

REVIEW OF AIR QUALITY MONITORING DATA – CITYLINK PROJECT

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SUMMARY

EPA has received and reviewed air quality data from Translink Operations (TLO) relating to the Domain and Burnley Tunnel stacks and ambient air monitoring at Grant Street and Madden Grove. This data has been compared with data from the EPA network. Results of that comparison are:

- Emissions from the stacks continue to be well below the licence limits for carbon monoxide (CO), nitrogen dioxide (NO₂), and particles.
- TLO has been reporting TEOM¹ PM₁₀² and TEOM PM_{2.5}³ data against a rolling 24-hour average. The use of daily averages is required for consistency with HiVol⁴ results.
- PM₁₀ levels monitored at Madden Grove and Grant Street during autumn 2001 were similar to the EPA network medians.

- There were no exceedences of the PM₁₀ objective⁵ (50µg/m³) at either Madden Grove or Grant Street during autumn 2001.
- A single exceedence of the PM_{2.5} objective (based on TEOM measurements) was recorded at Grant Street in May 2001. Similar elevated PM_{2.5} readings were also recorded in the EPA network on this day.

INTRODUCTION

Data was received from TLO under its licence to operate the Burnley and Domain Tunnels exhaust stacks at Madden Grove and Grant Street respectively. This data was emission data from the stacks and data from TLO monitoring stations in the vicinity of each stack. In order to interpret the TLO data in view of seasonal variations and meteorological conditions, EPA extracted comparative data from its own air monitoring network. The results of the review conducted by EPA are detailed below. Note that a more comprehensive review of the CityLink data is

¹ TEOM = Tapered Element Oscillating Microbalance. An on-line method for measuring particles

² PM₁₀ = particles with an equivalent aerodynamic diameter of 10 micrometers or less

³ PM_{2.5} = particles with an equivalent aerodynamic diameter of 2.5 micrometers or less

⁴ HiVol = Particle measurement via a high volume sampler. Particles are collected on a filter and weighed.

⁵ The particle objectives for CityLink were set as part of the design criteria for the ventilation stack. Particle emissions from the stack were set so as not to cause PM₁₀ to exceed 50 µg/m³ or PM_{2.5} to exceed 25 µg/m³ at the adjacent air monitoring stations.

planned for early 2002 when a full 12 months of operating data will be available for both tunnels.

STACK EMISSIONS

TLO has reported the stack emissions to EPA as required. These are also displayed on the EPA web site (www.epa.vic.gov.au). No breaches of the licence limits have occurred, and the emissions are typically no greater than 30 per cent of the limits.

Particles (PM₁₀ and PM_{2.5})

Both the Burnley and Domain Tunnels are near the CBD, where thousands of vehicles travel daily, so the particle concentrations would be expected to be elevated compared with stations in the suburbs. In addition, air quality is strongly influenced by meteorology. In order to see whether the air quality has changed due to CityLink, EPA has reviewed the data to compare Madden Grove and Grant Street air quality with the nearby EPA monitoring network stations (Alphington, Lord Street, Paisley and RMIT for HiVol data, and Alphington and Brighton for TEOM data). Comparisons were made to see whether the relationship has changed with the opening of the Burnley and Domain Tunnels.

Note that TLO has been reporting exceedences of TEOM PM₁₀ and TEOM PM_{2.5} objectives based on a rolling 24-hour average. Whilst the State Environment Protection Policy (SEPP) (Ambient Air Quality) does not specify TEOM procedures, for consistency with HiVol results, exceedences should be reported based on daily averages. This is consistent with the National Environment Protection Measure (NEPM) for Ambient Air Quality. The use of rolling 24-hour averages is therefore not considered

the appropriate measure. It is, however, a more stringent target than the daily averages specified within the SEPP. EPA in its review has recalculated the TLO TEOM data on the basis of daily averages.

For PM₁₀ during the autumn season 2001, the air quality at both CityLink sites is similar to the EPA network median (see Tables 1 and 2). PM₁₀ levels at the two CityLink sites during this time were only slightly elevated above EPA network median levels (note, that this elevation is a continuation of the trend observed prior to the tunnels opening). No exceedences of the PM₁₀ objectives were observed. Median levels also do not appear to have changed significantly before and after opening of the tunnels (see Tables 3 and 4).

For PM_{2.5} (particles with an equivalent aerodynamic diameter of 2.5 micrometers or less), the fine particles most frequently associated with motor vehicle exhaust, median levels do not appear to have changed significantly before and after opening of the tunnels (see Tables 3 and 4). A single exceedence of the TEOM PM_{2.5} objective was recorded at Grant Street (26.4 µg/m³ on 4 May 2001). Elevated PM_{2.5} readings were also recorded in the EPA network on this day (20.3 µg/m³).

Table 1. Grant St - Particle Concentrations (PM₁₀ and PM_{2.5}) over various autumns

Instrument	Period	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
		EPA Network median**	Grant St median	EPA Network median	Grant St median
HiVol	Autumn 1999	20	28	-	-
	Autumn 2000	15	17	-	8
	Autumn 2001	19	26	-	11
TEOM	Autumn 2000	15	25	7	11
	Autumn 2001	17	25	9	12

** The network median for HiVol's is based on data from EPA sites at Alphington, Lord Street, Paisley and RMIT. The network median for TEOM's is based on data from EPA sites at Alphington and Brighton. The median is calculated using data from the EPA network at the same times as when valid readings are available from the TLO monitoring site being investigated. As a consequence, the network medians used in the Grant Street and Madden Grove comparisons may differ slightly, however this will allow more rigorous comparisons to be made.

Table 2. Madden Gv - Particle Concentrations (PM₁₀ and PM_{2.5}) over various autumns

Instrument	Period	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
		EPA Network median	Madden Gv median	EPA Network median	Madden Gv median
HiVol	Autumn 1998	(insufficient data)	29	-	10
	Autumn 1999	20	31	-	14
	Autumn 2000	14	19	-	10
	Autumn 2001	19	24	-	12
TEOM	Autumn 2000	15	22	7	10
	Autumn 2001	17	22	9	11

Table 3. Grant St – Particle Concentrations before and after opening the Domain Tunnel

Instrument	Period**	Value	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
			EPA Network	Grant St	EPA Network	Grant St
HiVol	Before opening: Autumn 99-00	Median	17	20	-	9
		Max	33	40	-	35
	After opening: Autumn 00-01	Median	19	28	-	19
		Max	30	40	-	38
TEOM	Before opening: Autumn 00	Median	18	28	8	12
		Max	52	80	16	46
	After opening: Autumn 00-01	Median	15	24	8	11
		Max	35	49	20	26

** To enable a more rigorous comparison, before and after periods are based on the same date ranges over the different years. Note, that the Domain Tunnel opened on 16 April 2000.

Table 4. Madden Grove – Particle Concentrations before and after opening the Burnley Tunnel

Instrument	Period**	Value	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)	
			EPA Network	Madden Grove	EPA Network	Madden Grove
HiVol	Before opening: Autumn 99-00	Median	17	25	-	12
		Max	30	66	-	33
	After opening: Autumn 01	Median	19	24	-	12
		Max	33	34	-	25
TEOM	Before opening: Autumn 00	Median	15	22	7	10
		Max	52	66	19	41
	After opening: Autumn 01	Median	17	22	9	11
		Max	35	48	20	24

** To enable a more rigorous comparison, before and after periods are based on the same date ranges over the different years. Note, that the Burnley Tunnel opened on 22 December 2000.

OTHER POLLUTANTS

CO and NO₂ data from the 2001 autumn season are summarised in Table 5. It is clear that concentrations of these pollutants are not sufficiently high to be of concern, with maximum levels quite low compared with SEPP objectives. Maximum CO concentrations observed at the two CityLink sites were well below the CO eight-hour objective of 9.0 ppm. Maximum NO₂ concentrations observed at the two CityLink sites were well below the NO₂ one-hour objective of 120 ppb.

Table 5. Summary statistics for CO and NO₂ at both CityLink sites.

Pollutant	Grant Street			Madden Grove		
	Median**	Maximum**		Median	Maximum	
	1 hr	1 hr	8 hr	1 hr	1 hr	8 hr
CO (ppm)	0.22	6.44	4.76	0.18	7.64	5.63
NO ₂ (ppb)	18	73	-	17	60	-

** Medians and maxima presented are based on the 1-hour concentrations rather than rolling averages. In addition, the maximum rolling 8-hour CO concentration is given to enable direct comparison to the CO SEPP.