Aerial Suppression an End – Users Perspective

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What do we know

- Aerial fire suppression is expensive on an hourly basis
- There is believed to be an upper fire intensity limit in mixed eucalypt forest of 2000 kW/m for unsupported drops and 3000 kW/m with follow up ground support (Loane & Gould 1986)
- There is a period of time for a fire to develop through the acceleration phase –

1. Forests 20 -30 minutes (Luke & McArthur 1978)
2. Grassland 10 minutes Alexander 1992)

Deployment - 2002/03

1. Request time – period between initial call (000) and helicopter request

2. Dispatch time – period between helicopter request and departure from airport

3. Flying time – period from airport to fire scene

Request time

- 41% of requests exceeded 30 minutes between 000 call and the actual request for the helicopters made
- 13% - 26 – 30 minutes
- 13% - 21 – 25 minutes
- 16% - 16 – 21 minutes
- 11% - 11 – 15 minutes
- 3% - 6 – 10 minutes
- 3% - 0 -5 minutes (Milne & Abbott 2005)

Dispatch time

- This time incorporates the power up time (2 – 3 minutes) and time to fill belly tanks (1 -2 minutes)
- Time taken between request and departure from airport
- 18% - 0 - 5 minutes
- 24% - 6 -10 minutes
- 42% - 11 – 15 minutes
- 13% - 16 – 20 minutes
- 3% - 21 – 25 minutes

Flying time

- Travelling at a cruising speed of 225 km/hr
- Time taken between departure from airport to arrival at the incident
- 24% - 0 -5 minutes
- 37% - 6 – 10 minutes
- 21% - 11 – 15 minutes
- 8% - 16 – 20 minutes
- 5% - 21 – 25 minutes
- 5% - > 31 minutes
- 82% of incidents within 15 minutes flying time

Combined time

- Time taken from 000 call to arrival at incident

- 89% - > 31 minutes
- 3% - 26 – 30 minutes
- 5% - 21 – 25 minutes
- 3% - 16 – 20 minutes

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Outcome 2002/03

- 89% of incidents attended by the helicopters were beyond the initial 30 minute threshold (Luke & McArthur, 1978: Gould 2003)
- This time lag reduced the helicopter effectiveness
- These issues have been considered and are being addressed

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Adjunct Activity

- FESA is also mapping fuel loads to identify sites with heavy fuels loads
- From this is the option to initiate a modified response protocol

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Vegetation Type	Intensity	Minimum Water Depth	Footprint area	Using Drop Characteristics	Approximate dimensions	Flight speed	Flight Height
Australian Eucalypt	500kW/m	0.4mm	334m^2	drop 3 (1-1.5mm)	27 X 12m	50kn	50ft
	1000kW/m	0.63mm	334m^2	drop 3 (1-1.5mm)	27 X 12m	50kn	50ft
	2000kW/m	1.2mm	185m^2	drop 1 (1.5-2mm)	23 X 8m	50kn	50ft
Australian Cured grass	500kW/m	0.19mm	334m^2	drop 3 (1-1.5mm)	27 X 12m	50kn	50ft
	1000kW/m	0.35mm	334m^2	drop 3 (1-1.5mm)	27 X 12m	50kn	50ft
	2000kW/m	0.65mm	334m^2	drop 3 (1-1.5mm)	27 X 12m	50kn	50ft
Canadian pine	500kW/m	1.32mm	185m^2	drop 1 (1.5-2mm)	23 X 8m	50kn	50ft
	1000kW/m	2.64mm	64m^2	drop 4 (3-3.5mm)	8 X 8m	0kn	50ft
	2000kW/m	5.28mm	12m^2	drop 4 (5.5-6mm)	3 X 4m	0kn	50ft

Table 7. Drop depths and dimensions in various vegetation types with fires of different intensities

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	AREA IN SQUARE METRES				
	DROP 1	DROP 2	DROP 3	DROP 4	DROP 5
WIND DIRECTION	SE	S/SE	S	S	S
WIND SPEED	2.8km/hr	11.8km/hr	15.9km/hr	17.3km/hr	14.8km/hr
WIND SPEED DURING DROP	2.1km/hr	16.2km/hr	20.1km/hr	17.1km/hr	19.7km/hr
HELICOPTER SPEED	40kn	50kn	50kn	0kn	50kn
HELICOPTER HEIGHT	50ft	50ft	50ft	50ft	50ft
SUPPRESSANT CONCENTRATION	0.40%	0.20%	0.40%	0.20%	0%
TOTAL AREA (m^2)	**286m^2**	**289.5m^2**	**334m^2**	**168m^2**	**311m^2**
FOOTPRINT DEPTH (Depth of water in cups placed within the grid)					
0 - 1mm					
1-1.5mm	286	289.5	334	168	311
1.5 - 2mm	185	216	175	132	142
2 - 2.5mm	99	132	18	97	72
2.5 - 3mm	56	82		77	12
3 - 3.5mm	31	58		64	
3.5 - 4mm	10	26		55	
4 - 4.5mm		0.5		41	
4.5 - 5mm				33	
5 - 5.5mm				22	
5.5 - 6mm				12	
6 - 6.5mm				5	

Table 4. Calculated footprint areas and depth thresholds from the preliminary footprint field tests

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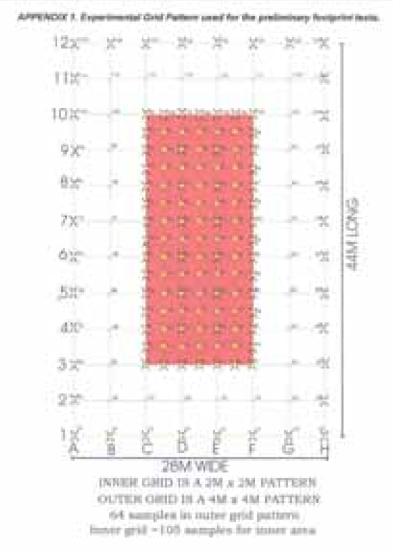
Foot Print Grid Design



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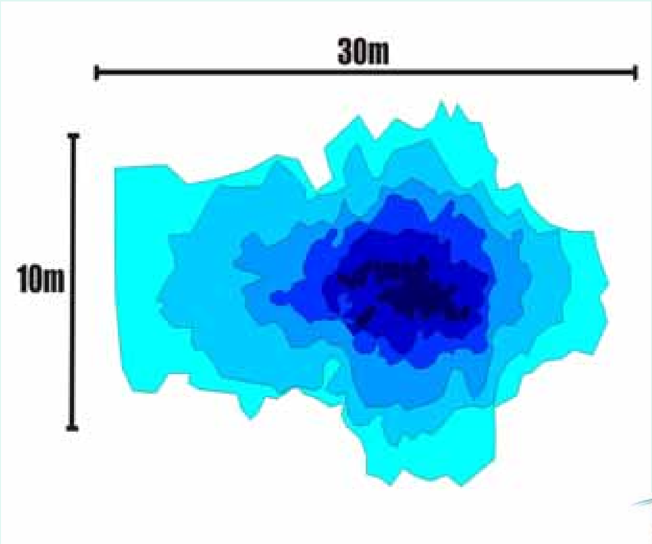
Effective Foot Print



Issues

- What is the impact on penetration of the suppressant within an overstorey crown?
- How does the penetration differ for varying suppressants eg foam, retardant, water?
- How does this affect effectiveness on the ground?
- What is the appropriate overlap of the footprints to achieve fire suppression effectiveness?

Issues

- What is the upper fire intensity limit for the use of helicopters without ground support for:

1. woodlands
2. forests
3. grasslands

under operational conditions?

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Issues

- There needs to be an analysis of the effectiveness and efficiency of the fixed wing / rotary aircraft with an outcome of a definitive cost / benefit analysis
- The analysis should also cover the various configurations and size of aircraft

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