060574

A FOREST PRIORITY SYSTEM FOR BAUXITE MINING OPERATIONS IN GOOD QUALITY FOREST. (INCLUDING D.R.A.)

Version Approved

November, 1988.

APPROVED VERSION

A FOREST PRIORITY SYSTEM FOR BAUXITE MINING OPERATIONS

SUMMARY

A Forest Priority System is proposed which requires the highest priority areas to be treated under the driest seasonal conditions. The system will be applied to all Alcoa's mechanised surface operations in substantial areas of vulnerable, good quality forest. Good Quality Forest will be designated by CALM in consultation with Alcoa during development of 25 Year Mining Plans. These areas may be inside or outside DRA.

Forest priorities will be allocated as follows:

Downslope Status	Pit Status	
	Dieback-free/Uncertain	Dieback
Vulnerable to Dieback	Priority 1	Priority 2
Not Vulnerable	Priority 2	Priority 3

Operations will be carried out according to special Prescriptions for Good Quality Forest.

A simplified 'category' system will operate outside Good Quality Forest.

Research projects are underway to define critical soil moisture levels and develop risk and hazard assessment procedures. These data will be considered, along with field operating experience, for incorporation into annual reviews of the prescriptions commencing in December 1989.

A FOREST PRIORITY SYSTEM FOR BAUXITE MINING OPERATIONS

Introduction

A high standard of dieback control will be required where mining occurs in vulnerable, Good Quality Forest (GQF). The methods used need to effectively control dieback while being appropriate for mining and efficient to implement.

The first significant area of mining scheduled in Good Quality Forest is in Urbrae block, mainly outside DRA, with smaller areas scheduled at Wren Road, inside DRA. Mining at Huntly is expected to be largely within Good Quality Forest by about 1991. The procedures proposed in this document need to be progressively implemented and evaluated under routine operating conditions prior to that date.

A Forest Priority System has been proposed which requires the highest priority areas to be treated under the driest seasonal conditions. Lower priority areas can then be allocated to the seasons which are less favourable for hygiene.

The priority system will be applied to all Alcoa's mechanised surface operations, from grade control drilling onwards, which occur in designated areas of vulnerable, Good Quality Forest (Table 1). Exploration drilling and survey will continue to be subject to the existing hygiene prescription, in line with other more extensive forest operations such as logging.

Once drainage containment systems have been established, the priority system will not be required during the blasthole drilling, mining and landscaping stages, where operations are below the level of the original soil surface.

Aims

The aims of priority setting and dieback control during mining will be to:

TABLE 1 : CONTROL PROCEDURES APPLIED TO STAGES OF BAUXITE MINING OPERATIONS

Organisation	Stage	Profile Location	Control Principles	Operating Procedures (see Table 3)
CALM	FIRS	Surface	Standard hygiene	CALM procedures*
ALCOA	Survey + Exploration	"	"	Extensive low intensity
	Grade Control	"	Modified hygiene	Intermediate
CALM	Logging	"	Standard hygiene	CALM procedures*
ALCOA	Clearing	"	Containment, modified hygiene	Intensive
	Soil stripping	"	"	"
	Drill & Blast	Sub-surface	Containment	Not applicable
	Ore Extraction	"	"	" "
	Landscaping	"	"	" "
	Soil Return	New surface	Containment, modified hygiene	Intensive
	Ripping	"	"	" "
	Drainage Works	"	"	" "
	Seeding	"	"	Intermediate
	Planting	"	"	"
	Broadcast Fertilisation	"	"	"
CALM	Management	"	Standard hygiene	CALM procedures*

* Refer to "Manual of Hardwood Logging Specifications".

- effectively control dieback while maintaining an efficient mining operation.
- prevent the development of dieback disease on dieback free areas which are mined.
- protect vulnerable adjacent forest from dieback introduction and intensification.

Definitions

This Priority System will be applied to substantial areas designated as Good Quality Forest by CALM in consultation with Alcoa during the development of Alcoa's Twenty Five Year Mining Plans, and shown on the Five Year Plans approved by the Minister for Resources Development.

Good Quality Forest will be designated where the forest is substantially dieback free, in large contiguous areas, and where access can reasonably be controlled. The intent is for Good Quality Forest to be designated where most of a ridge is free of dieback, regardless of infections in the surrounding stream-zones or at isolated spots on the ridge (Figure 1). The Urbrae Ridge is a typical example.

Vulnerable forest is that which is not mapped as dieback and which contains jarrah or a significant proportion of other species which are susceptible to the disease. Hazard ratings such as the Shearer system may be used, when more data are available, to assist in defining vulnerability. This may also involve assessments of surface geology, topography and drainage patterns.

Hygiene is the basic principle of maintaining equipment cleanliness, designed to prevent the transport of fungal inoculum from an infected area to an uninfected area. e.g. cleandown of vehicles, restricting operations to dry conditions where appropriate.

Containment refers to principles used to confine infection to the operating site by controlling the movement of fungal inoculum from a given area. e.g. use of a blasted slot or impervious drains to contain runoff, confining vehicles to a single dieback category.

The Priority System

Forest will be allocated on a case by case basis to one of three priorities as shown in Table 2 below:

TABLE 2: Forest Priority Rating

Downslope Status	Pit Status	
	Dieback-free/Uncertain	Dieback
Vulnerable to Dieback	Priority 1	Priority 2*
Not Vulnerable	Priority 2	Priority 3

* Generally small areas

The status and significance of downslope forest will also be considered on a case by case basis. The areas and priorities will be proposed by Alcoa for approval by CALM.

A cut-off of 10% of the area of the pit upslope can be used as a guide when deciding if a significant area of vulnerable forest exists downslope.

An example of how the system would apply is shown in Figure 2.

Operating Conditions

Operations will be carried out according to the Developmental Prescriptions for Dieback Control in Good Quality Forest, as summarised in Table 3 below. Alcoa will be responsible for securing sufficient equipment to achieve the priorities. If equipment is unavailable, priorities will normally carry over into the next year. Priorities may be reviewed after exceptional weather or other such circumstances. Small changes in priority, for example the need to reschedule mining of small areas due to grade control problems, or the need to complete mining of remnant areas left at the end of season because of other environmental considerations, should be considered by the local CALM District Office. Major changes should be referred to CALM Regional Office.

TABLE 3
OPERATING CONDITIONS

Operations	Priority	Soil Moisture Description	Conditions	Hygiene
Extensive (eg. exploration drilling, survey)	*Dieback-free/ Uncertain	Dry/Moist#	No soil movement	As per existing prescription.
	* Dieback	Wet	No restrictions	As per existing prescription.
Intermediate (eg. grade control drilling)	1	Dry to moist	Doesn't stick, dusty to moist.	Strict hygiene and cleandown before entry and between holes, no soil transfer.
	2	Damp, but not saturated	Soil may stick, damp but no water pressed out.	Strict hygiene and cleandown before entry and between holes, no soil transfer.
	3	Wet, but not boggy	Sticky, wet, water pressed out.	No restrictions on entry. Strict cleandown on exit from dieback.
Intensive (eg. clearing, stripping, rehabilitation)	1	Dry to moist	Doesn't stick, dusty to moist.	As per developmental prescription.
	2	Damp, but not saturated	Soil may stick, damp but no water pressed out.	As per developmental prescription.
	3	Wet, but not boggy	Sticky, wet, water pressed out.	No restriction on entry, cleandown before exit from dieback.

* Priority system not used for exploration and survey.

\# Dry/moist - operations will only occur under dry soil or moist soil /no soil movement conditions. As a guide this is usually under 5mm of rainfall.

Extensive, Low-Intensity Operations (natural soil surface)

During extensive operations (eg. exploration drilling, survey, security patrol) the area put at risk may be large. The aim is to prevent the transfer of potentially infected soil, with a very high degree of certainty. All dieback-free areas are therefore treated under dry or moist, no soil movement, conditions. This is in line with all other extensive forest operations such as logging.

Intermediate Intensity Operations (natural soil surface)

During intermediate operations (eg. grade control drilling), activities occur at the soil surface but are limited both in intensity and area. Activity is generally restricted to sites which have been approved for mining. The key to dieback control is no fungal transfer, regardless of what the soil moisture conditions are. Provided no soil is transferred, between drill holes for example, no dieback spread can occur. Hygiene is therefore achieved by operating under dry conditions, by very strict cleandown between holes, or both. If drills are rubber tyred, operate over caprock or leaf-litter, stay off muddy tracks and the augers etc are cleaned between holes, no soil should be moved provided the soil is not wet enough to cause bogging. These actions constitute the modified hygiene procedures referred to in Table 1.

Intensive Operations (movement or exposure of topsoil)

During intensive operations (eg clearing, stripping, rehabilitation) the transfer of soil or root material is generally an objective of the operation. Furthermore, subsoil at caprock level may be moist even in summer when the surface is dry. Dieback control is therefore achieved by confining operations to single dieback categories under soil moisture conditions which are not conducive to the proliferation of the fungus or to its spread in drainage water to adjacent dieback free areas.

While large volumes of soil of varying moisture content are being transferred inside equipment (eg scraper bowls), it is not a sensible objective to prevent the transfer of soil on the outside of those same machines, provided dieback boundaries are not being crossed. The soil should however be dry enough to restrict fungal growth and survival as

well as preserving the soil structure. The actual moisture levels required to do this are not presently known. Dry or damp conditions are obviously more desirable than very wet soil conditions. A simple, conservative means of judging soil dryness is required. Presently the easiest test is to see that the soil is not wet enough to exude water when pressed. The soil moisture standards in Table 3 will therefore apply until further research specifies otherwise.

The conditions in this document and the Developmental Prescriptions will be reviewed annually. They may be changed, by agreement, in the light of new research or operating experience.

Application of the Priority System

Within Good Quality Forest

The Priority System for Good Quality Forest will be applied according to the GQF steps in Figure 3.

The arrangement fits within the existing procedures of the Mining Management and Planning Liaison Group (MMPLG) and Mining Operations Group (MOG) structures as shown in Figure 4.

Annual planning will be co-ordinated by the Working Group identified on Figure 3. This group will comprise Alcoa Minesite Environmental Scientists and CALM District and Regional staff. Day-to-day operating concerns will be addressed by Alcoa minesite and CALM District staff with reference to CALM Regional staff when necessary. The need for a small, senior Steering Group at Regional Manager/Manager Protection Branch level will be subject to further discussion.

Outside Good Quality Forest

A similar but less stringent 'Category' system will operate outside Good Quality Forest. These less stringent conditions will be appropriate to the reduced consequences of dieback outside GQF. Operations will occur in the designated categories, using the equipment normally available on each minesite. Suitable prescriptions will be added to the existing Working Arrangements for operations outside designated areas of GQF.

Research and Review

The results of ongoing research and field experience will be incorporated into annual reviews of this GQF Priority System and the Developmental Prescriptions.

Research on the further development of minesite risk and hazard assessment procedures and work on soil moisture levels critical to fungal survival and rapid growth will be undertaken by Alcoa and CALM as a matter of particular importance.

This Priority System and the Developmental Prescriptions are due for review by December 1989.

PE2/88/525

FIGURE 1. : EXAMPLE OF GQF DESIGNATION

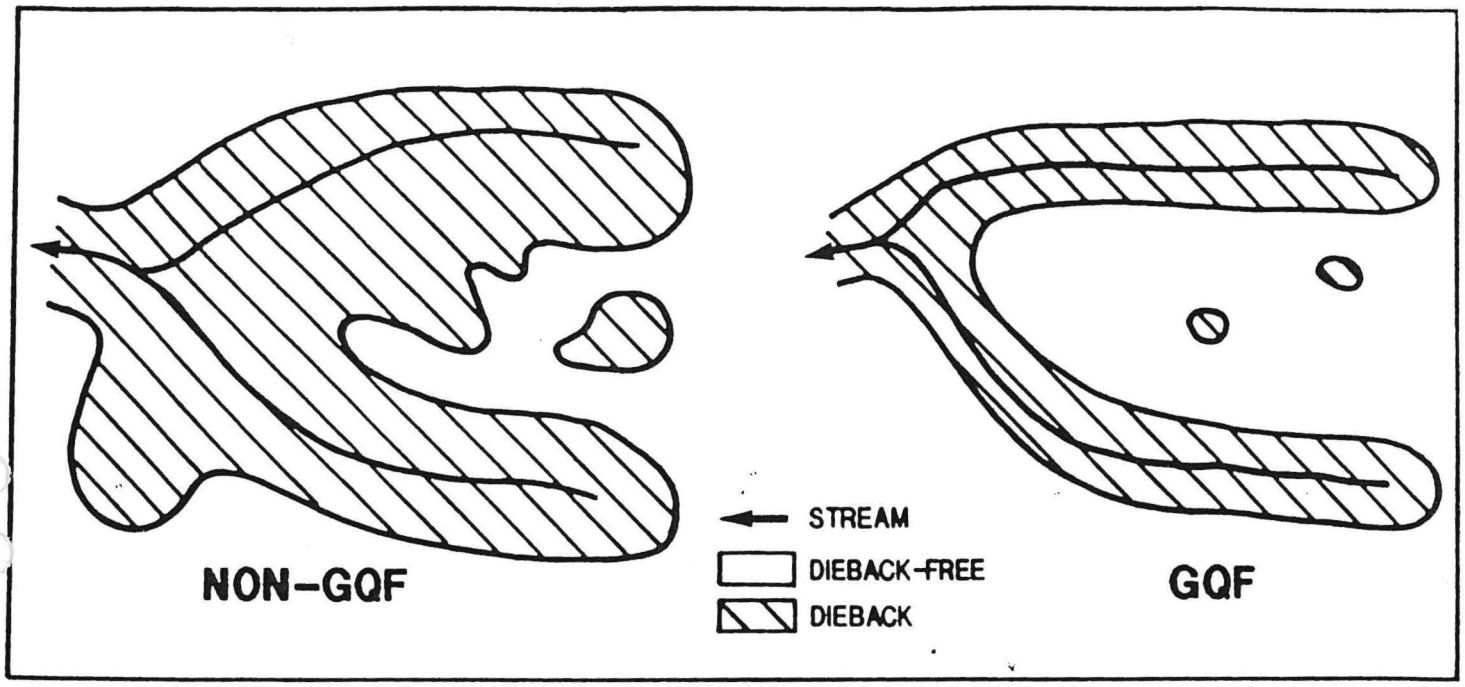
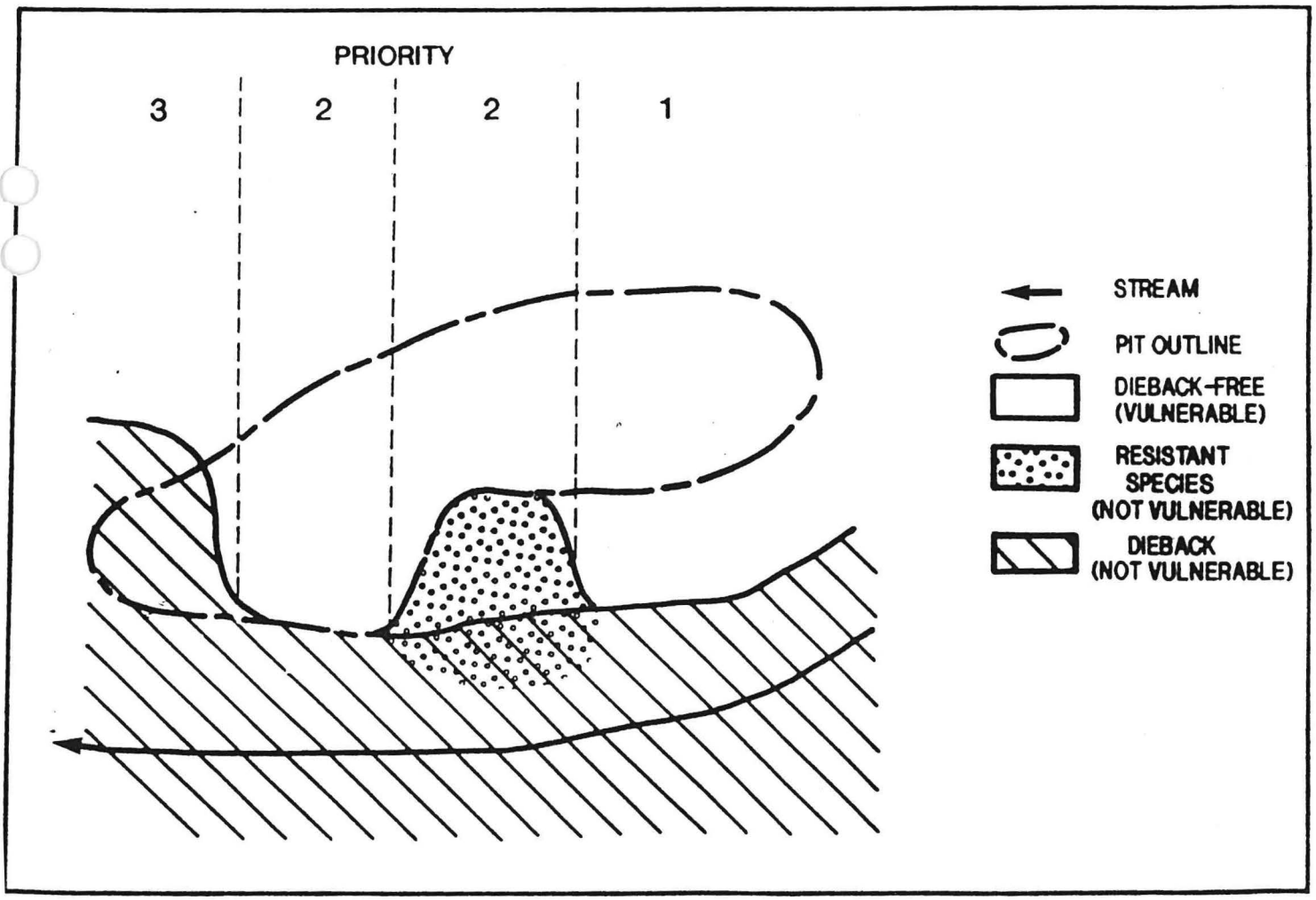


FIGURE 2. : EXAMPLE OF PRIORITIES



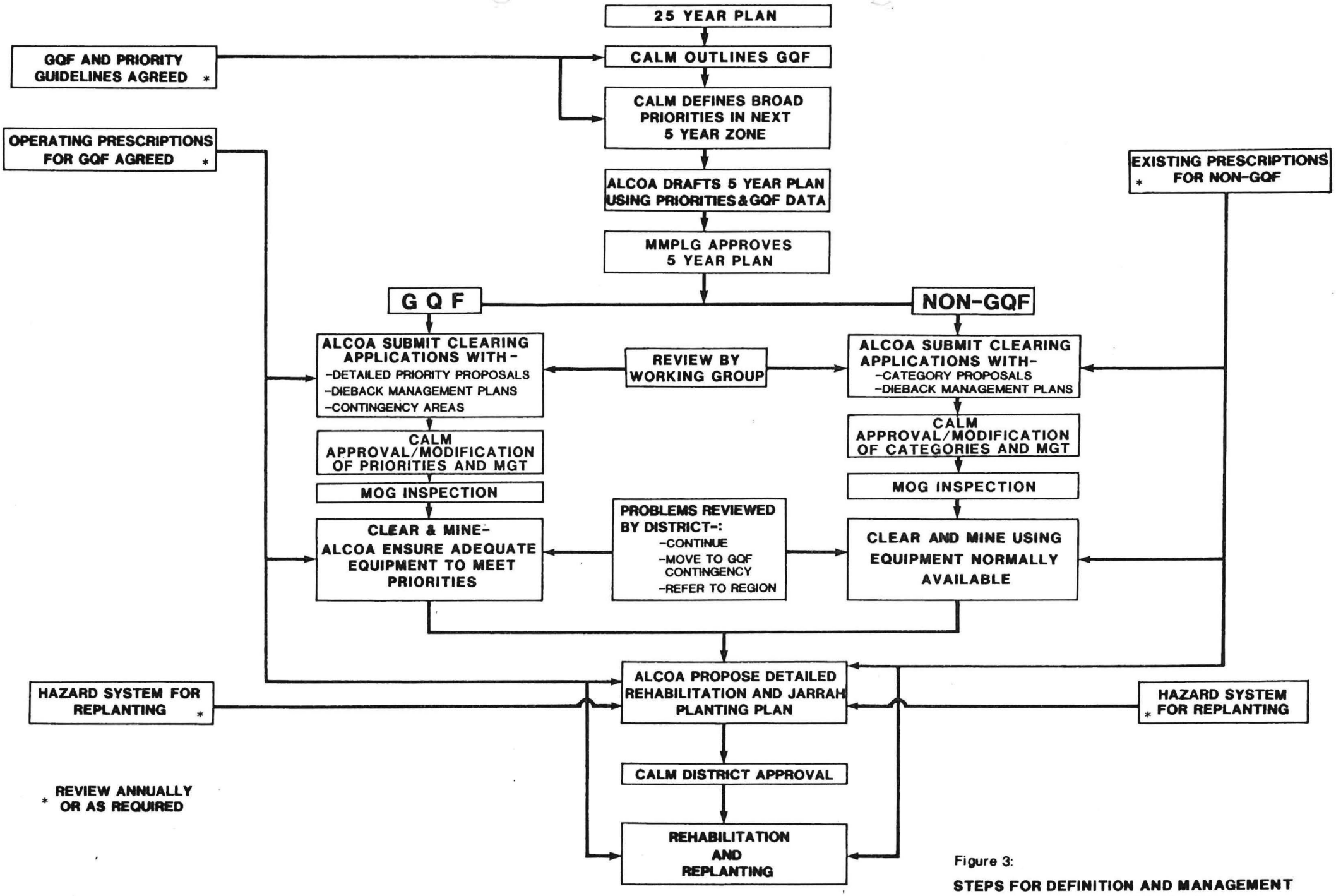


Figure 3:

STEPS FOR DEFINITION AND MANAGEMENT OF GOOD QUALITY FOREST.

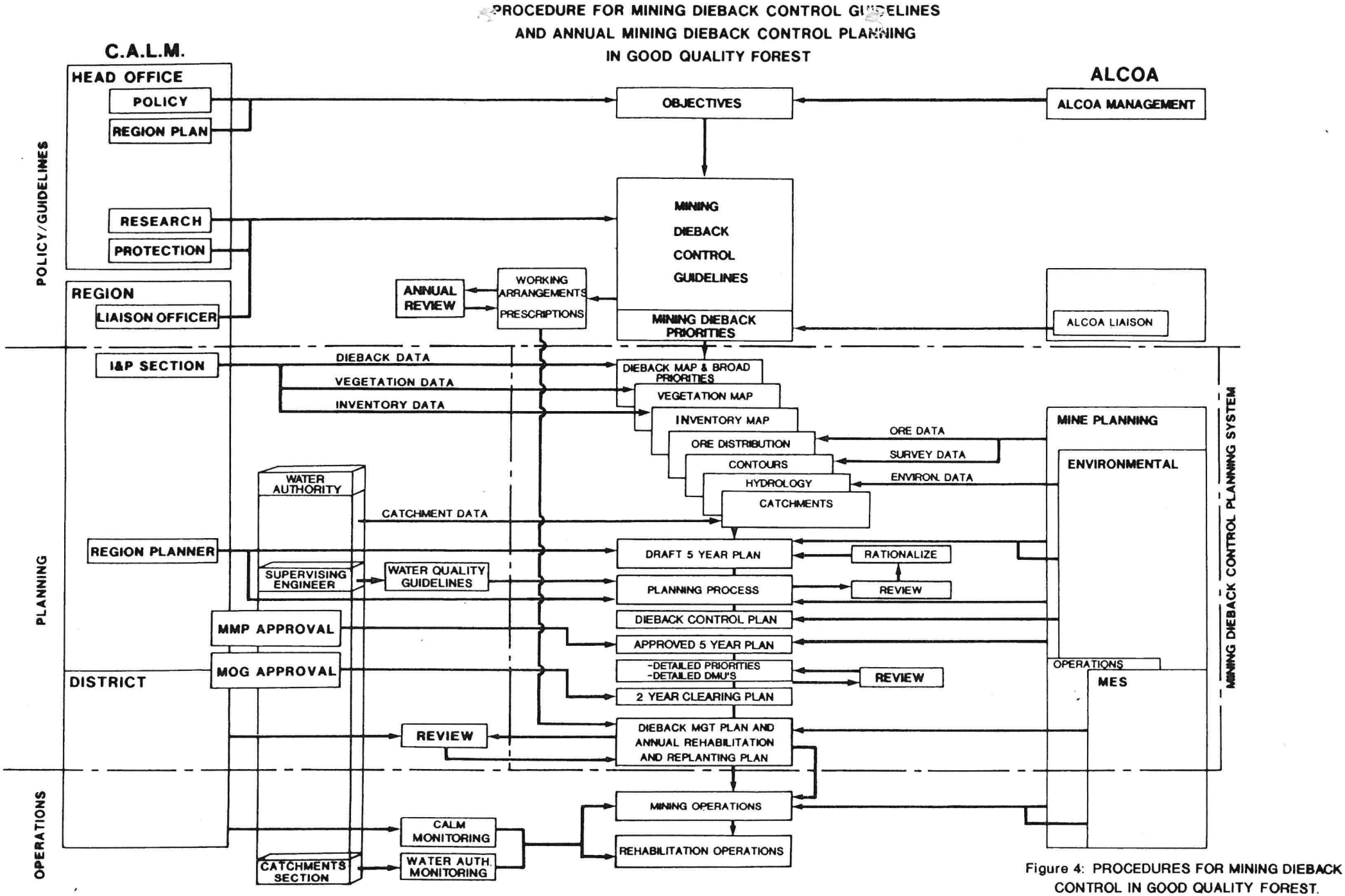


Figure 4: PROCEDURES FOR MINING DIEBACK CONTROL IN GOOD QUALITY FOREST.

A FOREST PRIORITY SYSTEM FOR BAUXITE MINING OPERATIONS

APPENDIX

Research Programme

The specific research topics listed below have been identified as addressing questions important to the future evaluation of the effectiveness of dieback control prinicples identified in the above document.

These topics have been listed by the Steering Committee for Research on Land Use and Water Supply in their Annual Report to the Research Co-ordinating Committee 1987/88. More details on each topic can be found in *Croton, 1988.

The specific topics of relevance are;

- minimising dieback impact in areas of forest adjacent to mining;
- survival and sporulation of Phytophthora cinnamomi in soils of haul roads, pit floors and forest adjacent to bauxite mining;
- monitoring of intensive dieback management sites to evaluate the presence and spread of dieback;
- application of dieback hazard systems to comprehensive dieback management in mining operations;
- development of criteria to define appropriate soil moisture conditions for pre-mining operations and direct topsoil return.

Findings from other topics in Croton (1988) and other relevant research will also be incorporated, as appropriate, in future reviews of the procedures.

---

* Reference: CROTON, J T, 1988. Alcoa's R & D Programme for Comprehensive Dieback Management. Alcoa Environmental Department, Internal Report. 88/7.