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FORESTS DEPARTMENT

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Manjimup Fire research Office,

To A.D.F.O. Burrows, 19th October, 1977

Forests Department, Western Australia

MANJIMUP WA 6258

Reference-H.O.

Local

SUBJECT: FIELD T.I. INCENDIARY TRIAL.

INTRODUCTION

A small trial set up as a forerunner to the planned electrical ignition field tests this summer has now been completed.

The trial was aimed at testing [illegible] compatibility of locally made incendiaries to soil penetration. As an adjunct to the trial two new type incendiaries were tested also. These can be broadly described as 'munitions" and "composite". The former is a small aluminium capsule filled with a solid, highly flammable composition into which is embedded an electrical detonator. The latter is simply a coupling of the munitions capsule and the fire-lighter component of the locally made incendiary sealed together in a plastic bag. Neither of these units has previously been tested in the field.

Fifteen units of each incendiary type were laid out in an area of open jarrah forest in Yeelicup Block on September 27th and a rain gauge installed nearby. At weekly intervals five of each type were fired and interim rainfall recorded.

Units that failed to ignite were brought home and examined for fault. Table 1 summarises the performance of each type over the three week test period.

TABLE 1

Type	Firing	Functional	non Functional	Rain During week
Local	1	60%	40%	18.2mm
	2	20%	80%	32.0mm
	3	Nil	100%	21.0mm
Munition	1	100%	Nil	18.2mm
	2	Nil	100%	32.2mm
	3	Nil	100%	21.0mm
Composite	1	100%	Nil	18.2mm
	2	60%	40%	32.0mm
	3	80%	20%	21.0mm

Of [illegible]

Local-

Firing 1

The term functional is used in this discussion to describe an incendiary unit doing what it was designed to do: that is ignite and continue to burn for a period long enough to give reasonable expectation of extension to a surrounding fuel body.

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At the first firing, and after full exposure to the weather, 40 per cent of the local industries no longer fulfilled this requirement. The reason for failure was in some instances a too violent and rapid combustion of the black powder which gave the fire-lighter component no time to ignite, and in others a very weak powder burn which failed also to ignite the fire-lighter. The violent burn is deemed to be caused by insufficient aluminium powder additive and the weak burn by moisture entry.

Firing 2

At this firing 80 per cent of the units were non-functional; half of these through moisture entry and half through overly violent combustion.

Firing 3

Failure of all units, with 40 per cent firing so violently as to be explosive and the remainder failed by moisture entry.

Additions-

Firing 1

All still functional but obviously affected by moisture. The cap of this unit is not totally sealed and moisture entry is inevitable, however, and perhaps because of the combustible material being solidified, it is more resistant to moisture than might be expected.

Firing 2

Failure of all units due to moisture entry. All detonators fired very weakly but no ignition of gas took place.

Firing 3

Failure of all units due to gas ignition. Only 20 per cent of detonators fired and only one of these at full capacity. All units severely moisture affected.

Composite-

Firing 1

All units fully functional with total factory ignition of fire-lighter component. No moisture entry noted inside plastic bag.

Firing 2

Failure of 40 per cent of all units due to moisture entry. Remainder still functional.

Firing 3

Failure of 80 per cent of all units caused by moisture entry. Remainder still functional.

CONCLUSION

In failure of the "New" units used in the trial it must be pointed out that these were "left-overs" from last summers field trials and hence are nearly twelve months old. It is possible, although not probable that component materials are beginning to deteriorate. Unfortunately no materials were at hand with which to make fresh ones. Apart from failures due to moisture intrusion there were some that appeared due largely to

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faulty manufacture. For example the violence of some of the powder burns can only be attributed to a bad black powder-aluminium powder mix. And again, units were found in which the fire-lighter component had been placed in a plastic bag instead of the specified cellophane bag with disastrous effect on the black powder. There is an obvious need for better quality control during manufacture.

The munitions incendiary performed well only in the short term and is obviously not a good risk on an operational basis if there is any possibility of it being exposed to prolonged moisture. Its best application would lie in the situation where a "quick" circuit was needed for immediate firing in very dry fuel. The brevity of its burning time (18 seconds) lends doubt to its ability to ignite marginally dry fuels.

The composite incendiary performed consistently better throughout the trial than either of its counterparts, and is worthy of further testing under field conditions. Like the other incendiaries it is prone to eventual moisture entry through the leg-wire exit, but has the advantage of the others in that any water entering the plastic bag containing the [illegible] also penetrate the capsule to render it ineffective. [illegible] the flame wrapped fire-lighter which is the only [illegible] unit has shown no sign of being affected by [illegible] throughout the trial.

Cost-wise the "composite" is expensive at 75 cents for the capsule, plus the fire-lighter component plus the plastic bag plus labour. On the credit side the safety hazards of handling and storing the ingredients, blasting powder and aluminium dust, are eliminated, and the simplicity of its construction would greatly reduce labour cost.

In summary the trial has shown that although none of the units tested are impervious to moisture, some are better than others. The next step is to field test and compare the efficiency with which each type will ignite a fuel body. Circumstances permitting, one circuit of each will be fired inside a Pemberton slash-burn this summer, following which a further appraisal of performance will be made.

R. Voutier

R Voutier
T/A.I.