

REGULATORY AND NON-REGULATORY SOLUTIONS TO AIR QUALITY PROBLEMS IN MOUNT GAMBIER, AUSTRALIA

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INTRODUCTION

Air quality in Mount Gambier exceeds the health-based national standard for particles less than 10 microns in size. Exposure to fine particles is associated with adverse health effects, such as an increase in daily mortality or hospital admissions for respiratory or cardiovascular disease [1].

Through a review of current air quality legislation, the South Australian Environment Protection Authority (EPA) is considering developing several regulatory tools to coordinate the management of traditional industry emissions and address several sources not previously managed by the EPA. To complement this strategy several non-regulatory mechanisms supporting administration of the *Environment Protection Act 1993* (the Act) are being implemented.

MOUNT GAMBIER REGION

Mount Gambier is South Australia's largest regional city, and is located in the south east corner of the state. The city is surrounded by a mixture of intensive agricultural and plantation forestry industries.

Mount Gambier has a cooler Mediterranean-type climate characterised by warm dry summers (summer day temperatures of 16–42°C) and cool wet winters (daytime temperature ranging from –2°C to 20°C). The annual average rainfall for the city is 709.5 mm [2].

Although there is a range of smaller industry activities within the city area, the processing and management of plantation timber products is the largest industry in Mount Gambier—employing 25% of the regional workforce [3]. The processing of this plantation timber is geographically focused near Mount Gambier, with all the processing facilities within 35 kilometres of the city. These processing facilities contribute significant particle emissions into the Mount Gambier airshed.

A significant proportion of homes in Mount Gambier rely primarily on solid fuel home heating with wood as the main fuel. This, together with the continued practice of backyard burning within and around the city, also adds significant particles to the airshed from domestic sources.

In the rural area surrounding the city, burning in the open is a common practice for removing excessive vegetation. This includes burning residue materials left over after the harvesting of plantation forests and broadacre crops.

CURRENT REGULATION OF AIR QUALITY IN MOUNT GAMBIER

Three tiers of government in Australia—national, state and local—have responsibilities relating to air quality management. The interaction between these different levels of government adds complexity to air quality management and regulation.

NATIONAL AIR QUALITY STANDARDS

In June 1998, the National Environment Protection Council (NEPC), representing all states and territories and the Australian Government, agreed to set uniform standards for ambient air quality. These standards were the first step in establishing a consistent approach to managing air quality across Australia with the aim of providing equivalent protection to all Australians no matter where they live [4].

The National Environment Protection Measure (NEPM) for Ambient Air Quality (Ambient Air Quality NEPM) sets a 24-hour standard of $50 \mu\text{g}/\text{m}^3$ for particles less than 10 microns in size (PM_{10}), with an associated maximum goal of five exceedences per annum in major population centres by 2008 [5].

In 2003, the NEPM was amended to include a 24-hour advisory reporting standard for $\text{PM}_{2.5}$ of $25 \mu\text{g}/\text{m}^3$, with an annual average standard of $8 \mu\text{g}/\text{m}^3$. The goal associated with the $\text{PM}_{2.5}$ standard is to gather sufficient data nationally to facilitate a review of the standard scheduled to commence in 2005 [5].

The South Australian Government has an statutory obligation to establish strategies to achieve the standards set out in the Ambient Air Quality NEPM by 2008.

STATE

Each state and territory of Australia is responsible for developing legislation to manage their environment, as long as the laws are not inconsistent with Australian Commonwealth legislation. In South Australia, the *Environment Protection Act 1993* (the Act) places a general environmental duty on all persons undertaking an activity that pollutes, requiring them to take all reasonable and practicable measures to prevent or minimise any resulting environmental harm.

Subordinate to the Act, air pollution from point sources is regulated through the *Environment Protection (Air Quality) Policy 1994* (Air Policy). This policy principally places an obligation on the occupier of premises not to emit air pollution from a stack above specified levels.

The EPA generally administers and enforces the Act and is responsible for delivering the national standards at the state and local level.

LOCAL GOVERNMENT

Local governments in South Australia deliver a range of planning, community and environmental services at the local level. These responsibilities include traditional public and environmental health issues under various legislation covering local issues such as food safety, insanitary conditions and general environmental nuisance.

The State Government is working with local authorities to encourage greater enforcement of the Act by local government officers. Largely due to resource

implications, this sharing of responsibilities has yet to be adopted by all local governments in South Australia.

CURRENT AIR QUALITY IN MOUNT GAMBIER

A monitoring campaign to assess ambient air quality in Mount Gambier was conducted from September 2001 to August 2002. The EPA collected air quality data from a central location within the city (Frew Park) and used a mobile air monitoring unit to conduct two hotspot monitoring programs in the vicinity of the major wood processing plants during the winter of 2002 [2].

Real time PM₁₀ concentrations were sampled at the Frew Park site and two hotspot sites using a Tapered Element Oscillating Microbalance (TEOM).

Particle levels sampled at the Frew Park site are presented in Figure 1. This data was adjusted using the National Temperature Adjustment outlined in Technical Paper 10, which was developed by the Commonwealth Science and Industry Research Organisation (CSIRO) to support the Ambient Air Quality NEPM [6].

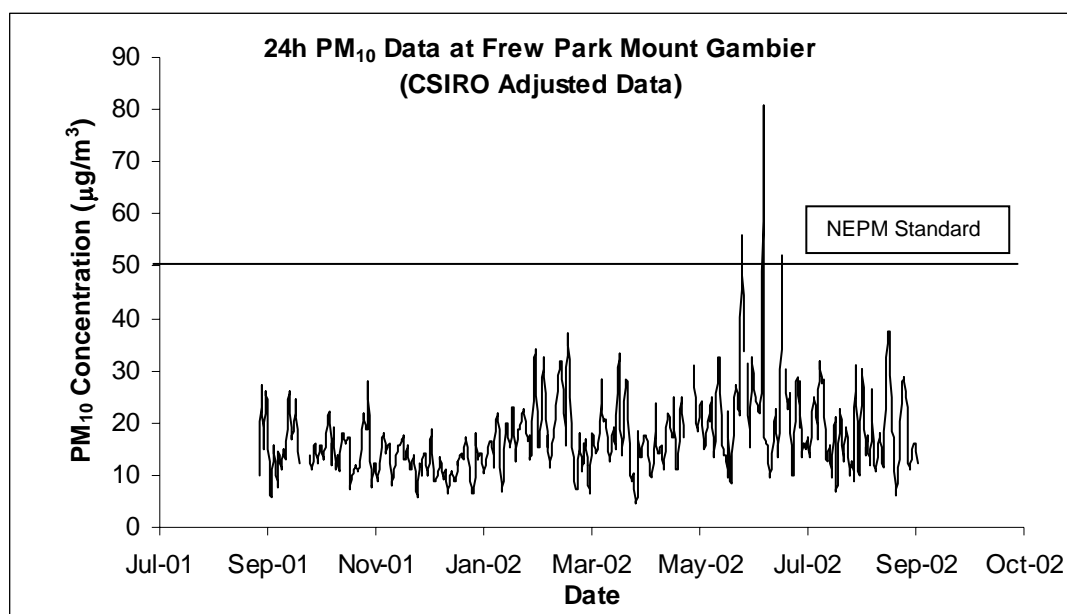


Figure 1: PM₁₀ data collected in Mount Gambier (Frew Park)

At the Frew Park site, the adjusted data exceeded the numerical PM₁₀ standard cited in the Ambient Air Quality NEPM on three occasions. One of the hotspot sites recorded two exceedences of the NEPM standard, but the other site recorded no exceedences.

Technical paper no 10 outlines four methods for adjusting PM₁₀ data collected using a TEOM. In addition to the National Temperature Adjustment, data may be adjusted using site specific adjustments developed from 24-hour sampling using a collocated High Volume Sampler [7].

At the Frew Park site a collocated High Volume Sampler was located adjacent to the TEOM but, due to quality control issues, this method could not be uniformly applied with confidence. An initial assessment indicates, however, that up to 12

exceedences may have occurred during the monitoring period if the TEOM data was adjusted using site specific data.

REVIEW OF AIR QUALITY MANAGEMENT IN MOUNT GAMBIER

The results of ambient air monitoring indicate that particle levels in Mount Gambier occasionally exceed the health based numerical PM₁₀ standard. With the primary source of particles arising from combustion sources, and the uncertainty regarding the correction of the PM₁₀ data, air quality in the Mount Gambier area could currently be exceeding the goal in the Ambient Air Quality NEPM.

There is a diverse range of emission sources within Mount Gambier and the surrounding region. This requires an integrated approach to managing the issues incorporating both regulatory and non-regulatory instruments.

REGULATORY INSTRUMENTS

The EPA has initiated a process to review the current *Environment Protection (Air Quality) Policy 1994*. The current Air Policy is mainly focused on managing and monitoring stack emissions from factories. While this remains an important issue, the diversity of sources contributing to elevated particle levels in Mount Gambier demonstrates the need to extend the scope of the policy. One of the proposed management tools is the designation of an Air Quality Control Region (AQCR).

In an area where a number of sources contribute to elevated pollution levels, there are clear benefits in coordinating the management of air pollution sources. Based on establishing a carrying capacity for the airshed, an AQCR enables the EPA to:

- require further reductions in emissions from sources within the control region
- seek emission offsets before approving the development of large new sources in control regions
- provide for development of air quality improvement plans.

The principle is based on the Victorian State Government's *State Environment Protection Policy (Air Quality Management) 2002*. In this model the area covered by the AQCR is defined by topography, climatology (and meteorology), population distribution, major emission sources, and the region's air quality [8]. This enables the emission limits, emission offsets and any other tailored regulation for the region to be formalised in the policy, and supporting strategies to be designated through an Air Quality Management Plan.

There are two particle sources that have not been traditionally regulated by the EPA but have the potential during the winter months to contribute significant levels to the region. These are agricultural stubble burning and the burning of forestry residue.

Unlike the other commercial sources of particles, these industries have largely relied on self-regulation. Whilst a recent assessment has identified circumstances when ongoing use of these practices may be required, it has also identified that the frequency and way in which these activities are undertaken can adversely affect the resulting emissions [9].

A mechanism exists under environment protection policies to establish codes of practice detailing ways in which the environmental impact of specific industries or

activities can be minimised. Therefore, whilst the codes are developed in partnership with industry, their inclusion in the Air Policy means they can be enforced by the state or local government.

Both the Air Quality Control Region for Mount Gambier and codes of practice for agricultural stubble burning and the burning of forestry residue are being integrated into the review of the Air Policy.

Finally, continued local government involvement in environmental regulation aims to build on the success of a trial to share responsibility for regulation of small and domestic activities under the Act. New administrative arrangements are being pursued to provide a mechanism for local government to recover the costs of addressing breaches of the Act.

NON-REGULATORY INSTRUMENTS

The review of air quality issues in Mount Gambier has identified several non-regulatory options that could assist in the regulation of small scale and domestic sources of pollution. These include community behaviour change programs aimed at woodheaters users.

In Mount Gambier, approximately 33% of households rely primarily on solid fuel home heating. Although gas supply infrastructure is available throughout the city, the availability of wood and the historic construction of houses with solid fuel heaters indicate that solid fuel heaters will continue to be a major form of home heating in the city.

A significant campaign is currently being run through the local media and local government to educate users in ways to reduce woodheater emissions. Whilst this form of heating is still an economic option, the management campaign encourages local government to respond to specific complaints and to educate users in ways to minimise their impacts. More advanced community behaviour change programs are being considered to improve woodheater practices and reduce emissions.

INTEGRATION UNDER AN AIR QUALITY MANAGEMENT PLAN

The review of air quality legislation in South Australia has provided an opportunity to further assess and integrate air quality management in the Mount Gambier region. Further, the development of legislation and other administrative and community behaviour change programs will be integrated under a regional Air Quality Management Plan.

The Management Plan will contain mechanisms to assess the effectiveness of programs to manage air quality. Monitoring and evaluation of the programs and particle levels in the air shed will guide any modification of programs or approaches that have been undertaken.

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