ANNUAL COMPLIANCE REPORT FOR THE NORTHERN TERRITORY
1 JANUARY – 31 DECEMBER 2008

AMBIENT AIR NEPM
REPORT TO THE NATIONAL ENVIRONMENT PROTECTION COUNCIL (NEPC)

BACKGROUND

Clause 18 of the National Environment Protection (Ambient Air Quality) Measure (Ambient Air NEPM) requires jurisdictions to submit a report of their compliance with the Measure for each calendar year. The content of the jurisdictional report is prescribed in clause 17 of the Ambient Air NEPM.

This NT report covers the performance evaluation and assessment under the NEPM for the 2008 reporting year (1 January to 31 December 2008). The report is based on Technical Paper No. 8 (Annual Reports) which details the format and data requirements of the Annual Report. It is a technical report to the National Environment Protection Council (NEPC) and supplements the annual summary report provided each year by each jurisdiction under the NEPC Act on the overall implementation process.

SECTION A – MONITORING SUMMARY

A.1 Monitoring Requirements

The results of campaign monitoring in 2000-2001 were used to assess the monitoring requirements for the Northern Territory using the screening criteria outlined in Technical Paper 4 (Screening Procedures). This monitoring identified particles from landscape fires affecting the Darwin region as the primary air pollutant of concern in the Northern Territory. Screening of the 2000-2001 data indicated that nitrogen oxides, sulfur dioxide, carbon monoxide, ozone and lead aerosols were not a cause for concern in the Darwin/Palmerston conurbation when assessed against the Ambient Air NEPM national standards.

The Northern Territory Government has committed funding in 2008-09 to the establishment and ongoing operation of a comprehensive air quality monitoring system for the Darwin region. The

new air quality monitoring system will build on current monitoring for particles to other pollutants identified in the Ambient Air NEPM in a manner consistent with the technical requirements of the Ambient Air NEPM. As of mid 2009 two air quality monitoring stations have been ordered and are planned to be operating by late 2009.

A.2 Current Monitoring Stations

In the Darwin /Palmerston conurbation there is currently one monitoring station located at Charles Darwin University, Casuarina, Darwin (Figure 1).

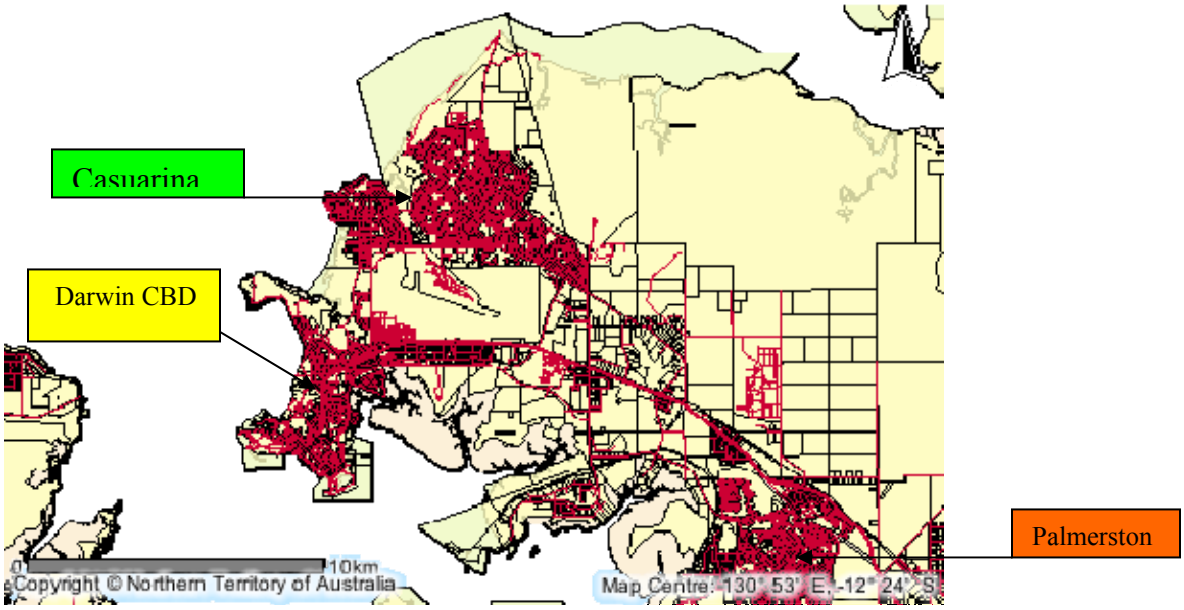

Figure 1: Darwin/Palmerston region showing location of Casuarina monitoring site

A.3 Determination of Exposed Population for Each Performance Monitoring Station

Based on a total population for the Northern Territory of 219 818 (ABS 2008) the Darwin/Palmerston conurbation (101 784) and Alice Springs (27 481) region are the only areas in the Northern Territory that exceed the population threshold for ambient air quality monitoring (threshold population >25,000).

The Casuarina monitoring station is located in the northern suburbs of Darwin. The major air pollutant of concern for the region is particles from bushfire smoke in the Dry season (April - October). Prevailing winds during the Dry season are South-Easterly to Easterly, suggesting that population of the region may at times be exposed to particles from bushfires in surrounding areas. Monitoring at Palmerston in previous years has shown data consistency with the Casuarina

monitoring site. Monitoring for particles at Casuarina is expected to provide a representative measure of air quality experienced by the general population of the Darwin/ Palmerston region.

A.4 Monitoring during the Reporting Period

Sampling for particles was carried out during 2008 at the Casuarina monitoring station. Monitoring for PM_{10} was undertaken using both a Tapered Element Oscillating Microbalance (TEOM) sampler and Partisol Dichotomous sampler, while monitoring for $PM_{2.5}$ was undertaken using a Partisol Dichotomous sampler. Although Partisol dichotomous sampling is not a standard method for PM_{10} monitoring under NEPM technical guidelines, Partisol dichotomous sampling has been maintained for PM_{10} to enable comparison and as a contingency to TEOM sampling. Data availability rates for the Partisol Dichotomous sampler reported in Section B reflect unanticipated delays in repair of the sampling instrument.

A.5 Changes to the Approved Monitoring Plan

As previously reported, data taken at both Casuarina and Palmerston had shown consistency over a number of years to the extent that it was decided to rationalise monitoring to one site for the Darwin region. In a partnership agreement between the Department of Natural Resources, Environment, the Arts and Sport (NRETAS), the Department of Health and Community Services, Darwin City Council and Charles Darwin University, one monitoring station continues to be located in the Darwin region at the Charles Darwin University, Casuarina.

The establishment of a new air quality monitoring system for the Darwin region late 2009 will require the submission of a revised monitoring plan for approval of the Peer Review Committee.

A.6 Unresolved Issues

There are no other unresolved issues in the reporting period.

A.7 Status of NATA Accreditation

Monitoring is not NATA accredited. Quality controls are adopted as per manufacturers' specification and for laboratory gravimetric analysis. Weights are NATA accredited plus quality controls are adopted for calibration of the balance. NATA accreditation is a priority for the new Darwin air quality monitoring system.

A.8 Methods Other than Physical Monitoring

No other methods were used in the reporting period.

SECTION B – ASSESSMENT OF COMPLIANCE WITH STANDARDS AND GOALS

Table 1: 2008 Annual Compliance Summary for 24 hr PM_{10}

NEPM Standard 50µg/m^3 (Averaging period 1 day)
NEPM Goal within 10 years – No greater than 5 exceedences

Region/ Performance monitoring station	Data Availability Rates (% of Days)					Number of exceedences (days)	Performance against the standard and goal
	Q1	Q2	Q3	Q4	Annual		
Casuarina *	100.0	97.8	94.6	96.7	97.3	1	Met
Casuarina **	72.5	83.5	92.4	38.0	71.6	2	Not Demonstrated#

* TEOM (adjusted)
** Partisol Dichotomous Sampler
# Performance is not demonstrated as Partisol Dichotomous sampling is not a standard method for PM_{10} monitoring under the NEPM Technical Guidelines. Partisol data is presented as a comparison.

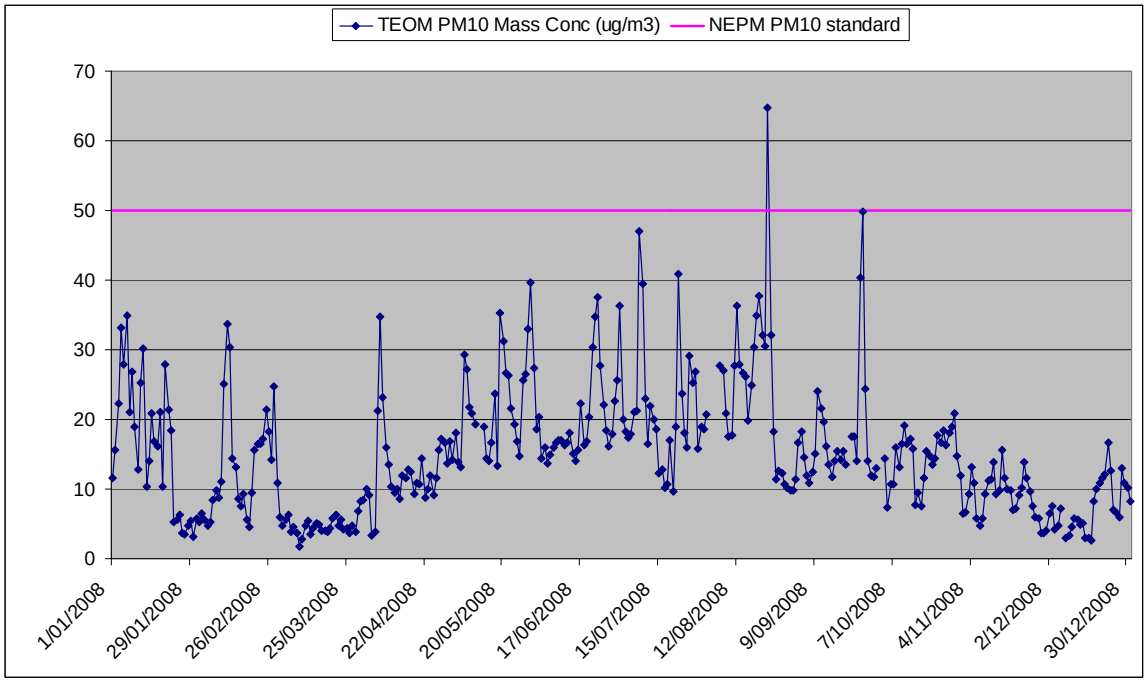

Figure 1: TEOM PM_{10} 24-hour mass loadings at Casuarina, Darwin 2008

Table 2: 2008 Annual Compliance Summary for 24 hr $PM_{2.5}$

NEPM Reporting level 25µg/m^3 (Averaging period 1 day)
NEPM Goal within 10 years – To gather data

Region/ Performance monitoring station	Data Availability Rates (% of Days)					Number of exceedences (days)	Performance against the reporting level and goal
	Q1	Q2	Q3	Q4	Annual		
Casuarina*	72.5	83.5	92.4	38.0	71.6	2	Goal is to gather data

* Partisol Dichotomous Sampler

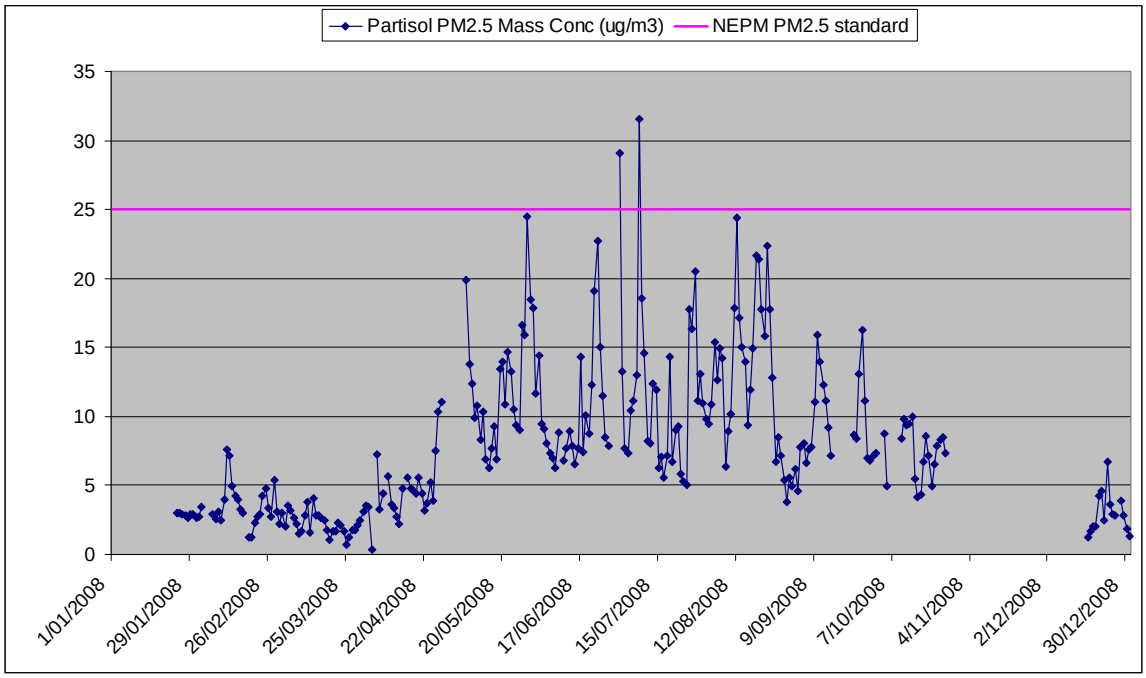

Figure 2: Partisol $PM_{2.5}$ 24-hour mass loadings at Casuarina, Darwin 2008

SECTION C – ANALYSIS OF AIR QUALITY MONITORING

In 2008, TEOM sampling at Casuarina reveals one exceedence of the NEPM standard for PM_{10} thus the NEPM standard has been met. The Casuarina monitoring station is in compliance with the NEPM goal. It is worth noting that although Partisol dichotomous sampling is not a recognised standard method of sampling for PM_{10}, Partisol sampling reveals two exceedences of the NEPM standard on 23 August and 26 September 2008. The Partisol exceedence on 23 August 2008 at 58.1µg/m^3, coincides with the highest recorded daily level (TEOM) of 64.8µg/m^3 (refer Table 3).

Table 3: 2008 PM_{10} exceedences of NEPM reporting level at Casuarina monitoring station, Darwin (TEOM sampling)

Date	PM_{10} mass ($\mu g/m^3$)
23 August 2008	64.8

No monitoring has been undertaken in Alice Springs and compliance with the NEPM has not been demonstrated.

Table 4: 2008 Summary statistics for 24-hour TEOM PM_{10} at Casuarina monitoring station

AAQ NEPM standard
$50\mu g/m^3$ (24-hour average)

Number of valid days	Highest ($\mu g/m^3$)	Highest (date)	6th highest ($\mu g/m^3$)	6th highest (date)
356	64.8	23 Aug 2008	39.6	30 May

In 2008, incomplete Partisol sampling reveals two exceedences of the NEPM reporting level for $PM_{2.5}$ (refer Table 5). These exceedences occurred on different days to the PM_{10} exceedences.

It should be noted that although there is a low number of valid days for $PM_{2.5}$ data, most of the missing days are in January and November during the Wet season when the air is less likely to be impacted by fires than during the Dry season. Thus the number of exceedences of the $PM_{2.5}$ reporting level in 2008 is likely to be accurate.

Table 5: 2008 $PM_{2.5}$ exceedences of NEPM reporting level at Casuarina monitoring station, Darwin (Partisol sampling)

Date	PM2.5mass ($\mu g/m^3$)
1 July 2008	29.0
8 July 2008	31.5

Table 6: 2008 Summary statistics for 24-hour Partisol $PM_{2.5}$ at Casuarina monitoring station

AAQ NEPM reporting level
25μg/m^3 (24-hour average)

Number of valid days	Highest (μg/m^3)	Highest (date)	6th highest (μg/m^3)	6th highest (date)
260	31.5	8 July 2008	22.3	23 August

The elevated levels of particles in Darwin during the Dry season are predominantly due to bushfire smoke. Whilst there is no other significant source of particles affecting the region apart from localised impacts from dust attributed to land clearing and urban development, the overriding influence on levels of PM_{10} and $PM_{2.5}$ against the Ambient Air NEPM national standard and reporting level respectively are almost certainly from the interaction of smoke from landscape fires in the region and the prevailing wind conditions (South-Easterly and Easterly during the Dry season).

Consistent with previous years, the 1 July 2008 exceedence of the $PM_{2.5}$ reporting level is expected to be due to fireworks associated with Territory Day celebrations.

Monitoring of particles will contribute towards development of NT Government air quality policy and provide the basis for the development of appropriate and effective management strategies aimed at ensuring the NEPM standards and goals will continue to be met in the future. NRETAS is continuing to discuss fire management in the region with the Northern Territory Bushfires Council in an ongoing process to minimise the impacts of particles from smoke on the Darwin region. This includes engagement in projects aimed at reducing greenhouse gas emissions from savannah fires.

SECTION D – DATA ANALYSIS

Table 7: Summary of daily peak Percentiles concentration (µg/m^3) PM_{10} and $PM_{2.5}$, 2008

Pollutant	Data Recovery Rate (%)	Max. conc. µg/m^3	Percentiles µg/m^3					
			99th	98th	95th	90th	75th	50th
PM_{10}*	97.3	64.8	40.6	37.8	33.0	27.3	19.0	14.0
$PM_{2.5}$#	*71.6*	*31.5*	*24.5*	*22.2*	*17.9*	*15.1*	*10.7*	*7.0*

* TEOM
# Partisol Dichotomous sampler
Years with data availability less than 75% shown in italics

It is not possible to accurately compare number of exceedences over time in accordance with NEPM technical requirements, as different sampling techniques have been used since monitoring began in 2004 (TEOM and Partisol). As an indication however, comparisons of exceedences for PM_{10} and $PM_{2.5}$ for the period 2004 – 2008 are presented in Figure 3.

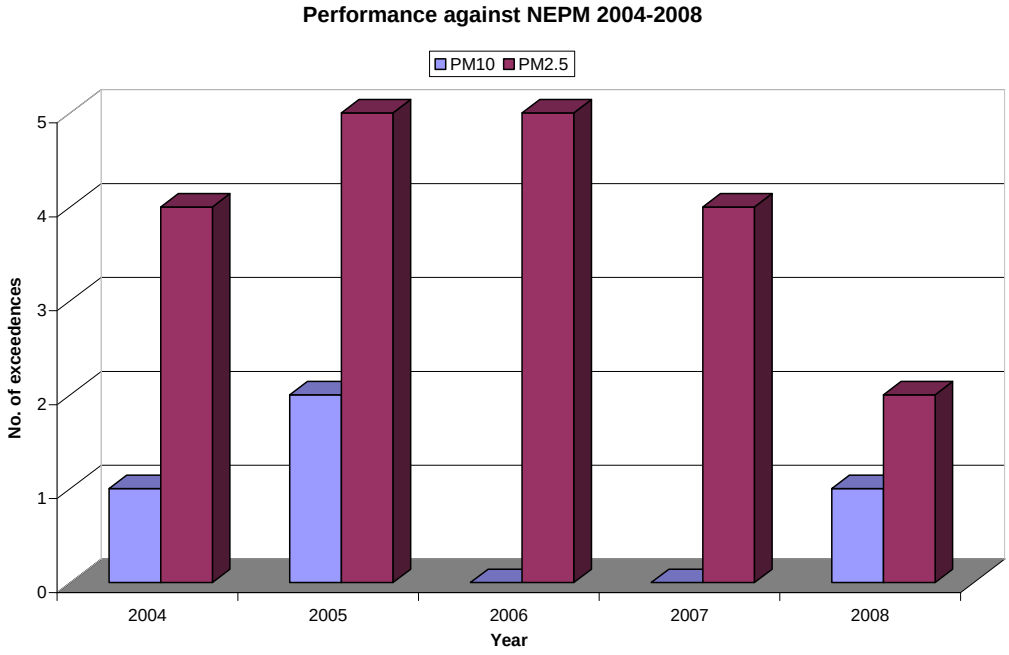

Figure 3: Comparison of Partisol PM_{10} and $PM_{2.5}$ exceedences at Casuarina, Darwin for the years 2004-2008.

Statistical trends for 2004-2008 are presented in Tables 8 and 9.

Table 8: Trends in percentiles of daily peak concentration (μg/m^3) PM_{10}, 2004-2008 (TEOM or Dichotomous Partisol Sampler for 2006)

AAQ NEPM standard
50μg/m^3 (24-hour average)

Year	Data Recovery Rate (%)	No. of exceedences (days)	Max. conc.	Percentiles μg/m^3					
				99th	98th	95th	90th	75th	50th
2004	*68.8*	*1*	*53.7*	*44.7*	*38.5*	*29.7*	*26.3*	*21.4*	*17.4*
2005	98.1	2	63.4	37.6	31.8	29.4	26.2	21.3	15.1
2006 *	97.0	0	44.1	39.0	34.7	30.2	26.5	21.2	14.6
2007	95.1	0	45.3	38.5	32.4	28.2	24.3	19.0	12.2
2008	97.3	1	64.8	40.6	37.8	33.0	27.3	19.0	14.0

* Partisol PM_{10} data used for this year due to very poor data recovery rate from TEOM PM_{10}

Years with data availability less than 75% shown in italics. Note that data collection commenced in April 2004.

Note that percentiles from years previous to 2008 have changed slightly due to errors in the calculation.

Table 9: Trends in percentiles of daily peak concentration (μg/m^3) $PM_{2.5}$, 2004-2008 (Partisol Dichotomous Sampler)

AAQ NEPM reporting level
25μg/m^3 (24-hour average)

Year	Data Recovery Rate (%)	No. of exceedences (days)	Max. conc. μg/m^3	Percentiles μg/m^3					
				99th	98th	95th	90th	75th	50th
2004	*60.1*	*4*	*36.5*	*26.7*	*24.8*	*20.8*	*17.7*	*13.9*	*9.5*
2005	97.8	5	57.7	26.6	22.6	17.6	15.2	11.1	6.8
2006	97.0	5	29.9	25.9	20.9	16.6	14.6	10.9	6.5
2007	*64*	*4*	*47.7*	*25.8*	*22.0*	*18.7*	*14.1*	*8.8*	*4.5*
2008	*71.1*	*2*	*31.5*	*24.5*	*22.2*	*17.9*	*15.1*	*10.7*	*7.0*

Years with data availability less than 75% shown in italics. Note that data collection commenced in April 2004.

Note that percentiles from years previous to 2008 have changed slightly due to errors in the calculation.

References

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