NORTHERN JARRAH FOREST

LOGGING OPERATIONS HANDBOOK

C O N T E N T S

PART 1 : INTRODUCTION

1.1 General

Hardwood timber production operations in the northern jarrah forest must:

(i) be in accordance with the land use plan;

(ii) satisfy dieback hygiene rules; and

(iii) result in an improvement in the health and vigour of the forest.

Forest knowledge and forestry techniques continue to evolve - particularly in the field of jarrah dieback. However, current information allows for cautious optimism. If the latest developments in disease management are applied, there may well be a future for the timber industry and for the northern jarrah forest. If they are not, there may not be.

The techniques outlined in this handbook were developed for the Logging Trials Within Quarantine which started at Dwellingup in 1980. A logical next step is the extension of these techniques elsewhere in the forest, and the following sections indicate how this is to be done.

1.2 Basic Principles

Basic principles are:

(i) Logging operations can only be considered for areas where timber production is compatible with the primary land use - see L.U.M.P.

(ii) Every operation must be evaluated from the standpoints of best hygiene option, or least impact of hygiene failure - see the "Dieback Hygiene Guide" - appendix 1 to these notes.

(iii) There are no universal prescriptions. Each stand must be treated on its merits, with the best treatment determined after study of land use priority, dieback status, stand structure, site and silvicultural options.

(iv) Other than for research purposes, silvicultural treatment must be based on the availability of markets for unwanted trees - ie. thinning to waste and cull felling will not be considered at the moment.

(v) Cutting and regeneration plans must be integrated with regional protection plans and mining plans.

1.3 Scope

This manual covers:

Part 1 - Introduction
Part 2 - Logging
Part 3 - Silvicultural Practices
Part 4 - Hardwood Operational Control System

It is basically aimed at the high rainfall northern jarrah forest, west of quarantine.

PART 2 : LOGGING

This section comprises:

2.1 PLANNING

2.1.1 Primary Checklist

All cutting proposals must conform with the requirements of:

(i) The G.W.P.

(ii) L.U.M.P.

(iii) The 3 Year Logging Plan approved by Regional Leading Planning;

(iv) F.D. 49B approved by Conservator.

2.1.2 Classification

Classify the area to be cut.

Use 1:25,000 Topographic Plans with contour print as base maps.

(i) Show Land Use Priority and Influence Zones

(ii) Show Forest Block boundaries.

(iii) Show dieback categories:

Diebackfree protectable	:	no colour
Dieback	:	red
Suspect and downslope of suspect	:	blue
Dieback-free non-protectable	:	yellow

In the definition of the categories, Non-protectable and Downslope of Suspect, use this guide:

Slope 1-15°	:	include an angle of 30°
Slope 16°+	:	include an angle of 20°

(iv) Sub-divide blocks into coupes. Each coupe is a single dieback category, namely:

Dieback
Dieback-free protectable
Dieback-free non-protectable
Suspect and Downslope of Suspect

or parts of a single category.

Where areas of Dieback-free forest are sub-divided into coupes, try to make each coupe a microcatchment by using natural drainage and contour patterns.

Field check coupe boundaries.

2.1.3 Resource Data

Use most up-to-date inventory data to determine the volume on each coupe.

2.1.4 Allocation of Coupes

Allocate coupes to season, cutting priority and the stockpile target.

Basic priority is to utilize dieback forest before dieback-free non-protectable before diebackfree protectable. Wherever possible, avoid logging suspect forest until suspicions are or are not confirmed.

Dieback can be logged when soils are moist (provided machines do not bog). Dieback-free forest should not be logged when soil is moist (especially in spring) unless absolute hygiene can be guaranteed.

2.1.5 Road System

Design basic access system and mark on plan. Observe these guidelines:

(i) Use as few roads as possible;

(ii) Avoid new roading, unless required to re-locate parts of existing roads for access to dieback-free forest;

(iii) Roads to be as low in the profile as possible;

(iv) Define unwanted roads for closure;

(v) Avoid crossing dieback categories;

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

2.1.6 Presentation of Plan

(i) Tabulate volumes by coupes by season and by year, to ensure allocations balance permissible intakes.

(ii) Produce coupe sheets for tree-markers and industry reps.

2.2 ROADING

2.2.1 Demarcate the planned roading system on the ground. Ensure the dieback risk category is demarcated where boundary crosses a road to be used. Ensure any road required for access within a coupe remains in the single dieback category. In-coupe haul roads which pass through dieback into dieback-free forest can be used if surface-stabilised.

2.2.2 Construct roads only in dry soil conditions or when activity of P. cinnamomi in the soil is dormant.

(i) Control vehicle cleanliness by blowing down or washing down.

(ii) Road-working machinery to be washed down when travelling from dieback forest into dieback-free forest at designated washdown points.

(iii) Washdown point to be on boundary of dieback on downslope of roadside, draining from road to diseased forest.

(iv) Washdown point to be sign-posted and to have hard surface for machine to stand on, eg. reject sleepers or belting, surface to be kept clean.

Contractor to supply own washing down equipment and specified fungicide. Spray washdown point with fungicide.

2.2.3 Road Specifications

Construct roads according to expected soil conditions at the time the road will be used and according to amount of expected use.

(i) For Roads to be used only during Dry Soil Conditions

Specifications for these roads will be ... 6..

minimal; eg. 5m road clearing with 4m road surface, shallow side drains, culverts only in areas where surface run-off is defined, eg. creek beds. Gravel not necessary unless road crosses dieback-free forest and there is a risk of dieback transport.

(ii) For Roads to be used during Wet or Moist Warm Soil Conditons (Winter/Spring/Autumn)

If the road crosses or enters dieback-free forest, specifications will allow for rapid drainage and stabilised road surface.

eg. 6m road clearing with 4m road surface but drained on both sides of road.

For access into dieback-free forest, stabilisation is required on steep slopes, tight corners and dieback areas. Gravel surface is required and culverts every 200m where slopes exceed 1:15.

Road stabilisation requires:

- Construction of 10-15cm thick layer of gravel on well-drained, crowned road.
- Application of water to road surface.
- Use of loaded gravel trucks and/or vibrator to compact moist road surface.

2.2.4 Road Works

(i) Clear and form - Road line to be pegged. Minimize width of clearing on roads used for short periods. Roads planned for heavy use to have allowances for corners to be straightened.

Debris from cleared areas to be stacked in natural gaps on edge of road.

(ii) Gravelling to be carried out during dry soil conditions. Use gravel from dieback-free pits whenever possible. Infected gravel only for roads passing through dieback forest. Use pits within the coupe whenever possible (in situ gravel), to avoid carting gravel across dieback boundaries.

(iii) Select landing sites - see later under "Split-phase Logging".

(iv) Maintenance grading to be concentrated during dry soil conditions. If soil moisture is required for road stabilization, aim for early

Autumn grading prior to Phytophthora sporulation. Avoid spring grading when Phytophthora sporulation is active. Ensure grading does not pass from dieback into dieback-free forest without washdown.

(v) The main objective of grading is to shape the road profile and to clean table drains to improve drainage off and way from road surface.

(vi) Culverts. Install pipes by dozer or backhoe. If moist soil accumulates on machinery during culvert installation, machine must be washed down before leaving culvert.

(vii) Cross check all prescriptions in the Dieback Hygiene Manual.

2.3 LOGGING

2.3.1 General

According to what is on the ground, logging may take place in areas which are classified as:

- Dieback forest
- Non-protectable forest
- Suspect forest
- Dieback-free forest

The approach adopted with respect to both hygiene and silviculture will vary depending on the dieback status of the coupe. For example, non-protectable and suspect will be treated as Dieback for hygiene purposes, but as Dieback-free for silvicultural purposes.

Silviculture will be dealt with in Part 3 of this Manual.

The table overleaf summarizes hygiene requirements, which are elaborated upon in det ail.

COUPE	STATUS OF PLANT ON ENTRY TO COUPE	LOGGING SYSTEM	STATUS OF PLANT ON EXIT FROM COUPE
Dieback-free protectable	Must be clean	Split phase	Need not be clean.
Dieback-free Non-protect-able.	Must be clean	Split phase	Must be clean.
Suspect and below Suspect	Must be clean	Split phase	Must be clean
Dieback	Need not be clean	Conventional	Must be clean if exit route traverses dieback-free forest.

The Dieback Planner should be used to cross-check each decision taken for each area.

2.3.2 Vehicle and Machinery Cleanliness

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

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

If log roads deteriorate, or free water lies on the road so that there is a risk of soil pickup and transport, haulage through dieback-free forest must cease

2.3.3 The Mill Landing

Hygiene at the mill landing is crucial as it is the focal point for all logging operations.

The mill landing must be designed to prevent infected vehicles and trucks travelling back to the forest.

Basic design principles are:

- prevent contact between log trucks and mill landing equipment
- trucks to travel only on a soil-free hard deck.
- a washdown unit to be incorporated with landing exit, if other design criteria cannot be satisfied.

Similar principles must be applied to other town or settlement depots (eg. F.D. compound, workshop) from which infected vehicles could move out into the forest.

2.3.4 Conventional Logging System

Conventional logging is used in dieback forest. This means no special effort is required to separate the snigging, roading and hauling phases; sub-coupes are not required.

But:

Coupe boundaries must be carefully marked and no plant or equipment may cross out into dieback-free forest unless it is washed clean. Every effort should be made to minimise the number of vehicles moving in and out of the dieback coupes.

2.3.5 Split Phase Logging in Coupes Other Than Dieback

2.3.5.1 General

Logging operations in dieback-free and suspect forest, will be based on the split phase system.

The aim is to prevent Phytophthora on log trucks and loaders being spread up into the coupe by snigging machines. Potential infections are kept to the valleys.

The snigging phase for each landing must be completed before loading and hauling commence. Split phase logging and fewer, larger landings require greater planning and control of the falling sequence and snigging pattern.

2.3.5.2 The Bush Landing

Each bush landing will service a nominated area, called a sub-coupe.

The siting of each landing within the sub-coupe is to be decided by the tree-marker in liaison with the company bush boss. Landings must be as low in the profile as possible. Use existing gaps.

Clear the landing before snigging commences. Landing area to be minimal but sufficient to store the volume of all timber to be removed from the sub-coupe.

A six metre uncleared strip is left between the haul road and the edge of landing to act as a buffer.

Remove overhanging and potentially dangerous trees.

Debris is to be neatly stacked on the edge of the landing away from crop trees or regrowth.

2.3.5.3 The Shunt

When landing construction is completed a shunt road to the haul road will be installed leaving a physical barrier (e.g. log) at the landing entrance. The Shunt is for parking of all outside vehicles until snigging of the sub-coupe is completed. No machine or vehicle may travel from the haul road onto the landing until snigging on the sub-coupe is complete. This is the vital key of of the split phase operation.

2.3.5.4 Falling

The company bush boss will demarcate major snig tracks through the sub-coupe, ensuring point of entry into landing is designed to prevent water run-off onto landing (see diagram).

The proper sequence of falling within sub-coupe is :

(i) major snig tracks to a depth that includes over-hanging trees.

(ii) back third of the block

(iii) front of the block.

All marked trees must be felled and fully utilised but no tree should be felled into a designated crop tree.

2.3.5.5 Snigging

(i) Once within a coupe, the movements of the snigging machine must be strictly controlled. Machiney must work systematically from one sub-coupe to the next, starting on a new sub-coupe only after the previous one is completed. Sub-coupes at "the back" of the coupe will be worked first. When the tree-marker is satisfied that all operations in the sub-coupe are completed, the machine may travel to the next landing through the bush, avoiding haul roads and shunts. If a snigging machine must cross a haul road or if there is any risk of dieback pickup en route to the next sub-coupe, it must be washed down before re-entering the bush.

(ii) Skidders will construct major snig tracks and then remove logs along snig tracks as directed by the company bush supervisor. Logs will be pulled progressively from the rear to the front of the sub-coupe.

(iii) Avoid damage to future crop trees and dieback resistant eucalypts, and make use of snig tracks and natural gaps in the forest. Tops will be snigged back from crop trees as directed by the tree-marker.

(iv) Approval of the tree-marker is required before machinery may move to a new sub-coupe, following a joint inspection with bush boss of the recently cut over sub-coupe, to check utilization, hygiene and erosion control.

(v) Logs on landings may be sorted and heaped, but may not be loaded and hauled until all operations associated with snigging and erosion control are competed.

2.3.5.6 Erosion Control

Erosion control is required in all coupes, irrespective of dieback status. It must be undertaken before snigging machine leaves the sub-coupe. This work includes cutting the snig tracks diagonally with the blade at intervals as follows:

Grade	Lateritic Gravels (Average Erosion Class)	All Other Soils (Extreme Erosion Class)
0-1°	Nil	200 metres
2-5°	200 metres	100 metres
5-10°	100 metres	50 metres
10-15°	60 metres	30 metres
15°	30 metres	15 metres

Where possible, cut-offs are to be located so that they discharge into logging debris or dense vegetation. Cut-offs will be at least 150mm deep and must have an adequate outlet to prevent water ponding. Erosion control measures are required on all snig tracks where the mineral earth is exposed.

2.3.6 Load and Haul

In the split phase logging system, this operation commences with the opening of the shunt to the landing by the loader. Loading may only commence when snigging in the sub-coupe is completed.

The loader may not leave the log landing and haul road, except to snig and load logs from trees retained for

safety reasons while the haul road and landing is being used (ie. trees on immediate edges of landings and haul roads) or trees pushed over in the roading operation.

Aim to maximise the size of log trucks, so as to minimise trips carted.

Restrict the speed of trucks to lessen road damage. This especially applies to empty trucks.

2.3.7 Landing Rehabilitation

Following loading, the loader will push log and clearing debris into the centre of the landing and ensure drainage lines are open. Where landings are severely compacted, contour ripping must be carried out to allow regeneration.

NOTE: In areas other than dieback, this operation may be postponed to dry soil conditons, as directed by the tree-marker.

2.4 PERMIT CONTROL

The tree-marker is responsible for all permit control. Permit control must be completed before snigging machines depart and hauling commences for each landing where the split phase system is operating.

The aim of permit control is to ensure logging has followed the manual, and that forest produce is not wasted.

2.4.1 Log Utilisation Standards

(i) Minimum dimension log (jarrah)

log length	2.1m and straight
crown D.O.B.	250mm

(ii) All crown logs to be utilised.

(iii) Bend in logs is acceptable to 20mm in 1m.

(iv) Shattered logs are acceptable if less than 50% of the log in the one place has been affected.

(v) Stump height at the bottom of the scarf not to exceed 45cm unless for reasons of butt defect or safety.

(vi) Minimum acceptable log should be considered down to 50% defect-free face occurring at the same place at both ends after an average amount of heartwood has been boxed out.

(vii) Minimum wind to be 1 in 4.

(viii) Long butting and dressing of logs must not exceed the minimum log specification.

2.4.2 Environmental Standards

(i) Check for damage to crop trees including die-back resistant trees, and advance re-growth.

(ii) Check for soil damage in coupe and landing and see that erosion control is correctly completed.

2.4.3 General

(i) Permit control to be carried out daily for major mills.

(ii) Mill landing inspections to be carried out fortnightly or more frequently during log stockpiling.

(iii) Safety Precautions

- logging company to use adequate number of log truck warning signs with correct location.
- speed limits of 50 km/hour to apply on forest roads.
- avoid walking on stacked logs when measuring or checking logs on landings.
- stay clear of moving winch ropes, traveller and saw.

(iv) Logging will not proceed until log utilization is complete and damage to residual stand and soil is minimised.

(v) Logging will not proceed if hygiene is being compromised unnecessarily.

(vi) Tree-markers to work to a permit control check list. Wherever possible problems must be sorted out on the spot.

2.5 LOG STOCKPILING

2.5.1 The aim of stockpiling is to maintain log supplies to a mill without causing irreversible damage to the forest at times when damage is most likely to occur.

Damage can be defined as:

Reversible - soil disturbance or compaction

Irreversible - introduction and/or intensificatio
of dieback disease

Damage to the forest is most likely during wet or moist soil conditions and most critical when Phytophthora is sporulating.

2.5.2 Summer stockpiling in the Northern Jarrah Forest is defined as the assembling of logs into dumps in specific locations during dry soil conditions, in order to avoid moist soil logging.

2.5.3 The aim is to obviate the need for logging in dieback-free forest during moist/wet soil conditions.

Dieback affected forest can be operated all year provided access is suitable and the fungus is not transported to dieback-free forest elsewhere.

2.5.4 It is most desirable to carry out stockpiling in dry soil conditions during summer but can also be done during moist soil conditions in Autumn before Phytophthora is active. If the latter is done, great care must be exercised and the soil monitored daily.

Dumps are to be either at mill landing or adjacent to haul roads which have no access problems during wet soil conditons.

Plan to commence stockpiling in early January. Logs should be milled in the same sequence that they were stockpiled. The early logs must be milled before end-checking or bardee damage becomes significant. Cutting in the mill will then not deplete logs stockpiled at a time when degradation is much slower.

Water may be used through a sprinkler system during parts of the day to slow down end-checking and bardees.

PART 3 : SILVICULTURAL PRACTICES

Virtually the FIRS prescription.

3.1 AIMS

The aim of this section is to provide guidelines for the preparation of cutting and regeneration prescriptions for stands programmed for logging in the NJF.

Because there are many variables involved, there is no uniform prescription. Treatment will vary according to land use priority, stand health and structure and site quality.

However, there is a uniform aim: to improve the health and productivity of the forest. This aim is to be achieved by:

(i) The selection (or establishment) and protection of future crop trees, followed by

(ii) Cultural practices which strengthen the capacity of the forest to tolerate existing or possible future dieback infection.

3.2 PLANNING

Part 2 of this handbook dealt with the measures to be adopted in the planning and conduct of a logging operation so that the risk of dieback spread is minimized. We now look at the sivicultural practises to be followed.

Completed logging plans will show the annual cutting section sub-divided into Forest Blocks and coupes (eg. Clinton 7) each coupe being a separate dieback category, ie.

- Dieback-free protectable
- Dieback-free non-protectable
- Suspect and below suspect
- Dieback

This sub-division is necessary to enable dieback hygiene to be prescribed. To enable the silvicultural system to be prescribed a further classification is needed. Categories are :-

(i) Land Use Priority

Areas of theNJF west of Quarantine where logging will occur will be either Recreation, Water Production MPA or designated Influence Zone.

(ii) Dieback Status

From the silvicultural standpoint (as opposed to the hygiene one) only two dieback classes are recognized:

a) Graveyard Dieback where the jarrah overstorey has suffered widespread mortality; and

b) Other Stands, including Dieback forest where only the understorey is affected.

Note: dieback status may change with time in that the disease may intensify to the graveyard in some areas. But as we are not able to predict this infallibly for all sites at present, lightly infected and non-protectable stands will be given the silvicultural benefit of the doubt.

(iii) Forest STructure

Depending on past events, stands in the western NJF fall roughly into two categories:

(a) Densely stocked even-aged pole stands; and

(b) Other stands normally comprising mixtures of size and age classes.

(iv) Site Quality

This varies widely but is of concern here with respect to the replanting of graveyard dieback sites.

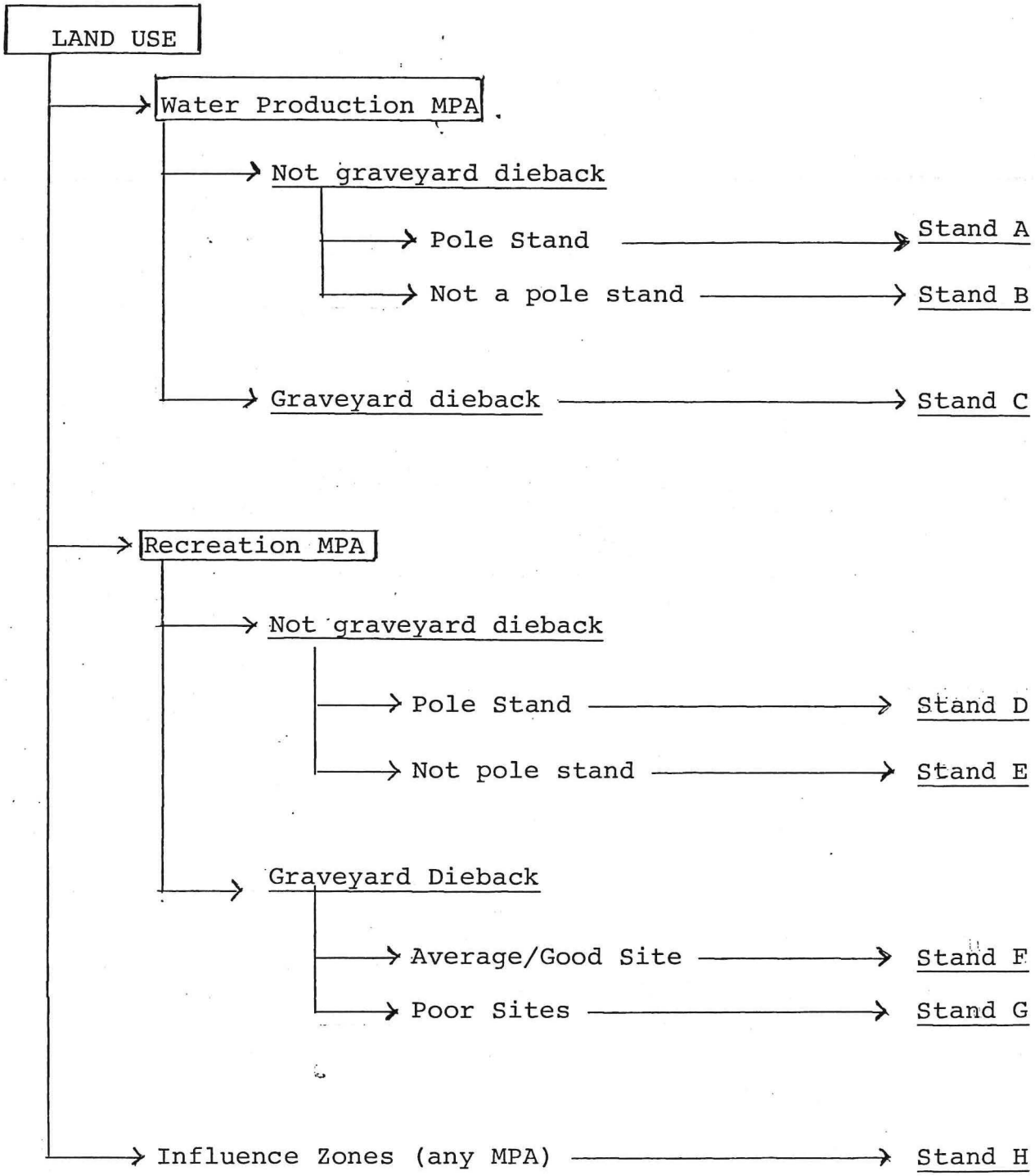
(a) Average to good sites should produce a new timber crop without difficulty (ie.sites are reasonably fertile, well drained and with deep soil).

(b) Poor sites are unlikely to produce a new forest without difficulty. These are poorly drained, infertile, rocky areas.

Although these are very broad classifications, the situation may appear complex. To simplify the preparation and implementation of prescriptions stands will be inspected, classified and encoded before cutting commences.

3.3 CLASSIFICATION & ENCODING

Before logging commences in a coupe, a detailed field inspection must be carried out. This will provide data for classification and the assignment of a stand code, as set out overleaf:



When classification is completed, coded stands will be marked clearly on each coupe sheet, to indicate where particular prescriptions will be applied.

PART 3 : SILVICULTURAL PRACTICES (cont)

3.4 THE CROP TREE

For the purposes of this prescription, a crop tree is defined as a tree which occurs in or above the general level of the canopy (i.e., is a dominant or co-dominant), has a healthy crown and a straight, defect-free bole. It should have the capacity to grow vigorously for many years, i.e. to be available in the future crop whether that be 5 or 50 years hence.

Size and age are not important, although very large mature trees will not normally be retained as crop trees.

High value products such as poles, piles and veneer logs will not normally be retained as crop trees, unless no alternative tree at the prescribed spacing and of the desired form and vigour is available for retention.

Where no crop tree exists in the current stand, one must be established either by natural regeneration from seed trees, or by planting.

3.5 PRESCRIPTIONS

3.5.1 Stand A

Water production MPA
Not graveyard dieback
Pole stand

(i) Select and mark crop trees for retention. Aim for 250 sph or approximately 6m x 6m between crop trees.

(ii) Jarrah is the preferred species, but if absent or deficient, retain marri, blackbutt, wandoo or bullich.

(iii) Harvest all marketable poles, logs and minor produce from trees not marked for retention. Crop trees must be protected from falling and snigging damage. Ensure erosion control and landing rehabilitation measures are carried out.

(iv) Scrubroll mature (over 6 yrs old) banksia.

(v) Carry out tops disposal on crop trees.

(vi) After one summer's drying, burn tops and banksia. Seek dry soil conditions, but low FDI.

PART 3 : SILVICULTURAL PRACTICES (cont)

(vii) Close roads not wanted for future management.

Note : Need for hygiene precautions during parts (iii) and (iv) of this prescription.

3.5.2 Stand B

Water Production MPA
Not graveyard dieback
Not an even aged pole stand

(i) Note presence and stocking of poles or advance growth. Where areas are understocked (i.e. less than 500 sph of J or M), seed trees to be retained.

(ii) Seek and mark for retention and protection crop trees less than 60cm dbh at a spacing of approximately 250 sph (6m x 6m spacing).

(iii) Harvest all trees over 60cm dbh and all other marketable trees not marked for retention as crop trees, for poles, sawlogs and minor forest produce. Crop trees to be protected from falling a snigging damage. Erosion control measures to be carried out.

(iv) Carry out tops disposal on crop trees.

(v) Scrub roll mature banksia.

(vi) Burn tops and banksia in the autumn, under dry soil conditions.

(vii) Rehabilitate landings and close unwanted roads.

3.5.3 Stand C

Water production MPA.
Graveyard dieback

(i) Mark for retention and fully protect all sound, healthy dieback tolerant species - e.g., marri, blackbutt, bullich.

(ii) Salvage all marketable produce from trees not marked for retention.

(iii) Carry out tops disposal on retained trees.

PART 3 : SILVICULTURAL PRACTICES (cont)

(iv) If finance available, stack debris into heaps at regular intervals to create ashbeds, and push banksia.

(v) Burn in the autumn under dry soil conditions to promote natural regeneration.

(vi) Rehabilitate landings.

(vii) Protect from future burning until regeneration can withstand fire.

Note : Replanting not required in Water Production MPA.

3.5.4 Stand D

Recreation M.P.A.
Even-aged pole stand
Not graveyard dieback

Apply identical treatment to Stand A, but ensure Influence Zones are identified and excluded from Stand A treatment.

3.5.5 Stand E

Recreation MPA
Not an even aged pole stand
Not graveyard dieback

(i) Mark for retention crop trees and/or seed trees as in Stand B, but also retain the occasional large old tree (over 60cm dbh) to add to the character and diversity of the forest scene.

(ii) Harvest trees not marked for retention, for poles, sawlogs and minor forest produce.

(iii) Carry out tops disposal and push banksia.

(iv) Burn in the autumn when soil is dry, but use low FDI to prevent scorching retained forest.

(v) Tidy up and rehabilitate landings and snig tracks.

(vi) Protect regeneration until no longer fire sensitive.

3.5.6 Stand F

Recreation MPA
Graveyard dieback
Average to good site quality

(i) Apply as for Stand C (i) to (vi).

PART 3 : SILVICULTURAL PRACTICES (cont)

(ii) In the winter after burning, plant with dieback tolerant timber producing trees. Use : E. wandoo, E. patens, E. resinifera. Plant on ashbeds at approx. 625 stems per hectare. Fertilize with 100 gms MAP per tree at time of planting.

(iii) Protect from fire until fire-resistance achieved.

3.5.7 Stand G

Recreation MPA
Graveyard dieback
Poor site quality

(i) Apply as for Stand C (i) to (vi)

(ii) In the winter after burning, plant E. wandoo on selected sites (e.g. ashbeds, stump holes, etc) where a future tree might grow. An establishment of only 100 trees per hectare will be acceptable.

(iii) Protect from fire until regeneration is no longer fire sensitive.

3.5.8 Influence Zones

These are areas designated by the planner which surround special natural or artificial features in the forest. For example :

- Streams and rivers
- Roads, railway lines, SEC lines
- Private property, Settlements
- Tourist, recreation facilities, scenic drives, walk tracks etc.

After designation, the local DFO will prepare an appropriate prescription for each area, taking into account land use, dieback status, hygiene, aesthetics, conservation values and risks of visual or noise pollution or of undesirable effects on water supply.

PART 4 : IMPLEMENTATION

4.1 Responsibility

Classification of the forest, and implementation of both hygiene and silvicultural prescriptions are the responsibility of Senior Divisional staff who will direct treemarkers and Industry staff.

4.2 Procedure

The basic steps are :-

(i) Inspection of logging coupes

(ii) Classification and encoding stands within coupes

(iii) Marking coupe sheets

(iv) Treemarking to prescription

(v) Logging and Regeneration treatments

(vi) Return of coupe sheets so that work programmes can be compared with work carried out.

(vii) Amendment of master burning plans to ensure protection of regeneration.

The fine details of the HOC system have not yet been finalized, but will be included in this handbook when they are.

DIEBACK HYGIENE GUIDE

An aid for planning forest operations so that dieback spread is prevented or minimized

Comprises: Introduction
How to use the guide
Planning Routines A to I
Glossary of terms

Prepared by: R.J. Underwood
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1980

INTRODUCTION

Jarrah dieback is a serious forest disease of south-western Western Australia. It is caused by the soil borne fungus *Phytophthora cinnamomi*. An effective means of controlling the disease is by the practice of "dieback hygiene". The aim of dieback hygiene is to prevent transport of the fungus from infected to dieback-free forest.

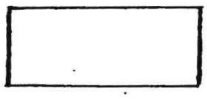
It is necessary to consider dieback hygiene when planning any forest operation in the southwest. Often difficult decisions must be made, and alternative courses of action evaluated.

This guide has been designed to help foresters plan and conduct an hygienic forest operation. It will NOT provide him with the detailed job prescription; this will vary for almost every job and every site. Rather it concentrates on the principles involved, to be used as a guide and memory-jogger at the planning phase of every operation.

NOTE: For the sake of convenience, the guide uses logging as the base operation. For any other proposed activity (e.g. road-works, bauxite mining, fire control, recreation etc) substitute the appropriate word - for example, "pit" for "coupe"; "crusher" for "mill landing" etc.

TO USE THE GUIDE

Enter at Routine A and follow through to Routine I, as directed.

The symbol  denotes an action.

and  denotes a question.

Routine A deals with the different impact of the disease in the major forest types.

Routine B concerns operations planned in dieback-tolerant forests.

Routine C provides for the definition of dieback risk categories.

Routine D provides for dieback-free and protectable stands.

Routine E provides for stands non-protectable from infection.

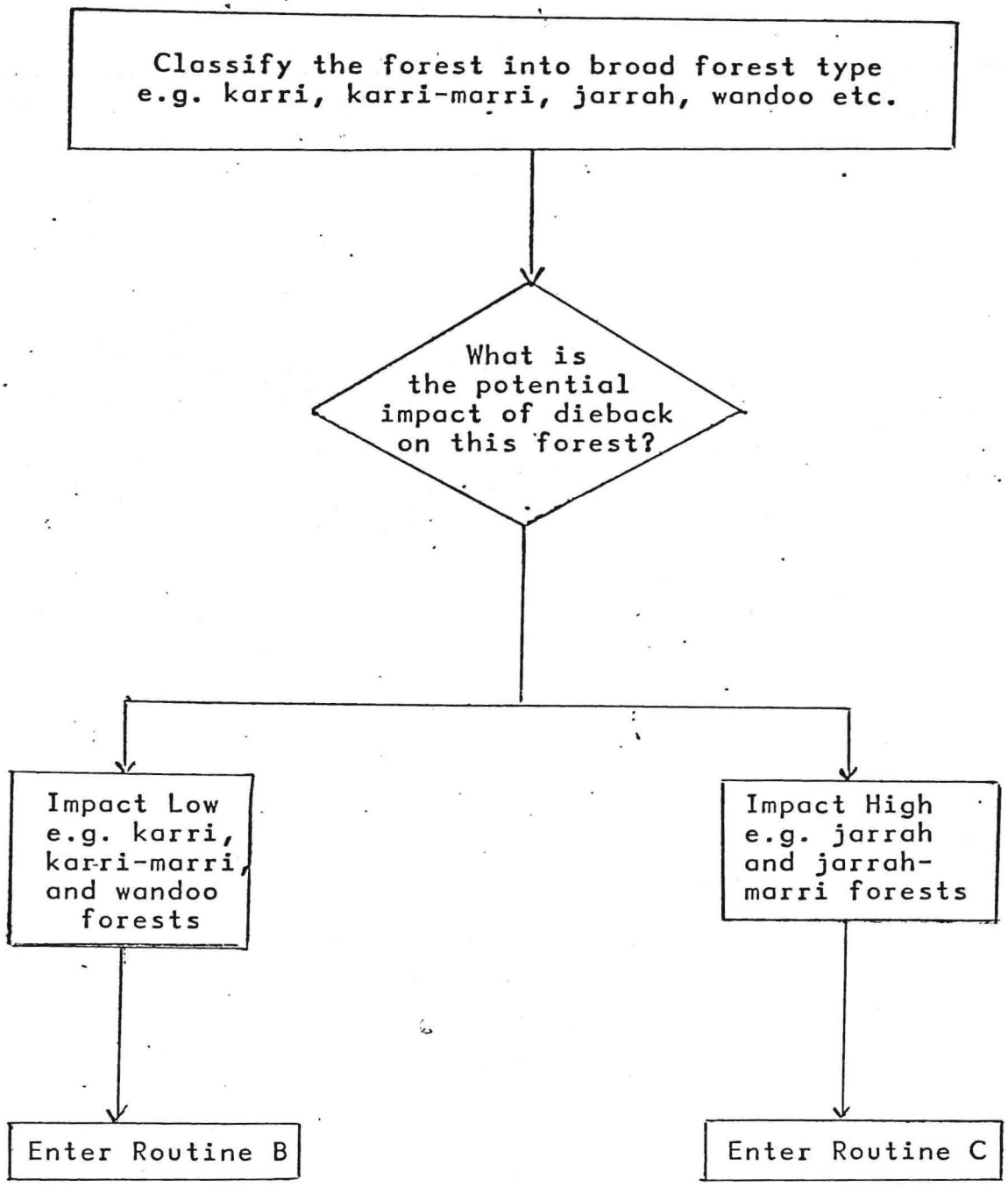
Routine F provides for dieback or suspect dieback stands.

Routine G concerns access planning.

Routine H is a hygiene failure test.

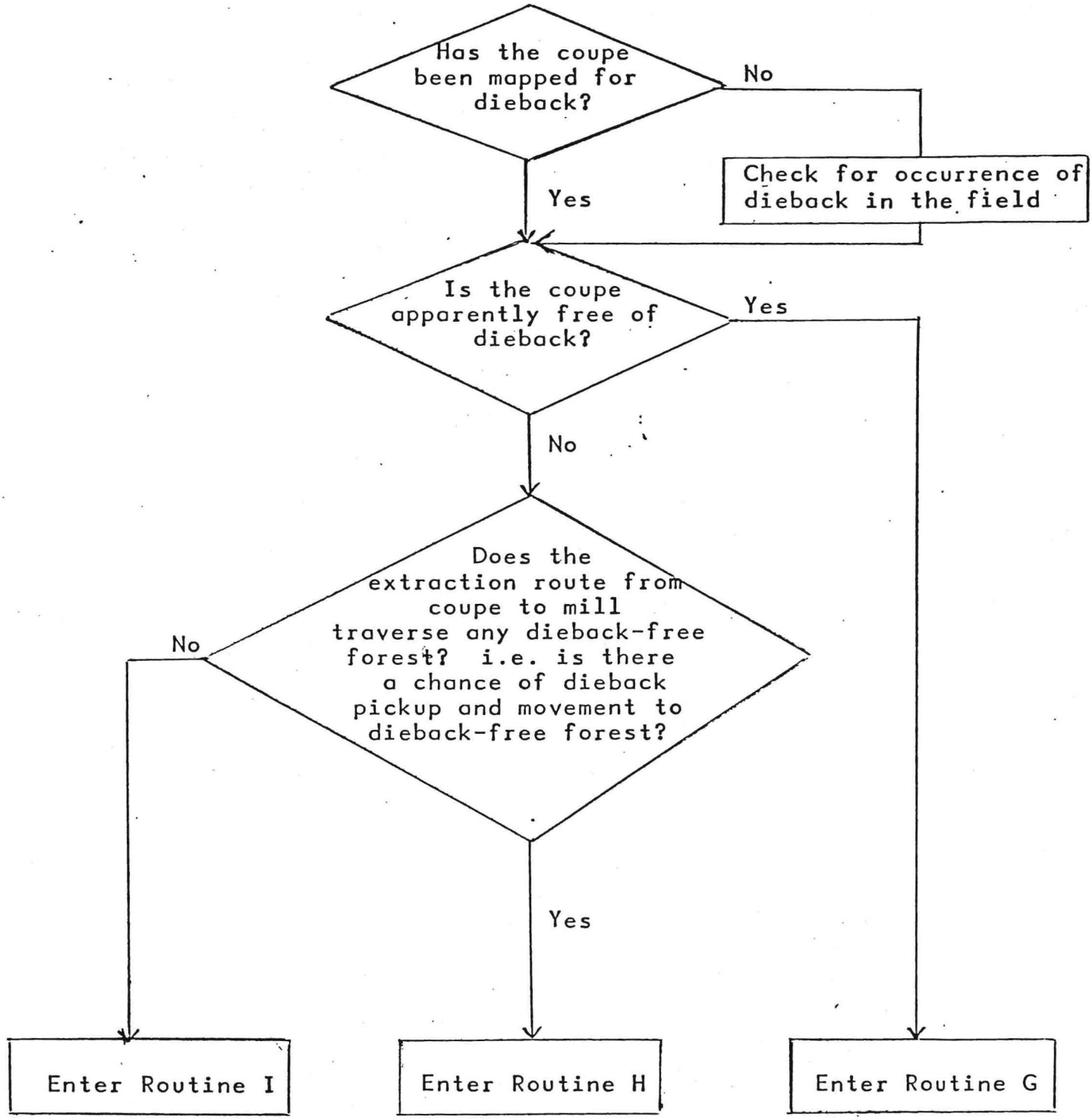
Routine I is a mechanism for prescription and control.

ROUTINE A : DIEBACK IMPACT



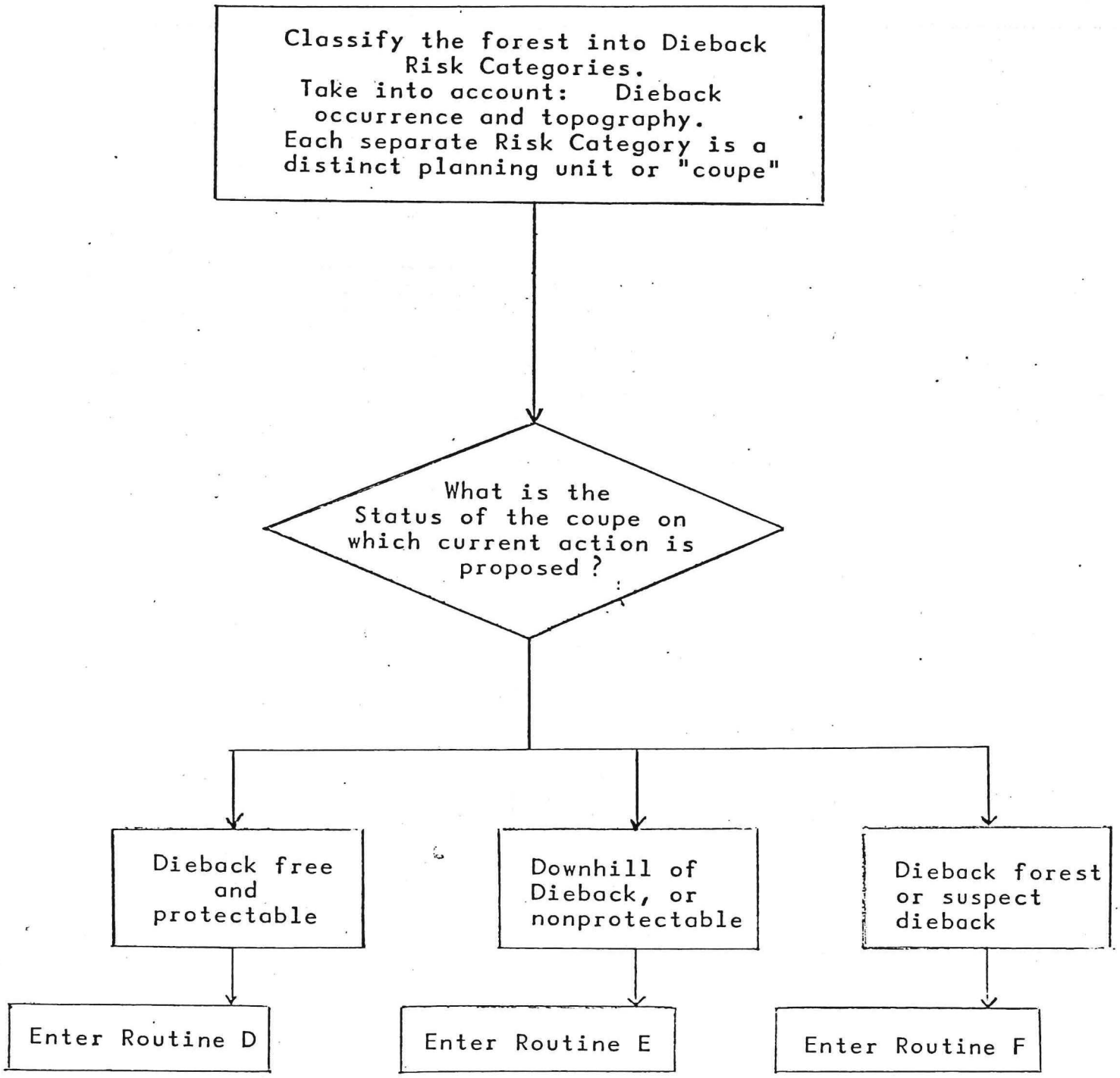
ROUTINE B : DIEBACK TOLERANT FORESTS

For an operation in dieback-tolerant forest:



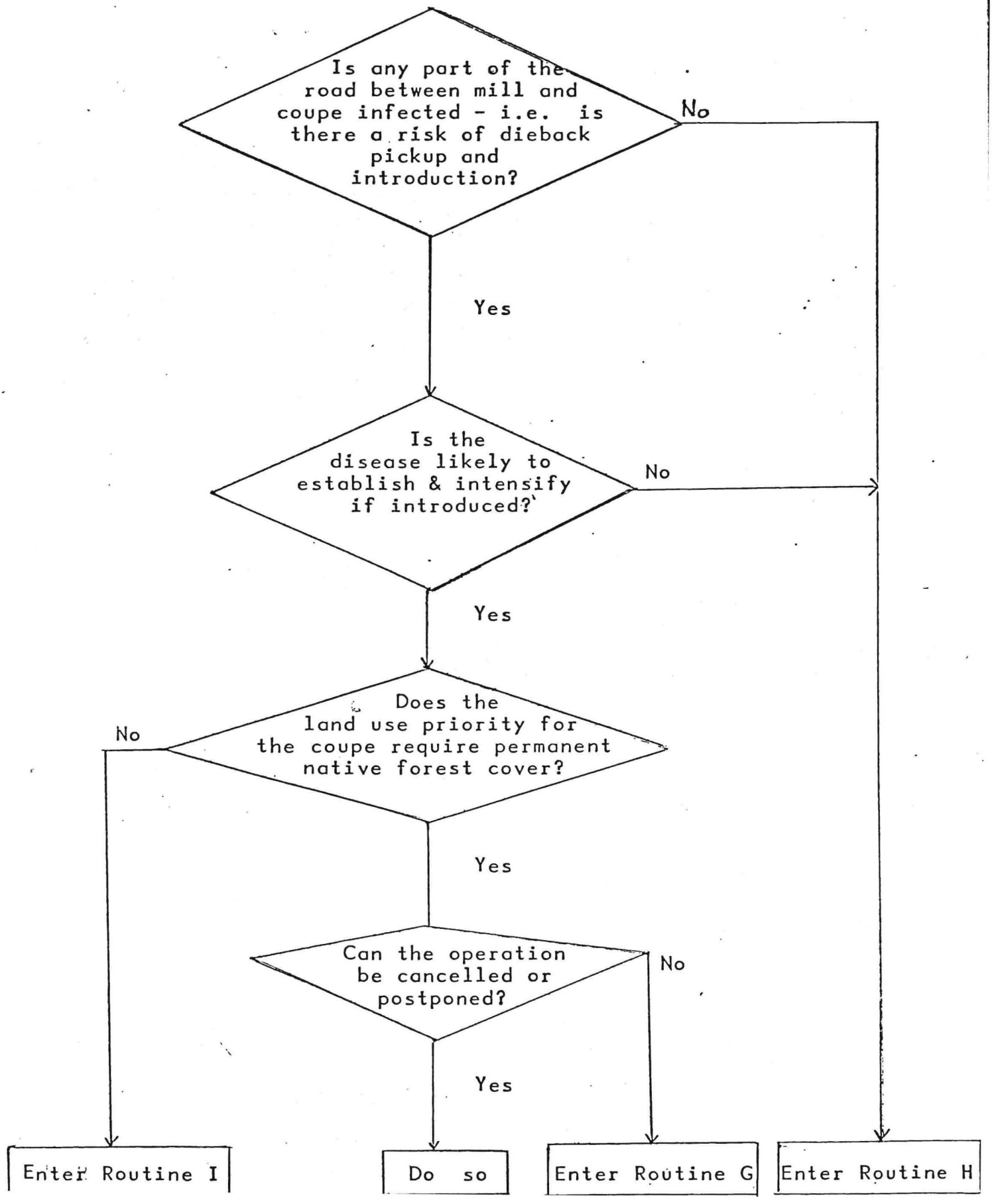
ROUTINE C : DIEBACK RISK CATEGORIES

For forest in which the impact of dieback could be high:



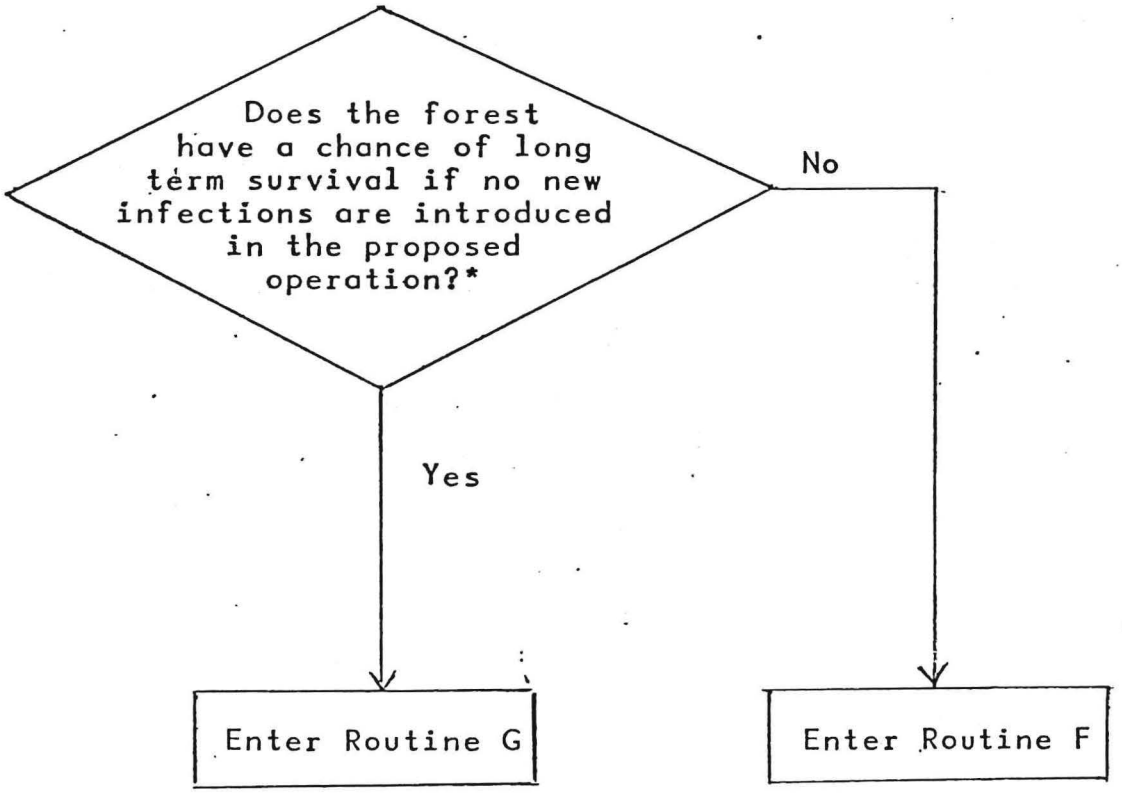
ROUTINE D : THE COUPE IS DIEBACK FREE AND PROTECTABLE

For forest apparently free of infection and upslope of any known infections:-



ROUTINE E : THE COUPE IS NONPROTECTABLE FROM INFECTION

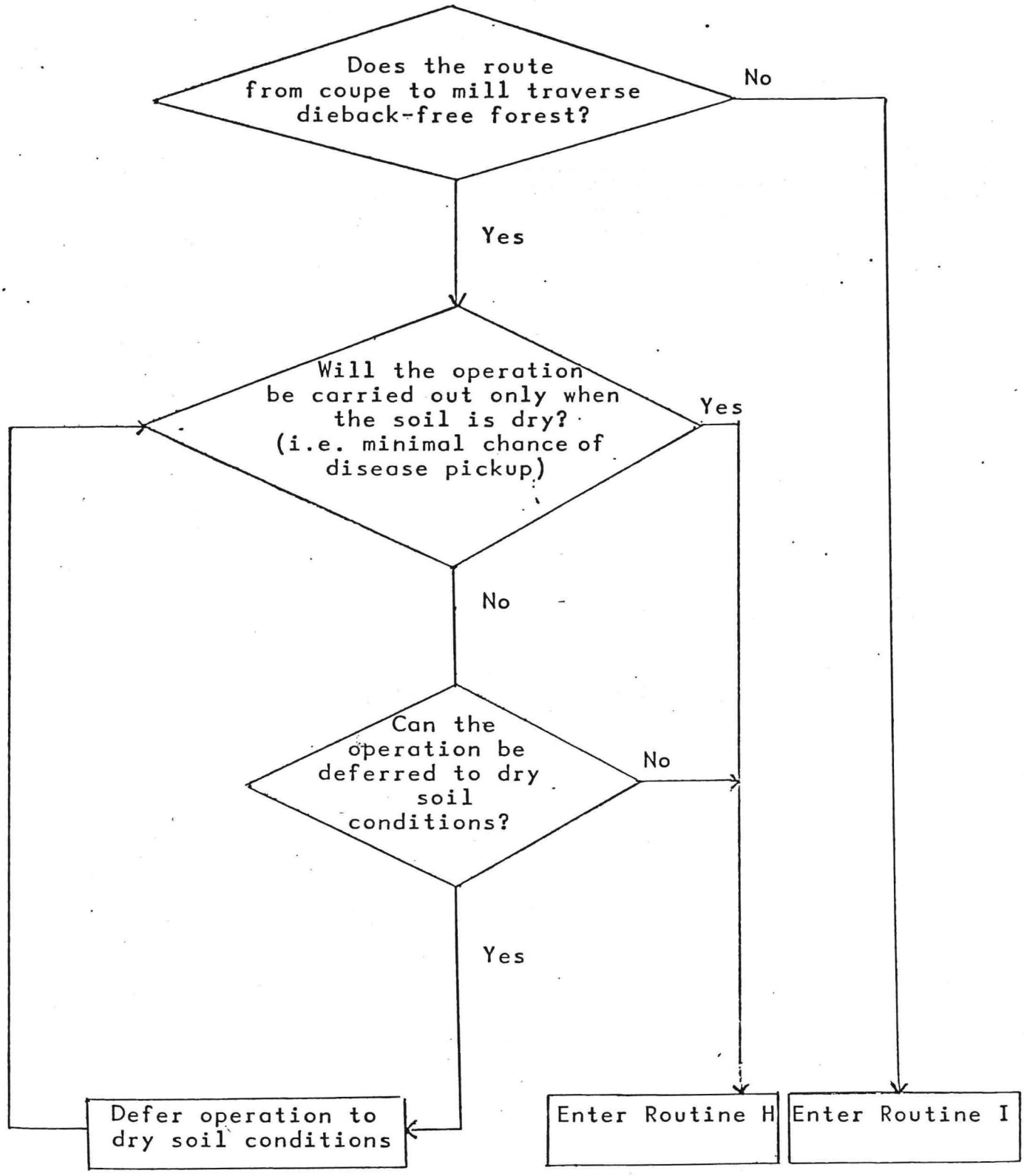
For forest which is downslope of an area already infected with dieback.



* This requires, with present knowledge, a value judgement. If in doubt, check your assessment against that of experienced foresters and research scientists.

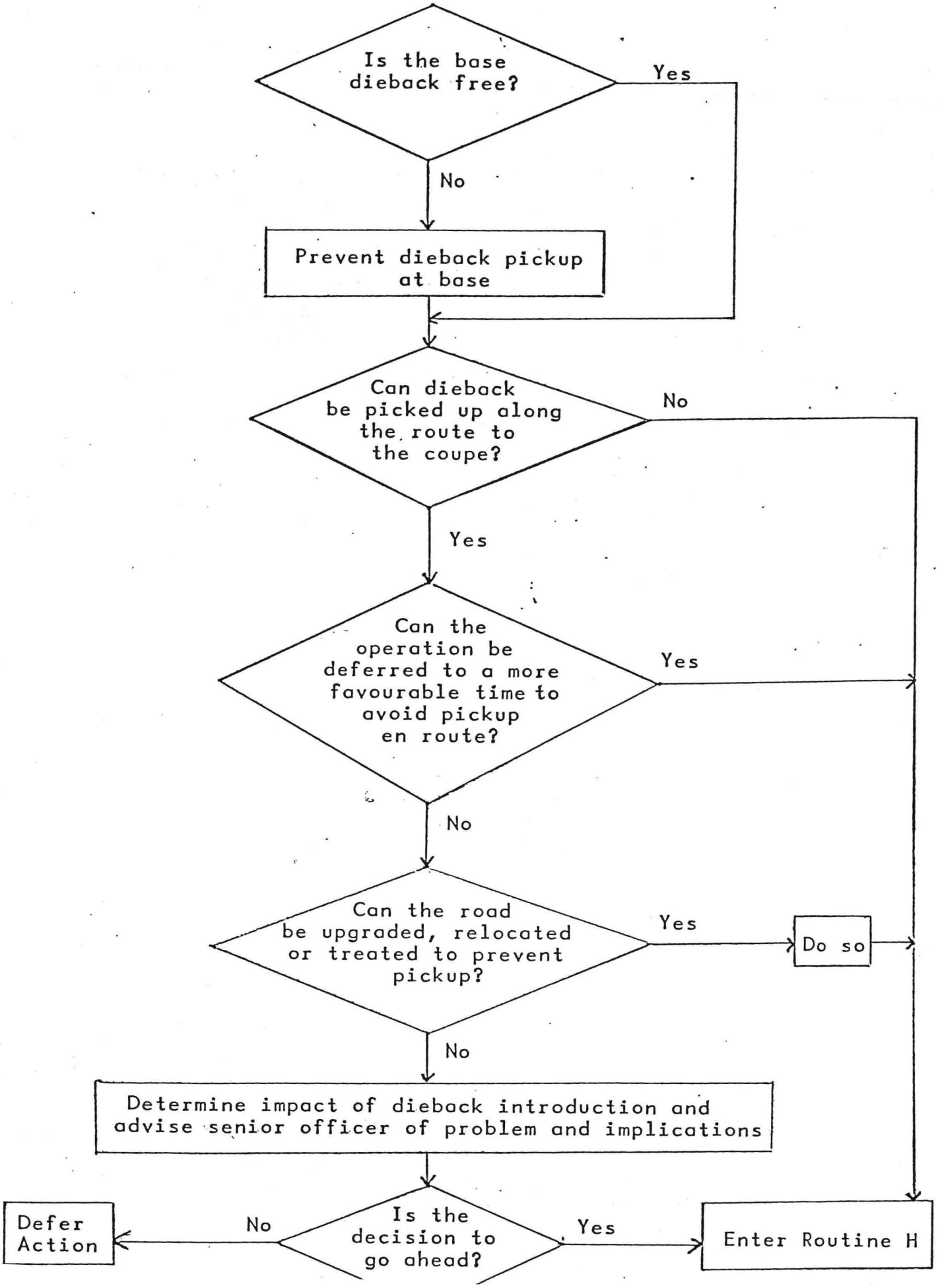
ROUTINE F : THE COUPE IS DIEBACK OR SUSPECT DIEBACK

If an operation is proposed in forest which is already infected, or suspected of being infected, the main risk is of disease pickup and transport to dieback-free forest elsewhere.



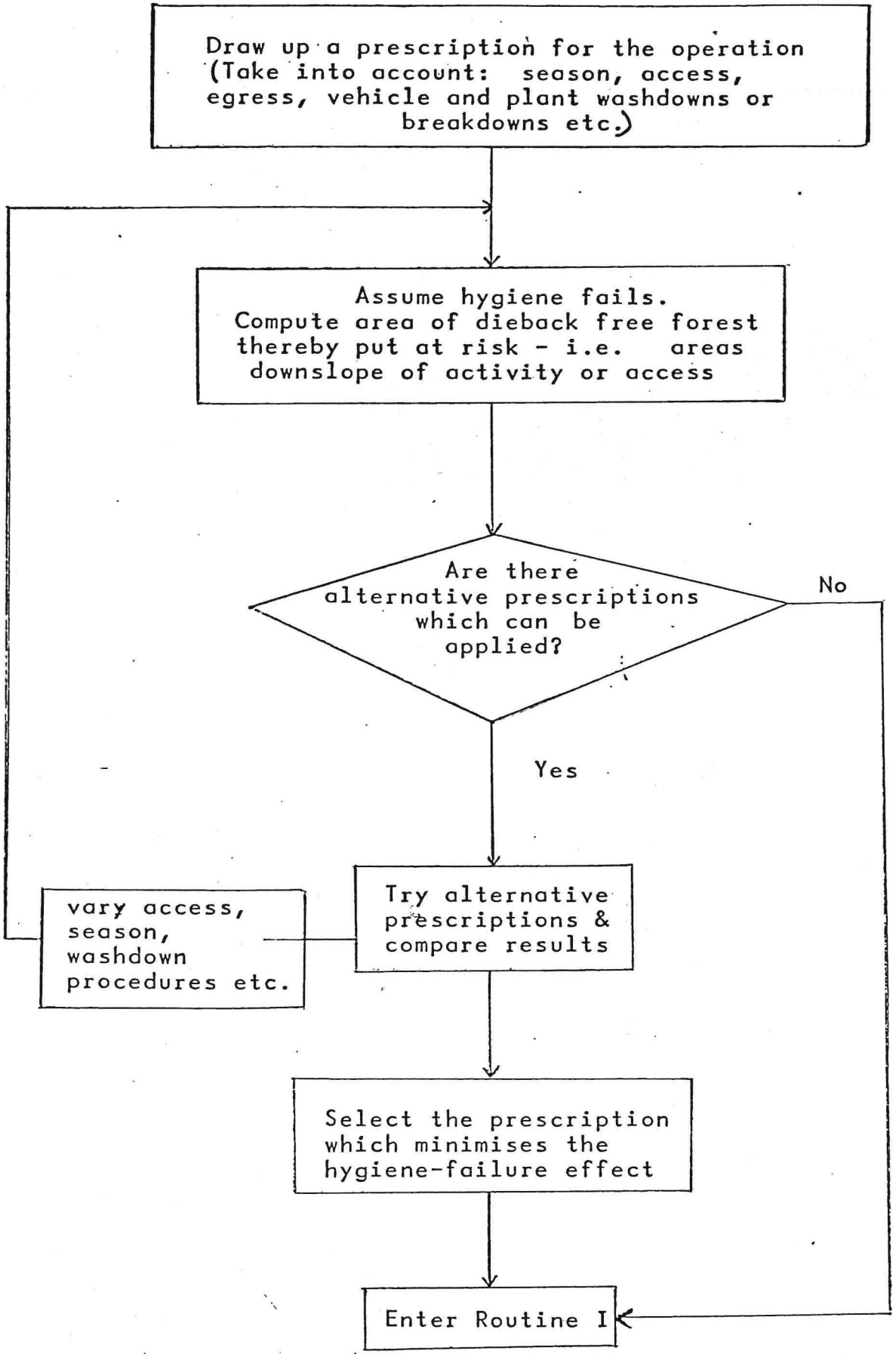
ROUTINE G : ACCESS

For any operation, dieback pickup can occur at the base (i.e. mill landing) or along the route to and from the forest operation.

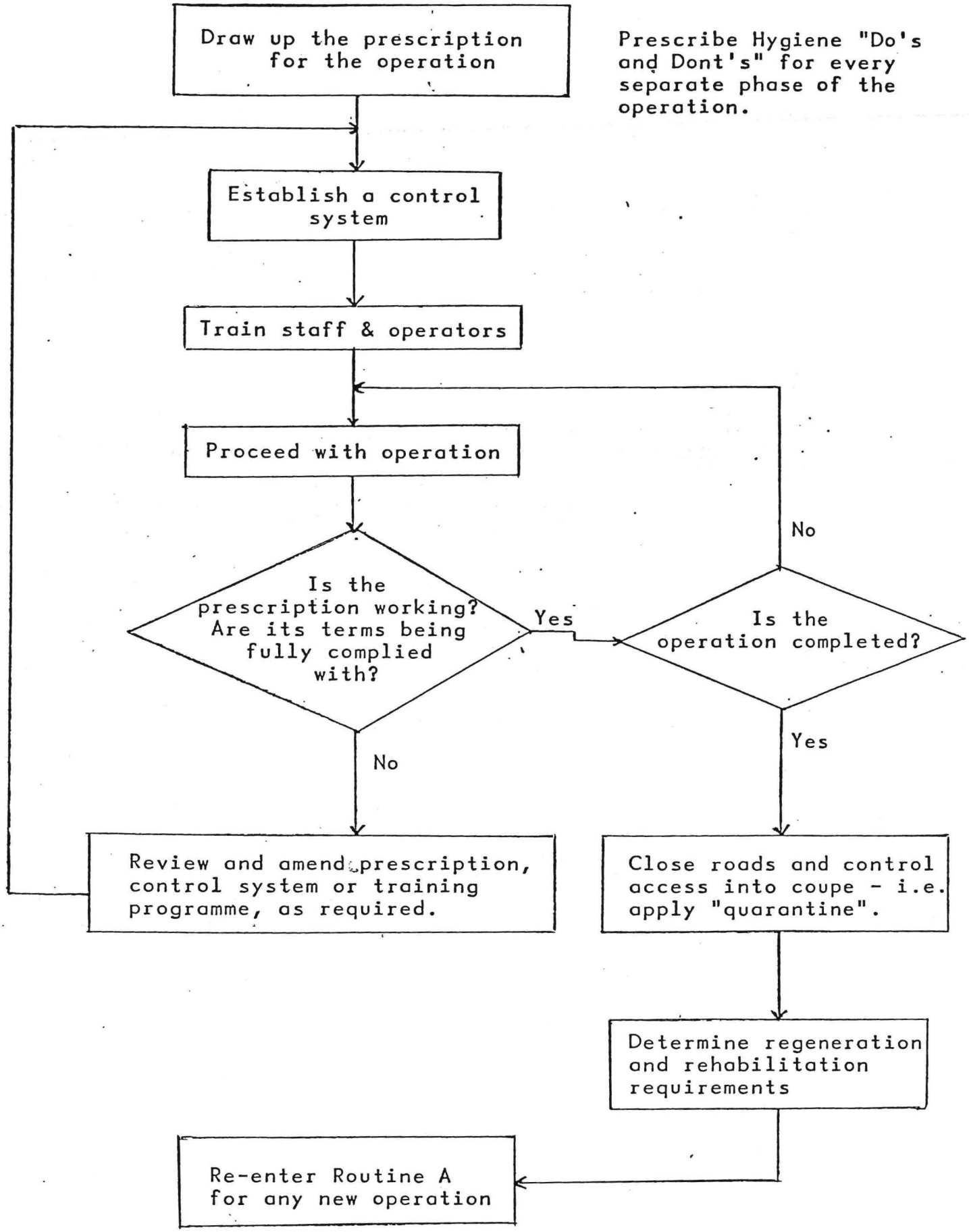


ROUTINE H : THE HYGIENE-FAILURE TEST

For any proposed operation it is necessary to examine the implications of possible hygiene failure.



ROUTINE I : THE OPERATION



GLOSSARY OF TERMS

DIEBACK:	The W.A. forest disease caused by *Phytophthora cinnamomi* ("*P.c.*").
DIEBACK FOREST:	Forest in which dieback symptoms are present.
DIEBACK SYMPTOMS:	Decline and death of indicator species in a particular pattern and/or location, suggesting the presence of dieback.
INDICATOR SPECIES:	Plants susceptible to dieback in the field.
SUSPECT DIEBACK:	Forest in which the evidence for dieback presence is inconclusive.
DIEBACKFREE FOREST:	Forest apparently free of dieback.
DIEBACK TOLERANT FOREST:	Forest in which susceptible tree species do not die after infection with *P.c.*
PROTECTABLE FOREST:	Forest apparently diebackfree and uphill from existing dieback infections.
NONPROTECTABLE FOREST:	Forest downhill from dieback infection.
DIEBACK IMPACT:	The effect of the disease on the forest plants and animals and/or the use to which the forest is to be put.