

**ANNUAL COMPLIANCE REPORT FOR THE NORTHERN TERRITORY  
1 JANUARY – 31 DECEMBER 2007**

**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 2007 reporting year (1 January to 31 December 2007). 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 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) (CSIRO 2001, 2002). This monitoring identified particulate matter 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 particulate matter to other

pollutants identified in the Ambient Air NEPM in a manner consistent with the technical requirements of the Ambient Air NEPM.

## 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).

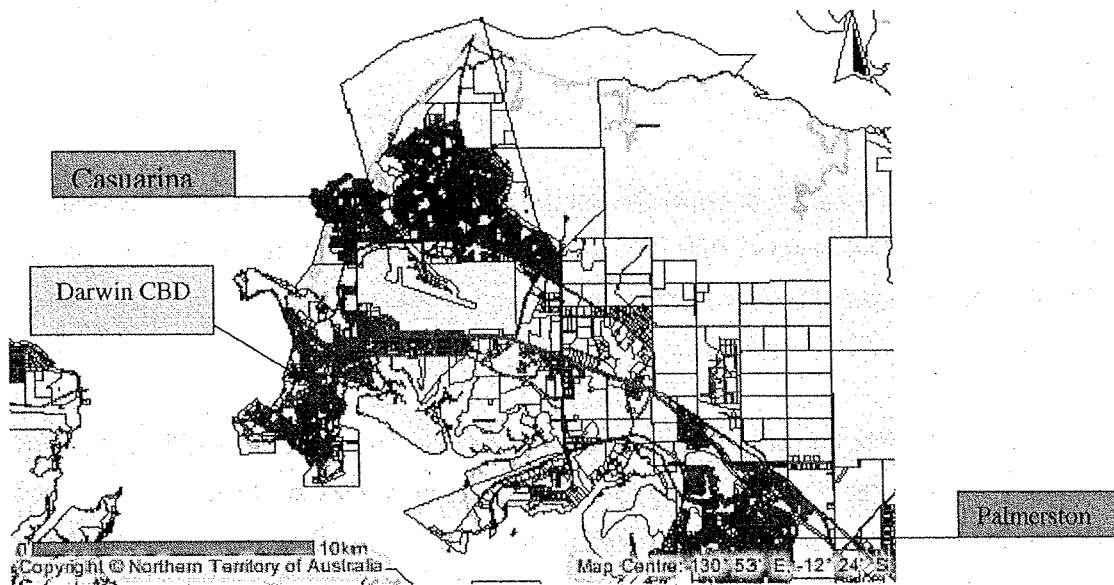


Figure 1: Darwin/Palmerston region showing location of Casuarina monitoring site

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

Based on a total population for the Northern Territory of 206,688 (ABS 2006) the Darwin/Palmerston conurbation (96,573) and Alice Springs (27,018) region are the only areas in the Northern Territory requiring a performance monitoring station (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 particulate matter 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 particulate matter from bushfires in surrounding areas. Monitoring at Palmerston in previous years has shown data consistency with the Casuarina monitoring site. Monitoring for particulate matter 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 particulate matter was carried out during 2007 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 reported in 2006, final rationalisation of a monitoring station for the Darwin region was not initiated due to the developments with the ARC Bushfire Smoke project: a research initiative that focused on ambient air quality and specifically particulate matter pollution from bushfire smoke. Data taken at both Casuarina and Palmerston had shown consistency over a number of years to the extent that it was decided to conserve funding with a view to potentially resourcing monitoring requirements in Alice Springs. In a partnership agreement between the Department of Natural Resources, Environment and the Arts, 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 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: 2007 Annual Compliance Summary for 24 hr PM<sub>10</sub>**

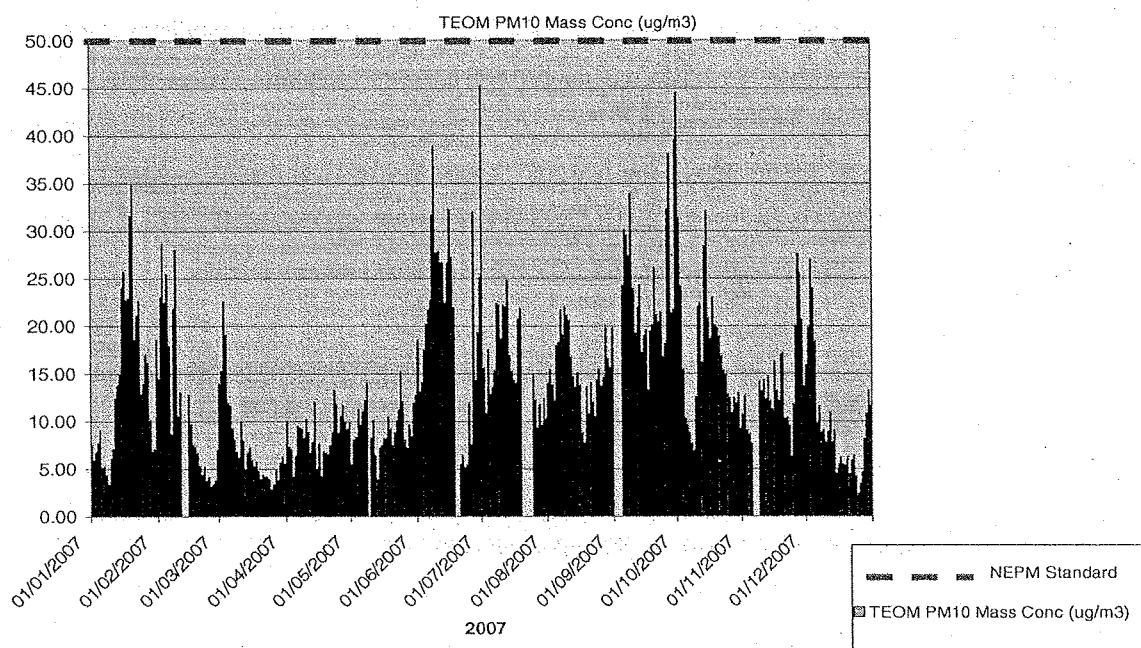
NEPM Standard 50µg/m<sup>3</sup> (Averaging period 1 day)  
NEPM Goal within 10 years – No greater than 5 exceedences

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 *	97	97	90	97	95	0	Met
Casuarina **	95	100	77	0	64	1	Not Demonstrated#

\* TEOM (adjusted)

\*\* Partisol Dichotomous Sampler

# Performance is not demonstrated as Partisol Dichotomous sampling is not a standard method for PM<sub>10</sub> monitoring under the NEPM Technical Guidelines. Partisol data is presented as a comparison.



**Figure 1: TEOM PM<sub>10</sub> 24-hour mass loadings at Casuarina, Darwin 2007**

Table 2: 2007 Annual Compliance Summary for 24 hr PM<sub>2.5</sub>

NEPM Reporting level 25µg/m<sup>3</sup>  
NEPM Goal – 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*	95	100	77	0	64	4	Goal is to gather data

\* Partisol Dichotomous Sampler

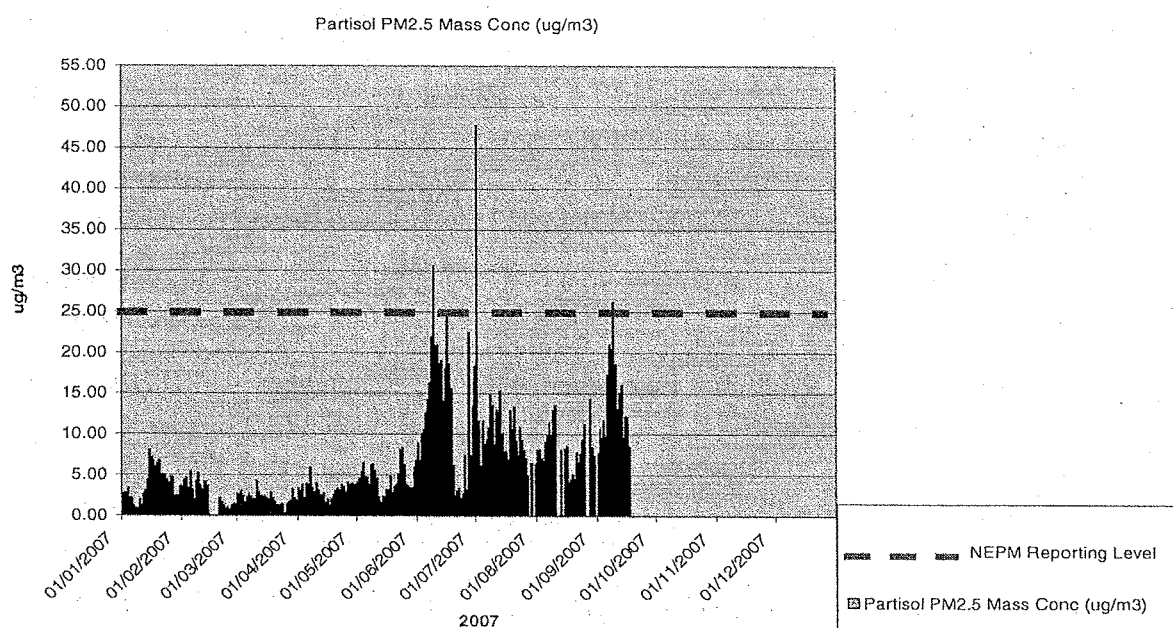


Figure 2: Partisol PM<sub>2.5</sub> 24-hour mass loadings at Casuarina, Darwin 2007

## SECTION C – ANALYSIS OF AIR QUALITY MONITORING

In 2007, TEOM sampling at Casuarina reveals no exceedences of the NEPM standard for PM<sub>10</sub> and 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<sub>10</sub>, Partisol sampling reveals one exceedence of the NEPM standard on 1 July 2007. This coincides with the highest recorded daily level (TEOM) of 45.3µg/m<sup>3</sup> (refer Table 3). The highest PM<sub>2.5</sub> level recorded in 2007 also occurred on this day (refer Table 4). Elevated levels of PM<sub>10</sub> on this day are due to the release of fireworks celebrating Territory Day.

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

**Table 3: 2007 Summary statistics for 24-hour TEOM PM<sub>10</sub> at Casuarina monitoring station**

AAQ NEPM standard  
50µg/m<sup>3</sup> (24-hour average)

Number of valid days	Highest (µg/m <sup>3</sup> )	Highest (date)	6 <sup>th</sup> highest (µg/m <sup>3</sup> )	6 <sup>th</sup> highest (date)
347	45.3	1 July 2007	34.8	20 January 2007

In 2007, incomplete Partisol sampling reveals four exceedences of the NEPM reporting level for PM<sub>2.5</sub>. The list of exceedences against the NEPM reporting level is presented in Table 5.

**Table 4: 2007 Summary statistics for 24-hour Partisol PM<sub>2.5</sub> at Casuarina monitoring station**

AAQ NEPM reporting level  
25µg/m<sup>3</sup> (24-hour average)

Number of valid days	Highest (µg/m <sup>3</sup> )	Highest (date)	6 <sup>th</sup> highest (µg/m <sup>3</sup> )	6 <sup>th</sup> highest (date)
234	47.7	1 July 2007	21.9	8 June 2007

**Table 5: 2007 PM<sub>2.5</sub> exceedences of NEPM reporting level at Casuarina monitoring station, Darwin (Partisol sampling)**

<b>Date</b>	<b>PM2.5mass (µg/m<sup>3</sup>)</b>
9 June 2007	30.6
16 June 2007	25.2
1 July 2007	47.7
9 September 2007	26.2

The elevated levels of particulate matter in Darwin during the dry season are predominantly due to bushfire smoke. Whilst there is no other significant source of particulate matter affecting the region apart from localised impacts from dust attributed to land clearing and urban development, the overriding influence on levels of PM<sub>10</sub> and PM<sub>2.5</sub> 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). With the exception of 1 July 2007, the PM<sub>2.5</sub> exceedences detected through monitoring coincide with bushfire events in the Darwin Region over the dry season.

Monitoring of particulate matter will contribute towards development of an NT Government air quality framework 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. The Department of Natural Resources, the Environment and the Arts (DNRETA) is continuing to discuss fire management in the region with the Northern Territory Bushfires Council in an ongoing process to minimise the impacts of particulate matter from smoke on the Darwin region.

## SECTION D – DATA ANALYSIS

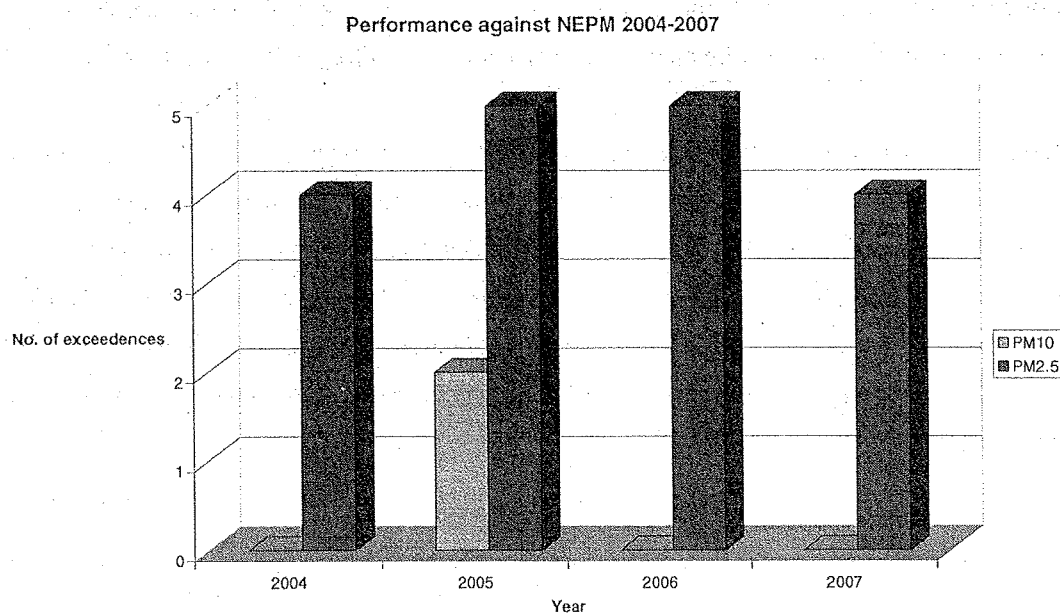
**Table 6: Percentiles of daily peak concentration PM<sub>10</sub> and PM<sub>2.5</sub>, 2007**

Pollutant	Data Recovery Rate (%)	Max. conc.	99 <sup>th</sup> percentile	98 <sup>th</sup> percentile	95 <sup>th</sup> percentile	90 <sup>th</sup> percentile	75 <sup>th</sup> percentile	50 <sup>th</sup> percentile
PM <sub>10</sub> *	95%	45.3	38.4	32.2	27.8	24.1	18.6	11.9
PM <sub>2.5</sub> #	64%	47.7	23.5	20.9	16.0	12.2	6.7	2.8

\* TEOM

# Partisol Dichotomous sampler

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<sub>10</sub> and PM<sub>2.5</sub> for the period 2004 – 2007 are presented in Figure 3.



**Figure 3: Comparison of Partisol PM<sub>10</sub> and PM<sub>2.5</sub> exceedences at Casuarina, Darwin for the years 2004-2006.**

Figure 3 reveals that over the period 2004-2007, the  $PM_{10}$  standard was only exceeded in 2005 (twice), while for  $PM_{2.5}$ , the reporting level has been exceeded each year by four or five times.

## References

A Pilot Study of Air Quality in Darwin, NT for the Northern Territory Government, Department of Lands Planning and Environment, Final Report CSIRO Atmospheric Research Aspendale, Victoria Australia, 15 March 2001

A Screening Procedure for Monitoring Ozone and Nitrogen Dioxide in "Small-to Medium-sized" Cities: Phase II – application of the procedure, Report CSIRO Atmospheric Research Aspendale, Victoria Australia, October 2002.

Australian Bureau of Statistics, Publication Number 3218.0 - Regional Population Growth, Australia, Northern Territory 2005-06.

Bushfire smoke and the relationship between human and landscape health – ARC funded Report, Charles Darwin University 2007

