	Small end under bark not less than 30cm. Logs with small end under bark not less than 20cm and not greater than 29cm shall be graded as Second Class Pine Sawlogs.
age	A minimum age of 25 years.

Defects :

The following log defects are not permitted:

* Blue stain
* Abrupt changes in diameter
* Massive knot whorls

The following log defects are permitted to the limits shown:

Individual dead knots not to exceed 6cm in diameter on greatest axis.

Sweep shall not exceed 20% of the small end diameter under bark in any 3.0m length measured from log surface to the chord created by a straight edge or tight cord.

Burnt bark provided that the timber has not been affected.

(5) **Second Class Sawlog**

Species:

Radiata or pinaster pine

Preparation :

Logs shall be freshly cut trimmed and square docked. Butts will be supplied as cut with sloven and withdrawn slivers but generally free from falling splits and shakes. The sloven will not be tallied in the length.

Dimensions :

diameter

(A) For logs 2.1m to 3.3m in length, small end under bark not less than 25cm.

(B) For logs 3.6m and longer, small end under bark not less than 20cm.

length

(C) For short logs of minimum age 18 years - a minimum of 2.1m with increments of 0.3m to 4.5m.

(D) For young long logs of age 18-24 years - a minimum of 4.8m with increments of 0.3m.

tolerance

Tolerance will be from +20mm to +50mm for board docking.

Defects :

The following log defects are not permitted:

* Blue stain
* Abrupt changes in diameter
* Massive knot whorls

The following log defects are permitted to the limits shown:

Individual dead knots not to exceed 6cm in diameter on greatest axis.

Sweep shall not exceed 20% of the small end diameter under bark in any 3.0m length measured from log surface to the chord created by a straight edge or tight cord.

Burnt bark provided that the timber has not been affected.

(6) **Third Class Sawlogs**

Species: Radiata or pinaster pine

Specification : CALM does not set any specification. Third Class Sawlogs are logs that do not meet the First or Second Class Sawlog specification. Selection of third class sawlogs is the responsibility of the log buyer.

(7) **Small Sawlogs**

Species: Radiata or pinaster pine

Preparation : Logs shall be freshly cut flush trimmed and square docked. Butts will be supplied as cut with sloven and withdrawn slivers but generally free from falling splits and shakes. The sloven will not be tallied in the length.

Dimensions :

length 2.1m, 2.4m, 2.7m, 3.0m and 3.3m. Tolerance from nominal to +50mm

diameter Small end under bark: 15cm to 25cm.

Defects : The following log defects are not permitted:

* Blue stain
* Abrupt changes in diameter
* Massive knot whorls

The following log defects are permitted to the limits shown:

Dead knots less than 5cm diameter on greatest axis.

Sweep shall not exceed 20% of Small End Diameter Under Bark along the total length measured from log surface to the chord created by a straight edge or tight cord.

Burnt bark provided the timber has not been affected.

(8) **Rounds for Pressure Treatment**

Species: Radiata or pinaster pine

Preparation : Logs shall be freshly cut square sawn at both ends, all branches flush trimmed and not display marked variations in diameter over the length.

Dimensions :

length From 1.8m upward in 0.3m increments to a maximum of 4.8m. Tolerance will be nominal to +50mm for 1.8m and -50mm to +50mm for all other lengths.

diameter Small end under bark 7-20cm. Supply will be in any range of diameters of 4cm or greater.

Defects : The following log defects are not permitted:

* Fractures
* Dry sides
* Overgrowths
* Unsound knots
* Termite damage
* Clusters of cone holes
* Insect damage other than limited superficial bark borer
* Fungal decay (except blue stain)
* Axe or saw cuts other than superficial and bearing in mind end use.

The following log defects are permitted to the limits shown:

Blue stain: limited so as not to interfere with the treatment process.

Limbs & Spurs: shall protrude not more than 5mm above the bark.

Sound knots: except when in a whorl or located such as to impair seriously the strength of the pieces.

Cone Holes:

Distance apart of Whorls	Small end diameters	
	12cm or less	More than 12cm
Less than 1m	1 hole/whorl	1 hole/whorl
1m or more	2 holes/whorl	3 holes/whorl + 1 for every 4cm of additional diameter

Sweep - The maximum allowable sweep in length measured from log surface to a chord created by a straight edge or cord at the points of greatest deviation will be:

SED cm	Sweep per metre of length
Less than 12cm	8mm
12cm or more	10mm

Burnt bark provided the timber has not been affected.

Variation from Specification :

A tolerance up to 5% variation from the above specification in any one parcel is to be accepted.

6-15% departure from specification - faulty material will be replaced.

Over 15% departure from specification - whole parcel will be replaced.

(9) **SEC Poles**

Species: Radiata or pinaster pine

Specification : Refer to "SEC of WA Specification No. ES/11/89 for pine poles for use after full length preservative treatment". (May 1989 revision)

Note:
CALM logging contractors do not produce SEC poles as such direct from plantations. Logs produced and delivered by CALM contractors to CALM pole dump are classed as "unprocessed rounds". Once an unprocessed round is prepared, inspected and passed, then it is classed as an SEC pole. Forest officers and contractors must however ensure that all "unprocessed rounds" sent to a pole dump have at least a 75% chance of being prepared into an SEC pole.

SECTION 6 - LOG SPECIFICATIONS AND MEASUREMENT

SPECIFICATION 6.4 MINOR FOREST PRODUCTS

The following list of minor forest products may be sold under pre-paid Forest Produce Licences using the appropriate, up-to-date royalty, in-forest and roading charges (refer Schedule 3 of Schedule of Royalties, effective 1 July 1990).

1. **Speciality Timbers**

Speciality timbers are high value timbers available in relatively small quantities only. They include "curly" jarrah, sheoak, karri oak, river banksia, bull banksia, peppermint and Warren River cedar.

Speciality timbers may be sold in the round or in the square, but preferably in the round.

Speciality timbers are available for sale from clearfell cutting areas only, or from opportunistic clearing such as SEC line clearing or road widening operations.

2. **Craftwood**

"Craftwood" is a term used to describe any piece of wood (except burls) remaining on the forest floor after the completion of integrated logging operations. A piece of craftwood is generally small in size, but with certain features of grain, colour or shape that make it suitable for manufacture into craft items. The issue of a Forest Produce Licence for collection of Craftwood is not intended to allow members of the public to establish a sawmilling business in the conventional sense.

3. **Domestic Firewood**

Commercial sale of domestic firewood from State forests using the pre-paid Forest Produce Licence has been phased out in CALM's Northern Forest Region and in Harvey District, but is still permitted elsewhere. Any timber lying on the ground may be sold as firewood, provided it cannot be sold as a higher value product. Standing dead trees may be felled, subject to faller certification rules, again provided such trees cannot be sold as higher value products.

A standard specification for domestic firewood when sold under Contract of Sale is included in Specification 6.2.

Members of the public may collect small quantities of firewood for their own use without any special written authority. Only ground salvage material however may be collected, up to a maximum of approximately 0.5 tonne per trip. Where "Public Firewood Areas" exist, the public is encouraged to use such areas.

4. **Chopping Logs**

Chopping logs are short lengths (about 65cm) of jarrah, karri or pine, used in the sport of log chopping. Chopping logs are sold individually.

5. **Non-Engineering Grade Rounds**

Non-engineering grade rounds include a range of products used for fencing purposes or for small domestic construction. They include posts (split or round), struts, strainers, rails and small poles.

Non-engineering grade rounds are measured by weight (ref. Spec 6.12) or by individual measurement of length (to nearest 0.1m) and small end diameter under bark (to nearest cm).

A standard specification for non-engineering grade rounds when sold under Contract of Sale is included in Spec 6.2.

6. **Garden Paving Slabs and Rings**

These are rings, about 7.5cm thick, cut from logs about 40cm in diameter. They are sold individually.

7. **Burls**

Burls are dense outgrowths on the side of trees. It is thought that they result from a tree's reaction to attack from insects or viruses. Burls may be cut from felled trees only. They are sold individually, according to diameter as measured on the cut face.

8. **Hollow Logs**

Hollow logs are used for landscaping and in aviaries. Only logs that may be handled manually are sold as hollow logs. They are sold individually.

9. **Blackboy Stumps**

Blackboy stumps are used in the woodcraft industry. Only dead blackboys may be used. Blackboy stumps are sold individually.

10. **Bean Sticks**

These are the long thin stems of various species of Melaleuca or Leptospermum (commonly known as "T-Tree"). The cut stems are used as plant supports in the market garden industry. Bean sticks are sold by the 100.

11. **Pine and Eucalypt Debris**

Branches, tree loppings or small cull trees may be supplied free of charge to Shires or other Government organisations for purposes such as sand dune restoration work. Other users must pay royalty, in-forest and roading charges as prescribed.

12. **Pine Needles**

Pine needles may be collected by the public for private use free of charge. Commercial users must pay a prescribed charge per bag (super or potato bag size).

SECTION 6 - LOG SPECIFICATIONS AND MEASUREMENT

SPECIFICATION 6.5 LOG MEASUREMENT

Section 92(5) of the CALM Act gives the Executive Director the power to determine the system of log measurement. Traditional methods accepted have included :

i) measurement of individual log volumes (eg. hardwood sawlogs).

ii) measurement of log volume by bin measure (eg. pine particle board logs).

iii) tally of logs by length class (eg. SEC poles).

iv) tally of logs by length and diameter class (eg. bridge piles).

and

v) measurement of logs by weight (eg. hardwood chiplogs).

The Department's preferred method of measuring logs is by weight, for reasons of efficiency and accuracy. All royalties, stumpages, supply contractors' rates and other charges have been or will be listed in rates per tonne.

This specification provides guidelines for the use of each of the above five methods.

1. **MEASUREMENT OF INDIVIDUAL LOG VOLUMES**

1.1 Hardwood logs

This is the traditional method used to measure hardwood sawlogs. For detailed instructions refer to the "Cubic Contents of Hardwood Logs" booklet (CALM, 1985).

In summary, this method requires measurement of length rounded down to the nearest tenth of a metre; and mid log diameter measured using a diameter tape at the middle of the log rounded up to the nearest 10mm, after allowing 10mm for each 100mm diameter of bark underneath the tape, up to a maximum of 70mm.

The "Cubic Contents of Hardwood Logs" booklet provides volumes in cubic metres to two decimal places for length classes up to 24.9m and diameter classes up to 5750mm.

Measurement of hardwood logs may be carried out by CALM's logging contractor at the bush landing or by the buyer at the mill landing. In both cases, every log measurement must be immediately recorded on both the log and the relevant Delivery Note. An exception to this may be when a logging contractor measures logs on a bush landing in advance of delivery, in which case the measurements are written on the end of the log and recorded on the Delivery Note at a later date prior to loading and delivery.

For further details on the recording of log measurements on Delivery Notes, refer to the instructions on the inside front cover of the appropriate Delivery Note book.

1.2 Softwood logs

Individual log volume measurement is the traditional method used to measure pine sawlogs, although the trend is towards alternative, more efficient, methods. Peeler logs are also measured individually.

For pine logs measured individually, diameter is measured under bark at the crown (small) end and rounded down to the nearest 5cm class. When the cross section at the crown end is not circular, the average of measurement along the greatest axis and the axis at right angles should be recorded. The measurement is recorded in centimetres rounded down to the nearest multiple of 5.0cm.

Length is measured as the shortest distance between the ends of a log and recorded as either:

(a) actual length rounded down to the nearest tenth of a metre;

or

(b) the "preferred" length, ie. rounded down to the nearest standard pine length. (These preferred lengths begin at 1.8m and increase in 0.3m increments up to 6.0m)

Log volumes for pine, when based on length and diameter, are provided by the "General Log Volume" tables for radiata and pinaster. These tables are built into CALM's Logging Operations Computer System (LOIS). These tables incorporate two rounding rules:

(a) length - the recorded length places the log in a pine "preferred" 0.3m log length class. The nominal or effective length used to calculate volume is the low end of the class.

(b) diameter - the recorded diameter places the log in a 5cm diameter class. The effective diameter used to calculate volume is the mid point of the class.

2. MEASUREMENT OF LOG VOLUME BY BIN MEASURE

Bin measure is currently used in the softwood industry only. It is the method used to measure particle board logs and rounds for treatment, and sawlogs at some mills. Bin measure has the advantage of being quick and effective, but it is not an applicable method if logs are carted in anything but fixed lengths.

Bin measure involves the measurement of the height of a fixed width load or "bin" of logs, of a given length, then conversion of the gross volume obtained to a net log volume using a pre-established conversion factor. The conversion factor takes account of the space occupied in the bin by airspace and bark.

The standard width between stanchions on trucks is 2.2m.

The detailed procedure for measuring bin volume and loading trucks is as follows:

* An official measuring stick supplied to the customer by CALM is used to measure height in 10cm intervals.

* Each bin is measured in the centre and at each end, to the nearest 10cm, and the average of these measurements recorded on the pine delivery note.

* For identification, the bins are listed from the front to the rear of the truck when recorded on the D/Note.

* Before recording, agreement must be reached on the measurement by the mill representative and the truck driver.

* The D/Note must be signed by both parties.

* The bin volume is calculated from an official table prepared by CALM for each particular product and species. The sum of the individual bin heights for each length is applied to the tables.

* The loading of the bins by the contractor must satisfy the FOIC that the bin conversion factor, as determined for that particular operation, is applicable to that load. Logs must be stacked uniformly with no crossed logs.

* The driver will be responsible for ensuring the top of each bin is trimmed level enough to ensure the correct application of the bin conversion factor.

* If the FOIC is of the opinion that the loading of any bin is such as to cast doubt on the application of the authorized bin conversion factor, the contractor must unload the bin and reload to the FOIC's satisfaction.

* All measurements must be taken while the load binder chains are still secured.

Calculation of bin conversion factor:

The conversion factor is the wood volume under bark expressed as a fraction of the gross bin volume and requires:

(a) measurement of gross bin volume (ie. length x width x height of the bin).

(b) measurement of wood volume under bark in the bin (ie. gross bin volume x conversion factor).

Example: gross bin volume = $10m^3$
wood volume under bark = $6m^3$
conversion factor = 0.6

Wood volume under bark is calculated from each log using Smalian's formula:

$$\text{Volume of each log } (m^3) = \frac{(Bc + Bd)}{2} \times L$$

Where Bc = Crown end basal area
Bb = Butt end basal area
L = Length

When developing a bin conversion factor, Bin Volume Measurement Record sheets, supplied by Inventory Branch, must be used to record crown and butt diameters. At least nine bins must be measured and a statistical test applied to check the variation in the factor calculated.

3. TALLY OF LOGS BY LENGTH CLASS

This is the method currently used to determine volume of SEC poles, and volume of "unprocessed round" logs produced from forest or plantation specifically for SEC poles.

These logs are recorded by tally by length on the applicable Delivery note (for unprocessed rounds) or Inspection Certificate (for passed SEC poles). Nine lengths are recognized, each with a nominated volume:

9.5	-	0.55m^3
11.0	-	0.72
12.5	-	1.12
14.0	-	1.29
15.5	-	1.61
17.0	-	2.01
18.5	-	2.38
20.0	-	2.67
21.5	-	3.00

CALM's Logging Operation Computer System (LOIS) is programmed to calculate total volumes of SEC poles on Inspection Certificates using these nominated volumes.

Volume of "unprocessed rounds" on a Delivery note must be manually totalled using these nominated volumes and the total volume entered into LOIS.

4. TALLY OF LOGS BY LENGTH AND DIAMETER CLASS

This is the method currently used to determine volume of inspected and passed bridge or jetty timbers (piles, stringers and corbels) after recording on an Inspection Certificate.

Lengths are recorded after rounding down to the nearest 0.1m and diameters are recorded after rounding down to the nearest 10mm. Note: diameter is measured at crown end for piles, and mid log for stringers and corbels.

CALM's Logging Operation Computer System (LOIS) is programmed to calculate total volumes of passed bridge timbers based on "bridge timber volume tables".

Note: Volume of "unprocessed rounds" produced from forests specifically for bridge timbers is obtained by normal measurement and recording of individual logs on the standard volume Delivery note.

5. MEASUREMENT OF LOGS BY WEIGHT

5.1 Applications to use Weighing Equipment

Buyers of logs wishing to use weighing equipment for measurement of logs must apply in writing to :

The Executive Director
Department of Conservation and Land Management
50 Hayman Road
COMO WA 6152
Attn : Manager, Timber Production Branch

The application must include :

i) Address of mill or processing centre receiving logs,

ii) details of make of weighing equipment to be used,

iii) details of where the weighing equipment is to be installed or details of an existing weighbridge to be used,

iv) details of the weighbridge ownership, including (if a public weighbridge) the registered weighbridge number,

v) dimensions of the deck and capacity of the weighbridge or other equipment,

vi) details of the printer coupled to the weighing equipment (see 3 below).

and

vii) a copy of the certificate issued by the Weights and Measures Branch, Department of Consumer Affairs, certifying the accuracy of the weighing equipment.

*The Executive Director will confirm in writing permission to use a particular weighbridge or other equipment for measurement of logs by weight and only such approved equipment will be use.

5.2 Minimum Standards of Printer

*Any weighbridge used must be fitted with a printer which will print, at one printing, at least the following information :

i) time and date of weighing,

ii) place of weighing to identify the weighbridge used,

iii) weight to the nearest 0.1 tonne,

iv) identification of the weighing as either gross or tare.

*It is preferred that printers be able to accept one of CALM's two Log Delivery Notes (Weight). These are :

i) CLM 821A, designed to fit an Avery Printer type "8663"
and

ii) CLM 821T, designed to fit a Toledo printer type "matrix 8806"

*If either of the above two CALM Log Delivery Notes (Weight) do not fit a particular printer, the Executive Director may accept use of such a printer provided the ticket produced details at least the information listed in 3.1 above. Original printer tickets in this case must always be affixed to the original copy of a CALM Log Delivery Note (Weight).

*For weighing equipment other than weighbridges the arrangements for recording the results of the weighing will be considered on an individual basis.

5.3 Weighing Procedures

* When the weighbridge is located at the customer's log receival yard :- trucks must be weighed loaded immediately before unloading, then weighed immediately after unloading, to establish gross and tare weights respectively. The load weight is the difference between the two weighings.

* When the weighbridge is not located at the customer's log receival yard :- trucks must be weighed loaded enroute to the customer's yard, then weighed empty on the return journey to the bush. If the weighbridge printer has a fixed tare weight facility, the weighing of the empty truck after each trip may be obviated. In these cases the fixed tare weight measurement must be made when the truck's fuel tank is a least three-quarters full.

* If a log truck consisting of a truck unit and a trailer unit cannot be weighed complete because of the total length of the rig, each unit must be weighed separately and recorded on separate CALM Log Delivery Notes (Weight).

* In situations where the printer does not accommodate a CALM Log Delivery Note (Weight), the weighbridge operator or truck driver must immediately :

  i) affix the original weighbridge ticket to the original copy of the CALM Log Delivery Note (Weight),

  and

  ii) copy the same information onto the duplicate, triplicate and quadriplicate copies of the CALM Log Delivery Note (Weight).

5.4 Procedures Following Breakdown of Weighing Equipment

* When a breakdown occurs measurement must immediately revert to one of the following, as specified by the Executive Director :

  i) Log volume determination by individual log measurement,
  ii) bin measurement,

  or

  iii) use of average truck load weights based on the previous two month's actual measurements for each individual truck used, for a given product. The specified method must continue until the equipment is repaired and recertified by the Weights and Measures Branch.

  The appendix lists all currently approved weighbridges used to measure logs sold under CALM Contracts of Sale, their location, and the approved method of log measurement in the event of weighbridge breakdown.

* Any additional costs associated with log measurement in the event of breakdown of weighing equipment is the responsibility of the log buyer.

* For 5.1 (i) and (ii) above, log volume measurements must be recorded on the appropriate CALM Log Delivery Note (Volume), all four copies of which must be promptly forwarded to the appropriate CALM office. Volumes recorded will be converted to weight by CALM and details transferred to the appropriate CALM Log Delivery Note (Weight). Financial transactions will then continue on a per tonne basis in the normal way.

5.5 Minor Forest Products

Some forest products, in particular domestic firewood and non-engineering grade rounds (posts, rails, strainers, etc) are required to be recorded by weight. In many cases these products are transported from the forest in trucks of small capacity. Ideally every truck load should be measured on an approved weighbridge, however, because of the relatively low value of small loads of these products, a standard load weight for each particular truck can be accepted. This standard load weight must be the legal load weight, or net weight, for the particular truck. Unless the load is measured on an approved weighbridge, no other load weight will be accepted.

5.6 GENERAL

* If in the opinion of the Executive Director the system of weight measurement in use is abused, he can at any time direct that log measurement immediately revert to log volume determination.

* Forest Regulations 51, 58, 59, 60, 61 and 62 are applicable to the subject of log measurement.

APPENDIX

LIST OF APPROVED WEIGHBRIDGES AND PROCEDURES IN EVENT OF WEIGHBRIDGE BREAKDOWN

LOCATION	CUSTOMER(S)	ALTERNATIVE LOG MEASUREMENT PROCEDURE
1. Diamond Mill yard, Manjimup	Bunnings Forest Products	Average truck load weights
2. Deanmill Mill yard, Deanmill	Bunnings Forest Products	Individual log measurement
3. Pemberton Mill yard, Pemberton	Bunnings Forest Products	Individual log measurement
4. Power's Mill yard, Busselton	(i) K D Power (ii) Whiteland Milling	Individual log measurement Average truck load weights (for sheoak only) otherwise individual log measurement
5. Simcoa yard, Kemerton	Simcoa	Average truck load weights.
6. Nannup Mill yard, Nannup	Bunnings Forest Products	Individual log measurement.
7. Moniers Mill yard Busselton	Monier Roofing Pty Ltd	Individual log measurement

October 1990

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.1 SALE OF LOG PRODUCTS

1. There are two ways in which log products may be sold :

   i) Contract of Sale (either credit or pre-paid) - authorized by S.O.H.Q.

   and

   ii) Forest Produce Licence (pre-paid) - authorized by Districts.

2. Contracts of Sale may extend for periods up to 15 years. In most cases, payment for logs is made after delivery by a CALM employed logging contractor. In these cases the customer must have lodged security in the form of a cash deposit or a bank guarantee.

3. The Forest Produce Licence (form CLM165) may be used by Districts to sell minor forest products, including "Craftwood". All products sold under a F.P.L. must be paid for in advance.

4. Mill Returns

   4.1 All buyers of log timber under Contract of Sale are required to submit, to the CALM District Office, a Monthly Mill Intake Summary on form CLM183. The CLM183 is produced in book form; instructions for completion of the form are printed on the book cover.

   4.2 All registered mills must, in January and July of each year, submit a return to CALM's State Headquarters on form CLM182, being a "Summary of Milling Operations" for statistical purposes.

5. Simultaneous Operations on Crown Lands and Private Property

   If a buyer of log timber under Contract of Sale wishes to cut timber from private property and Crown Lands simultaneously, he must apply for permission to do so by writing to the relevant CALM District Manager (FOIC). The letter must state the location numbers from which the timber is to be obtained, the names of the owners, PP brands, estimated volumes, the names of logging operators to be engaged in the work, and the dates during which the work is to take place.

   Assuming permission is given to operate simultaneously, the above information will enable District procurement staff to monitor log haulage in their District, and efficiently carry out mill landing inspections.

   All deliveries of private property timber to a crown land mill must be recorded on a CALM log delivery note. (A special "private log" delivery note is currently being prepared for this purpose.)

6. Royalty-Free Timber

   The only timber product that can be taken from State forest free of any royalty charge is firewood from the forest floor for private domestic use. (See also Specification 6.11.) Any request for royalty-free timber from sporting or charitable organisations must be referred in writing, with recommendation, to the Executive Director.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.2 T.I.R. ACT AND REGISTRATION OF MILLS

1. The Timber Industry Regulations Act (1926-1969) provides regulations to ensure the health and safety of personnel involved in the timber industry. The regulations cover all components of the timber industry from log harvesting to log transport to log milling and primary processing, and log preservative treatment.

2. The T.I.R. Act and Regulations are enforced by District Inspectors who now work under a Controlling Officer from the Department of Health Safety and Welfare. These inspectors are based at Bunbury and Manjimup and may be contacted for advice or assistance by any Forest Officer or logging contractor on matters related to health and safety in the timber industry.

3. Forest Officers are required to have a reasonable knowledge of the T.I.R. Act and Regulations. Forest Officers must inform a District Inspector of any unsafe machinery, working conditions or work methods which are likely to lead to accidents. Forest Officers must also assist District Inspectors in obtaining prompt compliance with the provisions of the T.I.R. Act.

4. Registration of Mills

   Every mill used in the timber industry must be registered under and in accordance with the regulations made under the T.I.R. Act. Applications for registration must be made on the prescribed form, available from CALM's SOHQ. Registration is effected upon issue of a certificate with effect for the year ending 31 December.

   Mills not requiring registration include sawmills or benches belonging to farmers or hobbyists not involved in cutting timber for sale or profit.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.3 L.O.I.S.

1. "L.O.I.S." is the Department's "Logging Operations Information System", a computer system designed to handle the data processing and recording requirements for all aspects of CALM's hardwood and softwood logging activities.

2. The system is described in a number of documents :

   i) LOIS Reference Manual (a comprehensive loose leaf folder describing the system in detail for audit requirements).

   ii) LOIS System Codes (an A5 sized loose leaf folder containing all computer codes required to use the system)

   iii) Field Officers Guide to LOIS
   and
   iv) District Clerical Officers Guide to LOIS

   } (Small booklets designed to assist users of the system)

   CALM Staff dealing with LOIS must have access to these documents.

3. Initiation of a Contract of Sale in LOIS

   Before a sale of log timber can occur, the computer system must be loaded with information about the sale. This is done at SOHQ via the "Initiation of Timber Sale Document" (form CLM216). This is a one page form summarizing essential information about a Contract of Sale. Districts must receive a copy of the CLM216 before (i) the Logging Operation Prescription form (CLM709) can be completed and (ii) before production and/or deliveries can commence.

4. Logging Operation Prescription

   The Logging Operation Prescription form (CLM709) must be completed by Districts, and input into LOIS by Regions, before cutting can commence. The CLM709 provides the computer with base information about each logging operation in the field.

   Before the start of each logging year, it is advisable that District Staff and Regional Inventory staff meet to jointly prepare all CLM709 forms to cover all planned operations for the forthcoming year. Changes to 709 forms during the year must be authorized by the FOIC or the FOIC's nominated representative.

5. Delivery Notes

   The key to recording movement of log products is the Delivery Note. This is a one page document (in quadriplicate) which must be completed for each and every truck load of logs carted from State forest or any other land on which CALM manages the logging operation. If two different log products are carted at one time, two D/Notes must be completed, one for each product.

   All payments to contractors and invoices to customers are based on the original copies of the Delivery Notes, therefore great care must be taken, by truck drivers in particular, to neatly and correctly complete all relevant parts of the D/Note before leaving the bush landing or plantation roadside. Failure to do so is a serious offence.

Detailed instructions for completion of D/Notes are written on the inside front cover of every D/Note book. Damaged D/Notes must be kept in D/Note books, and completed books must be promptly returned to a CALM office, preferably the office from which the books were issued.

Forest officers must regularly check D/Notes in the field to ensure correct procedures for their completion are being followed. 5% of all D/Notes originating in any one District must be checked each month.

For deliveries of logs from private property by logging contractors not employed by CALM, a "private log" delivery note must be used (currently being prepared). This D/Note will also be used to authorize transfer of logs from one mill to another and other situations not involving a monetary transaction with CALM.

All original D/Notes, after processing by CALM, must be promptly forwarded to SOHQ on a monthly basis with the appropriate "Monthly Mill Intake Summary" sheets (CLM 183).

6. LOIS Input Documents

Delivery notes are just one of the several types of Input Documents that are used to "update" LOIS. A list of current Input Documents follows:

i) CLM823 Hardwood Log Delivery Note, used for logs measured individually.

ii) CLM821T Hardwood Log Delivery Note, used for logs measured by weight using a Toledo printer.

iii) CLM821A Hardwood Log Delivery Note, used for logs measured by weight using an Avery printer.

iv) CLM125C Round Timber Inspection Certificate, used for round timbers inspected by CALM.

v) CLM076 Log Credit Note, used for logs measured individually.

vi) CLM810T Log Credit Note, used for logs measured by weight using a Toledo printer.

vii) CLM810A Log Credit Note, used for logs measured by weight using an Avery printer.

viii) CLM100 Incorrect D/Note Adjustment Form, used to adjust incorrect volumes or tonnages or workcodes when discovered after the half monthly accounting period.

ix) CLM102 Hardwood Incorrect Rate/Price Adjustment (SOHQ use only).

x) CLM173 Private Log Delivery Note (Hardwood and Softwood) volume measure.

xi) CLM... Private Log Delivery Note (Hardwood and Softwood) weight measure.

xii) CLM544 Softwood Log Delivery Note.

7. Distribution of Hardwood Delivery Note Copies

Delivery Notes are produced in quadruplicate. It is essential that the various copies are distributed correctly. The table on the next page shows, for different hardwood logging situations, the correct procedures regarding D/Note distribution.

(For softwood logging operations, all logging is carried out by CALM employed contractors. The original copy of the D/Note is either left at the customer's mill, or returned by the contractor to the CALM District from which the logs were harvested.)

DISTRIBUTION OF HARDWOOD DELIVERY NOTES

EXAMPLE **D/NOTE COPY**	**1.CUSTOMER DOES OWN LOGGING**	**2.CUSTOMER EMPLOYS CONTRACTOR TO DO LOGGING**	**3.CALM SUPPLIES CUSTOMER VIA A SINGLE CALM LOGGING CONTRACTOR**	**4.CALM SUPPLIES CUSTOMER VIA TWO CALM LOGGING CONTRACTORS**	**5.CALM LOGGING CONTRACTOR DOES FALLING EXTRACTION & LOADING: CUST. EMPLOYS CARTAGE CONT. TO CART**
WHITE ORIGINAL	TO CUSTOMER THEN TO LOCAL CALM OFFICE AS ARRANGED BY CALM	ditto	ditto	ditto	ditto
PINK DUPLICATE	TO CUSTOMER	ditto	ditto	ditto	ditto
GREEN TRIPLI-CATE	TO CUSTOMER	TO CUST.'S CONTRACTOR	TO CALM'S LOGGING CONTRACTOR	TO CALM'S LOGGING CONTRACTOR DOING THE CARTAGE. OTHER CONTRACTOR MUST BE GIVEN PHOTOCOPY OF WHITE ORIGINAL BY CALM	TO CUST.'S CARTAGE CONTRACTOR. CALM'S CONTRACTOR MUST BE GIVEN PHOTO-COPY OF WHITE ORIGINAL BY CALM
YELLOW QUADRUP-LICATE.	STAYS IN BOOK	ditto	ditto	ditto	ditto

Note:

i). Separation of the original, duplicate and triplicate copies of the D/Note must not take place until logs are measured or weighed.

ii). CALM bases all invoicing to customers and all payments to CALM logging contractors on white original copy only. Authorization from Timber Production Branch is required before using any copy other than the original for LOIS input.

iii). Yellow copy always stays in book as backup copy only.

iv). Completed D/Note books must be returned to a CALM office, preferably the office from where books were issued. New books will not be issued unless used books are returned.

v). Unless otherwise arranged, all customers must keep the white original copy of the D/Note at his sawmill or processing plant to enable mill landing inspections to be carried out. These D/Notes are then collected by CALM, unless other arrangements are made.

8. Rates and Prices

The Timber Production Branch of the Department produces and maintains, through LOIS, official Contractors' rates, and prices to customers.

Users of LOIS can access these rates and prices through LOIS.

Amendments to the rates and prices usually take place:

i) on 1 April and 1 October each year to accommodate CPI or TPI increases on royalties, stumpages and standard Departmental logging charges.
ii) on 1 January and 1 July each year to accommodate CPI increases on contractor's rates, and
iii) at any time to accommodate a general royalty/stumpage review.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.4 LOGGING AND LOG SALE CONTRACTS

1. There are two main types of contracts initiated by Timber Production Branch :

   i) Contracts to Supply, and

   ii) Contracts of Sale.

   1.1 Contract to Supply

   This is where a logging company is contracted to CALM, to supply one or more types of forest produce from State forest or other land managed by CALM, and including private property, as planned and directed by CALM. In this case "supply" may involve one or more of the following:

   i) "production" of the produce (ie, falling, extracting, preparation and sorting).

   ii) individual log measurement on the bush landing.

   iii) loading and

   iv) hauling.

   Contractors may be engaged by CALM by:

   i) the acceptance of a tender after advertisement of a Contract to Supply, or

   ii) by the acceptance of a quote requested by CALM for a specific task.

   Contracts to Supply are numbered according to:

   i) The year the contract was signed,

   ii) The species of timber involved, and

   iii) The number of the contract in that particular year. For example, Contract 86/J3 was commenced in 1986, it involves jarrah, and it was the third contract signed in 1986. If more than one species is involved, the letter H, indicating hardwood, is used.

1.2 Contract of Sale

This is where a customer contracts to buy a specified quantity of forest produce from CALM. Produce sold under a Contract of Sale is usually supplied by a CALM contractor under a Contract to Supply. Contracts of Sale are entered into:

i) after an agreement is reached between a customer and CALM or
ii) after a specified quantity of produce is sold by auction or tender.

Contracts of Sale are identified by a three digit number.

In all Contracts of Sale the Department aims to recoup at least the following:

i) the cost of production and delivery (as per the Contract to Supply)
ii) a sum of money to cover administration of the Contract to Supply and the Contract of Sale.
iii) the Royalty or Stumpage for the produce
iv) a sum of money for roading,
v) a sum of money for "in-forest-costs" (for example, the costs of tree marking). and
vi) the cost of timber inspection by CALM Timber Inspectors (if applicable)

The total of the above costs is sometimes referred to as the "upset" or "reserve" price.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.5 REGISTRATION OF TIMBER WORKERS AND BRANDS

1. All persons regularly engaged in the cutting and removal of timber from State Forest or timber reserves must be registered, as required by Section 128(1)(d)(v) of the CALM Act. "All persons" includes the manager of any mill obtaining log supplies under a Contract issued by the Department, but does not include persons employed at that mill. Persons who only occasionally cut and remove timber from the forest, for example once-off or occasional minor forest produce operators, are not required to be registered.

2. To register, a timber worker must complete an Application for Registration as a Timber Worker (Form CLM014). This application must be endorsed by a local Forest Officer then recorded in LOIS at the District office. That person is then issued with a Timber Workers Certificate (CLM430) in return for the appropriate fee. A Timber Workers Certificate must be renewed annually.

3. **Fallers Brands**

   Every person engaged in felling of hardwood timber must have a registered brand. A brand, used to brand stumps of trees felled, and all logs produced, must be applied for in the same way as a Timber Workers Registration Certificate. (Note: These rules are currently being reviewed in conjunction with preparation of the new Forest Resource Management Regulations under the CALM Act.)

   Before issuing a registered brand, a Forest Officer must satisfy himself that the faller has been examined and recommended by an authorised faller assessor under the faller certification procedures administered by W.A.F.I.T.C. (W.A. Forest Industries Training Council).

4. **Timber from Private Property**

   All logs cut on private property for sale must be distinctly branded with the registered brand of the owner of the private property, before such timber leaves that property. To obtain a brand a private property owner must complete an Application for Registration of Private Property Brand (Form CLM083). This form must be processed at Districts through LOIS. Once a brand is issued, the holder may use that brand on all timber cut on any property he lawfully owns.

   In cases where timber is "resumed" from private property, for example by the Main Roads Department, then the private property owner is not required to hold a brand. In these cases, a written authority will be issued by the Government Department concerned to the contractor removing the timber.

5. All records of timber workers registrations, fallers brands and private property brands, as well as CALM treemarking axes and timber inspection hammers, are maintained in LOIS. (CALM's Logging Operations Information System)

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.6 SUPPLEMENTARY CUTTING

1. From time to time quantities of sawlog, or other log product types, not included in a current logging plan, need to be harvested at short notice. For example, minesite clearing areas, clearing for public utilities, wildfire damage, or research cutting areas.

2. In these situations the District Manager must consider:

   i) the tenure and land use priorities of the area in question and
   ii) the estimated quantity of log product involved.

3. If logging is authorized on the area in question, a logging plan must be initiated by the District Manager and prepared and approved in the normal way prior to logging.

4. Log products from approved supplementary cutting areas should be sold to existing Contract of Sale customers as part of their annual log intakes. If the quantity of log timber is in excess of current requirements, the District Manager should advise the Manager, Timber Production Branch. The advice should include:

   i) the area and location of the resource,
   ii) the quantity and quality of log products involved,
   iii) if applicable, the name of the CALM logging contractor in best position to carry out the logging,
   iv) if applicable, potential customers to which the log products may be sold,
   v) a time scale of the proposed logging operation.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.7 MILL LANDING INSPECTIONS

1. Log landings at all mills receiving individually measured logs under Contract of Sale from CALM ("Crown Land" Mills) must be inspected by a Forest Officer. The inspections should be carried out at least twice per month, but not on the same days each month.

2. When applicable, the party responsible for measuring individual logs (either the customer or the CALM logging contractor) must record the following information on the end of each log measured :

   i) D/Note number
   ii) Log Number (for that D/Note)
   iii) Length
   iv) Diameter

3. At each inspection, the Forest Officer must check the measurements on about six logs on the landing. The measurements taken must be checked against the measurements previously recorded by the mill on the appropriate D/Note. The Forest Officer must initial and date the D/Note entries checked.

4. The Forest Officer must record his visit in the "Mill Log Landing Inspection Record Book" (CLM096). This book is kept at each mill as a permanent record of all mill landing inspections. Any discrepancies, or departure from the correct procedure, with regard to numbering or measuring logs or the recording of measurements on the D/Notes, must be:

   i) recorded in the "Record Book" and
   ii) reported promptly to SOHQ via the District Manager and the Regional Office.

5. To check log measurements a Forest Officer must have a clear understanding of the method of measuring hardwood logs, as described in the CALM booklet: "Cubic Contents of Hardwood Logs". (1985).

6. Where a mill receives weight or bin measured logs under Contract of Sale from CALM, the above procedures do not apply. However, landing inspections must still be carried out and the mill log landing Inspection Record Book completed. During inspections at these mills the Forest Officer must check for:

   i) branding on logs.
   ii) separation of crown land and private property logs on the landing.
   iii) correct use of weighbridge or bin measuring equipment.
   iv) correct completion of D/Notes.

7. Below is a list of all current Crown Land mills (NB: excludes buyers of minor forest products such as domestic firewood and fencing material.)

(a) **Hardwood**

Company	Location of Mill	CALM District resp. for mill land. inspection
1. Pickering Brook Sawmills	Pickering Brook	Mundaring
2. Hamilton Sawmill	Osborne Park	Mundaring
3. Jarrah Case Factory	Bayswater	Mundaring
4. Ashfield Sawmill	Yokine	Mundaring
5. Stefanelli Sawmill	Middle Swan	Mundaring
6. Mountain Movers	Welshpool	Mundaring
7. Kaleema Sawmills (Hollingsworth)	Malaga	Mundaring
8. Inglewood Products Group	Malaga	Mundaring
9. Bunnings	Jarrahdale	Jarrahdale
10. P Colli and Son	Mundijong	Jarrahdale
11. Wesfi	Victoria Park	Jarrahdale
12. Coli Timber Merchants	Gosnells	Jarrahdale
13. Timber Traders Cockburn	Spearwood	Jarrahdale
14. Bunnings	Dwellingup	Dwellingup
15. F Muller & Co	Wandering	Dwellingup
16. W J & K Timber Co	Mandurah	Dwellingup
17. Bunnings	Yarloop	Harvey
18. C V Wood	Waroona	Harvey
19. Simcoa	Kemerton	Harvey
20. W.U.R.C.	Harvey	Harvey
21. Bunnings	Collie	Collie
22. G W & N L Saunders	Collie	Collie
23. T Tilbrook	Collie	Collie
24. S W Sawmill (Allen)	Waterloo	Collie
25. G Coli	Darkan	Collie
26. Whittakers	Greenbushes	Kirup
27. Adelaide Timber Co	Wilga	Kirup
28. Preston Timber Co (Coli)	Argyle	Kirup
29. Bedford Bros	Brookhampton	Kirup
30. Blackwood Timber Milling (Holroyd)	Bridgetown	Kirup
31. Bunbury Sawmill (Giovanetti)	Picton	Busselton
32. K D Power	Busselton	Busselton
33. P Colli & Son	Busselton	Busselton
34. J House	Yallingup	Busselton
35. IPE Packaging	Busselton	Busselton
36. Adelaide Timber Co	East Witchcliffe	Busselton
37. Monier Roofing	Busselton	Busselton
38. Whiteland Milling	Busselton	Busselton
39. Margaret River Sawmill (Rowe)	Margaret River	Busselton
40. Bunnings	Nannup	Nannup
41. Bunnings	Deanmill	Manjimup
42. Bunnings	Nyamup	Manjimup
43. Bunnings	Jardee	Manjimup
44. Gandy Timbers	Jardee	Manjimup
45. Bunnings	Diamond	Manjimup

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.9 CONDEMNING OF LOGS

1. Log products that do not meet the product specification may be condemned or "written off" by a Forest Officer at either:

   i) the stump
   ii) the bush landing or
   iii) the customer's mill landing.

2. Consistent with the need for full utilization, the FOIC must take all reasonable steps to ensure that all logs hauled from a logging operation under his control meet the relevant specification.

3. At the stump or bush landing, below standard logs may be condemned by the Forest Officer in Charge of the logging operations, or by any Forest Officer under the FOIC's control. Such logs are marked with a yellow crayon cross on one end. This "crossing out" also implies that the log in question is unsuitable for preparation into any alternative log product being supplied from that particular logging operation. Logs condemned to a lower grade specification should have the recommended grade chalked on the log in yellow crayon and initialled by the Forest Officer.

4. Logs loaded onto buyers transport may be condemned at the bush landing only.

5. Any logs condemned at a mill landing by the authorised Regional Forest Officer must be measured or weighed, and recorded on a Hardwood Log Credit Note (CLM076, CLM810T or CLM810A).

6. Logs delivered by a CALM contractor may be condemned at a customer's landing.

   The conditions for acceptance of a request for write off of logs by a customer are as follows:

   i) Requests for rejection by the buyer must be made in the first instance to the FOIC of the coupe from which the logs were obtained or if this is not possible to the FOIC of the Forest District to which the mill makes its reports.

   ii) Logs must have been delivered to the mill landing by a CALM contractor who is not also the sawmiller receiving the logs.

   NB: It is assumed that when the buyer buys logs at the bush landing he exercises his right of rejection there and therefore no write-off at the mill will be considered.

   iii) Logs must not have been selected by a representative of the buyer.

   NB: It is assumed that when the buyer buys logs at the bush landing he exercises his right of rejection there and therefore no write-off at the mill will be considered.

   iv) The buyer must be in a position to identify without question the source of the logs.

v) A request must be made within a reasonable time of receipt of the logs, ie. no consideration will be given to requests for rejection of logs which have obviously deteriorated since receipt by the buyer.

The buyer can request rejection of logs supplied to him as follows:

i) Individual logs can be put aside for later examination by CALM and the buyer. These logs must however, be included at the time of delivery in the system of measurement being used by the buyer.

ii) An individual bay of any truck load can be rejected by the buyer and not unloaded. This therefore, does not become part of the delivered log tally.

iii) A whole truck load of logs can be rejected by the buyer and not unloaded and therefore does not become part of the delivered log tally.

Caution should be taken by any buyer when exercising the second and third options listed above however, as if the rejections are not accepted by the Executive Director the buyer will be charged with all costs involved for the load or part load concerned.

Assuming that the buyer acts in good faith, no charges will be levied on the buyer for reject logs and if charges have already been levied a Credit Note will be issued by CALM. In addition, no reject logs will be included as part of the total quantity of logs received by the buyer.

Credit Notes for rejected logs can be issued only by specifically nominated CALM officers. Those officers also have the final say on behalf of the Executive Director in the event of a dispute.

These officers currently are:

Senior Forester	A Holland	for the Northern Forest Region and Wheatbelt Region (Pine and Hardwood)
Senior Forester	F Vince	for the Central Forest Region (Hardwood)
Forester	W Keals	for the Southern Forest Region (Hardwood)
Senior Forester	I Scott	for the Central Forest Region (Pine)
Senior Forester	T Maher	for the South Coast Region (Hardwood)

Any Credit Notes issued for reject logs are processed by CALM's Logging Operations Information System in exactly the same way as D/Notes. Buyers can therefore expect to see the inclusion of Credit Notes in their accounts in the same half month in which they were issued.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.10 PRODUCTION AND SALE OF ROUND TIMBERS BY CALM

Poles, bridge timbers and jetty timbers are some of the most valuable log products produced from timber production forests and plantations managed by CALM. This specification details the steps involved in their production, preparation and sale.

1. The Products

- poles may be
  (a) SEC poles - ie, poles produced to SECWA specifications, or
  (b) Non-SEC or "private" poles - ie, poles sold to customers other than the SEC.

- bridge and jetty timbers include piles, stringers and corbels, and are produced for sale to
  (a) Government Departments (eg, MRD, Marine and Harbours), or
  (b) private customers.

Collectively, the above products are referred to as "round timber", because they are logs that are used "in the round".

Species currently used for round timbers include jarrah, blackbutt, marri, karri, yellow stringybark, radiata pine and pinaster pine.

2. Production

"Production" involves the falling, extraction, loading and carting of "unprocessed round timbers" to CALM pole dumps, or other nominated delivery points, at rates as set out in the Contracts to Supply. Normal log Delivery Notes are used to record production and delivery of "unprocessed round timbers". "Unprocessed round timbers" delivered to a CALM pole dump must be either stored under water spray storage, or processed (prepared) immediately.

3. Priorities of Production

Unless otherwise advised by either the Manager, Timber Production Branch or the Department's Chief Utilisation Officer, the production of "unprocessed round timbers" must always receive highest priority in any hardwood logging operation.

4. Preparation

"Preparation" is the task of preparing the produce to a set specification, and includes debarking, trimming, branding, sealing ends with sealing compound, etc. Preparation is normally carried out in a central location known as a "pole dump". In the karri forest, preparation may be carried out on bush landings.

4.1 SEC Poles: three contractors are currently authorised to prepare poles to SEC specifications They are:

i) V & D Ridolfo - operator of the Dirkbrook pole dump, and karri poles on bush landing in S.F.R..
ii) Bunnings Forest Products - operator of the Worsley pole dump, and karri poles on bush landings in S.F.R.
iii) Brookes Transport - karri poles on bush landings in S.F.R.
(iv) BE & DM Wilson - karri poles on bush landings in SFR.

"Unprocessed round timbers" produced by other contractors must be prepared by either Ridolfo or Bunnings. Such material is normally directed to the nearest pole dump for preparation.

4.2 Bridge Timbers: two contractors are currently authorised to prepare bridge timbers. They are:

(i) V & D Ridolfo - operator of the Dirkbrook pole dump.

(ii) Bunnings Forest Products - operator of the Worsley pole dump, and the "Diamond" pole dump.

"Unprocessed round timbers" produced by other contractors must be prepared by either Ridolfo or Bunnings.

5. Inspection

It is CALM's aim that all round timbers will ultimately be inspected by CALM's timber inspection service to guarantee adherence to specifications. Currently, all round timbers prepared for sale to any Government Department must be inspected and passed by a CALM round timber inspector. Round timber destined for non-Government use may or may not be inspected, depending on:

i) the customer's requirements,
ii) the availablility of round timber, and
iii) the decision of the Department's Chief Utilisation Officer.

Results of inspections are recorded on a CALM Inspection Certificate (CLM 125C).

6. Stockpiling and Storage

Because of environmental constraints it is often not possible to supply round timbers throughout the year from current bush operations. SECWA is prepared to accept production of SEC poles "as and when available" and pay accordingly. All storage and stockpiling of prepared SEC poles is therefore at SECWA's expense with stocks being held at either Worsley or Dirkbrook pole dumps.

Supply of prepared round timbers to other customers is based on specific orders only, as communicated by the Chief Utilisation Officer. CALM does not stockpile prepared round timbers for these other customers.

7. Sale

Round timbers can be sold by CALM at one of four points:

i) At a CALM pole dump, after the material has been prepared, inspected and passed (via Inspection Certificate)

ii) At a bush landing, after the material has been prepared, inspected and passed (via Inspection Certificate).

iii) At a CALM pole dump, after the material has been prepared, inspected and rejected (via normal Delivery Note or Forest Produce Licence).

iv) At a CALM pole dump, as reject material (ie, round timber that is not prepared for inspection), (via normal Delivery Note or Forest Produce Licence).

At all times the priority customers are Government Departments, ie, SEC, MRD, Marine and Harbours, etc. All round timber delivered to a CALM pole dump must be produced with the intention that the timber be prepared to Government specifications. Forest Officers in charge of bush operations must not permit round timber of the desired sizes to be carted to pole dumps if such material has no chance of meeting Government specifications. Alternative sizes and specific production to meet individual private orders can be produced if approved by the CUO.

7.1 Sale of passed timber at either a pole dump or a bush landing: timber passed at CALM inspection is sold under Contracts of Sale at negotiated prices. These prices include:

i) the cost of production and delivery (if applicable) of unprocessed round timber,
ii) the cost of preparation and delivery (if applicable),
iii) an administration charge on the cost of production,
iv) a charge for in-forest costs,
v) a roading charge,
vi) an inspection fee, and
vii) royalty or stumpage.

The cost of inspection of material prepared in good faith to SECWA specification, inspected by a CALM inspector, and subsequently rejected is charged to SECWA. This practice does not apply to other Government Departments at this stage.

Round timber prepared and passed to a Government specification may be sold to a non Government customer at listed prices set by CALM, only if and when authorised by the Chief Utilisation Officer. Such customers may include CALM contractors. Such authorisation will be given only when the supply for Government orders is not likely to be jeopardized.

7.2 Sale of prepared and subsequently rejected material at a pole dump: in many cases, round timber prepared to a set specification, then rejected by a CALM inspector, is docked by the contractor then presented again for inspection.

For material unable to meet the specifications, despite docking, CALM can authorise sale as either:

i) non-SEC poles, piles etc
ii) sawlogs,
iii) fencing material, or
iv) firewood.

The authority to initiate sale of this material (except sawlogs) lies with the Forest Officer in Charge of the respective pole dumps, as advised by his District Manager. As necessary, the Chief Utilisation Officer and/or Regional procurement staff should be consulted.

Pending finalization of Contracts of Sale, non-SEC poles, fencing material and firewood may be sold under a Forest Produce Licence, using the appropriate royalty, production and delivery costs to the CALM pole dump contractor.

Sawlogs may be sold direct to existing CALM customers or they may be sold by Auction or Tender. The Manager Timber Production Branch, should be consulted for advice in this regard.

7.3 Sale of reject material: sale of round timber that is rejected by the pole dump contractor without being prepared may be sold as in 7.2 above.

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.11 SEIZURE OF FOREST PRODUCE

1. A Forest Officer must seize any forest produce believed to be illegally obtained. The procedures for seizing of produce, and taking written statements, must be understood and carefully followed.

2. **Seizure of forest produce**

2.1 Forest produce on which any royalty, dues or charges are payable may be seized in the forest, on a landing, on a truck, at a mill, or at some other place.

2.2 Forest produce, on private property, suspected to be the property of the Crown may be seized under warrant. The Forest Officer may lodge a complaint to a Justice of the Peace, who can in turn issue a warrant to the police to search for the produce in question.

2.3 Forest produce seized must be clearly stamped or marked with:

i) a broad arrow punch,
ii) the word "seized", the officers name and the date in timber crayon, and
iii) a "Notice of Seizure" label (CLM143), completed with a permanent marking pen.

If the above equipment is not immediately available, seized produce may be marked with any available marking material. Where forest produce in a whole or part stack is seized the stack should be clearly identified eg, with yellow tape and a section of the seized produce stamped or marked as above.

2.4 A full report on the seizure must be forwarded without delay to SOHQ via the Regional Office. Accompanying the report should be original copies of statements taken, and a completed form CLM259 (Attachment 7.11.1). Included in the report should be a recommendation for disposal of the seized produce.

2.5 Persons from whom forest produce has been seized for non-payment of royalty, dues or charges must be given at last 10 days in which to pay such royalty, dues or charges.

3. **Procedure for recording interviews and taking Statements:**

3.1 All statements from persons likely to be charged should be taken in duplicate, and in triplicate if the offender wants a copy.

The statement must be in the actual words of the offender. Each copy must be signed in ink by the offender, and any corroborating witness, the original copy to be held by the officer taking the statement for court evidence, if required.

3.2 A person present as a corroborating witness should be present the whole of the time the statement is being taken.

3.3 When taking a statement, the obligation resting upon the Forest Officer is to put all questions fairly and to refrain from anything in the nature of a threat, or any attempt to extort a statement ie, no threats, violence, bribes or promises are to be used to obtain a statement.

3.4 Points to be included in the statement are:

i) Exact Location (6 Fig ref.) and time of apprehension.
ii) Registration, make, type and colour of vehicle.
iii) Name and address of offender.
iv) What section, or sections of Calm Act, Wildlife Conservation Act, Bush Fires Act infringed.
v) Did offender know that he had infringed any of the above acts? Was there any evidence to tell offender that he had illegally entered Quarantine area - ie, were there any "No Entry" signs on the roads upon which he travelled?
vi) Particulars of how and why infringement occurred.
vii) Names and addresses of all persons present (including Forest Officers).

3.5 The written statement should commence as follows:

"I have been warned by (Officer's name and rank) that I am not obliged to make a statement (or say anything) unless I wish to do so, and whatever I do say will be taken down in writing and may be given in evidence."

The statement should end as follows: (in the offenders own handwriting if possible).

"I have read this statement through, and it is true and correct in detail and given at my own free will without any threat, promise or inducement, and I do not desire to make any corrections."

3.6 The person making the statement should read it aloud prior to signing the statement.

3.7 Mistakes should be crossed out, and should be initialled by the person making the statement.

Attachment 7.11.2 is a proforma for use when taking a statement.

4. Seizure of produce, or alternative action, when Delivery Note discrepancies are found.

4.1 Forest officers are required to check a minimum of 5% of all D/Notes in the field. Possible discrepancies, and recommended action to be taken, are listed in table 7.11.1:

Table 7.11.1: Delivery Note Discrepancy V Recommended Action

	Discrepancy	Action Category (See codes below)
1.	No Delivery Note	A
2.	Suspicion of attempt to defraud	A
3.	Suspicion produce illegally obtained	A
4.	No date or incorrect date	A
5.	No customer name	B
6.	No customer address	B
7.	No coupe name or number	B
8.	No species name, or wrong species name	B
9.	No product type, or wrong product type	B
10.	No total number of logs, or incorrect numbers (if individual log measurement)	B or C
11.	No name(s) of logging contractor(s)	C
12.	No work description, or incorrect work description	D
13.	No indication whether CALM contractor or not	D
14.	No carter's signature	D
15.	No truck number (if required by contractor)	E
16.	No faller's brand (if required by contractor)	E

Action Category	Description
A	Seizure with CLM 259 report
B	Investigation by District with statement for Forest offence to Region/SOHQ. Notify employer
C	Investigation by Forest officer and caution to offender with recording at District and notification to employer
D	Caution by Forest officer only
E	No action

4.2 When inspection of a D/Note on a truck results in decision to seize the load of logs, the following steps should be taken:

* the truck driver be instructed to move his truck to a safe place off the road edge,

* the Forest officer contact the driver's employer or the contractor representative,

* complete a CLM 259,

* organize the truck to be unloaded at an appropriate place,

* place logs under seizure and release the truck,

* notify SOHQ on same day (Manager Timber Production Branch).

4.3 Stopping of trucks on main roads and highways should be avoided unless the truck can be directed to an area off the road survey where other road users are not in any way put at risk.

4.4 If the Forest Officer believes an offence has been committed, he should communicate ahead to the expected truck destination, or follow the truck and carry out the investigation at the truck destination.

5. Release of seized produce

The recommended authority for release of seized produce depends on the nature of the offence. For the Action Categories listed in Table 7.11.1, authority for release from seizure is as follows:

Category A - Executive Director (through Manager, Timber Production Branch)

Category B - Regional Manager

REPORT CONCERNING ILLEGAL CUTTING OR REMOVAL OF TIMBER OR OTHER FOREST PRODUCE

Full names and addresses of Offenders_____

_____

Nature of Offence_____

_____

Date and Time of detection_____

By whom Reported or Detected_____

Names and addresses of any other persons present_____

Locality (Attach plan or sketch)_____

Period of Operations _____

What indications are there of operations_____

Vehicle used_____Registered No._____Owner_____

If employee, employed by whom_____

Quantity of timber or forest produce removed_____

To whom supplied_____

Is it saleable_____Value_____Likely buyers_____

Purpose for which obtained_____

Was trespass deliberate or accidental_____

(State reasons for opinion)

_____

Was area fenced or blazed (give particulars)_____

Could direction of removal be seen by tracks etc. (Give particulars)_____

Has offender been previously reported or warned_____

Is offender a registered timber worker_____

Further particulars_____

_____

Recommendation:_____

Statement obtained and attached hereto:_____

Did offenders refuse to give written statements_____

Place_____ Date_____

Forest Officer _____

STATEMENT BY PERSONS APPREHENDED BY AN

AUTHORIZED CALM OFFICER

Please be advised that I: .....

Address: .....

.....

Occupation: .....

Was apprehended by .....

on.....day of .....19....

at.....time .....

and was requested to make a statement.

I have been advised that I do not have to make a statement, but should I do, then anything I say will be taken down in writing and may be used as evidence.

I wish to make a statement signed:

I have read this statement through and it is true and correct in detail and given at my own free will, without any threat, promise or inducement, and I do not desire to make any corrections.

Signed .....

Witnessed by.....

In the company of .....

SECTION 7 - ADMINISTRATION

SPECIFICATION 7.12 RESPONSIBILITIES OF FOREST OFFICERS

1. A Forest Officer is an officer of the Department of Conservation and Land Management, designated as such by the Executive Director. A Forest Officer, upon designation, will be issued with a Certificate of Authority, signed by the Executive Director. This certificate gives the Forest Officer all the responsibilities invested in a Forest Officer as specified in the CALM Act. The CALM Act also requires that the area of the State in which the Forest Officer is authorised to operate be listed on the Certificate.

2. To be designated as a Forest Officer, it is likely that a new graduate will be required to complete about two years of on-the-job training.

3. To carry out his or her responsibilities, a Forest Officer must not only possess adequate knowledge and bush skills, but must possess sound people management skills.

   A paper written by R J Underwood in 1979 entitled "The Application of Management Principles to Management of Hardwood Logging Operations in the Field" is a valuable document in relation to this subject.

4. To be designated a Forest Officer in Charge (FOIC) or a Forest Representative, as defined in the logging Contracts to Supply, Forest Officers must meet the requirements of formal Timber Production training schools, and be formally nominated by the relevent Regional Manager (in the case of a FOIC) or by the District Manager (in the case of a Forest Representative).

   Attachment 7.13.1 details the roles and responsibilities of the FOIC, the Forest Representative, and other key personnel involved in timber production.

ROLES AND RESPONSIBILITIES OF KEY PERSONNEL INVOLVED IN TIMBER PRODUCTION

1. Definition of FOIC

In both the Contracts to Supply and the Contracts of Sale, the FOIC is defined as the "forest officer for the time being or from time to time appointed in writing by the Executive Director to be in charge of any site or any part thereof".

2. Role of FOIC

In the Contracts to Supply the role of the FOIC is covered under clause 25, which states that "All work shall be executed in accordance with Contract and subject thereto, to the satisfaction of and (if applicable) in accordance with any directions given by the FOIC. All orders, instructions, directions, determinations, certificates and approvals which may or are to be given to the contractor by a FOIC pursuant to the Contract shall unless the Contract provides otherwise, be deemed to be given by that FOIC on behalf of the Executive Director".

The FOIC's are therefore the persons who are officially in charge of CALM's logging contractors. They are therefore the persons who are responsible for:

- Advising the contractor of his work areas and production targets
- Ensuring products produced by the contractor meet specification
- Ensuring all work carried out is in accordance with the Code of Logging Practice, the Manual of Logging Specifications and/or the Pine Management Guide.

and

- Ensuring the contractor is paid correctly and promptly at the end of each half monthly accounting period.

3. Knowledge/Skills

To be able to carry out the above duties the FOIC must have the knowledge and/or skills to be able to actually do the following, or at least be able to check to ensure the following is done by the Forest Representative or another Forest Officer :

- Set delivery schedules to the various customers which must be supplied by the contractor in question (in liaison with Regional procurement officers/Timber Production Branch officers)
- Complete Logging Operations Prescription (CLM709) form using the LOIS System Codes and CLM216 forms
- Complete Pre-Operation Checklist (CLM109)
- Apply in the field the appropriate silvicultural/treemarking prescription
- Select log products in accordance with set specifications
- Apply the hardwood "In-forest Treatment" prescription

- Complete a Seven-way Test (CLM781) and apply in the field the dieback hygiene rules as per the Seven-way Test and Policy No. 3

- Carry out a general logging inspection and complete a Softwood or Hardwood Logging Inspection and Action Sheet (CLM106 or CLM 105)

- Carry out logging inspections in order to formally certify hardwood logging areas as complete, and complete a Certification Sheet (CLM104)

- Carry out a field assessment of soil damage, and complete a form CLM108

- Carry out a field assessment of crop tree damage and complete a form CLM107

- Carry out field checks of Delivery Notes

- Code Delivery Notes and enter into LOIS

- Use LOIS to monitor mill intakes, contractor production levels, production by operation, and use of Delivery Notes

- Efficiently administer any breaches of rules by the Contractor

- Pay Contractors promptly via the Contractor's Payment Report in LOIS

- Accurately record cut over areas and silvicultural treatment details on HOCS and POCS sheets and complete Coupe Silviculture Reports (CLM160) for jarrah operations.

and

- Maintain regular contact with the Contractor and his representatives, and ensure the names of the contractor's representatives are nominated to the FOIC in writing; and that the names of the FOIC and Forest Representative are nominated in writing to the Contractor.

All the above tasks need to be done correctly and promptly. If several CALM logging contractors are working in a CALM District, the FOIC's job can be difficult and time consuming. This is where the Forest Representative plays a role.

4. **The Forest Representative**

In the Contracts to Supply the Forest Representative is defined as a "Forest Officer to be named by the Executive Director or a FOIC (to which is delegated) such of the powers, duties, discretions and authorities vested in (the FOIC) as he may think fit".

The FOIC may therefore delegate some or all of the tasks listed under 3 to the Forest Representative. However, the FOIC must maintain his/her ability to carry out the tasks delegated because he/she is the one who must get involved if a conflict arises between the Forest Representative and the Contractor.

5. **Nomination of FOIC's and Forest Representatives**

The nomination of FOIC's is a responsibility of Regional Managers who control the works programs and priorities of staff within their Regions.

Timber Production Branch staff, with their knowledge of contractors, and with their involvement in Timber Production training schools, can advise Regional Managers on nomination of FOIC's.

6. **Role of the Region**

Regional staff (ie, Regional Manager, Regional Procurement Officers and Regionally based Planning and Inventory Officers) are <u>not</u> responsible for supervising or instructing CALM logging contractors directly in the field (unless of course, a Regional Officer is a nominated FOIC).

The specific responsibilities of Regional staff in relation to Timber Production are :

- Approve Seven-Way Tests
- Prepare logging and roading plans (after liaison with Districts)
- Co-ordinate delivery schedules to the various customers, especially for customers who are supplied by contractors from more than one District or Region (in liaison with District and Timber Production Branch officers). These schedules should be for a 12 monthly period
- Approve Logging Operation Prescriptions (CLM709) and enter into LOIS
- Use LOIS to monitor mill intakes and contractor performances
- Carry out general logging inspections and complete Softwood or Hardwood Logging Inspection and Action Sheets (CLM106 or CLM105)
- Provide one-to-one advice and guidance to District staff involved in timber production on any aspect of timber production, but particularly the selection of log products and the supervision of contractors in the field.
- Check log quality at customers landings and, if necessary, approve the write-off or redirection of below-specifiction logs using CLM076
- Maintain standards within the Region, and between Regions by visiting other Regions as required
- Act as link between FOIC & TPB for resolution of contract problems and issues

and

- Provide specific advice to a FOIC if the FOIC is confronted by a difficult problem that he/she cannot solve.

7. Role of Timber Production Branch

As with the Regional staff, Timber Production Branch staff are not responsible for supervising or instructing CALM logging contractors directly in the field.

Timber Production Branch's role is centred around the negotiations and contractual arrangements that go with the setting up of Contracts to Supply and Contracts of Sale in the first place.

Specifically, Timber Production Branch is responsible for :

- Calling tenders or conducting auctions for the production or sale of log products
- Authorising new contractors and customers
- The development and maintenance of LOIS
- Preparation of Contracts of Sale and Contracts to Supply
- Setting log specifications
- Preparing expenditure and revenue estimates for timber production
- Writing, producing and maintaining the "Code of Logging Practice" and the Manual of Logging Specifications
- Providing formal training in timber production for District and Regional staff
- Providing specific advice to Regions and FOIC's on matters that cannot be solved locally (this usually involves talking to customers and contractors as well as CALM staff)

and

- Invoicing customers through LOIS and Accounts Branch.

8. Communication Links Between CALM and CALM Employed Logging Contractors

The table on next page is a guide illustrating the correct lines of communication between the different personnel involved in timber production.

COMMUNICATION BETWEEN CALM & LOGGING CONTRACTOR