PENISULAR BROADCAST BURN (8th September 1978)

N. D. BURROWS 1978.

Clear felled 14 year old P. radiata (cyclone damaged) compt A12 Lewana Plantation.
Slash age - 4 months.

Tops - yellow-red in colour.

Fuel Weights:
approx 60 tonnes/ha. of slash
10 tonnes/ha. needlebed (30mm deep)
slash height (1.0m.) (up to 2m in height)
approximately ground cover - slash
fuels not trea[illegible]e. well aerated.

Moisture Contents:
SMC = 13%
PMC = 45% (sampled under slash heap)
PMC = 30% (sampled in open)
* AMC = 24% (needles still not cured) (aerial moisture content).
AMC = 12% (needles cured - approx. 25% of total needles)

Adjacent stand (14 year old P. radiata, thinned)
AMC = 18% (cured needles)
PMC = 64%
SMC = 20%
SDI = 110 (Soil Drought Index.)
Difference in M.C. of SMC = 7%, AMC = -6%

Area of burn: approximately 4 hectares.

Dozer break, no push in or advance mop up.

Slope 6°, North West aspect

Fire Data

Start at 10.45

Time	1050	10.54	10.58	11.02	12.00	12.04	12.08	12.15
$\bar{x}$ Headfire Flame Ht.	2.5-4	2.0	3.5	4	3	3	3	3
Smoke colour	white	white	brown	brown	W-B	B	B	W-B
ROS	60m/hr	60m/hr	80m/hr	80m/hr	100	100	180	80
Temperature	19°C	-	-	-	23	-	-	-
R H	47%	-	-	-	42	-	-	-
Wind	3.5KPH	4.4	3.4	2.0	10	9	10	5
Direction	N	N	N	N	N	N	N	N

* AMC = aerial moisture content (fine fuels)

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The danger spot was the top end. This was adjacent to 14 year old P. radiata (see plan) and the edge contained very heavy fuels as a result of the dozer heaping while cutting the break. The northerly breeze coming up the slope would carry fire into the pines.

This whole edge was lit in two sections. The first section, about 60m, was lit with torches from the edge and allowed to back burn. As the fire data above shows, considerable flame heights were experienced as heaps ignited. In some instances, flames reached seven metres when two metre high heaps of tops ignited.

Having allowed this edge to back burn for some 20m (which was fairly slow because of the slope and the stiff northerly wind) the remainder of the coupe was stripped out in parrallel lines at some 20m apart. At about 1200 hours, the wind increased to 10KPH and rates of spread increased accordingly (see table above).

There are a number of features peculiar to pine slash burning which were noticeable in this burn. Firstly, the lack of ash, embers, sparks, etc. carried aloft by convection. Even with seven metre flame heights, this was evident I would say the reason for this is the flashly nature of pine fuels. Burning pine tops is a very rapid flash of flames initially. Within minutes, the flames have dropped considerably as the flashly needles are consumed. Unlike karri regen. burns and karri litter, pine needles burn completely (and rapidly) away on ignition and do not float around as hot embers.

The second feature is the rapid travel of fire. When wind speeds increased, the fire behaved not unlike a grass fire - with flames rolling through the fuel. The 10KPH winds kept flame heights down, although flame length was considerably increased. No spotting was evident - again because flash fuels burnt away on ignition.

Another feature was the noticeable lack of sustained ignition of wood fuels. Branches and stem material up to 4 - 5cm. diameter was consumed but material larger that this had only its bark burned off. This meant little need for mop up - yet another (Note-SDI 110) peculiarity. One hour after the burn, there were no flames and very little material smouldering. Mop up was extremely easy.

Because of the high combustion rate of pine needles, complete removal of woody material is difficult to achieve unless:

1. Some form of fuel arrangement is incorporated (crushing, heaping, windrowing)
2. There is almost no wind initially.
3. The wood is below f.s.p. (i e below 32%)
4. Combinations of the above.

Fuel Removal

The removal of woody fuels was directly related to fuel arrangement (see diagram 2 below). Where fuels were heaped (Diag. 2-1) then 100% of all branch material was consumed and most (70%) stemwood up to 7cm diameter was removed. All needle material down to mineral earth was removed.

Where fuel was not heaped (2-2) only 30-40% of branchwood was consumed and stemwood up to 2cm diameter was consumed. All needle material was removed.

Conclusion

This fire was very effective for a fire hazard reduction burn but would not have been suitable as a site preparation burn. For a site preparation burn, the following points may be helpful.

Woody material up to 7cm diameter must be below fibre saturation point (30% o.d.w.) and preferably less than 20%M.C.

Moisture content in surface litter in the surrounding plantation is greater than 20% (o d.w.)

Moisture content in material in the surrounding plantation is greater than 25%.

Moisture content of fine fuels (surface and aerial needles) is less than 15%.

Winds are less than 10 KPH.

Temperature between 18 - 25°C.

RH between 35 - 45%.

Cloud cover less than four eighths.

It is noteworthy that these conditions are guides only and should be treated as such. There is much more work to be done in the field of broadcast burning pine slash. From the very little amount that has been done, I feel that broadcast burning pine slash is not quite as difficult as originally suspected.

N. Burrows
FIRE RESEARCH OFFICER