Impact of dioxin emissions from bushfires in Australia

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Polychlorinated diobenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) and coplanar polychlorinated biphenyls (PCB) are reputably among the most toxic of compounds and are of major international concern. They are listed under the Stockholm Convention on Persistent Organic Pollutants (POPs). In Australia, biomass combustion from stubble burning, fuel reduction burning in forests and wildfires is thought to be a major source of PCDD/PCDF. A review of dioxin emission sources to air in Australia commissioned by Environment Australia in 1998 estimated that total national PCDD and PCDF emissions were 150-2100 g of Toxic Equivalents (TEQ) per year, of which bushfires (prescribed and wildfire) contributed between 72 to 1700 g TEQ annually. This estimate was based on very limited measurements from European and US studies and was considered to be highly uncertain.

The Australian Government Department of the Environment and Water Resources through its National Dioxins Programme, commissioned CSIRO and its collaborators to review the issue from 2001-04. The first study, through a field measurement programme, concluded that emissions from prescribed fires and wildfires were most probably at the lower end of the range of 31- 495 g TEQ per year . However the study also identified that there was a possibility that a proportion of this emission to the atmosphere might be volatilisation of pre-existing PCDD and PCDF from the soil and fuel. This lead to a further investigation of the mechanisms of PCDD and PCDF emission during biomass combustion in the field.

In this paper we present the results of these studies. We discuss the implications of PCDD and PCDF emissions from bushfires for the Australian dioxin budget and to regional and personal human exposure.

Key Words

Bushfire smoke, dioxin, air quality, health