442 m/h

REPORT ON PLANTATION FIRE AT GNANGARA ON JANUARY 22nd 1962.

SUMMARY.

CAUSE.

DETECTION.

ACTION TO SUPPRESS RUNNING FIRE.

MOPPING UP.

AREA BURNT.

SALVAGE.

ORGANISATION OF ASSISTANCE.

ASSISTANCE FROM OTHER DIVISIONS.

VOLUNTEER ASSISTANCE.

REPORT OF PLANTATION FIRE AT GNANGARA ON 22.1.62

SUMMARY.

January 22nd was a day of Dangerous fire hazard. A maximum temperature of 102° was recorded at Wanneroo.

The fire started at approx. 11.50 on the Eastern Edge of C.4 on Wetherell Rd opposite the old mill site.

It was caused by a McCulloch 47A chain saw while falling large edge trees. Evidence of scorching from the exhaust was found alongside other stumps in unburnt country. The fire must have smouldered for at least 45 minutes before burning noticeably, and did not ignite until after the fallers had left.

The smoke was observed by a bulldozer driver six miles away at 11.50 but was not reported by the tower. Gnangara H.Q. became aware of the fire at 12.05. This 15 minute delay was undoubtedly responsible for the fire becoming uncontrollable. When the first gangs arrived at 12.10 the fire covered half an acre and was burning fiercely.

The compartments burnt all carried heavy thinning debris producing a very hot fire which spotted heavily up to 12 chains in a moderate wind. A change in the wind to a fairly fresh south wester at 2 p.m. resulted in the fire crossing Wetherell Rd and burning out valuable experimental areas in C.19.

The running fire was stopped by 5 p.m. and the area burnt confined to 120 acres. An estimated 5,000 loads of timber are to be salvaged.

Much experience has been gained from this fire and the following detailed report has been prepared mainly to provide a basis for discussion so that any lessons learnt may be passed on.

CAUSE OF THE FIRE.

There is no doubt that the fire was started by a McCulloch 47A chain saw from the heat of the exhaust gases during a falling cut on a large edge tree. The needles must have smouldered for at least 45 minutes before igniting.

Faller Q. Delbianco was falling large edge trees along Wetherell Rd in C.4 until about 11.40 a.m., when he went home. The suspected starting point of the fire is at the butt of a tree felled before 11.00 a.m. For. Staley talked with faller at 11.00 Thirteen more trees were felled before the faller went home at 11.40 a.m. Of these, 9 are in unburnt country and at the butts of 3 of these, definite evidence of scorching of needles can be seen. There is a 3" circle of charred needles alongside the stump in each case.

The fallers, Delbianco and Leonard, and tractor driver R. Reynolds, left the area between 11.40 and 11.45.

NOTES:

Forester Staley has often looked for any evidence of burning by the exhaust of the chain saws after a falling cut but has never seen it before. These edge trees are probably the largest that have been felled at Gnangara and conditions were extremely dry. This evidence has been photographed.

The question of using chain saws in the pines must be very carefully investigated.

DETECTION OF THE FIRE.

There is evidence that at least 15 minutes were lost due to the towerman's failure to report the smoke. e.g.,

1. A dozer driver - saw the column of smoke from the marl pit 6 miles away at 11.50. He is reasonably sure of this time.

2. Children at Gnangara saw the heavy smoke before 12.00 and pointed it out to Mrs. Staley. She did not realise how close it was and felt sure the office would know about it.

3. F.G. G. Reynolds saw smoke from Gnangara office at 12.05, told staley and Quicke and immediately took H.D. to the fire.

4. An overseer saw smoke and on radio at 12.05 asked towerman where smoke was and this was the first the towerman knew of it. Haddrill was pruning pines in C.3 Nth Barlow, 2½ miles from the fire.

5. At 12.05 Mundaring rang Wanneroo, after trying to ring Gnangara, to report Gungin Lookout had sighted fire at 12.04.

At the same time Gnangara and the tower rang Wanneroo to report the fire.

The towerman was interviewed on the 24th. He had no explanation for his failure to report the smoke and was dismissed.

Apart from one incident - asleep on duty 2 years ago - this man had been very reliable and had given prompt reports of two fires in the plantation area already this season. He had 2 days relief a fortnight previously.

The towerman was replaced temporarily by F.G Quicke on Wednesday.

Ex-F/G E. Popham is interested in the towerman's job for the rest of the season. He has had experience on towers in the South-West and should be a good man for the job. He will start on the 20th January.

SUPPRESSION ACTION.

The fire started on the Western edge of C.4 in falling operations opposite the old mill. See map.
Known to start before 11.50.
Not reported until 12.05.
Fire hazard - Dangerous. M.T. 102°, M.R.H. 13%.

12.08 Staley inspected fire and returned to call for help. Fire covered half an acre when first seen and was burning fiercely with flames 12' high.
12.10 F/G Reynolds and Quicke arrived with H.D. No.1 and workshop gang and attacked S side of fire intending to work round to front. The wind was swinging E and SE.
12.20 Staley with H.D. No.2 (6x6) and 3 men attacked N side of fire but by this time fire was spotting 100 yards ahead to N.W.

Staley pulled out to N boundary of C.4 to watch for spotting into C.16 and C.15.

Reynolds continued on S and W side.

There was many hopovers into 16 and 15. These were attacked but developed into a strong fire on the S side of C.16 H.D. No.2 continued to fight it here.

A.D.F.O. van Noort, organising from Wanneroo, advised F.C.S. Milesi of assistance required.
12.30 Haddrill's gang arrived. Sent to W side of fire in C.4 without H.D.
12.45 F.G. Cooper arrived with Wanneroo H.D. and 1 man. Sent to fight fire on E and N sides in C.16, i.e. to support H.D. No.2.

(3 H.D.s and 20 men were at the fire within 40 minutes)
13.10 Units from West Swan Bush Fire Brigade arrived. Some sent to SS side in C.4 and others to C.16. A.D.F.O. van Noort arrived from Wanneroo after advising other Dept. centres and after relief by For. Clover from Pinjar.
13.30. The edge in C.4 quietened down. Reynolds and H.D. No.1 and B.F.B. gangs continued here.

Remainder i.e., 2 H.D.s and a large team of men, worked on the numerous spot fires in C,s 15 and 16. (Spot fires occurred at least 12 chains ahead of fire).

Wanneroo gang arrived from Pinjar. Sent to C.16.
Pinjar H.D. arrived but not immediately useable due to mechanical trouble. (The tail shaft jammed and the truck motor would not start due to a vapour lock. This is a 1942 Ford and will be replaced by a 4 x 4 Chev.)

13.45 Mundaring gang arrived. Sent to C.16 with hand tools.

Wanneroo B.F.B. Pumper arrived. Sent to C.16.

Wanneroo H.D. was out of action for 20 minutes due to fuel blockage in the pump motor.

D4 arrived from Marl Pit and break pushed around N side of fire in C.16.

Como H.D. arrived.

13.50 The wind appeared to be changing to the SW.

Two H.D.s started spraying water into C.19 opposite the burning section in C.16. NOTE: If more work could have been done in this section to control the fire in C.16, the jumpover into C.19 may have been prevented.

It is most unfortunate that 2 H.D.s were temporarily out of action at this critival time when the wind changed.

14.00 A fresh SW wind took the fire across Wetherell Rd. into C.19 and all efforts to stop it failed. In the very heavy slash from the recent falling the fire crowned temporarily on both sides of the road.

Lines were established through C.19 with two ploughs and one D4 and direct attempts made to stop the fire with H.D. outfits and gangs of men.

The fire spotted continuously with the SW wind and ran through to the E boundary of the plantation and was held on the N and W sides. The running fire was stopped by 17.00 hours and mopping up commenced.

NOTES

Fire Behaviour.

The area burnt carried heavy thinning debris, resulting in a very hot and fierce fire. The fire crowned several times, notably on both sides of Wetherell Rd. near C.19. Crowning was always temporary and depended on the presence of abundant fuel and a fresh following wind. It was found that the intensity of the fire varied a lot depending on the wind. It would surge up with every gust of wind and then go down again.

Generally the fire did not advance very rapidly and any fast progress was due to spotting ahead. Very heavy spotting occurred with spots up to 12 chains ahead with a moderate wind. A large number of men with pack-sprays and fast mobile light pumpers are needed to cope with these.

Methods of Attacking the Fire.

Direct attack with H.D. outfits was possible at the fire heads but very heavy volumes of water are needed to make an impression. The small shut-off nozzles are too small and all hoses should be fitted with $\frac{3}{8}$" or $\frac{1}{2}$" directors in the fire season.

Attack with hand tools was possible on the flanks and rear but heavy thinning debris makes this job slow and difficult.

A great deal of useful work was done in running lines with Ferguson ploughs and a D4 parallel to the edge. Rakes were also used extensively for this but it is slow work amongst the thinning debris. A special triangular blade on a D4 to push debris to both sides and leave a 4' track would be extremely valuable.

No burning back was attempted despite much advice from outside. It was seriously considered but it was felt that greater danger would result in the circumstances.

Access.

Access is all important and agrid system of extraction tracks is very necessary. Consideration should be given to the establishment of more cross tracks as well as outrows at planting time.

Early arrival at the fire is vital and fast light duty outfits carrying 100 gallons of water are needed.

MOPPING UP.

Mopping up commenced immediately the running fire was stopped. There was an acute danger from spot fires and flare-up along the edge.

Monday Night.

The edge was divided into 5 sectors, and 5 gangs with H.D. outfits and 4 dozers worked all night. Dozed lines were established around the edge and several outer lines parallel in the unburnt country. The H.D. outfits worked continuously along the edge, and a vigilant patrol was maintained for spot fires.

An adequate water supply was maintained by fitting an additional pump to the old Gnangara bore.

Tuesday.

Three gangs with 5 H.D.s worked continuously all day.

Tuesday Night.

Gnangara gangs worked two shifts to maintain a continuous patrol.

Wednesday.

Two gangs continued mopping up. Smouldering heaps and stumps were still being discovered.

From Wednesday onwards a continuous patrol was maintained by small parties. Smouldering material was still being discovered by the mopping up teams on Friday morning. Patrols were discontinued after rain fell on Sunday.

NOTES.

It was found in mopping up that the main problem was smouldering duff and roots on and below ground level. Great volumes of water are necessary and detergent is a great help. None of the pines continued to burn up in the air after the initial flare. It is estimated that 70,000 gallons of water were used on the fire.

The following points arose in discussion with Mr. Ashcroft:

Need for Lights.

All vehicles were equipped with lights byt the men found that there was no light from the fire to work by. Miners lamps would be very useful.

Due to the dark edge the dozer drivers found it difficult to maintain the correct distance from the edge. They need to be guided by men with torches.

Use of Dozers.

The heaps from the dozer trail gave a lot of trouble in subsequent mopping up. These heaps ofneedles and sand continued to smoulder until they could be scattered and watered. It would be better to make a dozer trial a few feet outside the fire edge and push out. The actual edge should be separated with hand tools and perhaps a plough.

A modified dozer blade of triangular shape to push the material to either side and leave a bare trail without having to push up heaps would be extremely useful.

D4s with narrow blades can get about in the pines much more easily than those with wide blades.

Use of Ploughs.

The disc ploughs on Ferguson tractors are very useful for clearing trails but care should be taken where possible to avoid ploughing access routes.

Use of Detergents.

Detergent was used in mopping up and appeared to be very effective. Further investigation is needed to decide the correct quantity to be used. One pumper had trouble with frothing. This affected the pressure in the pump and also the cooling system of the motor. The trouble was corrected by adding no detergent to the next 2 tankfuls.

The detergent used was Stanvac 4DE at the rate of 3-4 lbs per 600 gallons.

Marking of Hopovers.

Hopovers were numerous and the importance was stressed of marking areas where further mopping up is required.

High Stumps.

In places, high stumps made access difficult for vehicles. All stumps should be cut low.

AREA BURNT.

The area burnt is approx. 120 acres, made up as follows:

Compt.	(Age)	S.Q. I	S.Q. II	S.Q. III
4	(34)	5	20	10
16	(31)		2	15
19	(30)		14	20
21	(30)		3	31
		5	39	76

= 120 acres

Unfortunately a valuable experimental and demonstration area was destroyed.

SALVAGE.

It is estimated that there will be approximately 5,000 loads of pine to be salvaged.

calculated from Area by S.Q.s
Yield Tables
Thinning Cards

There will be a high proportion of over 7" and some over 10" logs.

The possibility of spraying the area to prevent Ips attack and the resultant rapid blue mould infestation is being investigated.

ORGANISATION OF ASSISTANCE.

The Wanneroo H.D. was despatched to the fire immediately the report was received.

The Wanneroo gang at Pinjar and the Pinjar H.D. were contacted by telephone and despatched straight away.

Mr. Milesi was advised of the fire and assistance requested. He arranged for the Como H.D. and 1 gang and 1 H.D. from Mundaring to be sent as soon as possible.

Mr. Eastman arranged for further assistance to be sent from Mundaring, Dwellingup and Gleneagle during the afternoon.

Departmental assistance from other centres was as follows:

Como	1 H.D.	and 2 men
Mundaring	1 H.D.	3 gangs 1 dozer
Dwellingup		2 gangs 2 dozers
Gleneagle		1 gang

Assisting and relieving staff included:

F.C.C. Eastman

F.C. For. Ashcroft

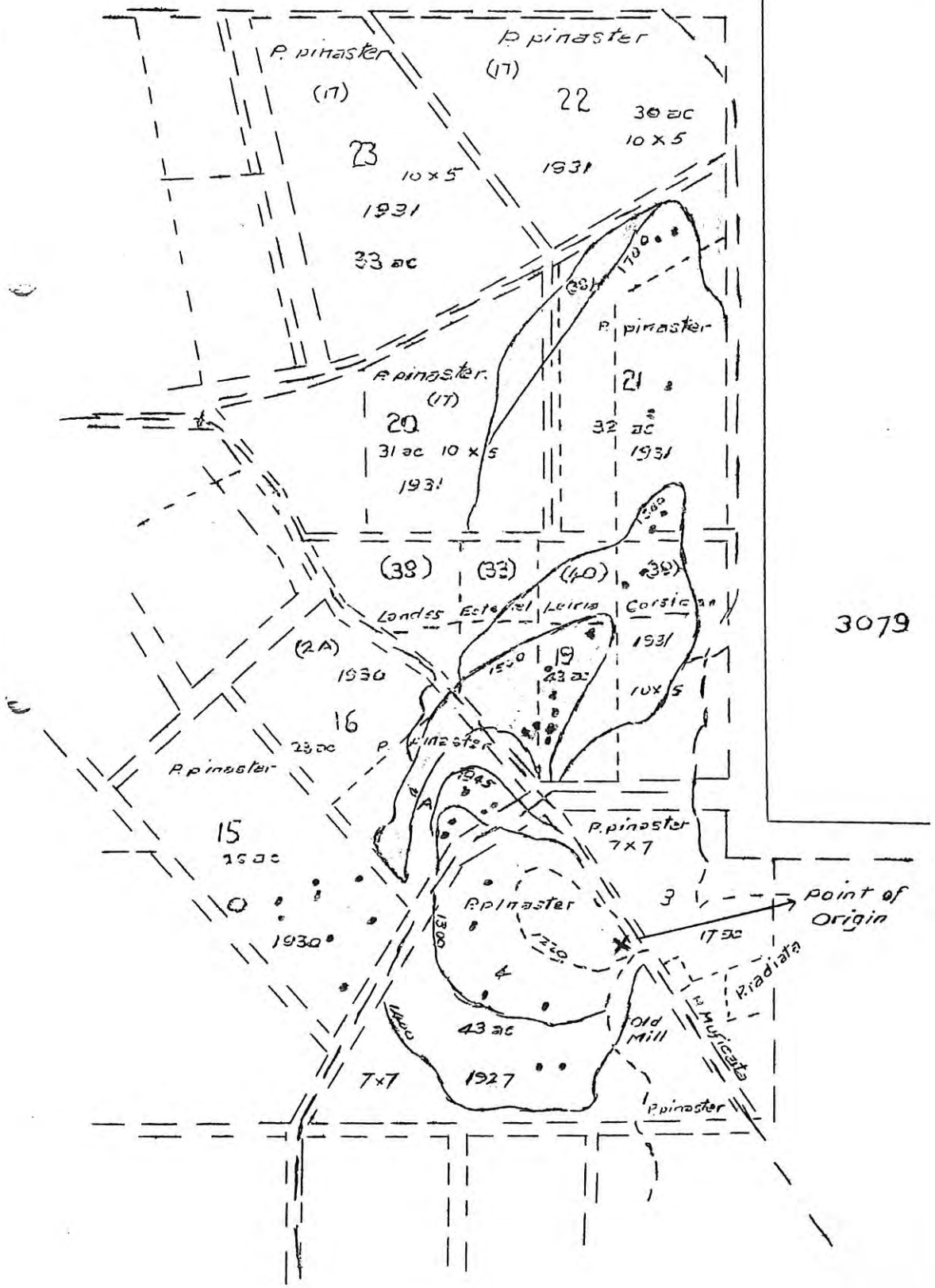
A.D.F.O. Hewett

A/F Watson.

GNANGARA FIRE 22-1-62

Plan of Rate of Spread

10 chains = 1 inch



3079

Dwellingup
25th January 62

Conservator of Forests,

PERTH

Report on Plantation Fire Gnangara 22.1.62

Attn: Mr. Wallace
Mr. Eastman

I enclose a report on the fire at Gnangara which occured on the 22.1.62 and burnt portion of Compartments 4, 16, 19, 20 and 21.

Meteorological conditions on 22.1.62 from the Perth Observatory were -

Time	Screen Temp.	R.H.%	Wind
12 a.m.	97.4	18%	E - 8 m.p.h.
3 p.m.	99.0	15%	SW - 13 "
5 p.m.	94.3	19%	SW - 13 "

Fire detected at 1205
Fire Suppressed at 1700
Approximate Area Burnt 115 acres (perimeter 165 chains.)
Forest types burnt.

30 acres 26 year old P. pinaster, treatment 3 thinnings.
85 acres 31 year old P. pinaster, variety Esterel, Lieria Corsican, treatment 2-3 thinnings.
The distribution of Site Quality is given on Map 1.

Fire Behaviour Analysis

Refer to Map 2 which illustrates the progress of the fire with time. Perimeter were derived from estimates of the fire control officers at the scene of the fire.

Rate of Forward Progress of the headfire has been divided into 2 headfire attack classifications.

(A) Unrestricted by attack. Section 1, 4, and 5
(B) Progress restricted by attack. Section 2.

Table 1

Fire Spread

Period	Reduced to Hrs.	Headfire Forward Progress Chain per Hr.	Perimeter Spread Chns. per Hr.	Headfire Attack Classification	Flank Fire Attacked	Maximum Spotting Distance	Wind
0-1 hr.	1	15	56	A	Yes	4-6 chns.	E
1-2 hr.	1	6	17	B	Yes	-	SE
2-4 hr.	1	12	60	A	Yes	4-6 chns.	SW
4-5 hr.	1	22	48	A	Yes	4-6 chns.	SW

From Table 1.

Classification A.

Mean perimeter increase = 55 chains per hour.

Mean forward progress of headfire = 16 chains per hour.

Classification B.

Perimeter increase = 17 chains per hour.

Forward Progress of Headfire = 6 chains per hour.

Fire Characteristics

Flame height was between 4 and 20 feet on the flanks. The headfire caused only intermittent crowing but spotted 4-6 chains ahead, only in section 2 hours was the headfire attacked directly. For most of its run the headfire was to hot and spotting to far ahead for direct attack.

The increase in forward progress of the headfire between 4 and 5 hours was assisted by an increase in slope.

Suppression of the Fire.

(1) The initial attack was carried out by two Forests Department gangs with one heavy duty which arrived within 15 minutes of detection. By this time the fire was approximately 1 acre in extent.

(2) The main suppression force comprising the following units arrived within 1½ hours of detection-

3 more Forests Department gangs } Considered as five gangs.
2 Fire Brigade }
4 Heavy duty tankers
1 D4 Bulldozer
1 Wheel Tractor and disc plough.

This force contained the fire by 1700 hours on 22.1.62

(3) Mop up of the fire continued throughout the night with the following force -

5 Forestry gangs
5 Heavy Duties.
3 D4 Bulldozers.

The following points are pertinent to the equation of suppression force to rate of fire spread.

(1) During the run of the fire i.e. when flanks only were attacked, the perimeter increase was 55 chains per hour.

(2) The suppression force controlled 165 chain of edge in 5 hours.

From this basis the suppression force has been broken into its components, and each component rated on a work output per hour i.e.

1. Each gang controlled 5 chains of fire edge per hour.
2. Each heavy duty pumper controlled 7 chains of fire edge per hour.
3. Each bulldozer controlled 17 chains of fire edge per hour. (considers tractor and plough equal to one bulldozer in work output).

From this information a despatcher guide for a fire occuring under the given weather and forest conditions has been drawn up.

Despatcher with * of detection	Gangs No.	Heavy Duties No.	Dozers No.	Approx. Suppression Time.
* 1 hour	11	8	3	$1\frac{1}{4}$ hours.
* 2 hour	22	16	6	2 hours.
* 3 hour	33	24	9	-

This despatcher table assumes

(1) That the suppression force worked over the final perimeter of 165 chains.

(2) Suppression time has been calculated from a ratio between the perimeter spread of Cl A and B and the work output of the actual suppress on force against estimated required suppression force.

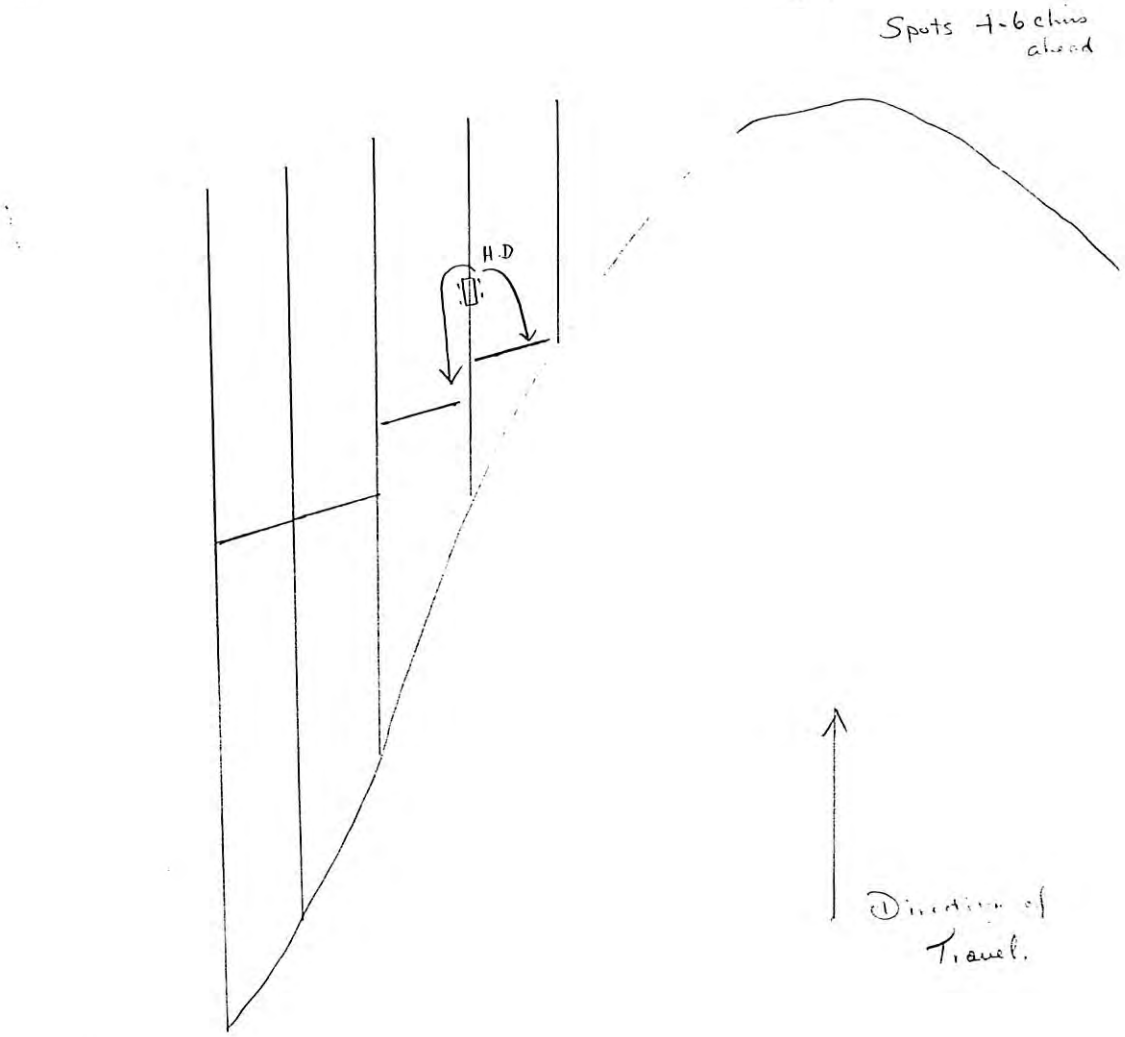
Method of Attack.

(1) The flank of the fire were controlled by running a series of parallel breaks along the fire edge. Each successive break reduced fire intensity; until the edge could be directly attacked by pumpers and gangs.

(2) The wheel tractor and plough was used effectively both in running breaks parallel to the fire edge and in the method now described.

The extraction tracks on the west flank of the fire in Compartments 19 and 20 ran directly into the fire edge. These tracks were ploughed as fire breaks, breaking the fire edge into approximately 2 chain sections. Each sector was controlled in its sequence by the heavy duties proceeding south along the fire edge. See diagram.

Method of attack using disc plough and heavy duty.



1 2 3 4 sequence of attack by pumper - fire stopped by pumper in each sector and comprising the controlled fire edge. Estimation of the Effectiveness of breaks in reducing the fire area.

(1) If allowed to burn unrestricted the slope of the fire in section 2 hours can be extrapolated using the following assumption.

The shape of a fire is symmetrical about its long axis.

From this assumption it is estimated that the presence of breaks reduced the fire area in section2 hours by 50%.

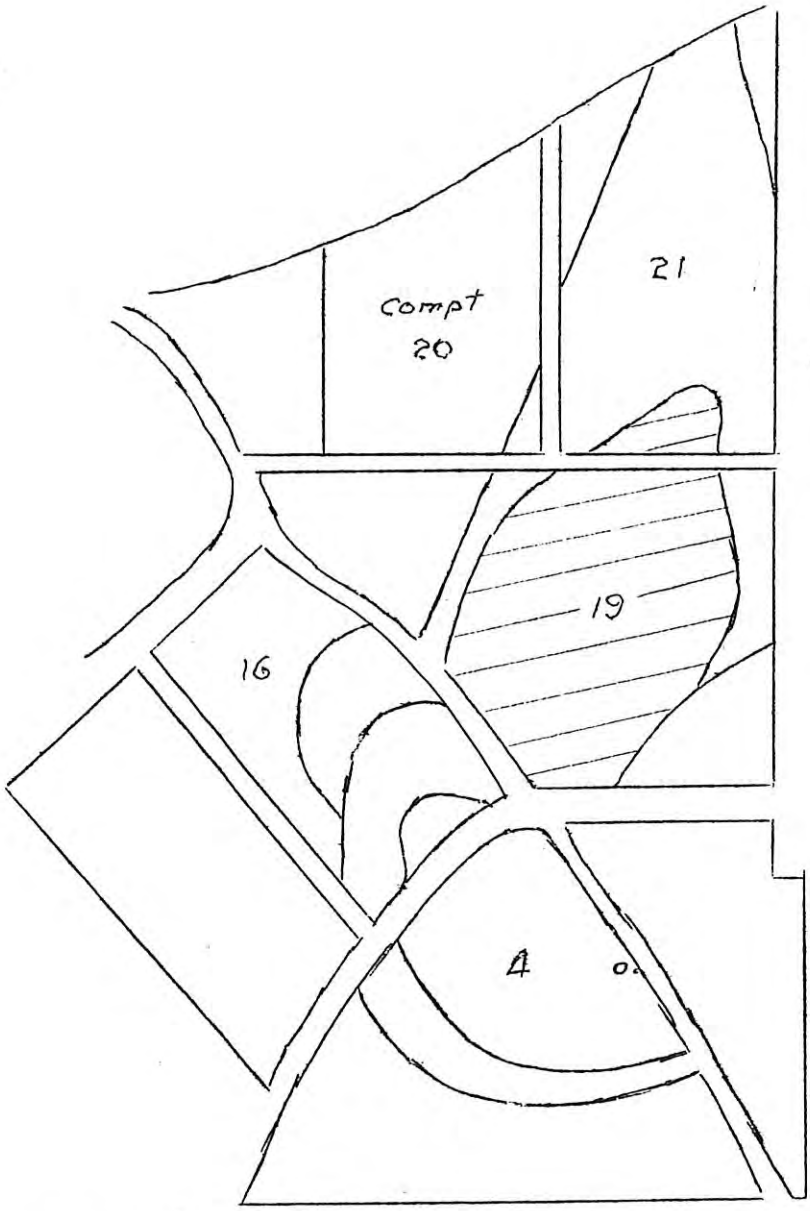
G.B. PEET
A.F.F.O.

Spread of Fire from Time of Detection to Suppression.

Map 2

ref: Gnangara Group ap Sect: A.

Scale: 10 chns = 1 inch



Legend:

Colours indicate fire size at a given time

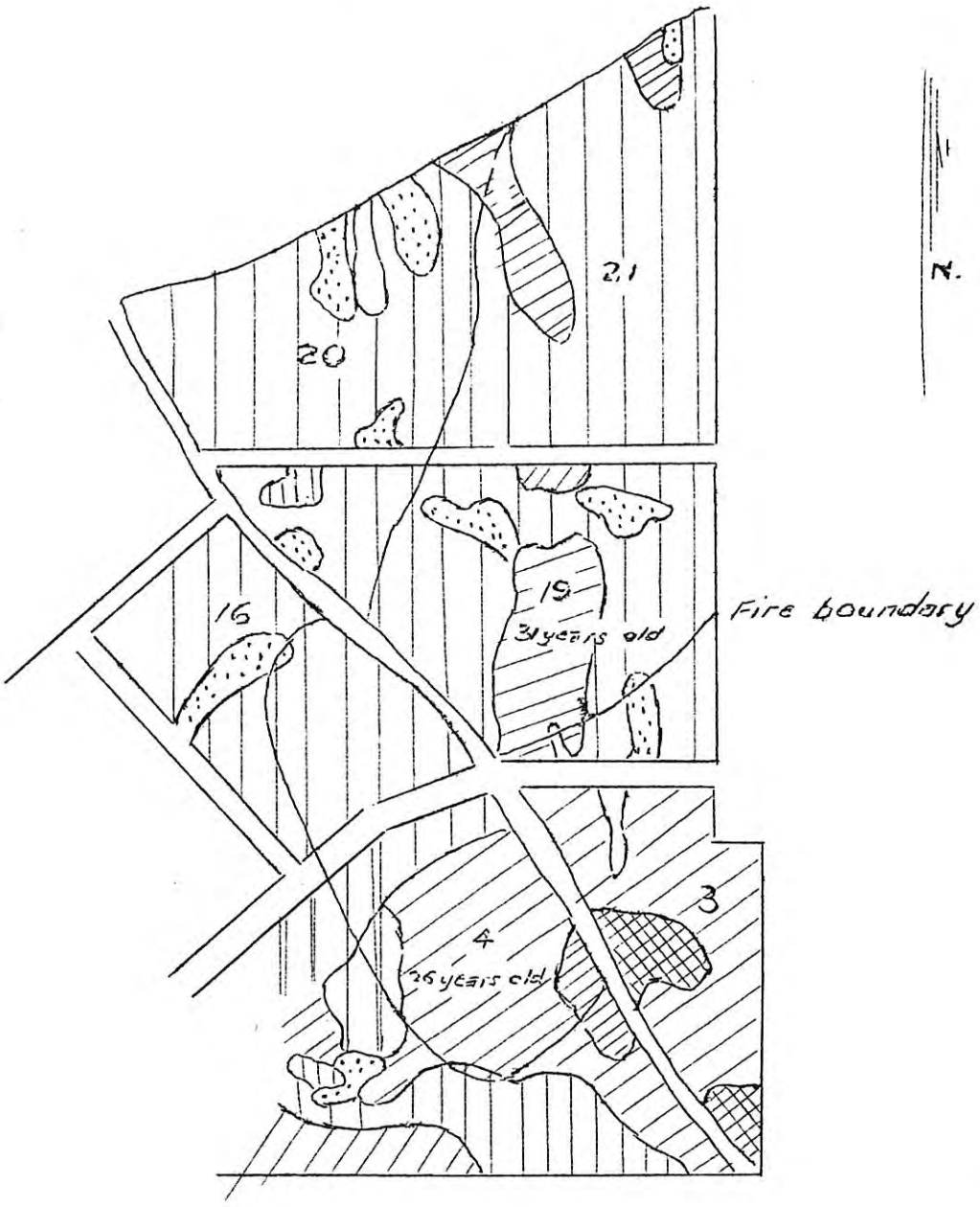
° Start of fire - Detected 1205

Section / hours	Fire area / hour from detection
2	" " 2 " " "
2-4	Fire formed between 2nd 3rd 4th hours from Detection (started from hopover at 1400)
5	Fire area formed 5 hours from Detection.

Forest Type

Map 1.

Scale: 10 chns = 1 inch



Legend:

Sq. 1

2

3

4

5

6