



## Air Quality Monitoring in Perth Region

### Purpose

The purpose of this Fact Sheet is to provide information on air quality monitoring that is undertaken by the Department of Environment Regulation (DER) in the Perth Metropolitan Region.

### Introduction

Air quality monitoring is undertaken by DER at a number of metropolitan and regional centres within Western Australia in accordance with the National Environment Protection (Ambient Air Quality) Measure (NEPM).

DER is responsible for the operation and maintenance of 13 air quality monitoring sites in Western Australia. This includes eight sites within the Perth Metropolitan Region at Caversham, Duncraig, Quinns Rocks, Rolling Green, Rockingham, South Lake, Swanbourne and Wattleup.

#### Key Points - Air Quality in Perth

- Air quality in Perth is considered good on most days, although some poor air quality events occur in any given year.
- Poor air quality events have been primarily attributed to prescribed fire hazard reduction burns, bushfires or wind borne dust.
- Monitoring will continue in accordance with NEPM as the national standard.
- Future monitoring sites are proposed for Perth CBD and Mandurah during 2017.

### Our Monitoring

Air quality pollutants that are monitored in the Perth Metropolitan Region include:

- Carbon monoxide – a gas found in air that can be harmful to humans, with the main source attributed to motor vehicles and industrial activities.

- Photochemical oxidants (as Ozone) – the principal component of a mixture of air pollutants commonly known as ‘photochemical smog’. It can be harmful to humans and is formed through a complex reaction between sunlight and air pollutants (volatile organic compounds and nitrogen oxides). Sources of air pollutants include industrial activities, motor vehicles and bushfires.
- Nitrogen dioxide – a gas found in air that contributes to ‘photochemical smog’ which can be harmful to humans. Sources include motor vehicles and industrial activities.
- Sulfur dioxide – a gas found in air that reacts to form compounds such as sulfuric acid, sulphurous acid and sulfate particles which can be harmful to humans. Sources include industrial activities and the processing of some minerals ores that contain sulfur.
- Particulate matter – includes particulate matter found in air that is less than 10 micrometres in diameter (PM<sub>10</sub>) and less than 2.5 micrometres in diameter (PM<sub>2.5</sub>). It contains small particles that can be harmful to humans and can be attributed to industrial activities as well as natural sources such as bushfires, dust storms and pollen.

### Air Quality Criteria

The NEPM provides a number of criteria for pollutants. Table 1 details the air quality pollutants and the maximum concentration standards, which are used to assess ambient air quality to protect human health and wellbeing.

**Table 1. Air Quality Particle Criteria**

Pollutant	Averaging Period	Maximum concentration (parts per million or micrograms per cubic metre)
Carbon monoxide	8 hours	9.0 ppm
Nitrogen dioxide	1 hour	0.12 ppm
	1 year	0.03 ppm
Photochemical oxidants (as Ozone)	1 hour	0.10 ppm
	4 hours	0.08 ppm
Sulfur dioxide	1 hour	0.2 ppm
	1 day	0.08 ppm
	1 year	0.02 ppm
Lead*	1 year	0.5 µg/m <sup>3</sup>
Particle Matter as PM <sub>10</sub>	1 day	50 µg/m <sup>3</sup>
	1 year	25 µg/m <sup>3</sup>
Particle Matter as PM <sub>2.5</sub>	1 day	25 µg/m <sup>3</sup>
	1 year	8 µg/m <sup>3</sup>

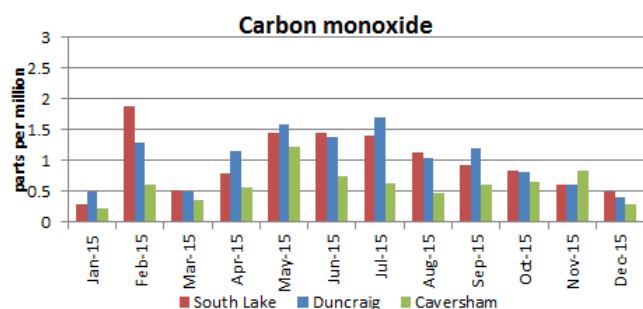
\*Lead has not been monitored since 2001 as the average lead level in Perth was very low at less than 5% of the NEPM Standard.

## Carbon Monoxide

Three sites – namely Caversham, Duncraig and South Lake, measure carbon monoxide in the Perth Metropolitan Region.

Figure 1 shows that in 2015, carbon monoxide levels in Perth continued to remain low attaining around 21 per cent of the NEPM standard (9.0 ppm).

The highest concentration for 2015 of 1.9 ppm was measured at South Lake in February 2015.



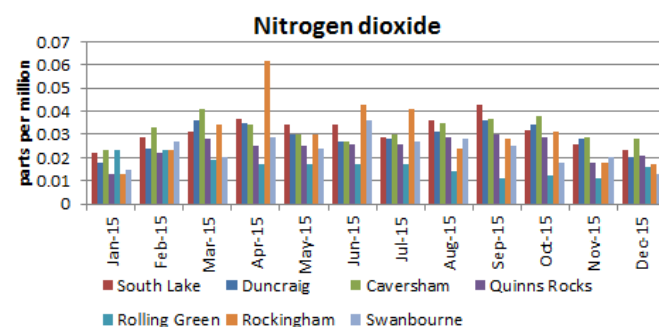
**Figure 1. Maximum eight hour averaged carbon monoxide concentrations measured every month at a range of sites**

## Nitrogen Dioxide

Seven sites – namely Caversham, Duncraig, Quinns Rock, Rockingham, Rolling Green, South Lake and Swanbourne, measure nitrogen dioxide in the Perth Metropolitan Region.

Figure 2 shows that in 2015, nitrogen dioxide levels in Perth remained low, attaining around 52 per cent of the NEPM standard (0.12 ppm).

The highest concentration in 2015 of 0.062 ppm was measured at Rockingham in April 2015.

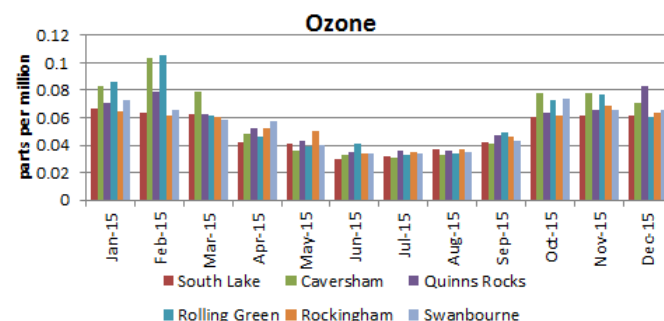


**Figure 2. Maximum one hour averaged nitrogen dioxide concentrations measured every month at a range of sites**

## Ozone

Six sites – namely Caversham, Quinns Rock, Rockingham, Rolling Green, South Lake and Swanbourne, measure Ozone in the Perth Metropolitan Region.

Figure 3 shows that in February 2015, one hour averaged ozone slightly exceeded the NEPM standard of 0.1 ppm at Caversham (0.103 ppm) and Rolling Green (0.105 ppm). These two exceedences in February 2015 can be attributed to bushfires south of Perth.

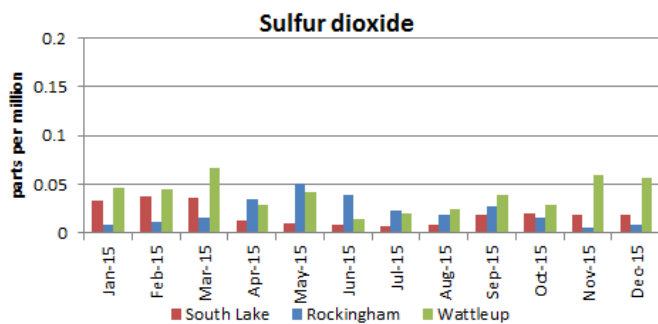


**Figure 3. Maximum one hour averaged ozone concentrations measured every month at a range of sites**

## Sulfur Dioxide

Three sites - namely South Lake, Rockingham and Wattleup, measure sulfur dioxide in the Perth Metropolitan Region.

Figure 4 shows that in 2015, sulfur dioxide levels in Perth remained low with the maximum level recorded at Wattleup of 0.067 ppm in March 2015. This represents around 34 per cent of the NEPM standard (0.2 ppm).

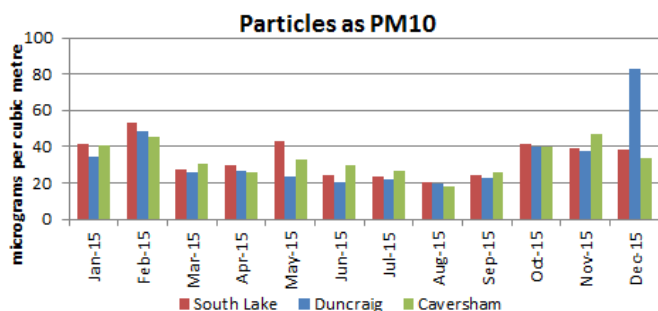


**Figure 4. Maximum one hour averaged sulphur dioxide concentrations measured every month at a range of sites**

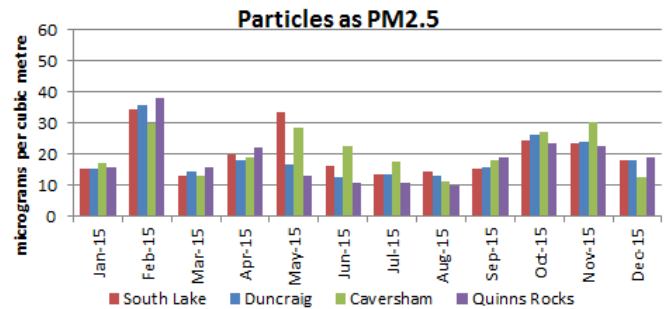
## Particle Matter

Three sites - namely Caversham, Duncraig and South Lake, measure PM<sub>10</sub>. These sites, together with Quinns Rocks, also measure PM<sub>2.5</sub> within the Perth Metropolitan Region.

Figures 5 and 6 show that in 2015, there were occasional exceedences to the NEPM standard of PM<sub>10</sub> (50 µg/m<sup>3</sup>) and PM<sub>2.5</sub> (25 µg/m<sup>3</sup>).



**Figure 5. Maximum daily averaged PM<sub>10</sub> particle concentrations measured every month at a range of sites**



**Figure 6. Maximum daily averaged PM<sub>2.5</sub> particle concentrations measured every month at a range of sites**

Other than the maximum PM<sub>10</sub> concentration reached in December at Duncraig (a recording of 82.7 µg/m<sup>3</sup> which was caused by heavy machinery working in the vicinity of the monitoring site), all other exceedences were a result of prescribed fire hazard reduction burns or bushfire events.

## Future Monitoring in Perth

New monitoring sites are scheduled for 2017 in Perth Central Business District and Mandurah. In addition, Quinns Rock monitoring is proposed to be expanded in 2019/20 to include PM<sub>10</sub>.

### Particles Explained

Airborne particles are commonly classified by size in terms of their equivalent aerodynamic diameter (EAD). An EAD is the diameter of a spherical particle of density 1 gram per cubic centimeter (the same density as water) which exhibits the same aerodynamic behavior as the particle in question. Particles are sampled and described on the basis of their EAD but usually simply called the particle size.

PM<sub>10</sub> particles are any substances that have an EAD less than or equal to 10 micrometres in diameter. PM<sub>2.5</sub> are any substances that have an EAD less than or equal to 2.5 micrometres in diameter. Particles in this size range make up a large portion of dust that can be drawn into the lungs. Larger particles tend to be trapped in the nose, mouth or throat<sup>1</sup>.

The important thing to note is that PM<sub>10</sub> and PM<sub>2.5</sub> is not one particular substance, but simply a classification of particle or dust size.

<sup>1</sup> [National Pollutant Inventory, Particulate matter \(PM<sub>10</sub> and PM<sub>2.5</sub>\)](#)

## More Information

For advice on the Regulations, or related matters, please contact Licensing and Approvals on 6467 5000.

This document is available in alternative formats and other languages on request.

## Related Documents

Additional publications about Air Quality are available online from

[www.der.wa.gov.au/airquality](http://www.der.wa.gov.au/airquality) or can be requested by phoning 6467 5000.

## Legislation

This document is provided for guidance only. It should not be relied upon to address every aspect of the relevant legislation. Please refer to the State Law Publisher (SLP) for copies of the relevant legislation, available electronically from the SLP website at [www.slp.wa.gov.au](http://www.slp.wa.gov.au).

## Document Versions

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The information provided to you by DER in relation to this matter does not constitute legal advice. Due to the range of legal issues potentially involved in this matter, DER recommends that you obtain independent legal advice.