



Spectrum

Bushfire smoke and city smogs

What will happen if smoke from a bushfire drifts into a city smog? Will it make the smog worse?

In *Ecos 9* we reported that ozone forms at the top of a plume where the smoke comes in contact with sunlight. We also mentioned the studies of Mr Tony Evans, who is now with the Division of Applied Organic Chemistry, which have shown that mixing oxides of nitrogen from urban air with bushfire smoke will increase the amount of ozone formed — by as much as 50 %.

These findings raised the question of whether bushfire smoke drifting into a city may add to already high levels and thus contribute to the formation of photochemical smogs.

Further studies by Mr Evans have now shown that the smoke must be fresh. A peak of ozone production in a smoke plume is reached within an hour of its formation, by which time the relevant chemicals in the smoke have been consumed. Thus smoke that has drifted in sunlight for more than 1 hour will generate no more ozone, even if it becomes

mixed with extra oxides of nitrogen coming from such city sources as motor car exhausts.

So bushfire smoke, if it finds its way into an urban area, will mainly cause 'pollution' by reducing the visibility. Provided it's more than 1 hour old, it will not cause more ozone to be formed.

On still days when smogs form, a bushfire would have to be located very close to a city centre for the smoke to drift in within that time. That smoke will, however, bring in any ozone formed earlier at the top of the plume.

At ground level, it seems, this extra ozone isn't likely to be a problem. The maximum level of ozone permitted by the air-quality standards in the United States is 80 parts per billion (p.p.b.).

Levels greater than this have occasionally been recorded at the tops of smoke plumes from prescribed burns in Western Australia. But Mr Evans' calculations have shown that by the time this ozone reached the ground dilution would have reduced its level to 55 p.p.b. at the most.

Ozone levels in severe smogs in Sydney or Melbourne may reach 200 p.p.b. or more. So the chance that bushfires contribute in a major way to smogs in city areas seems rather small.

Photochemical ozone in smoke from the prescribed burning of forests, L.F. Evans, I.A. Weeks, A.J. Eccleston, and D.R. Packham. *Environmental Science and Technology*, 1977, 11 (in press).