ANNUAL COMPLIANCE REPORT FOR THE NORTHERN TERRITORY
1 JANUARY – 31 DECEMBER 2006

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 2006 reporting year (1 January to 31 December 2006). 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.

A.2 Current Monitoring Stations

In the Darwin /Palmerston conurbation there is currently one monitoring station located in Casuarina (Darwin). At the Casuarina site located at Charles Darwin University measurements were taken using a TEOM sampler for PM_{10} whilst a Partisol dichotomous sampler was similarly operated and maintained for PM_{10} and $PM_{2.5}$.

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) Darwin/Palmerston conurbation (96,573) and starting this year Alice Springs (27,018) region are the only areas in the Northern Territory requiring a performance monitoring station (threshold population >25,000).

A.4 Monitoring during the Reporting Period

Sampling at the Casuarina monitoring stations was carried out during calendar 2006. A number of problems were encountered with the TEOM sampler at Casuarina, and data availability rates in section B reflect this. Due to problems with condensation, an issue the setting up of the TEOM failed to anticipate; only a very small dataset is available. This has been rectified by moving the TEOM to a non-airconditioned room. Measurements from the Partisol sampler were more reliable and a continuous dataset was obtained for both PM_{10} and $PM_{2.5}$ for 2006.

Whilst the paucity of data from the TEOM means that compliance is not demonstrated, the timing of the problems associated with the TEOM malfunctioning did not coincide with the period of the 'dry season' (the winter months), historically the period of highest particulate levels due to bushfire burning. It is reasonable to conclude that it is unlikely that exceedences for the period have not been detected due to the malfunctioning of the TEOM.

A.5 Changes to the Approved Monitoring Plan

As previously reported 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 focusing on ambient air quality and specifically particulate matter pollution from bushfire smoke. Data taken at both Casuarina and Palmerston has shown consistency over the previous three years to the extent that it has been 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 will now continue be located in the Darwin region at the Charles Darwin University, Casuarina.

A.6 Unresolved Issues

There are no other unresolved issues in the reporting period.

A.7 Status of NATA Accreditation

The need for NATA accreditation for the monitoring station is unresolved. 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.

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

2004 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 *	0	14	13	10	9	0	Not Demonstrated#
Casuarina **	96	97	97	100	97	0	Not demonstrated##

* TEOM (adjusted)
** Partisol Dichotomous Sampler
# Performance is not demonstrated as less than 75% of data was captured in any quarter due to technical problems. From the little data that was collected, predominantly during the dry season, plus inclusion of data supplied by Partisol sampling it is likely that the goal would have been met.
Performance is not demonstrated as Partisol Dichotomous sampling is not a standard method for PM_{10} monitoring under the NEPM Technical Guidelines.

2004 Annual Compliance Summary for 24 hr $PM_{2.5}$
NEPM Reporting level 25µg/m^3
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*	96	97	97	100	97	5	Goal is to gather data

* Partisol Dichotomous Sampler
# Sampling for $PM_{2.5}$ was also undertaken in Palmerston although data integrity is currently being assessed.

SECTION C – ANALYSIS OF AIR QUALITY MONITORING

As previously noted there were technical issues relating to condensation affecting the TEOM. Whilst this has been rectified, statistically there is insufficient data to draw any definitive conclusions. Comparison with data retrieved through Partisol sampling might suggest that for PM_{10} there were no exceedences and the NEPM PM_{10} goal has been met. $PM_{2.5}$ data from Partisol sampling at Casuarina is more consistent and indicates there were 5 exceedences for $PM_{2.5}$, one in the early dry season and 4 during the late dry season. The list of exceedences is presented in Table 1.

Date	PM2.5mass (µg/m^3)
30 June 2006	25.5
21 August 2006	27.5
10 September 2006	26.5
12 September 2006	29.0
5 October 2006	29.9

Table 1: $PM_{2.5}$ exceedences at Casuarina monitoring station, Darwin for the period Calendar 2006

The few TEOM measurements plus Partisol readings for PM_{10} and $PM_{2.5}$ for Casuarina are presented in Figure 1. The unusually high PM_{10} at the end of January and early February 2006 was due to sea salt depositing on the filters and not smoke related. 2006 summary statistics for 24-hour PM_{10} are presented in Table 2 (excluding January and February readings).

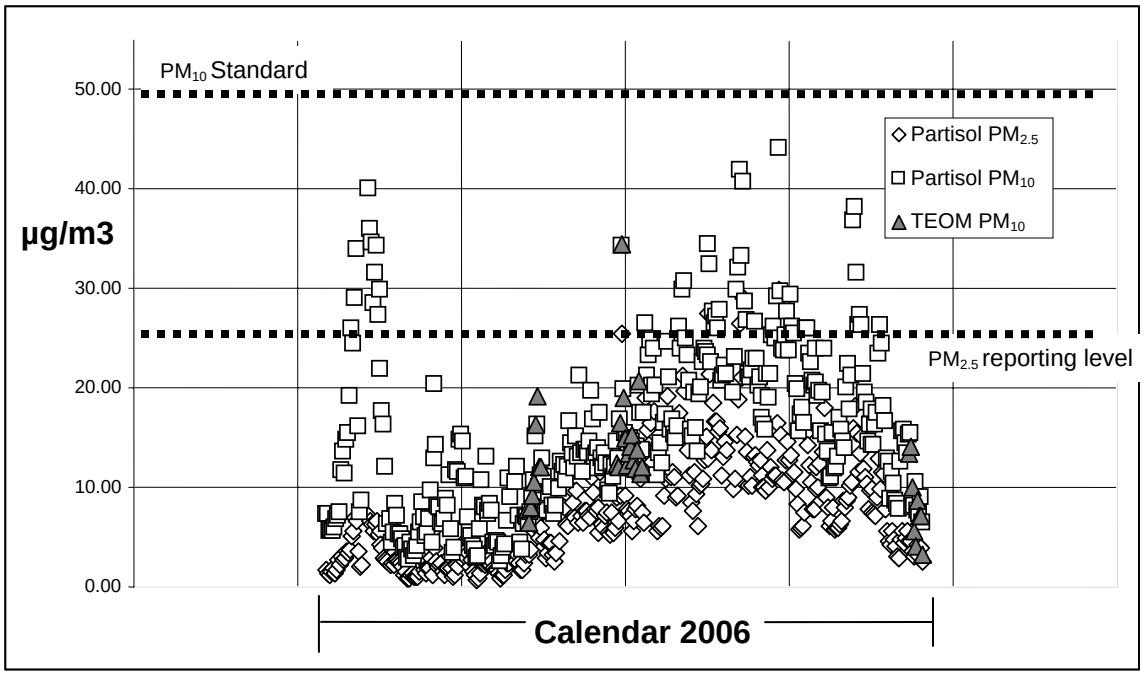

Figure 1: Partisol PM_{10} and $PM_{2.5}$ and TEOM PM_{10} 24 hour mass loadings at Casuarina station Darwin for the period Calendar 2006

AAQ NEPM standard

50µg/m^3 (24-hour average)

Number of valid days	Highest (µg/m^3)	Highest (date)	6th highest (µg/m^3)	6th highest (date)
355	44.1	4 October 2006	34.5	21 August 2006

Table 2: 2006 summary statistics for 24-hour Partisol PM_{10} at Casuarina monitoring station

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_{10} and $PM_{2.5}$ above 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, SE and Easterly during the dry season. The exceedences detected through monitoring coincide with bushfire events in the Darwin Region over the dry season with the greatest threat of exceedences occurring in the latter

part when historically the greatest number of fires occur and where the greatest quantity of available biomass fuel load exists. The one exception is the $PM_{2.5}$ exceedence on 30 June 2007, which is likely to be the result of fireworks celebrating Territory Day.

As indicated in previous annual reports the ambient air quality NEPM monitoring program is contributing to a collaborative research project assessing the seasonal patterns of landscape fires and bushfire smoke plumes across the Top End, and their impacts on public health and landscape condition. The project has provided information on processes generating the particulate matter affecting the Darwin region and created the capacity to monitor air quality and develop policy to manage particulate pollution. It 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 meeting the NEPM standards and goals in the future.

In collaboration with the Department Health and Community Services the project has

- raised the profile of air quality effects on human health and had a commitment from the Department of Health and Community Services to continuing monitoring ill health related to smoke pollution further support towards development of air quality policy

In collaboration with the Bureau of Meteorology the project has

- provided an historical and regional perspective of bushfire smoke in the greater Darwin region;
- raised issues of the potential community impacts of bushfire smoke pollution; and
- provided opportunities to consider the development of forecasting and other services that might benefit the community.

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

Comparisons of exceedences for PM_{10} and $PM_{2.5}$ for the period 2004 – 2006 are presented in Figure 2.

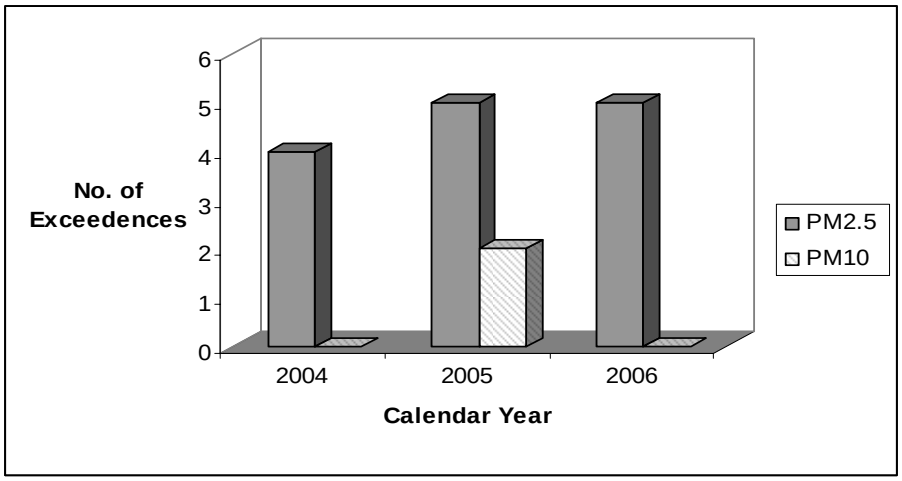

Figure 2: Comparison of Partisol PM_{10} and $PM_{2.5}$ exceedences at Casuarina station, Darwin for the years 2004-2006.

Figure 2 reveals that over the period 2004-2006, 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, five and five times respectively.

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