

General Purpose Standing Committee No 5

Report on Inquiry into the M5 East Ventilation Stack (2001)

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Report on Inquiry into the M5 East Ventilation Stack (2001)

Chair: Richard Jones MLC

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Terms of Reference

That General Purpose Standing Committee No 5 inquire into and report on:

- (a) the implementation of the recommendations of the General Purpose Standing Committee No 5 report on the Inquiry into the M5 East Ventilation Stack; the International Tunnel Ventilation Workshop, Sydney Australia 7-9 June 2000; the CSIRO and Department of Urban Affairs and Planning conditions of approval for the M5 East Ventilation Stack;
- (b) the effectiveness and adequacy of the property value guarantee offer made to residents affected by the M5 East Ventilation Stack by the Minister on 13 February 2001;
- (c) the reasons for and methodology used to determine the nature and scope of the property value guarantee offer made to residents affected by the M5 East Ventilation Stack by the Minister on 13 February 2001; and
- (d) the economic and greenhouse implications of the energy needs of the M5 East Ventilation Stack.

Committee Membership

The Honourable Richard Jones MLC Independent (Chair)

Ms Jan Burnswoods MLC Australian Labor Party

The Hon Rick Colless MLC National Party

The Honourable John Jobling MLC Liberal Party

The Honourable John Johnson MLC Australian Labor Party

The Honourable Malcolm Jones MLC Outdoor Recreation Party

* **The Honourable Janelle Saffin MLC** Australian Labor Party

Ψ **The Honourable John Ryan MLC** Liberal Party

Ψ On 26 April 2001 the committee was advised that the Honourable John Ryan MLC would replace the Honourable Richard Colless for the purpose of the M5 East Inquiry.

* The President informed the House that on 8 June 2001 the Leader of the Government nominated Ms Saffin as a member of General Purpose Standing Committee No. 5 in place of Mr Dyer, resigned.

Table of Contents

	Chair's Foreword	ix
	Summary of Recommendations	xi
	Glossary	xiii
Chapter 1	Introduction	1
	Referral of this inquiry	1
	Conduct of the inquiry	1
	Structure of the report	2
Chapter 2	Background	3
	The Committee's 1999 report	3
	Timeline of events since previous report	3
	Government response: March 2000	3
	International Tunnel Ventilation Workshop: June 2000	4
	CSIRO report: August 2000	4
	DUAP 2000 Schedule: August 2000	4
	Community protests: May and August 2000	5
	The Flagstaff Report: September 2000	5
	Roads Amendment (M5 East Road Tunnel) Bill 2000	5
	Green Ban on M5 East Ventilation Stack construction site: December 2000	5
	Property Value Guarantee: February 2001	6
	Connell Wagner Report: March 2001	6
	Current status of the M5 East project and the ventilation stack	6
Chapter 3	The Committee's 1999 report and the International Tunnel Ventilation Workshop	9
	The Government's response to the Committee's 1999 Report	9
	Additional information received by this inquiry in relation to recommendations from the 1999 Report	16
	1999 Recommendation One: Implementation of Subregion Air Quality Plan	16
	1999 Recommendation Four: Discussion of the stack and exceedences of air quality standards	16
	1999 Recommendation Five: <i>Environmental Planning and Assessment Act</i>	19
	1999 Recommendation Six: Epidemiological Study	21
	1999 Recommendation twelve: Risk assessment in relation to the impact of the stack upon urban consolidation	22

	The International Workshop on Tunnel Ventilation	24
	The RTA's response to the Recommendations in the <i>Facilitator's Report on the International Workshop on Tunnel Ventilation</i>	28
	The EPA's response to the relevant recommendations in the <i>Facilitator's Report on the International Workshop on Tunnel Ventilation</i>	33
	NSW Health's response to relevant recommendations in the <i>Facilitator's Report on the International Workshop on Tunnel Ventilation</i>	36
	The Committee's observations in relation to the International Workshop on Tunnel Ventilation and the implementation of the recommendations in the <i>Facilitator's Report</i>	37
Chapter 4	The CSIRO report and DUAP conditions of approval	39
	CSIRO Report	39
	Implementation of the CSIRO Report: DUAP's assessment of condition 73	43
	Implementation of DUAP's conditions of approval	49
Chapter 5	Property Value Guarantees	55
	Background	55
	Concerns with the property value guarantee	57
	Assessment of the offer of a property value guarantee	58
Chapter 6	Air quality	62
	Composition of air pollution	62
	Particulate Matter	62
	Key contributing factors – sources of particulate pollution	62
	Air quality standards for PM ₁₀	63
	Exceedences of air quality standards for particulate matter in Sydney	64
	Are overall pollution levels increasing or decreasing?	64
	Measures to reduce air pollution	64
	Domestic solid fuel heaters	64
	Motor Vehicles	66
	Other Measures	66
	PM_{2.5}s and PM₁₀s	67
	Nature of vehicle emissions	69
	Air quality in the Turrella area	70

	Impact of stack on surrounding air quality	70
	Evidence of CSIRO concerning impact of pollution from the stack	71
	EPA view on impact of pollution from the stack	71
	Other evidence	72
	Location of stack	73
	Height of stack	73
	Surrounding population	74
	RTA evidence	76
	Conclusion	77
	Air quality monitoring near the stack	77
	Monitoring of PM _{2.5} s	78
	How will exceedences from the stack be measured?	79
	Will exceedences in general trigger condition to install filtration?	79
	Health impacts of particulate matter	81
	Conclusion and recommendations	84
Chapter 7	Filtration	86
	Feasibility/ viability of filtration technology	86
	RTA evidence	86
	CTA evidence	87
	Cost of filtration	88
	RTA evidence	88
	CTA evidence	89
	Filtrontec evidence	90
	Economic and greenhouse implications of energy needs of the stack	91
	Conclusion and recommendation(s):	92
	Statement of Dissent	94
Appendix 1	List of Submissions	98
Appendix 2	List of Witnesses	106
Appendix 3	Minutes of Meetings	110

Chair's Foreword

This is the Committee's second report on the M5 East Ventilation Stack. The first report was tabled on 17 December 1999.

In the first report, the Committee noted that it had received conflicting evidence concerning the possible exceedences of air quality goals and the impact of pollution from the stack on surrounding air quality. As a result of the conflicting evidence, the Committee was concerned that the M5 East Ventilation Stack may lead to exceedences of regulatory air quality goals. In view of this concern, the Committee made a key recommendation that the Government call for international expressions of interest for the installation of world's best treatment processes for particulate and nitrogen dioxide removal in the M5 East Motorway tunnel. This recommendation was not implemented by the RTA, and as at July 2001 the unfiltered stack has been constructed to its full height of 35 metres.

The Committee in this inquiry also received conflicting evidence concerning the impact of pollution from the stack on surrounding air quality. The Committee received evidence from the EPA that in the year 2000 (ie since the tabling of the earlier report) there have been 2 exceedences of the national regulatory air quality goal for particulate matter in the Turrella region. Not only was there evidence of 2 exceedences in the Turrella region, but also evidence of high background levels of particulate matter pollution (PMs).

The Committee received evidence of the dangers of $PM_{2.5}$ (particles 2.5 micrometres or smaller) and smaller particles which enter deep into the alveoli, the deepest part of the lungs and that $PM_{2.5}$ emissions will increase with the new generations of vehicles which will meet Euro 3 standards by 2004/5 and Euro 4 by 2006/7. Gasoline direct injection vehicles will emit four to six times as much mass of particles as existing vehicles.

The Committee was of the view that when a standard is developed for $PM_{2.5}$ this should be capable of being incorporated into the protocol being developed to establish how exceedences are determined. The Committee heard that upwards of 75% of the particulate matter emissions from vehicles are $PM_{2.5}$ or smaller and these are of greatest concern.

The decision to build the stack in such a poor location has been widely criticised and subject to ongoing community protest. In addition to this, the decision by the RTA to not install filtration equipment in the stack is the subject of ongoing community concern, in particular, a concern about the negative health impacts that will be associated with the additional source of pollution from the stack.

The Committee received convincing evidence from the CSIRO that the estimates employed by the RTA (in determining whether or not the stack would have an adverse impact on local pollution levels) significantly underestimated the contribution of particulate pollution. This was a key concern to the Committee given the undisputed evidence that there is no threshold level of particulate pollution below which adverse health effects are not observed.

The CSIRO also stated in evidence, that while the contribution from the stack might be relatively small in comparison to background levels, "any contribution, no matter how small or large, could cause an exceedence of the air quality standard".

It is due to these various concerns that the Committee, in this report, has resolved to recommend that filtration equipment be installed in the stack - to minimise or eliminate the additional source of pollution from the stack to the Turrella region. It is patently unfair to this community to add a significant point source of air pollution to their local air shed as a result of a political decision without taking steps to ameliorate that pollution.

The Committee further recommends that in view of the increasing number of proposed tunnels in NSW that the M5 East stack be treated as a pilot study of filtration technology in Australia. I believe that this would provide the perfect opportunity for the RTA and other government agencies to assess the effectiveness of this form of technology, in particular electro-static precipitators.

Notwithstanding the question of filtration of the M5 East stack, the Government should do all in its power to improve the air quality of the Turrella regional air shed which, even without the additional emissions from the stack, already has a high background level of pollution.

I would like to thank the members of the Committee for their hard work and input into this report.

I would also like to thank the Committee secretariat for their involvement during the inquiry. In particular I would like to thank the Director David Blunt and Senior Project Officer Roza Lozusic for their invaluable assistance in drafting this report, as well as Paul McKnight for his assistance with drafting Chapter 5.

The Hon Richard Jones MLC

Chair

Summary of Recommendations

Recommendation 1 p23

The Committee reaffirms Recommendation Five from its 1999 Report and calls on the Government to urgently amend the *Environmental Planning and Assessment Act* to prevent a determining authority from approving developments with modifications, which have any significant impact upon the environment or which have an impact upon a different group of citizens to those affected by the proposed development, unless those modifications have been exhibited for public comment. The modifications must be subject to adequate public consultation before the proposal is determined.

Recommendation 2 p23

The Committee reaffirms Recommendation Six from its 1999 Report and calls on the Department of Health to immediately begin work on an epidemiological study of the health impacts of the M5 East Ventilation Stack upon the surrounding community, to continue for at least five years after the stack comes into operation.

Recommendation 3 p38

The Committee recommends that the RTA fully implement the recommendations contained in the *Facilitator's Report: International Workshop on Tunnel Ventilation*, including the specific recommendations for:

- an examination of the potential of emissions testing and further regulation of solid fuel heating on ambient air quality; and
- information on the effect of electrostatic precipitators on external air quality to be specifically sought from countries where this technology is used for external environmental purposes, including Japan and South Korea.

Recommendation 4 p61

The Committee recommends that the Government reconsider the scope of the property value guarantee offer, and include within it, not only the area visually impacted by the stack, but also those areas where air quality will be disproportionately affected. The approach should be clear and transparent and its application systematic. An organisation outside the RTA should be responsible for the determination of this.

Recommendation 5 p61

The Committee recommends that the terms of the stack property value guarantee be reviewed and that a new offer be made in substantially the same terms as the offer to owners of property above the tunnel and around its portals.

Recommendation 6 p61

The Committee recommends that the Government provide a detailed estimation of the costings relating to the Property Value Guarantee.

Recommendation 7 p69

The Committee recommends that the NSW Government should take a lead role in the work being undertaken by the National Environment Protection Council in the development of a national air quality standard for PM_{2.5}.

Recommendation 8 p80

The Committee recommends that the protocol that is required to be developed under additional condition of approval 73(4) clarifying the circumstances in which exceedences of air quality goals will require the installation of electrostatic precipitators in the M5 East Ventilation Stack, adopt the standard given in evidence to the Committee by the Director-General of DUAP that *any exceedences, regardless of whether they are due to background air quality or the stack itself*, will require the installation of ESP's in the stack.

Recommendation 9 p80

The Committee recommends that an allowance be made to include the emerging PM_{2.5} air quality national standard in the protocol being developed by the RTA, EPA and DUAP.

Recommendation 10 p81

The Committee further recommends that the EPA investigates and reports on diffuse and point sources of industrial pollution in the Turrella region. All scheduled industries should be assessed to ensure they are complying with license requirements for air pollutants. Non-scheduled industries should be targeted to ensure they are adopting best practice in the reduction of air pollutants. The EPA should facilitate industries in the region to move towards cleaner production technologies.

Recommendation 11 p85

The Committee notes that the Conditions of Approval require the RTA to develop a regional air quality plan, and recommends that the NSW Government consider adopting further additional measures to improve air quality across the Sydney region, with particular emphasis on the regional air shed in which the stack is situated, such as:

- Application in the Sydney region of the regulatory approaches to solid fuel heaters being adopted in regional areas such as Armidale;
- That an immediate start be made (under the new EPA solid fuel heater initiative) to buy back solid fuel heaters that do not meet EPA standards in the Sydney metropolitan area, particularly in areas of Sydney with significant air quality problems during winter months;
- The introduction of emission testing for all vehicles in conjunction with registration checks;
- The provision of funding to enable the development of technology for the monitoring of emissions of vehicles and the recording of details of vehicles with excessive emissions at particular locations, such as the entrances to the M5 East tunnel, through the use a “pollution camera” (akin to a “speed camera”).

Recommendation 12 p85

The Committee recommends that filtration equipment be installed in the M5 East Ventilation Stack so as to minimise this additional source of air pollution to the Turrella region. [Refer also to recommendations in Chapter Seven concerning filtration.]

Recommendation 13 p92

The Committee recommends that the Roads and Traffic Authority immediately call for tenders for the installation of electrostatic precipitators in the M5 East Ventilation Stack.

Recommendation 14 p93

The Committee recommends that, in view of the increasing number of proposed tunnels in NSW (such as the Cross City tunnel and Lane Cove tunnel) and the concerns expressed by the RTA over the viability of filtration technology in the form of electrostatic precipitators, the M5 East Ventilation Stack be treated as a pilot study of filtration technology in Australia. An independent organisation such as the CSIRO, together with the RTA and other relevant authorities should monitor and report on the effectiveness of this technology and its possible future application in other tunnels in NSW.

Glossary

Air NEPM	National Environment Protection Measure for Ambient Air Quality
AQCCC	Air Quality Community Consultative Committee
AQMP	Air Quality Management Plan
CFMEU	Construction, Forestry, Mining and Energy Union
DOH	Department of Health
DUAP	Department of Urban Affairs and Planning
EPA	Environment Protection Authority
m³	cubic metre
NEPM	National Environment Protection Measure
NO₂	nitrogen dioxide
NO_x	oxides of nitrogen
PM	particulate matter
PM_{2.5}	particulate matter less than 2.5 micrometres
PM₁₀	particulate matter less than 10 micrometres
PVG	Property Value Guarantee
RAPS	Residents Against Polluting Stacks
RTA	Roads and Traffic Authority
Fg	microgram
Fg / m³	micrograms per cubic metre

Chapter 1 Introduction

Referral of this inquiry

- 1.1** On 8 March 2001 the Director of the Legislative Council's General Purpose Standing Committees received correspondence signed by three members of General Purpose Standing Committee No 5 requesting that, in accordance with the procedure set out in paragraph 4 of the Resolution of the House of 13 May 1999 establishing that Committee, a meeting be convened to consider proposed terms of reference in relation to the M5 East Ventilation Stack.
- 1.2** At a meeting on 14 March 2001, the Committee resolved to adopt the following terms of reference: That General Purpose Standing Committee No 5 inquire into and report on:
- a) the implementation of the recommendations of the General Purpose Standing Committee No 5 report on the Inquiry into the M5 East Ventilation Stack; the International Tunnel Ventilation Workshop, Sydney Australia 7-9 June 2000; the CSIRO and Department of Urban Affairs and Planning conditions of approval for the M5 East Ventilation Stack'
 - b) the effectiveness and adequacy of the property value guarantee offer made to residents affected by the M5 East Ventilation Stack by the Minister on 13 February 2001;
 - c) the reasons for and methodology used to determine the nature and scope of the property value guarantee offer made to residents affected by the M5 East Ventilation Stack by the Minister on 13 February 2001; and
 - d) the economic and greenhouse implications of the energy needs of the M5 East Ventilation Stack.
- 1.3** During the meeting held on 14 March 2001, a member of the Committee argued that the Committee did not have jurisdiction to undertake this inquiry. The Committee divided on the question of the adoption of these terms of reference. The question of the Committee's jurisdiction was again raised at a meeting on 26 March 2001 and the Committee sought advice from the Clerk of the Parliaments on this issue. That advice, which was received on 9 April 2001 advised that the Committee did have the capacity to undertake this inquiry.

Conduct of the inquiry

- 1.4** The Committee resolved, at its meeting on 26 March 2001, to call for submissions in relevant local newspapers. The Committee placed advertisements in the following newspapers: *St George & Sutherland Shire Leader*, *Canterbury-Bankstown Express*, *Bankstown-Canterbury Torch*, and *Cooks River Valley Times*.
- 1.5** The Committee further resolved to invite submissions from the following Government agencies and organisations: the Roads and Traffic Authority (RTA), Department of Urban Affairs and Planning (DUAP), Department of Health (DOH), the Environmental Protection Authority (EPA); CSIRO; Residents Against Polluting Stacks (RAPS); and

proponents of commercially available technologies to treat emissions from the M5 East Tunnel.

- 1.6** The Committee received 234 submissions from interested individuals and organisations. This included a petition from residents in the Earlwood area. A list of submissions is contained at Appendix 1.
- 1.7** The Committee held two hearings at Parliament House, Sydney, on 1 May 2001 and 3 May 2001. The witnesses who gave evidence at the hearings included representatives of government departments, community groups, scientific experts in air quality and proponents of commercially available filtration technologies – two of whom flew from overseas at their own expense to attend the hearings. A list of witnesses who appeared before the Committee is included at Appendix 2.

Structure of the report

- 1.8** Chapter Two of the report provides brief background information in relation to this inquiry, including an outline of the events that have occurred since the conclusion of the Committee's 1999 inquiry into the M5 East Ventilation Stack.
- 1.9** Chapter Three discusses the Government's response to, and implementation of, the recommendations contained in the report on the 1999 report undertaken by this Committee, together with the recommendations of the international tunnel workshop held in June 2000.
- 1.10** Chapter Four discusses the conditions of approval for the M5 East Ventilation Stack, and the report prepared for the Department of Urban Affairs and Planning (DUAP) by the CSIRO, in relation to the impact of tunnel emissions on air quality, in order to assist DUAP determine the height of the ventilation stack.
- 1.11** Chapter Five addresses the property value guarantee offer made to residents affected by the ventilation stack by the Minister for Transport on 13 February 2001.
- 1.12** Chapter Six draws together all of the air quality issues relating to the M5 East Ventilation Stack.
- 1.13** Chapter Seven draws together the issues concerning filtration of the tunnel emissions.

Chapter 2 Background

The Committee's 1999 report

- 2.1** On 17 December 1999, General Purpose Standing Committee No 5 tabled its earlier *Report on Inquiry into the M5 East Ventilation Stack* ('the 1999 report'). The Committee's 1999 report outlined the background to the M5 East project. The 1999 report noted the 1996 proposal for a 4 km tunnel with three exhaust stacks in Bardwell Park and Arncliffe, the response to the EIS Supplement which outlined this proposal, the RTA's June 1997 "Representations Report" which proposed the current option including a single exhaust stack, and the RTA's determination to proceed with this proposal on 14 July 1997. The 1999 report described the approval process leading to the December 1997 decision of the Minister for Urban Affairs and Planning to issue approval for the project subject to 150 conditions. The 1999 report also noted the unsuccessful legal challenge to the approval.¹
- 2.2** The recommendations in the Committee's 1999 report, and the response of the Government to those recommendations, are outlined in Chapter Three of this report. Of the twelve recommendations made by the Committee, eight dealt with issues of air quality (Recommendations 1, 2, 3, 4, 9, 10, 11 and 12). Two recommendations dealt with filtration of tunnel emissions (Recommendations 7 and 8). One recommendation proposed a health study (Recommendation 6), and one recommendation dealt with the *Environmental Planning and Assessment Act 1979* (Recommendation 5).

Timeline of events since previous report

- 2.3** Set out below is a brief outline of events since the tabling of the Committee's 1999 report.

Government response: March 2000

- 2.4** On 31 March 2000, the NSW Government released its response to the recommendations of the Committee report. The Government's response to the Committee's 1999 report is discussed in Chapter Three.
- 2.5** As part of the response to the Committee's 1999 report, the Government announced the establishment of an International Tunnel Ventilation Workshop, to investigate the viability of filtration and current international status of filtration technologies.

¹ *Transport Action Group Against Motorways v Roads and Traffic Authority* [1999] NSWCA 196. For more detail on the background to the development of the one stack model, see: LC General Purpose Standing Committee No 5, *Report on Inquiry into the M5 East Ventilation Stack*, Report No. 4, NSW Parliament, December 1999, pp 3-7

International Tunnel Ventilation Workshop: June 2000

2.6 The stated aim of the tunnel workshop was to "...canvass international practices and techniques in air quality management".² The tunnel workshop was held in Sydney between 7 and 9 June 2000 and a report by the facilitator, Mr Arnold Dix, was issued on 26 July 2000. The recommendations which came out of the tunnel workshop are discussed in Chapter Three.

CSIRO report: August 2000

2.7 Condition 73 of the conditions of approval from the Minister for Urban Affairs and Planning required the Director-General of DUAP to obtain independent wind tunnel testing, in relation to the determination of the height of the stack, prior to the detailed design of the stack. DUAP engaged the CSIRO to provide this advice. The CSIRO report was completed in August 2000. The CSIRO report and the Minister's conditions of approval are discussed in Chapter Four.

DUAP 2000 Schedule: August 2000

2.8 In August 2000, DUAP supplemented the conditions of approval with a schedule of further measures. This schedule is discussed in Chapter Four of this report. The schedule addresses further issues relating to the conditions of approval with respect to air quality. Included in the schedule are the following conditions:

- That the stack be constructed to a height of 35 metres
- That the RTA prepare detailed plans and specifications for the construction of electro-static precipitators prior to the tunnel opening to traffic.
- That should the results of monitoring of air quality, required under condition 75, show that particulate matter (PM₁₀) contributions from the stack result in exceedences of air quality goals (specified in condition 72), the RTA must install electro-static precipitators ('ESPs') within 6 months of the direction by the Director-General.
- The RTA should establish a protocol outlining procedures for deciding how an exceedence due to the stack will be determined.
- The RTA should establish a complaints mechanism for receiving complaints relating to air quality.

² Carl Scully, *ibid.*

- The Air Quality Management Plan (AQMP) shall include a detailed assessment of a buy-back or replacement scheme to owners of solid fuel heaters in the local air shed.³

2.9 The conditions of approval included in the 2000 schedule are discussed in Chapter Four.

Community protests: May and August 2000

2.10 There has been ongoing community action concerning the M5 East Ventilation Stack and its impact on air quality and health of the resident in the Turrella region. This action has included, among many other events, a rally at Parliament House on 2 May 2000, and a sit down protest on 19 August 2000 in which 400 families took part.⁴

The Flagstaff Report: September 2000

2.11 The RTA commissioned the Flagstaff Consulting Group to prepare an estimate on the installation of electro-static precipitators for the M5 East project. The report concluded that the cost of installing ESPs for the M5 East was \$36.9 million as well as additional operating costs. These costings are discussed in Chapter Seven.

Roads Amendment (M5 East Road Tunnel) Bill 2000

2.12 The Roads Amendment (M5 East Road Tunnel) Bill 2000 passed through its third reading stage in the Legislative Council on 2 November 2000.⁵ The Bill required that the RTA install filtration equipment to filter emissions from the M5 East tunnel. The Bill has been introduced into the Legislative Assembly but has not, at this time, proceeded to a vote on its second reading.⁶

Green Ban on M5 East Ventilation Stack construction site: December 2000

2.13 The local residents raised their concerns about the health implications of the M5 East stack with the Construction, Forestry, Mining and Energy Workers Union ('the CFMEU') who issued a green ban on the construction site on 12 December 2000 following the residents' representations. According to the CFMEU, they have also been instrumental in facilitating access for the residents to a number of key stakeholders.⁷

³ 'DUAP 2000 Schedule', Annexure C to *RTA Submission*

⁴ 'Families blow their stack', *Sydney Morning Herald*, 20/8/2000, p. 21. See also Residents Against Polluting Substances (RAPS) website at: <http://savewollicreek.8m.com> for further details on community action in relation to the M5 East Stack.

⁵ *NSWPD*, (LC), 2/11/00.

⁶ *NSWPD*, (LA), 8/3/01.

⁷ CFMEU, 'Green ban on M5 East stack', *Media Release*, 12/12/2000

Property Value Guarantee: February 2001

- 2.14** On 13 February 2001, the Minister for Transport and Minister for Roads, the Hon Carl Scully MP, announced that a Property Value Guarantee (‘PVG’) would be offered to residents living within 400 metres of the M5 East Stack as a gesture of goodwill. The Minister indicated that the offer followed discussions with residents, the CFMEU and local MPs.⁸ The property value guarantee is discussed in Chapter Five.

Connell Wagner Report: March 2001

- 2.15** In March 2001, the RTA commissioned Connell Wagner to further investigate international developments in tunnel ventilation systems. A desktop review resulting in a report, dated 16 March 2001, which concluded with respect to ESPs, that there was no “convincing evidence of the need for or the cost effectiveness of this type of treatment system”.⁹ The Connell Wagner report is discussed in Chapter Seven.

Current status of the M5 East project and the ventilation stack

- 2.16** The RTA has a contract with Baulderstone Hornibrook Engineering Pty Ltd and Bilfinger + Berger Bauaktiengesellschaft (BHBB JV) for design and construction of the M5 East project and its operation and maintenance for 10 years.
- 2.17** The RTA’s submission to this inquiry notes that the budget for the M5 East is \$752 million of which \$540 million had been spent as at March 2001. Currently monthly expenditure is approximately \$20 million, which will reduce from September 2001, as construction nears completion.¹⁰
- 2.18** Construction of the M5 East commenced in February 1999 and the estimated time frame for completion is 4 June 2002.
- 2.19** As at 27 April 2001 the stack had been constructed to its full height of 35 metres and is substantially complete.¹¹

⁸ Carl Scully MP, Minister for Transport, ‘Property Guarantee for M5 East Stack’, *Media Release* 13/2/2001

⁹ RTA, *Submission*, p 17.

¹⁰ RTA, *Submission*, p 10.

¹¹ RTA, *Submission*, p 10.

Photo of Stack taken on 3 July 2001 – courtesy of RAPS

[PRINTING TO INSERT PHOTO OF STACK]

Photo of stack and surrounding area – courtesy of RAPS

[PRINTING TO INSERT PHOTO OF STACK AND SURROUNDING SUBURB]

Chapter 3 **The Committee's 1999 report and the International Tunnel Ventilation Workshop**

3.1 This Chapter discusses the implementation of recommendations from General Purpose Standing Committee No 5's earlier *Report on Inquiry into the M5 East Ventilation Stack*, tabled on 19 December 1999 ('the 1999 report'). The Chapter also discusses the implementation of the recommendations from the International Workshop on Tunnel Ventilation held in Sydney from 7-9 June 2000, as set out in the *Facilitator's Report*.¹² The discussion in this Chapter is limited to those recommendations in relation to which the Committee has received new information concerning their implementation or which do not relate directly to either air quality or to filtration. There is little comment in this Chapter on the recommendations concerning air quality or filtration, as evidence concerning these issues has been placed together in Chapters Six and Seven.

The Government's response to the Committee's 1999 Report

3.2 Reproduced on the following pages is the Government's response to the recommendations contained in the Committee's 1999 report (this includes the text of the Committee's recommendations). The Government's response was forwarded to the Committee Chair, by the Minister for Transport and Minister for Roads, the Hon Carl Scully MP, on 31 March 2000.

3.3 As outlined in Chapter Two, Recommendations 1,2,3,4,5,9,10,11 and 12 relate to air quality, which is addressed in Chapter Six of this report. Recommendations 7 and 8 are concerned with filtration, which is discussed in Chapter Seven. Recommendation 6 proposes a health study. Recommendation 5 is concerned with the *Environmental Planning and Assessment Act*.

Reproduced on the following pages is the Government's response to the Committee's 1999 Report.

¹² A Dix, *Facilitator's Report: International Workshop on Tunnel Ventilation, 7-9 June 2000, Sydney Australia*, 26 July 2000.

**GOVERNMENT RESPONSE
TO RECOMMENDATIONS OF THE INQUIRY
ON THE M5 EAST VENTILATION STACK**

Recommendation 1

The Committee recommends that the NSW Government complete the development of the draft subregional air quality management plan, for the area surrounding the motorway, by the 30 June 2000. The Government agencies responsible for the development of the plan should consult with the Community Consultative Committee, established in relation to the ventilation stack; as well as relevant local councils, in the formulation of a draft plan, which should then be released for public comment and input. The plan must have specified targets, goals, dates for achievement, identified sources of funding and clear responsibilities for implementation.

Response

Pursuant to Condition 80 of the Department of Urban Affairs and Planning's (DUAP) conditions of approval, the Roads and Traffic Authority (RTA) is preparing a process for the development of the Subregional Air Quality Plan (SAQP). An outline of the process and scope of the Plan will be submitted to DUAP concurrently with the reports on air quality modelling and community consultation regarding the design of the ventilation stack. The SAQP will be developed in consultation with EPA, DOT, Dept of Health and DUAP, and local councils.

Recommendation 2

The Committee recommends that at six monthly intervals from 30 June 2000 an information paper be published outlining the steps taken to implement the draft air quality management plan, focussing on the specified goals and dates for achievement.

Response

Agreed, the RTA will prepare the required information paper.

Recommendation 3

The Committee recommends that six months before the conclusion of the five year term during which the Roads and Traffic Authority is required to provide \$0.5 million per year funding for the implementation of the air quality management plan, a review of funding sources and implementation of the plan be commissioned and published

Response

Agreed.

Recommendation 4

The Committee recommends that in any future discussion of the impact of the proposed ventilation stack upon air quality, the Roads and Traffic Authority and the Environment Protection Authority adopt the statements of the Minister for the Environment and the Minister for Urban Affairs and Planning that it is intended that emissions from the stack and tunnel should not result in any exceedences of air quality goals in their vicinity and not suggest that up to five exceedences per year are allowable within these goals, excluding natural and extraordinary disasters.

Response

Noted. The ventilation system for the M5 East project should not result in additional exceedences of the stringent air quality goals set for the project. DUAP and EPA recognised that exceedences of air quality goals occur from time to time across the entire metropolitan area as a result of occasional regional events in setting the Conditions of Approval for the stack.

Recommendation 5

The Committee recommends that the Environmental Planning and Assessment Act be amended to prevent a determining authority from approving a development with modification, which have any significant impact upon the environment or which have a significant impact upon a different group of citizens to those affected by the proposed development, unless those modifications have been exhibited for public comment. The modifications must be subject to adequate public consultation before the proposal is determined

Response

Current provisions within the Environmental Planning & Assessment Act require a determining authority to consider modification in respect of an activity. Section 112 (4) (b) enables a determining authority to modify an activity where such a modification would eliminate or reduce the detrimental effect of the activity on the environment. Section 11 5BA requires a Proponent to undertake a formal modification process (including formal public consultation) if a modification is inconsistent with an approval granted by the Minister for Urban Affairs and Planning.

Recommendation 6

The Committee recommends that no matter what form of tunnel ventilation or emission control is finally implemented, the Roads and Traffic Authority, in conjunction with the Department of Health fund an epidemiological study of the health of the community in the area of any tunnel emissions, commencing this financial year and continuing for 5 years after the commencement of operation of the motorway, or as long as the Department of Health recommends. The technique and operation of the study should be approved by the Department of Health, with results published on an annual basis.

Response

The Department of Health has advised that it is questionable whether a study, as contemplated by the Inquiry would contribute meaningful data to current knowledge of the health impacts of vehicle emissions.

The Department of Health will continue to examine links between air pollutants and general health through ongoing studies into air pollution and health.

Recommendation 7

The Committee recommends that the Roads and Traffic Authority, when investigating international developments in tunnel emission treatment systems as required by the condition of approval number 79 for M5 East Motorway not only survey the relevant literature but directly contact the suppliers of such equipment.

Response

Noted. In response to evidence produced at the inquiry hearing and pursuant to Condition 79 of the approval conditions for the project, the RTA has included interviews with international experts in tunnel ventilation and suppliers of treatment equipment in its ongoing review of international practices. In addition, the RTA has recently sent senior representatives to meet with a number of European road authorities, including Norway, to specifically discuss tunnel ventilation and air quality management practices.

This will continue in future reviews as required under Condition 79. A Consultative Committee will be established to oversee the subsequent reviews of international practice, comprising representatives from the Environment Protection Authority, Department of Health and the Department of Urban Affairs and Planning and the RTA.

Recommendation 8

The Committee recommends that the Roads and Traffic Authority immediately call for international expressions of interest for the installation of world-best treatment processes for particulate and nitrogen dioxide removal in the M5 East Motorway tunnel. The NSW Government should establish an independent panel of experts, including a community representative, to evaluate and report on the submissions which have been received by 31 March 2000. The report should identify accurate and possible final costs for the installation of such equipment.

The Committee recommends that the Roads and Traffic Authority continue with construction work on the stack in a manner which can incorporate and make provision for alternative ventilation systems which might be recommended as a result of the assessment of responses to the call for international expressions of interest.

The Committee further recommends that following the publication of the report identified above, a decision be made to either:

- **cease all further work on the ventilation stack and install pollution control equipment in the road tunnel itself or**
- **install pollution control equipment in addition to the ventilation stack**

Response

Noted.

AIR QUALITY & THE M5 EAST

The current tunnel ventilation system proposed for the project is required to meet New South Wales' stringent air quality goals, formulated by the Environment Protection Agency, by the approval authority, the Department of Urban Affairs and Planning.

The RTA is already required as a condition of approval of the M5 East project to ensure that the tunnel ventilation system design allows for the fitting of additional pollution control equipment if such equipment becomes viable and necessary in the future.

The recently completed physical modelling for the M5 East stack has shown that the previously predicted levels of emissions from the stack are overestimated by a minimum factor of 2.5. Physical modelling is a more accurate method of air quality modelling than numerical modelling. There is a greater margin of compliance with the air quality goals than has been previously estimated.

It should be noted that the tenderers for the project were free to include non-mechanical ventilation systems as part of their proposals. The successful tenderer, the Boulderstone-Hornibrook-Bilfinger Berger has extensive experience in tunnelling, including tunnelling in Europe. They selected a mechanical system.

EMISSION TREATMENT SYSTEM

An extensive investigation by the RTA, including a detailed analysis of the evidence put before the inquiry, personal inspection of international practice by senior RTA officers and direct contact with the manufacturers of such tunnel ventilation equipment, has concluded that the current tunnel treatment system is consistent with international practice. The RTA's assessment is that there is no system currently available that would remove the need for an emission stack, for a project such as the M5 East.

The RTA notes that the costs and performance of treatment equipment, presented to the Inquiry, was based on generalised information provided by manufacturers of the equipment. The RTA notes that robust performance data for continuous removal of fine particles is limited. Most significantly, no system is known to be operationally proven for treating the gaseous component of emissions. The removal of particles by treatment systems is typically assessed by weight of particles removed and fails to indicate the proportion of the finer particles versus the heavier, larger particles.

Advice from the Norwegian Public Roads Administration is that none of the electrostatic precipitators in Norwegian tunnels are operated continuously. In the Granfoss Tunnel the electrostatic precipitators were only installed in the uphill tunnel where visibility is an issue due to particulates produced from the heavy vehicles under load up the hill. It is noted that these conditions are distinguishable from those on the M5 East project. It is also noted that electrostatic precipitators do not address the gaseous components of air pollution.

AN INTERNATIONAL WORKSHOP

In recognition of the need to provide more detailed and authoritative information about the management of road tunnel emissions from overseas and relative to the Sydney environment the RTA will host an international workshop on the management of road tunnel emissions in 2000.

International experts experienced in the design, management and monitoring of road tunnel emissions will be invited. Community groups will be invited to submit questions in writing that will be addressed by a panel of speakers. The RTA will also proceed with a peer review of the tunnel ventilation design by experienced international experts to ensure tunnel ventilation systems continue to meet the world's best practice.

CLEANER VEHICLES, CLEANER AIR

The NSW Government is committed to improving air quality for all NSW residents. The State and Federal Governments are undertaking significant measures to improve vehicle emissions over the next several years. These improvements will further improve the air quality performance of the proposed M5 East ventilation system.

The Federal Government "Measures for a Better Environment" package which includes the introduction of European vehicle standards for light and heavy vehicles, and the reduction of sulphur in diesel fuel, will result in substantial reductions of pollutants in Sydney by 2015, as detailed below. Expected increases in vehicle ownership and usage are included in the assumptions on which the predictions are based.

The commencement of Phase 2 of the NSW Government's Vehicle Inspection and Maintenance Program in the Sydney region will reduce emissions in the intervening period from 2001, notwithstanding growth in vehicle ownership and usage.

The following extracts from the report, *The Australian Diesel Fleet: Existing Vehicle Characteristics and the Modelling of Transport Demand, Vehicle Populations and Emissions*, prepared for the National Environment Protection Council and released in January 2000, details the predicted substantial reductions of pollutants as a result the "Measures for a Better Environment" scenario. These measures are already in the process of being implemented. The reductions presented in this report are consistent with the reductions in pollutants from the Austrian heavy vehicle fleet as representative of the improvement in the western European heavy fleet, that was presented to the Inquiry by the RTA, in Annexure 3 of the RTA submission.

Forecast emissions in NSW for Scenario III; ("Measures for a Better Environment") are shown in the graphs below and indicate a substantial reduction in all pollutants, despite the projected increase in travel demand. The greatest percentage decrease is for particulates, the sharp drop in particulate emissions in 2003 and 2006 being due to the introduction of lower amounts of sulphur in diesel at this time.

EMISSIONS FOR NSW, 1995 TO 2015, SCENARIO III

The following table indicates just what vehicle types are contributing to the total emission load of each pollutant in metropolitan NSW. The percentage contributions of each vehicle type in both 1996 and 2015 are given so that any change can be identified.

CONTRIBUTION TO EMISSIONS BY VEHICLE TYPE, METROPOLITAN
NSW, 1996 AND 2015 (% OF TOTAL)

Vehicle Type	CO		Nox		HC		PM10	
	1996	2015	1996	2015	1996	2015	1996	2015
Cars	2.5	5.3	0.8	2.2	1.4	1.8	3.4	7.7
LCV's	5.5	10.6	2.8	7.1	2.7	3.9	7.9	11.4
Rigid Trucks	61.2	56.3	53.9	34.6	75.3	75.0	59.7	55.2
Artic. Trucks	20.2	18.4	26.5	39.7	9.8	7.2	19.4	17.0
Buses	10.6	9.4	15.9	16.5	10.8	12.1	9.6	8.7
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Tables in this report

Rigid trucks are seen to contribute the major proportion of all pollutants in metropolitan NSW in the year 2015 except for NOx. Despite a substantial increase in travel demand for articulated trucks their percentage contributions to total pollutant emissions decrease except for NOx. Both cars and LCV's increase their share of pollutants in 2015, mainly because of increasing travel demand but also because of the growing percentage of diesel vehicles for these vehicle types.

The changes in annual metropolitan emissions from the diesel fleet for Sydney over the forecast period from 1996 to 2015 are shown in the following table.

Significant reductions in emissions of 40 — 75% are expected from the diesel vehicle fleet over this period despite a significant growth in vehicle numbers and total annual distance travelled. The major reason for the decrease in all emissions is the better vehicle emission performance of the newer vehicles coming into the diesel fleet and the retirement of the older, poorly performing vehicles.

It should be remembered that emissions from diesel vehicles contribute about 2, 20,4 and 73% respectively of the total emissions of CO, NOx, HC and PM (EPA 1998). Any reduction in CO and HC diesel emissions will not, therefore significantly affect the total emissions for these two pollutants, which will be influenced mainly by changes in the petrol vehicle fleet.

On the other hand, diesel emissions contribute the greatest percentage (73%) of particulate emissions and the report, *The Australian Diesel Fleet: Existing Vehicle Characteristics and the Modelling of Transport Demand, Vehicle Populations and Emissions*, has found that particulates have the greatest percentage reduction of all pollutants between 1996 and 2015 (between 65 and 75%). The forecasts therefore indicate that there will be a significant reduction in overall emissions and ambient levels of particulates in Australian metropolitan areas.

PROJECTED CHANGES IN ANNUAL METROPOLITAN FLEET
EMISSIONS - 1995 TO 2015, SCENARIO III

	EMISSION FORECASTS (TONNES)			
	CO	NOX	THC	PM10
SYDNEY 1996	10622.4	17752.9	4975.5	1362.2
SYDNEY 2015	4548.0	8276.1	2306.9	327.7
NET REDUCTION (%)	57	53	54	76

Recommendation 9

The Committee recommends that air quality data reports, both before and after commencement of the motorway be made available 'real time' on the Internet so that those members of the population who are vulnerable to air pollutants may more easily become aware of any exceedences of air quality goals and take appropriate action. Further, it is recommended that air quality reports be published monthly, including on the Internet.

Response

The EPA publishes a daily pollution index for the information of the Sydney community. Provision of additional real-time data excludes the opportunity for quality review of the data to provide assurance that the data is accurate and valid. The response to Recommendation 10 addresses the commitment to ensure that reliable data is made available promptly to the community.

Recommendation 10

The Committee recommends that the Department of Urban Affairs and Environment, in consultation with the Community Consultative Committee, at six monthly intervals review all the sources of information, as identified in Condition 74, to assess whether pollution control equipment should be installed on the emission stack. The results of these reviews should be made public no later than six weeks after the end of the six month period, with reasons stated for the conclusions reached.

Response

The EPA advises that air quality information would be made available to the community within 10 weeks after the end of the six-month review period. At the end of the first year, providing that there is no adverse trend in air quality, the reviews will thereafter be undertaken on an annual basis.

Recommendation 11

The Committee recommends that the Roads and Traffic Authority, in consultation with the Community Consultative Committee, prior to the operation of the motorway, develop a contingency plan for instances of air quality exceedences at the Turrella site. This contingency plan must be approved by the Minister for Urban Affairs and Planning and made publicly available.

Response

Following community representations, a Working Party was formed in September 1999 to develop just such a contingency plan. Prior to implementation, any such contingency plan would require the approval of the Minister for Urban Affairs and Planning.

Recommendation 12

The Committee recommends that the Department of Urban Affairs and Planning release any risk assessment done of the impact of the stack on the implementation of urban consolidation policies in the vicinity of the stack. If no such assessment has been undertaken to date, the Committee recommends that an open and rigorous risk assessment of the impact of the ventilation stack on urban consolidation policies be performed without delay, with the results to be published.

Response

DUAP advises as follows: "It is anticipated that the relevant health goals will be met by the design and management of the stack proposed by the RTA. Current urban consolidation levels near the stack would not affect the dispersion characteristics of the M5 East ventilation system.

"For any future ventilation stack proposals, it would be the responsibility of the Proponent (ie the RTA) to identify likely air quality impacts on known urban consolidation areas."

Additional information received in relation to recommendations from the 1999 Report

- 3.4** Since the Government response to the Committee's 1999 report, the Committee has received updated information, from the relevant government agencies' submissions, to each of the 1999 recommendations.

1999 Recommendation One: Implementation of Subregion Air Quality Plan

- 3.5** Recommendation One in the Committee's 1999 Report was for the Government to complete the development of a draft sub-regional air quality plan for the area surrounding the motorway by 30 June 2000. The Government's response indicated that such a plan would be completed in accordance with condition 80 of the DUAP conditions of the approval for the project. The submission received from the EPA provides further information about the timeframe for the implementation of this sub-region air quality management plan:

The EPA is aware that the Roads and Traffic Authority has commissioned a contractor to develop the plan which will be finalised by the end of July 2001. The RTA will then implement the plan's actions well before the opening of the tunnel to traffic in 2002. The plan will identify the major emission sources within the M5 East sub-region and detail strategies to minimise emissions to ensure air quality goals are maintained. The EPA has required that a detailed monitoring program be conducted to check actual performance against air quality standards once the motorway is operational.¹³

- 3.6** The submission from the RTA notes that Sinclair Knight Merz has been engaged to develop the Sub-regional Air Quality Management Plan. A preliminary draft plan was expected to be submitted in May 2001 and a final plan by late July 2001.¹⁴

1999 Recommendation Four: Discussion of the stack and exceedences of air quality standards

- 3.7** Recommendation Four in the Committee's 1999 report related to statements by Government agencies and Ministers about the impact of the M5 East Ventilation Stack upon air quality goals. This issue is discussed in detail in Chapter Six of this report.
- 3.8** The recommendation in the Committee's 1999 report was based upon statements from the Minister for the Environment and the Minister for Urban Affairs and Planning. The Committee recommended that, in any future discussion of the impact of the stack upon air

¹³ EPA, *Submission*, pp 5-6.

¹⁴ RTA, *Submission*, p 21.

quality, the RTA and EPA adopt these statements “that it is intended that emissions from the stack and tunnel should not result in any exceedances of air quality goals...”¹⁵

3.9

Both the EPA and DUAP include detailed discussions of this recommendation in their submissions to this inquiry. The EPA submissions sets out the context of the statement by the Minister for the Environment, quoted in the Committee’s 1999 report, and notes that this issue has been addressed through the additional conditions of approval issued by DUAP in August 2000:

Condition 72 of the Minister for Urban Affairs and Planning’s conditions of approval set the air quality standards for this development. They reflect the goals to be achieved under the 1998 National Environment Protection Measure for Ambient Air Quality. The Air NEPM allows for five exceedances per year of the standard for PM₁₀, in recognition of the impact of natural and extraordinary disasters. The recommendations of the 1999 inquiry by Legislative Council Standing Committee No 5 into the M5 East refers to a reply by the Minister of the Environment dated 11 November 1999 to Mr Charles Briers of Residents Against Polluting Stacks (RAPS) to support this. The relevant paragraphs state:

“While (the environmental assessment for the M5 East) did note that there was potential for fine particle (PM₁₀) emissions from the stack to result in additional exceedances of the PM₁₀ goal under certain conditions when background levels are already elevated, it is important to also note that the Air National Environment Protection Measure standard for PM₁₀ allows for five such exceedances of the standard per annum. Furthermore, this goal is among the most stringent goals international for fine particles.

“Your submission specifically queried whether the air quality goals for the M5 East can be met if the goals are already being exceeded. The purpose of these goals is to provide a clear performance measure for assessing the impact of the M5 East and to act as a trigger to initiate further action if necessary and appropriate. In this context, the intention of the goals is that emissions from the M5 East stack and tunnels should not result in any additional [emphasis added] exceedances of air quality goals in their vicinity.”

Additional approval conditions issued by the Department of Urban Affairs and Planning in August 2000 (condition 73, clause 4) require the RTA to install electrostatic precipitators within 6 months of the direction by the DUAP Director-General should PM₁₀ emissions from the stack result in an exceedance of the goal.¹⁶

3.10

The submission from DUAP discusses the Department’s attempts to clarify this issue and, in that context, refers to the development of a protocol for deciding how an exceedance due to the stack will be determined.

This recommendation relates to a letter dated 9 August 1999, from the Minister to Ms Mawer, Mr Briers, Ms Rossi (RAPS). (Reference No. 45 in the 1999 Inquiry Report).

¹⁵ 1999 Report, pp 24-25.

¹⁶ EPA, *Submission*, p 6.

Whilst the recommendation is directed to the RTA and EPA, the Department wishes to clarify that the Minister for Urban Affairs and Planning did not make the statements referred to in the recommendation. The specific "statements" referred to in the attachment are clearly identified in the Minister's letter as representing the Department's position. The Department reiterates its position, as stated in the attachment, that the tunnel exhaust stack must be designed so that emissions do not result in ambient air at ground level exceeding the EPA goal for PM₁₀ of 50ug/m³.

Notwithstanding, the Department is acutely aware of community concerns about the interpretation of Condition 72, and specifically whether the goal is a National Environment Protection Measure (NEPM) or not, and if so, the implications for exceedences.

Condition 72 states that

The tunnel exhaust stack must be designed so that emissions do not result in ambient air quality at ground level exceeding the following emerging goals:

NO₂ - One hour average of 256ug/m³ (0.125 ppm)

PM₁₀ - 24 hour average of 50ug/m³

The critical term in the condition is emerging goal. The emerging goal referred to in the conditions was based on a definition included in correspondence between the EPA and DUAP^{17,18} which clearly recognised the Air National Environment Protection Measure (ANEPM) as the emerging EPA goal for PM₁₀. This goal was later to be adopted by the National Environment Protection Council as the National Environment Protection Measure for Ambient Air Quality (or NEPM).

It would therefore be the Department's view that the emerging goals specified in Condition 72 would be based on the NEPM goal. Notwithstanding, any exceedence of the goals attributable to the stack alone would be considered by the Department as a breach of the conditions of approval. This is not inconsistent with the NEPM allowance for 5 exceedences per year, because these allowable exceedences are assumed to relate to natural and extra-ordinary circumstances (ie bushfires, major accidents with high smoke levels etc) rather than an allowance for non-compliance per se.

In recognition of the complexity in what would be defined as "natural and extra-ordinary circumstances" and the local community's desire for clarification and transparency, the Department has required under the conditions of approval of the height of the stack (refer Condition 73 Clause 4), a Protocol to be developed for deciding how an exceedence due to the stack will be determined. The Protocol is to be developed in consultation with the Air Quality Community Consultative Committee and approved by the Director General and to be made publicly available at least 3 months prior to opening the tunnel to traffic. The Department's approval of the Protocol will be largely dependent on EPA advice.¹⁹

¹⁷ Facsimile from EPA (Michael Chertok) to DUAP (Mr Neville Osbourne) dated 4 November 1997.

¹⁸ Letter from EPA (Mr Brian Gilligan) to DUAP (Mr Sam Haddad) dated 20 November 1997.

¹⁹ DUAP, *Submission*, pp 6-7.

1999 Recommendation Five: *Environmental Planning and Assessment Act*

- 3.11** Recommendation Five in the Committee's 1999 report arose directly from the decision making process for the determination of the M5 East project. As outlined in the 1999 report, the "1996 EIS Supplement" for the M5 East motorway project was based on a proposal for a 4 km tunnel with three exhaust stacks in Bardwell Park and Arncliffe. The 30 June 1997 "Representations Report", arising from the response to the 1996 EIS Supplement, proposed significant modifications to the 1996 proposal, including the construction of a single exhaust stack, to be located in Turrella in place of the three stacks previously proposed. On 14 July 1997, the RTA determined that the project would proceed on the basis of the proposal set out in the "Representations Report".²⁰
- 3.12** As outlined in the Committee's 1999 report, the validity of the decisions to approve the M5 East project were the subject of litigation in 1998. One of the issues involved in the litigation was the suggestion that the project that was approved included substantial modifications of the proposal set out in the 1996 EIS Supplement and therefore should have been subject to a further environmental impact statement. As outlined in the 1999 report, the challenge was dismissed by the Land and Environment Court and, upon appeal, was also dismissed by the NSW Court of Appeal by a majority of two to one.
- The majority judges held that the changes to the proposed activity were, when examined in isolation, significant developments. But when examined in the context of the overall activity it could be said that the changes altered that activity without radically transforming it, and thus could be said to be modifications to that activity. The majority judges held that the power to modify an activity without conducting a further environmental impact statement was not subject to the constraints of procedural fairness, and could still be exercised even if the modification had new adverse environmental effects not previously addressed. In dissent, Fitzgerald JA found that the proposed alterations would impose new, significant, detrimental effects on different localities and different persons from those who had the opportunity to make submissions on the EIS. His Honour held that the power to modify an activity without a further EIS could not be exercised in this way. His Honour also held that it was impossible to rationally compare the different environmental effects of the initial and amended activities.²¹
- 3.13** The Government's response to the 1999 report noted that section 112(4)(b) of the *Environmental Planning and Assessment Act* ('the EPA&A Act') enables a determining authority to modify an activity where such a modification would eliminate or reduce the detrimental effect of the activity on the environment. Furthermore, section 115BA requires a proponent to undertake a formal modification process (including formal public consultation) if a modification is inconsistent with an approval granted by the Minister for Urban Affairs and Planning.
- 3.14** The DUAP submission to this inquiry elaborates upon this response, and notes a new administrative requirement being imposed upon the RTA in respect of future tunnel developments.

²⁰ 1999 Report, pp 3-4.

²¹ *Ibid*, p 7.

In short, the EP&A Act already provides for a formal public notification and assessment process for modification of projects where such modifications are either inconsistent with the originally approved activity or where increased/new environmental impacts can be demonstrated as the result of such modifications. The trigger for such process legally rests with the proponent, but is legally challengeable by any third party.

The Department further notes that a new administrative (ie non statutory) requirement for the RTA to make publicly available a Preferred Activity Report (PAR) when seeking approval of the Minister for Urban Affairs and Planning has been introduced for the proposed Cross City Tunnel and the Lane Cove Tunnel projects. The PAR will describe and justify any changes to the EIS proposal.²²

3.15 The Committee has received correspondence from the Environmental Defender's Office (EDO) in relation to the Government's response to this recommendation. The EDO expresses concern that the decision of the majority of the NSW Court of Appeal in the *Transport Action Group v RTA* case demonstrates the scope of the power to modify a Part 5 development under the EP&A Act, to the extent of affecting a whole new class of persons without the need for further assessment and exhibition of the modification:

It is of great concern to the EDO that the Government's response to Recommendation 5 does no more than restate the current legal requirements with respect to the modification of an activities where an EIS is required under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP& A Act).

The response neither acknowledges nor addresses a significant flaw in the environmental impact assessment process for major infrastructure projects in NSW. As the NSW Court of Appeal decision in *Transport Action Group Against Motorways Inc v Roads and Traffic Authority* [1999] NSWCA 196 demonstrates, there are clear limitations in the current provisions of the EP&A Act with respect to the requirement for community consultation in cases involving proposed modifications to such activities. As such, the Standing Committee's Recommendation has not been implemented.

The majority judges in that case held that the scope of the power to 'modify' an activity that has been the subject of an EIS without the need for further assessment is to be determined, in part, from the relationship between the 'modifications' and the activity as a whole. The changes to the proposed activity were, when examined in isolation, significant developments; but when examined in the context of the overall activity it could be said that the changes altered that activity without radically transforming it, and thus could be said to be modifications of that activity.

The majority also held that the power to modify an activity without conducting a further EIS was not subject to constraints of procedural fairness, and could still be exercised even if the modification had new adverse environmental effects not previously addressed. They also held that modifications need not be expressed with absolute precision, even though different possible permutations of the final activity (due to open-ended conditions) might have different effects.

²² DUAP, *Submission*, pp 7-8.

The majority decision demonstrates that the power to modify a Part 5 development under the EP&A Act is extremely broad. The Act permits an authority to alter an activity substantially from that which has gone through the statutory process of environmental assessment and public comment, to the extent of affecting a whole new class of persons, without the need for further assessment and exhibition, so long as those alterations do not “radically transform” the whole activity. This means that the larger the initially proposed activity is, the greater the changes that can be made to that activity without the need for a new EIS process, even if those changes have environmental impacts and will affect classes of people, far beyond those considered in the scope of the original EIS.

To quote the Committee “a fundamental element of environmental impact assessment is community consultation” (page 27). Clearly, the current provisions of the EP&A Act with respect to the modification of Part 5 activities, are deficient in this respect. To fulfil the aims of the EP&A Act of environmental protection and public participation in the development assessment process, legislative amendment in the terms proposed by recommendation 5 is needed.²³

1999 Recommendation Six: Epidemiological Study

3.16 Recommendation Six of the Committee’s 1999 Report was for the Department of Health to fund an epidemiological study of the health of the community in the area of the tunnel emissions, continuing for five years after the commencement of the motorway.

3.17 The Government’s response to the 1999 Report noted that the Department of Health had advised that it is questionable whether the proposed study would contribute meaningful data to current knowledge on the health impacts of vehicle emissions. The submission to this inquiry from the Department of Health elaborated on the reasons for not implementing this recommendation.

- Epidemiological studies are unable to detect health effects in small populations such as the potential population impacted by any significant increase in air pollution from the stack, unless the effect is very great.
- All literature on health impacts of air pollution show that the attributable risk is small, and only becomes measurable when applied to a large population, or in very high doses.
- Limitations of population cohort studies include the Hawthorne effect, that is the effect on measurable outcomes of a study simply by virtue of being studied. A further bias for such studies has recently been reported, that worry about air pollution is a better predictor of reported illness than residential proximity to a source.
- Department of Health does not believe that an epidemiological study is worthwhile in this instance. The best estimate of the effect on health is monitoring local air quality, as outlined in DUAP Conditions of Approval

²³ Letter from the Environmental Defender’s Office to the Chair of General Purpose Standing Committee No 5, dated 23 February 2001, p 2.

(Condition 75) and applying internationally accepted estimates of health impacts to measured levels.²⁴

3.18 The health impacts of air quality are discussed in detail in Chapter Six of this report.

1999 Recommendation Twelve: Risk assessment in relation to the impact of the stack upon urban consolidation

3.19 Recommendation Twelve in the Committee's 1999 report called for DUAP to undertake a risk assessment of the impact of the stack upon urban consolidation policies in the vicinity of the stack.

3.20 The DUAP submission to this inquiry advises that no such risk assessment has been undertaken. The submission further advises that, "as the specified [air quality] goals must be met, there would not appear to be particular merit in undertaking a detailed risk assessment at this time. Furthermore, if the goals are not met without treatment systems, the conditions of approval require the RTA to install electro-static precipitators." The submission provides further details in relation high rise buildings and the stack:

In the case of new development or rezoning, it would be the responsibility of the developer/consent authority to take into account existing conditions such as ventilation stacks when designing high rise buildings.

In the case of new ventilation stack proposals it would be the responsibility of the Proponent to consider existing and potential buildings and assess impacts accordingly, as is the current situation with the proposed Cross-city and Lane Cove tunnels.

The Department notes that the CSIRO raised a concern in the conclusions about the possibility of plume strike on tall buildings. However the report does not provide any analysis on how this conclusion was developed. the CSIRO has since clarified that this was a conceptual statement rather than applying to any specific nearby buildings and would be generally applicable to tall buildings within 500 metres of a stack. The North Arncliffe site is about 850 metres to the east of the stack.

The RTA has advised that current urban consolidation levels near the stack would not affect the dispersion characteristics of the M5 East vent stack.²⁵

²⁴ Department of Health, *Submission*, p 5.

²⁵ DUAP, *Submission*, p 9.

Recommendation 1

The Committee reaffirms Recommendation Five from its 1999 Report and calls on the Government to urgently amend the *Environmental Planning and Assessment Act* to prevent a determining authority from approving developments with modifications, which have any significant impact upon the environment or which have an impact upon a different group of citizens to those affected by the proposed development, unless those modifications have been exhibited for public comment.

The modifications must be subject to adequate public consultation before the proposal is determined.

Recommendation 2

The Committee reaffirms Recommendation Six from its 1999 Report and calls on the Department of Health to immediately begin work on an epidemiological study of the health impacts of the M5 East Ventilation Stack upon the surrounding community, to continue for at least five years after the stack comes into operation.

The International Workshop on Tunnel Ventilation

3.21 As set out above, a major part of the Government's response to the Committee's 1999 Report was the announcement that an International Workshop on Tunnel Ventilation would be held in Sydney, "to canvass international practices and techniques in air quality management."²⁶ The workshop was held from 7-9 June 2000. Approximately 60 people were invited to attend the workshop. Included among the participants was a range of international experts in tunnel ventilation systems and proponents of technology. The RTA engaged Dr Arnold Dix, a barrister and engineer, to facilitate the workshop. At the conclusion of the workshop, Dr Dix prepared a *Facilitator's Report on the International Workshop on Tunnel Ventilation* ('the Facilitator's Report').

3.22 The process followed by the RTA in organising the workshop, and to a lesser extent the conduct of the workshop and the content of the *Facilitator's Report*, have been the subject of criticism from Residents Against Polluting Stacks ('RAPS'). Key areas of criticism include the selection of the facilitator and the selection of international experts by the RTA.²⁷ The Chief Executive of the RTA, Mr Paul Forward, was asked to explain the process by which international experts were selected for the workshop, when he gave evidence before the Committee:

The Hon. J. F. RYAN: I have a copy of a comment from Mr Humphrey to Mr Didier, which says,

On a separate matter, we are looking for an international ventilation specialist with experience in air cleaning equipment to come to Australia on short notice (next week if possible) to support our position on the adequacy and integrity of ventilation through a stack without air cleaning. The person would need to be able to communicate well in English and present material on current European practice to key stakeholders. Could you be available and comfortable to do this or could you nominate someone. RTA would pay all costs. It would be expected that it would be unreasonable to ask someone to come this far without staying at least a week.

Regards

Garry Humphrey

Is it possible we could take that as a message that they were trying to find someone to come to the conference to put the RTA position?

Mr FORWARD: I think we had something like eight international experts there and, to my understanding, at least three or four were nominated by the community. It is fair to say that we were after a variety of views, and a variety of views were put forward at that workshop.

The Hon. J. F. RYAN: How many other people were asked whether they were going to be able to represent the RTA view before they attended? Were all of them or some of them?

²⁶ "Government responds to M5 East Report", Media Release issued with Government Response to the Committee's 1999 Report, 31/3/00.

²⁷ RAPS, *Submission*, p 6.

Mr FORWARD: The community was asked to nominate a number of people who also attended that workshop and clearly no doubt the community was after people who were able to represent its view. We were after a fair and honest debate. We were after a broad cross-section of views being presented, of world experts, and I believe that is what took place at that conference.²⁸

- 3.23** The Facilitator, in his report, said that “there was insufficient information presented to determine, on a holistic basis, the appropriateness of installing devices such as electrostatic precipitators and/or NO₂ gas conversion plants in the M5 East project or in other NSW tunnel projects.”²⁹ RAPS argued that this meant that “despite over \$250,000 of public money being invested in this workshop, it actively failed to address the key recommendation of the inquiry, which was that such an investigation should take place.”³⁰
- 3.24** The *Facilitator’s Report* notes that “insufficient material was made available at the workshop to draw any conclusion on whether the technologies are cost effective, and whether they would represent value for money in terms of the potential public health benefits.”³¹ As outlined above, the *Facilitator’s Report* called for further investigation of these matters.
- 3.25** Reproduced on the following pages is the executive summary from the *Facilitator’s Report on the International Workshop on Tunnel Ventilation*, dated 26 July 2000.

²⁸ *Evidence*, 1/5/01, p 21.

²⁹ *Ibid.*, p 47.

³⁰ RAPS, *Submission*, p 10. The RAPS submission at pages 7-11 contains a detailed critique of the reported findings of the workshop. However, the focus of this Chapter, as required by the terms of reference for the inquiry, is on the implementation of the recommendations arising from the workshop and therefore does not include an analysis or assessment of these recommendations. Of course, Chapters Six and Seven address many of the issues that were examined in the workshop.

³¹ *Facilitator’s Report*, p 25.

**Arnold Dix
Facilitator's Report
on the
International Workshop on Tunnel Ventilation**

7 to 9 June 2000 - Sydney, Australia

EXECUTIVE SUMMARY

The Workshop provided a forum for a detailed discussion of international and local trends and factors with respect to tunnel ventilation design.

An examination of alternative technologies occurred and an assessment of a number of air quality treatment systems was undertaken.

The Workshop focussed on the example of the M5 East project while also discussing the Cross City and Lane Cove tunnel projects generally and the underlying philosophies of tunnel ventilation design in Sydney, Melbourne, Western Europe, Asia and America.

Discussions focussed on international and local experience with tunnel ventilation technologies, the relationship between air quality and health, local and international trends in air pollution management, air pollution initiatives, the costs and effectiveness of technologies, and the importance of the relationship between communities and government.

FINDINGS

- Emissions from motor vehicles can cause adverse health effects.
- In all urban areas, including Sydney — people suffer adverse health effects as a result of breathing polluted air.
- Technologies exist which can alter the composition of polluted air from tunnels.
- A holistic approach to addressing polluted air is required when assessing tunnel air cleaning technologies. Prudent use of financial resources demands that the use of technology to alter the composition of tunnel air has to be compared with other methods of improving air quality.
- Information on the effectiveness of electrostatic precipitators at changing the air quality around tunnels, their cost and operational performance should be obtained from countries such as Norway, Japan and South Korea which use them.
- The suite of air quality objectives for tunnel emissions in New South Wales are comparatively strict compared with many other countries.
- The M5 East design is expected to meet all Sydney's comparatively strict environmental performance requirements, however in engineering terms, location is not optimal due to the remote stack location in a shallow valley.

- Analysis of the ventilation systems designed for the M5 East tunnel indicates that Sydney's comparatively strict standards are expected to be met outside tunnel portals and in areas surrounding the stack.
- The M5 East ventilation design is an example of a system, which has been designed by considering factors in addition to engineering.
- Conditions of approval substantially control the designs of Sydney tunnels.
- Holistic tunnel design includes consideration of more than engineering issues.
- The energy consumption of a ventilation system is a relevant factor in tunnel system design.
- Immediate consideration should be given to the most effective ways of improving air quality in areas identified as receiving the least benefit from the operation of the M5 East tunnel ventilation system.
- The benefits of cleaning tunnel air with various technologies — as they emerge — must be compared with the benefits of other measures to improve air quality.
- If measures to improve air quality are not implemented rapidly the opportunity afforded by the tunnel environment to manage motor vehicle emissions will become increasingly attractive.

I have not recommended air cleaning technologies be employed in the M5 East project. Nor have I recommended that works stop on the construction of the ventilation system. I have not made such recommendations on the basis that:

- a) Such a conclusion was not reached at the workshop; nor could it be reasonably reached on the basis of material presented at the workshop;
- b) My recommendations for further data collection, policy review, and air quality improvement measures will be responded to promptly;
- c) The M5 East system has been designed in a way that can accommodate both particulate and gas cleaning technologies should it be determined they are necessary and effective in the future.

Given the acknowledged adverse health effects of motor vehicle emissions it is appropriate that tangible programs for air quality improvement are introduced as a priority.

The RTA's response to the Recommendations in the *Facilitator's Report on the International Workshop on Tunnel Ventilation*

3.26 The RTA's submission to this inquiry contained the RTA's first formal response to each of the recommendations in the *Facilitator's Report on the International Workshop on Tunnel Ventilation* ('the Facilitator's Report'). Reproduced below is the section of the RTA's submission which lists the recommendations in the *Facilitator's Report*, together with the RTA's response to each recommendation.

It is recommended, in relation to the general design for urban tunnels in New South Wales that the relevant authorities:

Review the strict environmental performance requirements of tunnel ventilation systems in the context of other environmental outcomes that such requirements may cause.

This recommendation was particularly focussed on concerns expressed in the RTA International Workshop Report about the energy needs for meeting the requirement to minimise emissions from the Tunnel portals. Meeting that requirement will involve the use of reverse flow jet fans to suck air away from the portals and back into the Tunnel. The requirement reflects the fact that portal emissions do not disperse as effectively as ventilation stack emissions and therefore there is a greater potential for residents surrounding portals to be exposed to higher levels of emissions.

The Approval does allow for some emissions from the Tunnel portals provided that stringent air quality goals are met, recognising that in practice there will inevitably be some (albeit minor) leakage of emissions from the portals. It is anticipated that, as reductions in vehicle emissions accrue over time as a result of new vehicle and fuel standards, the need for strictly controlling portal emissions will diminish.

The RTA also refers to its response to point 8 under condition 73 of the Approval, in part 4.1(a) of this submission.

[Recommendation] An analysis should be undertaken of the likely timing and effect of introduced fuel and emission standards on both motor vehicle emissions from tunnels and their effect on ambient air quality.

Analyses of the effect on the Sydney motor vehicle fleet of changing diesel emissions and diesel fuel standards have been completed by consultants to Environment Australia, as part of the development of the draft *Diesel National Environment Protection Measure*. The Bongiorno Report noted that diesel fuel engines contribute greater quantities of particulates than petrol burning engines. [Paragraph 30 of the Bongiorno Report] The RTA understands that the Measure should be finalised later this year.

As a result of the large number of variables involved in conducting such analyses, there is uncertainty about the extent of the effects from changes in motor vehicle emissions and fuel standards. However, on the basis of these analyses, it is clear that there will be a significant reduction in emissions over time as a result of such changes. Consequently, emissions from the Tunnel can be reliably predicted to decrease significantly over the next decade.

[Recommendation] Implement a formal, transparent, multidisciplinary process for the regular review of tunnel design philosophy, ventilation performance monitoring and operational philosophy for all long urban road tunnels in Sydney.

As noted in part 3.6 of this submission, the RTA is continually investigating international developments in tunnel emissions treatment systems, and long urban road tunnels in Sydney will also be considered in this context.

Australian roads authorities are particularly well qualified in these areas at present, as a result of substantial experience in road tunnel design, construction and operation within the last decade.

In order to maximise the value of experience in relation to the M5 East, the M5 East Air Quality Management Plan Steering Committee will overview future reviews, starting from the proposed 2001 review.

[Recommendation] It is recommended, in relation to health risk evaluation of tunnel ventilation systems:

Methodologies for calculating and communicating comparative health risk assessment information should be established to better enable the assessment of the health implications of tunnel ventilation systems.

The use of both worst-case emissions predictions, as well as cumulative and long term predictions for health risk assessment should be considered.

That an explanation of the health risk implications of the standards, be prepared and made available to the public.

Air quality analysis, examining where present and future changes in air quality will occur and the nature of any changes should be conducted for tunnelling projects.

A health risk analysis of any change in air quality predicted should be undertaken which examines the nature and extent of the likely health impacts of any change in air quality identified.

These are matters which should more appropriately be addressed by NSW Health.

[Recommendation] It is recommended, in relation to cost benefit analysis of alternative tunnel ventilation designs that as a matter of urgency the following information should be sought overseas:

The relevant NSW department(s) formally request details of the rationale for installing the electrostatic precipitation systems for external air quality management in the Norwegian, Korean and Japanese tunnels from the appropriate government authorities.

The relevant NSW department(s) formally request data from Norway, Japan and South Korea on the effect on external air quality of operating electrostatic precipitators.

[Recommendation] It is recommended that the relevant NSW department(s) formally request data from Norway, Japan and South Korea on:

- **the effect on external air quality of operating electrostatic precipitators.**
- **the quantity and composition of wastes electrostatic precipitators generate.**
- **how wastes from electrostatic precipitators are disposed.**
- **the reliability of serviceability of operating electrostatic precipitators.**

The RTA has written to the Norwegian Public Roads Administration (the "NPRA") requesting any reports on the efficacy of filtration systems in road tunnels. In response, the NPRA has indicated that a study in respect of the air treatment systems which have been installed in the Bergen tunnel is being finalised, and the NPRA will provide the RTA with a copy of the report which is to be prepared on that study as soon as the report is completed.

In any event, the RTA views the recommendation to obtain this information as forming part of the RTA's ongoing investigation of international developments in tunnel treatment systems as required by condition 79 of the Approval (to the extent that such information would inform the RTA's investigation).

[Recommendation] In relation to more general issues about the Sydney context of future tunnel ventilation performance the following should be undertaken:

Further examination of alternative technologies is required to determine their actual costs and benefits.

As noted throughout this submission, the RTA has an ongoing process of investigating international developments in tunnel emissions treatment systems, which is in any event required by condition 79 of the Approval. The RTA is also uniquely placed to interpret these investigations for the Sydney context, given the RTA's recent experience in tunnel construction and operation in Sydney.

However, even with the benefit of this information, it is very difficult to determine costs and benefits of installing treatment systems. The main reasons for this are that no treatment systems have yet been developed on the scale that would be required for the M5 East [See in particular part 3.6(e) of this submission], and much of the cost-benefit analysis will depend on data which will only become available once operation of the M5 East commences. This is one of the reasons why the RTA undertook to design the Ventilation Stack to accommodate retro-fitting of treatment systems should this be required **after** the commencement of operation of the Ventilation Stack [See part 3.6(a) of this submission].

The RTA also refers to its response to Recommendation 8 of the 1999 Inquiry, in part 4.1(b) of this submission.

[Recommendation] It is recommended that further analysis of the benefits of NO₂ removal should be undertaken.

The EPA has examined the modelling for the M5 East with respect to this issue and has concluded that there would be little benefit in reducing NO₂ to NO within the Tunnel system. The proportion of NO₂ in the total NO_x from the Tunnel is less than 10%. Most of the conversion from NO_x to NO₂ occurs after discharge from the Ventilation Stack, as emissions enter the atmosphere and are oxidised. (There are several mechanisms by which oxidisation of NO occurs.) This analysis is reflected in the modelling for the Tunnel. Consequently, there would be very little benefit in seeking to remove NO₂ prior to emission from the Ventilation Stack.

[Recommendation] An analysis of the likely timing and effect of changes in fuel and emission standards on both motor vehicle emissions from tunnels and their effect on ambient air quality be conducted.

This recommendation reflects the second recommendation of the RTA International Workshop Report, which is discussed above.

[Recommendation] An examination is required of the effects of alternative measures – such as emission testing on motor vehicles – as was described from Switzerland – and the further regulation of other activities such as solid fuel heating will have on ambient air quality.

The effectiveness of emissions testing programs has been examined by the NSW Government and the vehicle emissions testing program is being further developed.

The RTA is also preparing the SAQMP, as discussed in relation to Recommendation 1 of the 1999 Inquiry Report, and in this context will investigate matters such as a buy-back or replacement scheme for solid fuel heaters as contemplated in the DUAP 2000 Schedule.

[Recommendation] It is recommended, in relation to the measurement of the environmental performance of long urban road tunnels that:

Data on air quality proximate to tunnels be made available to the public rapidly (such as via the Internet) in a manner similar to that currently deployed by the Victorian EPA.

Similar requirements have been addressed under Condition 75 of the DUAP 2000 Schedule. The RTA also refers to its response to Recommendation 9 of the 1999 Inquiry Report.

Graphs derived from the monitoring stations near the northern portal and the northern stack of the Eastern Distributor have been posted on the RTA Internet site. The format of those graphs is similar to that used by the Victorian EPA.

Test web pages have been prepared for the RTA Internet site and are awaiting completion of data sets and graphs. Sample graphs of the M5 East background air quality monitoring data have already been shown to the AQCCC.

[Recommendation] It is recommended, in relation to modelling that:**An independent assessment of the differences predicted by the numerical modelling as compared with the physical modelling of the M5 East ventilation system be undertaken.**

This issue was addressed by the CSIRO Report, which was prepared approximately 1 month after the RTA International Workshop Report. In summary, the CSIRO concluded that differences between the models occurred because the physical model did not consider wind speeds as low as the numerical model. The RTA does not consider this to present a significant difficulty for the RTA's modelling.

[Recommendation] The relevant NSW government agencies formally request their Victorian counterparts for data demonstrating any differences between actual and predicted changes in air quality as a result of the operation of the City Link ventilation system.

The report of the Victorian review of the Citylink air quality data associated with the Domain Tunnel has been published on the Victorian EPA Internet site for several months. In summary, that report concludes that:

"For PM₁₀ particles it is clear that the air quality is better, both at Grant St [monitoring station] and across the rest of Melbourne over this period compared to the same time last year. The difference between Grant St and the rest of the network is consistent, indicating that the Domain Tunnel stack has not made air quality worse in the area."

Oral advice from the Victorian EPA concerning the Burnley Tunnel (which is 3.6 km long) is that the levels of air pollutants measured both within the tunnel and the stack are well within the applicable goals.

[Recommendation] Investigation of the feasibility of conducting full height gas dispersion test for tunnel projects, and if feasible, conducted prior to the operation of ventilation systems.

Full height gas dispersion testing was considered by the RTA and was found to be not feasible due largely to the difficulty of scaling up results from a small scale test facility to the diameter and air velocity of the Ventilation Stack. However, dispersion from the Ventilation Stack will be tested as part of the commissioning process for the Ventilation Stack.

[Recommendation] It is recommended in relation to this report and the materials associated with it that they be made freely accessible to the public.

The RTA International Workshop Report has been made freely available to the public via the RTA's Internet site. In addition, the RTA has produced a CD which contains the full text of the RTA International Workshop Report, visual material provided by presenters at the RTA International Workshop and other material. Copies of the CD may be ordered from the RTA's Internet site.

[Recommendation] In relation to the recommendations of this report, that any responses to the recommendations be made available at the same location as the report.

The RTA has embraced many of the recommendations of the RTA International Workshop Report and has implemented many recommendations in the course of carrying out the M5 East project. [RTA, *Submission*, pp 27-34]

The EPA's response to the relevant recommendations in the *Facilitator's Report on the International Workshop on Tunnel Ventilation*

3.27 The EPA's submission to this inquiry provides detailed information in relation to the implementation of a number of the recommendations contained in the *Facilitator's Report*. This information is reproduced as follows:

Recommendation - Review the strict environmental performance requirements of tunnel ventilation systems in the context of other environmental outcomes that such requirements may cause.

The EPA understands that this recommendation was particularly focussed on concerns about energy used by the tunnel operator to meet the requirement that the ventilation system for the main tunnel must be designed to avoid emissions as far as practical. This is to be achieved using reverse flow jet fans to suck air back into the tunnel.

The requirement for minimising emissions from portals is because portal emissions do not disperse as effectively as stack emissions. Therefore, there is much more potential for residents surrounding portals to be exposed to higher levels of air pollutants. The trade-off between energy use and portal emissions is implicit in the conditions and is part of the overall trade-offs made during the approval process.

The development approval allows for some emissions from the tunnel portals provided stringent air quality standards are met, recognising that in practice there will inevitably be some leakage of emissions from the portals. It is anticipated that as reductions in vehicle emissions accrue over time due to new vehicle and fuel standards, the need to control portal emissions will diminish. This will also provide opportunities to reduce energy use.

Recommendation - An analysis should be undertaken of the likely timing and effect of introduced fuel and emission standards on both motor vehicle emissions from tunnels and their effect on ambient air quality.

Key developments stemming from Action for Air and other recent government initiatives are outlined below:

The Commonwealth Government emission standards for new vehicles are:

Diesel vehicles

In 2002-03: Adoption of Euro 2 for light duty diesels, Euro 3 for medium and heavy-duty diesels.

In 2006-07: Euro 4 for all diesels.

Petrol vehicles

In 2002-03: Adoption of Euro 2

In 2005/06: Adoption of Euro 3

A diesel standard for road transport fuel with a sulfur content of no more than 500ppm will be in place nationally by 2002 and 50ppm sulfur by 2006. Nationally, lead in petrol will be phased out by 2002. Petrol standards with a 150 ppm limit on sulfur in petrol are due in 2005.

The NSW EPA has been instrumental in developing a Diesel NEPM, the objective of which is to establish a strategy to reduce in-service diesel vehicle emissions. A draft Diesel NEPM and impact statement are currently available for review and comment. The Diesel NEPM is expected to be finalised by mid-2001.

The Summer Petrol Volatility Program requires the phased reduction of volatility of petrol supplied for retail across the Greater Metropolitan Region of Sydney over summer months. The program has been very successful to date, with reductions of 35 tonnes of hydrocarbon emissions per day in the summer of 1998-1999 and further reductions of seven tonnes per day in 1999-2000. The program is voluntary and to date compliance has been strong. Last summer, however, two key oil industry players notified the EPA of difficulty meeting this year's volatility target, due to operational constraints.

Because of the multiple variables involved, there is uncertainty about the actual size of the effect that will result from changes in emission and fuel standards. However, it can be clearly stated that there will be a significant reduction in emissions over time because of these changes.

The package of measures known as Measures for a Better Environment are particularly relevant. These measures include tighter emission standards for new vehicles and better fuel quality. Projections prepared in the context of the Fuel Quality Review suggest substantial reductions in total emissions in the next 20 years.

In Sydney, for example, between 2000 and 2020 total hydrocarbons are projected to fall 26-27 per cent, NO_x by 71 per cent, carbon monoxide 75-77 per cent and PM₁₀ 35 per cent. As may be expected from the improved fuel quality, lead and sulphur emissions are expected also to fall by 93 per cent and 84 per cent respectively. Emissions of air toxics (for example, benzene) are expected to fall by 50-70 per cent. These projections assume a 32 per cent increase in total vehicle kilometres travelled.

A study prepared specifically to examine the impact of changes to diesel vehicle emissions in the context of preparing the Diesel NEPM estimated that by 2015 PM₁₀ emissions could fall by as much as 69 per cent from 1996 levels.

Therefore, emissions from the tunnel can be reliably predicted to decrease over the next decade.

Recommendation - That an explanation of the health risk implications of the [air quality] standards, be prepared and made available to the public.

It is appropriate that NSW Health comment on health risks. However, the background papers to the Air NEPM contain substantial documentation of health impacts that were undertaken and/or reviewed for the development of the Air NEPM goals. These were used in developing the conditions of approval and are available to the public through the National Environment Protection Council's website.

Recommendation - There are a series of recommendations for the relevant NSW Department(s) to formally request details of the installation and operational effectiveness of electrostatic precipitation systems for external air quality management in the Norwegian, Korean and Japanese tunnels.

The EPA's approach is performance-based regulation: setting the environmental outcomes that must be achieved, rather than dictating the technology that must be used to achieve the outcomes. The reasons for this approach include:

The importance of placing the onus on the proponent to ensure that whatever technology is used achieves the environmental outcomes set for the project; and

The value of building industry's capacity for innovation in achieving – and bettering – goals.

Recommendation - It is recommended that further analysis of the benefits of NO₂ removal should be undertaken

The EPA has examined the modelling with respect to this issue and does not anticipate that NO₂ will be a problem.

The proportion of NO₂ in the total NO_x from the tunnel is relatively small. Consequently, the NO₂ levels predicted by the model at nearby receptors are primarily from the predicted reaction of the plume NO with background O₃.

The technology discussed at the Workshop does not remove the NO₂ but converts it to NO which then can react with O₃ to form NO₂. Therefore, there would be little benefit in reducing NO₂ to NO within the tunnel system. [EPA, *Submission*, pp 7-9]

NSW Health's response to relevant recommendations in the *Facilitator's Report on the International Workshop on Tunnel Ventilation*

3.28 In its submission to this inquiry, NSW Health provided information in relation to the implementation of the recommendations contained in the *Facilitator's Report* and health risk evaluation of tunnel ventilation systems. This information is reproduced below.

Officers of Department of Health participated in the workshop, and have reviewed the recommendations.

The Facilitator's Report, Executive Summary provides a reasonable assessment of Health's perspective on the outcomes:

The system as designed is likely to comply with air quality goals

Particle filtration would be fairly effective in decreasing the local impacts of fine particle pollution. However the local impacts are expected to be very small, and any benefit needs to be weighed against the energy/pollution costs of the filtration process.

Particle filtration of road tunnels is not used anywhere in the world to control ambient air pollution – it is used only to improve in-tunnel visibility.

Modelling of air pollution impacts is likely to have over-estimated the true impact.

The recommendations relating to Health were:

[Recommendation] Methodologies for calculating and communicating comparative health risk assessment information should be established to better enable the assessment of the health implications of tunnel ventilation systems.

Department of Health anticipates that the methodologies outlined in the draft document by the Health Council (of which Department of Health is a member) "Environmental Health Risk Assessment" will be accepted as standard Australian practice for calculating and communicating health risk. The calculation of health risk in relation to tunnels will continue to be dependent on modelled air quality impacts.

[Recommendation] The use of both worst-case emissions predictions, as well as cumulative and long-term predictions for health risk assessment should be considered.

In undertaking or assessing health risk assessments it is usual practice to utilise worst-case predictions. This is the basis on which Department of Health assessed likely health impacts of the stack. Cumulative effects are incorporated by adding risks from each hazard, following US EPA methodology. In considering the health impacts of air pollution, Department of Health also incorporates estimates of chronic impacts from studies such as the Six Cities Study.

[Recommendation] That an explanation of the health risk implications of the standards, be prepared and made available to the public.

The background papers to the NEPM for Ambient Air Quality⁶ contain substantial documentation of health risk assessments that were reviewed and undertaken for the development of the NEPM goals. This document is available on the National Environment Protection Council website: www.nepc.gov.au

[Recommendation] A health risk analysis of any change in air quality predicted should be undertaken which examines the nature and extent of the likely health impacts of any change in air quality identified.

As indicated above, Department of Health utilises the methodologies in health risk assessment as outlined in the draft Health Risk Assessment guidelines, or US EPA methodology in aspects not covered by the Australian guideline. This includes describing the nature and quantifying the extent of likely health impacts.

While a range of health effects is attributable to air pollution, including many impacts on respiratory and cardiovascular health, in the case of the stack, the Department has not looked at each outcome in isolation. This is because the effect is very small, on a very small population. Indicator outcomes such as death and bronchitis have been assessed, and found to be non-detectable.

[Recommendation] It is recommended that further analysis of the benefits of NO₂ removal should be undertaken.

It was apparent at the workshop that there was no benefit of the removal of NO₂ apart from in-tunnel air quality. The Department of Health has not evaluated this technology further. [NSW Health, *Submission*, pp 6-7]

The Committee's observations in relation to the International Workshop on Tunnel Ventilation and the implementation of the recommendations in the *Facilitator's Report*

- 3.29** As outlined in paragraphs 3.22 and 3.23 above, the facilitator, Dr Arnold Dix stated there was insufficient information before the International Workshop on Tunnel Ventilation to determine the appropriateness of the installation of electrostatic precipitators in the M5 East project. The Committee believes that this is an unsatisfactory situation. At best, it can be described as a lost opportunity. At worst, it can be described as a further example of the obstinate resistance of the RTA to ensure that any proposal to filter the stack was properly and openly evaluated.
- 3.30** The *Facilitator's Report* made a number of important recommendations. As outlined above, a number of these are already being implemented. However, two recommendations do not appear to have been addressed as yet.

3.31 The *Facilitator's Report* draws attention to the importance of regional air quality management. The Report recommended the examination of two specific issues that have the potential to have a significant affect upon regional air quality:

An examination is required of the effects of alternative measures such as emissions testing on motor vehicles – as was described from Switzerland – and the further regulation of other activities such as solid fuel heating will have on ambient air quality.³²

3.32 The RTA's submission to this inquiry indicates that information has been sought from the Norwegian Public Roads Authority on the efficacy of filtration systems in road tunnels. However, the RTA has not yet indicated that it has formally requested data from Japan or South Korea. This is despite the clear terms of the relevant recommendation in the *Facilitator's Report* and the statement in the DUAP submission that it would be appropriate for all the items in this recommendation to be examined as part of the review of international developments³³. This appears to be an omission of some significance as the *Facilitator's Report* notes that electrostatic precipitators are used in tunnels in these countries "for external environmental reasons".³⁴

Recommendation 3

The Committee recommends that the RTA fully implement the recommendations contained in the *Facilitator's Report: International Workshop on Tunnel Ventilation*, including the specific recommendations for:

- an examination of the potential of emissions testing and further regulation of solid fuel heating on ambient air quality; and
 - information on the effect of electrostatic precipitators on external air quality to be specifically sought from countries where this technology is used for external environmental purposes, including Japan and South Korea.
-

³² *Facilitator's Report*, p 36.

³³ As required under Condition 79 of the conditions of approval for the M5 East project.

³⁴ *Facilitator's Report*, p 23.

Chapter 4 The CSIRO report and DUAP conditions of approval

4.1 This Chapter discusses the remaining matters identified in paragraph (a) of the terms of reference for this inquiry: the implementation of the recommendations of the CSIRO; and the implementation of the Department of Urban Affairs and Planning (DUAP) conditions of approval for the M5 East Ventilation Stack.

CSIRO Report

4.2 As outlined in Chapter Two, the Minister for Urban Affairs and Planning approved the M5 East project in December 1997, subject to 150 conditions. Conditions 70-81 deal with air quality. These conditions were reproduced in full in the Committee's 1999 Report.³⁵ Condition 73 is concerned with the height of the stack and provides for the Director-General of Urban Affairs and Planning to approve the height of the stack above 25 m as deemed necessary to improve dispersion of emissions and/or reduce the potential impact of emissions on the local population.

4.3 In April 2000, the RTA formally requested approval for construction of the stack at a height of 25 m. The RTA submitted air quality assessment documents with this request. The request from the RTA for approval of the stack height was deferred pending the consideration of the results of the International Workshop on Tunnel Ventilation outlined in Chapter Three. The DUAP submission to this inquiry notes that, following the workshop, the RTA wrote to DUAP again on 18 August 2000, "confirming its earlier request for approval of the stack height of 25 metres."³⁶

4.4 In order to determine the stack height and deal with the RTA's request for approval of a 25 m stack, DUAP engaged the services of the CSIRO "to undertake a comprehensive independent assessment":

The main tasks required of the CSIRO was to assess the rigour of the technical air quality assessment in terms of the reliability of the predictions and to make recommendations on the preferred height of the stack from an air quality perspective.³⁷

4.5 The RAPS submission to this inquiry is critical of DUAP as having "restricted the scope of the review" undertaken by the CSIRO and by DUAP itself, to merely considering the height of the stack and not undertaking a more fundamental reconsideration of the M5 East ventilation system.³⁸ However, the DUAP submission makes clear that the decision of the Minister for Urban Affairs and Planning in December 1997 meant that there would

³⁵ 1999 Report, pp 21-24.

³⁶ DUAP, *Submission*, p 11.

³⁷ DUAP, *Submission*, p 11.

³⁸ RAPS, *Submission*, pp 26-30.

be a single stack in Turrella. What condition 73 left open was the final height of the stack and it was this decision that was the subject of review by DUAP, including the CSIRO report in August 2000.

The “Context and Conclusions” from the CSIRO report are reproduced below:

CSIRO Report on Air Quality Impact of the Emissions from the M5 East Tunnel

CONTEXT and CONCLUSIONS

DUAP has requested CSIRO to advise:

1. whether the procedures and data used by Hyder Consulting to assess the air quality impacts of emissions from the M5 East tunnel vented through a single stack at Turrella are appropriate;
2. if the procedures and data have been used appropriately;
3. if the conclusions in the report are credible;
4. what stack height is required to meet the air quality goals;
5. other considerations.

We advise that, based on the information in the main Hyder Reports (2000a, b), further information supplied informally, and supplementary reports on modelling using 1998 meteorology (Hyder 2000c) and air quality modelling for incident management (Hyder 2000d) that:

1. The methods employed by the Consultants are appropriate for making an assessment of the impacts of emissions.
2. There are a number of points that we have not been able to satisfy ourselves about in reviewing the procedures employed. We believe the estimates of emissions are reasonable except for particles, which may be underestimated by a factor of two or more. We also believe the reliance on the wind tunnel results to support a claim that the numerical modelling is conservative, has not been justified.
3. The Hyder Reports conclude that predicted ground-level concentrations are below the Air NEPM Standards. We believe this may be the case for nitrogen dioxide if stack height and efflux velocities are appropriate (see point 5), but although the modelling shows that PM₁₀ Standards are not exceeded, it is possible that at other times this may not be the case, principally because background PM₁₀ levels are occasionally high, and because the emissions estimates used by Hyder Consultants may be too low. These exceedences may occur irrespective of the stack emissions, which, in principal, could increase the number of potential exceedences.
4. The 1998 background data for PM₁₀ and NO₂ show generally similar peaks to those observed in the 1995 data, except for the maximum NO₂ value of 180 Fg m⁻³ which is substantially greater than the highest 1995 value of 136 Fg m⁻³. This indicates that conclusions based on Hyder's 1995 modelling may underestimate the potential for exceedence of the NEPM goals for NO₂. An unexplained feature of the 1998 glc predictions (Hyder 2000c) is that the highest stack contributions to PM₁₀ levels are about 30% lower than those predicted using the 1995 meteorology. Although the results of modelling 1995 and 1998 are broadly similar, it must be noted that, there are data for other years that show higher concentrations, particularly for PM₁₀. As high PM₁₀ is often associated with bushfires, some allowance is made in connection with exceedences. Nevertheless, some numerical modelling for these higher background occasions may provide a better estimate of the likely frequency of exceedence over a number of years.

5. In order to prevent exceedence of the NO₂ goal, which is predicted when using a conservative method for including background concentrations, we believe that the effective plume height needs to be increased in light wind conditions. This can be achieved with a higher physical stack height (i.e. 35 m or higher) or the use of enhanced stack exit velocities at night (i.e. at hours 20-23) or a combination of both. For example, it has been shown that if stack exit velocities were to be increased for these hours (see Section 8 for details), then maximum ground level concentrations of NO₂ at these times would be below the guidelines, even for the 25 m stack height, and when using a conservative approach to inclusion of background concentrations. This may also reduce the frequency of PM₁₀ exceedences.
6. We also believe the possibility of plume strike on tall buildings needs to be taken as a serious possibility and that building height restrictions be imposed in the region following modelling studies.
7. If further numerical modelling is undertaken, we recommend that the influence of thermal buoyancy and fan speed on plume rise should be included and that the background concentrations and plume strikes should be combined stochastically.

These conclusions are supported by the review presented here. In preparing it, we also have attempted to address residents and other citizens concerns raised at a meeting with DUAP on 14 June. This is largely achieved through a discussion of the inherent uncertainty in the estimates of ground level impacts from the Turrella plume.

Issues such as:

- the adequacy or otherwise of the air quality goals
- the suitability of the stack location
- the advisability of treating the ventilation air to reduce emissions were not included in the scope of the current review.

Implementation of the CSIRO Report: DUAP's assessment of condition 73

- 4.6** Following the CSIRO review, in August 2000 DUAP produced its own assessment report in relation to condition 73. The DUAP submission to this inquiry notes that the DUAP report took into account the CSIRO findings, together with advice from the RTA, EPA and community representatives. The DUAP submission (of which the relevant sections are reproduced below) summarises the key issues from the DUAP report in relation to condition 73:

The Department's assessment report on Condition 73 (made publicly available), dated August 2000 provides a summary and synthesis of the key issues with respect to the Department's statutory role in assessing Condition 73 and takes into account the many and varied meetings with the RTA, EPA and community representatives. For completeness it also addressed issues with respect to other outstanding air quality conditions of approval.

A summary of the key issues from the Department's report follows:

Air Quality Modelling and Compliance with Conditions of Approval

Based on the review by the CSIRO, the Department concluded that there is a high degree of confidence that the predicted ground-level concentrations for NO₂ would be below the specified goals if the stack height is 35 metres and there are enhanced stack exit velocities at night (i.e. at hours 8PM to 11PM). However with respect to the PM₁₀ goals, the level of confidence is less. The CSIRO report concludes that although the modelling shows that PM₁₀ goals are not exceeded, it is possible that at other times this may not be the case principally because the background PM₁₀ levels are occasionally high and because the emission estimates used by Hyder may be too low. These exceedences may occur irrespective of the stack emissions, which, in principle, could increase the number of potential exceedences. However, the CSIRO report also acknowledges that increased exit velocities and consideration of higher ambient rock temperature could potentially reduce the potential frequency of exceedences of PM₁₀ during critical winter periods.

Overall the CSIRO report confirms the 1997 Director-General's assessment (refer page 48 of the Director-General's Report) and the EPA's assessment at that time, that background levels will continue to be a critical factor in determining whether there could be exceedences of the specified goals. Accordingly, regional strategies to address high background levels of particulate matter (as specified under Condition 80) are and will continue to be integral to achieving the specified goals in addition to the performance of the ventilation stack.

Furthermore, EPA has advised that air quality monitoring at the Earlwood station since 1995 has shown only 1 exceedence of the PM₁₀ goal in 1997 and 2 exceedences of the PM₁₀ goal in 2000. All three exceedences are attributable to bushfires.

The Department notes that it has received a number of public submissions indicating that the CSIRO report recommended a 50 metre high stack. It did not. On the issue of a 50 metre stack, the CSIRO says on page 22:

"Given that the highest concentrations are expected to occur as impacts on nearby terrain (approx 500 metres from the stack), and that this terrain is up to 45 metres above the physical stack height, it would be advantageous to have an effective plume height (stack height + stack tip downwash + plume height rise increment) that was at least 50 m above the base. This could be achieved either by having a physical stack height of 50m with the current diurnal pattern of stack velocities, or by using a combination of physical stack height and a modified diurnal profile of stack exit velocities in order to achieve a minimum plume height of 50m"

It is acknowledged by the Department that a number of the issues and concerns raised in the report by CSIRO are highly technical in nature and a number of the conclusions have been disputed by the RTA as being of academic opinion rather than necessarily an established fact.

Key Community Concerns

The Department conducted a number of meetings and had many telephone calls and letters from community members throughout the assessment process. The Department is fully appreciative of the level of outrage and community concern and has endeavoured to be open and transparent.

The Department specifically acknowledges the considerable and significant community concerns with respect to variations in local air quality, the need for transparent and independent monitoring, guaranteed and unambiguous certainty about installation of electro-static precipitators if the goals are not met, immediate access to monitoring information and ensuring that risks to the community are equitable. This was integral to the development of additional conditions with respect to the approval of the height of the stack in August 2000.

Most of the recommended conditions are almost solely based on an attempt to address such concerns.

Sub-Regional Air Quality and the Air Quality Management Plan.

As recognised by DUAP and the EPA, and confirmed in the CSIRO report, the greatest concern for meeting the specified air quality goals is background air quality. The EPA has indicated that giving priority to implementation of the Air Quality Management Plan (AQMP), as required under Condition 80, could further address PM₁₀ background levels and would give greater confidence in terms of compliance with the air quality goals. The Department has also recommended that the Plan be further enhanced including detailed consideration of a buy-back/replacement scheme for solid fuel heaters which is considered to be an important contributor to background PM₁₀ levels during worst case situations in winter.

Health, Fine Particles and the NEPM Standards

There is a view by some sections of the community that exposure to any level of pollution from the M5 East is unacceptable, irrespective of whether the goals are met. Whilst the Department acknowledges this concern, it is not appropriate for the Department to assess the applicability of specified goals which are based on the National Environment Protection Measure (or NEPM) goals. This is a matter for consideration by the appropriate health regulators.

It is noted that a policy of 'no emissions of particulate matter to the environment under any circumstance' does not appear to be adopted anywhere in the world. In Norway for example, where electro-static precipitators are installed, these are switched off when in-tunnel conditions are acceptable and therefore emissions are allowed.

International Workshop on Tunnel Ventilation - June 2000

Whilst not directly related to the Department's role in regulating compliance with the Minister's conditions of approval, the Director-General's Report on the height of the stack also took into consideration international best practice for management of tunnel emissions. This has included a review of the issues raised at a 3-day International Workshop on Tunnel Ventilation organised by the RTA in June 2000. Overall there did not appear to be any strong evidence that the current M5 East vent stack is inconsistent with International best practice.

The Facilitator's Report concludes that it does not recommend air cleaning technologies be employed in the M5 East project. The Department is aware that sections of the community do not accept this conclusion.

Local Air Quality Impacts

Certain community members expressed considerable concern about the potential for severe localised air quality impacts which may not be picked up in the broader monitoring strategy. The Department considers that there would be merit in establishing a local complaint response procedure including the option for additional local air quality monitoring. A community based monitoring station was also recommended which would allow the community direct access to the monitoring site. The station would be entirely funded by the RTA but run independently by or on behalf of the community. It is understood that a similar set-up currently exists for the City-Link tunnel in Melbourne.

Urban Design

The Department has been advised that from a design and visual perspective, that there would be benefits of constructing the stack at 35 metres. It would be better proportioned, and would not significantly impact on the visual amenity of additional residents. Those that would see it, would look at it rather than into it which is considered to be an advantage. For a 25 metre stack most residents would look into it. There would also be perceived air quality benefits of a taller stack. The higher stack would have increased visibility to the south, but the Department has been advised that this would be acceptable because the stack would be viewed from a greater distance and would always be viewed with a background to the Undercliffe ridge. It is noted that a 50 metre stack

would have a vastly increased visual catchment as well as forming a prominent protrusion above the Undercliffe ridgeline and as such was not recommended.

Overall the Department recognises that there were a number of shortcomings in the design process. Nevertheless, this has been within the context of designing a structure which has been fundamentally unacceptable to the affected community. To some extent, the Department's view is that a redesign with community involvement may exacerbate current community hostility and grief towards the stack. The UDAS report concludes it is a credit to the RTA and their consultants that they have achieved an acceptable outcome at all. In the extraordinary circumstances of this case, it is considered that the current design outcome achieved is acceptable.

Capital, Operating Costs and Energy

Treatment systems for particulate matter exist and have been proven to be effective in capturing particulate matter. Costs, maintenance and reliability is complex and is still subject to more detailed investigations, however it is apparent that ESPs are likely to involve greater capital costs at least in the short term. The long term operating costs when comparing stack and treatment options is similarly complex. The stack system would require significant energy demands to operate the fans, however this has the potential to be reduced through improved air quality.

A treatment system would require much greater capital costs (potentially including fans to control smoke incidents) however are expected to have lower long term operating costs. However treatment systems would require a more significant maintenance regime and any replacement costs are likely to be much higher.

The Department considers that as part of the Air Quality Management Plan required under Condition 80, it would be worthwhile for a comparative economic assessment of options be undertaken.

Conclusions

The Department's report on Condition 73 concludes that there does not appear to be sufficient scientific certainty that a stack constructed at a height of 35 metres would not be able to meet the specified air quality goals. The fact that since 1995 there have been only 3 exceedences of the PM₁₀ goal, all contributable to bushfires, further reduces the uncertainty of compliance.

Notwithstanding, ambient background levels of PM₁₀ will continue to be a critical factor in determining whether there could be exceedences of the specified goals. Accordingly regional strategies to address high background levels of particulate matter (as specified under Condition 80) are and will continue to be integral to achieving the specified goals in addition to the performance of the ventilation stack.

Even if electro-static precipitators are installed, it is more than likely that a 35 metre stack would still be required for compliance with NO₂ goals. Electro-static precipitators do not treat NO₂ and there is no strong evidence of large scale gas treatment systems operating anywhere in the world. [DUAP, *Submission*, pp 11-14].

4.7 The RTA's submission to this inquiry notes that, by a letter to the RTA dated 22 August 2000, the Director-General of DUAP determined that the height of the stack would be 35 m. Attached to this letter was a schedule of additional conditions related to the height of the stack and related matters that arose from the assessment undertaken in relation to condition 73.

4.8 The schedule of additional conditions, known as the DUAP 2000 schedule is reproduced below.

On this basis of the above findings, a 35 metre stack height was approved by the Director-General on the 22 August 2000. In appreciation and as a direct result of considerable and significant community concern, the Department imposed some 9 additional conditions on the stack. These conditions expressly acknowledge and reflect the concerns raised by the community.

Condition 73 *Clause 3* requires the RTA to prepare detailed plans and specifications for the construction of electro-static precipitators prior to opening the tunnel. This was in direct response to community concerns about potential delays in installing ESPs should air quality goals not be met.

Condition 73 *Clause 4* specifically requires the RTA to install ESPs if there is an exceedence of the air quality goal. This was in response to community concerns about the perceived existing ambiguities in Condition 74.

Condition 73 *Clause 5* provides an explicit mechanism for dealing with local complaints about air quality impacts. This was in direct response to community concerns that there may be significant variations in air quality due to local topographical variations which may not be picked up by the monitoring program.

Condition 73 *Clause 6* requires the establishment of a community based monitoring station. This was imposed as a result of community concerns about the transparency and independence of the monitoring.

Condition 73 *Clause 7* was established (through direct advice from the EPA) to monitor in-tunnel pollution concentrations of NO_x and PM₁₀. This would assist in addressing the community concerns about the potential for the tunnel operator to "pollute up" to the goals.

Condition 73 *Clause 8* requires the RTA to consider options for potential partial ventilation at tunnel portals. This was in direct response to community concerns that there should be more equitable sharing of pollution so long as air quality goals can be still met.

Condition 73 *Clause 10* was imposed on the basis of community concerns that long term air quality impacts were not being considered and that such annual goals are now a requirement by the US EPA.

Condition 73 *Clause 11* was included on the basis of community concerns that incidents in the tunnel may have an impact on local air quality due to emergency procedures.

Condition 75 was also enhanced as part of the approval of the stack in response to community concerns about access to results of air quality monitoring data. Condition 75 now requires real-time monitoring to be made available on the Internet and other publicly accessible places.

A minor amendment was made to the Conditions of Approval 73 on the 20 October 2000 to correct two typographical mistakes. The amended Condition 73 has been sent to all key stakeholders and community representatives.³⁹

4.9 The timing and circumstances generally of DUAP's determination of the stack height is the subject of criticism in the RAPS submission to this inquiry. RAPS describes the DUAP decision in relation to condition 73 as "hasty", and the additional conditions as "seriously flawed and inadequate."⁴⁰ RAPS point out that on 21 August DUAP was advised that the RTA and the Minister for Transport and Minister for Roads were "considering proposing modifications to the project, following approaches by members of the Cross Bench and the community", only to find that the decision of the Director-General of DUAP to approve the stack height was announced two days later, "effectively preventing any community input into the process, or any opportunity for many of the concerns identified by the CSIRO to be satisfactorily addressed."⁴¹

4.10 The RAPS submission includes a detailed critique of the additional conditions included in the DUAP 2000 schedule and the decision in relation to condition 73. The RAPS submission is particularly critical of the way in which DUAP dealt with urban design issues in relation to the stack height, and the "acknowledged disaster" of community consultation concerning the stack.

By its approval of the 35 m stack, DUAP showed itself to be powerless and/or unwilling to address the chief concerns of the community and the experts it had commissioned to review the ventilation system. Neither the outcomes of air quality, aesthetic and property impacts, nor the processes of urban design and community consultation were adequately addressed by the DUAP review... [DUAP] may well have expressed sympathy to residents' plight but it has failed in its duty of care to appropriately fulfil its regulatory role. Despite all the critical expert opinion and community representations, no meaningful changes have resulted to the ventilation system which has been, from the very beginning of the project, the issue of most concern to the public.⁴²

4.11 In relation to community consultation, the RAPS submission criticises the RTA for a range of reasons, including: control of the agenda to exclude raising legitimate issues; controlling the minutes which require considerable correction; providing information in an overly detailed and therefore ineffective manner; failing to fund community dissemination of information. They also criticise DUAP for failure to intervene in the process to ensure its smooth running, in spite of complaints. The RTA has not had the chance to respond

³⁹ DUAP, *Submission*, p 15.

⁴⁰ RAPS, *Submission*, pp 30-31.

⁴¹ *Ibid*, p 30.

⁴² *Ibid*, pp 30-39.

specifically to these complaints, and the Committee expresses no view as to their validity. The Committee does, however, note that criticisms of this nature are indicative of a community consultation process that is not operating in a fully effective way.

Implementation of DUAP's conditions of approval

- 4.12** As outlined above, the Minister for Urban Affairs and Planning, in approving the M5 East project imposed 150 conditions. Twelve of these, conditions 70-81, dealt with air quality. In August 2000 a further nine conditions were imposed by DUAP.
- 4.13** The DUAP submission to this inquiry includes as an attachment a statement on the current status of implementation of the conditions of approval relating to air quality. This statement is reproduced below:

Current Status of Implementation of Conditions Relating to Air Quality

Condition 70 requires compliance with in-tunnel CO goals. Compliance with this condition is required prior to operation and is still subject to additional information from the RTA. TEC was approved in May 2000 as the independent design verifier and the verification was approved on the 22 August 2000.

Condition 71 relates to avoidance of air being recirculated between tunnel portals and through the portals and air quality goals at the tunnel portals. TEC has verified the design of the ventilation system and was approved on 22 August 2000. Compliance with this condition in terms of air quality goals would be subject to monitoring at the operation stage.

Condition 72 requires explicit compliance with EPA goals for ambient air quality at ground level. Compliance with this condition would be subject to monitoring at the operation stage..

Condition 73 requires approval of a independent consultant to undertake wind tunnel testing and the height of the stack. The Department approved MEL Consultants to undertake the independent wind tunnel testing. The Department approved the stack height on 22 August 2000 based on the following conditions

73 (1) - Height - Approved at 35 metres on 22 August 2000.

73 (2) - Materials and Finishes - Approved on 7 December 2000 subject to further landscape plans and details of ramp at the base of the stack showing soil depths as well as plant species, numbers and sizes to be provided.

73 (3) - Detail Plans and Specifications for ESPs. Being completed by RTA (Flagstaff Report).

73 (4) - Operation Stage Compliance - Operation stage. Preliminary discussions with AQCCC. Draft protocol for deciding how an exceedence will be determined being developed. The Department will rely on EPA advice as appropriate.

73 (5) - Operation Stage Compliance - Operation Stage. To be in place prior to the motorway opening

73 (6) - Community Based Monitoring Station - Being developed by RTA and under consideration by the AQCCC. No DUAP approval required.

73 (7) - Internal Monitoring Requirement - Being developed by RTA. Approval By DUAP required.

73 (8) - Investigate Portal Emissions - Being developed by RTA/EPA. No portal emissions allowed without a public modification process.

73 (9) - Matrix of emission concentrations - Approved by DUAP on 23 March 2001 following advice from EPA.

73 (10) - Operation Stage Compliance - In preparation. Operation Stage

73 (11) - Operation Stage Compliance - In preparation. Operation Stage

Condition 74 requires the RTA to make provision to the satisfaction of the Director-General for the installation of treatment systems including electrostatic precipitators and gas treatment systems. Condition approved by Director-General on 22 August 2000.

The condition also enables the Director General to require the installation of treatment systems following results of the monitoring in terms of compliance with the goals and after input from the Community Consultative Committee and the EPA.

Condition 75 requires the installation of a comprehensive air quality monitoring network developed with input from the EPA and the AQCCC. Stage 1 was approved on 22 August 2000. This was for the location of temporary air quality monitoring stations at Turrella and Undercliffe. Recorded data is currently being provided to the AQCCC on a monthly basis. Completion of compliance would be finalised prior to the operation stage.

Condition 76 relates to urban design aspects of the exhaust stack.. Architectural details were approved by DUAP on 7 December 2000. Further landscape plans are required particularly details on the ramp at the base of the stack.

Condition 77 relates to the requirements of the FAC. Compliance with this condition is required prior to construction of the stack. This condition does not require approval by this Department. Approved by FAC on 10 November 2000.

Condition 78 requires the establishment of a Community Consultative Committee to enable local input into the air quality monitoring requirements and local community access to relevant information. This Committee has been formed and has 21 meetings up until 21 March 2001.

The role of the CCC is to provide input into air quality monitoring and accessing and disseminating results and other information on air quality issues and associated potential impacts.

The Department is aware and has received numerous representations and expressions of concern from community members as to the conduct of the Committee. The Department has written to the RTA seeking clarification as to allegations made. The Department fully supports an efficient and transparent interface between the RTA and the community. No further action has been undertaken pending this Inquiry. In due course the Department will endeavour to facilitate an agreed outcome.

Condition 79 requires a report on an annual basis for 5 years on international developments in tunnel emission treatments. The most recent report was submitted in March 2001. The RTA has informed the Department that a further study will be provided in July 2001.

Condition 80 requires the RTA to undertake investigations into sub regional air quality including the identification of contributors to air pollution at the sub regional level and to formulate cost effective measures to control/manage such contributors. A consultant (SKM) has been commissioned and the Plan is expected to be completed by the June/July 2001. The Plan has been further expanded to consider solid fuel heater buy back scheme and cost effectiveness comparisons.

Condition 81 requires the commitment of funds of \$0.5 million per year for 5 years from the commencement of operation for air quality improvement measures. Yet to be triggered. [DUAP, *Submission*, pp 18-19]

- 4.14** The RTA's submission to this inquiry also includes a statement as to the implementation of the conditions of approval relating to air quality. This information is also reproduced below:

Conditions 70 and 71: The Tunnel infrastructure and associated ventilation systems have been designed in order to meet the air quality standards set out in these conditions. As required by conditions 70 and 71 of the Approval, the designs for these components were verified by internationally recognised tunnel firm Tunnel Engineering Consultants of the Netherlands ("**TEC**"). TEC was approved by DUAP for this purpose in May 2000. After reviewing TEC's findings, DUAP accepted the verification as noted in the DUAP 2000 Schedule. These components are now being constructed in accordance with the design.

Condition 72: The Tunnel infrastructure and associated ventilation systems have been designed to meet the emerging air quality goals specified in this condition. In this regard, the design of the Ventilation Stack has been verified by an expert air dispersion modeller from the New Zealand office of Sinclair Knight Merz.

Condition 73: As noted in part 3.4 of this submission, DUAP set the height of the Ventilation Stack at 35 m by letter to the RTA dated 22 August 2000. The DUAP 2000 Schedule, which was issued by DUAP in conjunction with

the setting of the Ventilation Stack height, includes a range of further matters which the RTA is addressing as follows:

point 1: The Ventilation Stack is being constructed to a height of 35 m, as required by the DUAP Director-General.

point 2: The final materials and finish of the Ventilation Stack were approved by the DUAP Director-General on 7 December 2000.

point 3: As noted in part 3.6(e) of this submission, the RTA has obtained concept plans and a concept estimate for ESPs in the Flagstaff Report.

point 4: The RTA is currently preparing a draft protocol outlining procedures for deciding how an exceedence due to the Ventilation Stack will be determined. The RTA has also begun preliminary discussions with the EPA for the purpose of preparing the protocol. The draft protocol will also be discussed with the Air Quality Community Consultative Committee, established pursuant to condition 78 of the Approval (the "AQCCC").

point 5: The RTA is considering the most appropriate way to establish a mechanism regarding the potential for complaints about air quality impacts from the Ventilation Stack. The mechanism will be in place before the M5 East opens to traffic.

point 6: The RTA has established funding for a community based air quality monitoring station. The location and design for the monitoring station are currently being considered by the AQCCC.

point 7: The Ventilation Stack is being constructed to incorporate in-stack monitoring equipment for the purpose of monitoring PM₁₀ and NO_x flow rate and temperature. This equipment will be installed before the M5 East opens to traffic.

point 8: The RTA established a Working Party to investigate (among other issues) the possibility of allowing some emissions from the Tunnel portals. Initial modelling suggests there is little scope for portal emissions in the short term. Further work is required to finalise the investigation. The potential for emissions from the Tunnel portals in the longer term (as vehicle emissions levels continue to fall) is also being investigated.

point 9: The RTA submitted to DUAP a draft matrix of emissions concentrations for PM₁₀ and NO_x and corresponding volumetric flow rates. DUAP indicated that it was satisfied with the matrix by letter to the RTA dated 23 March 2001. The RTA will continue to have dialogue with DUAP in relation to the application of the matrix.

point 10: A report will be prepared on the impacts of meeting an annual average goal of 30mg/m³ for PM₁₀ emissions at monitoring locations.

point 11: The Emergency Response Plan required by condition 130 of the Approval is being prepared and will address issues relating to pollution control external to the Tunnel during emergencies such as major fires.

Condition 74: The Tunnel infrastructure and associated ventilation systems have been designed to accommodate the retro-fitting of ESPs, should this be required under condition 74. As noted above in relation to conditions 70, 71 and 72, DUAP has approved the design for these components, and they are now being constructed in accordance with the design.

Condition 75: Two temporary air quality monitoring stations have been installed (at Turrella and Undercliffe) and began collecting air quality data during June 2000. The location of these monitoring stations was developed in close consultation with the AQCCC and with input from the EPA [DUAP indicated in the DUAP 2000 Schedule that the DUAP Director-General had approved Stage 1 of compliance with condition 75]. Background data collected by the monitoring stations is provided to the community representatives at the monthly AQCCC meetings and copies are available for perusal by the general community at the M5 East Community Information Centre. In addition, the RTA is developing a separate web page for its Internet site to accommodate data from current monthly monitoring for background levels of PM₁₀, NO₂ and CO. This will be prepared to accommodate "real-time" data when the M5 East opens to traffic.

Condition 76: The urban design for the Ventilation Stack was developed in close consultation with local councils, the AQCCC and the Central Community Liaison Committee. Two half day workshops were held with these committees regarding the Ventilation Stack's urban design. The proposed urban design was placed on public exhibition for two weeks at the M5 East Community Information Centre. Following review by its own consultants, DUAP approved the Ventilation Stack's urban design subject to provision of certain additional details, by letter to the RTA dated 13 November 2000. DUAP gave approval to the outstanding urban design details by letter to the RTA dated 7 December 2000.

Condition 77: Sydney Airport Corporation Limited, the operator of Sydney (Kingsford-Smith) Airport, approved of the 35 m height for the Ventilation Stack by letter to the RTA dated 10 November 2000.

Condition 78: The AQCCC was established during May 1998. The AQCCC generally meets monthly, and has held 21 meetings as at March 2001.

Condition 79: The RTA's investigation of international developments in tunnel emissions treatment systems is discussed in part 3.6 of this submission.

Condition 80: The RTA has been working with DUAP, the NSW Department of Health ("**NSW Health**"), the NSW Department of Transport and the EPA to investigate sub-regional air quality and to identify strategies for improving air quality.

In addition, the RTA has engaged Sinclair Knight Merz to develop a Sub-regional Air Quality Management Plan (the "**SAQMP**"), following a public tender process for this role. An inventory of the emissions in the sub-region is being compiled, through surveys and data collation. Strategies will then be developed to address emissions, and these will be tested for their cost-effectiveness.

Sinclair Knight Merz has been liaising with local councils in the area of the M5 East for the purpose of preparing a draft SAQMP. A preliminary draft SAQMP is to be submitted to the RTA in late May 2001. A workshop (incorporating the AQCCC) will then be convened to consider the strategies and responsibilities proposed in the draft SAQMP and public comment will be invited. At this stage, subject to the outcome of these reviews, the final SAQMP is due to be submitted in late July 2001.

Additionally, a Communication and Education Plan supporting the implementation of the SAQMP is to be developed. A preliminary draft of this Plan is due for submission to the RTA in late May 2001.

Condition 81: The RTA is already in the process of committing funds in order to provide \$0.5 million per year for five years from the commencement of operation of the M5 East, for air quality improvement measures. [RTA, *Submission*, pp 18-22]

- 4.15** In this Chapter, the Committee has been concerned to set out what CSIRO recommended and what additional conditions were imposed by DUAP, and to ensure that the various agencies' own assessments of how the conditions have been implemented are placed on the public record in a transparent manner. This Chapter does not include analysis of the merits of the CSIRO's findings or of the additional conditions of approval, or indeed their implementation. Chapters Five, Six and Seven of this report critically analyse the key issues remaining in relation to the M5 East Ventilation Stack.
- 4.16** The Committee considers it important to comment on DUAP condition 78 which requires the RTA to establish and maintain a process of community consultation. The RTA has responded to this condition by creating a Committee, the Air Quality Community Consultative Committee ('the AQCCC'). The purpose of this committee is to provide an interface with the community and allow discussion.
- 4.17** This is quite strongly criticised in the RAPS submission, which alleges a range of procedural flaws. It is also noted that DUAP indicates it has not to date intervened in the process, though it has an intention of "facilitating agreement" in light of this report.
- 4.18** The Committee acknowledges that the issues concerning the M5 East Stack have become acrimonious, and that, in the circumstances, it would not be expected that the AQCCC would be harmonious in its operation. Nonetheless, the Committee is concerned that the operation of the AQCCC is no longer constructive (if it ever was), and cannot be said to be providing an effective community forum.
- 4.19** It is vital that community consultation should be productive and open. For these reasons we consider, the structure and operation of the Committee needs to be re-examined. Moreover, it seems that at least DUAP, and possibly other government agencies, needs to be involved in the community process to ensure a fully open and two-way communication between government agencies and the community, and a fully effective government response to community concerns.

Chapter 5 Property Value Guarantees

Background

- 5.1** The terms of reference adopted by the Committee require it to consider the property value guarantee offered to residents affected by the M5 East stack, both in relation to its effectiveness and adequacy, in relation to its reason and methodology for determining the nature and scope of the guarantee.
- 5.2** The Committee's 1999 report includes a brief discussion of some of these issues. That report noted that "the Committee notes the good intention of the Property Value Guarantee but does not consider it should be extended."⁴³
- 5.3** As the RTA submission points out, the law, as contained in the *Land Acquisition (Just Terms Compensation) Act 1991* and the *Public Works Act 1912*, provides for compulsory acquisition only where a property is actually required for construction of public works.
- 5.4** Nonetheless, the New South Wales Government has established property value guarantee schemes three times (two in respect of the M5 East Tunnel, and an earlier scheme in respect of the M2). The property value guarantee schemes recognise that property, which is not itself required for roads, is nevertheless affected significantly by being near these road developments. The property value guarantees are offered not as a recognition of legal obligation but as a "goodwill gesture" to property owners.⁴⁴
- 5.5** The first of the property value guarantees was offered in respect of the M2 motorway. It was offered to residents meeting specific criteria. Two main groups were identified:
- those that had been developed or purchased in the knowledge that they adjoined a future road corridor though with no set date for construction announced — these were offer a property value guarantee of unaffected value minus a 9% allowance;
 - those property adjoining the revised route of the M2, and hence purchased or developed without prior knowledge — these were offer a property value guarantee at full unaffected value.⁴⁵
- 5.6** The second property value guarantee was that offered to owners of property affected by the M5 East tunnel. The government determined at the outset of the M5 East development that owners of property above the tunnel and around its portals ought to have a property value guarantee. The tunnel had not been included in the original plans for the road, which was planned to be sited elsewhere. The owners of these properties therefore had no notice of the potential effects of the M5 East on them. It was envisaged that there could be substantial effect for these owners' property values from having a

⁴³ 1999 Report, p 56.

⁴⁴ RTA, *Submission*, pp 34-38.

⁴⁵ RTA, *Submission*, p 34, and Annexure E.

tunnel run under them, or from the substantially altered traffic patterns around the tunnel entrance.⁴⁶

5.7 The third property value property guarantee was that offered to the residents around the M5 East stack, under consideration in this report.

5.8 As outlined in Chapter Two, in late 2000, the Construction, Forestry, Mining and Energy Workers Union (the “CFMEU”) placed an interim ban on the M5 East ventilation system. Prior to this, the CFMEU had been assisting local residents to deal with their environmental concerns. The CFMEU took the step of instituting a ban when the concerns failed to be resolved. The RAPS and CFMEU submissions state that the property value guarantee offered to residents around the stack was a result of this industrial pressure.⁴⁷

5.9 The Minister in making this stack offer described it as “a goodwill gesture”. (In fact, all of the property value guarantees include a statement that the property value guarantee is not legally required.)

5.10 In outline, the M5 East stack offer has the following key features:

- it is made to owner occupiers only;
- the properties must generally be within 400m of the Stack, though the offer is also open to those just outside the area who can demonstrate hardship;
- the owner must make an effort to sell on the open market (for 3-6 months);
- if that attempt fails, the RTA will offer to buy the property at a valuation determined by the RTA (which the owner may dispute, the Valuer General being the final arbiter);
- no costs of sale and purchase of a new property or moving expenses are included in the offer;
- the property may have a 3 month settlement period, during which time the RTA will attempt to on-sell the property, and the resident must make it available for inspection.⁴⁸

⁴⁶ RTA, *Submission*, p 35 and Annexure F.

⁴⁷ RAPS, *Submission*, p 47; CFMEU, *Submission*, p 1.

⁴⁸ RTA, *Submission*, pp 36-38, and Annexure G.

Concerns with the property value guarantee

5.11 The residents' response to the offer is summarised in the RAPS submission. They raise concerns with both the scope of the offer, and the terms of the offer.

5.12 As noted above, the offer is limited to those owner-occupiers within a 400 metre radius of the stack. It also states, however, that:

Property owners just outside the guarantee area who believe they should qualify for the scheme will be considered on a hardship basis.

5.13 According to the evidence of Mr Paul Forward, Chief Executive of the RTA, the 400 metre limit was chosen by the Minister as a policy decision after considering options that included covering areas at greater distance from the stack (with advice as to the cost of each of these options). According to Mr Forward, the primary reason for the stack offer was a recognition of the adverse *visual* impact of the stack on property values. He said:

The decisions for the property value guarantee around the vent stack was made on the perception of the impact of the presence of the stack, the visibility presence of the stack on property values.⁴⁹

5.14 Mr Forward emphasised that the air quality goals were not a factor in determining the scope of the property value guarantee. The 400 m boundary, in his evidence, was said to coincide "fundamentally" with the ridgeline (and hence, presumably, the visibility effect).⁵⁰

5.15 The RAPS submission argues that the pollution impact of the stack is likely to fall outside the 400 metre radius and argues that the loss of air quality in those areas could also affect property values.⁵¹

5.16 The terms of the stack offer are less generous than the offer to owners of property above the tunnel and around its portals in 4 main respects:

- The stack offer contains no compensation for legal costs in selling the property and buying a new one, nor moving expenses and stamp duty. The previous offer makes a standard allowance for such costs.
- The stack offer requires the owners to attempt a sale for a period of 3-6months, before making a request to the RTA to acquire the property. The previous offer is not dependent on an attempted sale.

⁴⁹ *Evidence*, 1/5/01, p 17.

⁵⁰ *Evidence*, 1/5/01, p 18.

⁵¹ RAPS, *Submission*, pp 47-51.

- The stack offer is open only during a period of 12 months after the tunnel opens. The previous offer is open from the date of approval of the M5 East until after the opening of the tunnel.
- The stack offer is confined to owner-occupiers. The previous offer was open to all owners.

5.17 RAPS considers these differences to be unfair.⁵²

5.18 The earlier M2 offer was also more generous than the M5 East stack offer. Though the M2 offer does not include legal and moving costs, it has a longer window of availability, it is open to all owners and it is not dependent on an attempt at sale on the open market.⁵³

5.19 The RAPS submission states that no compensation was proposed for inconvenience, noise or general loss of amenity during the construction of the stack. This form of compensation is not in the nature of compensation for loss of property value. Whether the inconvenience suffered by residents around the stack is such that it is beyond what might be expected in urban Sydney and should qualify for some form of recompense is not a matter we have received evidence on and is beyond the Committee's terms of reference.⁵⁴

Assessment of the offer of a property value guarantee

5.20 The property value guarantee is not required by law. The government has made the offer because it considers that it is fair and reasonable to do so. The Committee believes that standards of fairness and reasonableness should also be reflected in the scope and terms of any offer made, and in the treatment of those offered a property value guarantee.

5.21 There are a number of principles which may apply to a consideration of the adequacy of a property value guarantee. They could include:

- **Recompense for loss.** The purpose of any offer should be to compensate people affected by real and disproportionate loss.
- **Equity of treatment.** Arbitrary distinctions should be avoided.
- **Administrative simplicity.** An offer should be reasonably simple to access for the owner, and simple to administer.

⁵² RTA, *Submission*, pp 49-50.

⁵³ As noted above, the M2 property value guarantee offered unaffected value minus 9% for those properties adjoining the known road corridor when purchased or developed. This discount for prior notice is not relevant in the M5 East stack case.

⁵⁴ RAPS, *Submission*, p 49.

- 5.22** If property value guarantees are to be offered in the future, the government should state clearly the criteria for deciding when a property value guarantee will be offered and the general principles under which property value guarantees will operate. Such a statement of policy would enhance transparency and fairness.
- 5.23** The scope of the offer is set in terms of a defined area, with a provision to consider hardship cases outside that area. This structure is not of itself inappropriate; indeed, it is relatively simple and straightforward.
- 5.24** However, setting a 400m radius around the stack based on visual impact alone is arbitrary.
- 5.25** In focussing on visual impact, and the “perceptions” of the effects of the stack on property values rather than actual localised air quality effects, the government has failed to respond to the primary concerns of the residents. The residents are concerned mainly about loss of air quality brought about by an unfiltered stack. As a consequence, they are also concerned about the effect that the loss of air quality, and the perceptions in the market, will have on the value of their properties. [The issue of air quality is addressed in detail in Chapter Six.]
- 5.26** That said, residents have raised also subsidiary concerns about the visual impact, which is clearly significant and may well affect property values.
- 5.27** However, the Committee considers that those areas disproportionately impacted by air quality should also, as a matter of principle, be included in the property value guarantee area. The Committee has heard evidence from RAPS, Dr Peter Best (appearing on behalf of RAPS)⁵⁵ and the CSIRO,⁵⁶ which indicates that areas outside the 400m, sometimes well outside, are expected to be affected by the plume of the stack and therefore to suffer significant localised loss of air quality. The air quality effects are real, well-known to potential property purchasers, and are likely to affect property values.
- 5.28** The Committee considers that the scope of the property value guarantee has not been developed according to transparent and identifiable criteria, and that it is arbitrary. It is essential to identify those properties affected by either visual or loss of air quality impacts, and to extend the guarantee to those affected. The approach needs to be rigorous and transparent, and the application of the approach needs to be systematic. The committee considers that an organisation outside the RTA should be responsible for this.
- 5.29** The offer purports to be an offer of relief from loss of property values due to the M5 East stack. However, no costs of sale and purchase are included, strict conditions are placed on taking advantage of it, and the offer is made in terms of a purchaser of last resort. Because of these limits and conditions, it cannot be regarded as a full, or even satisfactory, compensation. It is likely to be attractive only to those who strongly desire to move to avoid the stack, or consider their property value will be so significantly impacted by the stack into the future that it justifies the expenses of moving in a situation where that would not otherwise be desired.

⁵⁵ Dr Peter Best, “Local Air Quality aspects of the M5 East Ventilation Stack, 3/5/01, especially pp 17-18.

⁵⁶ Dr Peter Manins, CSIRO, *Submission; Evidence*, 1/5/01.

- 5.30** The M5 East stack offer is the least generous, to individual owners, of all the property value guarantees outlined by the RTA, and is substantially less generous than the offer made to owners of property above the M5 East tunnel and around its portals. The justification for the difference is not adequately explained in the evidence of the RTA and it is not at all clear that the owners of property above the tunnel and around its portals are substantially worse off than those near the stack, to the extent that a more generous property value guarantee is justified for them.
- 5.31** It is true that owners of property above the tunnel will be subject to a compulsory acquisition of the substratum of their land. However, this compulsory acquisition does not require compensation under the Act, and the property value guarantee is not offered for that reason. Moreover, the owners of property around the tunnel portals are not subject to compulsory acquisition. This factor is not a justification for different treatment.
- 5.32** The committee considers that it is inequitable in principle to make an offer to one group affected by the M5 East Tunnel in substantially more generous terms than another. The offers should have been the same. In particular, the stack offer should have:
- included costs of compensation for legal costs in selling the property and buying a new one, nor moving expenses and stamp duty;
 - been extended to non-occupant owners, who are also prejudiced by loss of property value;
 - been open for a longer period of time.
- 5.33** Though it is not always inequitable as part of a property value guarantee to require an attempt at sale before access to a guarantee, in this case, for reasons of equality of treatment, it is unfair to require an attempt at sale.
- 5.34** The Committee notes that the estimated cost of the current property value guarantee is \$10 million.⁵⁷ This is a substantial amount. The recommendations concerning the property value guarantee made in this report would increase this cost – though without a proper analysis of where the impacts on air quality occur, and what property value impact might be expected, the amounts are not quantifiable.
- 5.35** The amount of these costs itself is no justification for not extending a fair property value guarantee to people impacted by the stack. Loss of property value is a cost that will be borne by the property owners, unless some relief is provided. It is unfair to impose this disproportionate cost on local residents, when the benefit is shared through the community.
- 5.36** This increase in cost can be avoided, however, if filtration is introduced. It would appear from the RAPS submission that residents largely agree that a filtration system, will

⁵⁷ Mr Paul Forward, RTA, *Evidence*, 1/5/01, p 16.

effectively deal with the air quality impacts to such a degree that the property value guarantee becomes moot.⁵⁸

Recommendation 4

The Committee recommends that the Government reconsider the scope of the property value guarantee offer, and include within it, not only the area visually impacted by the stack, but also those areas where air quality will be disproportionately affected. The approach should be clear and transparent and its application systematic. An organisation outside the RTA should be responsible for the determination of this.

Recommendation 5

The Committee recommends that the terms of the stack property value guarantee be reviewed and that a new offer be made in substantially the same terms as the offer to owners of property above the tunnel and around its portals.

Recommendation 6

The Committee recommends that the Government provide a detailed estimation of the costings relating to the Property Value Guarantee.

⁵⁸ Reference is made to the terms of the recommendation proposed by the Committee Chair in his draft 1999 report, which provided for an extension of the existing property value guarantee only if the Government did not pursue filtration of the stack emissions.

Chapter 6 Air quality

The primary concern of this inquiry is the effect of the M5 East Ventilation Stack on air quality in Turrella and surrounding suburbs. In particular, whether emissions from the stack will: have a detrimental impact on pollution levels in the area surrounding the stack; lead to exceedences of regulatory air quality standards; and subsequently pose a health risk to residents and workers in the area. This chapter will focus on the key aspects of the debate in this area, in particular the emerging issue of the increase in, and potential problems arising from, smaller particles of pollution (PM_{2.5}s).

Composition of air pollution

6.1 Atmospheric pollution is comprised of various substances. There are various key atmospheric pollutants – including particulate matter (PM₁₀s and PM_{2.5}s), nitrogen dioxide and carbon monoxide.⁵⁹ Particulate matter was the subject of much discussion during hearings of the Committee.

Particulate Matter

6.2 Particulate matter is commonly referred to by its size. PM₁₀ refers to particulate matter which is 10 microns in diameter or less and PM_{2.5} refers to particulate matter which is 2.5 microns in diameter or less. PM₁₀ is measured, along with other pollutants, however PM_{2.5} is not presently measured and there are no standards in Australia for PM_{2.5}.

Key contributing factors – sources of particulate pollution

6.3 In the *New South Wales State of the Environment 2000 Report* ('SoE 2000'), the EPA identifies the sources, and corresponding proportion, of PM₁₀ pollution as follows:

- Motor vehicles: 23%
- Other mobile sources: 25%
- Domestic wood heating: 25%
- Industrial facilities: 18%
- Open burning: 6%

⁵⁹ Some of the information in this section is taken from the Committee's 1999 Report, pp 7-13, which cites 4 key documents: National Environment Protection Council (NEPC), *Draft National Environment Protection Measure and Impact Statement for Ambient Air Quality, 1997*; Environment Protection Authority (EPA), *New South Wales State of the Environment 1997, 1997*; NSW Government, *Action for Air, February 1998*; and NEPC, *Revised Impact Statement for the Ambient Air Quality National Environment Protection Measure, 1998*.

- Domestic lawn mowing: <1%
- Other diffuse sources: 2%⁶⁰

6.4 In evidence to the Committee, the EPA stressed that vehicles (in particular diesel) were only one, albeit a key, source of particulate pollution.⁶¹ The EPA advised the Committee that another key source of particulate pollution is domestic wood heaters.⁶² The contribution from domestic wood heaters, in particular, is seasonally significant as it increases during the winter months to up to 60%.⁶³

Air quality standards for PM₁₀

6.5 As outlined in the 1999 report, the current ambient air objectives for PM₁₀ are as follows:

Table 1 – Ambient air objectives for particulates - PM₁₀

Jurisdiction	24 hour Fg/m³	Annual Fg/m³
United States	150	50
World Health Organisation	No standard	No standard
NEPMAQ	50	-
NSW – Previous	150	50
NSW <i>Action for Air Interim</i>	50	-
<i>Action for Air long term</i>	-	30

Source: NSW Environment Protection Authority, *Action for Air*, The NSW Government's 25 year Air Quality Management Plan, 1999, p. 23 & p. 119.

6.6 The EPA notes that NEPM air quality standards, including the particle standards, are stringent by world standards.⁶⁴ Also, the *Action for Air* standards are more stringent than the NEPM standards with no allowable exceedences permitted.⁶⁵

6.7 As noted earlier, there are presently no standards for PM_{2.5}.

⁶⁰ EPA, *NSW State of the Environment 2000*, p 93.

⁶¹ *Evidence*, 1/5/01, p 43.

⁶² EPA, *Submission*, p 3.

⁶³ EPA, *Submission*, p 5.

⁶⁴ EPA, *Submission*, p 3.

⁶⁵ EPA, *SoE 2000*, p 93.

Exceedences of air quality standards for particulate matter in Sydney

- 6.8** In the Sydney region in general there have been a total of 11 exceedences for the years 1995-1998 inclusive. In 1994 there was a total of 12 exceedences, and in 1991 there was a total of 12 exceedences.⁶⁶
- 6.9** According to the EPA, the main cause of exceedences are natural events such as bushfires⁶⁷ combined with seasonal conditions.⁶⁸

Are overall pollution levels increasing or decreasing?

- 6.10** In its submission and evidence, the EPA advised the Committee that pollution was trending downwards, and that subsequently air quality was improving despite growth in the Sydney region. The EPA further advised that despite increasing traffic and its ensuing increase in emissions, that air quality would not be adversely affected. This was due to cleaner fuel standards and better vehicle emissions. As a result, the EPA anticipated a reduction in emissions.⁶⁹

Measures to reduce air pollution

- 6.11** Various measures are being undertaken to reduce air pollution. These measures are briefly outlined below.⁷⁰

Domestic solid fuel heaters

- 6.12** Various statutory measures have been implemented which regulate the purchase, installation and use of domestic solid fuel heaters. These were in response to the increase in use of domestic solid fuel heaters (from 7% in 1986 to 13% in 1995)⁷¹ and the corresponding increase in their contribution to particulate pollution in Sydney.

⁶⁶ EPA, *SoE 2000*, p 105.

⁶⁷ EPA, *Submission*, p 3.

⁶⁸ EPA, *SoE 2000*, p 94.

⁶⁹ EPA, *Submission*, p 3; *Evidence*, 1/5/01, pp 40-41.

⁷⁰ NSW Government, *Action for Air: The NSW Government's 25-year Air Quality Management Plan, 1998*. The NSW Government has a 25 year Air Quality Management Plan which identifies key strategies and objectives for reducing air pollution.

⁷¹ EPA, *SoE 1997*

- 6.13** The Clean Air (Domestic Solid Fuel Heaters) Regulation 1997, which regulates the use of domestic fuel heaters in NSW, prohibits the sale of domestic solid fuel heaters unless they are certified to comply with the relevant Australian Standards.⁷²
- 6.14** Section 76A of the *Environmental Planning and Assessment Act 1979* ('the EP&A Act') provides that local councils must issue an approval for associated building work with respect to solid fuel heaters, while Part F4 of Section 67 of the *Local Government Act 1993* provides that councils must issue an approval for the installation of solid fuel heaters.⁷³ The latter provisions are designed to ensure that local councils take into consideration various factors when approving the construction or addition of a solid fuel heater to a house. Such factors includes the suitability of the site as well as the appropriateness of the location in the house so that the chimney is of a sufficient location, height and distance to ensure that the emissions do not adversely effect neighbouring residents (or to minimise impact on neighbouring residents).⁷⁴
- 6.15** Further, under the *Protection of the Environment Operations Act 1997* ('the POEO Act'), prevention notices can be issued to householders to direct them to not use solid fuel heaters, or use them in a particular manner.⁷⁵ It is an offence to fail to comply with such a notice and such a failure can attract a penalty of up to \$120,000. There are other provisions under the POEO Act which empower authorised officers to give on the spot penalties.⁷⁶
- 6.16** The EPA guidelines also advise that local councils can use the powers granted under the public nuisance provisions of the *Local Government Act 1993*⁷⁷ to issue orders to owners of heaters to minimise or prevent their use.⁷⁸
- 6.17** As outlined in Chapter Three of this report, the contribution of solid fuel heaters to air pollution was discussed at the International Workshop on Tunnel Ventilation, and the *Facilitator's Report* recommended that an examination be undertaken of the further regulation of solid fuel heating.⁷⁹

⁷² Clause 6. EPA, *Selecting, Installing and Operating Domestic Solid Fuel Heaters*, 1999, p 7.

⁷³ EPA, *Selecting, Installing and Operating Domestic Solid Fuel Heaters*, 1999, p 9.

⁷⁴ EPA, *Selecting, Installing and Operating Domestic Solid Fuel Heaters*, 1999, p 11.

⁷⁵ Section 96 of the POEO Act. EPA, *Selecting, Installing and Operating Domestic Solid Fuel Heaters*, 1999, p 12.

⁷⁶ Sections 126 and 134 of the POEO Act.

⁷⁷ Section 125 of the *Local Government Act 1993*

⁷⁸ EPA, *Selecting, Installing and Operating Domestic Solid Fuel Heaters*, 1999, p 13.

⁷⁹ *Facilitator's Report*, p 50.

Motor Vehicles

6.18 Measures which relate to motor vehicles are the introduction of an emission standard for diesel vehicles in 1995 (Australian Design Rule 70) and the smoky vehicles enforcement program which targets vehicles that emit excessive smoke.⁸⁰

6.19 The EPA further advise that other key developments, with respect to the reduction in emissions due to motor vehicles, include:

- the phasing out of lead in petrol by 2002;
- the development of a Diesel NEPM;
- the Summer Petrol Volatility Program which involves the phased reduction of volatility of petrol over summer months, which has so far resulted in a reduction of 35 tonnes of hydrocarbon emissions per day in the summer of 1998-1999, and a further seven tonnes per day in 1999-2000;
- the future adoption of Euro 2,3 & 4 standards for diesel vehicles and the adoption of Euro 2 & 3 standards for petrol vehicles⁸¹

6.20 The EPA advises that while there is uncertainty about the actual size of the effect due to changes in the emission and fuel standards, there will be a resulting significant reduction in emissions.⁸²

Other Measures

6.21 A variety of other measures have been implemented to target known sources, and reduce the level, of particulate pollution, including a ban on back yard burning since 1985.⁸³

6.22 More recently, the NSW Government announced a range of environmental initiatives to target and improve air quality, among other areas. The NSW Government launched its Environment Statement on 29 June 2001.⁸⁴ The measures include:

- The establishment of \$6 million Clean Air Fund to tackle local air pollution sources, in particular solid fuel heaters. The Government is targetting solid fuel heaters through: an education campaign; public alert program ('Don't light tonight

⁸⁰ EPA, *SoE 1997*, http://www.epa.nsw.gov.au/soe/97/ch1/6_8.htm#0_6_8_5_0_0_0 (accessed on 26/5/2001)

⁸¹ EPA, *Submission*, p. 8.

⁸² EPA, *Submission*, p. 8.

⁸³ EPA, *SoE 1997*, http://www.epa.nsw.gov.au/soe/97/ch1/6_8.htm#0_6_8_5_0_0_0 (accessed on 26/5/2001)

⁸⁴ *Action for the Environment New South Wales Government Environment Statement 2001*, June 2001

unless your heater's right); enforcement of stricter regulations on new heater standards; and funding for a solid fuel heater replacement program.⁸⁵ The program to replace solid fuel heaters will commence in Albury, Armidale, Cooma, Lithgow and Orange.

- A three - year \$5 million Cleaner Production Program to ensure greater environmental compliance by industry .
- *Action for Transport 2010* plan (to complement the Government's 25 year *Action for Air* plan).⁸⁶

6.23 The Committee notes and commends the measures introduced by the EPA to reduce air pollution (in particular fine particle pollution) in NSW.

PM_{2.5}s and PM₁₀s

6.24 A key issue raised throughout the hearings concerned the emerging debate over levels of smaller particulate matter - PM_{2.5}s or less. The Committee's specific concerns related to: what proportion of vehicle emissions consist of ultra fine particles (PM_{2.5}s or less); whether these particles were increasing in proportion to the overall level of particulate matter (and larger particles (PM₁₀s)) as a result of motor vehicle engine technology; and what specific health risks were associated with PM_{2.5}s. The Committee was also concerned with whether the current standards were adequate in assessing the impact of emissions from the stack.

6.25 The Department of Urban Affairs and Planning, in evidence to the Committee, stated that it was aware of the debate concerning particle size but it relied on established standards in setting conditions:

I am also aware of the international discussions that have been going on in relation to PM_{2.5} and PM₁₀, and their relative effects on health. In undertaking our assessments, however, we do rely on advice from the Department of Health and we rely upon established standards, particularly national standards. It just happens that the national standard in place, both existing and emerging, is PM₁₀. I am also aware there is still an ongoing debate about PM₁₀ and PM_{2.5} in that regard.⁸⁷

6.26 Ms Sue Holliday, Director-General of DUAP, stated, with respect to whether DUAP could order the fitting of electrostatic precipitators (ESPs) if a standard for PM_{2.5} emerges and is subsequently found to be exceeded:

I think that is a very difficult question, because assessment of the tunnel and the condition at the present time is specified in terms of the PM₁₀ and the NO₂s. That is the way in which consent has been constructed. If a new standard emerges, whether it is this year, next year or in 10 years, that fundamentally changes the performance or the perceived performance of the stack in the region and we

⁸⁵ Ibid., pp 4 & 7.

⁸⁶ Ibid, p 7.

⁸⁷ *Evidence*, 1/5/01, p 26.

would obviously have to consider how we integrate those emerging standards into the operation of the stack. But, at this stage, the protocols will have to be determined on the basis of the current standards and the conditions of the consent.⁸⁸

6.27 DUAP was however, open to the suggestion of any emerging standards for PM_{2.5} being considered in a protocol for determining how exceedences due to the stack would be measured:

...if whilst we are discussing the protocol there is evidence brought forward by the community in particular or by any health authorities...[about]...2.5...obviously we will have to also consider it whilst we are looking at the protocol.⁸⁹

6.28 The EPA, in evidence to the Committee, indicated that there is a process currently underway to review the particulate standards and specifically whether there should be a standard for PM_{2.5}:

There is a proposal under way. When the National Environment Protection Council considered the national ambient air quality standards back in 1998 it considered the issue of PM_{2.5}, and my understanding is that it decided there was not enough information available to actually be able to determine whether they should set a PM_{2.5} standard and, if so, what that should be. My understanding also is that the National Environment Protection Council has agreed that it will review the particle standard—it agreed to do that in December 2000—so that there is now information being brought forward into that national environment protection standard process to review the particle standard and determine whether it is appropriate to keep the existing standards or to change those standards. But that process has not yet been completed. In fact, it has only just started.⁹⁰

6.29 The EPA further advised the Committee that it was still unclear as to what exact impacts could be attributed to PM_{2.5}:

One of the issues that is being reviewed...through that national process is to look at what information really is available and whether the fractions of the particles make a difference and, if so, how do they make a difference. My understanding from the national process so far is that there really needs to be a thorough review of that information before judgments can actually be made. That is why they actually made the decision in 1998 to trigger a review of the particle standards.

6.30 The NSW Government, through its air quality management plan, *Action for Air*, has reiterated the importance of PM_{2.5} and the need for the development of a PM_{2.5} goal.⁹¹

⁸⁸ *Evidence*, 1/5/01 p 27.

⁸⁹ *Evidence*, Mr Sam Haddad, Executive Director, DUAP.

⁹⁰ *Evidence*, Ms Lisa Corbyn, Director-General, EPA, 1/5/01, p 40.

⁹¹ NSW Government, *Action for Air: The NSW Government's 25-year Air Quality Management Plan, 1998*, p 12.

Fine particles as small as of PM_{2.5}, which are capable of being absorbed deep into the lung, are of primary concern in terms of health effects. The NSW Government is committed to the development of a PM_{2.5} standard but further research is necessary to achieve this. NSW will set a PM_{2.5} goal as soon as sufficient information is available.⁹²

- 6.31** In light of the emerging evidence over effects of fine particles, the US Government introduced two new standards for PM_{2.5} in 1997 which were based on an extensive scientific and public review process. They are: an annual average of 15Fg/m³ and a 24 hour average of 65Fg/m³. The 24 hour PM_{2.5} standard is less than half the 24 hour PM₁₀ standard of 150Fg/m³. The US EPA have also been developing an extensive network of monitoring stations to monitor PM_{2.5}s. These standards have not been implemented due to a 1999 federal court ruling which blocked the implementation of these standards. According to the US EPA website, the US EPA have asked the US Department of Justice to appeal that decision in the Supreme Court.⁹³

Recommendation 7

The Committee recommends that the NSW Government should take a lead role in the work being undertaken by the National Environment Protection Council in the development of a national air quality standard for PM_{2.5}.

Nature of vehicle emissions

- 6.32** The Committee heard evidence that 70% or more of motor vehicle emissions were fine particles - PM_{2.5}s or less.⁹⁴ There was also the suggestion that this was increasing. Mr Hans Anderl, of CTA International, in his submission to the Committee stated:

Although it has been discussed for some time, one thing we detected in Japan was that diesel fumes in modern engines are producing a lot more particles today below 0.3 microns and less particles 0.3 and up. This is because the diesel engine which is most developed uses positive induction.⁹⁵

- 6.33** In his submission to the Committee, Dr Peter Manins of the CSIRO stated:

...the future emission estimates used by the Hyder consultants do not account for the likely trend in petrol vehicle technologies. There is a strong move toward GDI (gasoline direct injection) vehicles to meet required reductions in fuel

⁹² Ibid., p 16.

⁹³ US EPA, <http://www.epa.gov/airs/criteria.html> (accessed on 30 May 2001) <http://www.epa.gov/oar/aqtrnd97/brochure/pm10.html> (accessed on 30 May 2001); Testimony of Carol M. Browner, Administrator, US Environmental Protection Agency, before the Committee on Agriculture, United States House of Representatives, 16 September 1997.

⁹⁴ *Evidence*, 1/5/01, p 73.

⁹⁵ Mr Hans Anderl, CTA, *Submission*, p 2.

consumption and Nox emissions. However GDI technology has an inherent problem of much higher particle emissions than multi-point injection – particle emissions are four to six times as high...As diesel emissions are reduced by imposition of Euro 3 and Euro 4 standards over the next five years, particle emissions from petrol vehicles are likely to increase. So much so that any hoped-for reduction in overall vehicle particle emissions may be cancelled out.⁹⁶

Air quality in the Turrella area

6.34 In the past 6 years there have been a total of 7 high pollution readings for PMs, including 3 exceedences of the National Environment Protection Measure (NEPM) air quality goal, in Earlwood. The following table lists the levels recorded:

High PM readings at Earlwood since 1995

Year	Number of Exceedences	Maximum level recorded
1995	0	49.8
1996	0	46.0
1997	1	51.9
1998	0	48.1
1999	0	48.2
2000	2	54.6

Source: EPA, Submission by the EPA to the Legislative Council General Purpose Standing Committee No 5 Inquiry into the M5 East Ventilation Stack (2001), May 2001, p. 4.

6.35 According to DUAP, all 3 exceedences were attributable to bushfires.⁹⁷

Impact of stack on surrounding air quality

6.36 The Committee heard evidence that various factors will influence the nature and extent of the impact of the stack on surrounding air quality. The location of the stack, its position and height, and meteorological conditions at certain times (as well as existing background air quality) all play a role in determining to what extent the stack will influence air quality. The Committee also heard evidence that the contribution of the stack has been underestimated.

⁹⁶ CSIRO, *Submission*, pp 3-4.

⁹⁷ DUAP, *Submission*, p 12.

Evidence of CSIRO concerning impact of pollution from the stack

- 6.37** Dr Peter Manins from the CSIRO, in evidence to the Committee, presented a video which used a three dimensional numerical model simulation to demonstrate the impact of the stack - in particular how far the pollution will extend in different meteorological conditions.⁹⁸ Dr Manins demonstrated to the Committee that the plume from the stack will not only move in all directions but can have an impact up to 5 kilometres away:

Using the profile information, the matrix information that is in the Hyder reports that CSIRO was asked to look at for DUAP...Into the night time we find quite strong impacts on the northern terrain right out to large distances, out to 5 kilometres. As we go into the early morning on the second day we find down this Wolli Creek valley the plume quite frequently impacts on this high terrain here in the night time coming into the early morning of the third day it is escaping quite a bit. Now into the afternoon of the next day we have this consistent flow towards the south.⁹⁹

- 6.38** Dr Manins stated that the estimates of the contribution of the stack to overall levels of PMs, based on the Hyder modelling, would be up to 15 micrograms per cubic metre.¹⁰⁰ But he added that the contribution is likely to be higher:

We draw attention in our submission to the possibility that it will be higher by up to a factor of two than the model that the Hyder consultants used in their emissions estimates. So instead of 15 it could be 30, 10 or five micrograms—something in that range.¹⁰¹

- 6.39** In the CSIRO submission, Dr Manins stated that the contribution of the stack was still small when compared to background air quality levels:

CSIRO noted in the review that particle concentrations in the vicinity of the M5 vent were occasionally high due to sources unrelated to the vent. All the modelling results from the Hyder consultants showed that the highest cumulative concentrations would occur when the vent contribution was small, less than 5% contribution. Even after doubling or trebling this contribution, the vent emissions are not the major expected sources on high pollution days.¹⁰²

EPA view on impact of pollution from the stack

- 6.40** In its submission to the Committee, the EPA cited the CSIRO *Investigation Report on Air Quality Impact of Emissions from the M5 East Tunnel*, that the stack was unlikely to be the main contributor to exceedences:

⁹⁸ *Evidence*, 1/5/01

⁹⁹ *Evidence*, 1/5/01, p 71.

¹⁰⁰ *Evidence*, 1/5/01, p 73.

¹⁰¹ *Evidence*, 1/5/01, p 73.

¹⁰² CSIRO, *Submission*, p 4.

The CSIRO Investigation Report...found that previous reports had underestimated the possibility of PM₁₀ exceedences, but concluded that the overall contribution of PM₁₀ from the stack to exceedences would be small.

- 6.41** Notwithstanding these statements by Dr Manins, which acknowledge the relatively small contribution of the stack to possible exceedences, he stated in evidence before the Committee that “any contribution from the stack, no matter how small or large, could cause an exceedence of the air quality standard.”¹⁰³

Other evidence

- 6.42** Dr Peter Best of Katestone Scientific, in his submission to the Committee, also stated that the contribution of the stack could lead to exceedences of air quality goals when high background levels of pollution are taken into consideration:

The...[project]...EIA Air Quality Report shows maximum ground-level concentrations of nitrogen dioxide due to the stack occurring within 500 m of the stack and giving rise to values that may approach very closely the NSW goal. Similarly, the 24 hour maximum PM₁₀ contribution from the stack may occur at distances of 500-1500 m downwind of the stack and have a magnitude of 1-10 Fg/m³. This increment is sometimes sufficient to compromise the achievement of the NSW PM₁₀ goal, when background concentrations are added in.¹⁰⁴

- 6.43** He further added:

The EIA states that, as the goals are just achieved and/or the contribution from the stack is small compared to background, then the air quality objectives of the project can be met. In my opinion, it is unusual to see such a literal interpretation of air quality goals without detailed consideration of the likely errors in the predictions and the likely range in background concentrations (knowing that the inter-annual variability can be substantial).¹⁰⁵

- 6.44** The Director-General of the Department of Urban Affairs and Planning (DUAP), in evidence before the Committee, also recognised the existing high background levels of pollution:

The difficulty in this area is that there is an extremely high background air quality issue already. This stack adds a very tiny proportion to that background level and we have conditioned the stack in such a way that should the background air quality increase—in other words should it get worse and that small additional factor from the stack causes exceedences—then there will need to be, in accordance with the protocol, rectification.¹⁰⁶

¹⁰³ *Evidence*, 1/5/01, p 74.

¹⁰⁴ Dr Peter Best, *ibid.*

¹⁰⁵ Dr Peter Best, *Submission*, p 4.

¹⁰⁶ *Evidence*, 1/5/01, p 31.

- 6.45** In response to questioning from the Committee, DUAP stated that because of the existing air quality, filtration of the stack was likely to make little difference to the air quality in general:

Probably the answer to that is, no, you will not notice the difference, based on the best available information that we have. Now, that does not mean that the community perception will be what I am saying. Essentially, all the investigations that we have done indicate technically that you will not be able to notice the difference. Now, community may perceive this differently, but that is the best answer I can give.

Location of stack

- 6.46** The Committee heard evidence that the location of the stack in a valley was not ideal. Dr Peter Manins of the CSIRO stated the location of the stack in a valley was scientifically a poor choice.¹⁰⁷ He further stated, in his submission to the Committee:

Good environmental practice would never locate a pollution chimney in the bottom of a valley surrounded by residents. This is particularly so when the temperature of the emissions is close to that of the valley air temperature and the release velocity is low (and so the emitted pollutants do not rise very high into the atmosphere before dispersing back to ground level).¹⁰⁸

- 6.47** As outlined in Chapter Three, the *Facilitator's Report* from the international tunnel workshop held in June 2000 notes that "location [of the stack] is not optimal due to the remote stack location in a shallow valley."¹⁰⁹

Height of stack

- 6.48** The initial proposal of a stack height of 25 metres was found to be problematic in that there was a possibility that NEPM air quality goals might not be met at this height. The stack height was subsequently increased, upon recommendation of the Department of Health (DOH), to avert this problem. As noted by the DOH:

When computerised modelling of the proposal indicated that the original 25m stack might not achieve...[the emerging, more stringent air quality goals developed by the National Environment Protection Council]...the Department recommended the stack height be increased to 35m. This recommendation was subsequently adopted.¹¹⁰

- 6.49** DUAP's determination of the stack height under condition 73 is discussed in detail in Chapter Four.

¹⁰⁷ *Evidence*, 1/5/01, p 71.

¹⁰⁸ CSIRO, *Submission*, p 2.

¹⁰⁹ *Facilitator's Report*, p 3.

¹¹⁰ DOH, *Submission*, p 2.

Surrounding population

- 6.50** The RTA has stated at various times that the stack is in an industrial area, both in its literature (in the form of pamphlets¹¹¹) as well as verbally. However, the Committee has received a large number of submissions from nearby residents affected by the stack. The Committee has also viewed video (and other) evidence which demonstrated the close proximity of the stack to nearby residents.¹¹² The Committee notes that the surrounding area is comprised of a mix of residential housing as well as some light industrial/business dwellings.

Aerial view of location of stack and surrounding suburbs

[PRINTING TO INSERT AERIAL PHOTO OF STACK AND SURROUNDING SUBURBS]

¹¹¹ RTA, *Green light for new M5 East Work set to start in 1999*, the pamphlet states “No ventilation outlets in residential areas. A single ventilation outlet in the Turrella industrial area”; RTA *The new M5 East responding to community concerns*, the pamphlet states “There will be no exhaust stacks in residential areas”.

¹¹² *Evidence*, RAPS, video presentation, 3/5/01.

CSIRO modelling image of movement of plume from stack – 2km radius

[PRINTING TO INSERT CSIRO MODELLING IMAGE]

- 6.51** The repeated assertions that the stack is located in an industrial area are unhelpful and misleading.
- 6.52** Notwithstanding the above, the Committee notes that even if the stack were located in a solely industrial area, its emissions would still directly affect people who worked within that area, as well as having air quality impacts upon surrounding areas.

RTA evidence

- 6.53** The RTA has not been consistent in its information about the impact the stack will have on air quality in the surrounding area. In its submission to the Committee, the RTA states that the background levels of pollution in the Turrella area could cause exceedences irrespective of the contribution from the stack, and would subsequently need to be addressed on a regional level:

In this regard, it should be noted that the goal...[Air NEPM goal]...could be exceeded irrespective of whether the M5 East (and single stack) were built, given the possibility for the background PM₁₀ concentrations to exceed the goal. It was for this reason that the EPA recommended regional air strategies to improve the baseline ambient air quality.¹¹³

- 6.54** However, the RTA also states that fitting filtration on the tunnel would be unnecessary as the EPA goals could be met:

Given that the modelling indicated that ambient air quality goals would be met in the local area, the EPA considered the fitting of control equipment to be unnecessary. In this regard, the EPA's assessment of the project consistently focussed on the environmental goals of the project and whether they would be met. The EPA's position was that it was ultimately the role of the proponent to choose the method by which the outcome is to be achieved.¹¹⁴

- 6.55** The Committee also received a copy of an internal RTA email which stated:

Further to the notes I sent you on the Conditions for the meeting with EPA/DUAP, I forgot the obvious one—the issue of exceedences for PM10 under Condition 72.

Basically the condition cannot be met, as you are aware, because of background levels exceeding 50 ug/m³ from time to time.

While I would not have said this 12 months ago, the way that it has been managed on the M5 East, by recognising in the Repts report and the DUAP report, that the goal would be exceeded has worked reasonably well. I don't think quoting a number of exceedences in the conditions is the way to go as would be difficult to determine what the number should be.

¹¹³ RTA, *Submission*, p 6.

¹¹⁴ RTA, *Submission*, p 7.

For community perception it would be better to make a statement in the condition that recognises that the goal will be exceeded from time to time but that the M5 East should not be the "cause" of the exceedence.¹¹⁵

Conclusion

- 6.56** In its 1999 report, the Committee expressed concern that the stack may lead to exceedences of air quality goals in the Turrella area. The Committee notes the information from the EPA about the number of past exceedences, and high levels of pollution, in the area. The Committee notes that two exceedences have occurred since the tabling of the 1999 report. The Committee also notes the evidence of the CSIRO and Dr Peter Best about the poor location of the stack and the likely impact of emissions from the stack. In light of this information, the Committee believes that it has not been established/ demonstrated beyond a doubt that the stack would not contribute towards exceedences on such occasions. The Committee believes that as a point source of pollution, the stack will contribute to surrounding pollution levels and the Committee remains concerned that the stack may lead to exceedences of air quality goals.
- 6.57** The Committee is further concerned with the inconsistency of the evidence (referred to above) of the RTA which states that on the one hand background levels could cause exceedences to occur, and that on the other hand fitting filtration onto the stack would be unnecessary as the goals could be met. The Committee questions how the goals can be met if there are exceedences solely from background levels? The Committee not only questions the appropriateness of the decision to locate the stack in this particular location, but also not to filter it.

Air quality monitoring near the stack

- 6.58** In their submission CSIRO suggest with respect to the location of monitoring stations:

My experience is that monitoring the air quality effects of the vent would best be done by locating the additional monitoring station in a wind direction that is common in conditions conducive to high concentrations. Such a location might not be in the direction of the maximum expected concentrations, indeed it need not be. It is more important that the plume be measured frequently enough and in such a manner that it is unambiguously identifiable. Then comparisons with model predictions and scaling the results to extreme conditions can be done with some confidence. The result would be a meaningful determination of the performance of the M5 vent and a confident expectation of maximum impact, whether or not this is an exceedence due to the vent.

The clear implication from the above discussion is that monitoring to the west of the vent or at distances greater than a kilometre, as was proposed by RTA in practically all their suggestions to AQCCC...is not relevant to the issue. The meteorological conditions for impact in that direction and at these larger distances

¹¹⁵ Email from Mr John Anderson, Engineer and Project Manager for the M5 East, to Ms Jay Stricker, General Manager, Environment and Community Policy Branch, incorporated into evidence. *Evidence*, 1/5/01, pp 9-10.

are quite different to those relevant to the highest concentrations due to the vent. Furthermore, any impact to the west of the stack would be confounded by emissions from Sydney airport.

...it appears that an elevated close monitoring site to the south or south west of the vent would provide a useful watch on the operation of the vent, and would complement the RTA stations to the north and east north east.¹¹⁶

Monitoring of PM_{2.5}s

6.59 Some concern was expressed that monitoring of PM₁₀s would not give an accurate measure of PM_{2.5} levels. When questioned about the assumption that measuring PM₁₀s could give an accurate measure of PM_{2.5}s, Dr Peter Best advised the Committee:

If you are looking at general urban air quality that is a reasonable assumption. If you are looking close to a source, that is not a good assumption. I would also say that the assumption that you cannot monitor for ultrafines is not true. In fact right now studies are going on looking at ambient monitoring of ultrafines in other cities...It would be quite possible to look at the contribution of ultrafines within the stack and also at the nearest locations.¹¹⁷

6.60 In correspondence to the Committee, the EPA advised that they have been monitoring concentrations of PM_{2.5} at the following six locations in Sydney since 1998:

- Earlwood
- Lidcombe
- Liverpool
- Richmond
- Westmead
- Woolooware

6.61 In addition, there are four other monitoring positions in NSW, two in the lower Hunter and two in the Illawarra.¹¹⁸ The Committee, however, has not received any advice about the readings of PM_{2.5} in these locations.

¹¹⁶ CSIRO, *Submission*, pp 6-7.

¹¹⁷ *Evidence*, 3/5/01, p 25.

¹¹⁸ EPA, *Correspondence*, dated 14 June 2001, p 6.

How will exceedences from the stack be measured?

- 6.62** In its submission and evidence to the Committee, DUAP advised that there is a requirement for a protocol to be developed in consultation with the Air Quality Community Consultative Committee (AQCCC) which would determine how exceedences due to the stack will be measured. They further advised that the protocol requires approval from the Director-General of DUAP, and must be publicly available at least three months prior to the opening of the tunnel to traffic.¹¹⁹
- 6.63** Following questioning from the Committee in relation to the progress of the protocol, particularly in light of the narrow timeframe for its completion, DUAP advised:
- At this stage the RTA is pursuing the development of the protocol and at this stage we have not been involved in those discussions. We are mindful of the time and the date by which the protocol will have to be secured.¹²⁰
- 6.64** They further reiterated that "...the condition is very clear. If the protocol is not produced, agreed and approved, then the tunnel cannot commence operations."¹²¹

Will exceedences in general trigger condition to install filtration?

- 6.65** In submissions to the Committee, it seemed unclear whether exceedences attributed to stack solely would trigger the condition, or whether exceedences in general would trigger the condition to install filtration (and if so to what extent contribution from the stack towards exceedences would trigger the condition). This was a concern to the Committee given that a method of determining exceedences due to the stack has not been developed.
- 6.66** For example, the EPA stated in their submission:
- Additional approval conditions issued by the Department of Urban Affairs and Planning in August 2000 (condition 73, clause 4) require the RTA to install electrostatic precipitators within 6 months of the direction by the DUAP Director-General should PM₁₀ emissions from the stack result in an exceedence of the goal.¹²²
- 6.67** In evidence to the Committee, DUAP clarified this issue and indicated that regular exceedences of air quality goals in the region (irrespective of the exact contribution from the stack) will trigger the condition to install an ESP in the stack:

¹¹⁹ DUAP, *Submission*.

¹²⁰ *Evidence*, DUAP, 1/5/01, pp 26-28.

¹²¹ *Ibid*.

¹²² EPA, *Submission*, p. 6.

CHAIR: If the background levels increase to over 50 regularly, regardless of the stack, and the stack adds another five or 10 per cent to that, does that also mean that ESPs need to be fixed? I am saying that if it is not just the stack that takes it up another five or ten per cent but the background levels increase anyway.

Mr HATHER: I suppose that is right. If the backgrounds are going to increase over time then that is true.

CHAIR: If it goes over 50 regularly and you cannot determine whether it is the stack you would then have ESPs fitted automatically?

Ms HOLLIDAY: That is correct.¹²³

6.68 As outlined in Chapter Three, additional condition of approval 73(4) included in the DUAP 2000 Schedule, requires the formulation of a protocol to clarify the circumstances in which exceedences in which exceedences of air quality goals will result in the installation of ESP's in the stack. The RTA has indicated that work has commenced on the protocol and that it will be developed through the AQCCC. However, as pointed out in the conclusion to Chapter Four, the Committee is concerned that the AQCCC does not appear to be operating in way that has inspired community confidence.

Recommendation 8

The Committee recommends that the protocol that is required to be developed under additional condition of approval 73(4) clarifying the circumstances in which exceedences of air quality goals will require the installation of electrostatic precipitators in the M5 East Ventilation Stack, adopt the standard given in evidence to the Committee by the Director-General of DUAP that *any exceedences, regardless of whether they are due to background air quality or the stack itself, will require the installation of ESP's in the stack.*

Recommendation 9

The Committee recommends that an allowance be made to include the emerging PM_{2.5} air quality national standard in the protocol being developed by the RTA, EPA and DUAP.

¹²³ Evidence, DUAP, 1/5/01, pp 26-28.

Recommendation 10

The Committee further recommends that the EPA investigates and reports on diffuse and point sources of industrial pollution in the Turrella region. All scheduled industries should be assessed to ensure they are complying with license requirements for air pollutants. Non-scheduled industries should be targeted to ensure they are adopting best practice in the reduction of air pollutants. The EPA should facilitate industries in the region to move towards cleaner production technologies.

Health impacts of particulate matter

- 6.69** There are various health impacts of air pollution. Particulate matter is a key concern because, as it has been noted both in the earlier report and in submissions and evidence to the Committee, there is an absence of a threshold below which health effects are not observed. Particulate matter has been associated with a variety of respiratory problems and an increase in mortality and morbidity from asthma and heart and lung diseases.¹²⁴ The Department of Health stated that in Sydney there is a 1% increase in daily deaths for every 10Fg/m³ increase in PM₁₀.¹²⁵
- 6.70** On the issue of whether there are differing health impacts for ultra fine particles as opposed to coarser particles, PM_{2.5} versus PM₁₀, the Department of Health advised in evidence to the Committee that health impacts from PM_{2.5}, as a sub set of PM₁₀, are incorporated in the impacts from PM₁₀s:

The point about the issue of PM₁₀s versus PM_{2.5}s—I think this was illustrated very well by the Kunzli study in Europe last year—is ... we assess a cocktail of air pollutants. When an eminent group such as Kunzli uses PM₁₀ as an indicator pollutant for the pollutant mix across Europe, it is not ignoring the fact that there might be effects due to sulphur dioxide, PM_{2.5} or PM₁—all these pollutants occur in proportion across the spectrum of urban development because the main pollutant is motor vehicle pollution. Therefore, one does not need to pay too much attention to a particular fraction. The health effects are assessed across a city. If you measure an indicator pollutant across a city—in this case, it is quite easy to measure the indicator pollutant PM₁₀—the effects of PM_{2.5} will be incorporated in those health effects.

... Our point is that the indicator that is used for most health studies around the world on the impact of air pollution is the larger particle size. We believe that incorporates the effect of the smaller particles.¹²⁶

¹²⁴ DOH, *Submission*, p 3; EPA, *Submission*, p 3; LC General Purpose Standing Committee No 5, *Inquiry into the M5 East Ventilation Stack*, December 1999, p 8.

¹²⁵ DOH, *Submission*, p 3.

¹²⁶ *Evidence*, Dr Vicki Sheppeard, Senior Policy Officer, Environmental Health Branch, and Dr Andrew Wilson, Chief Health Officer, DOH, 1/5/01, p 55.

6.71 The Committee heard evidence that the majority of emissions from motor vehicles were ultra fine particles, PM_{2.5}s or less. According to Dr Manins of the CSIRO, "...practically all particles from motor vehicles are PM_{2.5}s...I thought it was more than 70 per cent."¹²⁷

6.72 The Committee also received evidence that as smaller particles can be inhaled more deeply into the lungs, they were especially hazardous to health. Professor Kearney concurred with the view that most particulates from vehicles were smaller in size (PM_{2.5}s) and emphasised the detrimental impact that such smaller particulate matter can have on health:

When we are looking at health impacts we are looking at the respirable particles. The particles which are measured under the so-called PM₁₀s include _{2.5}s. Perhaps upwards of 75 per cent of them, depending upon the source, can be 2.5. But in reality, the most important ones that get right down into the alveoli, the far distant points of the lung, are the smaller particles, of one micron or .1 micron.

The evidence is that the use of the PM standards is not applicable to quantify the products of combustion. They are applicable to quantifying road dust and also some of the urban background particulate matter, which comes from many, many sources. As the author Marawski has indicated, the PM₁₀ is not applicable to monitoring the emissions of a combustion engine. PM₁, yes, but we do not have PM₁. The EPA does not even monitor PM₁. What we have here is information that cannot be interpreted in terms of the health impact.¹²⁸

6.73 Professor Kearney in his submission to the committee also cites various studies which have investigated the health effects of smaller particulate matter.

6.74 As noted by the EPA:

Recent studies suggest the acute health effects may, in fact, be the result of exposure to very fine particles, such as those smaller than 2.5 Fg in diameter (referred to as PM_{2.5}) (EPA 1997). These particles can travel into the lower respiratory tract and lodge in the very small airways. These particles are all included in the PM₁₀ measurement but the mass of the larger particles may be what determines the overall result. The EPA is currently collecting monitoring data on PM_{2.5}.¹²⁹

6.75 Works by other academics and health professionals have also indicated that because smaller particles are able to be inhaled deeply into the lungs, they are responsible for a different set of physical problems (have a different impact on health):

Particulate airway distribution, and apparently health effects, are dependent on size of the particles, and on the structural and functional characteristics of the airways. Near universal pulmonary access is achieved by smaller particles (<PM₃); nearly all particles larger than PM₁₀ are trapped in the upper airways where they tend to be cleared by mucociliary mechanisms.²⁴ Persons with obstructive pulmonary disease (smokers, asthmatics, and patients with small airway disease or

¹²⁷ Evidence, Dr Peter Manins, CSIRO, 1/5/01, p 73.

¹²⁸ Evidence, Professor Ray Kearney, Lane Cove Tunnel Action Group, 3/5/01, p 30.

¹²⁹ EPA, *SoE 2000*, p 105.

COPD) have greater distal airway deposition of particles, and this effect is inversely and well correlated with predicted FEV1. A robust epidemiological data set associates PM₁₀ with adverse health effects. However, more recent epidemiologic studies have contributed to understanding the size specificity of health effects, and have increasingly implicated the gasses and smaller particles as the more relevant components of hazardous particulate exposure. National Research Council has urged EPA to increase research into the toxicology of particulate chemical components and the relationship between monitored community exposures and personal exposure.¹³⁰

6.76 According to CSIRO evidence:

... if there are 400 deaths over a year around the stack due to natural causes, then with a 10 microgram increase you might expect an extra four deaths due to fine particles. That is the relationship that the health people told me.¹³¹

6.77 The Department of Health stated that it is unclear as to what exact health impacts could be attributed to the stack as the standards were not designed to apply to point sources of pollution:

It is important to note that while the standards are based on health effects...the standards have not been designed to be applied to point sources, such as a stack, but apply to an average level of pollution across an airshed. This is important, as much of the health research on which the standards are based has been conducted on a population basis without individual measures of pollutant exposure. The standard thus represents an average level of exposure at which a health effect is or is not detected, and by implication, some personal or short-term exposures will be higher or lower than the regional average. Nevertheless, the standard is a useful tool against which to measure point sources, and is often used in this way.¹³²

¹³⁰ Jefferson H Dickey MD, 'No room to breathe: air pollution and primary care medicine', <http://www.psr.org/breathe.htm>. citing: Dockery DW, Pope ACd, Xu X, et al. 'An association between air pollution and mortality in six U.S. cities', *New England Journal of Medicine* 1993; 329:1753-9; Schwartz J, Dockery DW, Neas LM. 'Is daily mortality associated specifically with fine particles?' *Journal of the Air & Waste Management Association*, 1996; 46:927-39; Thurston GD. 'A critical review of PM₁₀-mortality time-series studies' *Journal of Exposure Analysis & Environmental Epidemiology*, 1996; 6:3-21; Burnett RT, Cakmak S, Brook JR, Krewski D. 'The role of particulate size and chemistry in the association between summertime ambient air pollution and hospitalisation for cardiorespiratory diseases' *Environmental Health Perspectives*, 1997; 105:614-20; Pope CAr, Thun MJ, Namboodiri MM, et al. 'Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults' *American Journal of Respiratory & Critical Care Medicine* 1995; 151:669-74.

¹³¹ *Evidence*, Dr Peter Manins, CSIRO, 1/5/01, p 78.

¹³² *DOH, Submission*, p 2.

Conclusion and recommendations

- 6.78** The Committee notes the commitment of the Environment Protection Authority to improve air quality in the Sydney Region and commends the EPA on the air quality management plan, *Action for Air*, and other recent initiatives.
- 6.79** However, the Committee draws attention to a number of additional measures which the Government might consider to further the improvement in air quality in Sydney.
- 6.80** Some of these additional measures were identified in the *Facilitator's Report* arising out of the International Workshop on Tunnel Ventilation. Others have been hinted at in the Government's own air quality management plans, but do not appear to have been fully developed at this stage.
- 6.81** With respect to the stack, the Committee finds that the stack is not primarily located in an industrial area but in an area which is surrounded by residential dwellings.
- 6.82** The Committee further finds that the stack is situated in a poor location both from an engineering viewpoint and environmental viewpoint.
- 6.83** The Committee notes the EPA evidence concerning both the number of exceedences of pollution goals, and the number of high pollution readings, in the past several years in the Earlwood area. The Committee further notes that there is a possibility of future exceedences irrespective of the contribution from the stack.
- 6.84** The Committee accepts that filtration of the stack will not resolve the ongoing issue of exceedences in the area. However, the Committee believes that the stack, as point source of pollution, will contribute an additional level of pollution to an area which already has high background levels of pollution (or has experienced high background levels of pollution). The Committee believes that all potential sources of pollution should be minimised or eliminated at the source - particularly in light of the fact that there is no threshold level of particulates (PM₁₀ or PM_{2.5}) below which adverse health effects are not observed. The Committee therefore recommends that electrostatic precipitators be installed in the stack so as to minimise this *additional* source of pollution to the Turrella region.

Recommendation 11

The Committee notes that the Conditions of Approval require the RTA to develop a regional air quality plan, and recommends that the NSW Government consider adopting further additional measures to improve air quality across the Sydney region, with particular emphasis on the regional air shed in which the stack is situated, such as:

- Application in the Sydney region of the regulatory approaches to solid fuel heaters being adopted in regional areas such as Armidale;
 - That an immediate start be made (under the new EPA solid fuel heater initiative) to buy back solid fuel heaters that do not meet EPA standards in the Sydney metropolitan area, particularly in areas of Sydney with significant air quality problems during winter months;
 - The introduction of emission testing for all vehicles in conjunction with registration checks;
 - The provision of funding to enable the development of technology for the monitoring of emissions of vehicles and the recording of details of vehicles with excessive emissions at particular locations, such as the entrances to the M5 East tunnel, through the use a “pollution camera” (akin to a “speed camera”).
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Recommendation 12

The Committee recommends that filtration equipment be installed in the M5 East Ventilation Stack so as to minimise this additional source of air pollution to the Turrella region. [Refer also to recommendations in Chapter Seven concerning filtration.]

Chapter 7 Filtration

- 7.1** In Chapter Six the Committee concluded that the air quality of Turrella and the surrounding area will be adversely affected by emissions from the M5 East Ventilation Stack, filtration equipment should be installed in the stack. There are two questions which therefore need to be addressed in regard to the installation of filtration equipment in the stack: firstly, is the technology viable or feasible; and, secondly, what is the cost of the equipment?

Feasibility/ viability of filtration technology

- 7.2** The Committee heard conflicting evidence concerning the viability and cost of filtration technology.

RTA evidence

- 7.3** The RTA in both their submission and evidence to the Committee have stated that filtration technology is currently not viable on a scale as large as the M5 East tunnel. The RTA cite two key reports to support their claim: the *Flagstaff Report*, which was commissioned by the RTA in September 2000 to look at the feasibility of installing ESPs in the M5 East and estimate the cost of such installation; and the *Bongiorno Report* (dated November 2000), which was a review commissioned by the Victorian Minister for Environment and Conservation into the Domain and Burnley Tunnels of the Melbourne City Link Project.
- 7.4** The RTA state that the *Bongiorno Report* found that out of the thousands of road tunnels around the world, very few were fitted with filtration technology and of those only 4 could be found which were installed for environmental purposes (or external air quality).¹³³
- 7.5** The RTA further state, that not only are there a small number of examples of overseas tunnels which use ESPs for external air quality, but that it was not possible to compare the data from those tunnels with the M5 East. In stating this, the RTA cite the *Flagstaff Report* which found that there was no comparable airflow rate for overseas tunnels with the M5 East tunnel, and that the M5 East maximum airflow rate of 850m³/s is 3 to 4 times greater than most overseas tunnels. The RTA state that “This considerably reduces the comparability of any data obtained in relation to any other ESPs which have been installed to date”.¹³⁴
- 7.6** In evidence to the Committee, the RTA restated that the vast majority of overseas tunnels were not fitted with filtration technology:

The RTA has seriously looked at this. We think it is an important initiative for the RTA to have the most recent and latest information on it. We have sent people

¹³³ RTA, *Submission*, p 16.

¹³⁴ RTA, *Submission*, p 15.

overseas to talk to various road authorities. As I said before, we have one of our senior executives on the PIARC International Tunnel Committee that has world experts on this committee keeping up to date with tunnel emission technologies. We are continuing also to employ consultants to provide us with advice on a yearly basis on what developments are happening around the world on this basis. So, it is not just the RTA doing it; we are actually employing people to advise us of the latest developments in technologies. You asked about how many tunnels have been installed with this technology. Once again, I can only quote from the most recent study from Bernard and Bongiorno that points out that over 99 per cent of the world's tunnels do not have any form of filtration and you can only identify one or two that in fact had been using electrostatic precipitators to treat the external air.¹³⁵

CTA evidence

- 7.7** In evidence to the Committee, Mr Hans Anderl, Managing Director of CTA International stated that filtration technology was viable and that there are examples of overseas tunnels fitted with ESPs on a scale equally as large as the M5 East (and in one case even larger):

The Flagstaff report says that the air volume in the M5 is three or four times bigger than in the Chimbu. I am wondering why he picked Chimbu. It seems that he should look at all the tunnels where precipitators have been installed. So why did he not compare it with the Oslo tunnel that is approximately 150 cubic metres per second more than in the M5?

...

When we started to look into precipitators there a lot of air quality studies were done. The calculations showed that by filtering the shaft air from the Oslo tunnel—that is 1,000 cubic metres per second—that would influence total air pollution in the Oslo area by 1 per cent.¹³⁶

- 7.8** Further, Mr Anderl added that there was no difference in size when assessing the effectiveness of ESPs:

I know the question that will come now very well: That is just a little unit and how many of those will you have to have for the M5? There is no difference whether the electrostatic filter is small or big. The efficiencies and the way it works are exactly the same. This is somewhat the same as the presentation I made last year in Sydney.¹³⁷

- 7.9** In response to the issue of whether filtration technology was used only for in tunnel visibility and not for external air quality, Mr Anderl stated:

During my meetings in Australia in June last year at the seminar in Sydney ...[the International Tunnel Ventilation Workshop]...I got the impression that they were

¹³⁵ *Evidence*, 1/5/01, p 2; RTA, *Submission*, p 14.

¹³⁶ *Evidence*, 3/5/01, p 46.

¹³⁷ *Evidence*, 3/5/01, p 43.

saying all the time that the Electrostatic Precipitator in Norway is only installed because of the visibility in tunnels. I am very surprised that things like that could be said, because they are not true.

You can compare a tunnel with an ordinary tube. The vehicle is coming in on one end and coming out on the other end. The same is happening with the fresh air requirements you are putting into the tunnel for cleaning the tunnel.

Vehicles inside a tunnel produce the same amount of particles as they would on the open road.

If you then use Electrostatic Precipitator with an efficiency of say 90% or more there is no doubt that the total amount of pollution will be reduced. In tunnels such as we use in Norway, the exhaust can concentrate and affect those living near by. This is why the people demand that the exhaust be filtered. This is a very easy thing to understand and it is simple technology. So I am extremely surprised how many times...[it is said]...that we only use it for visibility in tunnels.¹³⁸

7.10 Mr Anderl also stated in his submission to the Committee that the use of ESPs was widespread and not confined to use in road tunnels:

Besides use in road tunnels, electrostatic precipitators are use in hospital operating theatres where they have been used for over 2 years. They are also used in hotel bars, restaurants, discotheques, nightclubs and my company have sold over a thousand units especially in order to handle cigarette smoke.¹³⁹

7.11 In the hearing on 3 May 2001, Mr Anderl gave a demonstration to the Committee of how ESPs work by using a small ESP to filter cigarette smoke - which is comprised of particles from 0.01 to 3 microns in size.

Cost of filtration

RTA evidence

7.12 In its submission and evidence to the Committee, the RTA stated that the estimated cost of retro fitting filtration to the stack is \$36 million. The cost was prepared by Flagstaff Consulting.

Assuming that the filtration system is installed after the current work on site is completed, then the capital cost of that is \$36 million.¹⁴⁰

7.13 The RTA advised that the quote for the cost of installing an electro static precipitator (ESP) was obtained from CTA through their agent in Australia, Alstom:

¹³⁸ Mr Hans Anderl, CTA, *Submission*, p 4.

¹³⁹ Mr Hans Anderl, CTA, *Submission*, p 5.

¹⁴⁰ *Evidence*, 1/5/01, pp. 7-9.

A component of the cost in the Flagstaff is the ESPs. The cost of ESP actually came from CTA, the supplier of ESPs in Norway through their Australian agent Alstom. There are also other components in that cost that cover the additional fans required to make up the pressure drops that are influenced by the ESPs. So there are other costs such as additional fans, civil costs in terms of providing housing, issues of noise and vibration which have to be managed and they all cost money. The breakup of that cost is in the Flagstaff report.¹⁴¹

7.14 On the issue of obtaining other quotes, RTA stated:

Most of the discussions that I have had with Dr Dickel has been in the past two or three months. There has been an exchange of correspondence between Dr Dickel and his people and myself discussing various issues in relation to the installation or possible installation of the CLAIR system and that has been very fruitful for both parties, I believe. There were a lot of issues in our tunnel that clearly Dr Dickel and his group did not understand because every tunnel is unique, and this tunnel is different to some of the tunnels that Dr Dickel has been used to working with. That has been quite constructive. To answer your question directly they also have a relationship with Howden in Australia who are suppliers of fans. Some of the prices that they provided as indicative costs I believe, for those particular components of the Flagstaff report do not surprise me because CTA provided those sorts of figures initially to Flagstaff anyway. Flagstaff did not develop these costs themselves. They approached suppliers of equipment in this industry overseas and based their estimate on those.¹⁴²

7.15 On the issue of viability of technology/ use of technology in other countries, the RTA stated:

The evidence that I have is that there are no electrostatic precipitators installed in any road tunnels in France. I do not know why we would go to France. However, if you would like us to visit France—

...

We certainly have made contact with the local representatives of some of the Japanese companies so we have, in fact, continued to contact the Japanese. In fact, I sat through a presentation with some of the Japanese manufacturers of this technology.¹⁴³

CTA evidence

7.16 In evidence to the Committee, Mr Hans Anderl of CTA stated that the cost of installing an ESP in the M5 East would be approximately A\$8.5 million:

First I would ask where Flagstaff got the price. I was never asked. I have given a price for the total installation for the M5 of electrostatic precipitators with a high-

¹⁴¹ Ibid.

¹⁴² Ibid.

¹⁴³ Ibid.

voltage powerpack, electric cabinet, automatic control system, cabling, blending, water treatment system, tanks and everything—I gave the price a couple of years ago already—of \$8.5 million Australian.¹⁴⁴

Filtrontec evidence

7.17 In their submission and evidence, Filtrontec presented the Committee with three options for installing an ESP in the M5 East (in different locations) and three corresponding price estimates. In evidence to the Committee, Dr Paul Kerzel stated that these options were developed for the RTA in response to their request for information:¹⁴⁵

- Option A – installation of ESPs into the cross-connections between the tubes at each portal – cost A\$13 million for supply and installation including upgrading the ventilators.
- Option B – installation of ESPs at the exhaust outlets within the tunnel and an additional gas filter before the stack – cost A\$17.5 million (for the supply and installation, including the upgrading of ventilators, and energy supply) and A\$9.6 million for gas filter. Total price A\$27.1 million.
- Option C – installation of ESPs at the stack and additional location of gas filter - A\$22.5 million.

7.18 In correspondence to the Committee, the RTA stated that the Filtrontec estimates did not take into consideration the costs associated with changes to infrastructure which would be required in order to incorporate the filters in the locations specified by them. The RTA further stated that they also did not take into consideration other factors such as delays to the construction of the tunnel which would also have consequential costs:

As the RTA explained at the inquiry any proposed alteration or modification to the tunnels must consider the impact on the overall design of the ventilation system. This must also include the impact on the maintenance and operation of the tunnels...

Subsequent review of the proposal...has shown a number of issues that Filtrontec were unaware of regarding the design and operation of the tunnels which substantially affects its proposal both in technical and financial terms...

In terms of the cost estimate...the price does not include:

- Any additional power supply requirements,
- Connection to the tunnel control systems and Motorway Control Centre
- Monitoring and fire protection

¹⁴⁴ Evidence, 3/5/01, p 48.

¹⁴⁵ Evidence, 3/5/01, pp 33 & 35.

- Waste water treatment facilities cannot be located in the space suggested...as a sub-station is located in this area. The waste water would either need to be pumped outside the tunnel or space created by replacing the fan support structure...¹⁴⁶

Economic and greenhouse implications of energy needs of the stack

7.19 The Committee received very little evidence about the economic or greenhouse implications of energy needs of the stack.

7.20 The EPA advised the Committee that they have not been asked to assess the impact of greenhouse gas emissions due to the operation of the tunnel¹⁴⁷, and that the impact of the tunnel in this respect should ideally be dealt with through an environmental impact assessment process:

We would wish that it would be looked at through the environmental impact assessment process to make sure that people understood the consequences of that.¹⁴⁸

... It really is up to the decision-makers in terms of costs and the trade-offs across a range of environmental issues. ¹⁴⁹

7.21 Mr Mark Curran, representative of Residents Against Polluting Stacks ('RAPS) stated that the energy needs of the stack were quite high, and that the energy needs of ESPs in comparison were relatively small:

The other thing about the energy costs, he said two interesting terms and now we will be able to define those. He said "enormous" for the cost of the electrostatic precipitator, and it would be if you are paying it out of your own pocket, and I believe he said it was "humungous" for the cost of running the tunnel. I can now define those for you. Enormous is about one to 1½ gigawatt hours per year, which is the maximum amount of energy electrostatic precipitators would use. "Humungous" is actually 32½ gigawatt hours per year because that is what the tunnel ventilation system will actually consume. Now, 32½ gigawatt hours per year is 32,000 tonnes of greenhouse gas. It is nearly \$3 million. We believe that by the proper use of precipitators, working on overseas experience, if you went back and designed it from the beginning, you could reduce that 32½ gigawatt hours per year to about five, including the cost to run the precipitators. This is what the Japanese tell us. And even now there are options which could significantly reduce that enormous energy cost. It absolutely amazes us that the Government is not worried about a project where its running costs are going to be \$3 million when they could be \$500,000.¹⁵⁰

¹⁴⁶ RTA, *Letter*, dated 14 May 2001.

¹⁴⁷ *Evidence*, 1/5/01, p 53.

¹⁴⁸ *Evidence*, 1/5/01, p 52.

¹⁴⁹ *Evidence*, 1/5/01, p 53.

¹⁵⁰ *Evidence*, 3/5/01, p 13.

- 7.22** Dr Paul Kerzel of Filtrontec stated that the installation of ESPs in the cross connection between the tubes at each portal of the tunnel would present a substantial energy and cost saving:

This installation has two main advantages. The first advantage is that we are able to eliminate more than 50 per cent of the particles which normally would be blown out of the stack. The location of the EP is very good because it is at the end of the slope of the tunnel where the vehicles will emit the most particles. We have an elimination rate of more than 50 per cent. Another advantage is that we can, by locating the ESPs at this place, reduce the costs because of the reduced air volume flow and thereby the energy costs could be decreased. The reason is that we have to introduce fresh air into the tunnel to dilute the air inside the tunnel. But if we eliminate the particle we do not have to dilute it so much and so the amount of air which has to be blown into the tunnel could be reduced.

...if you can reduce air flow down to 50 per cent, the energy costs will be reduced to one eighth because power consumption is proportional to the value of air flow to the power of three.¹⁵¹

Conclusion and recommendations:

- 7.23** The Committee notes the evidence received by Filtrontec and CTA International about the viability and cost of filtration technology. The Committee also notes the view of the RTA that the technology is presently not viable. The Committee believes that due to its poor location, the M5 East stack provides the perfect opportunity for the RTA and other authorities to study the effectiveness of ESP technology in the Australian context.
- 7.24** The Committee also notes that the construction of the stack is virtually complete. In light of this the Committee reiterates part of its recommendation No 8 of the earlier report to seek expressions of interest for the installation of ESPs in the stack and takes this further, now calling on the RTA to immediately call for tenders for the installation of ESP's in the stack.

Recommendation 13

The Committee recommends that the Roads and Traffic Authority immediately call for tenders for the installation of electrostatic precipitators in the M5 East Ventilation Stack.

¹⁵¹ *Evidence*, 3/5/01, p 33.

Recommendation 14

The Committee recommends that, in view of the increasing number of proposed tunnels in NSW (such as the Cross City tunnel and Lane Cove tunnel) and the concerns expressed by the RTA over the viability of filtration technology in the form of electrostatic precipitators, the M5 East Ventilation Stack be treated as a pilot study of filtration technology in Australia. An independent organisation such as the CSIRO, together with the RTA and other relevant authorities should monitor and report on the effectiveness of this technology and its possible future application in other tunnels in NSW.

Statement of Dissent

By

Jan Burnswoods MLC

John Johnson MLC

Janelle Saffin MLC

The NSW Government has considered the issues of concern to the residents around the M5 East Ventilation Stack many times and in considerable detail. Part of the consideration has been the ongoing investigation of ways to improve air quality, including the use of filtration. The Environment Protection Authority has set air quality goals for NSW and this project, which are equal to the most stringent in the world.

No definitive scientific evidence has been presented, whether at the RTA International Workshop, to the Victorian Government inquiry process, the 'Bongiorno Inquiry' (which called for external expressions of interest for air cleaning systems in relation to the Melbourne City link tunnels), or by other avenues, that supports either the effectiveness of current filtration systems and prototypes in improving external ambient air quality or the reliability of such systems for long term or continuous use.

The Majority Report recognises the importance of regional and sub-regional strategies for air quality improvement. We endorse this view. In addition to the NSW Government's "Action for Air Plan" to improve regional air quality across the Sydney basin, the RTA is completing a sub-regional air quality management plan for the M5 East area. Local sources of air pollutants have been investigated, including solid fuel heaters, and strategies are being developed to reduce the emissions from them. This is consistent with the evidence by Dr Manins of CSIRO who noted that "it requires an airshed wide effort to reduce particle emissions." [Page 77 Transcript 1 May 2001] and:

"What I am trying to draw attention to is that the contribution from the vent itself to particle concentrations is not large, that most of the particle concentration in the Turrella region is already there and is due to the existing motor vehicle fleet and to the forms of heating that people choose to use, and due to the local industry." [Page 81 Transcript 1 May 2001]

Recommendations 12 and 13 of the Majority Report are not consistent with this evidence and Dr Manins further elaborates the point [page 82 Transcript 1 May 2001]:

Dr MANINS: I feel that treatment of the emissions, the particle emissions, is feasible, but that it is rather poor value scientifically because of the local contribution to ambient levels from the stack, but it is feasible.

The Hon. R.D. DYER: Why do you say it is poor value scientifically?

Dr MANINS: Because of the low contribution of the stack for the vast majority of the time to the ambient PM concentrations, you have this precipitator running all the time, absorbing an enormous amount of electricity,"

In relation to Recommendation 14, the Norwegian Government has been testing electrostatic precipitators for about ten years, and the twelve month study, which has been evaluating their systems

in operation, is close to completion. A pilot study of the same technology is unlikely to add value to this body of knowledge. However, a recent paper on 'Particle Cleaning in Norwegian Urban Road Tunnels' by Mr Harald Buvik, Directorate of Public Roads, Norway has concluded that :

"From a practical, traffic, environmental and economical point of view our investigations and measurements indicate that use of electrostatic filters in road tunnels with heavy two-way traffic (eg. Hell tunnel) or short one-way tunnel (eg. Granfos, Ekeberg and Nygard Tunnel) should not be recommended."

With regard to the issues of exceedance of the ambient air quality goals, Recommendation 8 of the Majority Report is illogical and inconsistent with the evidence provided by DUAP officers. The Recommendation, as it is worded, could result in the requirement for filtration to be fitted whether there were any emissions from the stack or not, for example if the motorway were closed, but background levels were high, e.g. due to bushfires. The evidence of the DUAP officers, as reproduced in the Majority Report, is clearly in relation to the possibility of background levels increasing over time to cause regular exceedances of the goals.

Condition 73(4) states "Should the results of monitoring required under Condition 75 and from the community based monitoring station show that the PM₁₀ concentrations from the exhaust stack results in exceedance of the goals specified in Condition 72, the RTA shall install electrostatic precipitators ..."

The clear intention of the condition is that the exceedance must be due to the stack to require fitting of ESPs.

The NSW Government, through the RTA and DUAP, has investigated the systems and technology used overseas. There is no reliable evidence that the use of electrostatic precipitators in the tunnel or ventilation stack will significantly improve the local air quality. The most effective way to improve local air quality is to reduce the emissions from motor vehicles and other sources of emissions in the area, through the air quality management plan for the M5 East area.

Appendix 1

List of Submissions

List of Submissions

No	Author
1	DICKELS Dr Karl (Luft-und Gasfilter)
2	SOLDENHOFF Karan
3	ARMOUR Mr & Mrs Ned & Lucie
4	ANDERL Mr Hans (CTA International ASA)
5	HARRIS L
6	BRIDGE Rosi
7	MARQUES A
8	COHEN MS Elaine
9	ZAMMIT Leearna
10	MCINTOSH Mr Ron
11	KRUPINSKI M
12	KRUPINSKI Ms Liz
13	JAZZINI Mr & Mrs H D & MC
14	KOS Mrs Ruth
15	RIDSDALE Mrs B
16	MORRIS Rae
17	SUTTON Ern
18	MORRIS Mr Peter
19	MAGEE Bernadette
20	O'MAHONEY Mrs D
21	PENDERGAST A
22	INSHAW Ms Beverley
23	CLARKE Mr Andrew
24	O'MAHONEY Mr G
25	WONG H (Lane Cove Council)
26	BARTLETT Mr Chris
27	MARTIN Leigh (Total Environment Centre)
28	GIZAS Patricia
29	LEE Mrs Dorene
30	PHILIPS Yolande and Paul
31	ZARIFFA Roland and Mona
32	SIAPOS Miss Isabelle
33	JAZZINI HD
34	MANES Mr Richard
35	PACHECO Eddy
36	HAFFAR Soraya
37	PACHECO Michael
38	LEE Mr John

39	HERBERT Brian
40	TSOVOLOS T (Bexley North Public School)
41	PEYIOTIS Mr Harry (Australiawide Realty Pty Ltd)
42	DONOGHUE Mr Mathew
43	LEE Ms Christine
44	STARK Mr David
45	LEE Mr Robert
46	SIAPOS Natalie
47	GRACE Mr Howard
48	PENMAN Mr Andrew (The Cancer Council)
49	DANN M & J
50	MANINS Dr Peter (CSIRO)
51	MOGLAN-BROUFF Glenda
52	FRIAR Janet
53	THE GLEN VILLAGE (The Glen Village)
54	HAILEY JA
55	WOSCHITZ Dr R (University of TechnologyGraz)
56	WANG Liwei
57	ALEXANDER Mrs M
58	MERLINO Mr Paul
59	STOJCEVSKI Mr Boris
60	WANG Dilin
61	MANGSKYEYCO.LTD
62	JOHNSTONE Janet
63	FINLASON MS Judy
64	JONES Mr Stephen
65	LAKSHMI Lalita (Harris Community Centre)
66	PIZOVIC Mr Osman
67	HOFFMAN Lee
68	VIGLAS Christos
69	SUVVA Christian
70	SOBBAH Jenny
71	NAGLE Emily
72	NICOLA Nicholas
73	MUSSAWAR Rami
74	TOUMA Mr Sam
75	TOUMA Mr Paul
76	TOUMA Gihan
77	TOUMA Mrs Anna
78	STARK Mrs Betty
79	STARK Mr Peter

80	MAWER Simon
81	STARK Cathy
82	MELLISH Dawn
83	ANDRIANO Michael
84	BELL Mrs Beverley
85	HALE Ms Sylvia (Marrickville Council)
86	HOFFMANN Lee (Wolli Creek Preservation Society Inc)
87	KARAS Nold
88	MOORE Mrs Maureen
89	TIPPETT Mr John
90	ANDREWS Mr & Mrs Frank & Tina
91	TULLY Errol & Miriam
92	MAROTE Isabel Navarro
93	OLIVE Mr Peter
94	ALEXANDER Warren
95	RIDGE Kathy (Nature Conservation Council of NSW Inc)
96	DOWDEN Mary-Anne
97	BRIERS Mr David
98	BOVIS Mr Andrew Mark
99	CHIK James & Lucy
100	PLATER Mr Merrick (ABC)
101	BRIERS G
102	BRIERS Paul
103	BRIERS Mr Charles (RAPS (Residents Against Polluting Stacks) Inc)
104	KEARNEY Dr Ray (Lane Cove Tunnel Action Group)
105	FORWARD Paul (RTA)
106	HADDAD Sam (Department of Urban Affairs and Planning)
107	POPPLER Thomas
108	POPPLER Janet
109	POPPLER Garth
110	VISSEL T Frances
111	JONES Janet (Combined Central & Air Quality CCC)
112	KADLEC Ivona
113	GLOVER FAMILY The
114	DWYER John
115	BRIEN Dale C
116	COLUBRIALE Domenico & Giuseppina
117	COLUBRIALE Joe & Wilma
118	SEVERINO Frank & Carmel
119	MATTAROLA Giusto & Rina
120	MOORE Leon & Judith

121	SANLHEY S
122	LAZTIC
123	LEVOUIS Erene
124	LEVONIS Stan
125	GARDINER Flora Evelyn
126	ROSSI Mr Ricc
127	BURGESS Mark
128	XU Li
129	XU Ang Zu
130	TOUMA Josephine
131	TOUMA Mr Joseph
132	TOUMA A
133	TOUMA Louise
134	TOUMA Hanna
135	SABBAH John
136	SABBAH Freda
137	SABBAH Mr Daniel
138	SABBAH Emma
139	SABBAH Jeffrey
140	SABBAH Nadia
141	FRENOPOULO Julian
142	ROSSI Michael
143	ROSSI Angela
144	CLARE CROSS Alison
145	ROSSI Judith
146	NELSON Mr Daniel
147	KYRIACOU Christina
148	THOMPSON M
149	GREAVES Brenda
150	KYRIACOU Stavrovla
151	DASKALAKIS A
152	VRANTAS Maria
153	MAWER Danielle
154	MAWER Giselle
155	TOUMA Donna
156	TOUMA Tania
157	TOUMA Mark
158	TOUMA Charlie
159	TOUMA Fadia
160	SAVAS Maria
161	MORRIS A

162	PLATER Ms Helen
163	PLATER Mr Peter
164	ROBERTS Colin (Air Quality Consultative Committee)
165	TARTOK Suzarne & Michael
166	TARTOK Suzarne
167	HAY Mrs Julie
168	KYRIACOU Mr & Mrs
169	DANCZ Michael & Magda
170	W Peter
171	MOUSOS S
172	MACBETH Irene
173	CONSTANTINE Gregory
174	BAYNDRIAN Cleo
175	ELLISTON Kelsey
176	ELLISTON Katrina
177	FONDA Rod
178	STONHAM Michael
179	HARRIS Catherine
180	TOUMA Morris
181	STONHAM Ashley
182	TOUMA Natalie
183	TOUMA Simon
184	TOUMA Amal
185	NAGLE Mark
186	ELLISTON Toni
187	XHENEMONT Horst
188	NEVILLE Michael
189	SUTTON Mr John (Construction Forestry Mining Energy Union)
190	CORBYN Ms Lisa (Environment Protection Authority)
191	TOUMA David
192	ISSA Therese
193	GOTHIS Anne
194	ELLISTON Dani
195	ELLISTON Richard
196	MINCHIN Jake
197	PETSCHUK Varunee
198	MOUSOS D
199	CONSTANTINE Jackson
200	MOUSOS J
201	CHEN Hong Ming
202	ARMSTRONG Mrs R

203	DIETZ L
204	HANSEN M R
205	MOUSOS C
206	CONSTANTINE Cimon
207	COPELLO Beatriz
208	BAYNDRIAN Christine
209	DIETZ Mrs L
210	XU James
211	BAYNDRIAN Mario
212	SHEPPEARD Dr Vicky (NSW Health)
213	MELLISH Mr Morgan
214	LIM Mr Allan
215	SEETO Ms Maenin
216	GRESSON Mr Stephen
217	BEST Dr Peter
218	LANGLEY Flash
219	CASEY Kevin
220	PUTWAIN William
221	STODART Eileen
222	CAMPBELL James
223	BISHOP Meryl
224	NEUENS-JAKOBI Colette
225	HIGGINS Dr Les
226	OLIVER Kirk
227	OLIVER Margaret
228	OLIVER Warren
229	LIM Samantha
230	DICKINS Christine
231	PINKERTON Debra
232	FLANDERS Terry
233	PLATER Maria
234	HERBERT Brian & Lyn

Appendix 2

List of Witnesses

List of Witnesses

Tuesday, 1 May 2001

Mr Paul Forward	Chief Executive Roads and Traffic Authority
Ms Jay Stricker	General Manager, Environment and Community Policy Branch Roads and Traffic Authority
Mr John Anderson	Project Manager—M5 East Roads and Traffic Authority
Ms Sue Halliday	Director-General Department of Urban Affairs and Planning
Mr Sam Haddad	Executive Director Department of Urban Affairs and Planning
Mr Mark Hather	Team Leader, Transport and Telecommunications Department of Urban Affairs and Planning
Ms Lisa Corbyn	Director-General Environment Protection Authority
Mr Joe Woodward	Assistant Director-General (Operations) Environment Protection Authority
Dr Andrew Wilson	Chief Health Officer NSW Health
Dr Vicki Sheppard	Senior Policy Officer, Environmental Health Branch NSW Health
Dr Peter Manins	Chief Research Scientist, Leader, Atmospheric Pollution Program CSIRO

Thursday, 3 May 2001

Ms Giselle Mawer	Residents Against Polluting Stacks
Mr Mark Curran	Residents Against Polluting Stacks
Mr & Mrs Rossi	Residents Against Polluting Stacks
Mr Charlies Briers	Residents Against Polluting Stacks
Mr Peter Siapos	Residents Against Polluting Stacks
Dr Peter Best	Katestone Scientific
Professor Ray Kearney	Lane Cove Tunnel Action Group
Ms June Hefferan	Lane Cover Tunnel Action Group
Mr Kevin Lownie	Projects and Applications Engineer Howden Australia (in association with Filtronic, Germany)
Dr Paul Kerzel	Howden Australia (in association with Filtronic, Germany)
Mr Hans Anderl	CTA—Norway

Appendix 3

Minutes

Minutes of Meetings

Minutes No. 49

Monday 26 March 2001
Room 1153, Parliament House at 11.05 am

1. Members Present

Mr R Jones (in the Chair)
Mr Dyer
Ms Burnswoods
Mr Colless
Mr Jobling
Mr Johnson
Mr M Jones

2. Confirmation of minutes

Resolved, on the motion of Mr Jobling, that the draft minutes of meeting no 48, as amended, be confirmed.

3. Tabled documents

CORRESPONDENCE RECEIVED

The Chair tabled the following item of correspondence received:

Correspondence from the Hon Ron Dyer, MLC, to Chair, dated 26 March 2001, reaffirming points raised in opposition to the committee proceeding with its inquiry into the M5 East Ventilation Stack.

The Committee deliberated.

Resolved, on the motion of Mr Dyer, that formal written advice be obtained by the Clerk regarding matters raised in support of Mr Dyer's motion, at meeting of 14 March 2001, regarding the Committee's capacity or otherwise to deal with this reference.

4. Inquiry into the M5 East Ventilation Stack

The Committee deliberated.

Resolved, on the motion of Mr Dyer, that an advertisement calling for submissions be placed in local papers by Thursday 29 March 2001.

Resolved, on the motion of Mr Dyer, that the closing date for submissions be Thursday 12 April 2001.

Proposed witness list

The Committee deliberated.

Resolved, on the motion of Mr Colless, that the Committee Secretariat invite the following to appear as witnesses:

Directors-General, and/or appropriate senior representatives, of the following Government agencies:

- RTA
- DUAP
- EPA
- Health;

Representatives of the CSIRO;

Representatives of Residents Against Polluting Stacks;

Proponents of commercially available technologies to treat emissions from the M5 East tunnel including installation, running and maintenance costs; and other witnesses nominated by Members subject to Committee decision.

5. Timetable for inquiries

The Committee deliberated.

Resolved, on the motion of Ms Burnswoods, that the Chair circulate to members, by Wednesday 29 March 2001, a document setting out a proposed timetable and resource arrangements for the Committee's various inquiries.

6. Adjournment

The meeting adjourned at 12.10 pm.

Steven Carr
Committee Director

Minutes No. 50

Monday 9 April 2001
Room 1254, Parliament House at 12.30 pm

1. Members Present

Mr R Jones (in the Chair)
Mr Dyer
Ms Burnswoods
Mr Colless
Mr Jobling
Mr Johnson
Mr M Jones

2. Confirmation of minutes

Resolved, on the motion of Mr Dyer, that the draft minutes of meeting no 49 be confirmed.

3. Tabled documents

CORRESPONDENCE RECEIVED

The Chair tabled the following items of correspondence received:

Correspondence from the Hon Richard Amery MP, Minister for Agriculture, Minister for Land and Water Conservation, dated 4 April 2001, concerning the inquiry into Oil Spills in Sydney Harbour.

Correspondence from the Hon Ian Causley MP, Chair, House of Representatives Standing Committee on Environment and Heritage, dated 28 March 2001, concerning the National Conference of Parliamentary Environment Committees.

Correspondence from Mr John Evans, Clerk of the Parliaments, dated 9 April 2001, concerning the capacity of the Committee to undertake the inquiry into the M5 East ventilation stack.

[Deliberations in relation to other inquiries]

5. Inquiry into the M5 East ventilation stack

The Committee deliberated.

Resolved, on the motion of Mr Jobling, that the closing date for submissions for the inquiry into the M 5 East ventilation stack be extended to Friday 27 April 2001.

[Deliberations in relation to other inquiries]

7. Adjournment

The Committee adjourned at 2.40 pm until 10.00 am on Tuesday 1 May 2001.

David Blunt
Committee Director

Minutes No. 51

Tuesday 1 May 2001
Jubilee Room, Parliament House at 9.00am

1. Members Present

Mr R Jones (in the Chair)
Mr Dyer
Mr Jobling
Mr Johnson
Mr M Jones
Mr J Ryan (Colless)
(Mr Breen as additional Member)

2. Apologies

Ms Burnswoods

3. Inquiry into M5 East Ventilation Stack (2001) - hearing

The Chair declared the meeting open to the public and the press.

The Chair announced that he had received notification that for the purposes of M5 East Inquiry, the Hon John Ryan MLC was substituting for the Hon Rick Colless MLC.

The Chair announced that the Hon Peter Breen MLC was exercising his right as a Member of the Legislative Council to participate in General Purpose Standing Committee hearings.

Resolved, on the motion of Mr Jobling, that in order to better inform all those who are participating in the inquiry process, the Committee make use of the powers granted under paragraph 8 of the resolution establishing the General Purpose Standing Committees, and section 4 (2) of the *Parliamentary Papers (Supplementary Provisions) Act 1975*, to publish submissions 1-167 received by the Committee.

Resolved, on the motion of Mr Jobling, that the closing date for submissions be extended to Friday 4 May 2001.

The Committee deliberated.

Mr Paul Forward, Chief Executive, Ms Jay Stricker, General Manager Environment and Community Policy Branch, and Mr John Anderson, Project Manager – M5 East, from the Roads and Traffic Authority (RTA) were sworn and examined.

Evidence concluded and the witnesses withdrew.

Ms Sue Holliday, Director-General, Mr Sam Haddad, Executive Director, and Mr Mark Hather, Team Leader, Transport and Telecommunications, from the Department of Urban Affairs and Planning were sworn and examined.

Evidence concluded and the witnesses withdrew.

Ms Lisa Corbyn, Director-General, and Mr Joe Woodward, Assistant Director-General (Operations), from the EPA were sworn and examined.

Evidence concluded and the witnesses withdrew.

Dr Andrew Wilson, Chief Health Officer, and Dr Vicki Sheppard, Senior Policy Officer, Environmental Health Branch, from the NSW Health Department were sworn and examined.

Evidence concluded and the witnesses withdrew.

Dr Peter Manins, Chief Research Scientist, Leader Atmospheric Pollution Program, from the CSIRO was sworn and examined.

Evidence concluded and the witness withdrew.

Resolved, on the motion of Mr Ryan, that in order to better inform all those who are participating in the inquiry process, the Committee make use of the powers granted under paragraph 8 of the resolution establishing the General Purpose Standing Committees, and section 4 (2) of the *Parliamentary Papers (Supplementary Provisions) Act 1975*, to publish the transcript of the hearing held on 1 May 2001.

4. Adjournment

The Committee adjourned at 5.00 pm until 9.00 am Thursday 3 May 2001.

David Blunt
Committee Director

Minutes No. 52

Thursday 3 May 2001
Jubilee Room, Level 7, Parliament House at 9.00 am

1. Members Present

Mr R Jones (in the Chair)
Mr Dyer
Mr Jobling
Mr Johnson
Mr M Jones
Mr J Ryan (Colless)

2. Apologies

Ms Jan Burnswoods

3. Inquiry into M5 East Ventilation Stack (2001) - hearing

The Chair declared the meeting open to the public and the press.

Ms Giselle Mawer, Mr Mark Curran, Ms Judi Rossi, Mr Ric Rossi, Mr Charles Briers and Mr Peter Siapos were sworn and examined.

The witnesses tendered the following documents:

- Department of Urban Affairs and Planning, Major Assessments and Hazards Branch, Minute, File No. R93/00026, dated 15/9/97.
- RTA Memo, from Chief Executive to Minister, dated 1 May 2000.
- Letter to the Hon Richard Jones MLC from the Harris Community Centre, dated 23 May 2000.
- RTA Memo, from Jay Stricker to Director RNI, dated 16 May 2000.
- RTA Email, from Garry Humphrey to Dr Zemsteg, dated 21 March 2000.
- RTA Letter, from Jay Stricker to Mr A Dix, dated 3 May 2001.
- Document entitled *Background Information on Mr Arnold Dix*

Evidence concluded and the witnesses withdrew.

Dr Peter Best from Katestone Scientific was sworn and examined.

The witness tendered the following documents:

- Submission to the Committee.
- Overheads presented at the hearing.

Evidence concluded and the witness withdrew.

Professor Ray Kearney and Ms June Hefferan from the Lane Cove Tunnel Action Group were sworn and examined.

The witnesses tendered the following:

- Document regarding health effects of particulate matter.

Mr Kevin Lownie from Howden Australia and Dr Paul Kerzel were sworn and examined.

Evidence concluded and the witness withdrew.

Mr Hans Anderl from CTA-Norway was sworn and examined.

Evidence concluded and the witness withdrew.

The Committee deliberated.

Resolved, on the motion of Mr Jobling, that the documents tendered be received by the Committee.

Resolved, on the motion of Mr Ryan, that in order to better inform all those who are participating in the inquiry process, the Committee make use of the powers granted under paragraph 8 of the resolution establishing the General Purpose Standing Committees, and section 4 (2) of the *Parliamentary Papers (Supplementary Provisions) Act 1975*, to publish the transcript of the hearing held on 3 May 2001, together with the documents tendered at the hearing.

Mr Dyer requested that the minutes record his concern about the rowdy behaviour of some members of the public attending the hearing, and the fact that there was no attendant present to assist with the maintenance of order at the hearing.

[Deliberations in relation to other inquiries]

5. Adjournment

The Committee adjourned at 1.30 pm sine die.

David Blunt
Committee Director

Minutes No. 53

Wednesday 30 May 2001
Greenway Room, Level 7, Parliament House at 2.00 pm

1. Members Present

Mr R Jones (in the Chair)
Ms Burnswoods
Mr Jobling
Mr Johnson
Mr M Jones
Ms Saffin (Dyer)

2. Apologies

Mr Colless

3. Confirmation of minutes

Resolved, on the motion of Mr Jobling, that the minutes of meetings 50, 51 and 52 be confirmed.

[Deliberations in relation to other inquiries]

5. Proposed revised timetable for current inquiries

The Committee deliberated.

Resolved, on the motion of Ms Burnswoods, that the reporting date for the inquiry into the M5 East ventilation stack be extended to 5 September 2001, although the Committee would endeavour to report upon this inquiry by late June / early July if possible.

[Deliberations in relation to other inquiries]

6. Adjournment

The Committee adjourned at 2.30 pm sine die.

David Blunt
Committee Director

Minutes No. 59

Monday 9 July 2001
Room 1136, Parliament House, Sydney at 3.00 pm

1. Members Present

Mr R Jones (in the Chair)
Ms Burnswoods
Mr Jobling
Mr Johnson
Mr Ryan (Mr Colless)
Ms Saffin

2. Apologies

Mr M Jones

3. Tabled documents

CORRESPONDENCE RECEIVED

The Chair tabled the following item of correspondence received:

Letter from Filtrontec to the Chair, dated 5 July 2001, providing further information to their evidence given at the Committee hearing on 3 May 2001.

4. Inquiry into the M5 East Ventilation Stack (2001)

DRAFT REPORT

The Chair submitted his draft report entitled "M5 East Ventilation Stack (2001)", which having been circulated to each member of the committee, was accepted as being read.

The committee proceeded to consider the draft report.

The committee deliberated.

Ms Burnswoods moved: that Recommendation 1 be deleted.

Debate ensued.

Question put.

Ayes: 3
Ms Burnswoods
Mr Johnson
Ms Saffin

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that Recommendation 2 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods
Mr Johnson
Ms Saffin

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote

Question resolved in the negative

Resolved, on motion of Mr Ryan, that: paragraph 3.25, initial sentence, be deleted.

Resolved, on motion of Mr Ryan, that: paragraph 3.28 be amended by replacing the initial sentence with “the facilitator, Dr Arnold Dix stated there was insufficient information before the International Workshop on Tunnel Ventilation to determine the appropriateness of the installation of electrostatic precipitators in the M5 East project”.

Resolved, on motion of Ms Saffin, that: paragraph 3.28, be amended by deleting all words after “M5 East project.”

Ms Burnswoods moved: that paragraph 3.28, be amended by inserting after the words “M5 East project.”: “The committee notes that full data from Australian and international studies on similar tunnels was not yet available.”

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods
Mr Johnson
Ms Saffin

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Mr Ryan moved: that paragraph 3.28, be amended by inserting after the words "M5 East project.": "The Committee believes that this is an unsatisfactory situation. At best, it can be described as a lost opportunity. At worst, it can be described as a further example of the obstinate resistance of the RTA to ensure that any proposal to filter the stack was properly and openly evaluated."

Debate ensued.

Question put.

Ayes: 3

Mr R Jones
Mr Jobling
Mr Ryan

Noes: 3

Ms Burnswoods
Mr Johnson
Ms Saffin

The Chair applied his casting vote.

Question resolved in the affirmative.

Resolved, on motion of Ms Saffin, that: paragraph 3.29, be amended by deleting the initial sentence.

Resolved, on motion of Mr Ryan, that: paragraph 4.16, be amended by deleting the initial sentence.

Resolved, on motion of Ms Burnswoods, that: paragraph 5.2, be amended by deleting all words after " 'should be extended.' "

The committee agreed that Mr Johnson would be paired with an Opposition Member for purposes of voting for the remainder of the deliberative.

Resolved, on motion of Mr Ryan, that: paragraph 5.21, be deleted an inserting instead:

There are a number of principles which may apply to a consideration of the adequacy of a property value guarantee. They could include:

- **Recompense for loss.** The purpose of any offer should be to compensate people affected by real and disproportionate loss.
- **Equity of treatment.** Arbitrary distinctions should be avoided.

- **Administrative simplicity.** An offer should be reasonably simple to access for the owner, and simple to administer.

Resolved, on motion of Mr Jobling, that: paragraph 5.22, be deleted.

Resolved, on motion of Mr Jobling, that: paragraph 5.23, be amended, by deleting “and an ability” and inserting instead “with a provision”.

Ms Burnswoods moved: that paragraphs 5.27 and 5.28 and recommendation 4 be deleted.

Debate ensued.

Question put.

Ayes: 2
Mr R Jones
Mr Ryan

Noes: 2
Ms Burnswoods
Ms Saffin

Pairs	Mr Jobling	Mr Johnson
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The Chair applied his casting vote.

Question resolved in the affirmative.

5. **Adjournment**

The Committee adjourned at 5:35pm, until Thursday, 12 July at 2pm.

Steven Carr
Director

Minutes No. 60

Thursday 12 July 2001
Room 1108, Parliament House, Sydney at 2.00 pm

1. Members present

Mr R Jones (in the Chair)
Ms Burnswoods
Mr Jobling
Mr West (Mr Johnson)
Mr Ryan (Mr Colless)
Ms Saffin

2. Apologies

Mr M Jones

3. Correspondence

The Committee received correspondence from the Government Whip, dated 12 July 2001, stating that Mr Ian West would proxy for Mr John Johnson for part of the deliberative meeting on the M5 East Ventilation Stack (2001) held today.

4. Inquiry into the M5 East Ventilation Stack (2001)

DRAFT REPORT

The Committee continued to deliberate on the draft report on the M5 East Ventilation Stack (2001).

Ms Burnswoods moved: that paragraphs 5.27, 5.28 and Recommendation 4 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods
Ms Saffin
Mr West

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that paragraphs 5.29 – 5.33 and Recommendation 5 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Ms Saffin

Mr West

Noes: 3

Mr R Jones

Mr Jobling

Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that paragraphs 5.35, 5.36 and Recommendation 6 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Ms Saffin

Mr West

Noes: 3

Mr R Jones

Mr Jobling

Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that a new paragraph be inserted after paragraph 5.34 “That the Committee commends the Government in being more generous than any previous Government in offering a property value guarantee to so many local residents”.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Ms Saffin

Mr West

Noes: 3

Mr R Jones

Mr Jobling

Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Resolved, on a motion of Ms Saffin, that Recommendation 7 be amended by deleting the first sentence and replacing all words after “in the development” with “a national air quality standard for PM_{2.5}”.

The committee deliberated.

Ms Saffin moved: that Recommendation 8 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Mr Johnson

Ms Saffin

Noes: 3

Mr R Jones

Mr Jobling

Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that Recommendation 9 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Mr Johnson

Ms Saffin

Noes: 3

Mr R Jones

Mr Jobling

Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that Recommendation 10 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Mr Jobling

Mr Johnson

Mr Ryan

Ms Saffin

Noes: 3

Mr R Jones

Question resolved in the affirmative.

The committee deliberated.

Ms Burnswoods moved: that in light of the fact that there is no discussion of industrial pollution in the whole report that Recommendation 11 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods

Mr Johnson

Ms Saffin

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Resolved, on Motion of Mr Ryan, that the words “and reports on” be inserted after “investigates” in Recommendation 11.

The committee deliberated.

Ms Burnswoods moved: that all dot points in Recommendation 12 be deleted, and that the words “The Committee notes that the Conditions of Approval require the RTA to develop a regional air quality plan, and recommends” be inserted before the words “that the NSW Government”.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods
Ms Saffin
Mr West

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Mr Ryan moved: that Recommendation 12 be amended as follows –

- the words “The Committee notes that the Conditions of Approval require the RTA to develop a regional air quality plan, and recommends” be inserted before the words “that the NSW Government”
- the word ‘regular’ be deleted from dot point three
- that dot points 4 and 5 be deleted

Debate ensued.

Question put.

Ayes: 3

Mr R Jones
Mr Jobling
Mr Ryan

Noes: 3

Ms Burnswoods
Ms Saffin
Mr West

The Chair applied his casting vote.

Question resolved in the positive.

The committee deliberated.

Ms Burnswoods moved: that paragraph 6.84 and Recommendation 13 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods
Ms Saffin
Mr West

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Ms Burnswoods moved: that paragraphs 7.23 - 7.24, and Recommendations 14 and 15 be deleted.

Debate ensued.

Question put.

Ayes: 3

Ms Burnswoods
Ms Saffin
Mr West

Noes: 3

Mr R Jones
Mr Jobling
Mr Ryan

The Chair applied his casting vote.

Question resolved in the negative.

The committee deliberated.

Resolved, on motion of Mr Jobling, that Chapter 8 be deleted.

Mr Ryan moved that:

- the report as amended be adopted;
- the report be signed by the Chair and presented to the House in accordance with the resolution establishing the committee of 13 May 1999; and
- pursuant to the provisions of section 4 of the Parliamentary Papers (Supplementary Provisions) Act 1975 and under the authority of Standing Order 252, the Committee authorises the Clerk of the Committee to publish the report, submissions, corrected transcripts, and related documents and material with the exception of documents identified as “private and confidential” or “not publicly available”.

Debate ensued.

Question put.

Ayes: 3

Mr R Jones
Mr Jobling
Mr Ryan

Noes: 3

Ms Burnswoods
Ms Saffin
Mr West

The Chair applied his casting vote.

Questions resolved in the affirmative.

CORRESPONDENCE FROM PROFESSOR KEARNEY

Resolved on Motion of Ms Burnswoods that the committee accept the material sent to the committee by Professor Kearney, dated 14 May 2001, as correspondence.

[Deliberations in relation to other inquiries]

6. Adjournment

The committee adjourned sine die.

David Blunt
Director