



Local Government Air Quality Toolkit

Module 1: The science of air quality

Part 6: Toxic air pollutants

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

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Environment Protection Authority and
Department of Climate Change,
Energy, the Environment and Water
Locked Bag 5022, Parramatta NSW 2124
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment and Heritage enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for
1300 361 967
Email info@environment.nsw.gov.au
Website www.environment.nsw.gov.au

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1. Introduction

Two general types of impact are addressed under the category of 'air toxics':

- directly toxic air pollutants
- carcinogenic air pollutants.

1.1 National Environment Protection (Air Toxics) Measure

The National Environment Protection (Air Toxics) Measure (Air Toxics NEPM), developed in 2004, addresses 5 individual or sets of air toxics compounds (NEPC 2004):

- benzene
- formaldehyde
- benzo(a)pyrene as a marker for polycyclic aromatic hydrocarbons (PAHs)
- toluene
- xylenes (as a total of ortho, meta and para isomers).

While the Air Toxics NEPM sets monitoring investigation levels for these air toxics compounds, it has not set criteria. The Air Toxics NEPM also identified other air toxics, which are prioritised for further investigation at a later stage:

- 1,3 butadiene
- acetaldehyde
- arsenic and compounds
- cadmium and compounds
- methyl ethyl ketone
- methyl isobutyl ketone
- nickel and compounds
- styrene
- tetrachloroethylene
- trichloroethylene
- polychlorinated biphenyls (PCBs)
- polychlorinated dioxins and furans.

The *Approved methods for the modelling and assessment of air pollutants in New South Wales* (EPA 2022) sets out impact assessment criteria for principal toxic air pollutants, as defined in the Protection of the Environment Operations (Clean Air) Regulation 2022 (Clean Air Regulation).

The *Approved methods for the modelling and assessment of air pollutants in New South Wales* states that principal toxic air pollutants must be minimised to the maximum extent achievable through the application of best-practice process design and/or emission controls (EPA 2022).

2. Dioxins and furans

Dioxins and furans are families of cyclic organic chemicals. The toxic ones contain chlorine and in popular usage the term 'dioxins and furans' is applied in the environmental context to the many chlorine-containing compounds in these families.

Dioxins have been shown to be extremely toxic to humans, but they are only found in the environment in very small (trace) quantities. The concentrations usually found are a million or more times less than other common air pollutants in the atmosphere. The toxicity of the many forms of dioxin/furan varies widely and therefore, test results are converted to a toxic equivalent (TEQ) value, based on accepted ratios of toxicity of the family members to the most toxic member: 2,3,7,8 tetrachloro dibenzo-p-dioxin (usually called simply 'TCDD'). The corresponding furan is 'TCDF' or 2,3,7,8 tetrachloro-dibenzo-furan.

2.1 Sources of dioxins and furans

Dioxins and furans can be formed in many combustion processes where organic materials and chlorine-containing materials (e.g. PVC products) are present. Given the ubiquitous distribution of these materials in nature, it is not surprising that trace quantities of dioxin can be found in many situations involving traditional forms of burning.

Burning of biomass such as in bushfires, metallurgical processing (ferrous and non-ferrous), burning of wastes, and accidental fires, emerge as the 4 largest categories of dioxin emissions in Australia. For local councils, domestic solid fuel burning and operations such as cremation are dioxin sources warranting close attention.

For further information on crematoria emissions, see the Local Government Air Quality Toolkit – *Crematoria emissions guidance note*. Also see the Local Government Air Quality Toolkit – *Neighbourhood smoke guidance note*.

2.2 Addressing dioxins in Australia

In October 2005 a *National action plan for addressing dioxins in Australia* was released (EPHC 2005). This plan aimed to address Australia's obligations under the Stockholm Convention on Persistent Organic Pollutants (POPs), which entered into force in 2004 (Stockholm Convention 2019).

On the basis that dioxin concentrations in Australia appear to be low, the plan places emphasis on the following management strategies:

- enshrining the widely used emission standard of 0.1 ng TEQ/m³ as a national combustion emission limit
- reducing emissions from burning of wood fuels
- better understanding emissions from bushfires (the major source in Australia)
- adopting the Stockholm Convention best-practice guidelines for assessing proposals for new and upgraded facilities in Australia.

3. Considerations for local councils

Local councils will not often be required to make decisions about or regulate emissions of toxic air pollutants, other than those already covered by the existing National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM), or those in relation to minimising odours or smoke emissions (e.g. from spray painting, coating or domestic solid fuel burning).

Local councils should consider obtaining expert advice if they need to consider an emission involving toxic pollutants, and an air quality assessment involving atmospheric dispersion modelling will almost certainly be required.

3.1 Ambient design criteria for some toxic air pollutants

A list of ambient design criteria for air toxics has existed in Victoria since 1980. The 2001 revision of this list has been adopted in the *Approved methods for the modelling and assessment of air pollutants in NSW* (EPA 2022). It covers 90 chemicals and related substances, both inorganic and organic. These are relevant to the assessment of all sources of air pollution in New South Wales, including non-scheduled premises.

3.2 Emission limits for some toxic air pollutants

The Clean Air Regulation sets emission limits for some principal toxic air pollutants, including dioxins and furans at scheduled premises. There are no emission limits for toxic pollutants at non-scheduled premises in New South Wales.

4. References and other resources

All documents and webpages that are part of the Local Government Air Quality Toolkit are available from the EPA website.

Department of the Environment and Heritage (2005) *Dioxins in Australia: a summary of the findings of studies conducted from 2001 to 2004*, Australian Government Department of the Environment and Heritage, Canberra ACT, www.dcceew.gov.au/environment/protection/publications/dioxins-australia-summary-findings-studies-conducted-2001-2004#daff-page-main.

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