



Air Monitoring Report for South Australia 2011

Compliance with the National Environment Protection (Ambient Air Quality) Measure

June 2012

**Air Monitoring Report for South Australia 2011:
Compliance with the National Environment Protection (Ambient Air Quality)
Measure, June 2012**

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EXECUTIVE SUMMARY

South Australia's monitoring results for 2011 indicated that:

- The Adelaide region complied with all Ambient Air Quality (AAQ) NEPM standards with 24-hour PM₁₀ compliance not demonstrated at the Kensington site
- The Spencer region complied with all but the 1-hour SO₂ standard.
- In 2011 the AAQ NEPM goals were met for all substances at all NEPM monitoring sites except for sulfur dioxide at Port Pirie (not met) and PM₁₀ at Kensington (not demonstrated). There was average to above average rainfall around South Australia in 2011 (Bureau of Meteorology, 2012) which would have affected pollutant concentrations, especially particle concentrations. The EPA conducts monitoring at non-NEPM sites not reported in this document.
- Data capture rates above 81% per quarter and 87% per annum were achieved at all sites during the 2011 reporting year, with the exception of Kensington where PM₁₀ monitoring was recommenced in September 2011 after being discontinued in November 2009. This resulted in low data capture rates for both the third quarter and the year at this site.
- Air quality in the Adelaide airshed was generally good during 2011 and the AAQ NEPM goals were met for all pollutants at all five monitoring stations in this area.
 - There were no exceedences of the CO, NO₂, O₃, SO₂ PM₁₀ or PM_{2.5} standards at any of the metropolitan ambient air monitoring stations.
- Air quality in the Spencer airshed was reasonably good during 2011 and the AAQ NEPM goals were met for all parameters (PM₁₀, SO₂ and Pb) at all 3 monitoring stations except the 1-hour SO₂ goal at Port Pirie.
 - There were only 2 exceedences of the 24-hour PM₁₀ standard in the Spencer region, 1 each at Port Pirie and Whyalla.
 - In Port Pirie, exceedences of the 1-hour SO₂ standard were recorded on fifty six occasions and on forty days. However there were no exceedences of the 1-day or 1-year standards for SO₂.
 - The AAQ NEPM goal for lead was met at both NEPM monitoring stations in Port Pirie.
- Pollutant levels in Adelaide are generally either remaining steady or appear to be decreasing with the exception of ozone. In the Spencer region sulfur dioxide levels could be increasing. PM₁₀ levels in both Adelaide and the Spencer region increased initially but have dropped again in the last couple of years.
- Development of monitoring stations continues in order to meet the jurisdictional requirements for air monitoring. Planning is in progress for:
 - A station located in the Central Business District of Adelaide
 - A station located in the north-west metropolitan area.

SECTION A - MONITORING SUMMARY

Air quality in South Australia is monitored in accordance with a monitoring plan (SA EPA, 2001) developed under the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) (NEPC, 2003). This report assesses compliance with this measure.

Current performance monitoring stations

The AAQ NEPM requires the assessment of carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), lead (Pb) and particles less than 10 micrometres effective aerodynamic diameter (PM₁₀). In 2003, the AAQ NEPM was varied to include monitoring of particles less than 2.5 micrometres effective aerodynamic diameter (PM_{2.5}) (NEPC, 2003).

South Australia's AAQ NEPM air monitoring plan was approved by the NEPC in 2001. Data presented in this report have been produced in accordance with the plan (SA EPA, 2001), which details the stations where air pollutants are measured. Five regions have been identified in the monitoring plan: Adelaide, Spencer, Mount Gambier, Riverland and Barossa. Monitoring is currently being undertaken within the Adelaide and Spencer airsheds. Campaign monitoring for PM₁₀ and PM_{2.5} was conducted in Mount Gambier during winter 2011, the final year of the program. As this was not a full year of monitoring it has not been included in this compliance report.

Performance monitoring stations (PMS) are designated as either trend or campaign stations depending on the intended duration of monitoring. Trend stations are chosen to monitor pollutant levels over an extended period. Campaign sites are chosen as part of a screening program and may only operate for a short period if the pollutant levels do not warrant ongoing measurement. Figure 1 shows the current monitoring stations and population density in the Adelaide region and figure 2 shows current monitoring stations and population density in the Spencer region. The monitoring stations within the Adelaide region represent an exposed population of 1,020,675 and monitoring within the townships of Pt Pirie and Whyalla represent an exposed population of 34,324. Population data are based on collection districts from the 2006 census (ABS, 2008).

Additions to the monitoring network

The EPA made no additions to the NEPM monitoring network in 2011.

Table 1 below provides a summary of each performance monitoring station that was operating during the 2011 reporting year. Station location, type, exposed population and pollutants monitored have been included. Table 2 lists the methods used for monitoring the NEPM pollutants and Table 3 describes each station's compliance with siting criteria set out in AS/NZS 3580.1.1:2007.

NATA status

The South Australian Environment Protection Authority operates all monitoring stations described in this report. Although quality systems are in place, the EPA doesn't have accreditation for its laboratory.

Table 1 Summary of current performance monitoring stations in South Australia

REGION	Location category	site type	AAQ NEPM pollutants measured						
			CO	NO ₂	O ₃	SO ₂	Pb	PM ₁₀	PM _{2.5}
ADELAIDE									
ELI01 - Elizabeth Downs	Res	G/Trend	X	X	X			X	
NOR01 - Northfield	Res	G/Trend		X	X	X			
NET01 - Netley	Res/LI	G/Trend		X	X			X	X
KEN01 - Kensington Gardens	Res	G/Trend		X	X			X	
CHD01 - Christie Downs	Res	G/Trend		X	X			X	
SPENCER									
PTP01 - Pt Pirie Oliver Street	Res/I	G/Trend				X	X	X	
PTP05 - Pt Pirie Frank Green Park	Res/I	G/Trend					X		
WHY07 - Whyalla Schulz Park	Res/I	G/Trend						X	

Res Residential
 LI Light industrial
 I Industrial
 G Generally representative upper bound

Table 2 Methods used for monitoring the NEPM pollutants

Pollutant		Standard	Title	Method Used
Carbon monoxide	CO	AS3580.7.1 - 1992	Determination of Carbon Monoxide-Direct Reading Instrumental method	Gas filter correlation infrared
Nitrogen dioxide	NO ₂	AS3580.5.1 - 1993	Determination of Oxides of Nitrogen - Chemiluminescence Method	Chemiluminescence
Ozone	O ₃	AS3580.6.1 - 1990	Determination of Ozone- Direct Reading Instrumental Method	Ultraviolet photometry
Sulfur dioxide	SO ₂	AS3580.4.1 - 1990	Determination of Sulfur Dioxide-Direct Reading Instrumental Method	Ultraviolet fluorescence
Particles	PM ₁₀	AS3580.9.8 - 2001	Determination of Suspended Particulate Matter- PM ₁₀ Continuous Direct Mass Method using a Tapered Element Oscillating Microbalance Analyser	TEOM
	PM _{2.5}	AS3580.9.8 - 2001	Determination of Suspended Particulate Matter- PM ₁₀ Continuous Direct Mass Method using a Tapered Element Oscillating Microbalance Analyser [#]	TEOM
Lead	Pb	AS2724.3 - 1984	Determination of Suspended Particulate Matter- Total Suspended Particulate Matter (TSP) - High Volume Sampler (HVS) Gravimetric Method	Gravimetric
	Pb	AS2800 - 1985	Determination of particulate lead-High Volume Sampler Gravimetric Collection- Analysis is modified to use Inductively Coupled Plasma	Sampling as per standard and analysis by inductively coupled plasma optical emission spectroscopy (ICP-OES)

[#] With reference to PM_{2.5} in place of PM₁₀ and minor modifications to adapt the Standard for the purposes of PM_{2.5} monitoring as set out in *Technical Paper on Monitoring for Particles as PM_{2.5}* (NEPC, 2003)

Uncertainty of Measurement

The expanded uncertainties of measurements (U95) quoted below are at a confidence level of 95% with a coverage factor of 2. The values shown do not include any estimate of the effects associated with the sampling location.

Carbon monoxide	U95= ±0.66 ppm @ 9.0 ppm
Nitrogen oxides	U95= ±0.045 ppm @ 0.120 ppm
Ozone	U95= ±0.005 ppm @ 0.100 ppm
Sulfur dioxide	U95= ±0.011 ppm @ 0.200 ppm
Lead*	U95= ±0.09 µg/m ³ @ 5 µg/m ³ **
PM10	U95= ±1.5 µg/m ³ for 1hr average
PM2.5	Using TEOM with PM10 inlet and VSCC PM2.5 cut-off

* Analysis by Queensland Health Scientific Services, NATA accreditation # 41

** This value does not include the uncertainty of the analysis by Q.H.S.S.

Table 3 Stations' siting compliance with AS 3580.1.1:2007

Region Station	Location Category	Comments	Height Above Ground	Min. distance to support structure	Clear Sky Angle of 120°	Unrestricted Airflow 270/360	20m From Trees	No Boiler or Incinerators Nearby	Min Distance from Road or Traffic
Adelaide									
ELI01 - Elizabeth Downs	Res		✓	✓	✓	✓	✗	✓	✓
NOR01 - Northfield	Res		✓	✓	✓	✓	✗	✓	✓
NET01 - Netley	Res/LI	Heavy traffic	✓	✓	✓	✓	✓	✓	✓
KEN01 - Kensington Gardens	Res	30 m-high gums @ 10 m, but clear aspect—thin, high canopy	✓	✓	✗	✗	✗	✓	✓
CHD01 - Christie Downs	Res		✓	✓	✓	✓	✓	✗	✓
Spencer									
PTP01 - Pt Pirie Oliver Street	Res/I	Type 2	✓	✓	✓	✓	✓	✓	✓
PTP05 - Pt Pirie Frank Green Park	Res/I	Type 2	✓	✓	✓	✓	✓	✓	✓
WHY07 - Whyalla Schulz Park	Res/I	Type 2	✓	✓	✓	✓	✓	✓	✓

Res- Residential

LI- Light industrial

I- Industrial

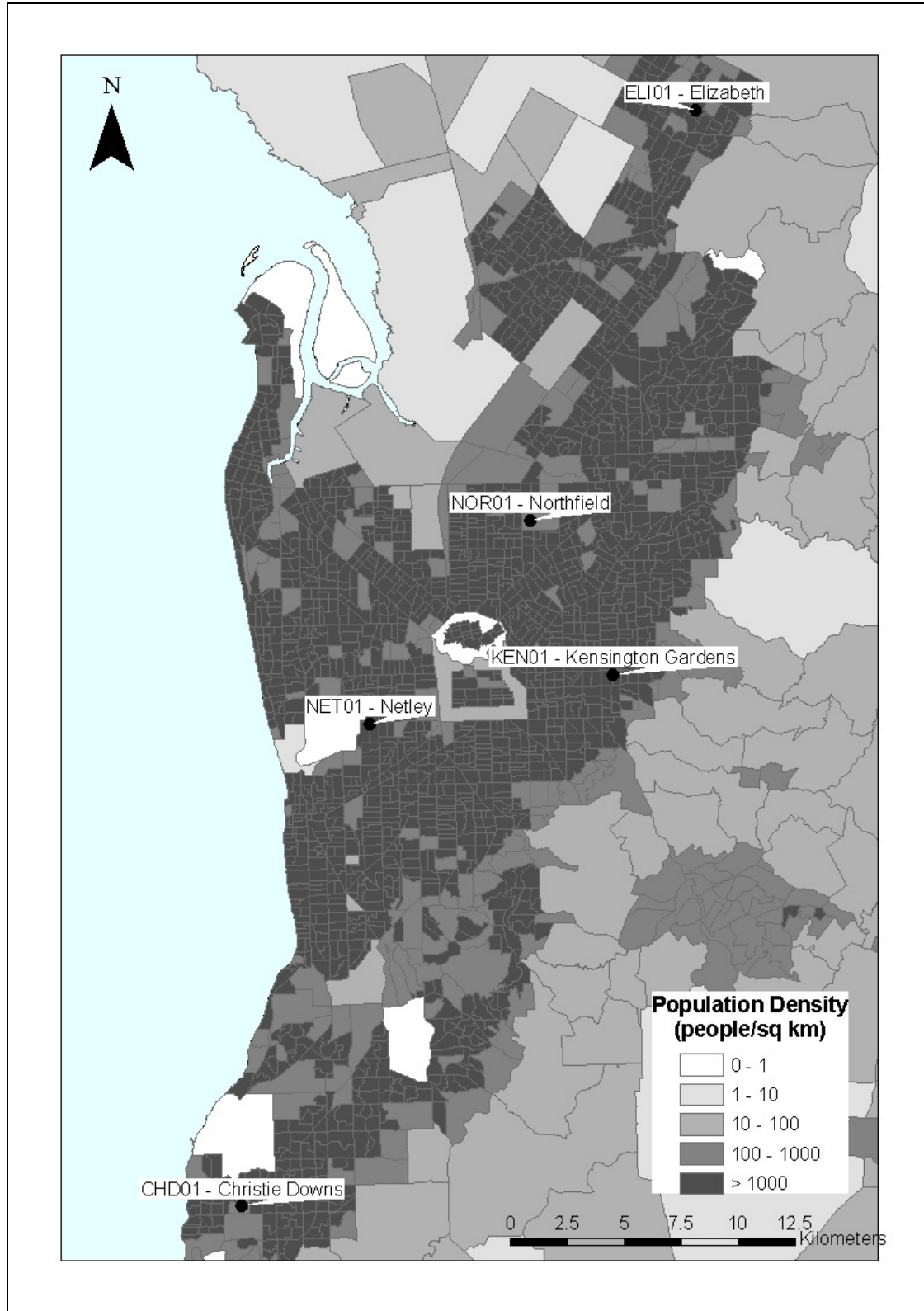


Figure 1 Population density of the Adelaide region based on the 2006 census (Australian Bureau of Statistics 2008) showing current monitoring sites.

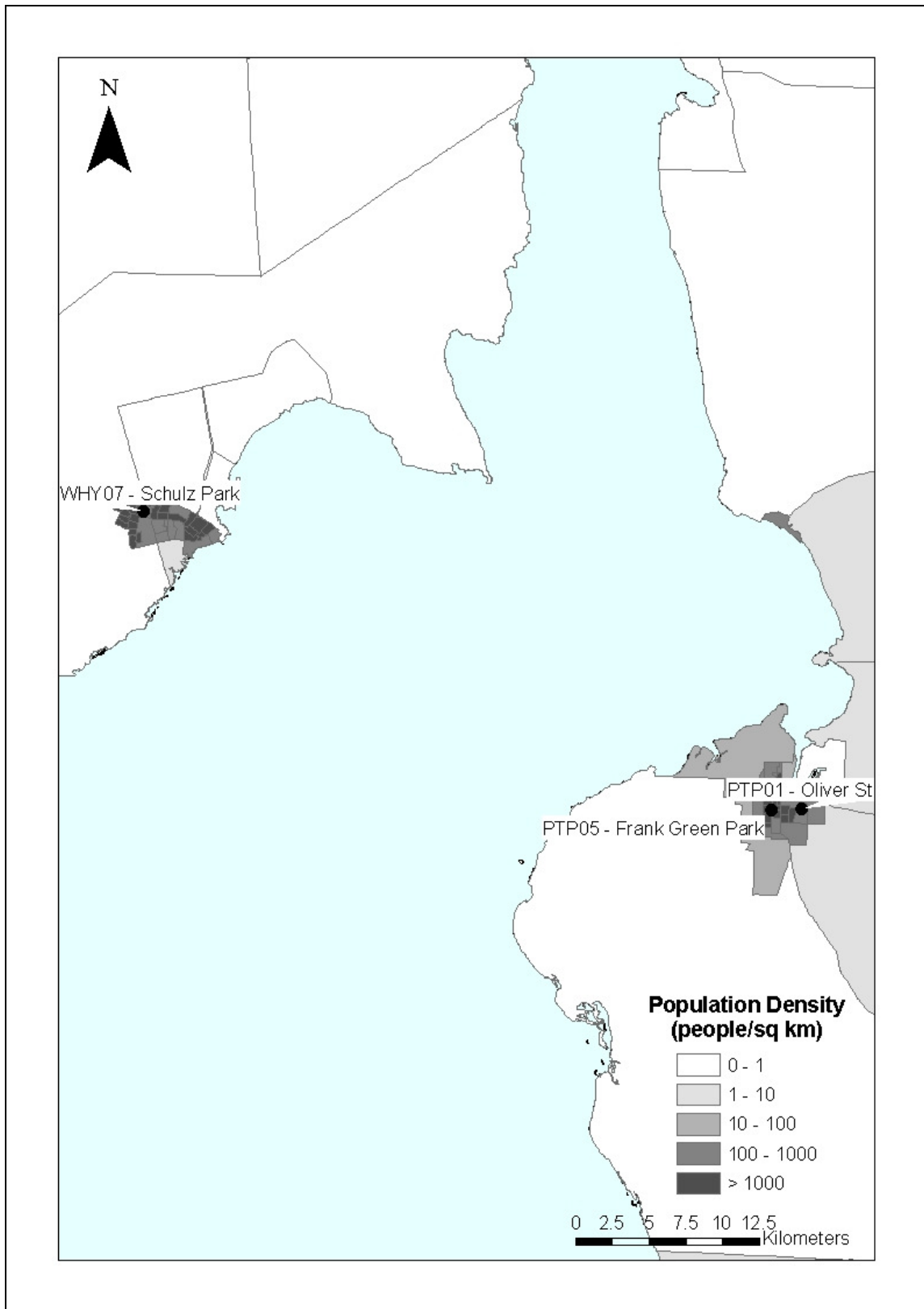


Figure 2 Population density of the Spencer region based on the 2006 census (Australian Bureau of Statistics 2008) showing current monitoring sites.

SECTION B - ASSESSMENT OF COMPLIANCE WITH STANDARDS AND 2011 GOAL

Tables 4 to 10 provide information for compliance assessment required under the AAQ NEPM. The AAQ NEPM standards and goals are specified in Schedule 2 of the NEPM. The AAQ NEPM goal is to achieve the standards to the extent specified.

Performance is assessed as meeting the standards and goal if the number of exceedences of the standard are no more than the number specified in Schedule 2 of the AAQ NEPM (NEPC, 2003), and data recovery were at least 75% in each quarter of the year (NEPC PRC, 2001).

If insufficient data are collected to demonstrate that the standards and goal have or have not been met, performance is assessed as 'not demonstrated' (NEPC, 2003).

Calculations and reporting methods used, comply with requirements detailed in the NEPC Peer Review Committee, Technical Paper No 8: Annual Reports (NEPC PRC, 2010).

PM₁₀ data reported as 'TEOM data' indicate data which have undergone an internal correction factor for US EPA equivalency but without subsequent treatment, as specified in Option 4 of PRC technical paper No 10 - Collection and Reporting of TEOM PM₁₀ Data (NEPC PRC, 2001).

Carbon monoxide

Table 4 2011 compliance summary for CO in South Australia

AAQ NEPM Standard
9.0 ppm (8-hr average)

Region performance monitoring station/s	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Adelaide							
ELI01- Elizabeth Downs	95.3	86.5	95.5	87.7	91.2	0	met

Nitrogen dioxide

Table 5 2011 compliance summary for NO₂ in South Australia

AAQ NEPM Standard
0.12 ppm (1-hour average)
0.03 ppm (1-year average)

Region performance monitoring station/s	Data availability rates (% of hours)					Number of exceedences (days)	Annual mean (ppm)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			1-hour	1-year
Adelaide									
ELI01 - Elizabeth Downs	87.7	95.1	97.7	97.8	94.6	0	0.003	met	met
NOR01 - Northfield	97.8	97.5	97.6	96.3	97.3	0	0.005	met	met
NET01 - Netley	91.1	96.3	90.4	97.6	93.8	0	0.007	met	met
KEN01 - Kensington Gardens	96.8	97.7	87.1	96.3	94.5	0	0.003	met	met
CHD01 - Christie Downs	91.9	87.7	85.3	83.9	87.2	0	0.005	met	met

Ozone

Table 6 2011 compliance summary for O₃ in South Australia

AAQ NEPM Standards
0.10 ppm (1-hr average)
0.08 ppm (4-hr average)

Region performance monitoring station/s	Data availability rates (% of hours)					Number of exceedences (days)		Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual	1-hour	4-hour	1-hour	4-hour
Adelaide									
ELI01 - Elizabeth Downs	95.6	95.1	97.8	97.9	96.6	0	0	met	met
NOR01 - Northfield	97.9	97.8	97.9	97.6	97.8	0	0	met	met
NET01 - Netley	93.4	88.6	97.8	97.5	94.3	0	0	met	met
KEN01 - Kensington Gardens	97.5	97.8	97.3	97.9	97.6	0	0	met	met
CHD01 - Christie Downs	97.0	88.2	86.3	85.0	89.1	0	0	met	met

Sulfur dioxide

Table 7 2011 compliance summary for SO₂ in South Australia

AAQ NEPM Standards
0.20 ppm (1-hr average)
0.08 ppm (24-hr average)
0.02 ppm (1-yr average)

Region performance monitoring station/s	Data availability rates (% of hours)					Number of exceedences (days)		Annual 1-hour mean (ppm)	Performance against the standards and goal		
	Q1	Q2	Q3	Q4	Annual	1-hr	24-hrs		1-hr	24-hrs	1-yr
Adelaide											
NOR01 - Northfield	97.9	97.7	97.8	97.7	97.8	0	0	0.000	met	met	met
Spencer											
PTP01 - Pt Pirie Oliver Street	95.7	90.6	95.0	95.5	94.2	40	0	0.008	not met	met	met

Particulate matter as PM₁₀

Table 8 2011 compliance summary for PM₁₀ in South Australia

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Region performance monitoring station/s	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Adelaide							
ELI01 - Elizabeth Downs	91.1	96.7	100.0	100.0	97.0	0	met
NET01 - Netley	94.4	97.8	100.0	100.0	98.1	0	met
KEN01 - Kensington Gardens	0.0	0.0	8.7	100.0	27.4	0	not demonstrated
CHD01 - Christie Downs	97.8	96.7	85.9	81.5	90.4	0	met
Spencer							
WHY07 - Whyalla Schulz Park	95.6	96.7	97.8	91.3	95.3	1	met
PTP01 - Pt Pirie Oliver Street	100.0	100.0	98.9	100.0	99.7	1	met

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

Lead

Table 9 2011 compliance summary for Lead in South Australia

AAQ NEPM Standard
0.50 µg/m³ (1-yr average)

Region performance monitoring station/s	Data availability rates (% of days)					Annual mean (µg/m ³)	Performance against the standard and goal
	Q1	Q2	Q3	Q4	Annual		
Spencer							
PTP05 - Pt Pirie Frank Green Park	100.0	100.0	100.0	100.0	100.0	0.10	met
PTP01 - Pt Pirie Oliver Street	100.0	100.0	100.0	100.0	100.0	0.28	met

Lead data is reported to ambient conditions and analyses were carried out by NATA accredited facilities at the Queensland Health Forensic and Scientific Services laboratory (NATA accreditation no. 41).

Particulate matter as PM_{2.5}

Table 10 2011 compliance summary for PM_{2.5} in South Australia

AAQ NEPM Advisory Reporting Standard
25 µg/m³ (24-hr average)
8 µg/m³ (1-yr average)

Region performance monitoring station/s	Data availability rates (% of days)					Number of days 24 hour standard exceeded	Annual Mean (µg/m ³)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			24 Hour	Annual
Adelaide									
NET01 Netley	94.4	92.3	100.0	100.0	96.7	0	7.1	met	met

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

SECTION C - ANALYSIS OF AIR QUALITY MONITORING

Progress Towards Achieving the AAQ NEPM 2011 Goal

As assessed against the National Environment Protection (Ambient Air Quality) Measure (NEPM, 2003), the following observations were made for 2011:

- For CO the standard and goal were met at the Elizabeth station.
- For NO₂ the hourly and yearly standards and goals were met at all stations.
- For O₃ the 1 and 4-hour standards and goals were met at all stations.
- For SO₂ the 1-hour standard and goal were met at Northfield but not met at Port Pirie, Oliver Street. The 24 hour and annual standards and goals were met at both sites.
- For PM₁₀ the standard and goal were met at all Adelaide metropolitan stations except Kensington Gardens which did not demonstrate compliance with the goal due to insufficient data as monitoring recommenced during the end of the third quarter of the year. Whyalla Schulz Park and Port Pirie Oliver Street exceeded the standard on one occasion each but both met the PM₁₀ goal.
- For Pb the annual standard and goal were met at Frank Green Park and Oliver Street monitoring sites.
- For PM_{2.5} at Netley both the 24-hour and annual advisory reporting standards were met.

Circumstances which led to Exceedences

Exceedences of the PM₁₀ standard occurred on two occasions in the Spencer region. There were no exceedences of the PM₁₀ standard in the Adelaide region. Tables 11 below summarises dates and inferred causes of exceedences occurring during the 2011 reporting year.

Exceedences of the SO₂ standard and goal occurred at Port Pirie. These exceedences were due to emissions from a major lead and zinc smelter located within the region, coupled with suitable meteorological conditions. Table 12 summarises dates and times of exceedences occurring during the 2011 reporting year.

Table 11 Summary of PM₁₀ exceedences in the Spencer region with corresponding data from the other site during 2011

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Date of Exceedance (dd/mm/yyyy)	Spencer Region			
	WHY07 - Whyalla Schulz Park	Inferred Cause	PTP01 - Pt Pirie Oliver Street	Inferred Cause
29/11/2011	77.7	Windblown dust (storm activity)	48.3	Windblown dust
25/01/2011	48.9		54.9	

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

Table 12 Summary of SO₂ exceedences during 2011 in South Australia

Date of Exceedence (dd/mm/yyyy)	Spencer Region		Date of Exceedence (dd/mm/yyyy)	Spencer Region	
	PTP01 - Pt Pirie Oliver Street	Inferred Cause		PTP01 - Pt Pirie Oliver Street	Inferred Cause
06/01/2011 16:00	0.224	Industrial source with suitable meteorological conditions	03/08/2011 11:00	0.228	Industrial source with suitable meteorological conditions
06/01/2011 17:00	0.204	As above	03/08/2011 18:00	0.205	As above
06/01/2011 18:00	0.429	As above	20/08/2011 14:00	0.283	As above
07/01/2011 13:00	0.336	As above	22/08/2011 14:00	0.338	As above
07/01/2011 14:00	0.212	As above	25/08/2011 04:00	0.205	As above
15/01/2011 10:00	0.251	As above	28/08/2011 14:00	0.321	As above
19/01/2011 10:00	0.448	As above	31/08/2011 13:00	0.523	As above
19/01/2011 11:00	0.231	As above	31/08/2011 14:00	0.773	As above
22/01/2011 11:00	0.204	As above	05/09/2011 15:00	0.286	As above
25/01/2011 10:00	0.201	As above	05/09/2011 16:00	0.406	As above
03/02/2011 11:00	0.377	As above	07/09/2011 12:00	0.225	As above
09/02/2011 15:00	0.238	As above	14/09/2011 11:00	0.290	As above
09/02/2011 16:00	0.406	As above	18/09/2011 12:00	0.274	As above
11/03/2011 11:00	0.307	As above	18/09/2011 14:00	0.350	As above
11/03/2011 12:00	0.216	As above	26/09/2011 15:00	0.273	As above
19/03/2011 14:00	0.239	As above	28/09/2011 13:00	0.384	As above
19/03/2011 15:00	0.282	As above	12/10/2011 11:00	0.210	As above
25/03/2011 12:00	0.263	As above	12/10/2011 12:00	0.210	As above
31/03/2011 11:00	0.332	As above	13/10/2011 12:00	0.458	As above
05/04/2011 11:00	0.208	As above	13/10/2011 13:00	0.297	As above
12/04/2011 11:00	0.205	As above	22/10/2011 11:00	0.210	As above
13/04/2011 13:00	0.224	As above	26/10/2011 11:00	0.343	As above
19/04/2011 16:00	0.407	As above	04/11/2011 12:00	0.442	As above
19/04/2011 17:00	0.212	As above	08/11/2011 15:00	0.216	As above
24/04/2011 13:00	0.228	As above	27/11/2011 16:00	0.219	As above

Date of Exceedence (dd/mm/yyyy)	Spencer Region	
	PTP01 - Pt Pirie Oliver Street	Inferred Cause
12/07/2011 14:00	0.272	Industrial source with suitable meteorological conditions
26/07/2011 12:00	0.260	As above
26/07/2011 13:00	0.219	As above

Date of Exceedence (dd/mm/yyyy)	Spencer Region	
	PTP01 - Pt Pirie Oliver Street	Inferred Cause
24/12/2011 11:00	0.564	Industrial source with suitable meteorological conditions
24/12/2011 13:00	0.496	As above
31/12/2011 11:00	0.299	As above

Note: times shown are finish times for events.

Analysis of extent to which standards and goals are met or not met

Annual summary statistics described in Tables 13 to 20 below allow assessment of air quality against the standards and the extent of compliance with the goal. Instances where the standard or goal have been exceeded are highlighted in bold. Note that the times shown are finish times for events. The AAQ NEPM states that the short-term standards should not be exceeded on more than one day for CO, NO₂, O₃, SO₂ and on no more than five days per year for PM₁₀ (NEPC, 2003). The second highest daily value for the year (or the sixth for PM₁₀) indicates the extent to which the standards are, or are not met.

Carbon monoxide

The standard and goal for carbon monoxide were clearly met at Elizabeth as CO levels were well below the AAQ NEPM standard. The highest concentration recorded reached only 9% of the standard.

Table 13 2011 summary statistics for daily peak 8-hour CO in South Australia

Region & Station/s	Number of valid days	Highest (ppm)	AAQ NEPM Standard 9.0 ppm (8-hr rolling average)		
			Highest (dd mon hh:mm)	2nd highest (ppm)	2nd highest (dd mon hh:mm)
Adelaide					
ELI01 - Elizabeth Downs	341	0.8	10 Jun 01:00 10 Jun 02:00	0.7	28 Jun 03:00

Nitrogen dioxide

Nitrogen dioxide concentrations were below the AAQ NEPM standard. The highest concentrations recorded varied from 26% of the standard at Elizabeth Downs to 47% of the standard at Netley. Second highest concentrations varied from 25% of the standard at Elizabeth Downs to 41% of the standard at Netley. Accordingly the 1-hour standard and goal were met at all sites.

Table 14 2011 summary statistics for daily peak 1-hour NO₂ in South Australia

Region & Station/s	Number of valid days	Highest (ppm)	Highest (dd mon hh:mm)	AAQ NEPM Standard 0.12 ppm (1-hr average)	
				2nd highest (ppm)	2nd highest (dd mon hh:mm)
Adelaide					
ELI01 - Elizabeth Downs	357	0.031	06 Apr 19:00	0.030	08 Dec 08:00
CHD01 - Christie Downs	339	0.035	06 Apr 20:00	0.033	15 Sep 19:00
KEN01 - Kensington Gardens	355	0.032	06 Apr 19:00	0.031	18 Apr 19:00
NET01 - Netley	357	0.056	19 Oct 20:00	0.049	23 Mar 11:00
NOR01 - Northfield	365	0.047	06 Apr 20:00	0.040	27 Jun 11:00

Ozone

The highest concentration of ozone, based on 1-hour averages, was measured at Kensington Gardens and reached 73% of the AAQ NEPM standard. The highest concentrations measured at the other stations varied from 61%-71% of the standard. The second highest concentrations ranged from 55% to 61% of the standard. Both the standard and goal were met at all stations.

Table 15 2011 summary statistics for daily peak 1-hour O₃ in South Australia

Region & Station/s	Number of valid days	Highest (ppm)	Highest (dd mon hh:mm)	AAQ NEPM Standard 0.10 ppm (1-hr average)	
				2nd highest (ppm)	2nd highest (dd mon hh:mm)
Adelaide					
ELI01 - Elizabeth Downs	363	0.061	30 Dec 16:00	0.058	19 Oct 16:00
CHD01 - Christie Downs	342	0.062	04 Nov 16:00	0.059	29 Jan 13:00
KEN01 - Kensington Gardens	365	0.073	29 Jan 18:00	0.058	24 Dec 11:00
NET01 - Netley	356	0.062	30 Dec 14:00	0.061	04 Nov 17:00
NOR01 - Northfield	365	0.071	29 Jan 19:00	0.055	19 Oct 17:00
					04 Nov 17:00
					24 Dec 11:00

The maximum daily peak 4-hour rolling ozone concentration was recorded at Kensington Gardens and reached 89% of the standard. The lowest daily peak was 71% of the standard and was recorded at both Elizabeth Downs and Netley. Second highest daily peaks ranged from 65% to 70% of the standard hence the standard and goal were met at all stations.

Table 16 2011 summary statistics for daily peak 4-hour O₃ in South Australia

Region & Station/s	Number of valid days	Highest (ppm)	Highest (dd mon hh:mm)	AAQ NEPM Standard 0.08 ppm (4-hr average)	
				2nd highest (ppm)	2nd highest (dd mon hh:mm)
Adelaide					
ELI01 - Elizabeth Downs	363	0.057	30 Dec 18:00	0.056	19 Oct 17:00
CHD01 - Christie Downs	346	0.058	04 Nov 17:00	0.056	29 Jan 15:00
KEN01 - Kensington Gardens	365	0.071	29 Jan 18:00	0.056	19 Oct 17:00
NET01 - Netley	357	0.057	04 Nov 18:00	0.054	19 Oct 17:00 19 Oct 18:00 04 Nov 17:00
NOR01 - Northfield	365	0.063	29 Jan 19:00 29 Jan 20:00	0.052	30 Dec 16:00 30 Dec 17:00

Sulfur dioxide

In the Adelaide region the 1-hour average sulfur dioxide concentration was well below the standard. It reached a maximum of 7.5% of the AAQ NEPM standard. The second highest concentration was 6% of the standard. The standard and goal were easily met in the Adelaide region.

At Pirie however the highest and second highest daily peak 1-hour SO₂ concentration exceeded the standard. In Port Pirie the maximum was 387% of the standard and the second highest concentration was 282% of the standard, both of which are significant exceedences. Hence the 1-hour standard and goal were not met in the Spencer region.

Table 17 2011 summary statistics for daily peak 1-hour SO₂ in South Australia

AAQ NEPM Standard 0.20 ppm (1-hr average)					
Region & Station/s	Number of valid days	Highest (ppm)	Highest (dd mon hh:mm)	2nd highest (ppm)	2nd highest (dd mon hh:mm)
Adelaide					
NOR01 - Northfield	365	0.015	24 Jun 04:00	0.012	31 Jul 15:00 17 Sep 08:00
Spencer					
PTP01 - Pt Pirie Oliver St	361	0.773	31 Aug 14:00	0.564	24 Dec 11:00

There were no exceedences of the 24-hour standard for sulfur dioxide hence the goal was met in both the Adelaide and Spencer regions. In the Adelaide region the maximum concentration was only 5% of the standard but in the Spencer region the maximum reached 90% of the standard. Second highest concentrations were 3% and 84% of the standard in Adelaide and Spencer respectively.

Table 18 2011 summary statistics for daily peak 24-hour SO₂ in South Australia

AAQ NEPM Standard 0.08 ppm (24-hr average)					
Region & Station/s	Number of valid days	Highest (ppm)	Highest (dd mon)	2nd highest (ppm)	2nd highest (dd mon)
Adelaide					
NOR01 - Northfield	365	0.004	24 Jun	0.002	26 Jun 17 Sep
Spencer					
PTP01 - Pt Pirie Oliver St	359	0.072	24 Dec	0.067	06 Jan

Particulate matter as PM₁₀

There were two exceedences of the 24-hour AAQ NEPM standard in the Spencer region one each at Port Pirie Oliver Street and Whyalla Schulz Park. There were no exceedences in Adelaide. The maximum concentration recorded in the Adelaide region was at Netley and was 78% of the standard.

The highest concentration in the Spencer region was at Schulz Park in Whyalla and was 155% of the standard. At Port Pirie the highest concentration was 110% of the standard.

The goal was met at all stations as the 6th highest concentration at each monitoring station was below the NEPM standard. 6th highest maxima in the Adelaide region ranged from 43% of the standard at Kensington to 61% of the standard at Christie Downs. It should be noted that monitoring at Kensington only occurred for the last quarter of the year. At Port Pirie and Whyalla in the Spencer region maximums were 67% and 64% of the standard respectively.

Table 19 2011 summary statistics for 24-hour PM₁₀ in South Australia

		AAQ NEPM Standard 50 µg/m ³ (24-hr average)			
Region & Station/s	Number of valid days	Highest (µg/m ³)	Highest (dd mon)	6th highest (µg/m ³)	6th highest (dd mon)
Adelaide					
ELI01 - Elizabeth Downs	354	36.5	18 Nov	27.7	17 Sep
CHD01 - Christie Downs	330	36.8	07 Mar	30.7	08 Dec
KEN01 - Kensington Gardens	100	28.1	08 Dec	21.4	16 Dec
NET01 - Netley	358	38.8	07 Mar	30.0	08 Dec
Spencer					
PTP01 - Pt Pirie Oliver St	364	54.9	25 Jan	33.4	08 Dec
WHY07 - Whyalla Schulz Park	348	77.7	29 Nov	32.0	21 Jan

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

Particulate matter as PM_{2.5}

There were no exceedences of the PM_{2.5} standard in Adelaide during 2011 hence the standard was met. The highest and 6th highest concentrations were 63% and 50% of the standard respectively.

Table 20 2011 summary statistics for 24-hour PM_{2.5} in South Australia

AAQ NEPM Advisory Reporting Standard
25 µg/m³ (24-hr average)

Region & Station/s	Number of valid days	Highest (µg/m ³)	Highest (dd mon)	6th highest (µg/m ³)	6th highest (dd mon)
Adelaide					
NET01 - Netley	338	15.8	19 Oct	12.6	20 Oct

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

SECTION D - TRENDS AND POLLUTANT DISTRIBUTIONS

Tables 21-48 provide results of additional analyses of daily peak values, including percentiles of daily peak concentrations. Where available, trend data have been included. Percentile data have been calculated from daily maxima as required in PRC technical paper number 8 (2010).

Figures 3-30 below are graphical representations of the trend data supplied in tables 21-48. The AAQ NEPM standards are shown except where the standards are too large to fit on the scale of the graph. In general:

- Carbon monoxide concentrations have been showing a decreasing trend over the last 9 years and concentrations are consistently well below the NEPM standard.
- Nitrogen dioxide concentrations in Adelaide are showing a decreasing trend at all stations.
- 1-hour and 4-hour rolling ozone concentrations are quite variable from year to year making it difficult to determine trends however concentrations are currently increasing at some Adelaide sites.
- 1-hour daily peak sulfur dioxide concentrations are increasing at Oliver Street Port Pirie but decreasing at Northfield. Concentrations at Northfield are very low and well below the NEPM standards.
- 24-hour average sulfur dioxide concentrations are showing a possible decreasing trend at both Northfield and Port Pirie.
- 24-hour PM₁₀ concentrations at all stations in the Adelaide and Spencer region are currently showing decreasing trends however there is yearly variability. PM₁₀ concentrations have fallen in the last couple of years consistent with increased rainfall in 2010 and 2011.
- Lead concentrations at both NEPM sites in Port Pirie are showing a decreasing trend.
- PM_{2.5} concentrations at Netley appear to be showing a decreasing trend.

Carbon monoxide

Table 21 Percentiles of daily peak 8-hour CO concentrations for Adelaide, ELI01 - Elizabeth Downs (2002 - 2011)

AAQ NEPM Standard
9.0 ppm (8-hr average)

Year (yyyy)	Data availability (% of days)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	83.6	0.8	0.7	0.6	0.4	0.3	0.2	0.1
2003	91.7	1.4	0.8	0.7	0.5	0.4	0.2	0.1
2004	97.7	0.8	0.6	0.5	0.4	0.3	0.2	0.1
2005	93.6	0.8	0.6	0.4	0.4	0.3	0.1	0.1
2006	85.9	0.7	0.5	0.4	0.3	0.2	0.1	0.0
2007	99.7	0.6	0.4	0.3	0.3	0.2	0.1	0.0
2008	95.7	0.5	0.4	0.3	0.3	0.2	0.1	0.0
2009	99.8	0.4	0.3	0.3	0.2	0.2	0.1	0.1
2010	97.8	0.4	0.3	0.3	0.3	0.2	0.1	0.1
2011	91.2	0.8	0.6	0.4	0.3	0.2	0.1	0.0

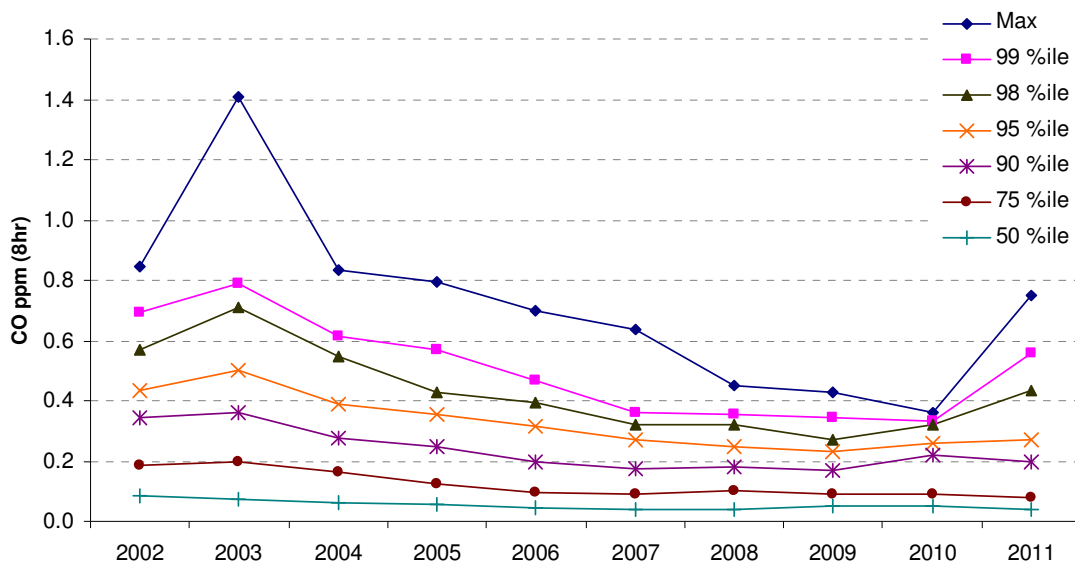


Figure 3 Percentiles of daily peak 8-hour CO concentrations for Adelaide, ELI01-Elizabeth Downs (2002-2011)

Nitrogen dioxide

Table 22 Percentiles of daily peak 1-hour NO₂ concentrations for ELI01-Elizabeth Downs (2002-2011)

AAQ NEPM Standard
0.12 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	93.8	0.040	0.034	0.033	0.029	0.026	0.022	0.014
2003	96.7	0.043	0.030	0.028	0.025	0.022	0.019	0.011
2004	94.7	0.037	0.031	0.029	0.025	0.023	0.019	0.012
2005	94.7	0.038	0.031	0.028	0.025	0.023	0.019	0.011
2006	89.2	0.043	0.030	0.029	0.026	0.023	0.017	0.011
2007	94.5	0.039	0.026	0.025	0.023	0.021	0.017	0.011
2008	93.4	0.031	0.027	0.027	0.024	0.023	0.018	0.011
2009	97.2	0.028	0.027	0.026	0.024	0.022	0.017	0.010
2010	94.8	0.035	0.028	0.027	0.025	0.023	0.017	0.011
2011	94.6	0.031	0.027	0.026	0.023	0.020	0.016	0.011

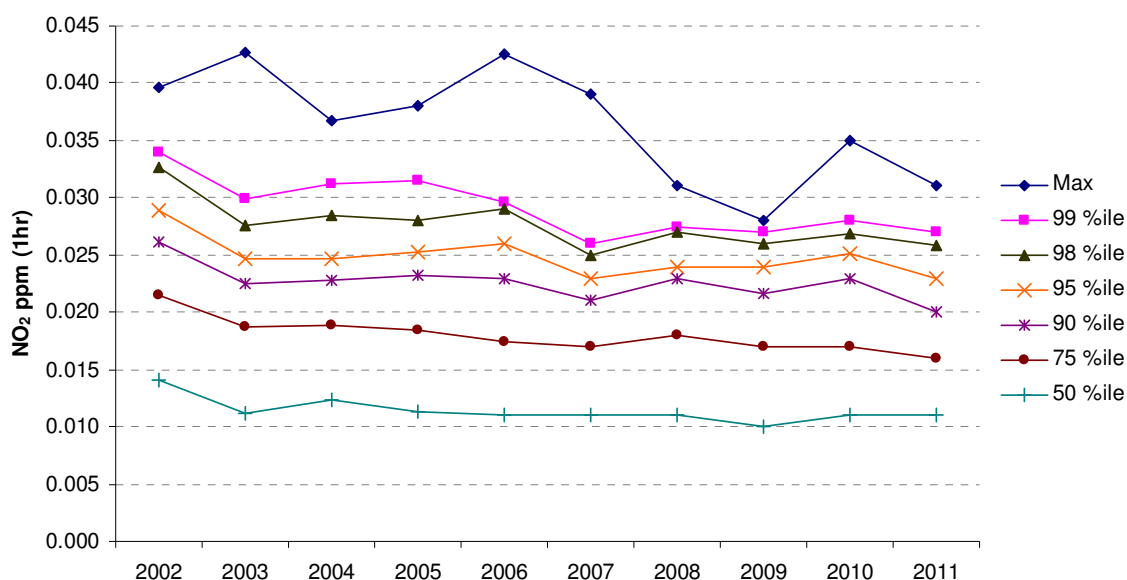


Figure 4 Percentiles of daily peak 1-hour NO₂ concentrations for ELI01 - Elizabeth Downs (2002-2011)

Table 23 Percentiles of daily peak 1-hour NO₂ concentrations for NOR01-Northfield (2002 - 2011)

AAQ NEPM Standard
0.12 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	94.1	0.047	0.038	0.033	0.031	0.028	0.024	0.018
2003	95.1	0.039	0.035	0.032	0.031	0.028	0.024	0.017
2004	96.1	0.045	0.038	0.033	0.029	0.026	0.023	0.017
2005	94.2	0.039	0.035	0.033	0.030	0.028	0.024	0.018
2006	93.4	0.034	0.031	0.030	0.028	0.025	0.021	0.016
2007	95.6	0.037	0.034	0.032	0.029	0.027	0.023	0.017
2008	96.9	0.041	0.035	0.034	0.030	0.028	0.025	0.017
2009	96.6	0.042	0.034	0.031	0.028	0.027	0.023	0.017
2010	96.7	0.045	0.035	0.033	0.030	0.027	0.023	0.016
2011	97.3	0.047	0.033	0.032	0.029	0.027	0.023	0.015

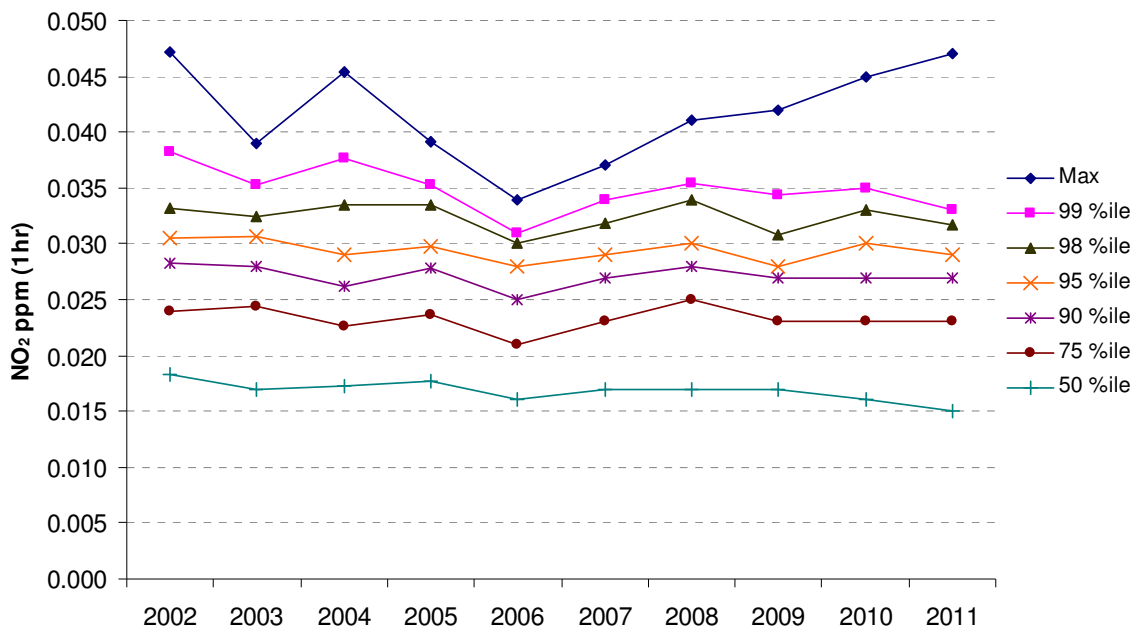


Figure 5 Percentiles of daily peak 1-hour NO₂ concentrations for NOR01-Northfield (2002-2011)

Table 24 Percentiles of daily peak 1-hour NO₂ concentrations for NET01-Netley (2002 - 2011)

AAQ NEPM Standard
0.12 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	84.4	0.050	0.042	0.037	0.035	0.032	0.028	0.023
2003	97.2	0.039	0.036	0.035	0.032	0.029	0.026	0.021
2004	96.2	0.103	0.041	0.038	0.034	0.030	0.026	0.021
2005	97.1	0.051	0.042	0.037	0.034	0.031	0.028	0.022
2006	94.6	0.054	0.037	0.036	0.033	0.030	0.027	0.021
2007	97.4	0.040	0.038	0.036	0.032	0.030	0.028	0.023
2008	97.2	0.047	0.040	0.039	0.035	0.031	0.027	0.022
2009	97.3	0.050	0.038	0.035	0.032	0.030	0.026	0.021
2010	91.2	0.054	0.039	0.036	0.032	0.029	0.026	0.020
2011	93.8	0.056	0.040	0.037	0.032	0.029	0.025	0.019

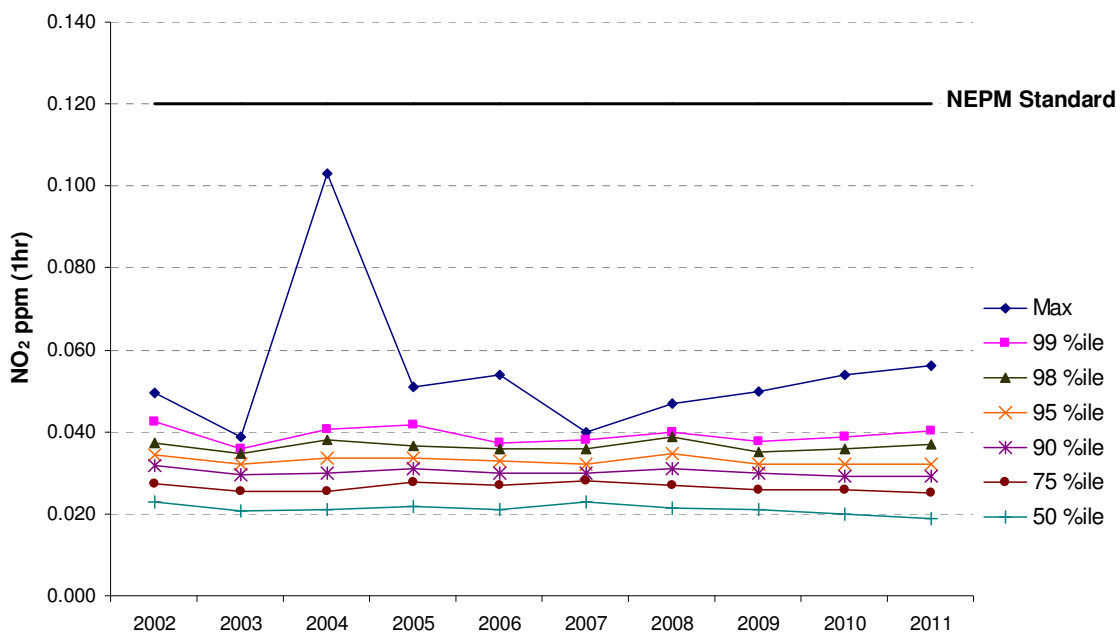


Figure 6 Percentiles of daily peak 1-hour NO₂ concentrations for NET01- Netley (2002-2011)

Table 25 Percentiles of daily peak 1-hour NO₂ concentrations for KEN01-Kensington Gardens (2002 - 2011)

AAQ NEPM Standard
0.12 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	94.0	0.041	0.030	0.030	0.028	0.025	0.022	0.015
2003	96.9	0.040	0.034	0.031	0.026	0.024	0.021	0.014
2004	96.2	0.037	0.032	0.028	0.025	0.023	0.019	0.013
2005	97.5	0.031	0.029	0.027	0.026	0.024	0.019	0.013
2006	96.4	0.037	0.028	0.027	0.025	0.022	0.018	0.013
2007	93.6	0.035	0.030	0.029	0.026	0.023	0.020	0.014
2008	94.6	0.032	0.028	0.027	0.025	0.023	0.019	0.012
2009	97.5	0.039	0.028	0.027	0.025	0.023	0.018	0.012
2010	97.5	0.034	0.029	0.027	0.025	0.022	0.018	0.011
2011	94.5	0.032	0.026	0.025	0.023	0.020	0.015	0.009

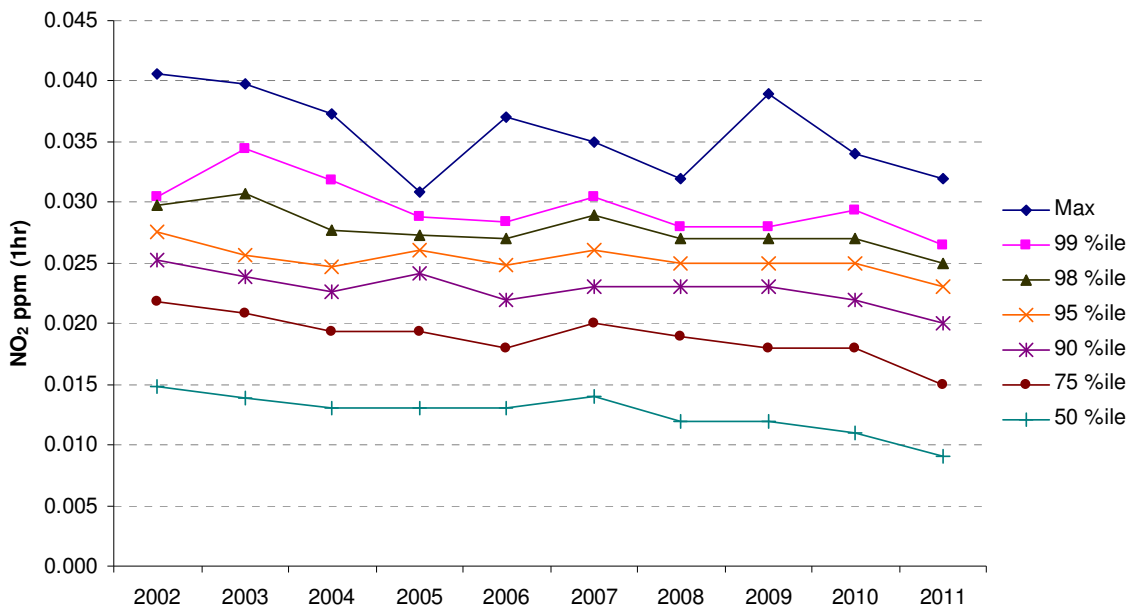


Figure 7 Percentiles of daily peak 1-hour NO₂ concentrations for KEN01- Kensington Gardens (2002-2011)

Table 26 Percentiles of daily peak 1-hour NO₂ concentrations for CHD01-Christie Downs (2006 - 2011)

AAQ NEPM Standard
0.12 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
<i>2006</i>	<i>69.0</i>	<i>0.033</i>	<i>0.029</i>	<i>0.029</i>	<i>0.026</i>	<i>0.025</i>	<i>0.021</i>	<i>0.015</i>
2007	96.7	0.038	0.031	0.030	0.027	0.025	0.020	0.013
2008	94.7	0.036	0.033	0.031	0.028	0.026	0.021	0.013
2009	90.5	0.043	0.035	0.032	0.027	0.026	0.022	0.013
2010	91.3	0.035	0.030	0.029	0.027	0.025	0.021	0.014
2011	87.2	0.035	0.030	0.028	0.027	0.025	0.020	0.012

Years shown in italics indicate data availability is less than 75%

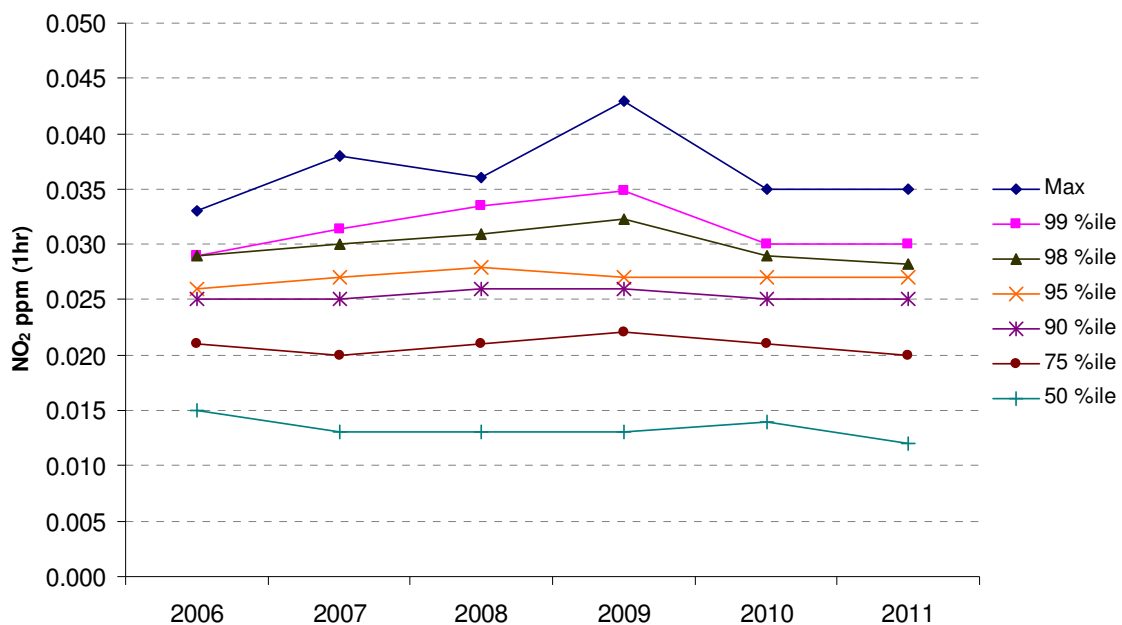


Figure 8 Percentiles of daily peak 1-hour NO₂ concentrations for CHD01- Christie Downs (2006-2011)

Ozone

Table 27 Percentiles of daily peak 1-hour O₃ concentrations for ELI01-Elizabeth Downs (2002 - 2011)

AAQ NEPM Standard
0.10 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	95.1	0.072	0.062	0.053	0.045	0.040	0.033	0.030
2003	96.7	0.077	0.064	0.059	0.050	0.042	0.034	0.029
2004	96.1	0.088	0.065	0.055	0.046	0.041	0.033	0.029
2005	97.2	0.062	0.057	0.050	0.041	0.036	0.032	0.029
2006	89.9	0.072	0.061	0.055	0.051	0.040	0.035	0.029
2007	97.5	0.082	0.070	0.065	0.051	0.045	0.035	0.030
2008	97.4	0.097	0.059	0.055	0.042	0.039	0.033	0.030
2009	97.5	0.073	0.061	0.059	0.051	0.044	0.034	0.030
2010	97.7	0.066	0.056	0.051	0.045	0.039	0.032	0.027
2011	96.6	0.061	0.052	0.050	0.044	0.040	0.032	0.029

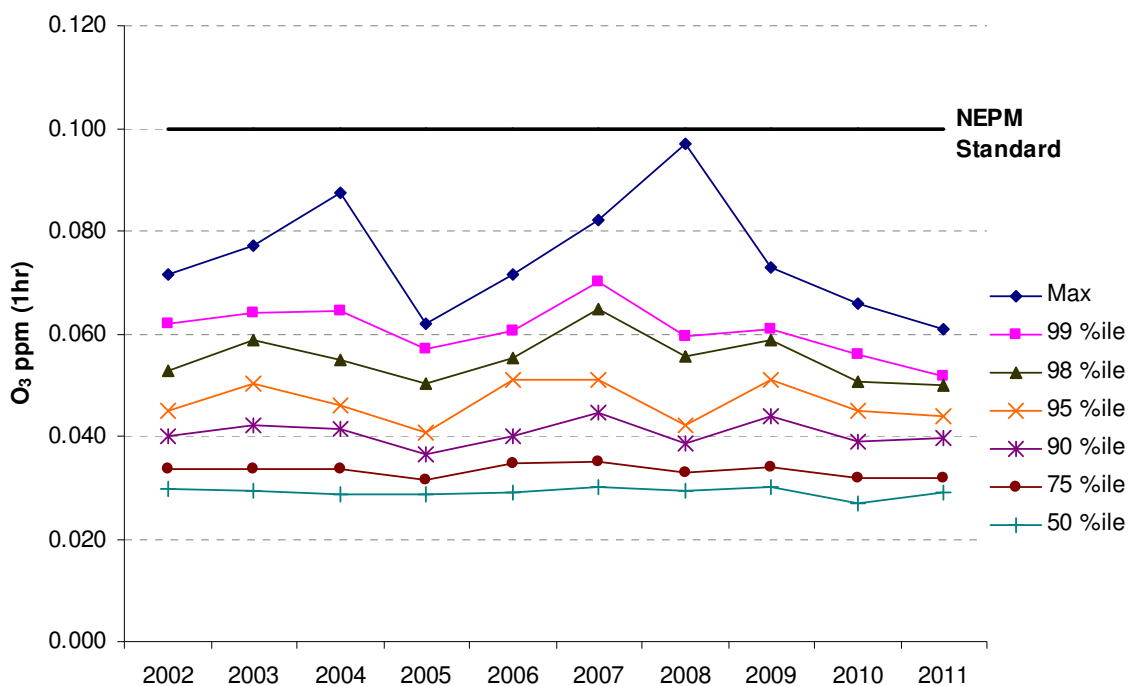


Figure 9 Percentiles of daily peak 1-hour O₃ concentrations for ELI01 - Elizabeth Downs (2002-2011)

Table 28 Percentiles of daily peak 1-hour O₃ concentrations for NOR01-Northfield (2002 - 2011)

AAQ NEPM Standard
0.10 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	97.5	0.080	0.060	0.051	0.045	0.040	0.033	0.029
2003	97.5	0.068	0.060	0.054	0.047	0.042	0.033	0.028
2004	94.1	0.081	0.065	0.058	0.045	0.040	0.033	0.028
2005	94.4	0.060	0.049	0.045	0.040	0.036	0.031	0.028
2006	94.5	0.067	0.053	0.050	0.043	0.038	0.031	0.027
2007	97.4	0.069	0.060	0.054	0.047	0.042	0.033	0.029
2008	97.2	0.074	0.054	0.048	0.042	0.038	0.032	0.028
2009	97.0	0.081	0.059	0.056	0.047	0.042	0.032	0.027
2010	96.9	0.061	0.052	0.051	0.046	0.039	0.033	0.029
2011	97.8	0.071	0.054	0.050	0.044	0.039	0.032	0.028

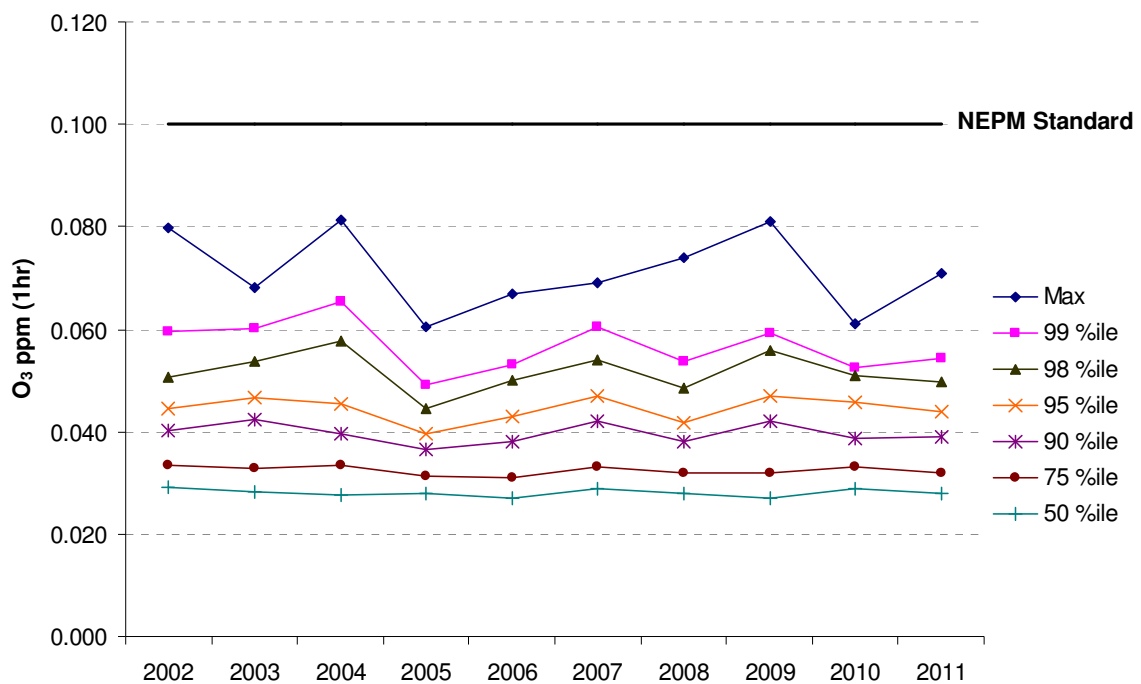


Figure 10 Percentiles of daily peak 1-hour O₃ concentrations for NOR01-Northfield (2002-2011)

Table 29 Percentiles of daily peak 1-hour O₃ concentrations for NET01-Netley (2002 - 2011)

AAQ NEPM Standard
0.10 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	98.2	0.087	0.056	0.048	0.042	0.037	0.031	0.028
2003	97.4	0.069	0.059	0.054	0.045	0.039	0.032	0.027
2004	97.5	0.067	0.056	0.049	0.044	0.037	0.032	0.028
2005	96.8	0.079	0.054	0.049	0.041	0.037	0.032	0.028
2006	94.6	0.105	0.058	0.054	0.043	0.038	0.031	0.028
2007	97.4	0.077	0.055	0.052	0.046	0.040	0.033	0.029
2008	97.0	0.071	0.056	0.047	0.041	0.037	0.032	0.029
2009	97.4	0.070	0.062	0.056	0.048	0.041	0.032	0.028
2010	94.9	0.062	0.056	0.052	0.045	0.038	0.031	0.027
2011	94.3	0.062	0.055	0.050	0.043	0.039	0.032	0.028

Data shown in bold type indicates an exceedence of the NEPM standard.

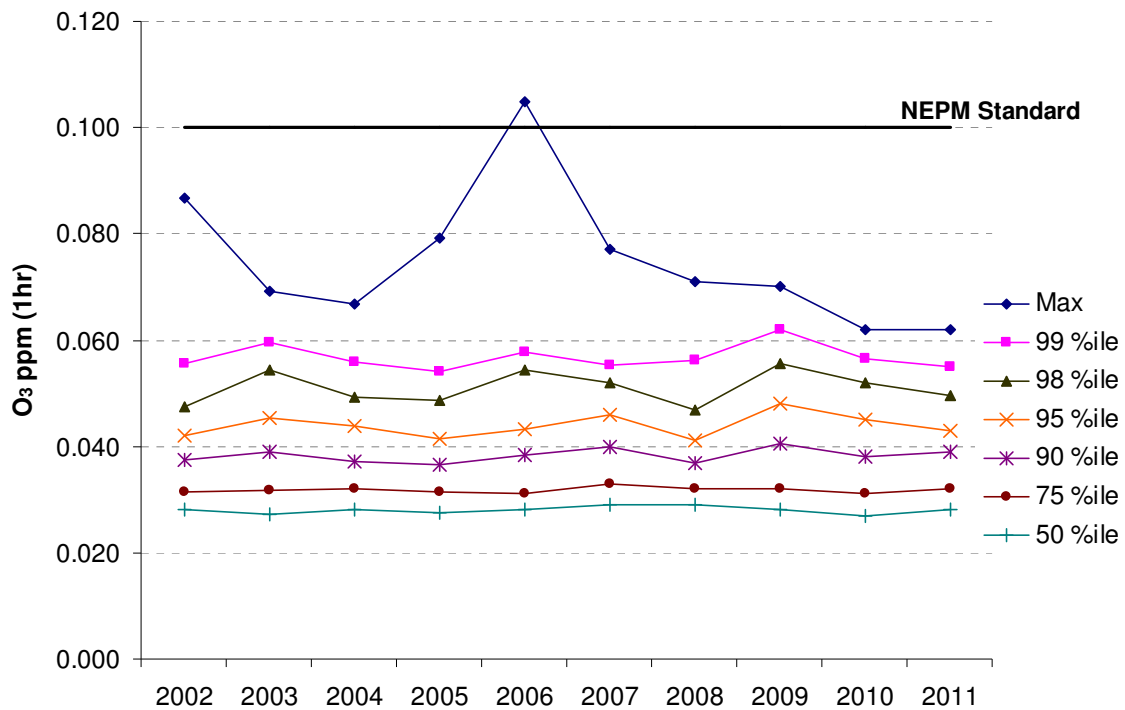


Figure 11 Percentiles of daily peak 1-hour O₃ concentrations at NET01-Netley (2002-2011)

Table 30 Percentiles of daily peak 1-hour O₃ concentrations for KEN01-Kensington Gardens (2002 - 2011)

AAQ NEPM Standard
0.10 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	95.9	0.086	0.057	0.053	0.046	0.042	0.035	0.030
2003	96.9	0.074	0.065	0.058	0.049	0.042	0.034	0.029
2004	97.2	0.078	0.067	0.062	0.047	0.041	0.033	0.029
2005	97.6	0.061	0.053	0.051	0.044	0.039	0.034	0.031
2006	96.3	0.090	0.061	0.057	0.048	0.040	0.033	0.029
2007	95.5	0.076	0.062	0.058	0.051	0.045	0.034	0.030
2008	95.0	0.072	0.059	0.053	0.044	0.039	0.033	0.029
2009	97.5	0.082	0.060	0.058	0.047	0.040	0.032	0.027
2010	95.8	0.062	0.055	0.053	0.047	0.041	0.034	0.030
2011	97.6	0.073	0.056	0.054	0.047	0.042	0.034	0.030

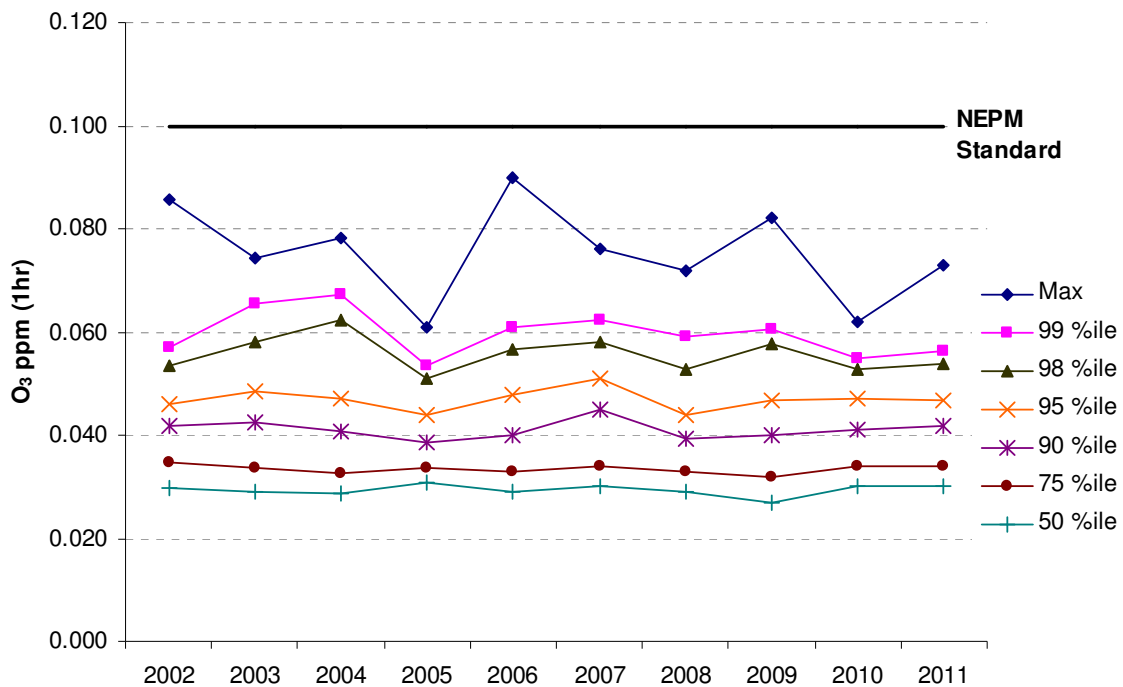


Figure 12 Percentiles of daily peak 1-hour O₃ concentrations for KEN01- Kensington Gardens (2002-2011)

Table 31 Percentiles of daily peak 1-hour O₃ concentrations for CHD01-Christie Downs (2006 - 2011)

AAQ NEPM Standard
0.10 ppm (1-hr average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50 th
<i>2006</i>	<i>65.6</i>	<i>0.055</i>	<i>0.050</i>	<i>0.046</i>	<i>0.040</i>	<i>0.037</i>	<i>0.033</i>	<i>0.030</i>
2007	96.7	0.074	0.054	0.053	0.046	0.040	0.034	0.030
2008	95.8	0.068	0.052	0.046	0.041	0.038	0.032	0.029
2009	92.9	0.066	0.055	0.050	0.043	0.037	0.031	0.027
2010	93.2	0.076	0.055	0.048	0.040	0.037	0.031	0.027
2011	89.1	0.062	0.056	0.051	0.042	0.038	0.033	0.029

Years shown in italics indicate data availability is less than 75%.

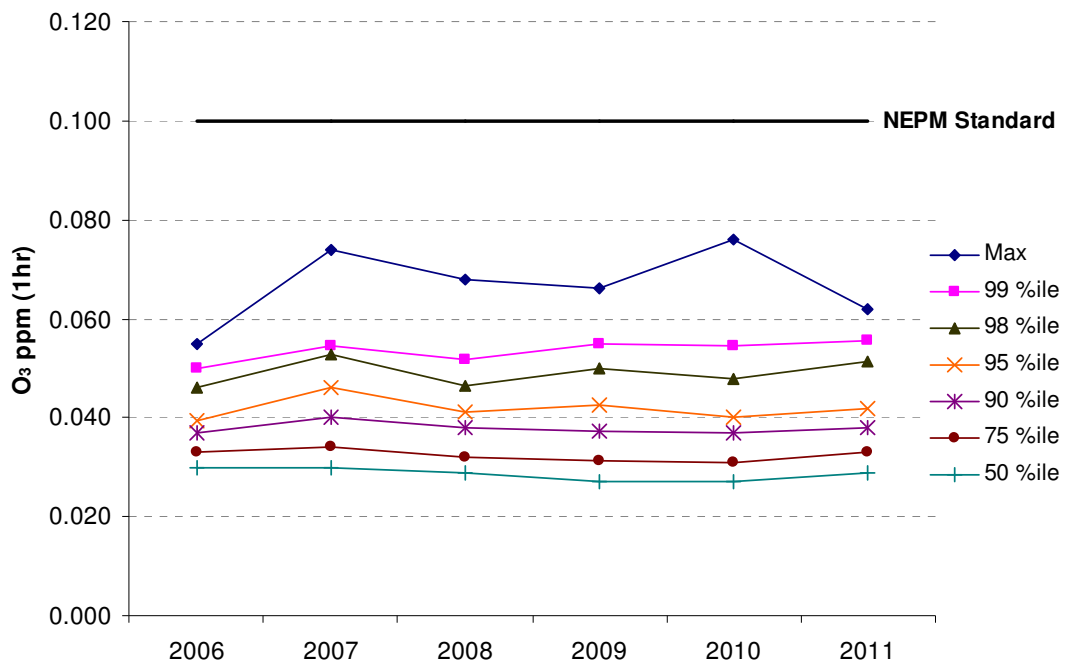


Figure 13 Percentiles of daily peak 1-hour O₃ concentrations for CHD01- Christie Downs (2006-2011)

Table 32 Percentiles of daily peak 4-hour rolling O₃ concentrations for ELI01-Elizabeth Downs (2002 - 2011)

AAQ NEPM Standard
0.08 ppm (4-hr rolling average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	96.3	0.057	0.046	0.044	0.039	0.037	0.032	0.029
2003	98.7	0.063	0.056	0.052	0.045	0.040	0.032	0.028
2004	98.2	0.079	0.056	0.051	0.042	0.037	0.032	0.027
2005	99.2	0.056	0.049	0.044	0.038	0.034	0.030	0.028
2006	91.7	0.065	0.051	0.049	0.045	0.038	0.033	0.028
2007	99.5	0.078	0.063	0.056	0.048	0.042	0.033	0.029
2008	99.5	0.086	0.051	0.048	0.041	0.037	0.032	0.028
2009	99.6	0.070	0.054	0.051	0.047	0.042	0.033	0.029
2010	99.7	0.059	0.050	0.048	0.041	0.037	0.030	0.026
2011	98.7	0.057	0.048	0.045	0.042	0.037	0.031	0.028

Data shown in bold type indicates an exceedence of the NEPM standard.

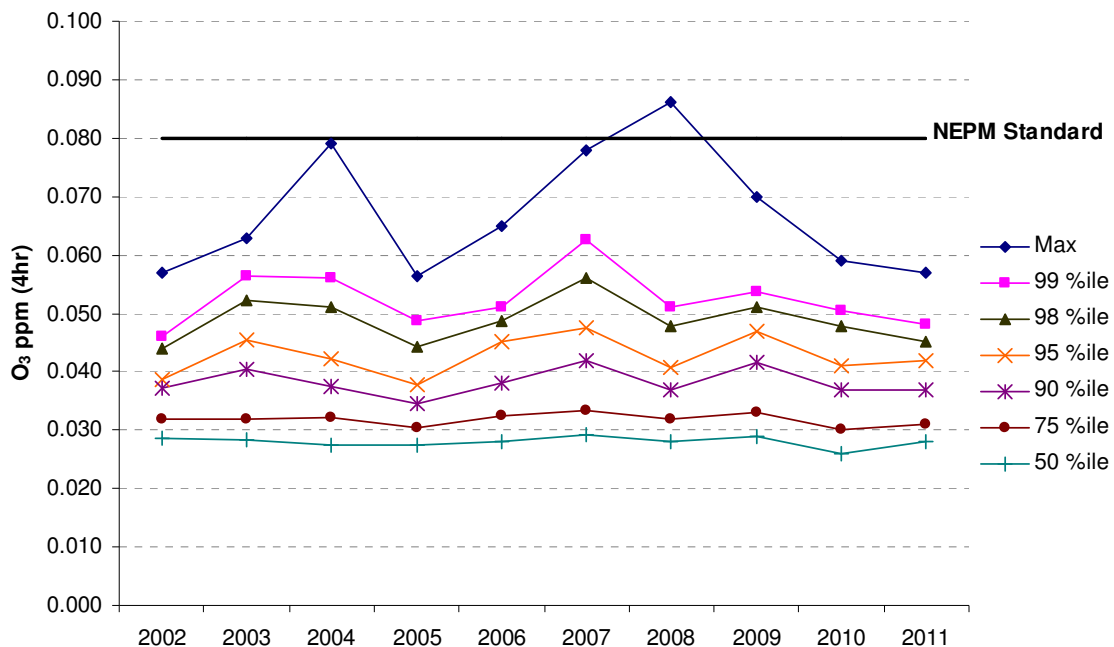


Figure 14 Percentiles of daily peak 4-hour rolling O₃ concentrations at ELI01 - Elizabeth Downs (2002-2011)

Table 33 Percentiles of daily peak 4-hour rolling O₃ concentrations for NOR01-Northfield (2002 - 2011)

AAQ NEPM Standard
0.08 ppm (4-hr rolling average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	98.9	0.064	0.052	0.046	0.041	0.036	0.031	0.028
2003	99.5	0.061	0.053	0.047	0.044	0.038	0.031	0.027
2004	95.9	0.067	0.058	0.049	0.041	0.038	0.032	0.027
2005	96.3	0.054	0.046	0.041	0.036	0.035	0.030	0.027
2006	96.7	0.058	0.048	0.045	0.040	0.035	0.030	0.026
2007	99.9	0.059	0.054	0.052	0.044	0.040	0.032	0.028
2008	99.6	0.068	0.049	0.045	0.039	0.035	0.031	0.027
2009	98.9	0.064	0.054	0.051	0.043	0.039	0.030	0.026
2010	98.9	0.050	0.048	0.046	0.042	0.037	0.032	0.028
2011	99.9	0.063	0.046	0.045	0.041	0.037	0.031	0.027

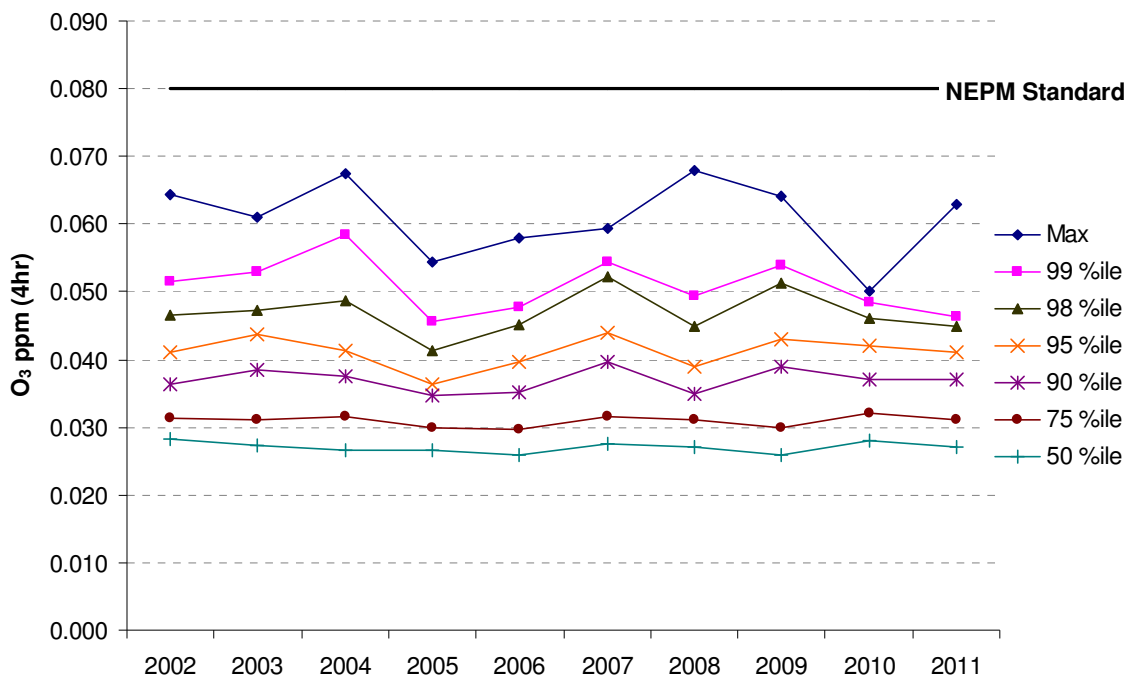


Figure 15 Percentiles of daily peak 4-hour rolling O₃ concentrations for NOR01-Northfield (2002-2011)

Table 34 Percentiles of daily peak 4-hour rolling O₃ concentrations for NET01-Netley (2002-2011)

AAQ NEPM Standard
0.08 ppm (4-hr rolling average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	99.5	0.071	0.050	0.044	0.038	0.034	0.030	0.027
2003	99.4	0.060	0.053	0.047	0.042	0.037	0.030	0.027
2004	99.6	0.059	0.048	0.044	0.040	0.036	0.031	0.027
2005	98.8	0.072	0.048	0.044	0.038	0.034	0.030	0.027
2006	96.7	0.094	0.052	0.047	0.041	0.036	0.030	0.027
2007	99.8	0.070	0.051	0.050	0.044	0.038	0.032	0.028
2008	99.2	0.061	0.049	0.043	0.039	0.036	0.031	0.027
2009	99.3	0.062	0.053	0.048	0.042	0.038	0.031	0.027
2010	96.7	0.056	0.051	0.046	0.041	0.036	0.030	0.026
2011	96.3	0.057	0.051	0.043	0.040	0.036	0.031	0.028

Data shown in bold type indicates an exceedence of the NEPM standard.

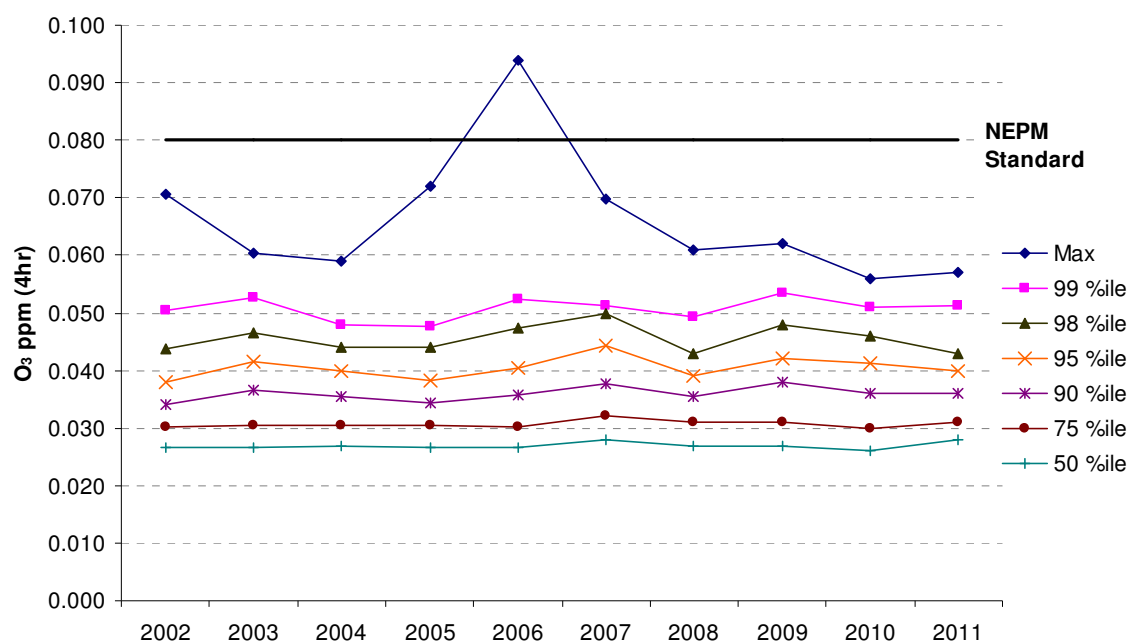


Figure 16 Percentiles of daily peak 4-hour rolling O₃ concentrations for NET01-Netley (2002-2011)

Table 35 Percentiles of daily peak 4-hour rolling O₃ concentrations for KEN01-Kensington Gardens (2002 - 2011)

AAQ NEPM Standard
0.08 ppm (4-hr rolling average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
2002	97.2	0.073	0.051	0.047	0.041	0.038	0.033	0.029
2003	98.9	0.071	0.054	0.051	0.045	0.040	0.032	0.028
2004	99.2	0.071	0.059	0.054	0.043	0.038	0.031	0.028
2005	99.6	0.055	0.050	0.044	0.040	0.037	0.032	0.029
2006	98.7	0.072	0.055	0.051	0.044	0.039	0.032	0.028
2007	97.8	0.063	0.058	0.054	0.047	0.043	0.033	0.029
2008	97.2	0.067	0.055	0.048	0.042	0.037	0.031	0.028
2009	99.1	0.066	0.054	0.051	0.043	0.038	0.030	0.026
2010	97.9	0.057	0.051	0.049	0.044	0.039	0.033	0.029
2011	99.7	0.071	0.052	0.049	0.044	0.039	0.033	0.029

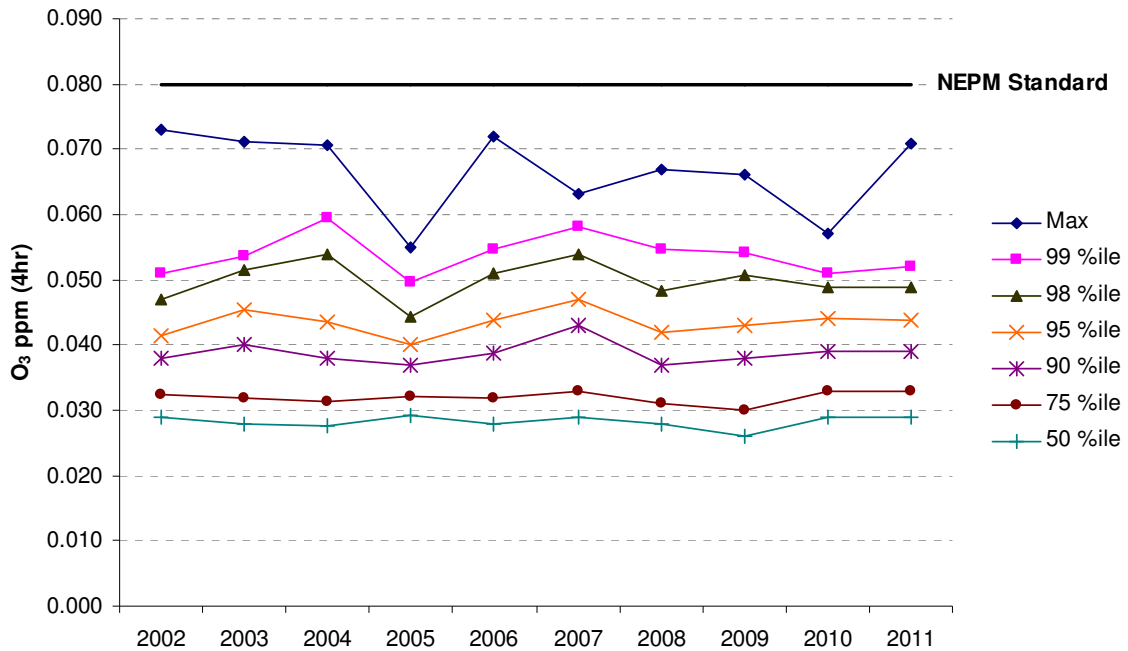


Figure 17 Percentiles of daily peak 4-hour rolling O₃ concentrations for KEN01- Kensington Gardens (2002-2011)

Table 36 Percentiles of daily peak 4-hour rolling O₃ concentrations for CHD01-Christie Downs (2006 - 2011)

AAQ NEPM Standard
0.08 ppm (4-hr rolling average)

Year (yyyy)	Data availability rates (%)	Max (ppm)	Percentiles (ppm)					
			99th	98th	95th	90th	75th	50th
<i>2006</i>	<i>65.9</i>	<i>0.049</i>	<i>0.047</i>	<i>0.042</i>	<i>0.038</i>	<i>0.035</i>	<i>0.032</i>	<i>0.029</i>
2007	98.4	0.060	0.052	0.050	0.044	0.038	0.033	0.029
2008	97.7	0.060	0.047	0.044	0.038	0.036	0.031	0.027
2009	94.9	0.056	0.051	0.046	0.040	0.036	0.030	0.026
2010	95.1	0.060	0.050	0.042	0.037	0.035	0.030	0.026
2011	90.7	0.058	0.049	0.047	0.039	0.036	0.032	0.028

Years shown in italics indicate data availability is less than 75%.

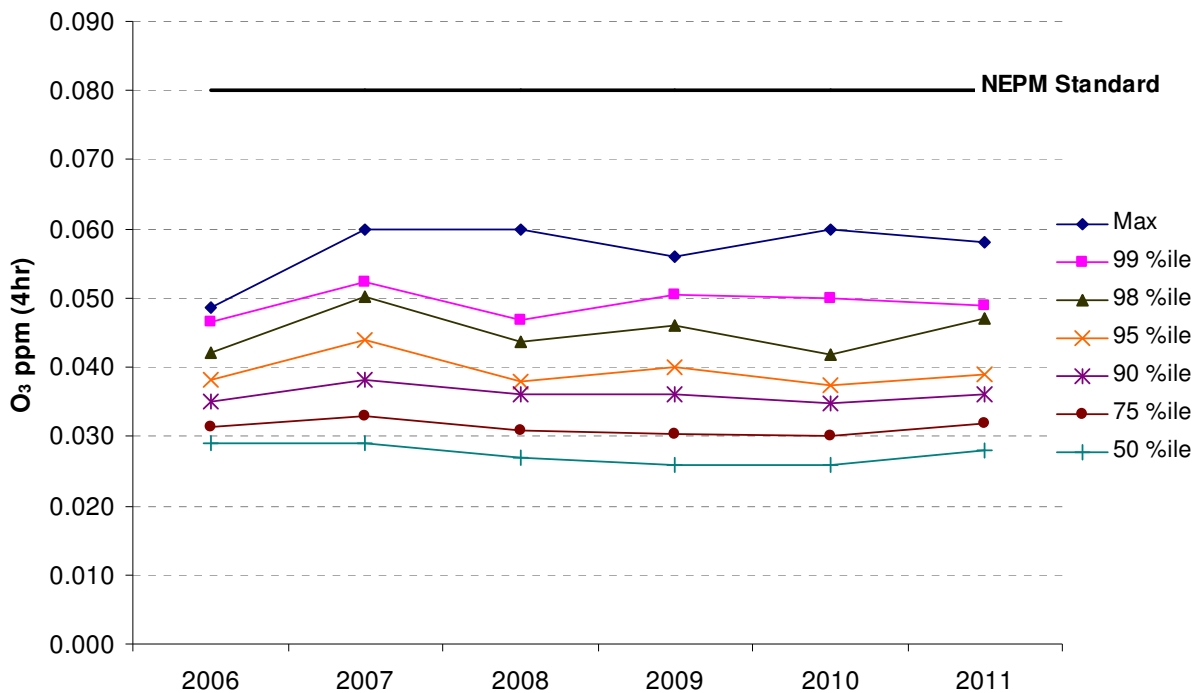


Figure 18 Percentiles of daily peak 4-hour rolling O₃ concentrations for CHD01- Christie Downs (2006-2011)

Sulfur dioxide

Table 37 Percentiles of daily peak 1-hour SO₂ concentrations for Adelaide, NOR01-Northfield (2002 - 2011)

AAQ NEPM Standard
0.20 ppm (1-hr average)

Year (yyyy)	Data availability (% of hours)	Max (ppm)	Percentiles (ppm)					
			99th	98 th	95th	90th	75th	50th
<i>2002*</i>	<i>15.5</i>	<i>0.027</i>	<i>0.024</i>	<i>0.020</i>	<i>0.013</i>	<i>0.010</i>	<i>0.005</i>	<i>0.003</i>
2003	95.2	0.009	0.007	0.006	0.005	0.004	0.002	0.001
2004	92.6	0.012	0.007	0.006	0.004	0.003	0.001	0.001
2005	93.4	0.015	0.008	0.006	0.004	0.003	0.001	0.001
2006	94.4	0.020	0.005	0.004	0.003	0.002	0.002	0.001
2007	96.2	0.008	0.006	0.005	0.003	0.002	0.001	0.001
2008	97.3	0.009	0.006	0.005	0.004	0.002	0.001	0.001
2009	97.0	0.022	0.006	0.005	0.003	0.002	0.001	0.000
2010	96.9	0.013	0.005	0.004	0.003	0.002	0.001	0.001
2011	97.8	0.015	0.011	0.008	0.004	0.002	0.001	0.000

*Data availability is low as monitoring began during the final quarter of 2002

Years shown in italics indicate data availability is less than 75%

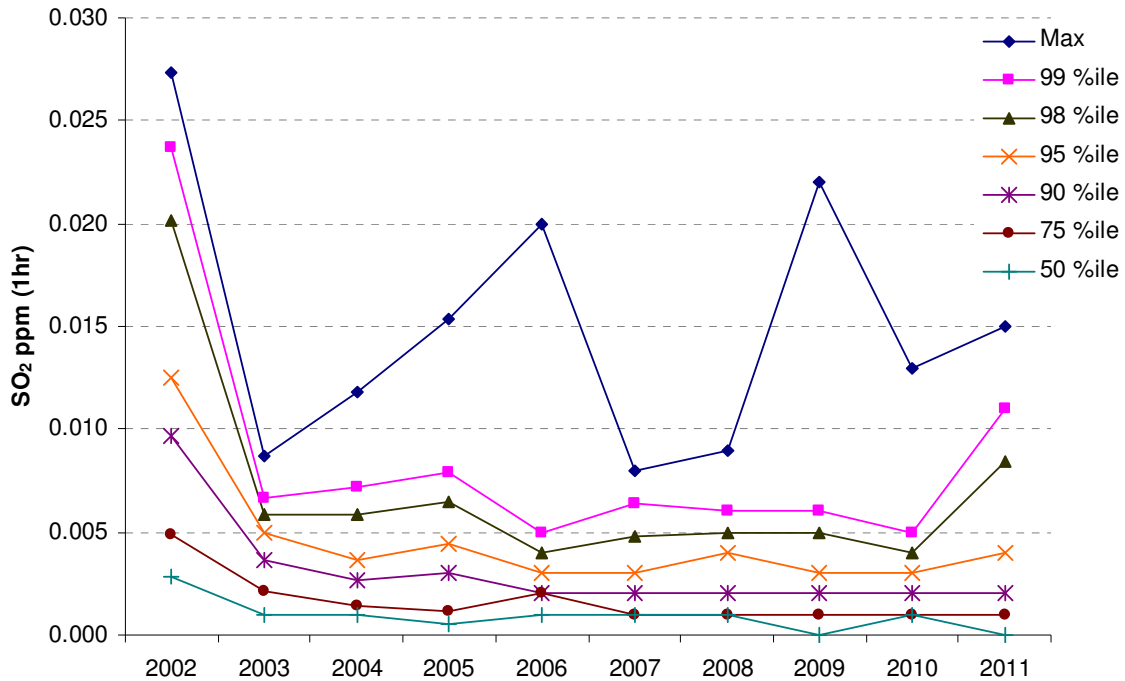


Figure 19 Percentiles of daily peak 1-hour SO₂ concentrations for NOR01-Northfield (2002-2011)

Table 38 Percentiles of daily peak 1-hour SO₂ concentrations for the Spencer Gulf, PTP01-Pt Pirie Oliver Street (2002 - 2011)

AAQ NEPM Standard
0.20 ppm (1-hr average)

Year (yyyy)	Data availability (% of hours)	Max (ppm)	Percentiles (ppm)					
			99th	98 th	95th	90th	75th	50th
<i>2002</i>	<i>50.8</i>	0.656	0.400	0.302	0.257	0.186	0.095	0.028
2003	95.6	0.487	0.388	0.309	0.221	0.152	0.070	0.023
2004	97.2	0.440	0.356	0.335	0.260	0.185	0.078	0.020
2005	93.6	0.721	0.391	0.362	0.234	0.186	0.105	0.042
2006	96.3	0.485	0.361	0.311	0.240	0.191	0.092	0.018
2007	97.2	0.594	0.404	0.312	0.249	0.175	0.101	0.029
2008	97.4	0.522	0.421	0.330	0.258	0.185	0.108	0.033
2009	97.8	1.260	0.467	0.367	0.238	0.174	0.093	0.024
2010	95.5	0.761	0.414	0.347	0.270	0.191	0.097	0.024
2011	94.2	0.773	0.444	0.406	0.299	0.205	0.098	0.022

Data shown in bold type indicates an exceedence of the NEPM standard.
Years shown in italics indicate data availability is less than 75%.

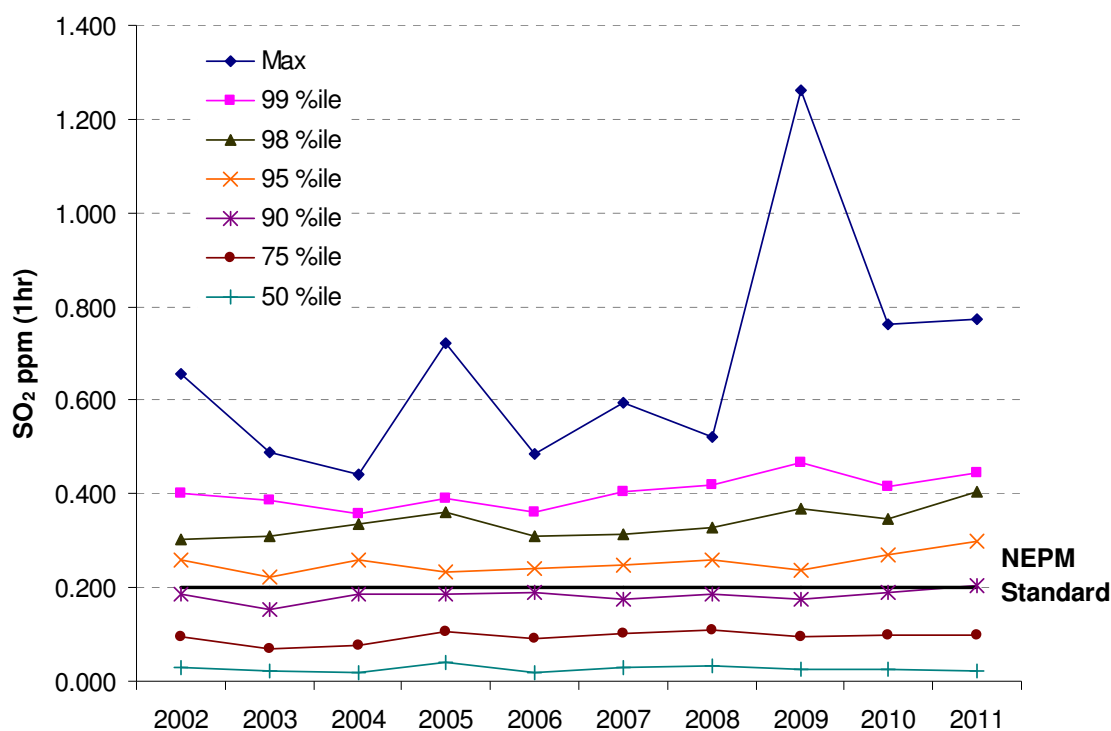


Figure 20 Percentiles of daily peak 1-hour SO₂ concentrations for the Spencer Gulf, PTP01-Port Pirie Oliver Street (2002-2011)

Table 39 Percentiles of 24-hour SO₂ concentrations for Adelaide, NOR01-Northfield (2002 - 2011)

AAQ NEPM Standard
0.08 ppm (24-hr average)

Year (yyyy)	Data availability (% of days)	Max (ppm)	Percentiles (ppm)					
			99th	98 th	95th	90th	75th	50th
<i>2002*</i>	<i>14.8</i>	<i>0.007</i>	<i>0.006</i>	<i>0.005</i>	<i>0.005</i>	<i>0.004</i>	<i>0.002</i>	<i>0.001</i>
2003	99.5	0.003	0.002	0.002	0.002	0.001	0.001	0.000
2004	95.9	0.003	0.002	0.001	0.001	0.001	0.001	0.000
2005	96.4	0.004	0.002	0.002	0.001	0.000	0.000	0.000
2006	96.4	0.003	0.002	0.001	0.001	0.001	0.000	0.000
2007	98.6	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2008	99.5	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2009	98.9	0.002	0.001	0.001	0.001	0.000	0.000	0.000
2010	98.6	0.003	0.002	0.001	0.001	0.001	0.000	0.000
2011	100.0	0.004	0.001	0.001	0.001	0.000	0.000	0.000

*Data availability is low as monitoring began during the final quarter of 2002 and although data availability is less than 15% data have been included for completeness; 2002 data were included in the 1-hour average SO₂ percentiles and trend summaries.

Years shown in italics indicate data availability is less than 75%

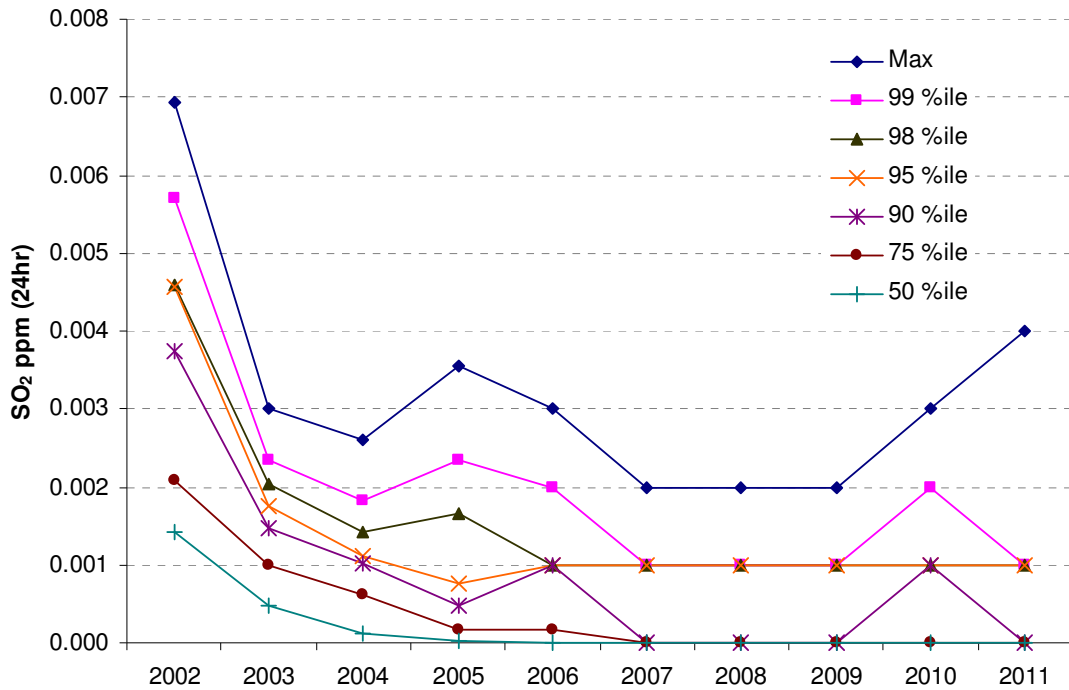


Figure 21 Percentiles of 24-hour SO₂ concentrations for Adelaide, NOR01- Northfield (2002- 2011)

Table 40 Percentiles of 24-hour SO₂ concentrations for the Spencer Gulf, PTP01-Pt Pirie Oliver Street (2003 - 2011)

AAQ NEPM Standard
0.08 ppm (24-hr average)

Year (yyyy)	Data availability (% of days)	Max (ppm)	Percentiles (ppm)					
			99th	98 th	95th	90th	75th	50th
2002	51.5	0.050	0.045	0.040	0.035	0.029	0.013	0.005
2003	97.3	0.095	0.043	0.037	0.024	0.018	0.011	0.004
2004	99.7	0.051	0.039	0.037	0.028	0.022	0.011	0.003
2005	94.8	0.072	0.054	0.049	0.033	0.023	0.014	0.005
2006	97.8	0.053	0.043	0.040	0.032	0.023	0.013	0.002
2007	98.9	0.061	0.044	0.042	0.032	0.024	0.014	0.004
2008	99.2	0.076	0.052	0.048	0.034	0.026	0.014	0.004
2009	100.0	0.104	0.062	0.046	0.032	0.023	0.012	0.003
2010	98.6	0.046	0.039	0.037	0.028	0.022	0.010	0.003
2011	98.4	0.072	0.053	0.043	0.032	0.023	0.013	0.003

Data shown in bold type indicates an exceedence of the NEPM standard.
Years shown in italics indicate data availability is less than 75%.

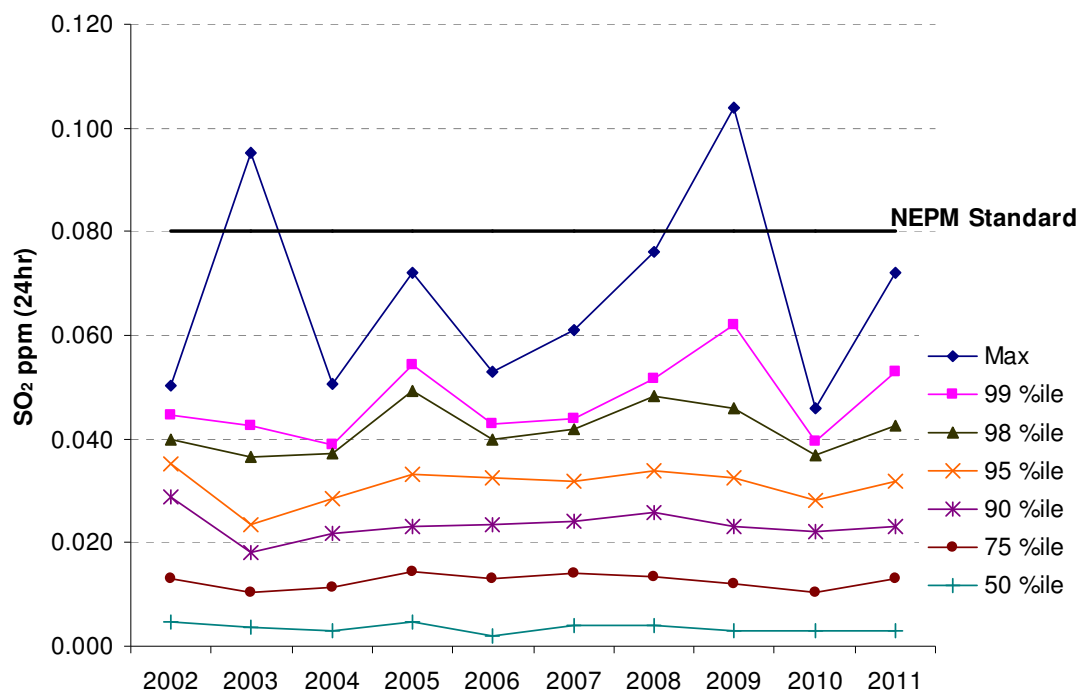


Figure 22 Percentiles of 24-hour SO₂ concentrations for the Spencer Gulf, PTP01- Port Pirie Oliver Street (2002-2011)

Particulate matter as PM₁₀

Table 41 Percentiles of daily 24-hour PM₁₀ concentrations for ELI01-Elizabeth Downs (2004 - 2011)

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Year (yyyy)	Data availability rates (%)	Max (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
<i>2004</i>	55.5	63.9	39.1	33.5	26.8	22.3	16.1	12.4
2005	95.1	84.8	58.8	48.5	38.2	30.0	21.7	14.9
2006	91.8	90.4	49.3	44.8	30.4	23.0	17.3	13.0
2007	97.0	74.9	47.2	41.9	31.9	25.9	19.5	13.5
2008	94.3	77.5	47.4	41.8	34.5	28.5	21.5	15.9
2009	97.0	197.5	61.2	53.4	46.8	34.9	24.4	15.6
2010	96.7	209.5	41.4	33.6	26.2	21.3	17.0	13.1
2011	97.0	36.5	29.1	27.1	23.4	19.8	15.8	12.8

Data shown in bold type indicates an exceedence of the NEPM standard.

Years shown in italics indicate data availability is less than 75%.

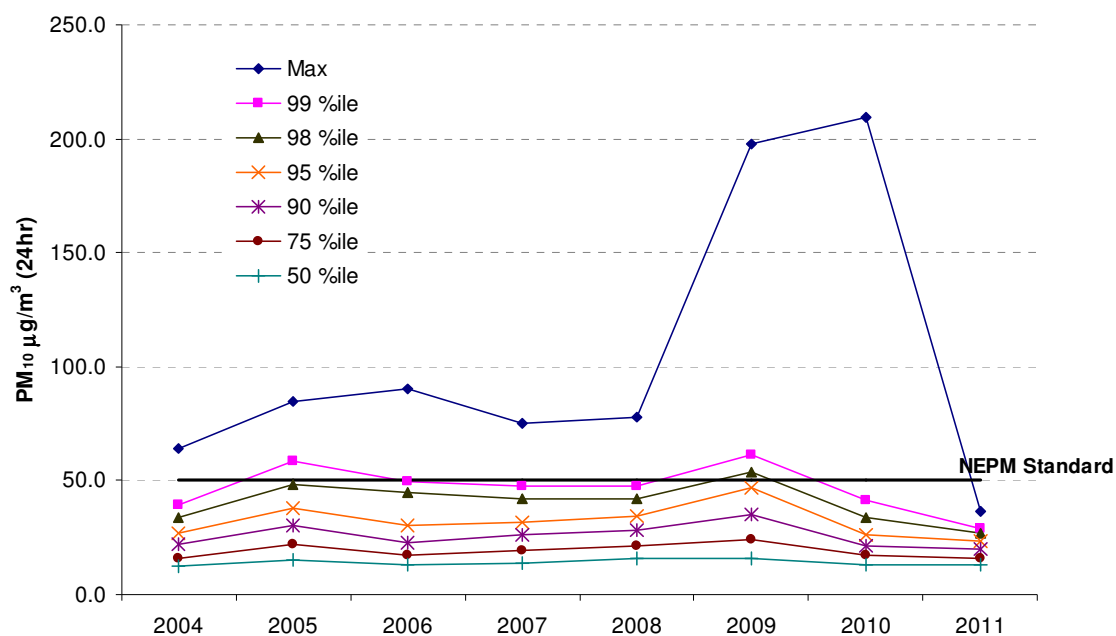


Figure 23 Percentiles of daily 24-hour PM₁₀ concentrations for ELI01 - Elizabeth Downs (2004-2011)

Table 42 Percentiles of daily 24-hour PM₁₀ concentrations for NET01-Netley (2002 - 2011)

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Year (yyyy)	Data availability rates (%)	Max (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
2002	100.0	79.3	43.1	38.1	31.6	27.5	22.8	18.5
2003	97.0	119.4	54.0	46.0	33.9	29.4	22.1	17.9
2004	98.6	62.7	42.4	40.3	33.6	29.5	23.1	17.3
2005	89.9	58.7	54.5	48.1	38.3	32.3	24.3	17.9
2006	91.0	101.4	85.7	69.2	43.0	33.5	24.6	18.1
2007	95.1	125.9	80.3	57.6	37.6	31.0	23.3	17.6
2008	98.6	90.3	50.5	43.8	36.7	30.9	22.9	17.4
2009	98.9	108.7	58.2	45.7	39.6	30.3	22.8	16.8
2010	95.3	93.9	46.3	37.6	29.3	25.2	20.3	16.1
2011	98.1	38.8	30.8	27.9	24.2	20.0	16.3	12.0

Data shown in bold type indicates an exceedence of the NEPM standard.

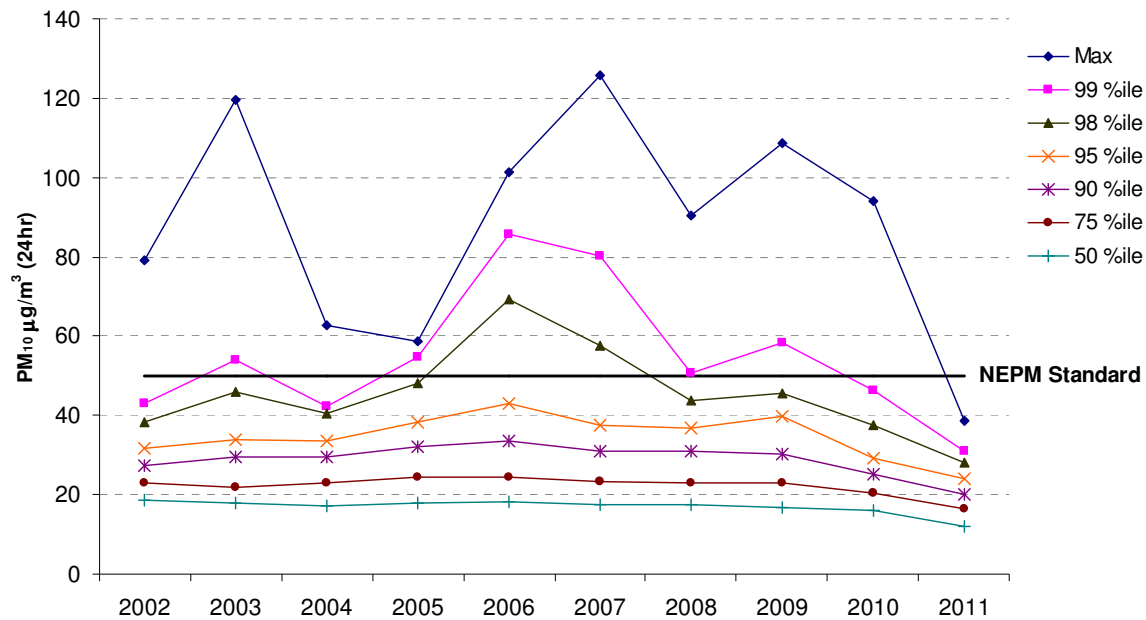


Figure 24 Percentiles of daily 24-hour PM₁₀ concentrations for NET01-Netley (2002-2011)

Table 43 Percentiles of daily 24-hour PM₁₀ concentrations for CHD01-Christie Downs (2006 - 2011)

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Year (yyyy)	Data availability rates (%)	Max (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
2006	73.4	52.2	49.6	42.1	31.2	25.8	19.4	14.3
2007	92.6	70.5	43.8	38.3	31.7	27.3	21.6	15.5
2008	95.9	89.7	40.5	34.0	30.7	26.9	20.4	15.1
2009	95.3	83.9	45.8	42.8	35.9	28.5	20.9	15.5
2010	96.4	88.7	52.8	39.6	27.3	22.7	17.7	14.0
2011	90.4	36.8	33.8	29.9	25.2	21.9	17.7	13.5

Data shown in bold type indicates an exceedence of the NEPM standard.
Years shown in italics indicate data availability is less than 75%.

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

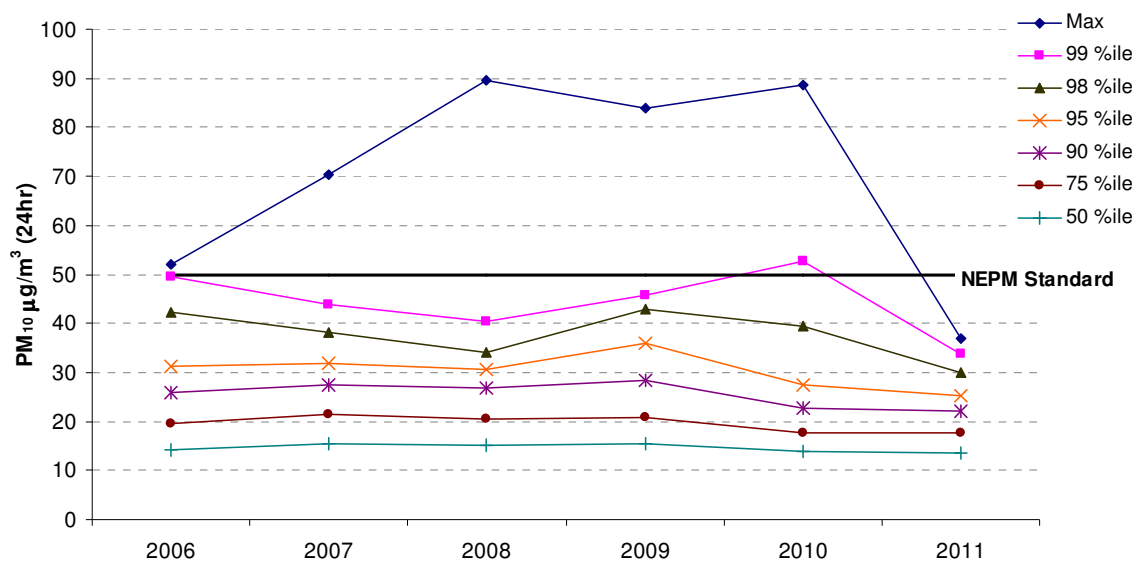


Figure 25 Percentiles of daily 24-hour PM₁₀ concentrations at CHD01- Christie Downs (2006-2011)

Table 44 Percentiles of daily 24-hour PM₁₀ concentrations for WHY07-Whyalla Schulz Park (2007 - 2011)

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Year (yyyy)	Data availability rates (%)	Max (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
2007	66.8	97.2	62.8	51.0	30.5	27.4	20.5	14.9
2008	97.5	96.5	57.6	45.3	36.9	32.1	23.7	15.9
2009	96.4	283.8	70.9	52.7	41.8	35.2	26.0	16.3
2010	98.6	92.3	44.8	32.3	25.5	22.5	17.2	12.5
2011	95.3	77.7	34.5	30.2	25.1	21.3	17.2	13.0

Data shown in bold type indicates an exceedence of the NEPM standard.
Years shown in italics indicate data availability is less than 75%.

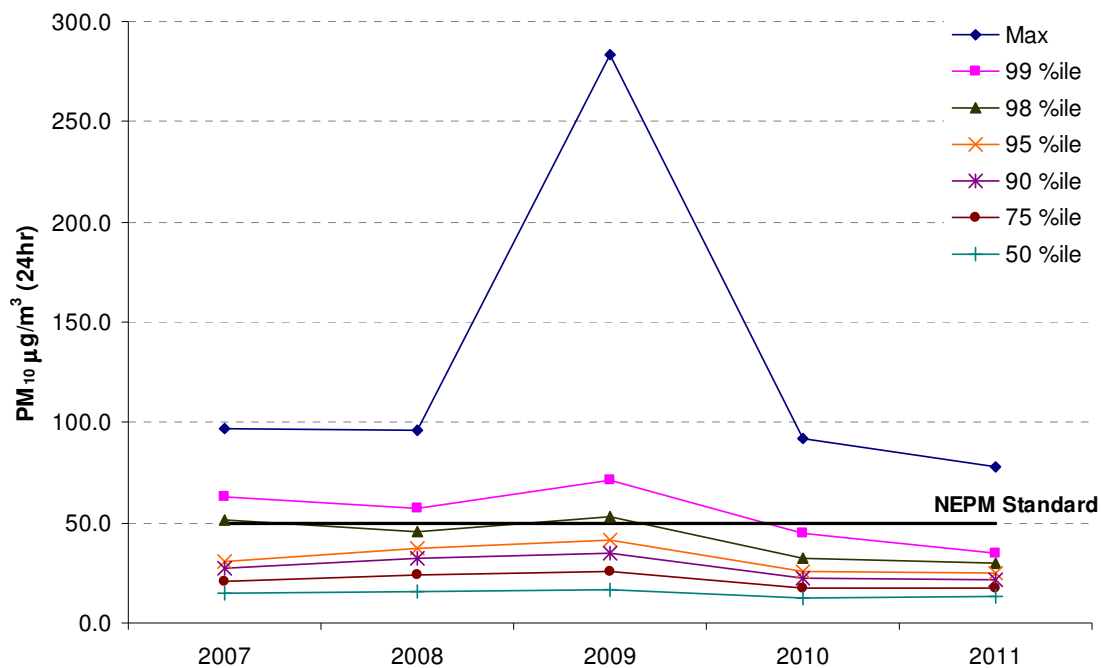


Figure 26 Percentiles and maxima of daily 24-hour PM₁₀ concentrations for WHY07- Whyalla Schulz Park (2007-2011)

Table 45 Percentiles of daily 24-hour PM₁₀ concentrations for PTP01-Pt Pirie Oliver Street (2002 - 2011)

AAQ NEPM Standard
50 µg/m³ (24-hr average)

Year (yyyy)	Data availability rates (%)	Max (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
<i>2002[#]</i>	16	57.0	50.4	45.1	33.4	31.3	27.8	21.2
<i>2003</i>	50.1	60.5	51.7	47.0	38.9	30.8	21.8	14.1
2004	97.3	135.8	51.8	43.9	35.7	28.5	22.6	15.7
2005	95.1	464.3	68.4	45.6	37.6	31.6	23.4	16.6
2006	96.2	181.8	71.0	59.3	42.9	34.6	25.1	17.4
2007	97.5	173.8	68.6	60.8	45.2	37.2	25.5	16.8
2008	97.5	235.1	83.1	64.0	48.9	39.5	25.3	15.5
2009	97.5	183.0	97.4	57.2	46.0	34.8	24.3	14.6
2010	95.9	142.9	45.4	40.6	30.6	24.9	16.8	12.3
2011	99.7	54.9	34.1	32.5	29.0	23.4	19.0	13.9

Data shown in bold type indicates an exceedence of the NEPM standard.
Years shown in italics indicate data availability is less than 75%.

Monitoring by high-volume sampler (one in six days), otherwise monitoring is by TEOM and reported as TEOM data (NEPC PRC, 2001).

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

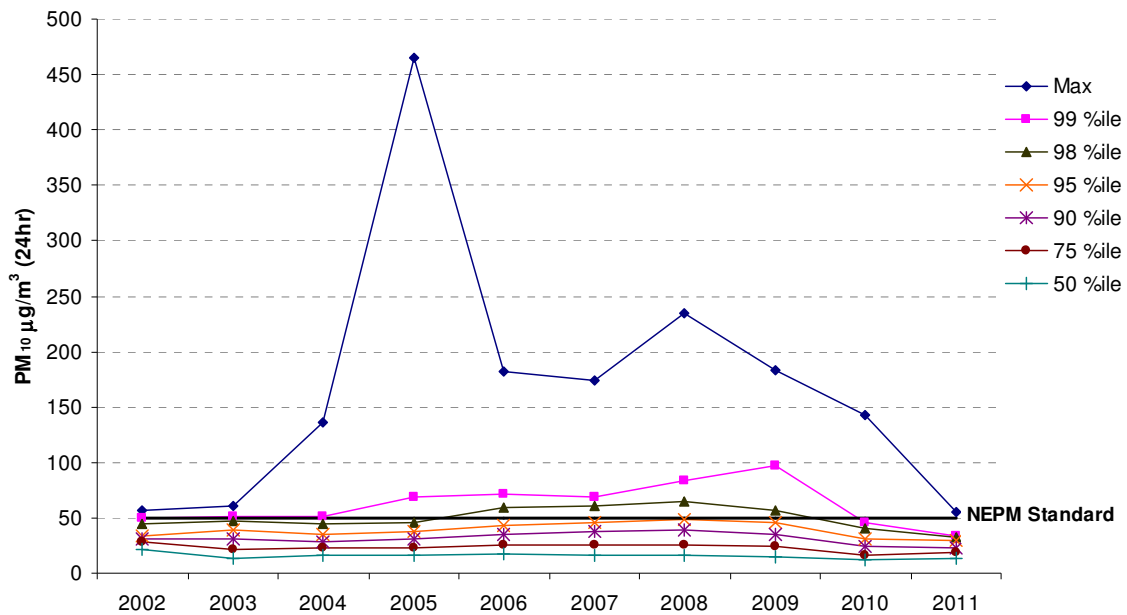


Figure 27 Percentiles and maxima of daily 24-hour PM₁₀ concentrations for PTP01- Port Pirie Oliver Street (2002-2011)

Lead

Table 46 Annual Mean Lead Concentration for PTP05-Pt Pirie Frank Green Park (2002 - 2011)

Year (yyyy)	AAQ NEPM Standard 0.50 $\mu\text{g}/\text{m}^3$ (annual-hr average)	
	Data availability rate (% days)	Annual mean ($\mu\text{g}/\text{m}^3$)
<i>2002</i>	<i>60.7</i>	<i>0.26</i>
2003	93.4	0.23
2004	98.4	0.33
2005	98.4	0.30
2006	100.0	0.19
2007	98.3	0.21
2008	100.0	0.14
2009	98.4	0.19
2010	96.7	0.19
2011	100.0	0.10

Years shown in italics indicate data availability is less than 75%.

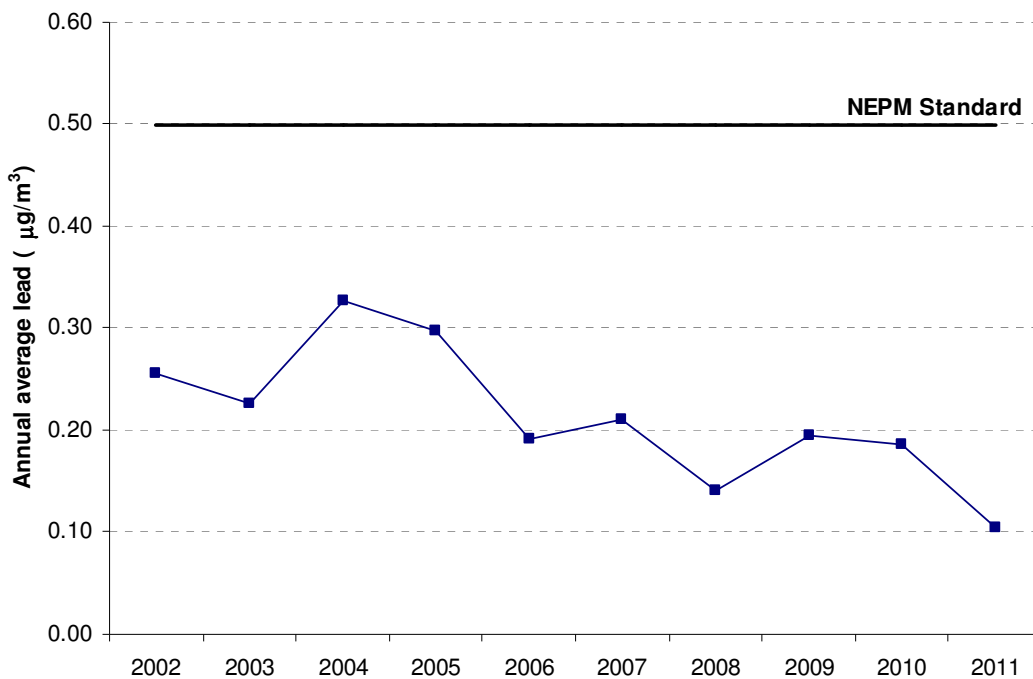


Figure 28 Annual mean lead concentration for PTP05 - Port Pirie Frank Green Park (2002-2011)

Table 47 Annual Mean Lead Concentration for PTP01-Pt Pirie Oliver Street (2002 - 2011)

AAQ NEPM Standard
0.50 $\mu\text{g}/\text{m}^3$ (annual-hr average)

Year (yyyy)	Data availability rate (% days)	Annual mean ($\mu\text{g}/\text{m}^3$)
2002	59.0	0.62
2003	96.7	0.68
2004	98.4	0.68
2005	98.4	0.70
2006	100.0	0.56
2007	100.0	0.59
2008	95.1	0.41
2009	100.0	0.40
2010	98.4	0.23
2011	100.0	0.28

Data shown in bold type indicates an exceedence of the NEPM standard.
Years shown in italics indicate data availability is less than 75%.

Lead data are reported to ambient conditions and analyses were carried out by NATA accredited facilities at the Queensland Health Forensic and Scientific Services laboratory (NATA accreditation no. 41).

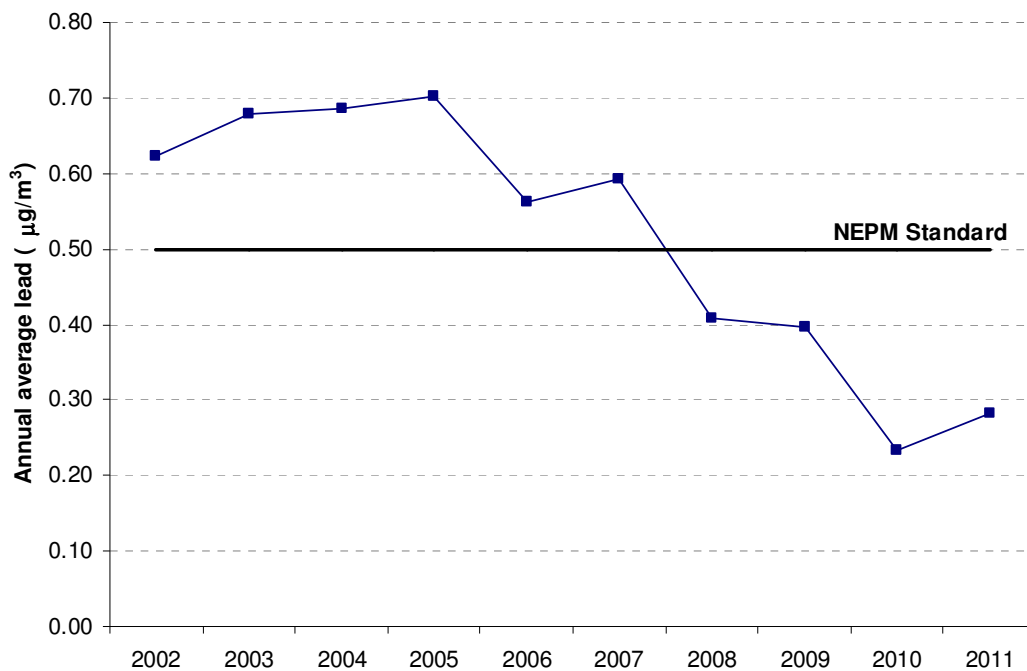


Figure 29 Annual mean lead concentration for PTP01- Port Pirie Oliver Street (2002 - 2011)

Particulate matter as PM_{2.5}

Table 48 Percentiles of daily 24-hour PM_{2.5} concentrations for NET01-Netley (2004 - 2011)

AAQ NEPM Advisory Reporting Standard
25 µg/m³ (24-hr average)

Year (yyyy)	Data availability rates (%)	Max (µg/m ³)	Percentiles (µg/m ³)					
			99th	98th	95th	90th	75th	50th
2005	96.4	17.3	16.4	15.0	13.2	11.6	9.4	7.3
2006	96.2	61.2	20.4	19.0	14.5	12.0	9.7	7.3
2007	99.2	21.9	14.4	13.5	12.3	11.3	9.3	7.6
2008	91.8	20.2	15.7	14.5	12.5	10.9	9.2	7.2
2009	85.5	26.8	17.9	15.2	13.5	11.9	9.6	7.6
2010	98.4	20.3	14.2	13.0	11.6	10.2	8.6	7.1
2011	96.7	15.8	13.3	12.4	10.9	10.1	8.2	6.8

Data shown in bold type indicates an exceedence of the NEPM standard.

Monitoring by Tapered Element Oscillating Microbalance (TEOM).

The SA EPA uses Section 6 Option 4 (no temperature adjustment of TEOM data) of Peer Review Committee, Technical Paper No 10 Collection and Reporting of TEOM PM₁₀ Data, May 2001 to report TEOM data. This is as volatiles are not expected to be significant.

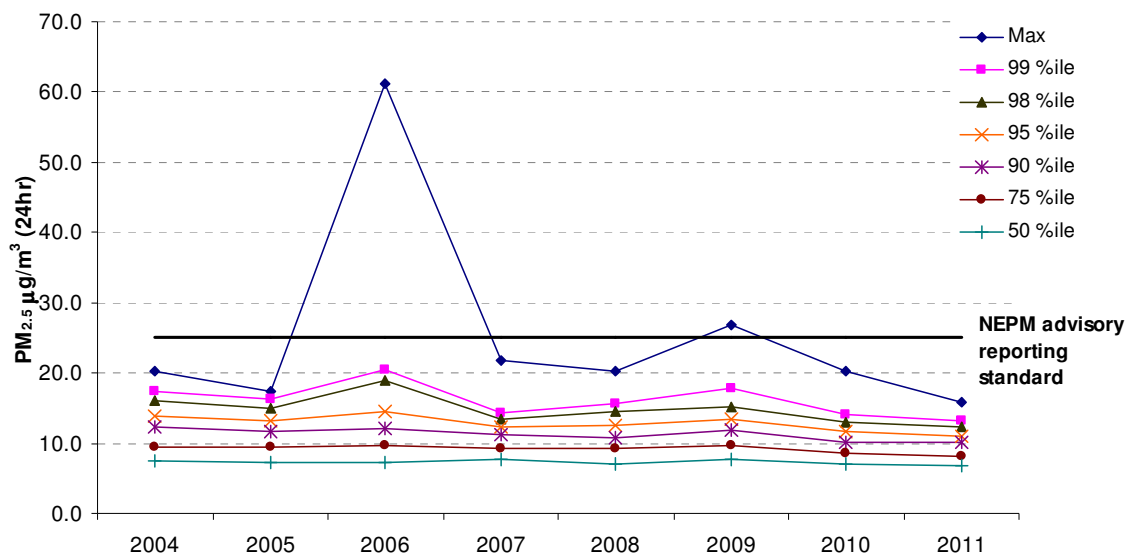


Figure 30 Percentiles of daily 24-hour PM_{2.5} concentrations for NET01-Netley (2004-2011)

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