

- FOREST, SCRUB AND GRASS FIRE SUPPRESSION METHODS -

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Fire fighting is the last line of defence in the saving of life and property when fire prevention and protective measures have been neglected or are inadequate.

It is often said that no two fires are exactly alike. Whilst this is true, it is equally true that certain principles of firefighting methods and tactics can be learnt and applied to any fire situation.

Fundamentally, there is no difference in the methods used to combat forest, scrub or grass fires. In practice, the job is largely a matter of tactics determined by the different types and distribution of fuels.

The following basic differences between these types of fires and fuels will be helpful in appreciating the tactics to be employed.

Generally, in South Australia, Forests are regarded as man planted and maintained plantations of pines and other timber. Scrub is recognised as virgin growth of various species of trees, mostly eucalypts, and undergrowth. Usually Forests have denser tree population with a ground fuel problem of forest litter and shrubby vegetation, where as Scrub conditions vary considerably in different parts of the State and often carry annual grasses and readily inflammable undergrowth such as furze, blackberries, yacca gum, broom bush, etc.

Grass fires are concerned with annual grasses, some perennials, crops, stubble, bushes, etc. - say to a height averaging 3 feet above ground.

Fuel density and height of fuel above ground level, and wind impedence, are the main considerations in comparisons between Forest, and Scrub, and Grass fires.

Forest & Scrub Fires

Grass Fires

Fuel

Heavy ground and elevated fuels.
Intense heat radiation. Crown
fire problem.

Light fuels near ground level,
(up to 3 feet)

Rate of forward Spread

Relatively slow due to heavy
fuel and wind impedence at
ground level. Forest wind
speeds at ground estimated at
1/5th of outside wind conditions
Rarely more than 60 chains per
hour, forward fire speed.

Faster than forest and scrub -
increasing markedly with in-
creasing wind speed.
Travel up to 10 to 12 mile per
hour.

Accessibility

Often difficult due to denser
tree population and topographic
barriers.

Access generally better than
scrub and forests although
major grass fires also have
their field obstacles inhibit-
ing ready access.

Spotting

(Ignition ahead of main fire from flying embers)

Several chains to several miles,
(in extreme conditions).

Limited to 1 to 2 chains, usually

BASIS OF FIRE SUPPRESSION:

The basis of sound fire fighting practice is the breaking of the "fire triangle" by the most expedient means available with the ultimate aim of accomplishing the task with a minimum of damage.

The "Fire Triangle" has become the universally accepted illustration of the three fundamentals of fire:- Fuel, Heat and Oxygen. Eliminate any one of these essentials and the fire is extinguished.

SUPPRESSION ACTION -

Part of Fire Triangle -

Fuels - Break the continuity of fuel from the path of the fire. Hand tools, ploughs, rotary hoes, slashers, bulldozers, graders. The value of shovels, rakes, (hand tools generally), is too often overlooked - More use could be made, in South Australia, of mechanised fuel reducing and earth moving plant.

Heat - Reduce temperatures - Science has not produced any more useful medium for the fire-fighter than water for this purpose. Knapsack pumps and spray jets for ground fuels. High pressure jets and monitors to subdue crown fires - reduce heat to ground level to cut down long range radiation and spotting. Heat reduction also counters firefighter fatigue.

Oxygen- Smother fuels with dirt, or chemicals, (fire retardents). Shovels and other hand tools - bull-dozers, graders and other mechanised plant. Displace oxygen by use of beaters, boughs, wet bags.

For convenience, "Suppression Action" has been divided into three basic parts:-

- (1) Immediate Action
- (2) Secondary Action
- (3) Final Action

1. **Immediate Suppression Action** - (after recce and decision on tactics to be employed or any immediate life saving action has been taken).

Prevent Spread - The first principle is to prevent the spread or "contain" the fire. In small fires this can be best achieved by attacking the head. In large and hotter fires, flank attacks pay better dividends. When ready extinction is not practicable, endeavour to slow the rate of burning on the perimeter.

2. **Secondary Suppression Action** -

Reduce property losses and prevent further damage - carry out salvage operations, within the perimeter.

3. **Final Action** -

Thoroughly mop up and maintain "fire-watch" to prevent re-kindles. Careful inspection of the entire area with particular attention to the perimeter.

SUPPRESSION METHODS AND TACTICS:

Tactics is the prudent choice and manner of employment of various methods to cope with specific fire situations.

A thorough understanding of methods is necessary before sound tactics can be considered.

This article sets out recognised methods of rural fire suppression which will promote efficient fire fighting and effective tactics.

DIRECT ATTACK METHODS -

1. Knapsacks and Beaters - (in file) method -

Small fires or sections of large fires, when fuel and conditions are within the scope of un-mounted fire-fighters, work as team, e.g., 1, 2, 3,4.

No. 1 Leader - attacks fire edge moving as quickly as practicable to break fire and reduce temperatures.

No. 2 Backs up No. 1 at a distance of two to four paces, knocking out hot spots or any break-aways left by No. 1 and further cooling the hot ground and fuel.

No. 3 Backs up No. 2 from a distance of four to six paces - doing a more thorough job of spotting and cooling.

No. 4 Mop-up man - makes a thorough job of consolidating the fire edge.

No. 1 will run out of water first and suffers the greatest fatigue. He should be relieved by No. 2 or No. 3 to re-charge his knapsack and to have a spell from leading. Nos. 1, 2 and 3 can alternate reliefs on leading attack. No. 4 should be able to work independently of relief.

When using knapsacks and beaters, the knapsack man should act as Leader, backed up by the beater-men.

When using all beaters, work to similar pattern alternating relief between 1, 2 and 3.

Hand tools such as shovels, rakes, McLeod Tools, (Rake-hoe), should not be over-looked in the follow up - mopping up, to establish a proper control line, where country will permit.

An experienced knapsack man will not waste his water on heavy fuels when there are sparse patches or lighter fuels in the path of the fire. Wait until the fire reaches the light fuel and you will achieve double the result. Make every drop of water count. On hot spots, two or three knapsack streams directed together will do the job of a larger jet.

This system of team work, when pursued resourcefully and patiently, will pay more dividends than the men attacking independently at various points of the fire. The team can comprise of two or more men.

It is important that all members of a team should not run out of water at the same time and care should be taken that this does not happen.

DIRECT ATTACK METHODS - continued -

2. Pump - Tanker Units - (In File) Method -

Here again, team work pays off and working in file on the fire edge is a system hard to better.

Trucks 1, 2, 3 and 4. They don't require to be numbered.

A knowledge of the Direct Attack, (In File) Method, and a mutual understanding made as the units arrive at the fire will soon establish the team. If the units are equipped with radio the team can be made up and co-ordinated more quickly and efficiently.

Teams can comprise of two or more units and be mixed, E.F.S., Woods & Forests Department and Private Plants, so long as there is a quick and effective co-operation.

The pattern is similar to the knapsack team file attack.

- No. 1 Leader - preferably the unit with the most powerful jets. This is the task for which the "Monitor" equipped truck was designed. Attacks fire edge moving as quickly as practicable to break fire and reduce temperatures.
- No. 2 Backs up No. 1 at a distance of two to four truck lengths. Knocks out hot spots left by No. 1 and further cools down.
- No. 3 Backs up No. 2 from a distance of four to six truck lengths, doing a more thorough job of spotting and quenching.
- No. 4 Mop-up Unit - 10 to 20 truck lengths from No. 3 - makes a thorough job of consolidating the fire edge.

3. Hot Spotting -

Checking the fire at points of most rapid spread, points needing first priority attention, saving lives, buildings, hay stacks, immediately threatened risks, knocking down crown fires to ground level, where necessary and possible.

Hot-spot teams should be well seasoned and properly equipped crews.

They can work independently, but better in pairs, and radio is essential.

Unfortunately, too many of the casual volunteers and private units try to follow the fire and do hot-spotting jobs without co-ordinated team work with a consequent negative result. They win ground temporarily only to lose it when they pull out to refill or when the fire sweeps past or around them.

CONTROL LINE METHODS:

1. Direct Control Line Method-

Using hand tools or mechanised plant - scrape or dig along the fire edge using the dirt to smother the fire. The two objects being to rob the fire of oxygen and fuel. The Direct Control line method is limited by fire and fuel intensity.

2. Parallel Control Line Method -

The Parallel Method is used when fuel and fire intensity will not permit a Direct Control Line to be attempted. It has the advantage of enabling crews to work under cooler conditions. The line should be constructed as close as practicable to and

CONTROL LINE METHODS - continued

following the fire edge to enable the crews to work effectively. The Line could be made from two feet to a chain from the fire edge, as conditions demand.

The intervening strip of unburnt fuel may be burnt out as the line proceeds and or may be allowed to burn out under supervision.

3. Indirect Control Line Method or Back-firing -

This method is more commonly known in South Australia as "Break Burning".

This method should only be under-taken as a last resort when less hazardous methods have been considered impracticable and the Backfire is directed by an experienced man with an intimate knowledge of the country, backed up by expert crews with good equipment. Efficient communications are essential.

Advantage should be taken of any natural or prepared fire breaks and the Control Line constructed along these features at sufficient distance to enable the line to be constructed in time for the subsequent back-fire to halt the fire effectively.

Timing is all important! The distance from the fire edge, which could be from a chain or more to a mile, the known and anticipated wind conditions, arrangement and types of fuel, topography, any special risks within or adjacent to the back-fire area, the width of the fire line, the quality of the fire force to meet the task, the effectiveness of communications, are matters for accurate appraisal by the Fire Supervisor.

Discipline is vital - All crews in the area must know the plan of action. Units and men must be in a position to protect special risks. Hot-spot crews must be given time to get clear, and the Supervisor must be certain that the area is vacated before the back-fire is lighted or lives could be lost.

Backfiring during the daytime, under serious fire risk conditions, is a hazardous action. The risk of the back-fire getting away is greatly lessened when back-firing in scrub and forest country is carried out after night-fall, when temperatures drop and the control line is effectively established before day break.

In major grass fires and open farm land, fires with wide fronts of a half a mile or more, back-firing to try and halt the fire is inadvisable.

Backfiring to Save Buildings -

Unco-ordinated back-firing, especially by unqualified persons, to save buildings and properties, has frequently proved a detriment to major fire control.

Although this action may be desirable in certain circumstances, its indiscriminate use can cause greater ultimate property losses. Its need can be rendered unnecessary by commonsense protective hazard reduction measures.

MAIN PRINCIPLES OF CONTROL LINE CONSTRUCTION:

1. The line should be of adequate width to meet the situation.
2. Clear line to mineral soil for all or part of width.
3. Clear and break up charred or burning material from line inside burnt area. Unburnt material from line construction should be cleared and separated to off-set kindling and simplify control.
4. On slopes protect the line against material which could roll over it.
5. Eliminate hot-spots with water or smother with dirt. Fell snags, (dead trees), along line and near line.

A FEW E.F.S. IMPRESSIONS AND WORDS OF ADVICE WHICH COME FROM EXPERIENCES
WITH OUR OWN TYPICAL FIRES AND FIRE CREWS.

1. Turning-out

Drive with care and at safe speeds when turning-out to fires. Make certain all crew members safely aboard before moving.

2. Driving at fires.

Wherever practicable, work from burnt or clear ground - or at least don't stray too far from it and keep it in mind. Realise that, with a change of wind, the "safe" flank of grass or scrub can become the new front.

3. When travelling in smoke or dust - reduce speed, switch on lights - sound horn. There have been some nasty near misses - Don't let us kill each other!

4. A petrol motor under "hot fire" conditions, has a good chance of being stalled and may not restart readily.

If you are driving in a hot-spot or you have to make a quick get-away, keep to low gears to maintain engine revs. Avoid changing of gears and any chance of stalling - maintaining revs reduces chance of motor stalling.

5. If truck stalls or breaks down in path of fire and there is no fire escape avenue, then the shelter of your cabin or car or vehicle is a safer refuge than trying to make a run through the fire.

Whilst it can be quite safe to jump over the "knife edge" small fire in grass burning against the wind, it is an entirely different matter with a fire travelling with the wind. Although you may not be able to see it through the smoke, there will be a moving broad pattern of fire, perhaps a half chain or more in depth.

Vehicles don't generally burst into flames instantly and after the fire has swept past, the vehicle could be vacated to the shelter of the burnt area - hot and mighty uncomfortable but a better chance of survival.

6. If your crew has to leave their vehicle to work on foot in scrub of hills fire which is otherwise inaccessible, leave the driver with the truck, turn the truck around so that it is facing the escape route ready for a quick get-away. Park vehicle on bare or burnt ground.

IMPRESSIONS & WORDS OF ADVICE - continued:

7. Fire Controllers should not permit vehicles to jam up access or escape routes, particularly hills tracks - make the drivers line up vehicles on safest side or clearing, preferably again, facing away from the danger area ready for that always possible need for speedy retreat.
8. Don't drive a vehicle towing a trailer into a danger area or a one way track. Attempting to back out in a hurry could be fatal for yourself and any others trying to escape.
9. The emergency signal of the Fire Service is three blasts on a whistle, which is the signal to alert all firemen of a dangerous situation. At building fires, this signal is the order for all men to evacuate the building, immediately, and report to the Officer-in-Charge. At bushfires, this signal could be given by a whistle, car or truck horn, as a series of three blasts and recognised by bushfire fighters as a danger signal or distress signal.
10. Intercommunications between the driver's cabin and crew on truck are important. Fit speaking tube, intercommunication telephone system, or have a code of signals with bell or buzzer.

Too much emphasis cannot be placed on the need for a sound district plan of action and prepared arrangements with neighbouring districts for mutual aid, to cope with major fires.

Discipline and training are essentials to the regular fire crews. Burning-off operations, carefully planned and efficiently executed, make excellent training, especially when landholders with their own equipment combine with the regular fire crews.

Have a district plan of action and rehearse it.

Practice and publicise within your district, the several basic methods of suppression so that private plant crews will work as teams with the co-ordination of effort that achieves results.

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