FIRE PROTECTION HANDBOOK

An Abridgement of Part 9
(Fire Control) of the

FORESTERS' MANUAL

1983 EDITION

For Internal Use Only

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Issued to .....

FORESTS DEPARTMENT OF WESTERN AUSTRALIA

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PREFACE

This abridged version of the Fire Control Section (Part 9) of the Foresters' Manual is intended only as a ready reference to assist Operational staff with the day to day fire control queries that may arise in the field.

For detailed reference you must consult the relevant paragraph (see ref. number) in Part 9 of the Foresters' Manual.

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INTRODUCTION

Fire Problems (Ref. 9.001)

The problem of fire control is intimately connected with the questions of reforestation and afforestation, and the ultimate success of the Department's efforts in these projects is largely dependent on a strong measure of public sympathy and co-operation in attacking the fire problem.

The eucalypt forests of Western Australia have evolved in a fire environment. Both flora and fauna have adapted to hot dry summers and the associated fires started by lightning and, more recently, by man. It is, therefore, natural and advisable to undertake hazard reduction by the intelligent use of fire of prescribed intensity and frequency to minimize damage caused by intense summer wildfires.

HISTORY

Protection Problems (Ref. 9.002)

Experience has shown that after 15 or 20 years' protection, the accumulation of combustible material was such that even heavy expenditure on men and equipment could not control a fire under the severe weather conditions that occur periodically in Western Australia. Other States have learned this lesson with equal force.

Effective fire control can only be achieved in the south-west forest through regular reduction of fuel hazards by prescribed burning and maintaining an efficient detection and suppression system capable of rapid and effective attack of fires before severe damage occurs.

OBJECTIVE OF MANAGEMENT

(Ref. 9.003)

The Department's objective is to provide a fire control system capable of protecting recognized forest values from serious damage. The system is to be compatible with the dominant land use in any area, with the cost of protection not exceeding the value of the loss prevented.

POLICY

Fire Policy

(Ref. 9.004)

Present fire control policy results from six decades of experience and research, and may be briefly summarized as follows:—

(1) Continue the investigation of fire effects on each major land use.
(2) Provide for public education, warning and control in relation to fire risk, and ensure liaison with other fire protection organizations.
(3) Provide a detection system which will ensure rapid, effective attack of all wildfires in State forest.
(4) Reduce fuels systematically in the indigenous forest to levels at which wildfire can be readily contained under normal weather conditions.
(5) Provide effective fuel reduced buffers in pine forests.
(6) Provide a well-trained and well-equipped suppression organization.
(7) Continue research programmes into all aspects of fire protection.
(8) Ensure effective liaison with individual neighbours, bush fire brigades, shires and other organizations.

STRATEGIES AND PROCEDURES FOR FIRE MANAGEMENT

Bush Fires Act

(Ref. 9.005)

Every forest officer must acquaint himself with the Bush Fires Act and Regulations and make sure that his copy of the Act is kept up to date by entering any amendments that are gazetted. A simple summary of the major sections of this Act is contained in the pamphlet Fire Law.

We are looked upon as the main exponents of fire control and it is essential that all forest officers be most careful to comply with the provisions of the Bush Fires Act.

Forests Act (Ref. 9.006)

Besides the provisions of the Bush Fires Act, the attention of all forest officers is drawn to the following fire provisions of the Forests Act and Regulations:—

Penalty for unlawfully lighting fires—Section 46.
Forest officers calling for suppression assistance—Section 47.
Setting fire to bush without notice to forest officers—Section 48.
Mill protection—Regulation 140.
Responsibilities of licensees and permit holders—Schedules.

Forest officers must be most punctilious in the observance of all provisions of these Acts.

Prohibited Burning Period (Ref. 9.007)

The Bush Fires Act provides for a period each year during which the lighting of fires, except for certain specific purposes, is prohibited. The dates for the prohibited periods for different zones are published in the *Government Gazette* from time to time and area O.I.C.'s (Officers-in-charge) must acquaint all officers with the dates of local zone restrictions.

Provision is also made for this Department to obtain a suspension of the prohibited period to enable us to carry out protective burning.

Suspensions (Ref. 9.008)

Applications for suspension of the prohibited burning season must be lodged with the O.I.C. of Protection Branch, State Headquarters (SHQ), at least one week before the closing date of the restricted period. Except for special regeneration and clearing burns, suspension will normally only be granted by the Bush Fires Board to enable burns already commenced to be completed.

Fire Investigation (Ref. 9.009)

In every case of fire the local officer must take immediate steps to ascertain the cause. From his local knowledge, the forester will generally have a good idea of the cause of most fires which occur. Where it is obvious that it is directly due to human agency, immediate steps should be taken to obtain more specific information concerning the identity of the culprit with a view to possible law enforcement.

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Points in Investigating Outbreak of Fire

It is usual and advisable to call in the local police constable to accompany the forest officer.

Every person in the locality who is likely to have useful information should be interviewed.

A full report must be submitted to the Protection Office immediately after the investigation is completed. The following details should be included:—

(1) Full name and address of the person lighting, or suspected of having lit, the fire.
(2) Signed statements from this person, if possible.
(3) The section of the Act infringed.
(4) Exact location of the start of the fire, with an attached plan.
(5) Tenure of land where fire started, e.g. State forest or private property.
(6) Time fire started as nearly as possible.
(7) Method of lighting.
(8) Reason, e.g. carelessness, match, cigarette butt or, if deliberate incendiarism, the suggested motive.
(9) Names and address of witnesses, with signed statements.

Prosecution by Local Authority (Ref. 9.010)

Where a breach of the Bush Fires Act occurs on private property outside the boundary of State forest, the local authority, which is charged with the policing of the Act, should carry out the prosecution.

The forester may assist officers of the local authority to obtain evidence, but as far as possible should leave prosecutions to the local authority if the breach occurs on private property.

Legal Actions (Ref. 9.012)

Your attention is drawn to the need to provide prompt, comprehensive and accurate information on fires which are likely to involve the Forests Department in legal action...

In the event of anticipated legal action by or against the Department for costs arising from a fire, a report should be compiled immediately as set out in Para. 9.012 of the Foresters' Manual.

Under no circumstances should Officers or employees admit liability, offer opinions, or facts on matters relating to the fire.

LIAISON WITH PUBLIC, PRIVATE PROPERTY OWNERS AND OTHER ORGANIZATIONS

Fire Reduction Through Education (Ref. 9.013)

The most effective means of fire prevention is through education. The objective is to make everyone fire conscious, and to make the general public realise the value and necessity of fire control.

Special attention should be given to the training of children. Every effort should be made by the forest officer to introduce the subject of fire prevention into the schools of his district.

Fire Danger Signs (Ref. 9.014)

McArthur Index	Colour	Code No.
Low	Verdigris Green	280
Moderate	Arctic Blue	112
High	Canary Yellow	309
Very High	Traffic Yellow	368
Extreme	Rail Red	593

Forests Department Assistance (Ref. 9.016)

When Departmental assistance is requested for suppression of fires which do not threaten State forest, timber reserves or land vested in the Conservator, the following policy will apply:—

Assistance can only be given when it will not prejudice other Departmental commitments.

Assistance should only be given following a request through the Chief Fire Control Officer or, in the event of such officer not being available, through a responsible shire officer, Fire Control Officer or Bush Fire Brigade Officer. Requests from individuals will be discouraged in all cases except where there are break-downs in communication within the rural fire organization.

Assistance as neighbour to neighbour should be the keynote of decisions to provide help. This assumes local fire brigades have been called upon for maximum effort. Circumstances will then decide where recoups are warranted.

Where a recoup is proposed, provide early advice of the details to Head Office.

Bush Fires Board Liaison Officers (Ref. 9.017)

For large fires involving both State forest and private property, the Bush Fires Board will provide liaison officers to assist in co-ordinating the fire fighting efforts of Forests Department forces, Bush Fire Brigades and any other organization helping to suppress the fire.

Liaison officers will be equipped with radios covering Forests Department V.H.F. (very high frequency) and brigade frequencies, and can provide communication to produce marked improvements in joint fire fighting operations.

Burning On Other Lands (Ref. 9.019)

The Department undertakes prescribed burning of lands other than State forest on behalf of various organizations. Where formal arrangements have been made, it can be assumed the Department has been vested with the necessary authority to burn the area.

Where no formal arrangements exist, *the Department or a forest officer has no legal authority to burn these lands without the written approval of the organization concerned. This provision extends to areas of unvested vacant Crown land.*

Public Warnings (Ref. 9.020)

The need to publicize the locality of extensive aerial burns for the sake of travellers, surveyors, fishermen etc., cannot be over-emphasized. Prior to burning operations, advertisements are to be placed in local newspapers and warnings arranged over public radio stations on the morning of each burn.

Road signs warning the public shall be erected on roads around or within areas to be burned as follows:—

"Burning Imminent" signs placed three or four days before aerial burn.

"Prescribed Burning" signs placed from the start of all prescribed burns until patrol work ceases.

All warning signs must be removed as soon as their purpose has been achieved.

Specialist Sections (Ref. 9.021)

Specialist Officers are responsible for checking burning programmes likely to affect their area of operation.

P.A.F.S.O.U. (Protection of Persons and Property from Damage during Prescribed Burning) (Ref. 9.022)

Each prescription is to be accompanied by P.A.F.S.O.U. form FD 659 which specifies notifications and field checks to ensure the safety of property and persons during burning. This form must be strictly observed.

The Department is required to observe provisions of Section 18 of the Bush Fires Act providing notification to neighbours of intention to burn. Notifications are to be given in writing on form FD 243 at least four days before the burn, and dates for burning specified on the form are to be not less than 4 days or more than 28 days from the date of the notice.

Notification to Beekeepers (Ref. 9.023)

In order that beekeepers can plan their operations and protect apiary sites, the area O.I.C. must ensure that individual beekeepers affected by the burning programe are adequately forewarned. Written notifications on FD 622 are to be forwarded before 31 August for spring burning and before 31 January for autumn burning.

Westrail Locomotives (Ref. 9.024)

It is the policy and practice of the Railways Commission to fit all Westrail locomotives with spark arresters during the summer months. Forest Officers have no authority to stop or inspect any Westrail locomotive suspected of being faulty, however, officers must maintain close liaison with local Westrail officers in all matters of fire prevention.

Any fire having been lit by a Westrail locomotive should be reported immediately to O.I.C. Protection, Bunbury with the following information:—

Number of the locomotive,
Locality,
Date and time,
Direction of travel,
Any other relevant information.

S.E.C. and Telecom (Ref. 9.025)

To minimize the risk of fires from powerlines, close liaison with the State Energy Commission must be maintained in all matters of fire prevention.

Where a fire has started from or threatens a powerline, the S.E.C. must be notified immediately.

Extreme caution must be exercised when fighting fires in the immediate proximity of powerlines.

The locality of all Telecom and S.E.C. lines in State forest and other areas where the Department is carrying out prescribed burning must be recorded on plans for easy reference when programming burns. Where lines are not adequately protected, the organization concerned must be given ample notice of proposed burns, as this Department may otherwise be held responsible for damage.

Any accident or incident concerning high tension powerlines is to be reported immediately to the nearest S.E.C. office, Regional Leader and O.I.C. Protection Branch.

Sawmills (Ref. 9.027)

The area O.I.C. is to ensure sawmill owners comply with fire control provisions of the sawmill permit document and that all sawmills conform to requirements under Section 25.1 (g) of the Bush Fires Act.

SERVICES AND ADMINISTRATION

Planning for Divisions Fire Control (Ref. 9.029)

The statutory body for formulation of the Bush Fires Act is the Bush Fires Board, of which the Forests Department is a member.

This Department should co-operate with the Bush Fires Board and other authorities in developing and implementing district fire plans and hazard reduction schemes.

Zones

"P" Zone ("Priority" Zone): This will comprise areas on which exotic or indigenous forests have been established, areas cleared or part-cleared awaiting planting, areas under regeneration, paired catchments or other nominated areas.

"A" Zone: This will comprise all country on which fires will be attacked as soon as they become known.

"B" Zone: This will include forest on which protection is provided by prescribed burning and where suppression of uncontrolled fires may be delayed when commitments on Zone "A" or "P" require the postponing of immediate attack.

"Priority" zone fires will be attacked as soon as they become known. They will be given precedence for fire attack and will be defined for preplanned fire suppression.

Fire Control Working Plans (Ref. 9.031)

All Divisions must prepare Fire Control Working Plans. These Working Plans will give regular local checks of the general organization within other Divisions. They will also provide officers from other Divisions, relieving in an emergency, with a quick reference to available manpower and equipment, and to the general situation concerning prevention and pre-suppression measures in the Division concerned.

The Fire Control Working Plan is in three parts:—

Part A: Fire Control objectives

Part B: Information necessary for planning and implementing the Working Plan

Part C: Inventory of manpower and equipment

Weather Forecasting and Calculations (Ref. 9.032)

The 0745 forecast must be obtained by all Divisions each morning. Should Divisions not be able to receive the forecast from the computer network they must obtain it from a neighbouring Division. Where total computer failure occurs, S.H.Q. or Dwellingup will distribute the forecasts by radio.

The Fire Danger Index (F.D.I.) should be calculated for each major forest type in a Division using the 07 45 hours forecast and updated with the 10 15 hours amendments. This will provide the basis for all fire control planning and should be displayed prominently at Headquarters.

The local fire danger must be calculated for each fire at the time it is reported. Soil Dryness Index must be calculated at Divisional Headquarters and used for planning operations such as prescribed burning. The limits to be observed are:—

50-180	Top disposal burning Pine burning Flats burning
80-250	Jarrah edging
120-500	Nth Jarrah prescribed burning
160-550	Sth Jarrah, Karri type 3 and 6 prescribed burning
200-600	Karri type 4 and 5 prescribed burning
300-700	Karri type 1 and 2 prescribed burning
500+	Karri regeneration burns

Fire Behaviour (Ref. 9.033)

Fire behaviour characteristics, including intensity and rate of spread, are controlled by weather, fuel and forest conditions.

Past weather—rain and drying conditions.
Present weather—temperature, relative humidity, wind.
Fuel—quantity, moisture content, type, distribution.
Forest—density, height, species, understorey scrub.
Topography—slope and aspect.

The Forest Fire Danger Tables are provided as a basis for prediction of fire behaviour. Predictions from Table C assume level topography, 60 per cent crown cover and standard fuel quantities for each forest type e.g. jarrah seven to nine tonnes per ha. They also assume lateritic soil type and 10-20 per cent low scrub. Variations from these standard conditions must be given due allowance when predicting local fire behaviour.

Communication System (Ref. 9.034)

Effective means of communication are vital, not merely in fire control but in the successful administration of the Department.

There are five "legs" to the communication system for fire control:—

(1) Aircraft or lookout to Headquarters;
(2) Headquarters to fire gang;
(3) Fire gang back to Headquarters;
(4) Point to point around the fire;
(5) Fire to aircraft for reconnaissance information.

Spotter V.H.F. (very high frequency) radios are equipped to act as mobile repeaters in emergencies.

In all cases where radio is used, messages must be kept concise and traffic kept to an essential minimum. The men selected as runners or messengers must be reliable and trained for the role.

Where the use of radio from point to point around the fire proves to be difficult, portable repeaters and portable radios are available through Radio Branch.

Full details of radio procedure are laid down in the Foresters' Manual—Radio Communications (Part 7) and every officer must be conversant with the subject matter of the orders.

Detection System (Ref. 9.035)

Early detection and accurate location of fires is paramount to successful fire suppression. The main detection system is provided by spotter aircraft. Adequate tower or aircraft coverage is to be maintained when F.D.I. is greater than 20 metres per hour.

The Department employs managers, pilots and aircraft to cover surveillance circuits.

The Managers will arrange for the supply and maintenance of aircraft, supervision, initial flying and plotting training and rostering of pilots. They will also ensure the provision of ancillary supplies, e.g. fuel, and assist in maintaining and improving detection standards.

The Regional Leaders and area O.I.C.'s have the prime responsibility for ensuring proper functioning of the detection system, and that standards are maintained. Area O.I.C.'s will be responsible for training of pilots in fire control matters, day to day supervision of pilots covering the Division circuits and are to ensure that pilots are properly briefed and daily work sheets completed.

Pilots—Wages and Allowances (Ref. 9.037)

Pilots will be employed under contract to the Department and payment of wages, travelling allowances etc., will be in accordance with the Pilots' General Aviation Award. Pilots will be paid by the Division where based.

Search and Rescue (Ref. 9.038)

The area O.I.C. is responsible for ensuring a Search and Rescue (S.A.R.) watch is maintained whenever an aircraft is working on the Department's Operations in the Division concerned.

The pilot will call on taxiing from the airstrip, take-off, landing approach, after landing and at half hourly intervals during the flight, giving "operation normal" and position. These calls are to be acknowledged and recorded in a daily log book by the Division concerned.

Tower Maintenance (Ref. 9.039)

Towers are to be maintained and the area O.I.C. shall arrange the inspection of all towers to ascertain what repairs are necessary and to see that the area around the tower is clear of debris.

He shall see that equipment for key towers is installed and working at the beginning of the fire season and trained towermen available.

PRESCRIBED BURNING IN HARDWOOD FOREST

Types of Prescribed Burning (Ref. 9.040)

There are six types of prescribed burning that are standard practice; namely

(1) Buffer burning of strips or firebreaks around areas of high risk;
(2) Buffer burning of strips or firebreaks around areas of high value;
(3) Prescribed burning of large areas on a rotational system;
(4) Advance burning—prior to logging operations;
(5) Slash burning, for regeneration or hazard reduction;
(6) Burning under pine canopy.

Areas To Be Protected (Ref. 9.041)

Except for those areas where specific approval for burning has been obtained from Head Office, complete protection from fire will be afforded to:—

Exotic Softwood and Hardwood Forests;

Tops or scrub-rolled areas being held for regeneration burning and areas programmed for cutting within three years;

Regenerated areas where crop saplings are less than 15 m tall (karri) or 6 m tall (jarrah);

Areas required for research and investigation.

Master Plans (Ref. 9.042)

Divisions are to draw up:

(1) Prescribed burning master plans showing hardwood areas which will be burnt as buffer areas.

(2) Prescribed burning of hardwood areas on a rotational basis for protection of timber, flora, fauna or recreational values.

As our suppression organization can be expected to handle wildfires in fuels to 8 tonnes/ha in jarrah types and up to 19 tonnes/ha in karri types, this should generally be used as the criterion to decide rotation length.

Standards for Prescribed Burning (Ref. 9.043)

(1) *Areas were primary land use requires mild prescribed burning.*

Jarrah Forest: Burning cover in the range 60 to 80 per cent with minimal crown scorch to crop or potential crop trees.

Karri Forest: Burning cover in the range 60 to 80 per cent with up to 10 per cent scorch in small clumps or individual crop trees.

Flats: Burning under mild conditions only to give a mosaic pattern with 40 to 60 per cent cover.

Poor Quality Forest: Burning cover in the range 40 to 60 per cent carried out under mild conditions.

(2) Where more intense fires are specified for management objectives, the desired fire intensity and level of acceptable crown damage must be defined in the prescription.

Wherever possible, planning must aim to use aerial ignition techniques.

The area O.I.C. shall draw up a current burning plan each year, setting out the proposed programme. He should also ensure that environmental conditions can be met by completing FD 713 for each job.

All hardwood burning (hand and aerial) proposals are to be shown on a 1:50 000 plan with job numbers and areas. These plans will be used to provide:

(1) Details to the Department of Agriculture for the benefit of beekeepers;
(2) Protection Branch with records;
(3) Mapping Branch with necessary information for the preparation of flight plans.

These will be submitted, after vetting by the Regional Protection officer and the Regional Leader, to the O.I.C. Protection Branch by 15 May.

Prescription and preparation for burns in hardwood forest susceptible to dieback disease must be completed before 1 March, during the dry summer months, to maximize hygiene.

Prescriptions (Ref. 9.043)

A prescription is to be prepared for all burns whether hand, aerial, regeneration or clearing burns. Job specifications have been prepared describing the methods of fuel sampling and proper recording for the prescription form.

Where applicable, burning prescriptions are to include constraints on vehicle movements and wash-down to prevent the spread of dieback disease. These specifications should cover each phase of the operation, i.e.: preparation, edge burning and mop-up.

When the inspection and prescription are being prepared for each prescribed burn, every object, operation or establishment within the area which may suffer damage must be identified and action taken to ensure protection. The position of anything liable to be damaged must be recorded on the inspection form so that protection is not overlooked, see P.A.F.S.O.U. and Environmental Check List forms.

Bush Operations

Identify the precise location of sawlog, pole and firewood operations and relate them to prescribed burning plans. Advise the operators of burning to be carried out near the site of their operations or on their access routes. Plan and take precautions to avoid damage from the prescribed burn or from "hop-overs".

Dieback Disease Quarantine Area (Ref. 9.045)

In dieback disease quarantine areas, road preparation will be restricted to log removal and slashing or brushing litter from road surfaces. No grading is to be carried out in these areas without the written approval of the Regional Superintendent.

Burn Intensity (Ref. 9.046)

The fire intensities prescribed for each area will be determined by the primary land use objective for that area. Normal prescribed burning will be carried out in the F.D.I. range of up to 40 metres per hour (m/hr).

Hardwood Prescriptions Preparation (Ref. 9.047)

Preparation of hardwood prescriptions should follow guidelines set out below.

Use the aerial photography interpretation (API) plan for separating each job into similar forest types based on species, height and density.

Examine cutting records.

Records of past burning.

Inspect sufficient check points to confirm the predictions of fuel type and weight, and height of the potential crop tree regeneration.

The prescription must nominate the fire danger index and number of lightings for each job.

Number of lightings will be decided from range of forest types and fuel quantities in the area. Where fuel quantity range is sufficient to introduce a variation in F.D.I. of 10 m/hr or more, two lightings should be prescribed. The fire danger index prescribed for any one lighting should be within a range of 5 m/hr.

As a guideline:

Flats should be burnt at F.D.I.	11 to 16 m/hr
Saplings over 5 m in height	12 to 17 m/hr
Poles and mature trees	20 to 25 m/hr
Mature trees	30 to 35 m/hr

Refer to job specifications "Measurement of Forest Fuels".

Environmental Controls (Ref. 9.048)

Ensure prescribed burning conforms with required environmental standards, i.e.:

Strips fronting onto major tourist routes and surrounding tourist attractions are not burnt during the main floral display of the wildflower season.

Prescribed burns, and particularly aerial burns, in the vicinity of major towns or airstrips, should not be carried out unless weather conditions are suitable for proper smoke dispersal, and the Department's smoke prediction services consulted to ensure heavy smoke accumulations do not occur in key areas.

Appropriate warning signs must be set up without fail where smoke is likely to impair visibility on highways, major roads and roads used by the public in forest areas.

Large-scale burning of the slopes adjacent to holding dams and reservoirs for domestic use may result in contamination of stored water by ash, particularly when water levels are low. Clearance for any such burn should be obtained from the O.I.C. Protection Branch before they are implemented.

For fauna refuges, the deliberate burning of swamps must be avoided except where it is necessary for perimeter control.

Records (Ref. 9.049)

Ensure proper records of prescribed burning are maintained.

Overseers or officers directly in charge of burning operations must daily mark on the plan in the Divisional office the area considered to have been burnt.

A summary of burning is to be prepared on a weekly basis during the restricted season. This summary is to be forwarded to O.I.C. Protection Branch at 11 00 hours each Monday morning, or the first working day for the week.

No Burning Without Firebreaks (Ref. 9.050)

An area prescribed for burning must be completely enclosed by firebreaks and cleared to mineral soil at least 3 m wide or by a safe edge as approved by the area O.I.C. Such firebreaks will usually be roads or firelines, but may be fuel moisture barriers in mixed forest types.

In the latter case, the burn must be completed at the earliest opportunity and should take precedence over any new job. Care should be taken to ensure grass is removed from firebreaks adjoining private property.

Leeward Edge Safe (Ref. 9.052)

Under all circumstances and by whatever method an area is burnt, the officer in charge must ensure that the leeward edge is safe before proceeding with the remainder of the burn.

Conditions For Edge Burning (Ref. 9.053)

To strengthen roads and firelines acting as boundaries of a burn and avoid time-consuming mop-up and patrol, edging is allowed in late autumn, winter and early spring when subsequent weather will not allow the edge burn to flare up and continue running. Re-ignition is unlikely and edging reasonably safe whilst the Soil Dryness Index is under 300.

Local fire danger should not exceed twenty metres per hour, and unstable conditions ahead of lows and fronts associated with strong and gusty north-westerly winds should be avoided. Flame throwers may be used but operators must be trained in the method of lighting, i.e., when to spot, when to use continuous lighting and when to stop lighting.

The area within edging burns must be burnt out before the summer to prevent uncontrolled fire damage. Dieback hygiene requirements must be strictly observed during edge burning operations, especially in early spring.

10 15 Hours Checks (Ref. 9.057)

Although initial job selections are made at 07 45 hours, the actual conditions at 10 15 hours is to be the criterion for implementing prescribed burns.

The "forecast" local fire danger index must match that prescribed before a job is programmed for lighting.

Detection During Burning (Ref. 9.059)

Detection and weather stations which give adequate coverage and weather data must be manned while prescribed burning is being carried out.

Heavy Duty At Burns (Ref. 9.060)

A heavy duty outfit must be taken to every burn except where otherwise directed by the area O.I.C.

Mopping Up (Ref. 9.061)

The perimeter of prescribed burns must be mopped up to the standard set out in Fire Suppression section (9.105) as follows:—

Mopping up is the term used for the work done in rendering a fire safe after it has been brought under control.

Mopping up means completely extinguishing every piece of burning material that might permit the fire to escape.

A strip at least one metre wide must be cleared to mineral earth around every fire, strictly following its edge.

Within 20 m of unburnt fuel around the edge, all low stumps or logs must be extinguished with water or mineral soil, or both. Heaps of smouldering debris must be broken up and dispersed to prevent too great a flame close to the edge.

Heaps of debris around the butts of trees, close to the edge, must be cleared away.

Within 100 m of unburnt fuel around the edge, all burning spars or trees must be extinguished, felled or burnt around to provide an adequate safety margin. Green crowns of trees felled near the fire edge must be either isolated or burnt to avoid unexpected ignition once the leaves dry. Piles of logs or tops must be separated and dampened down and, if necessary, covered with earth.

In mopping up, pumper units should be brought right into the fire face so that water can be applied to burning trees and stumps. If mopping up is done during the heat of the day, the pumpers should be moved around fairly rapidly damping down the more dangerous areas and then returned again to consolidate the position.

Spot fires should be clearly marked to ensure they are not missed by replacement crews.

Mop up operations are greatly improved by the use of fire retardant. The area O.I.C. is to ensure pumper crews are trained in the use of retardants and that supplies are available at the fire. (See relevant job specification).

Patrol Of Burn Edges (Ref. 9.062)

Patrol must be regarded as a very important duty. The officer resonsible for the burn should also be responsible for the final patrol of the edge. It is essential that subsequent patrols are carried out daily until the edge is completely safe. Foot patrols may be necessary to check for dangerous burning trees likely to affect roads, railway lines, walking trails, etc.

Assistance To Adjoining Landholders (Ref. 9.064)

There is no objection to assisting adjoining landholders in burning breaks, either on their own property or on adjoining State forest, timber reserves or land vested in the Conservator.

The landholder's responsibilities must be clearly understood and impressed upon him. He must be in attendance and commence the lighting if on private property and agree with any mop-up and patrol requirements.

F.C.O. To Attend Burning On Crown Land (Ref. 9.065)

Similarly, a Fire Control Officer (F.C.O.) or a Bush Fire Brigade Officer must commence the lighting where Departmental personnel are assisting Shires to burn on Crown lands (other than forest land) at the Shire's request. *It must be remembered that a forest officer has no legal protection when carrying out prescribed burning on other than forest land unless written authorization is obtained from the occupiers and permits have been obtained.*

Air Transport Group Regulations (Ref. 9.067)

The Department of Transport: Air Transport Group requires that approval be obtained from private property owners where aircraft operate above their property at heights below 600 m. The form FD 562 should be used for this purpose where private properties are close to aerial burning operations.

Safety Of Men (Ref. 9.072)

Safety of the work force is of paramount importance. All men engaged in hand burning must have read and signed Bulletin 71.

Where the strip line length exceeds 3 km or in heavy scrub fuels and rough topography, lighters will work in pairs.

All personnel engaged on prescribed burning are to be properly dressed with helmet, long-sleeved shirt, trousers, boots and eye protection.

Briefing The Men (Hand Burning) (Ref. 9.076)

The Overseer (or Officer) directly in charge of a hand burn must ensure that the gang members are fully briefed on the job ahead.

They must know:

(1) The whole area to be burned, its boundaries and orientation;

(2) The method of lighting;

(3) The direction and distance of each strip line;

(4) Weather conditions.

Strip width and spotting distance must be calculated from the fire danger tables on the morning of the burn and for aerial ignition a flight plan will be prepared.

Arrange flight lines to ensure that the *bombing aircraft WILL NOT overfly part of ANY plantation during the ignition phase of the burn.* This must include turning at the end of flight lines.

The following rules apply to beacon vehicles operating near powerlines during aerial burns:

Beacon vehicles are to be fitted, preferably, with whip aerials.

If beacon vehicles are fitted with long aerials they are not to approach within 40 metres of powerlines.

Control of Aerial Burns (Ref. 9.077)

At each aerial burn, there will be a Controller who will direct aircrew, markers and suppression crews assisted by a Fire Boss.

Verey Pistols (Ref. 9.083)

Verey pistols may only be handled by staff and employees who have been fully trained and authorized to use them. Police authority is required for each person using the pistols. For this purpose Divisions must provide Protection Branch, Como with the names of likely operators not later than 1 September each year.

Aircraft Insurance (Ref. 9.085)

It is the responsibility of every officer and employee engaged on aircraft flights to check that personal insurance has been arranged through the Department's policy. Procedures must be implemented by the area O.I.C. on a daily basis.

The O.I.C. of aircraft base may authorize flights for passengers in the Department's aircraft providing they are employed by the Department and are undertaking legitimate Departmental business, and insurance has been arranged.

Under no circumstance are passengers not employed by the Forests Department to be carried without the approval of O.I.C. Protection Branch.

Passengers who are not employed by the State Government cannot be covered by the Department's insurance policy. These persons must provide evidence they have aircraft insurance before being eligible as passengers.

FUEL REDUCTION IN SOFTWOOD FORESTS

Prescribed Burning (Ref. 9.088)

Prescribed burning in Softwood forests must be approved by Superintendent Protection Branch.

Proposals for Softwood burning to be submitted to O.I.C. Protection by 15 March.

Prescriptions are to be prepared for each proposed burn in Softwood forests.

Constraints (Ref. 9.089)

Constraints are to be observed as listed below.

Conditions will generally require an F.D.I. (pines) less than 25 m/hr.

Every burn is to be supervised and controlled by an officer or overseer trained and experienced in procedure for Softwood burning.

The minimum age at which burning can be undertaken will be determined by the time taken for trees to attain thick plated bark structure to 4 m. Usually, this is not before age 11 in either *Pinus pinaster* or *P. radiata.*

No burning may be undertaken unless the fuel profile has first been completely saturated and is drying from the top. This requires a physical check before lighting commences at each burn.

Burning must not be started or continued while the open wind velocity exceeds 40 km/hr.

Burning must not be started or continued while the surface moisture content (S.M.C.) of the needlebed is less than 16 per cent for *P. radiata* or 18 per cent for *P. pinaster,* or the relative humidity is below 40 per cent.

No burning to start until the hazard has peaked for the day.

Method of Burning (Ref. 9.090)

Test fires must be lit in each burning unit before overall lighting starts.

Head fire flame height above 0.7 to 1.0 m is unacceptable except for occasional flare-ups.

Compartment edges within 20 m of breaks must be treated as separate fuel types and burned under minimum conditions.

No burning is to be carried out when the Soil Dryness Index is greater than 250.

For burning under pine canopy, area O.I.C.'s will be responsible for the daily decision to burn, having taken into account past and present weather.

Approval of the Regional Leader Operations must be obtained each year for any burning after 15 September, under pine canopy.

Fire Risk Reduction (Ref. 9.095)

Smoking will be prohibited in Softwood forests except on fire lines, where butts and spent matches must be deposited on bare mineral soil and buried.

When it is necessary to light a billy fire, it must be lit on an area cleared down to mineral soil and the remains of the fire doused with water and covered with soil.

Chainsaws must be fitted with an efficient spark arrester which will be inspected regularly.

Chainsaws must not be used for at least 60 minutes prior to the operator leaving the area of operation.

Pack sprays must be kept in the immediate work area, full of water, tested frequently and ready for instant use.

The area worked over each day must be closely inspected by the operator before leaving.

Vehicles must be in reasonable condition and particular attention given to exhaust systems and brakes.

FIRE ATTACK

Early Attack and Aggressiveness (Ref. 9.096)

No two bush fires can be fought in exactly the same manner; each one calls for a different approach depending on weather conditions, men and equipment available, fuel-bed and topography.

The two essentials for all fires are early attack and aggressiveness. The earlier the fire is attacked the sooner it is brought under control. Once a fire is allowed to develop a long perimeter, the task of controlling it is increased tremendously.

The man in charge of the fire gang must take the offensive from the outset; he must realise he has the strength and training to stop any fire he is sent to deal with. Officers can do much to foster this idea in the minds of their gangs.

Speed of attack is essential and will depend, to a considerable extent on the despatcher, who will usually be the officer responsible for co-ordination of fires.

Sequence of Action (Ref. 9.098)

The following sequence of action will be taken in the event of a fire endangering State forest:—

(1) Check reports from spotter aircraft, including fire behaviour, fuels and access.

(2) Locate the smoke on a grid reference and record.

(3) The most senior officer present will take charge and despatch forces laid down in the operation orders or despatcher tables, ensuring that dieback checklists are followed as set out in Job Specification No. 3.

(4) If rate of spread exceeds 140 metres per hour or if three or more gangs are required, set up a Large Fire Organization.

(5) Advise the area O.I.C. as soon as possible.

(6) First responsible person to the fire will, after reconnaissance, report to despatcher:—

Position of fire;	P
Area and details of fire size;	A
Fuel type in and around fire;	F
Time estimated to gain control of fire;	T
Additional assistance required;	A
Cause;	C
Communication arrangements.	C

Red Action (Ref. 9.100)

The term Red Action is used to describe an automatic response by suppression forces to fires occurring in certain defined high value forest areas.

All Red Actions called are to be notified to Protection Branch, SHQ, who in turn will alert the Conservator.

Large Fire Organization (L.F.O.) (Ref. 9.106)

(Ref. L.F.O. Handbook for Duties and Chain of Command.)

A Divisional Large Fire Organization will be implemented when:—

Three or more gangs are committed,

OR

the predicted rate of spread exceeds 140 m/hr when the fire is burning in forest or 1.5 km/hr when the fire is burning in grassland.

The Duty Officer will promptly advise:

Area O.I.C.;

O.I.C. Protection Branch or SHQ Duty Officer;

Regional Leader (Operations) or

Regional Duty Officer.

Helmet Markings (Ref. 9.110)

Professional Officers—Black stripe on White helmet;

Fire Protection Branch—Orange stripe on White helmet;

Assistant Forester and above—Red stripe on White helmet;

Forest Guards and Rangers—Green stripe on White helmet;

Overseers—Yellow stripe on White helmet.

Fire Records (Ref. 9.118)

A complete record of events, instructions, reports and messages must be maintained.

Softwood Forest Fires (Ref. 9.120)

Fires in Softwood Forests must be reported immediately to the Regional Leader (Operations) during weekdays and to the Regional Duty Officer at other times.

Daily Fire Reports (Ref. 9.121)

All centres will submit to Protection Branch, SHQ at 08 15 hours on the next working day, a report covering any wildfires of the previous day or days.

All fires still running at 1600 hours must be reported to Protection Branch, SHQ on weekdays and to the Regional Duty Officer on week-ends and holidays by 16 15 hours of the same day.

Reports on L.F.O. (Ref. 9.122)

In the event of either:—

Large Fire Organization
Or
Red Action
Or
A fire which may draw comment from the media (these will usually be fires affecting the public)
Or
Fire causing claims for damage,

the area O.I.C. or Duty Officer is required to notify on weekdays:

Regional Duty Officer, and Protection Branch, SHQ

and on weekends and Public Holidays:

Regional Duty Officer, and SHQ Duty Officer.

EQUIPMENT

Equipment Checks and Maintenance (Ref. 9.126)

After every fire all equipment must be checked to replace losses and effect repairs to damaged items.

In the case of equipment burnt or damaged in or at a fire, this Department accepts no responsibility for any loss of non-essential personal items carried on Department vehicles.

At the end of the fire season, all equipment is to be checked, maintained and stored away ready for the next fire season.

Pumper units are to be stored and maintained in accordance with circular 14/75.

The area O.I.C. is responsible for ensuring pumper units receive weekly and daily maintenance during the fire season as required and kept in *peak* condition.

Plastic Containers (Ref. 9.128)

Officers are to ensure that plastic containers are not being used to carry flammable liquids, and regular checks are to be made to see this practice is avoided. However, they may be used by men for carrying kerosene on prescribed burning, but must be emptied and placed in closed boxes when on trucks.

The Timber Industry Regulations Act (T.I.R.) requires that, except as provided in subclauses (1) and (2), a truck shall not carry liquid fuel whilst also conveying workmen.

(1) A truck carrying a fire-fighting unit may carry petrol in the normal supply tank of the pumper engine.

(2) For chainsaw or fire pumper operation, a truck carrying men may carry a maximum of two leakproof metal cans of petrol, each not above 23 litre capacity.

All containers used for flammable liquids must use the correct identification.

Petrol: Jerry-can containers or permanently mounted tank painted silver with the word "PETROL" in red, above a central red band.

Chainsaw Fuel: Jerry-can container painted red with a central green band, and the words "CHAINSAW FUEL" in white, above the band.

Kerosene: Jerry-can container or permanently mounted tank painted silver with a central yellow band and the word "KEROSENE" in yellow, above the band.

Distillate: Jerry-can container or permanently mounted tank painted orange with central white band and the word "DISTILLATE" in black, above the band.

Oil: Container painted yellow with a central black band and the word "OIL" in black, above the band.

Water containers are to be identified with the word "WATER" in large white letters on a black background, and jerry-cans must not be used for drinking water. If the water is unsuitable for drinking, the container must be labelled accordingly.

Glycol and permanganate crystals must not be carried on the same vehicle.

All containers must be securely fastened during transit.

Area O.I.C. must ensure that all staff, overseers and truck drivers are thoroughly aware of, and understand these instructions.

No unlabelled containers are to be carried.

Canvas Hose Maintenance (Ref. 9.129)

Collie Fire Store will test and classify hose into four categories and paint couplings accordingly:

Tested at 1 725 kPa—yellow

Tested at 1 035 kPa—white

Tested at 690 kPa—blue

Training hose only—black

O.I.C. is responsible for ensuring hose is properly maintained in the Division, i.e.:

(1) Cleaned and dried after use;

(2) Stored in a clean and dry condition;

(3) Checked regularly for mildew or other deterioration;

(4) Hose is not painted.

Protection of Equipment at Fires (Ref. 9.130)

All equipment taken to the vicinity of a fire is in danger of being burnt, and whenever any equipment is left unattended, every precaution must be taken to see that it is adequately protected.

Particular attention must be given to cleanliness of machines working on a fire face to minimize chances of the machine catching alight.

Inflammable materials such as cleaning rags, cotton waste or clothing must not be carried on machines working on the fire face. Machines must be fitted with a chemical fire extinguisher (suitable for oil or diesoleum fires) at all times.

The safest place to park a vehicle is on cold burnt ground or bare mineral soil, such as gravel pits, away from overhanging trees. If the ashes are still hot, a strip must be raked down to mineral soil for each wheel, and all smoking embers raked from under and around the truck. Care must be taken to see that the truck is sufficiently removed from burning trees to preclude the possibility of sparks or burning debris dropping on the vehicle.

All inflammable articles, such as clothing etc., should be placed in the cab of the vehicle, the windows of which must be wound up to prevent the entry of sparks or burning embers.

If the vehicle must be left on unburnt ground including roadways, it should be placed on an area clear of scrub and trees. All litter must be raked from under it and for a space of two metres all around it, and any trees that might possibly drop debris on the truck must also be raked to ensure that they do not become alight from any fire. Raked litter must be well scattered and not left in heaps.

Do not leave a vehicle on a road unless there is ample clearance to permit the passage of other vehicles.

A vehicle should always be left facing an escape route so that it is possible to drive straight away without the need for time-wasting manoeuvring. Ignition keys should be left in the vehicle when at a fire.

WATER SUPPLIES (Ref. 9.131)

It is important that adequate static water points are available for fire control.

In hardwood areas the objective should be to provide major points on an 8 km grid.

In plantations they should be sufficiently close to allow a 20 minute turn-around of tankers.

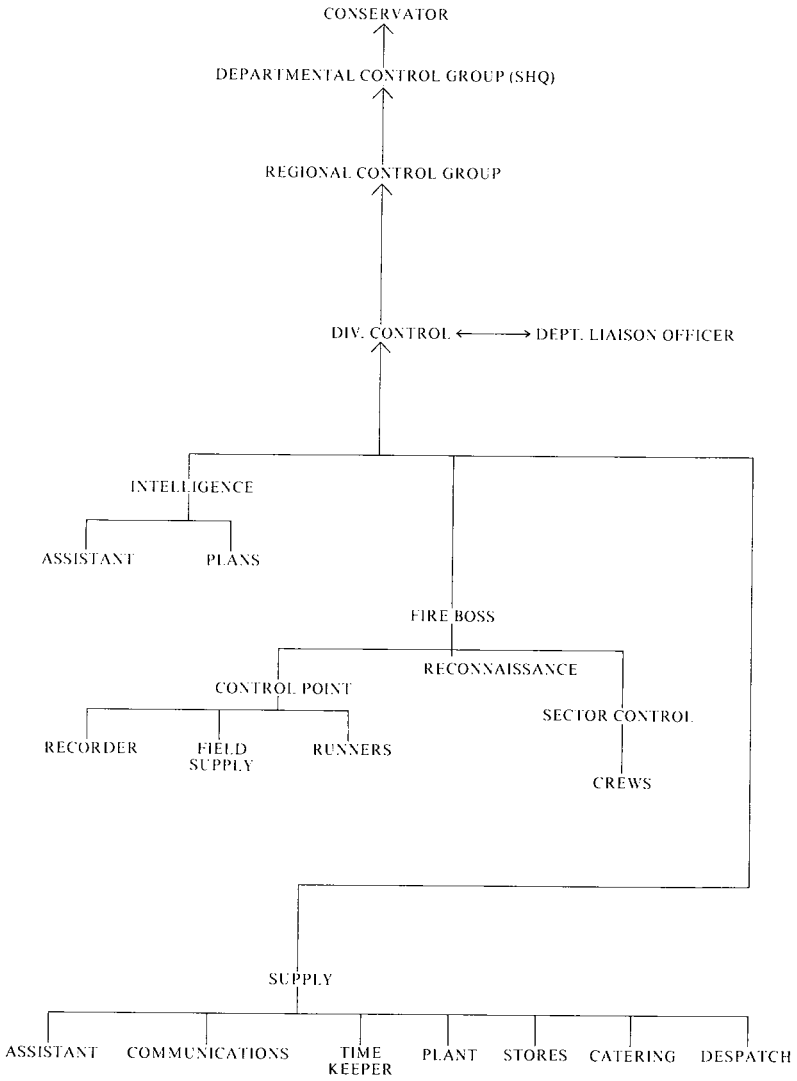
Each water point should be capable of yielding a minimum of 50 000 litres at any time during the summer.

The roads into water points should be well signposted.

Where water points are located in forest affected by dieback disease, the O.I.C. must ensure tanker drivers are instructed in the use of fungicide additives for disease control.

Appendix I

L.F.O. ORGANIZATION CHART
Functions and Line of Responsibility



NOTE: MORE THAN ONE FUNCTION MAY BE FILLED BY ONE PERSON

Appendix II

STANDARDIZED EQUIPMENT ON FIRE TRUCKS

Type and Minimum Quantity of Equipment For Heavy Duty Pumper Units

1 tank—2 700 litres to 3 000 litres.
1 pump unit.
50 metres of 19 mm Nylex high pressure hose on live reel.
8 m x 63 mm armoured suction hose and strainer.
10 x 30 m (300 m) of 38 mm canvas hose (150 m only where vehicle is certain to be confined to hardwood areas).
2 x 38 mm short canvas hoses (numbers as required locally).
1 set hose keys.
3 x 38 mm directors with tips.
2 "Y" couplings, 38 mm.
2 hose clamps.
1 shut-off nozzle.
2 packsprays.
1 axe.
1 shovel.
A container of drinking water (CLEARLY MARKED).
2 drip torches with quantity of kerosene.
1 spotlight.
1 torch (hoseman).
1 first-aid kit.
2 rake hoes.
1 crowbar.
1 Divisional plan (1:50 000 or 1:63 360 scale).
Quantity of fire retardant.
Emergency rations (one meal for each man).
1 set (3) vehicle roadside warning signs (Aust. Safety Standards E38-1962).
1 plastic folder with gang/unit cards (Large Fire Organization).
Quantity of hose washers.

Type and Minimum Quantity of Equipment for Standard Gang Trucks

1 water tank—800-900 litres.
1 light pumper unit.
50 m of Nylex type high pressure hose on live reel.
8 m of 38 mm armoured suction hose and strainer.
8 m of 38 mm canvas hose, director and tips.
1 shut-off nozzle fitted to hose on live reel.
1 set of hose keys.
3 packsprays.
1 container drinking water (CLEARLY MARKED).
1 container kerosene (CLEARLY MARKED) plus pump.
6 drip torches.
6 kerosene carrying containers.
2 shovels.
2 axes.
4 rake hoes.
1 crowbar.
1 snig chain.
1 chainsaw, plus filing equipment, oils and fuel (fuel cans to be CLEARLY MARKED).
Hammer and wedges.
4 waterbags.
1 spotlight.
1 radio, plus list of call signs.
1 first-aid kit.
1 Divisional plan (1:50 000 or 1:63 360 scale).
1 axe stone.
1 pair pliers, footprints or similar.
Quantity of retardant.
2 prescribed burning/wildfire signs.
1 set (3) vehicle roadside warning signs (Aust. Safety Standards E38-1962).
Emergency rations (one meal for each man).
1 plastic folder with gang/unit cards (Large Fire Organization).
Burning prescription and report forms.
P.A.F.T.A.C.C. report forms.
Quantity of torch wick, fusee, hose washers etc.

Appendix III

FIRE RETARDANT MIXTURES

AMGARD D./S.B.

W.A. developed Fire Retardant.

This is the proprietary name covering the blending of 88% D.A.P. and 12% sodium benzoate, a basic active ingredient plus a corrosion inhibitor.

Fire Retardant-Mop-up Mixtures.

MOP-UP MIXTURE R.

2 700 litres (600 gallons) = 3¼ pails Amgard Type "R"

820 litres (180 gallons) = 1 pail Amgard Type "R"

R4 KNOCKDOWN MIXTURE

2 700 litres (600 gallons) = 13 pails Amgard Type "R4"

820 litres (180 gallons) = 4 pails Amgard Type "R4"

Appendix IV

DATES TO REMEMBER

Notify beekeepers of Autumn Burns by 31 January

Quarantine burning—prescriptions by 1 March

Pine burn proposals to Protection by 15 March

Fire Equipment estimates prepare sched. 5 by 15 March

Hardwood burn proposals to Protection for by 15 May

(1) Mapping branch flight plans.

(2) Agriculture Department (Apiarists).

(3) Protection section records.

Canvas hose to Collie (late) May

Annual fire report to Protection (mid) June

Prepare hardwood burning Prescriptions (aircraft) by 31 July

Notify beekeepers of spring burns by 31 August

Verey Pistol operators to Protection by 1 September

No pine burning without special approval (after) 15 September

Tower inspection report to Protection by 30 September

Fire Control Working Plan Update by 15 November

Appendix V

PROHIBITED BURNING DATES IN YOUR DIVISION

ZONE	SHIRE	DATE
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc
.....	from	to ..... inc

Appendix VI

SOME "DO'S AND DON'TS" WHEN PRESCRIPTION BURNING

DON'T—*burn without an approved prescription.*

DON'T—*assume the fire won't escape; be prepared and ensure patrol and mop-up standards are adhered to.*

DO—*understand the objective of the burn.*

DO—*ensure weather conditions are stable and match the prescription.*

DO—*use a test fire to confirm fire behaviour.*

DO—*brief all personnel regardless of experience and maintain control over them at all times.*

26908/6/83—750—L/3490 WILLIAM C BROWN, Government Printer, Western Australia