Australian Capital Territory

THE

AUSTRALIAN CAPITAL TERRITORY
2008 AMBIENT AIR QUALITY REPORT

AGAINST THE

AMBIENT AIR QUALITY
NATIONAL ENVIRONMENT PROTECTION MEASURE

JUNE 2009

Section A - Monitoring Summary

This 2008 annual report has been prepared with reference to the national Peer Review Committee's (PRC) *Technical Paper No. 8 – Annual Reports* (October 2002).

Consistent with the ACT's Ambient Air Quality Monitoring Plan this report only covers four of the six criteria pollutants, namely carbon monoxide, nitrogen dioxide, ozone and particulate matter less than 10 micrometres (PM_{10}). Lead monitoring ceased in 2002 with levels significantly less then the national standard and sulfur dioxide has never been measured due to a lack of industry. The report also covers particulate matter less than 2.5 micrometres ($PM_{2.5}$).

To date the ACT has only reported against one performance monitoring station (PMS). Based on an estimated population of 346400[1] the ACT has passed the point where it needs a second PMS. The Department of the Environment, Climate Change, Energy and Water and ACT Health are currently negotiating to secure funds to establish this station.

In regions where only a single PMS is required, the PRC recommends that such a station be located to be generally representative of upper bound (GRUB) pollutants concentrations.

By using GRUB stations to monitor the ambient air across a region we can be reasonably sure that, if the NEPM Standards are met at those sites, then in theory most of the total population of the region would be exposed to air at or below these pollution levels. In this way the NEPM's desired environmental outcome of adequate protection of human health and well-being should be assured.

Maximums measured at the existing station at Monash are at the upper bound of levels historically recorded in Canberra and it has been designated as the ACT's NEPM PMS.

Monash is located in southern Canberra and sits centrally in the Tuggeranong Valley. The station is located on vacant land approximately 250 metres north of Isabella Drive and 150 metres west of Cockcroft Avenue.

The Monash station has been operational since 1996 and is sited in accordance with AS2922-1987 (*Ambient Air - Guide for Siting of Sampling Sites*). It is intended that this remain a permanent monitoring and trend site for the ACT.

The ACT Government monitoring network is NATA accredited.

[1] 3101.0 - Australian Demographic Statistics, Sep 2008

Section B - Assessment of Compliance with Goal and Standards

Annual compliance summary for 8-hour carbon monoxide

NEPM standard - 9.0 ppm

Region/ Performance monitoring station	Data availability rates (% of hours)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Canberra							
Monash	95.5	95.8	95.6	72.6	88.0	0	Met

Annual compliance summary for 1-hour and 1-year nitrogen dioxide

NEPM standard - 1hour 0.12 ppm, 1year 0.03 ppm

Region/ Performance monitoring station	Data availability rates (% of hours)					Annual mean Concentration (ppm)	Number of 1-hour exceedences (days)	Performance against the standards and goal	
	Q1	Q2	Q3	Q4	Annual			1- hour	1-year
Canberra									
Monash	91.3	95.8	95.6	71.3	86.5	0.006	0	Met	Met

Annual compliance summary for 1-hour and 4-hour ozone

NEPM standard - 1-hour 0.10 ppm , 4-hour 0.08 ppm

Region/ Performance monitoring station	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
Canberra									
Monash	95.7	82.3	95.6	71.3	84.2	0	0	Met	Met

Annual compliance summary for 24-hour PM_{10}*

NEPM standard 50 $\mu g/m^3$

Region/ Performance monitoring station	Data availability rates (% of days)					Number of exceedences (days)	Performance against the standards and goal
	Q1	Q2	Q3	Q4	Annual		
Canberra							
Monash	100	100	100	46	82	3	ND

* TEOM data adjusted in accordance with Technical paper No. 10. Due to the relocation of the Monash station data collection ceased on 26 October.

Annual compliance summary for 24-hour and 1-year $PM_{2.5}$*

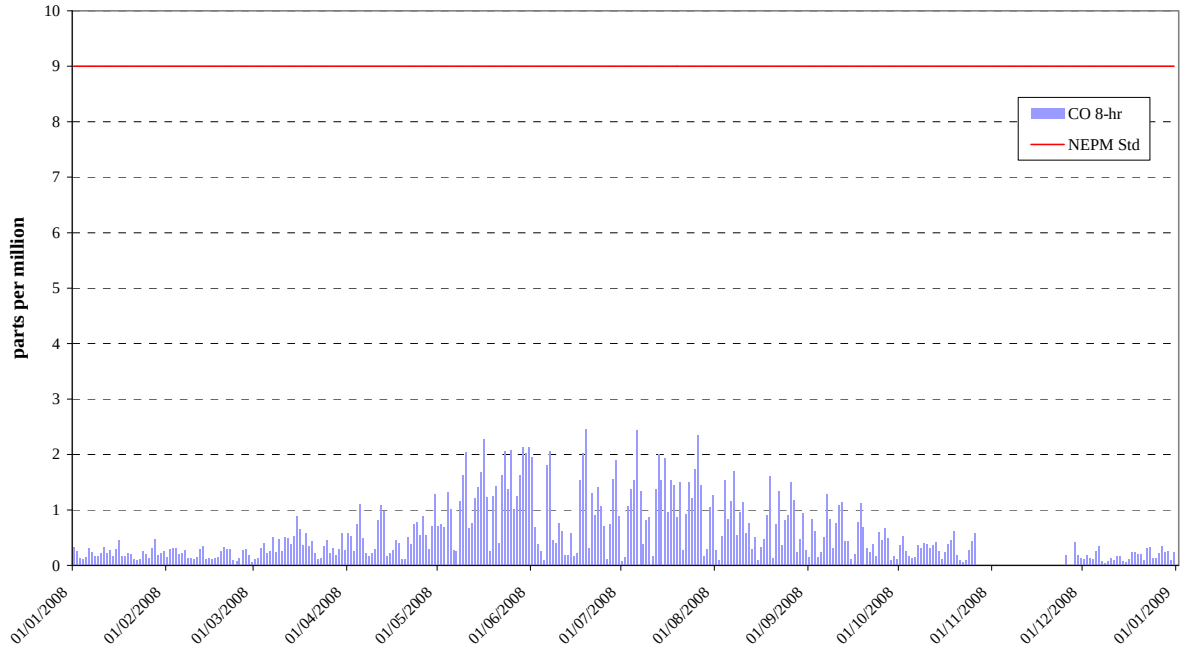
NEPM standard - 24hour 25 µg/m$^{3\#}$, 1year 8 µg/m$^{3\#}$

Region/ Performance monitoring station	Data availability rates (% of days)					Annual mean Concentration (µg/m^3)	Number of exceedences (days)
	Q1	Q2	Q3	Q4	Annual		
Canberra Monash	71	75	55	0	45	8.7	6

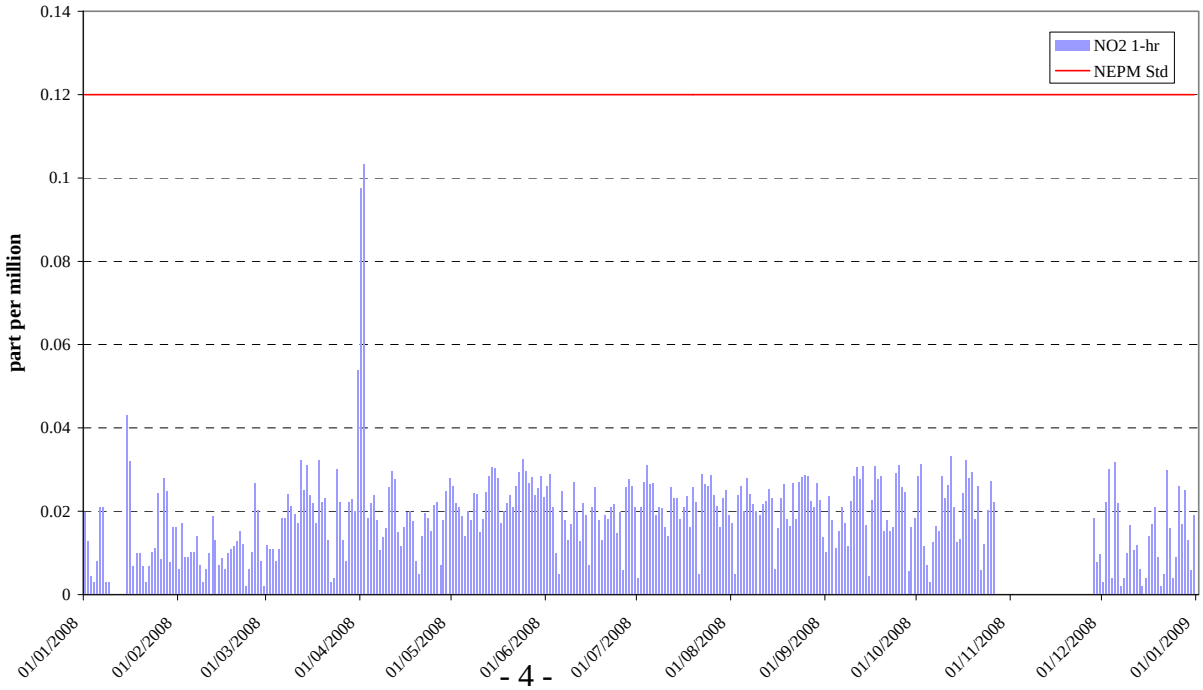
* Due to instrument malfunction and the relocation of the Monash station PM2.5 data collection ceased on 19 August 2008.
# - reporting standard only

Daily Peak time series graphs

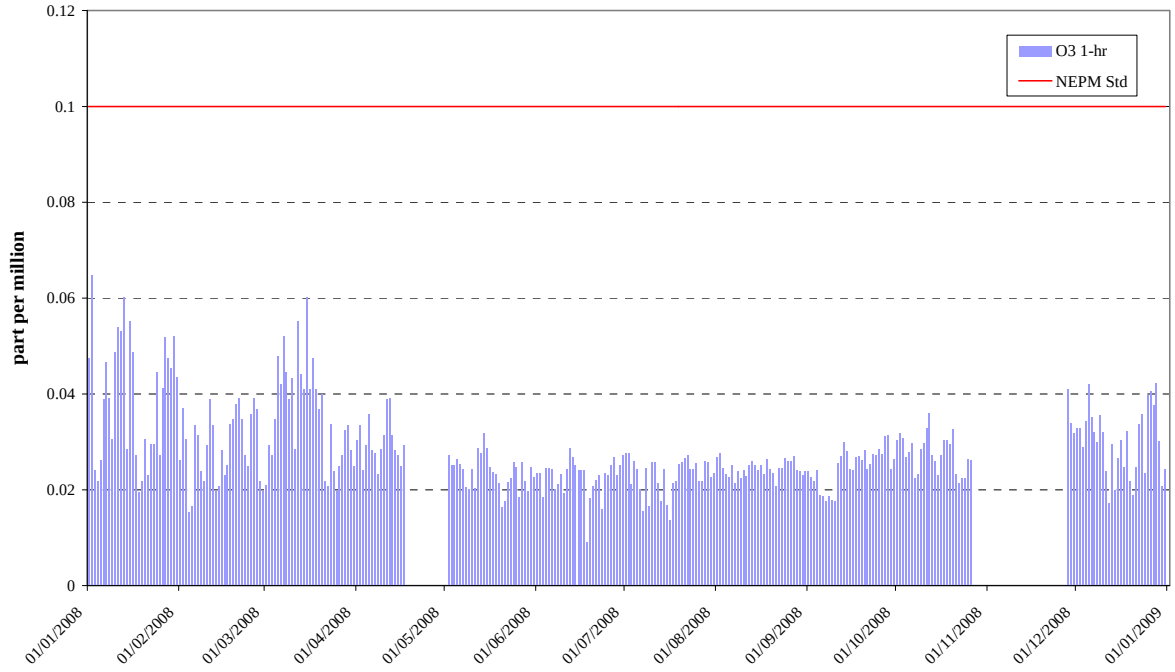
Carbon monoxide 8hr



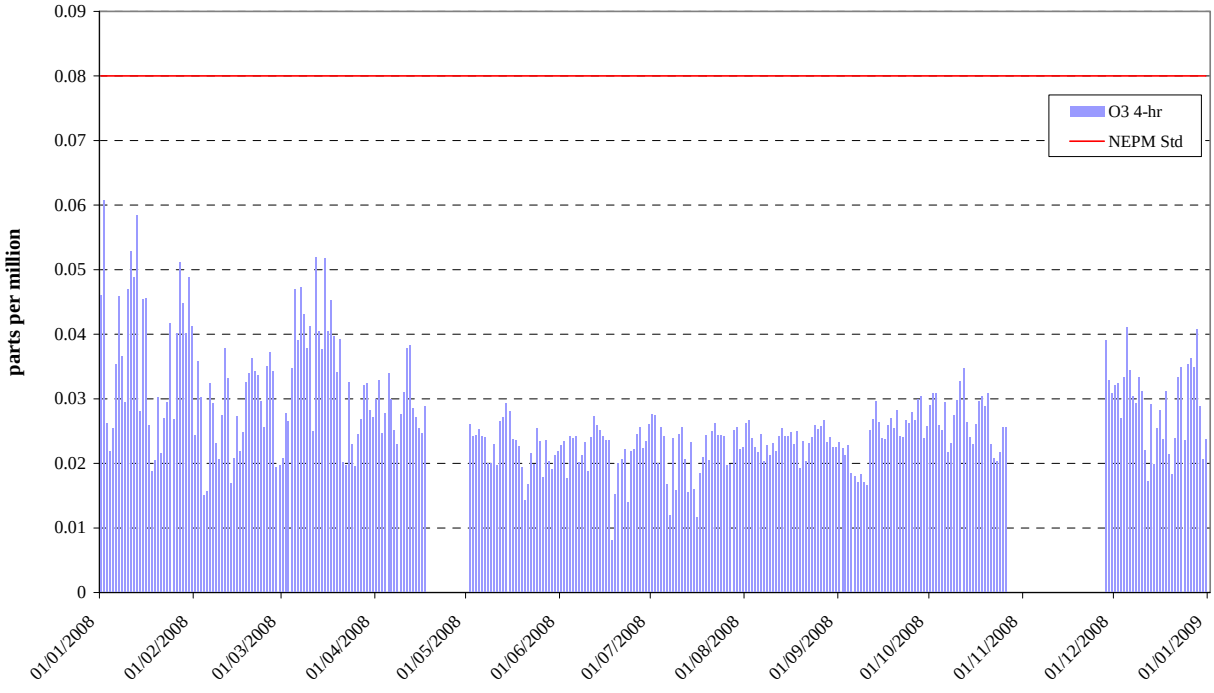
Nitrogen dioxide 1hr



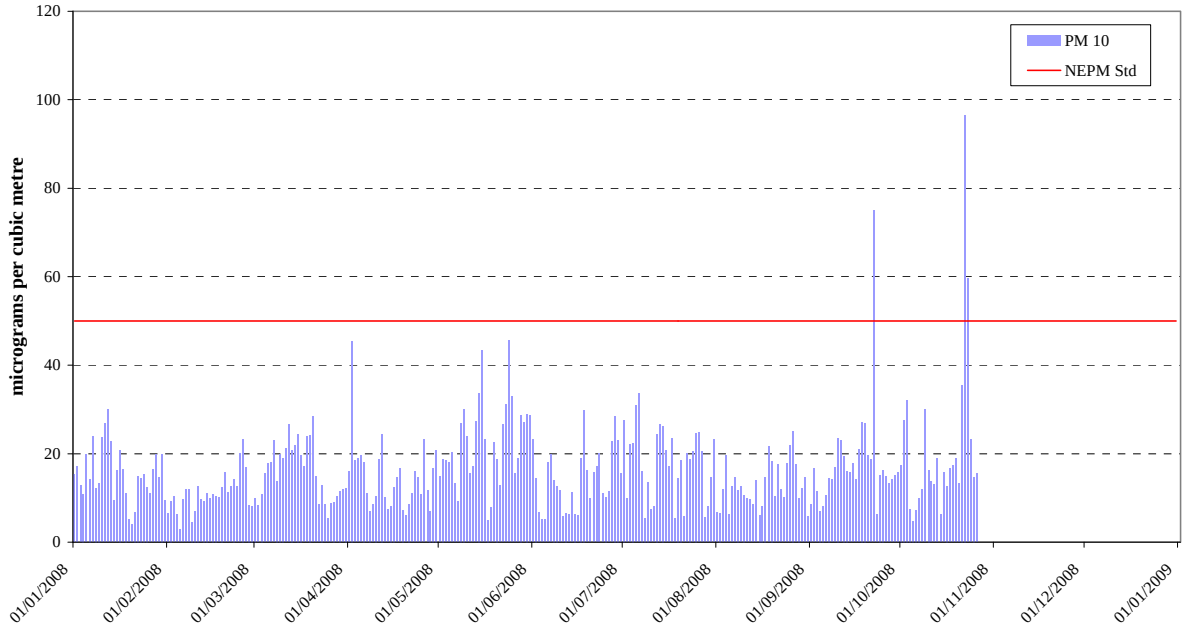
Ozone 1-hr



Ozone 4hr



PM10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100
80
60
40
20
0
PM 10
NEPM Std
01/01/2008
01/02/2008
01/03/2008
01/04/2008
01/05/2008
01/06/2008
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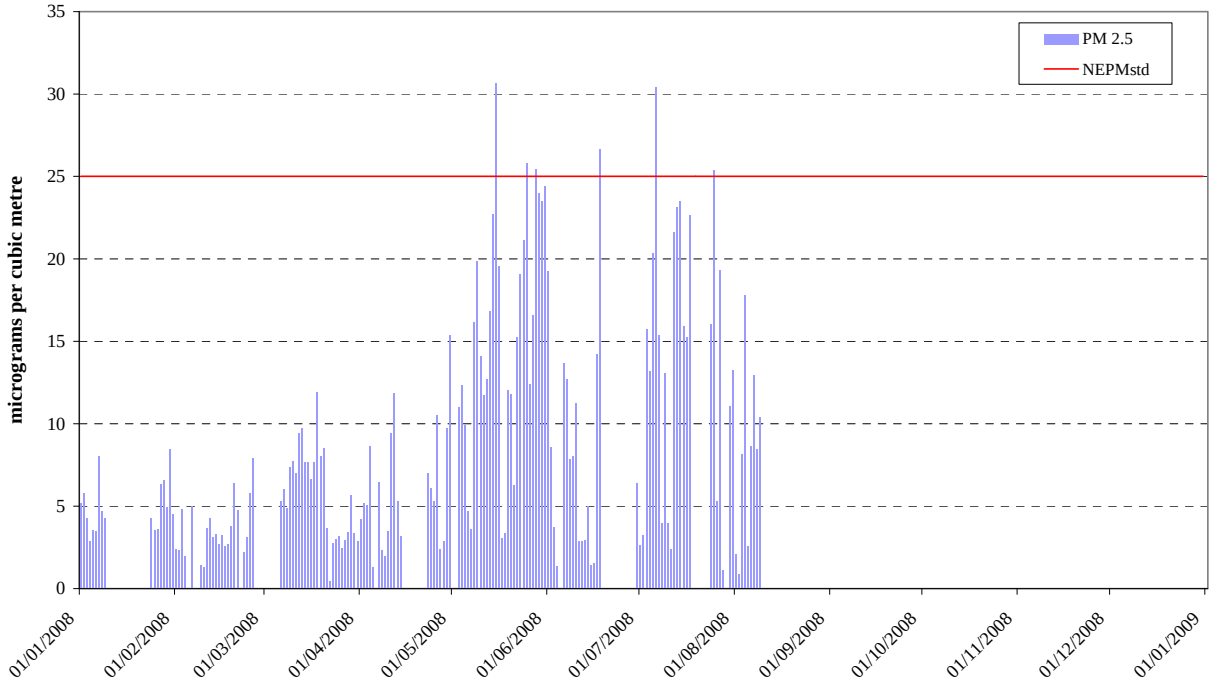
01/11/2008
01/12/2008
01/01/2009

PM 2.5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30
25
20
15
10
5
0
PM 2.5
NEPMstd
01/01/2008
01/02/2008
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01/04/2008
01/05/2008
01/06/2008
01/07/2008
01/08/2008
01/09/2008
01/10/2008
01/11/2008
01/12/2008
01/01/2009

Section C - Analysis of Air Quality Monitoring

The ACT is making steady progress towards achieving the goal of the NEPM, which is to achieve the standards specified in Schedule 2. With the exception of particulate matter all measured parameters are below the standards.

Historical monitoring indicates that Canberra experiences an increase in particulate matter levels during winter due to emission from domestic wood heaters, although this year no exceedences of the standard were recorded during this period. In more recent years exceedences have also been recorded from dust storms and bushfire smoke due to continuing drought conditions in the region.

During 2008 a total of three PM_{10} exceedences were recorded. The first exceedence on 22 September was due to a dust storm. The second and third exceedences on 22 and 23 October respectively, were due to dust from nearby construction activities as the site is being redeveloped for an aged persons village. The station was closed for relocation on 26 October 2008 with the new site being approximately 150 due West from the old location.

Due to instrument malfunction and the subsequent station relocation $PM_{2.5}$ monitoring data is not available after 9 August 2008 and PM_{10} monitoring for the year ceased on 26 October 2008.

Annual summary statistics for daily peak 8-hour carbon monoxide
NEPM standard 9.0 ppm

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date/ time)	2nd Highest (ppm)	2nd Highest (date/ time)
Canberra Monash	335	2.45	Jun19:02	2.45	Jul6:05

Annual summary statistics for daily peak 1-hour nitrogen dioxide
NEPM standard 0.12 ppm

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date/ time)	2nd Highest (ppm)	2nd Highest (date/ time)
Canberra Monash	329	0.103	Apr2:07	0.097	Apr1:20

Annual summary statistics for daily peak 1-hour ozone
NEPM standard 0.10 ppm

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date/ time)	2nd Highest (ppm)	2nd Highest (date/ time)
Canberra Monash	320	0.065	Jan1:14	0.060	Jan13:15

Annual summary statistics for daily peak 4-hour ozone
NEPM standard 0.08 ppm

Region/ Performance monitoring station	Number of valid days	Highest (ppm)	Highest (date/ time)	2nd Highest (ppm)	2nd Highest (date/ Time)
Canberra Monash	320	0.061	Jan1:14	0.058	Jan13:15

Annual summary statistics for 24-hour PM_{10}
NEPM standard 50 μg/m^3

Region/ Performance monitoring station	Number of valid days	Highest ($\mu g/m^3$)	Highest (date)	6th Highest ($\mu g/m^3$)	6th Highest (date)
Canberra Monash	300	96.6	Oct 22	43.6	May 15

Annual summary statistics for 24-hour $PM_{2.5}$
NEPM standard 25 μg/m^3

Region/ Performance monitoring station	Number of valid days	Highest ($\mu g/m^3$)	Highest (date)	6th Highest ($\mu g/m^3$)	6th Highest (date)
Canberra Monash	132	30.7	May 15	26.6	Jul 25

Section D – Data Analysis

Percentiles of daily peak pollutant concentration (2008)

Pollutant	Data availability rates (%)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
CO 8 hr	88.0	2.4	2.2	2.1	1.8	1.5	0.8	0.3
NO2 1hr	86.5	0.103	0.040	0.032	0.031	0.028	0.025	0.019
Ozone 1hr	84.2	0.065	0.055	0.053	0.047	0.040	0.031	0.026
Ozone 4hr	84.2	0.061	0.052	0.049	0.045	0.038	0.030	0.025
PM10	82	96.6	45.8	35.7	29.9	26.6	20.1	14.8
PM2.5*	36.1	30.7	28.0	25.7	23.5	19.7	12.4	6.3

Daily peak 8-hour carbon monoxide data summary (1998-2008)

Year	Data Availability (%)	No. of Exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
1998	90.5	0	5.8	4.6	4.4	3.7	2.9	1.2	0.5
1999	82.6	0	4.5	4.2	4.2	3.7	3.2	2.2	0.7
2000	79.1	0	5.8	4.5	4.4	3.7	3.0	1.7	0.7
2001	91.7	0	4.2	4.0	3.8	3.1	2.5	1.2	0.4
2002	92	0	4.3	3.7	3.4	2.9	2.3	1.2	0.4
2003	86.8	0	3.7	3.0	2.8	2.5	2.0	0.8	0.3
2004	94.1	0	3.2	2.7	2.5	2.0	1.6	0.9	0.5
2005	99.5	0	3.2	2.8	2.5	2.2	1.7	1.0	0.4
2006	99.7	0	3.7	2.8	2.6	2.2	1.8	1.1	0.4
2007	95.3	0	2.6	2.5	2.4	2.0	1.5	0.7	0.4
2008	88.0	0	2.4	2.2	2.1	1.8	1.5	.08	0.3

Daily peak Nitrogen dioxide data summary (1998-2008)

Year	Data Recovery (%)	No. of Exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
1998	70.9	0	0.045	0.039	0.034	0.030	0.028	0.023	0.016
1999	86.3	0	0.054	0.034	0.031	0.030	0.028	0.025	0.019
2000	90.0	0	0.042	0.034	0.031	0.028	0.026	0.022	0.018
2001	86.3	0	0.039	0.036	0.036	0.033	0.029	0.024	0.020
2002	88.3	0	0.045	0.036	0.034	0.031	0.026	0.022	0.017
2003	90.4	0	0.064	0.042	0.033	0.028	0.025	0.021	0.016
2004	91.8	0	0.040	0.033	0.031	0.028	0.026	0.022	0.018
2005	97.8	0	0.041	0.034	0.031	0.028	0.027	0.024	0.018
2006	98.4	0	0.044	0.036	0.033	0.031	0.029	0.024	0.019
2007	97.0	0	0.039	0.037	0.035	0.030	0.028	0.023	0.018
2008	86.5	0	0.103	0.040	0.032	0.031	0.028	0.025	0.019

Daily peak 1-hour ozone data summary (1998-2008)

Year	Data Recovery (%)	No. of Exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
1998	82.5	0	0.075	0.034	0.032	0.031	0.028	0.0221	0.018
1999	87.5	0	0.069	0.061	0.055	0.045	0.039	0.030	0.024
2000	57.9	0	0.054	0.047	0.044	0.041	0.032	0.027	0.022
2001	81.5	0	0.062	0.044	0.041	0.038	0.034	0.030	0.026
2002	93.5	0	0.063	0.055	0.052	0.047	0.042	0.032	0.024
2003	92.4	0	0.102	0.069	0.061	0.050	0.045	0.035	0.025
2004	94.1	0	0.064	0.56	0.054	0.048	0.044	0.038	0.030
2005	97.8	0	0.065	0.058	0.053	0.045	0.041	0.034	0.030
2006	99.7	0	0.067	0.060	0.057	0.052	0.049	0.040	0.032
2007	100	0	0.075	0.064	0.062	0.057	0.052	0.043	0.032
2008	84.2	0	0.065	0.055	0.053	0.047	0.040	0.031	0.026

Daily peak 4-hour ozone data summary (1998-2008)

Year	Data Recovery (%)	No. of Exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
1998	82.5	0	0.038	0.033	0.031	0.028	0.026	0.021	0.017
1999	87.5	0	0.063	0.054	0.046	0.042	0.036	0.029	0.024
2000	57.9	0	0.047	0.043	0.041	0.035	0.030	0.026	0.019
2001	81.5	0	0.051	0.041	0.038	0.035	0.032	0.028	0.024
2002	93.5	0	0.058	0.051	0.049	0.044	0.039	0.031	0.023
2003	92.4	1	0.082	0.063	0.058	0.048	0.043	0.033	0.025
2004	94.1	0	0.060	0.053	0.051	0.045	0.042	0.036	0.029
2005	97.5	0	0.062	0.054	0.049	0.044	0.039	0.033	0.029
2006	99.7	0	0.061	0.056	0.055	0.050	0.046	0.038	0.031
2007	100	0	0.072	0.061	0.059	0.054	0.050	0.040	0.032
2008	84.2	0	0.061	0.052	0.049	0.045	0.038	0.030	0.025

Daily peak PM10 data summary (1999-2008)

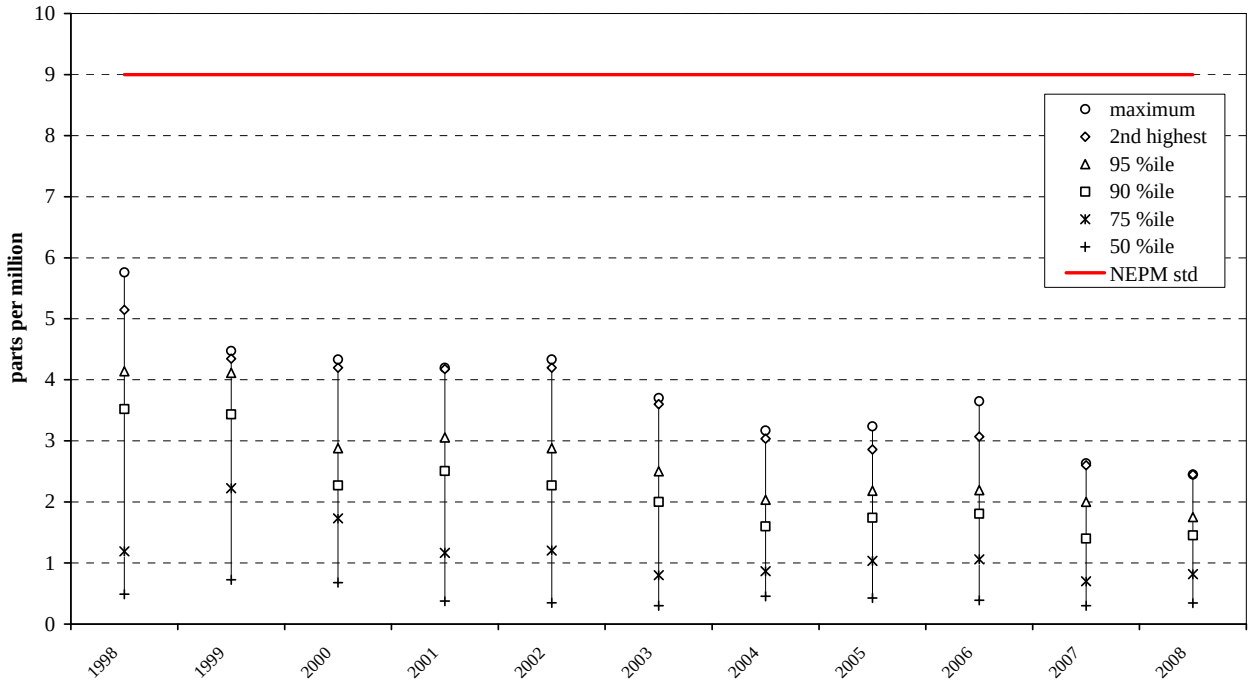
Year	Data Recovery (%)	No. of Exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
1999	9.0	4	65.11	65.0	64.9	63.6	51.3	37.7	21.1
2000	15.3	1	56.4	52.6	49.4	47.6	42.4	23.1	14.5
2001	15.9	4	70.6	66.1	61.9	56.2	45.6	25.0	13.9
2002	75	0	108.4	56.6	48.5	42.4	37.7	25.3	16.2
2003	97.5	13	350.4	136.4	105.3	39.6	30.3	21.2	14.6
2004	99.7	3	52.0	48.2	46.0	33.8	28.5	20.7	14.7
2005	97.5	10	98.8	57.6	52.7	37.3	31.0	21.2	14.5
2006	83.8	4	55.2	51.0	44.9	33.9	28.3	22.7	16.9
2007	99.7	5	117.7	61.8	42.5	35.3	28.0	21.0	14.9
2008	82	3	96.6	45.8	35.7	29.9	26.6	20.1	14.8

Daily peak PM2.5 data summary (2004-2008)

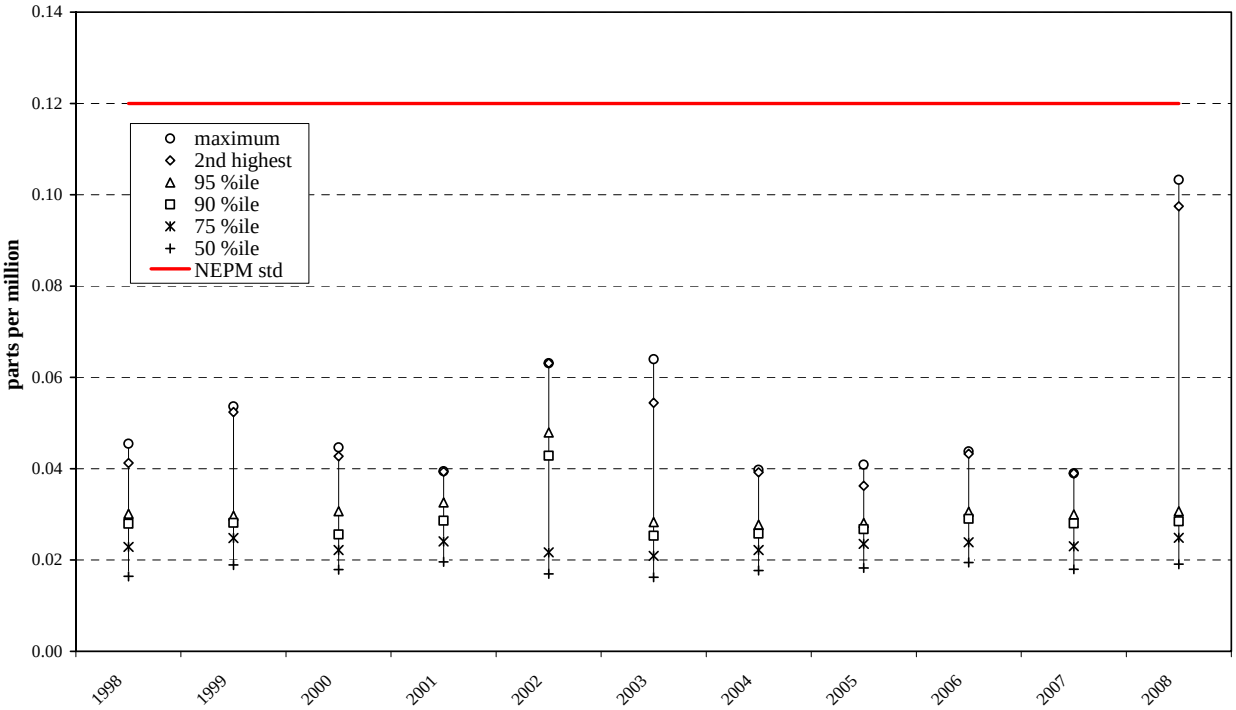
Year	Data Recovery (%)	No. of Exceedences (days)	Max conc. (ppm)	99th percentile (ppm)	98th percentile (ppm)	95th percentile (ppm)	90th percentile (ppm)	75th percentile (ppm)	50th percentile (ppm)
2004	93.1	15	38.3	35.8	31.5	23.5	16.6	9.5	6.2
2005	73.6	14	38.6	31.4	29.3	25.0	20.7	9.0	4.9
2006	83.3	20	46.9	35.6	33.3	27.8	15.6	8.7	5.8
2007	58.1	8	45.7	27.8	27.6	20.9	15.7	8.8	5.4
2008	36.1	6	30.7	28.0	25.7	23.5	19.7	12.4	6.3

Daily peak data summary graphs

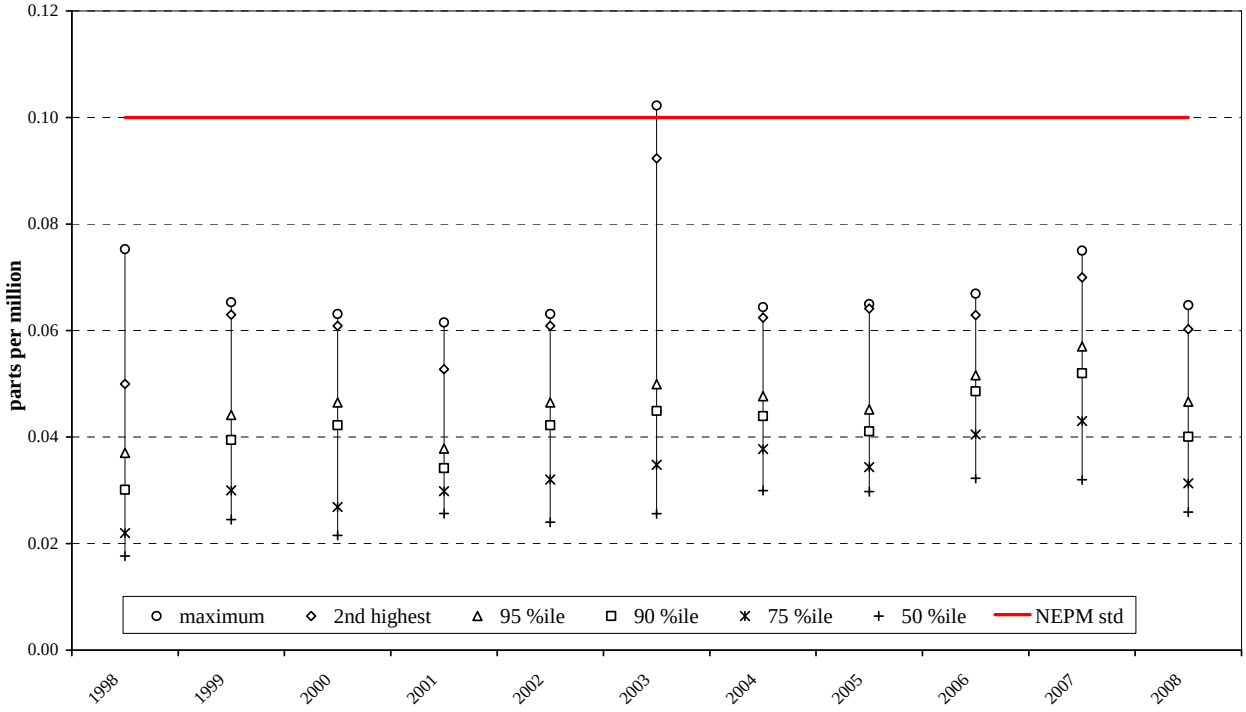
Carbon monoxide 8hr



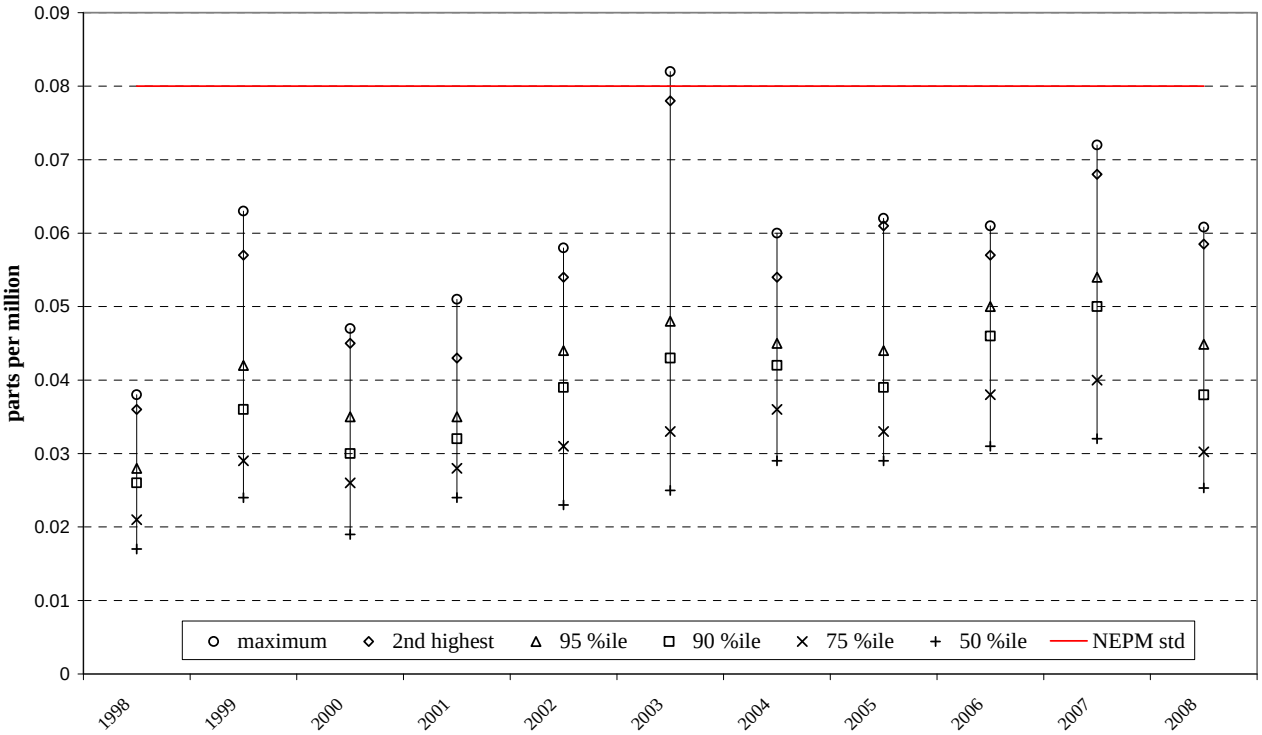
Nitrogen dioxide 1hr



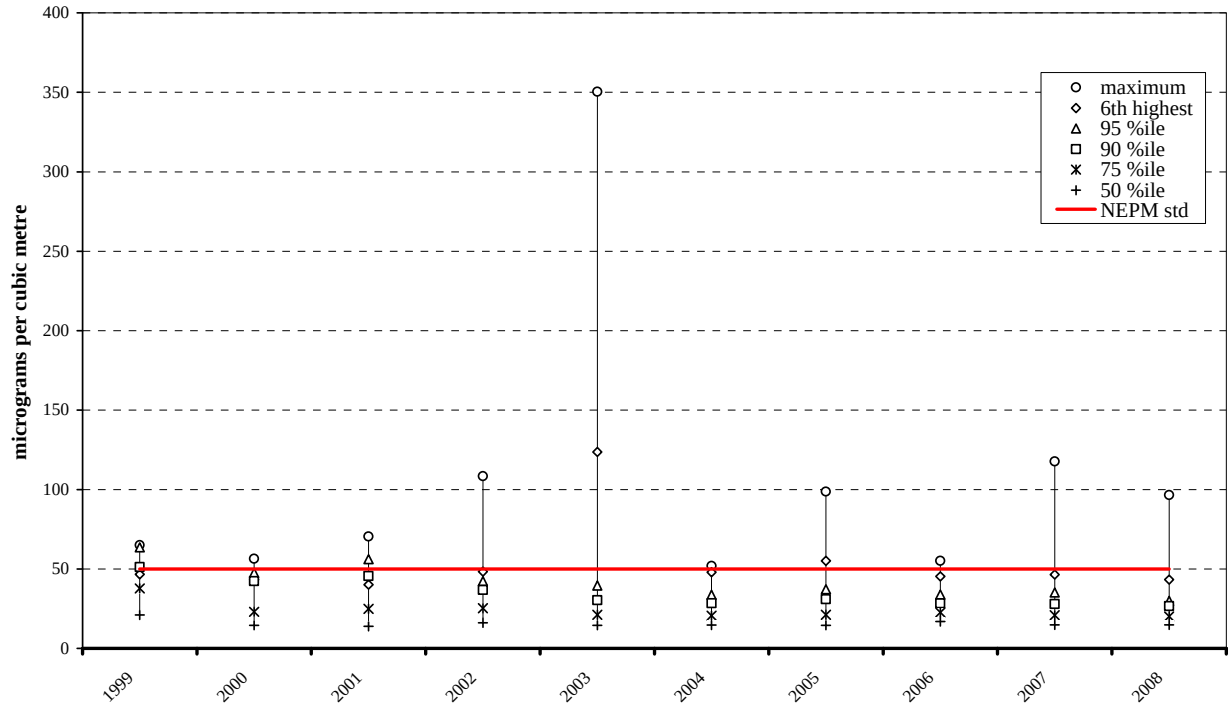
Ozone 1hr



Ozone 4hr



PM10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350
300
250
200
150
100
50
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maximum
6th highest
95 %ile
90 %ile
75 %ile
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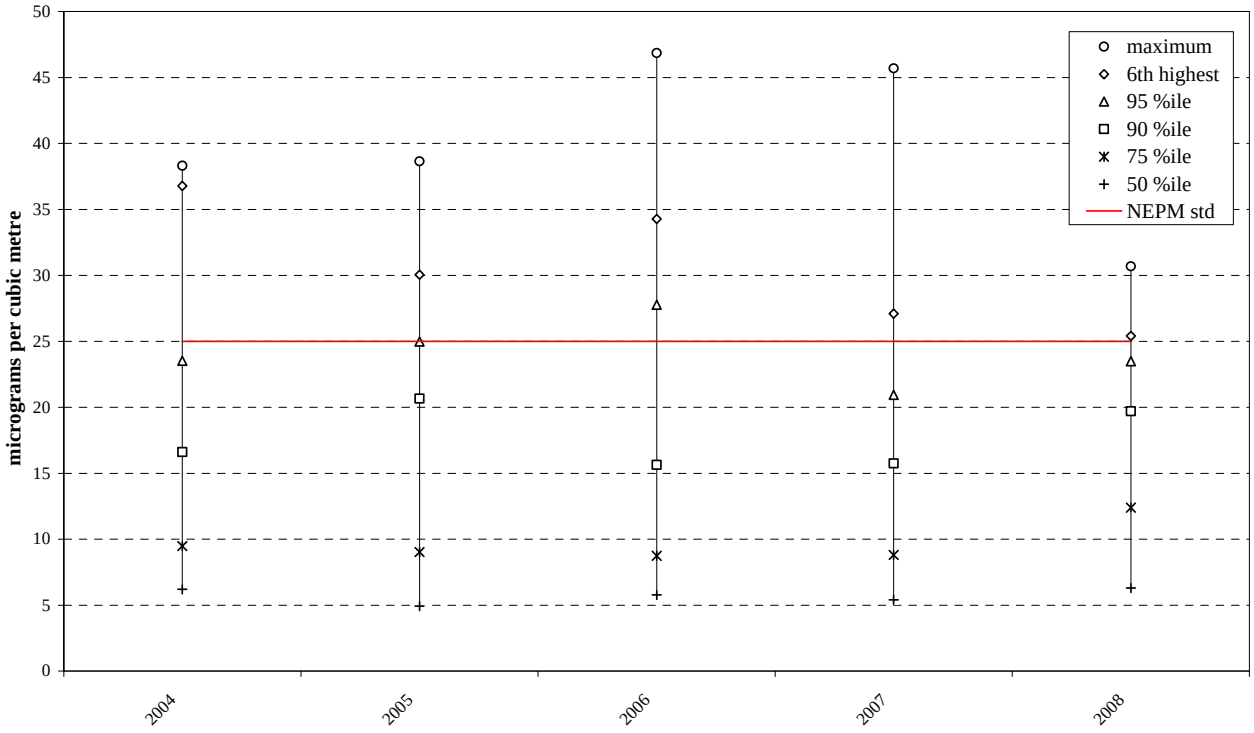
2003
2004
2005
2006
2007
2008

PM2.5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6th highest
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75 %ile
50 %ile
NEPM std
2004
2005
2006
2007
2008