



A Submission by RAPS

Residents Against Polluting Stacks (Inc.)

to the

**Inquiry into the Single Exhaust Stack at Turrella
for the M5 East Motorway**

by the

**General Purpose Standing Committee No.5
of the Legislative Council
of the State of New South Wales**

1st & 3rd May 2001

RAPS. (Residents Against Polluting Stacks Inc.)
C/- PO Box 270, Earlwood. NSW. 2206. Phone 1800 614 603. Fax 95588300
Web site: <http://nostack.8m.com> Email: savewollicreek@email.com

INQUIRY INTO THE M5 EAST VENTILATION STACK (2001)

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.

The Committee is commencing the inquiry with a call for submissions from the general public and interested organizations. Advertisements for submissions will appear in suburban newspapers. The closing date for written submissions is Thursday 12 April 2001. Submissions should be sent to:

The Director,
General Purpose Standing Committee No 5,
Parliament House,
Macquarie Street
Sydney NSW 2000.

Information about making a submission can be obtained from the Committee Secretariat on telephone (02) 9230 5344, facsimile (02) 9230 3416 or email: gpscno5@parliament.nsw.gov.au. Information is also available on the Committee's website at www.parliament.nsw.gov.au.

COMMITTEE MEMBERS

The Hon Richard Jones MLC (Chairman)	Independent
The Hon Ron Dyer MLC (Deputy Chairman)	Australian Labor Party
The Hon Jan Burnswoods MLC	Australian Labor Party
The Hon Richard Colless MLC	National Party
The Hon John Jobling MLC	Liberal Party
The Hon John Johnson MLC	Australian Labor Party
The Hon Malcolm Jones MLC	Outdoor Recreation Party

CONTENT PAGE

INTRODUCTION	2
1. THE 1999 UPPER HOUSE INQUIRY	3
1.1 Main Finding and Recommendations	3
1.2 Sequel to the Inquiry's Recommendations	4
2. THE 2000 INTERNATIONAL TUNNEL VENTILATION WORKSHOP	6
2.1 Politics, Agenda and Process	6
2.2 The Workshop Findings	7
2.3 Best Practice in Tunnel Design	10
2.4 Suggested Improvements to the M5 East Ventilation System	10
2.5 Workshop Report and Recommendation	10
2.6 Workshop Follow Up	11
2.7 Conclusion	12
3. THE 2000 CSIRO REVIEW OF THE STACK	27
4. DUAP'S CONDITIONS OF APPROVAL	30
4.1 DUAP's Original Conditions of Approval (1997)	30
4.2 Whose Responsibility was it to Make Modifications?	30
4.3 The Basis for the Hasty Approval - Problems Too Technical and Not Enough Certainty	31
4.4 Inadequacies of August 2000 Conditions	32
4.5 Urban Design - A Case of "Masking Abhorrence"	36
4.6 Community Consultation Issues Remain an Acknowledged Disaster	37
4.7 Emissions, Standards and 'Strict Environmental Conditions'	39
4.8 Conclusion	41
5. DEPARTMENT OF HEALTH'S ROLE IN RISK ASSESSMENT FOR THE M5 EAST STACK	44
5.1 Advise Only When Requested	44
5.2 RAPS' Approaches to the Department of Health	44
5.3 Health's Response to the 1999 Parliamentary Inquiry and 2000 Workshop	45
5.4 Health Justifies its Lack of Action	46
5.5 Conclusion	47
6. THE 2001 PROPERTY VALUE GUARANTEE-EFFECTIVENESS, ADEQUACY, REASONS AND METHODOLOGY	50
6.1 Background to the Property Value Guarantee	50
6.2 How the February 2001 Property Value Guarantee Came About	50
6.3 Adequacy and Effectiveness	52
6.4 Conclusion	54
7. ENERGY COSTS AND GREENHOUSE GAS IMPLICATIONS OF THE TUNNEL	55
7.1 State Governments Commitment to Green House Reduction	55
7.2 Energy and Greenhouse Implications of the M5 East Stack	55
7.3 Comparative Costs of Tunnel Ventilation	56
APPENDIX 1	58
1997 DUAP CONDITION OF APPROVAL – AIR QUALITY ASPECTS	58
APPENDIX 2	59
SELECTED MEDICAL REFERENCES ON COMMUNITY HEALTH IMPACTS OF VEHICLE POLLUTION	59
APPENDIX 3	61
(a) 1997 PROPERTY VALUE GUARANTEE	61
(b) 2001 PROPERTY VALUE GUARANTEE	61

INTRODUCTION

Our submission to the 1999 Parliamentary Inquiry into the M5 East Exhaust stack explained that *Residents Against Pollution Stacks (RAPS)* is a single issue community group who came together to seek a safer and more sensible alternative to the proposed stack:

"We are a very diverse group, in age, cultural and political leanings reflecting the usually silent majority who are not politically active. However, we have been so outraged by the lack of due process surrounding the M5 East ventilation system, and by the apathy of those in positions of influence, that we have pooled our resources to make sure that this fundamentally flawed proposal does not proceed.

Our objection is based on the fact that community health and public safety will be severely compromised by toxic pollutants from the proposed exhaust stack which is:

- *35 metres high, unfiltered and located at Turrella, 900metres from the 4.5km M5 East road tunnel:*
- *the only outlet for exhaust fumes from an expected 70.000 vehicles a day (20% diesel trucks):*
- *located in a sheltered valley, close to thousands of homes and an industrial area currently being redeveloped with over \$300m of residential development projects:*
- *being built without an EIS, or consultation with new communities affected by the change from three stacks (proposed in 1996) to one.*

At different stages of the project, there have been clear breaches of trust, violation of codes of equity, due process and some of the project approval conditions, seemingly with impunity The State Government has failed to carry out its fiduciary duty, and to demonstrate its duty of care¹. "

This current submission demonstrates that in the intervening period of time, the Government and its authorities have taken very little, if any notice of our expressed objections. They still refuse to accept the condemnatory findings of:

- The Upper House Inquiry.
- The CSIRO Report.
- The International Tunnel Workshop.
- The DUAP Urban Design Report.

Scientific and technical evidence since 1999 has continued to vindicate our claims that this unfiltered stack was ill-conceived, does not represent world's best practice, will seriously degrade the local community's health and environment and is economically and environmentally unsustainable. Community opposition and public condemnation has continued to grow, as this project bulldozes its way through regardless.

The only meaningful modifications to the \$750 million project have been the approval of a 35 metre unfiltered stack, and an inadequate property buy-back offer to 270 of the thousands of home-owners affected.

Community alarm has grown as the same disregard is extended to new projects such as the Cross City and Lane Cove Tunnels, applying, unchanged, the same fundamentally flawed processes and technologies.

We welcome the re-convening of the Inquiry, and the opportunity it provides for public scrutiny, accountability and redress. As in 1999, we hope that this Inquiry will achieve a radical review of the current ventilation system to ensure treatment of tunnel exhaust fumes, and a health and property value guarantee for all affected residents and businesses. We also hope that this inquiry will result in the necessary legislative and procedural changes to ensure that no other community is subjected to similar abuse. The expertise and technology is available to significantly improve current practice, and the environmental, economic and social benefits of their adoption are clear. All that is required is the political, professional and bureaucratic will to use them.

¹ Residents Against Polluting Stacks, "No Stacks Near Homes", submission to the General Purpose Committee No. 5 Inquiry into the M5 East Exhaust stack, 15th November 1999, p1-2.

1. THE 1999 UPPER HOUSE INQUIRY

The Parliamentary Inquiry was held in November 1999 and received submissions and petitions from over 2,000 individuals and organisations who were “overwhelmingly” opposed to the stack.

1.1 Main Finding and Recommendations



The Parliamentary Inquiry’s main findings in December 1999 were that!:

- ❑ The decision to exhaust tunnel air through just one emission stack instead of three above the tunnel was **made hastily, with no public consultation, no published environmental studies or open risk assessment.**
- ❑ The additional capital cost of the relocated single stack and 800m exhaust tunnel was **\$30 million.** The RTA was unable to provide information on the associated electricity and operational costs.

- ❑ The single stack option is **unacceptable to the community as it is inappropriately sited, will concentrate the tunnel emissions into one source and will result in an increase in the air pollution levels in the locality, no matter how high the stack is constructed.**
- ❑ **The RTA has failed to acknowledge the adverse health effects** of this increased pollution on the surrounding community, or to adequately consult with the affected community.
- ❑ The **only group of people** who believe that a rigorous and open risk assessment of the project has been undertaken are those **representatives from the RTA and other government departments.**
- ❑ **DUAP has the only regulatory authority to force the RTA to install pollution control equipment,** but the mechanism to address exceedences of air quality goals was unclear. **The lack of a clear contingency plan** with specific lines of responsibility means that remedial action in the form of expensive retro-fitting of treatment equipment is likely to take **2-3 years.**
- ❑ The **world’s best practice has not** been incorporated in the design of the tunnel ventilation and exhaust system.
- ❑ The RTA’s investigation of international tunnel emission treatment systems had been **inadequate,** and **contradicted findings by DUAP, manufacturers of the equipment and community groups.**
- ❑ The **technology exists** to fit particulate and gaseous pollutant control technologies either on the stack or within the tunnel. The RTA estimated the cost at \$55 to \$70 million, while RAPS, on manufacturers’ advice, estimated costs of \$25 million.
- ❑ Improvements to regional air quality from improved vehicle emission standards may **take up to 20 years to make a significant impact.**
- ❑ **Property values had been adversely affected,** however, while the Property Value Guarantee offered to home-owners above the tunnel and near the portals was well-intentioned, **it should not be extended to those around the stack.**

The inquiry's key, unanimous recommendation (No 8)² was that the RTA **immediately 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.

1.2 Sequel to the Inquiry's Recommendations

The key recommendation was rejected by the RTA, on the basis that the RTA had *already "extensively researched this issue"*² and proposed instead to hold an international workshop, which occurred in June 2000. In their response to the inquiry's recommendations, the RTA attempted to shift the responsibility for not including filtration emission systems in the original proposal onto the contractor, when this exclusion had been the RTA's own decision³.

Other recommendations were equally ignored, trivialized, or their implementation stalled. For example:

- Emissions from the stack and tunnel should not result in any exceedences of air quality goals (4). This issue was the subject of great discussion at the Inquiry, with the Committee basing its recommendations on statements from the Hon Dr Andrew Refshauge, Minister for Urban Affairs and Planning and the Hon Bob Debus, Minister for the Environment. Yet, the RTA and Minister Scully's office are both on record in recent months stating that **such exceedences will occur but will be "managed" by trivializing their occurrence or claiming that they were not caused by the stack**⁴.
- The RTA develop a contingency plan for instances of air quality exceedences. (11). While the RTA stated in its response that a Working Party had been formed in September 1999 to develop just such a contingency, the committee has only met three times, **(the last meeting being on 16th May 2000)**. The Working Party commissioned a report by Dr Kerry Holmes which showed that increasing exit velocities in the stack would alleviate some local impacts, especially of nitrogen dioxide. The report also indicated that emissions directly from portals would result in exceedences. A follow up strategy meeting was arranged between Kerry Holmes, Noel Child (air quality consultant) Nick Agapides (EPA) and Craig Burrell (Hyder) to develop a management scheme. However, we understand this meeting was cancelled, and since then, **no further meetings of the Working Party have taken place**, and there has been no formal communication as to its status to the community members by either the RTA or Dr Holmes. **In spite of this, the RTA and ministerial correspondence still claim that the Working Party is functioning and is developing an incident management scheme**⁵.
- The Working Party's recommendation to increase exit velocities was also subsequently made by the CSIRO, but correspondence from the Minister's office indicates there is **reluctance to implement this simple move, as the life-spans of the fans may be reduced**.⁶
- An open and rigorous risk assessment of the impact of the ventilation stack on urban consolidation policies be immediately performed (12). **This has not occurred**.
- Air quality data reports be made available 'real time' publicly and on the Internet both before and after the commencement of the motorway(9). This has not yet eventuated, despite the local monitoring stations having been operational since June 2000. **Air quality data from the new local monitoring stations indicate, as expected, that exceedences in background air quality are already occurring**. Moreover, there have been a significant number of other occasions on which the PM10 levels have been close enough to the limits as to **make exceedences, caused by the stack, highly likely**.
- The RTA directly contact the suppliers of tunnel emission treatment systems, and not rely on literature surveys. (7) The latest review of international developments (March 2001) **is yet again a desk-top review of literature, which has not attempted to directly contact manufacturers of Japanese or Korean treatment installations**. The RTA undertook to establish a Consultative Committee made up of EPA, DUAP and Health Department to oversee such reviews of international practice. To our knowledge, **this has not occurred**.

- ❑ An **epidemiological study of the health** of the community be conducted (6). The Health Department has **rejected** this recommendation on the basis that such as study would be too costly, the population was too small a sample, and the results might be negative.
- ❑ The development of the draft subregional air quality management plan, with specified targets, goals, dates, funding and clear responsibilities for implementation and that an information paper be published at *six monthly intervals from 30 June 2000*^{1,2}. The actual work on the preparation of the plan **began only in December 2000** and the first questionnaire distributed, without input from the established air quality consultative committee in March 2001.
- ❑ The amendment of the *Environmental Planning and Assessment Act* to ensure adequate public consultation before such proposals are determined (5). **This has not yet occurred.**
- ❑ the Department of Urban Affairs and Environment, in consultation with the Community Consultative Committee, review every 6 months whether pollution control equipment should be installed on the emission stack.¹⁰ To our knowledge, **no such consultation or review has occurred.**

In its response, The RTA claimed that substantial **reductions of pollutants would occur in Sydney by 2015** as a result of the Federal Government's "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. These **claims were contested by the EPA** who claimed the projected improvements were considerably more modest, especially in relation to fine particles. In fact, the EPA claims that the report of the Government's response to the inquiry was sent without its approval. Furthermore, recent media reports have revealed that the **RTA is two years behind with its promised plans to introduce compulsory emission testing** for older cars and has still not decided what form the program will take⁷.

In February 2001, Minister Scully announced a home-buy back offer to home owners within 400 metres of the stack. However, the 400 metre radius **does not correspond with the areas of highest pollution or visual impact, nor does it reflect the same conditions offered in 1997** to homeowners above the tunnel, or within 100 metres of the portals.

2. THE 2000 INTERNATIONAL TUNNEL VENTILATION WORKSHOP



The June 2000 workshop was held as part of the RTA's response to the Parliamentary Inquiry's key recommendation Number 8.

For communities affected by the M5 East, much depended on the outcomes of the workshop. Minister Scully had assured them and members of Parliament that he had asked for the submission of the M5 East ventilation system to DUAP for approval to be delayed ***“until after the workshop is held so that any recommendations arising can be considered in DUAP's assessment of the ventilation design”***⁸

2.1 Politics, Agenda and Process

Minister Scully had also assured the Cross Bench members that ***“the workshop will maximise input from all relevant community groups, government agencies and air quality experts”***⁹. However, **this did not take place**, in spite of genuine and repeated attempts by a number of community groups to engage in the process. For example:

- The **aims and expected outcomes** of the workshop were **contradictory and confused**, despite community attempts to have them clarified and clearly communicated to all participants¹⁰.
- The **facilitator** selected by the RTA, barrister Arnold Dix had acted for Transfield Obayashi in relation to the City Link project at the Administrative Appeals Tribunal, where **he had argued against filtration** of tunnel exhaust. Early in 2000, **he was commissioned by the RTA to write a report on tunnel ventilation claiming the M5 East design reflected world's best practice**¹¹. Yet he was described in the RTA invitation as a “noted lawyer, scientist and **advocate for community groups**”.¹² In a meeting with one community group, he apparently could not recall what he had written in his report, nor could he concede that there was any perception of a **conflict of interest** in his facilitating such a workshop¹³.
- **International experts were carefully selected and briefed** by the RTA and its facilitator, and it took a great deal of persistent lobbying for some of the experts nominated by the community groups to be invited. For example, in drawing up a list of speakers, the RTA asked for ***“an international ventilation specialist with experience in air cleaning equipment to support our position on the adequacy and integrity of ventilation through a stack without air cleaning”***¹⁴. The facilitator flew to Europe to personally brief each speaker, deliver a CD of background material and reported back in writing on their likely position to the RTA (travel alone cost \$10, 000). Yet his final report states that **insufficient material** was made available to conduct a useful cost benefit discussion, when **such information was not sought** from the suppliers, **nor some of the key data required for such costings provided**¹⁵. The workshop itself cost more than \$250,000, yet while some speakers were paid preparation and attendance fees and expenses, experts nominated by the community were only paid travel and accommodation expenses.
- Despite repeated requests by all community groups and some government departments for a meaningful planning process and a more open workshop, (eg a steering committee to agree on aims, participants, and process, the appointment of a more impartial facilitator, videoing the proceedings) this was refused¹⁶. **Workshop planning was totally RTA directed, with key issues unaddressed.**

- **Attendance at the workshop was strictly limited and controlled.** Community representation was initially limited to observation by two representatives from the M5 East and Lane Cove tunnel groups, with their participation consisting of submitting written questions that would be vetted by an RTA committee before being put to the speakers. Requests from professional associations, interested professionals community groups (eg the Cancer Council) and the media to attend were refused. Similarly, requests by the community and DUAP for proceedings to be videoed were also refused, as was the request for a public session. **Instead of a media release** promoting this world first event, security guards were hired to ensure no intruders gained access! The RTA was responsible for the transcription of proceedings, but **quality of the final transcripts was so poor that vital parts of proceedings were missing or misreported** and had to be corrected by the facilitator, and supplemented using recordings made by RAPS.

At best, it would seem that the aim of the workshop was to generate inconclusive discussion and debate rather than provide clear directions on how to improve the ventilation of the M5 East and other tunnels. As one of the technical experts put it: **“The underlying agenda of the workshop was clearly to justify the design approach taken to date** by the regulatory authorities and **there has never been any earnest desire** by them to realistically assess alternative technologies **on a fair and reasonable basis.**”¹⁷ Any concessions or modifications made to the workshop were only obtained after persistent and vigorous public and political intervention.

Despite these misgivings, the community representatives approached the workshop positively and constructively, and their input was perceived by the facilitator and the international experts to be both well-informed and valuable¹⁸. About 50-60 people attended the three-day workshop. The facilitator noted that “...all sessions ran overtime, with active open and frank discussion”¹⁹.

2.2 The Workshop Findings

Experts at the workshop raised a number of serious and urgent concerns about the suitability and viability of the ventilation design proposed for the M5 East. There were points of unanimous agreement, issues of difference identified and a number of recommendations made. Many of these points were **understated or not reflected** in the facilitator’s final report and recommendations.

Points of broad agreement

The workshop transcripts indicate there was broad agreement on the following points:

Design Principles and Philosophies

- Each tunnel ventilation system must be considered on a tunnel by tunnel basis, but longitudinal ventilation systems are the most economical in most situations²⁰.
- **“The complex, remotely located M5 East single stack tunnel ventilation design can be distinguished from any other tunnel ventilation scheme in the world”**²¹. This design results from the decision to have a single exhaust stack for a 4.5 km road tunnel located 800m away in a valley and the **absolute prohibition on emissions from the portals** as required by the approval conditions, a condition which may well be **unique** to Australia.²² Although portal emissions of untreated tunnel exhaust are generally unacceptable in urban areas because of the poor dispersal, this problem can be easily overcome by **using small vertical dispersal structures**, with or without filtration, **which improves dispersal by several orders of magnitude**²³.
- The exhaust stack **should not be located in the Turrella valley**, 800m from the actual road tunnel, because of **poor dispersion** due to the topography and because of the **excessive energy usage**²⁴.

Energy use, Greenhouse Emissions and Energy Costs

- One of the major benefits of a longitudinal ventilation system is that most of the energy required for the unidirectional movement of air is supplied by the moving traffic. Because of this, fans are often not required during normal operation. However, the complicated nature of the M5 East design means **excessive amounts of increasingly expensive energy** (RTA estimate 12 megawatt) will be **required in perpetuity**, regardless of any anticipated improvements in fuel composition and vehicle emission standards as the exhaust must always be pumped out through the stack via the 800m service tunnel. In contrast, experience in Europe shows improvements in fuel consumption and vehicle emission standards have already led to a reduction in the use of ventilation systems and energy consumption.
- **Greenhouse gas** production to provide electricity for the operation of this exhaust system will be in excess of **30,000 tonnes per year**. This additional energy is produced by burning coal, with serious resulting equity and environmental implications as, besides the pollution emitted at Turrella, excessive and unnecessary amounts of greenhouse gases and nitrogen dioxide are also emitted where the electricity is produced. Rather than reducing, **actual running costs will continue to increase with time**, as energy costs increase²⁵.
- As at the Parliamentary inquiry, **the RTA was unable to provide data on energy costs**, to enable a meaningful cost benefit analysis of alternatives.²⁶

Air quality goals, and health

Existing evidence clearly shows that for almost all vehicle exhaust pollutants, **the adverse health effects are additive and cumulative, with no safe exposure limit**²⁷. The adverse health effects of **very small particles is becoming of much greater concern around the world**, especially as the occurrence of these particles has increased in recent years²⁸.

The **various measurements used for air quality goals and the air quality modelling are confusing**, making it difficult for experts, let alone the community, to compare or make valid predictions as to their health impacts²⁹. In the case of PM10s, these measurements do not define or measure the actual components of concern (particles less than 2 microns)³⁰ and the basis of the measurement (weight) is inappropriate³¹.

The appropriateness of the air quality standards and goals set for the M5 East was seriously questioned:

*"The setting of air quality standards is an imperfect process based on politics as well as science, achievability and cost. **The standards apply to regional, ambient air quality, not to local situations or point sources of pollution**"³².*

*"The **cumulative impacts of pollutants over time have not been adequately taken into account** in the form of annual averages. Predictions have been based on 'worst case' scenarios rather than the more realistic measures of cumulative impacts of the pollutants over time"³³.*

"Health department studies have focused mainly on acute impacts, mortality and hospital admissions, not morbidity and reduced life function"³⁴.

*"The additional adverse impacts of **induced traffic** following the completion of the M5 East, particularly to local roads most adversely impacted by the stack emissions **have not been taken into account**"³⁵.*

Modelling

RTA documents often quote the claim from the final report that *"The experts on tunnel ventilation design at the workshop generally agreed that the results of the design analysis meant there should be confidence the M5 East project would meet the comparatively strict environmental standards set"*³⁶. Yet such a claim is not supported by the transcripts. **Only two of the international guests were experts in air quality and modeling** (Zumsteg and Rhodes) and **they expressed reservations** about the accuracy or reliability of the models used and forecasts made³⁷. **The modelling clearly demonstrated that local air quality in the area around the stack site will be adversely affected and that this effect will be permanent and cumulative.**³⁸

It was evident from all the experts' comments that technical compliance with the goals even if achieved, will be by minuscule margins, and some seriously questioned the adequacy of such **marginal compliance and the lack of account of important aesthetic and psychological factors in the modelling**³⁹.

Equity

The facilitator noted in his final report that all the international experts readily understood the community's anguish about the design of the M5 East, and the inequity of dispersing all pollutants from one outlet: *"The discontent from the local community appeared partly the result of a failure of the approval process to adequately deal with community concerns about scientific, engineering and health issues but perhaps even more importantly, consultation, property values and the physical/visual intrusiveness of a ventilation stack into their environment were also relevant"*⁴⁰

The adverse local air quality impact was clearly established by the modelling, and acknowledged by the RTA⁴¹. On the one hand, the Health department stated that as a general principle, identifiable groups of people should not be disadvantaged by such projects. **However**, on the other hand, it presented a curious argument that it was actually **inequitable** in planning a new project, to protect a section of the population from a disproportionate and preventable load of pollution when people in other, more heavily trafficked areas of Sydney, were subjected to similar loads.⁴²

The workshop also pointed to the inequity caused by the excessive use of energy required by the present design of the ventilation system on those living or working near where the electricity is produced⁴³.

Effectiveness of Exhaust Treatment Systems

Electro-static precipitators are highly effective in removing particulates⁴⁴ and have been installed for **environmental**⁴⁵ as well as **visibility reasons**. **Gas cleaning techniques are effective** in removing toxins from tunnel exhaust and **are likely to improve local air quality**. The decision about their actual utility in the case of the M5E depends only on the determination of a realistic rate of conversion of NO to NO₂ in the air under local conditions.⁴⁶ This information has been requested on numerous occasions, but has not yet been provided by the RTA or its consultants.⁴⁷ It was requested and promised again during the workshop, but still not provided.

Indicative costs provided at the workshop for these treatment systems **confirmed their cost-effectiveness** for the M5 East⁴⁸. The **energy use** of the various cleaning systems (electrostatic precipitators and gas cleaning) is very modest and when properly used, **would markedly reduce overall energy costs**⁴⁹.

Improvements Expected from Fuel and Vehicle Emission Standards

Improvements in diesel engine design will lead to a decrease in the size of fine particles, therefore the likely reduction in adverse health effects from vehicle pollution **will not be in the same proportion** as the predicted quantitative reduction in PM 10 emissions⁵⁰.

Australia lags significantly behind Europe in its vehicle dependence and poor fuel and vehicle emission standards. Significant regulatory measures adopted in Europe to control traffic and minimise vehicle emissions, (emission based tolls, traffic management restrictions, strict engine and emission standards) are not used in Australia, or are only beginning to be implemented⁵¹. The age of the Australian fleet and current status of regulations means that **substantial improvements** in air quality due to fuel and vehicle emission standards will not achieve parity with Europe **until 2020**.

2.3 Best Practice in Tunnel Design

The workshop presentations indicated that **Best Practice designs do not use a dilution of pollution** approach to tunnel emissions, **nor do they only channel all the exhaust from one outlet**⁵². Best practice approaches to pollution control focus on the **reduction and treatment of pollutants**, not allowing for permanent increases, even if within permissible limit levels⁵³

These approaches incorporate flexible options and anticipated improvements so that components of the ventilation system can be made redundant or turned off when they are not necessary, either during times of low traffic, or over time as vehicle emissions improve⁵⁴. This reduced need for ventilation leads to significant energy savings. In contrast, the M5 East design is **fixed, imposes the total burden of emissions on a small section of the population and its energy costs will only increase, regardless of any improvements in the fleet or traffic**. It was clear from the workshop discussions and presentations that **no international expert would ever choose to design a tunnel such as the M5 East**.⁵⁵ **Retro-fitting** of treatment equipment, while possible, **would only address some of these fundamental deficiencies**.

The M5 East design stands in **stark contrast** to standard principles applied in designing fire safety systems for tunnels, a topic specifically addressed during the workshop⁵⁶. **Fire safety considerations are integrated into the tunnel design from the outset, with all possible attempts to predict, reduce, manage and where possible, eliminate risk**. The considerable investment made in fire safety is justified not in terms of the relatively small numbers of actual fatalities resulting from fires, but in terms of its preventative effect on lives and health⁵⁷.

2.4 Suggested Improvements to the M5 East Ventilation System

There was obvious reticence from some of the experts in recommending a radical review of the ventilation design partly because of the extent of construction work already underway⁵⁸. Most of the experts expressed this at the initial site visit, as well as informally during the workshop.⁵⁹ **The RTA's rejection of the Inquiry's key recommendation and the continuation of construction had effectively closed off a number of cost effective, environmentally and socially acceptable options**. Nevertheless, a number of specific recommendations made by experts to improve the present design included:

- relying on more than one ventilation outlet.**
- changing the position of the stack.**
- fitting in of electrostatic precipitators and gas cleaning equipment**
- emitting filtered or unfiltered exhaust at the portals, through small vertical distribution outlets**
- varying the height of the stack**
- modifying the orifice size of the outlet**
- conducting a full height gas dispersion test of stack emissions**
- modifying the velocity rate of the emissions**⁶⁰.

2.5 Workshop Report and Recommendation

The workshop did not discuss formal resolutions or recommendations on the final day, despite such an item being identified in the agenda⁶¹. In fact, the last session ran over time, with the facilitator providing his impressions after 5pm. However, he did undertake to circulate his draft report to participants for comments.

Both the draft and final reports began with the disclaimer that they did *"not attempt to detail every matter canvassed, argument raised or conclusion reached at the workshop. To obtain a detailed appreciation of all matters, argument and conclusion of the workshop the transcript, briefing material and overheads should be examined in their entirety"* and that because of the poor quality of the transcripts, no references were made to quotations from the workshop.⁶²

As predicted by the community groups, the **findings were not evidence-based, clear or objective**. They were deliberately inconclusive because of the limitations imposed from the very beginning by the RTA and the facilitator:

“Given the limitations of the Workshop 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”⁶³.

As one of the international experts, John Day noted in his response: *“However, from my point of view, I feel the report doesn't have either a strong structure or a strong message. **You probably had your lawyer's hat on when you wrote it rather than your engineer's hat!**”⁶⁴*

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.

Instead, the report made **almost 40 recommendations** including over 20 for more data and investigation in the areas of **technological developments, tunnel design, air quality and health risk analysis**. It also recommended **a review of community consultation and the wide dissemination of the workshop report and associated documents**⁶⁵. Community feedback on the draft report strongly recommended that work directly associated with the ventilation system **should be suspended** until a comprehensive investigation of the international experts' concerns and the implementation of the draft report's recommendation. Instead, **the final report added the following key recommendation, which was not discussed or flagged** with any of the community participants:

“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 improvements are introduced **as a priority**⁶⁶.

Of these three caveats it should be noted that:

- ❑ **The workshop was not asked or permitted to reach a ‘conclusion’** and that it is only the opinion of the facilitator that the ‘conclusion’ could not ‘reasonably’ be reached..
- ❑ Far from being responded to promptly, **no response has been made as yet**, in spite of undertakings to the contrary.
- ❑ The fitting of **filtration** under this provision will occur only long **after actual harm has been done**.

2.6 Workshop Follow Up

The final report was released at the beginning of August 2000, **a full eight weeks** following the workshop. There was **no timeframe or implementation** strategy associated with the recommendations.

The RTA's media release⁶⁷ (7th August 2001) boasted that the experts generally agreed that *“the M5 East project would meet strict environmental standards set”* and noted the report's *“useful recommendations”* regarding the availability of air quality data, the regulation of wood heaters, the need to seek further data from Norway and Japan, and **stated that the majority of the recommendations will be implemented**. It also noted the report's

recommendation **“with respect to community consultation and has already endeavoured to provide a more accessible and comprehensive community consultation process.”**

Curiously, the release was also used to announce that the RTA would send two delegates to **“present the report to the World Road Congress (Permanent International Congress or PIARC), to promote international discussion about these issues.”**

The submission for the ventilation system was re-presented by the RTA for DUAP’s approval without any modifications on 18th August 2000. DUAP having earlier commissioned a CSIRO air quality and an urban design review of the stack, approved an extended 35 metre stack **4 days later** on 22nd August, with a new set of conditions. **Despite Minister Scully’s assurances that the delay would enable the consideration of ‘any recommendations arising in DUAP’s assessment of the ventilation design’, the RTA did not propose any modifications, and DUAP did not consider it within its powers to enforce any such modifications.**

The Health Department in its response to the workshop down-played the role of ultrafine particles, rejected the value of measuring cumulative health impacts **and repeated its claim that there will be no discernible health effects from the tunnel vent emissions.** The EPA conceded the value of providing additional information to measure health impacts. It stated that if air quality goals are met initially, **pollution levels will lessen over time as improvements to emission standards begin to have impact⁶⁸.**

There has been no discernible improvement to the project as a result of the report, in the technical areas of tunnel design and air quality or in the related areas of health risk analysis, community consultation or even the dissemination of the workshop report and its associated documents.

On December 11th 2000, RAPS again sought a response from the RTA at the Consultative Committee meeting on the progress of the implementation of the Workshop’s findings and recommendations. To date, this has not yet been tabled, except for a verbal response from Ms Jay Stricker that a letter has been sent to Norway.

2.7 Conclusion

Given the workshop’s structure and set up, it is in some ways remarkable that it actually reached the conclusions and recommendations made in the final report. However, as with the Inquiry’s recommendations, even the sanitized recommendations of the Workshop have been treated with contempt by the RTA and the regulatory authorities.

Following the criticisms voiced by the international experts, the M5 East ventilation system could no longer be in anyway claimed to be world’s best practice. However, the final report was carefully crafted to claim that, despite all its uniquely problematic features, it was still *“expected to meet all Sydney’s comparatively strict environmental performance requirements⁶⁹,”* inferring that satisfactory health outcomes resulted. In fact, the stringency of the conditions had more to do with the design specifications restricting emissions to one outlet than with safeguarding community health.

It is significant that the final report also stated that:

*“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.*

*If measures to improve air quality are not implemented rapidly, **the opportunity afforded by the tunnel environment to manage motor vehicle emissions [ie treatment of emissions] will become increasingly attractive⁷⁰.”***

It is now almost a year since the Workshop, with no discernible measures in place in the areas of tunnel design, improvement of background air quality, contingency plans or protection of residents. The report’s faith that its recommendations would be promptly responded to has proved totally misplaced. As the report

noted, tangible measures to improve this deplorable situation are strongly warranted, yet the RTA continues to refuse to implement treatment of emissions, and DUAP continues to claim it is powerless to intervene.

Anger management



An artist's impression of the proposed M5 East exhaust stack.

RTA's \$210,000 junket to soothe tunnel protests

By KELVIN BISSETT
Political Reporter

TAXPAYERS paid \$210,000 for a three-day "workshop" at the exclusive ANA Hotel to discuss motorway exhaust stacks earlier this month, *The Daily Telegraph* has learned.

Three guest speakers were flown in from Norway, Switzerland and the US—costing \$10,000 in airfares alone—to address 50 bureaucrats and representatives of various community groups.

The workshop, held from June 7 to June 9, was organised and funded by the Roads and Traffic Authority. It went ahead despite the State Government already ruling out filtering technology at the planned M5 East exhaust stack at Turrella.

"Tunnelling work on the M5

ment committee last week the \$210,000 cost, including \$53,000 for professional fees for a facilitator.

But, when called by *The Daily Telegraph* yesterday, an RTA spokesman could not state what conclusions came out of the workshop although a report may be issued soon. Mr Forward told the parliamentary committee the workshop was "one of the first of its kind in the world" and \$53,000 to an organiser was not excessive.

"We could easily have got a much lower paid facilitator. However, this was a very important workshop," Mr Forward said.

He told the committee the RTA would examine the workshop's findings, but gave no commitment to act on them.

"We will certainly be advising the minister about any additional follow-up work that



The RTA organised the workshop after demands by community groups protesting against the M5 East.

John Turner said the cost of the workshop made it an extravagance at taxpayers' expense.

But Mr Turner said now the conference had been held, the State Government should ensure it gets value for money by taking its findings seriously.

An RTA statement released before the workshop stated it was intended to "look at trends, developments and various technologies used throughout the world to ventilate road tunnels".

Need



"The underlying agenda of the workshop was clearly to justify the design approach taken to date by the regulatory authorities and there has never been any earnest desire by them to realistically assess alternative technologies on a fair and reasonable basis." George Hare, Columbus, Response to International Tunnel Workshop, July 2000

¹ General Purpose Standing Committee No 5, December 17th 1999. Report on Inquiry into the M5 East Ventilation Stack. Report No 4, Parliament of New South Wales Legislative Council.

² Media Release 31.3.00, the Hon Carl Scully. Government Responds to M5 East Report.

³ RTA Response to Recommendations of the Inquiry on the M5 East Ventilation Stack. 31.3.00: *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 Baulderstone-Hornibrook-Bilfinger Berger has extensive experience in tunneling including tunneling in Europe. They selected a mechanical system.*

⁴ **Letter from the Hon. Reba Meagher MLA, on behalf of Minister Scully to the Hon Peter Breen MLC, 21.12.2000: "It is not correct to say that the PM10 goal will be exceeded regularly. It is recognised that the strict air quality goal for PM10 will be exceeded on occasions whether the M5 East is built or not. To put the likelihood of exceedences in perspective I am advised that the air dispersion modelling, using the 1995/96 data set, has indicated that at the location of the maximum predicted cumulative concentration (ie background plus stack contribution), the PM10 level will be between 40 ug/m3 and 45 u.g/m3 on five days and between 45 ug/m3 and 50 ug/m3 on five days in the year.**

This means that in total the PM10 readings, at the worst affected receptor, will be well below the strict air quality goal of 50 ug/m3, for over 97% of days during the year."

Email John Anderson, RTA M5 East Project Manager to Jay Stricker RTA Manager, Environment and Community Policy , 16.3.2000: *"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 50ug/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 Reps 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 it would be difficult to determine what the number should be".

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 M5East should not be the "cause" of the exceedence."

⁵ See for example Letter Kerry Holmes, Holmes Air Sciences to John Anderson, RTA 31.7.00: *"In recognition of the possibility that a high stack constrictuion could occur at the same time as a high background level, an incident management scheme is being developed."* Ministerial Correspondence from Lance Fernando, Political Correspondence Section, Min Scully's office to John Anderson and Greg Butler, 24.1.01: *"The third incident management scheme workshop was held in **May 2000 and further workshops are planned"***

⁶ The Hon. Reba Meagher MLA, on behalf of Minister Scully to the Hon Peter Breen MLC, 21.12.2000: *"As noted in your letter, should monitoring indicate potential exceedences of the air quality goals at night for nitrogen dioxide, then fan velocity can be increased. There would however be additional operation costs and capital cost over time **as the life of the fans would be reduced"**.*

⁷ SMH 1.2.01, Geesche Jacobsen, Two-year lag on pledge to test car emissions.

⁸ Connell Wagner

⁸ Letter Hon. C. Scully MP to Members of the Cross Bench, 12.4.00

⁹ Letter Hon. C. Scully MP to Members of the Cross Bench, 4.5.00

¹⁰ For example, the preliminary RTA agenda (undated, February 2000?) stated: *'the workshop is intended to provide access to the collective experience of tunnel ventilation experts from around the world and to have the key elements of that conveyed to the community through a controlled question and answer session with invited community representatives'*. The final agenda, (7.6.00) after a great deal of negotiation and lobbying was modified by the RTA to state: *"This workshop will promote detailed discussion of international experience, local conditions and alternative technologies, with a view to assessing appropriate air quality treatment systems for road tunnels. This workshop will focus on the example of the M5 East and consider the Cross City Tunnel and Lane Cove Tunnel projects."*

¹¹ Dix, A. An International Perspective on Tunnel Ventilation Practices. February 2000.

¹² RTA invitation letter to RAPS, 16.5.00

¹³ Letter from L. Lakshmi, Harris St Community Centre, 23.5.00 reporting on a 3 hour meeting with A. Dix: *"Given the findings of his report for the RTA, written in February this year, we expresses our concerns regarding Mr Dix' ability to impartially facilitate this workshop. He repeatedly said he could not recall what he had written in the report, he had not kept a copy of it, nor was he aware of the critique of the report by RAPS.*

Mr Dix did not agree that it could be seen as a conflict of interest to facilitate the workshop given he had written the report, or that it could be seen by others as a conflict of interest¹⁷.

¹⁴ Email from G. Humphrey, RTA to D. Lacroix, France, 21.3.00

¹⁵ See for example, letter from G. Hare, Columbus Pty Ltd, to A. Dix, 17.7.00 "Cost benefit [analysis] was never requested as part of the original scope"; Workshop transcript Day 3, p83 Ole Bockman, ABB AS Norway *I tried to ask yesterday, what is the total energy consumption, of the ventilation system in the tunnel? I never got an answer*"; Letter from L Lakshmi and J. Hutchinson-Ultimo and Pymont community "There is no indication of how the facilitator actually briefed and prepared the speakers before coming. If he had a general discussion like he did with us, he can't blame them for not giving what he did not ask for." International Tunnel Ventilation Workshop CD, available from RTA library.

¹⁶ The three community groups (RAPS, Lane Cove Tunnel Action Group and Harris St Community Centre wrote to Min Scully on 28.5.00 requesting a steering committee to agree that:

- ☐ " the core focus of the workshop be on innovative world's best practice in tunnel ventilation technology, with particular reference to the design of the M5 East Tunnel while also considering the Cross City and Lane Cove tunnels.
- ☐ the workshop closely examine the adequacy of existing DUAP approval conditions and monitoring processes in the light of emerging standards and latest research on air quality and its health effects. The workshop's deliberations should result in recommendations and outcomes improving the current ventilation system for the M5 East which will have direct implications for other road tunnel projects.
- ☐ the facilitation of the workshop be acceptable to community stakeholders The present arrangements are totally unacceptable.
- ☐ community and professional bodies be allowed unimpeded representation.
- ☐ the Steering Committee be vested with the responsibility for the determination of findings and reporting mechanisms. There is at present no discernible process, time frame, dissemination mechanism nor agreement that outcomes will actually be implemented

Properly managed this workshop must restore public credibility and provide a new benchmark for informed collaborative decision making. As it currently stands, it is a cynical attempt to orchestrate and justify the RTA's current position against filtration, guaranteed to outrage already frustrated communities and create an international embarrassment."

¹⁷ G. Hare, Columbus Pty Ltd. Op.Cit.

¹⁸ See for example transcript of day 3, p 116-117. International Tunnel Ventilation Workshop CD

¹⁹ A.Dix, 26th July 2000. Facilitator's Report International Workshop on Tunnel Ventilation 7-9 June 2000, Sydney Australia, p12. . International Tunnel Ventilation Workshop CD

²⁰ **Excerpts from workshop transcripts, International Tunnel Ventilation Workshop CD**

DESIGN PHILOSOPHIES

Day2.. p 16 John Day, IP Electrowatt Engineering, Switzerland If the M5 East was in Switzerland, okay, I would have a portal exhaust system on each portal by the exits and have one of those things in the ah one of those cooling fans at each portal, blasting up into a shaft maybe 20 metres high.

Day 2 P22 Giselle Mawer (M5 E, Residents Against Polluting Stacks) Is it usual in Switzerland to have an 800-metre tunnel for the exhaust to bring it out the way we have here.

John Day No.

Day 2 P 29 Art Bendelius, Parsons Brinckerhoff, USA: You are talking about a stack on top of a building, unless it is underground, we have very few of those. We are talking about that. We don't have to my knowledge any freestanding stacks as you will have here.

Day 2 P 57-8 Dr Franz Zumsteg , Ingenieurburo FZ, Switzerland We have to optimise the situation concerning the energy that we use, the cost that there will be, the air quality - just to mention three of them. There might be more. But we have to apply certain limits to be able to dimension what we want to build. So if we don't know any limit for example for the air quality we cannot say how much air we should put into this tunnel or take out of this tunnel. If we have no limit of money available then problem is not too big, we can afford everything, but usually there is quite a strict limit where the costs have to be what the maximum cost can be. For the energy, this is a critical value and I realise that energy cost here in Australia is about a third of what we have in Switzerland and this might be quite an important reason why tunnel ventilation systems are different in our country. So you speak about 800 to 1,000 cubic metres per second that is moved in these tunnels. Well Art was telling about 150 cubic metres per second and kilometre lane, we speak about 300 cubic metres per second that we take and exhaust through stacks. We never would build an exhaust stack with 800 cubic metres per second.

²¹ Dix, A. July 2000, p43.

²³ **COMPLICATED DESIGN**

DAY2.P9 JOHN DAY THE SYSTEM EXTRACTION ABOVE IS USED IN THE EASTERN DISTRIBUTOR, IT IS THROUGH TWO OR THREE FANS I THINK IN PARALLEL. THE DIFFERENCE WITH THAT, WITH THE DESIGN OF THAT TUNNEL, THE TUNNEL IN PERTH, THE TUNNEL IN, THE CITY LINK IN MELBOURNE IS THAT NO EMISSIONS ARE ALLOWED FROM THE PORTAL, SO AIR IS DRAWN BACK FROM THE PORTAL AS WELL AS COMING ALONG THROUGH THE WHOLE TUNNEL. NOW AS FAR AS I AM

CONCERNED, I WOULD NEVER DESIGN A SYTEM LIKE THAT. I'VE NO REQUIREMENT TO DO THAT. WE EXTRACT MOST OF THE FLOW UP THROUGH THE CHIMNEY BUT WE DO NOT STOP IT GOING OUT THROUGH THE PORTALS. THE ENERGY COSTS TO BRING BACK THAT BIT OF FLOW FROM THE END OF THE TUNNEL MAY BE OVER 50 METRES IS INCREDIBLE. AND WITHIN OUR GOVERNMENT WE ARE NOT ALLOWED TO WASTE ENERGY, AND WE HAVE TO BALANCE RESOURCES.

²⁴ **STACK IN THE VALLEY PROBLEMATIC**

Day 3 p 106 John Day: I think the design has been forced upon Hyder by the requirements, the atmospheric requirements and the emissions from the vehicles. Let me give you an example. I've designed a tunnel, which is longer than this. Its installed power for normal operation is zero kilowatts. No, I tell a lie; 100 kilowatts, not 12 megawatts, 100 kilowatts because we have total portal emissions at one side and we have one extraction thing at the other side at the northern portal. This is the **(Islesberg)** Tunnel 4.09 kilometers, similar traffic. And because we've got the lower emissions, which you will get in the future, you'll get it, the operating costs will go down.

Day 3, P 104 Dr Franz Zumsteg: I agree with what Norman just said but we have a situation that we have to deal with and it is obvious that the position of the stack is not the best.

Dr Norman Rhodes, Mott Macdonald Great Britain... That's all I'm saying. It's not to say...that an even higher stack wouldn't be better. But I don't think anyone would disagree that a hill mounted stack would be even better still without a doubt, so this business of putting it in a valley is a very strange sort of compromise

Day 3, P103 Hans Anderl, Clean Tunnel Air, Norway: I agree with Bockman and also with our friend from America, why put that stack in a valley. I'm really confused and as I said, I would find another place where I would place it and probably hide it much better too. Besides that, I have seen a lot of tunnels through my approximately fifteen years, more or less now only tunnel and you have made a very roughly complicated system, and as he said, it is very difficult to change it, but still you have the possibility to clean the air either out from the stack or whichever other way you want to do it. So at least that is possible.

Day 1, P 17 Assoc Prof Chris Winder, School of Safety Sciences, UNSW. I accept as does RAPS that tunnels in some cases are a necessity however, discharging the emissions of 70,000 vehicles without filtering or clearing from one emission stack seems intuitively illogical. Locating the stack in a valley where the possibility of increased local concentration of contaminants can arise seems to add absurdity to illogic. Discharged polluted air unfiltered or untreated air into the environment is an option that we used to use in the 1800, the industry stacks would pollute belching clouds of pollution into the environment because the environment was a sink.

²⁵ **ENERGY COSTS**

Day 2, P 62 Dr Franz Zumsteg This is the city of Zurich... a motorway built around the whole city in several tunnels. Now they are stacks, there were stacks. One is here, one was there, one was there, one was there, one was there, one was there and other one was down here in the original project. Quite a number of stacks... At the moment this part is under construction. And the stacks which are still in the project are this one and this one, this one has been taken away, these two as well, this one as well, this one as well. This was just possible because of the reduction of the emissions... I think that the aspect of energy is quite a strong argument against stacks. It is not just the pure costs. Of course it is a question of money too. But it is also how we regard the importance of energy. And energy in our country is produced roughly 60% is nuclear and 40% is water and hydropower and we don't burn coal or oil. I think this has to be regarded. If we talk about energy consumption in your country then it is as what I understand directly related with pollutants too, because you burn coal. Is that right? So you are producing a least CO2 somewhere else and CO2 adds to the unwanted effect of as an ozone killer.

Day2..P9 John Day The energy costs to bring back that bit of flow from the end of the tunnel may be over 50 metres is incredible, and within our Government we are not allowed to waste energy.

²⁶ **LACK OF COST BENEFIT ANALYSIS**

Day 2, P 128 Giselle Mawer – M5 East (RAPS) the issue of costs and cost benefits analysis is ..one of the questions that the Committee Groups tabled right up front, cost benefit analysis of comparative strategies for dealing with tnnel emissions. I know it is very late but if we could request that both the Commercial Contractors and the RTA put their minds to that tomorrow and perhaps we could use the M5 East as the basis for providing an indicative costs if nothing else, so we can compare like with like. Is that a possible strategy for tomorrow?

Lutz Sengbusch - DEUS Energie-und Umweltsystem GmbH Germany! think that nobody is very keen on dealing with figures that have not been confirmed or anything. This is why I was so hesitant, I couldn't possibly quote here a figure which in the end may be totally wrong because it might be much cheaper definitely not much more expensive than what I just said. But, anyway, I want to be very hesitant, OK, to ask us to find a solution and then quote it. We might be able to.

Arnold Dix, facilitator I have a question that Mark Curran has put to the RTA this afternoon. And I understand that they're endeavouring to have material here tomorrow. I don't claim to have control over that process but what I do say, is quite clearly we will be looking at how you weigh up what you has been identified as quite a number of factors and will be central to our discussions tomorrow. So I understand your question.

Day 3, p83 Ole Bockman, ABB AS Norway I think the comment about energy consumption is highly relevant, there's no doubt about that, there's also no doubt that it takes energy to clean the gases. But I tried to ask yesterday, what is the total energy consumption, of the ventilation system in the tunnel? I never got an answer, the fact is that if you could, for instance, also cleaning, you could reduce the amount of tunnel air with 10%, you would save 27% of the energy, that is power. So please for comparison, is it possible that somebody could tell how much energy does the ventilation system consume, without cleaning. Thank you

RAPS comment. It was not provided

27 **HEALTH EFFECTS OBSERVED BELOW NEPM GOALS**

Day 1, p 36 Dr Steve Corbett, NSW Department of Health We conducted those studies in Sydney, Newcastle and Wollongong. ..what we were able to document was small, but significant effects on important aspects of health at current levels of air pollution. We found effects on daily mortality and admission to hospital, in relation to ozone and NO2 and PM10. We found increases in admission for childhood asthma. We found increases in heart diseases admissions in the elderly for unit increases in particulates..effects of ozone on respiratory function in children. So at whatever kind of outcome we studied, we were able to demonstrate small effects of the results of air pollution at current levels... These studies have been replicated in at least 20 cities throughout the world, And in general terms people are finding effects at very low levels even at current levels of pollution in our cities, even in cities like Sydney where by international standards pollutant levels are quite low.

28 **No SAFE LEVELS OF EXPOSURE**

Day 1 P 38 Dr Steve Corbett, Is there a safe level or threshold for health effects rule in general? The answer for most of these pollutants is no. There are continuous effects above 0. And that is the case for almost all pollutants with which we deal.

P 39 Dr Steve Corbett, People are discovering all sorts of effects on the immune system in the lungs as a result of exposure to fine particles and I think there has been a much greater concern about the role of these very small particles and diseases such as asthma and that is certainly a very active area of research at the present time, so we are keeping a very close watching brief on those developments.

Day 2, p 68 Dr Franz Zumsteg, I just want to add in this context that there is new limits discussed, the limit for PM2.5 because people are quite convinced in our country, the responsible people, that it is the small particles.

29 **CONFUSION OVER UNITS OF MEASUREMENT AND THEIR SIGNIFICANCE**

P56 Day 3, Dr Ray Kearney, Lane Cove Tunnel Action Group. Can I just make a simple point and that is there has been a perception of snow storming. Where Hans made a very important point, that there is a lot of data presented to the audience, some of whom, the experts, are familiar with the terminology, the expressions but we see shifts in the standardisation and the nomenclature. Micrograms and then we get grams and so on and it is very difficult for us as amateurs to comprehend what it really means. Now this is sleight of hands. Now let's agree on some of the standards so we have a common basis...

Arnold Dix I think your observations needed to be made. I was heckled, not heckled but grabbed at the bus by Norman Rhodes this morning and we....we spoke about the problem of having different units in different reports and the way the data was presented..

Norman Rhodes: I did actually make the point that there were a lot of units around which even I find difficult to comprehend.

Arnold Dix: And we had kilograms per hr in the report from the EPA and that was, I noticed Ole Bockman had raised the point well is it dilution, what is the actual rate of polluting and then there was the first time I had seen it was an amount as opposed to a rate per hour but an actual amount.

30 **IMPORTANCE OF SMALL PARTICLES**

Day 1 p 41-2 Dr Steve McPhail NSW EPA. Just a comment about size distributions within the environment, and it's a tangential comment because my reading of the health literature would suggest that all of the associations that have been found with whatever health end points you'd like to measure, are associated with mass of particles, be it a pm10, pm2.5. However, the research that's been done in Australia, shows that particle numbers are in no way correlated with particle mass. Which would seem to me to suggest that getting too concerned about what we're doing in the ultra fines, when the effect is clearly mass driven, is to miss the point of where we should be thinking.

Dr Ray Kearney, Lane Cove Tunnel Action Group: I totally reject that comment, Dr McPhail, I really do, I think that if you're not going to accept that a person exposed to 20 micrograms per cubic meter in the Sydney atmosphere is going to have X amount of or milligrams or grams in time, of pollutants, whether it be small or large, it is there. Then let's face it, there's no point in any further discussion.

Steve McPhail – I'm not suggesting that at all, I'm saying that if we focus on particle number then the fact of what controlled strategies we may have put in place has changed the distribution of numbers of particles, I agree the issue is mass, it's not number.,

Ray Kearney: It is numbers, it's the numbers that get down the lower respiratory track which impact adversely on health. The numbers of the fine particles which directly relate to the area for those particles to carry other toxins. It is absolutely...

Steve McPhail: Why is the correlation then with mass? Look at the six-city study, the lines are only unequivocal, pm2.5 mass, correlates with the end points.

Ray Kearney: ...This, of course...

Steve McPhail: ...volume not surface area.

31 **SMALLER PARTICLES MORE HARMFUL**

Dr Ray Kearney: The 2.5 mass, maybe umm 20 micrograms in that bottle which is all made up of 10 micrometres of diameter particles. The same mass over here with ultra fines of 0.1, will have millions upon millions of particles, the surface area is different. It's like having a can of paint, how much paint is needed to paint the outside surface, as opposed to the little particles. (With) The smaller (the) particles you're approaching the amount of paint in the tin, not just the amount on the out surface.

Dr Steve McPhail: But the correlations are with mass, which is volume driven, not with number, I mean, we know in Australia that numbers of particles don't correlate with mass, that health end points do correlate with mass.

RAPS explanatory note: Dr Mc Phail's comment seems at odds with the health literature, where the correlation is with PM10 measured as $\mu\text{g}/\text{m}^3$, in other words concentration. The measurement is used as an indication of the degree of particle pollution present in the air, as this is

often the only available measure. The population of particles so described will contain a varying number of particles of 2.5 microns or less (PM 2.5). Most of the literature then goes on to point out that the use of the PM10 measurement is actually inappropriate as it is the PM 2.5 fraction which is of concern. It is absolutely clear that the effects would correlate best to surface area, if such a measure was available. Surface area for any given sample is determined by the degree of subdivision of the sample and for a sample of given mass, the surface area is directly related to the degree of subdivision – the smaller the particles, the greater the surface area.

It is also interesting that Dr McPhail declined to discuss issues relating to ozone, "because ozone from this proposal isn't really an issue" (day 1, p26) which from later discussion among the experts of NO2 conversion rates clearly is. He also declined to discuss the synergistic interaction of pollutants (p32), or the cumulative impact of pollution below the goals (p33-4).

P67, Day 1 Hans Anderl, Clean Air Tunnel International AS, Norway/Austria –It's quite correct the smallest particle is the biggest problem. If we have a population say 2 million particles, or 30.1 micro, you only need two particle; 10 micron and they will weight three times so much. That's why the new European rules for testing all kinds of filtration equipment, is now saying that particle count, and particle weight and those (inaudible) and that is the standard that also will be taken over hopefully, worldwide.

P 70 Mark Curran, M5 East Residents Against Polluting Stacks: I'd like to ask whether the New South Wales..actually subdivides the PM2.5 into size classes.

Steve McPhail: No

Mark Curran: Okay, then we have no data, which will enable us to decide whether there has been a change in that particular part of the thing...What we would have to look at to explain is, is (there) a change in the relative size distribution (inside) the PM2.5s and we don't have that data so we can't argue about it.

³² PROBLEMS WITH STANDARDS

Day 1, p33. Mark Curran, What concerns me is when I see the predictions that have been done, very proficiently I believe from the, of what is likely to happen from the exhaust system, and just to take a few examples where a background for nitrogen dioxide might be 7, very very low, but the stack emissions will push it up to 130. Still under the NEPM goal, but once again, you have, what is the factor, 10, 20 times you've increased my exposure by this particular technology which is being adopted. Now that sort of vein runs right through the whole of this, and this is the point I was trying to make, that what is unacceptable is this continuing increase on us, the so called 'exposed receptors'...

Dr McPhail The two comments I'd like to make are, I'm pleased you recognise that things are improving in Sydney because certainly there is an anecdotal feeling that within the community that they are not...in terms of whether, how you set goals, I think Steve Corbett will be addressing that far more competently than I can comment.

Dr Steve Corbett day 1, p 40. Air quality standards are derived by and large, well it is a messy process. By and large they are derived at the scale of a city, and what we define as an acceptable level, well I didn't define it, but what the process defined as an acceptable level, was on the scale of a city. There are real problems in applying those standards to local situations because all of the assumption that go into defining the standard at the scale of the city don't necessary apply at a local level, because what we are trying to do is to define an acceptable level of morbidity in a large population of people. Those assumptions are corrupted to a certain extent by a local level.

³³ USE OF DATA TO PREDICT HEALTH EFFECTS.

Day 1, p42 Franz Zumsteg, Ingenieurburo FZ, Switzerland. I would like to ask you a question concerning the averaging of the measured values, and importance that you think can be attributed to it. You mentioned, for example that the air quality standards apply to measured pollution. I would add there that the prognostic values that are resulting from calculations are extremely difficult if they have to be attributed to 24 hour peak values for example. That is the reason why we try to calculate annual average, annual averages in Switzerland if you look at projects. What is your opinion concerning this annual average of NO2 for example that you have shown in a table, in comparison with the peak values.

Dr Steve Corbett Well I think it very much depends on the health outcome that you're interested in. For the studies we did on mortality, what we do there is count the number of people who die from all causes every day, annual averages aren't relevant for that particular type of study. ... Things like cancer are different because the effects of cumulative exposure are more important, and we have not done any studies on cancer of people living on roadside, but I think we would be much more interested in their cumulative exposure over a period of time, because it is not just what happens today that is important, it's cumulative exposure. ..And I mean there are other concerns we have about averaging, because you know we would like to be able to refine our estimates by apportioning locally measured pollutants to people who live in those areas and we haven't done that. We average it over a whole city. It is very difficult to do that because you have to make all sorts of assumptions about people's mobility etc. but I think that increasingly the methods are being refined to try and take into account some of these uncertainties.

³⁴ LACK OF LOCAL DATA ON CUMULATIVE EFFECTS.

Dr Steve Corbett day 1, p 66 I don't really think that umm, umm I mean, we have turned our back on cumulative effects, certainly umm, we in our own studies, the studies that was done in Western Sydney looked at umm, effects of ozone on lung function and that made some attempt to look at cumulative exposures on lung function. It just so happens that the studies we have done have focused on acute effects, because I guess rightly or wrongly, we believe that they would be the most sensitive indicators and the one's that were most likely to drive umm, regulatory processes. That may be an incorrect assumption, as I indicated in my talk, it may be that carcinogenic effects or other effects may occur at, at even lower levels than we, than we currently adopt in relation to acute effects. Much harder to study. But I certainly don't discount that possibility,

³⁵ **NO ACCOUNT TAKEN OF EFFECT OF INCREASED LOCAL TRAFFIC EMISSIONS**

Day 3, p20 John Mayger, Turrella. It has been suggested that tunnels can reduce local, or regional PM10 values and that is possible. But in the case of the M5 East stack, according to DUAP's figures, there will be increases in local traffic between 5% and 10% [36% increase in trucks] which will directly in itself, without the contribution of the stack, increase local particulate levels.

³⁶ Dix, A. July 200, Op Cit p 46

³⁷ **QUESTIONS ABOUT THE MODELLING AND LOCAL AIR QUALITY IMPACT**

Dr Franz Zumsteg Day2, p60 Here is a measurement results for NO2 as an annual average... I also want to point out that the limiting value, the allowed value, is 30 micrograms per cubic metre for the NO2 and the annual average. This is actually the value we are designing our tunnel portal regions for. Or we are designing the ventilation in regard to the emission in the tunnel portal regions. We say we have to be some where between 27 and 33 because our prediction cannot be better than this. I think this is quite an important point since I heard yesterday values like 49.9 or 93.7 and things like this. It doesn't make sense I believe.

Day 1, p 53 Norman Rhodes: It's very hard to relate the predictability of the model unless you know how accurate it is, with the resulting health impact if there is one. It's a hard question to answer, you need to get to a more accurate representation. ..to validate the trend against absolute data would take a longer period of study I think, to do that.

Day 3, p 37 Arnold Dix: One of the issues that I perceive is this question of confidence in the modeling and whether what is being done is appropriate and whether or not the predictions are appropriate, how accurate they are, what does that mean because of the health consequences we learnt about on the first day.

Day 3 Dr Norman Rhodes. P60 There is only one area of uncertainty I have in the modeling and that is the comparison between the mathematical and physical model.

Day 3, p 109 Norman Rhodes: If I were asked to say how accurate is the modeling, I would need to go and study the thing in a lot more detail.

³⁸ **Day 3, p 38 Craig Burrell, Hyder Consulting .:** This is a distribution of the highest predicted maximum daily average, at each receptor for the entire meteorological data set. Now this is the main issue is that it shows a predominance of concentration where you will get the high stack contribution and this is for PM10 stack contribution and this is looking at the entire data set. ... So what it shows is the general predominance of an impact to the north of the stack which is Met condition driven and topography driven in that context. I think we all recognise that.

³⁹ **Day 3 P61 Ole Boeckman, ABB AS Norway:** Of course it is very difficult to evaluate this model study, this report without having done the whole lesson before we came here. What I will say is that one thing you that you can never model to my opinion is that the psychological effect of having this stack down in the valley here. Is it something proper? I would hate to have it at the bottom near my house.

Day 3 61 Arthur Bendelius Well, first comment I am not a modeler and so I don't have any detail comments on any of the process. My only comment is that the general reaction only after listening to what has been said by many people the last 2 days or almost 3 days I guess, it's almost now, it would appear, it appears to me in the near field to the stack you're going to have some exceedances. They appear to be modest in number and just from the general reaction I am not surprised at that.

106 Mr Bernhard Falconnat, Scetaroute, France: First thing, what are, with, what I've seen in the documents, ..is that the goal it meets, because if you see the pollution you are just a little under the barrier. . I don't see that it is a good thing.

EQUITY

⁴⁰ Dix, July 2000 p 46.

⁴¹ **Day 3, p 41 John Anderson –M5 East, RTA:** one of the basic reasons for building the M5 East is that it is going to reduce the traffic on the network generally and that is way beyond the grid that Craig has actually shown. I am not an Air Dispersion Modeller but I would suggest that .over the network that we are talking about, which probably is something like 10 km square, ..there is a lot of benefit to the community generally over a very broad area and what Craig is showing is I guess the negative side in a fairly small area. So overall there is a lot of benefit but there is also a disadvantage to that area to the north of the stack.

⁴² **Day 1, p 40 Dr Steve Corbett (Health Dpt)** We are trying to minimise impacts by achieving improvements, by not disadvantaging identifiable groups of people.

Day 3, p 72. Mark Curran (RAPS): I believe it is inequitable for some portions of the population to bear a disproportionate load of the vehicle pollution, if this can be avoided.

Dr Steve Corbett (Health Dpt) There is a vast inequity of who is exposed to air pollution and who is not and that is a fact. We live in a very large city and there are hundreds of thousands of people who live on main roads, there are people who in the South-West of Sydney, the whole of the south west get a disproportionate, so let's look at equity in some sort of reasonable context here. Are we proposing to, isolate a small group of people and relieve them of that inequity? I mean, if you are going to talk about equity, then lets talk about equity, because I don't think you are in that proposition.

⁴⁴ **EFFECTIVENESS OF ELECTROSTATIC PRECIPITATORS**

Day2, p 15 Arnold Dix: Can I just ask a question? You have been asked a questions about the efficiency of electrostatic precipitators and you declined to specifically.

John Day Oh Oh No. Even using an efficiency of 100% of removing all of the particles, I am not arguing whether it is 93, 95, 80, it doesn't matter, I just assume it took all the opacity out. But even then, I still needed to change the air because of the CO and NOX. Let me, let me just add to this before we go any further in this conversation. I believe that electrostatic precipitators are one of the great things that have come in for tunnel ventilation. You've only got to look in Japan, they have been using them, there are dozens of tunnels in Japan with electrostatic precipitators working all the time, where they have a very high diesel fleet

Day 2, p 36 Jan Henning, Norwegian Road Authority Experience with the use of EP in tunnel. Function well with high efficiency of particles the total effect of the visibility inside the tunnel and on the outlet of particles to the depends on the design criteria and capacity of the cleaning station.

Day 2, Hans Anderl, P 78 And for your information I have at the moment a list of 32 tunnels that are going to be built from now until year 2010 in Korea, and everyone is using the electrostatic precipitator.

⁴⁵ ELECTROSTATIC PRECIPITATORS USED FOR ENVIRONMENTAL PROTECTION.

P 37 Jan Henning ... We strongly believe the use of cleaning technology in order to reduce the contents of particles and NO2 will be of great benefit in the world to obtain improved ventilation conditions in the future tunnels. This applies to long tunnels and to tunnels in urban areas where emission of polluted air is a large and ever increasing problem. The developed methods for cleaning particles of NO2 may easily be integrated in longitudinal ventilation plant. That to have a good efficiency it is very important to correct design of the system. ...My conclusions. This technology represents a new solution for ventilating long tunnels and tunnels in urban areas...and in many cases will eliminate the need of ventilation shafts on tower and therefore give an easier formal planning process. Reduce the running costs for ventilation, especially in long tunnels.

⁴⁶ EFFECTIVENESS OF NO2 TREATMENT SYSTEMS FOR LOCAL ENVIRONMENT

Day 2, p 110 John Day: If you needed to, but it will not reduce NO2 in the environment, because its not removing either the N or the O, unlike Hans Anderl who is taking out particles in a box you're not taking out anything, you're just mixing the things around, spitting them out and then remixing later.

Ole Bockman: Wrong

John Day: Good please explain

Ole Bockman: You must compare this to no removal of NO2 at all and no removal of NO2 at all we give substantially higher concentration in the vicinity of the stack than removing all the NO2.

John Day: OK I accept that in the vicinity of the stack...

Ole Bockman: Sure and it only goes for the vicinity of the stack...

⁴⁷ UNANSWERED QUESTIONS ABOUT NO2 CONVERSION

P 108 Franz Zumsteg I think it's just what you said before that the 5-10% is inside the tunnel and the 60% is outside the tunnel, that's all.

Arnold: Does that clarify that point? ...

Arnold: Mr Holmes at the back did you want to add something to that debate or?...

Nigel Holmes: look .. I would like to explore this issue a lot further so that we don't, I'm very unsatisfied with where we're left, everything that I've heard said is actually sort of correct, but in a.I.think we are talking at cross purposes and I think that perhaps if we could explore it at another time, perhaps tomorrow or people amongst themselves and then come out with a...

Arnold Dix Well could we get agreement it's an important issue, we flag at the debate tomorrow, tomorrow is an essentially a lets throw it around day, we're getting late now so we've identified a key issue, we'll deal with it that means deal with it overnight, if there's any is there any information that could be provided to Mr Bockman in relation to a data that we have Sydney that would insist in forming a view overnight as well?

Nigel Holmes: Probably not overnight but certainly tomorrow...

Arnold Dix Tomorrow

Ole Bockman: well yes at any point I should be very glad to see, we have been trying to get such data all around.

RAPS comment. *The debate did not occur. No resolution was reached on this crucial point which had been identified long before the meeting.*

⁴⁸ INDICATIVE COSTS FOR INSTALLING PARTICULATE AND GAS TREATMENT EQUIPMENT

Day 2, P 44 Ole Bockman: Yes I actually looked at it [cost of installation]. I would think but I mean this is very very rough, you are speaking about 850 or 870 something in that region cubic metre per second. I would guess that a gas cleaning system upstream of the stack including an electrostatic precipitator, including a gas filter to take the NO(2) gas and some VOC etc and say civil works in that context would cost in the magnitude I would think of A\$30-35M.

Day 3, p81, Hans Anderl, Clean Air Tunnel International AS, Norway/Austria The EP System for 856 cubic meter per second, with pre mechanic filter afterwards, with power pack cabinets, with automatic running cabinet, also the whole treatment system, with all the facility around that, have a price in Norwegian Kroner of approximately \$45-47 million Kroner. That should be approximately around \$7.5 - \$8 million Australian dollar.

Male: That's the EP alone?

Hans Anderl, Clean Air Tunnel International AS, Norway/Austria That's the EP alone, I don't talk about the sale of NO2 gas cleaning.

Lutz Sengbusch - DEUS Energie-und Umweltsystem GmbH Germany I think that nobody is very keen on dealing with figures that have not been confirmed or anything. This is why I was so hesitant, I couldn't possibly quote here a figure which in the end may be totally wrong because

it might be much cheaper definite ly not much more expensive than what I just said. But, anyway, I want to be very hesitant, OK, to ask us to find a solution and then quote it. We might be able to.

⁴⁹ **REDUCED ENERGY COSTS AS A RESULT OF USING ELECTROSTATIC PRECIPITATORS**

Day 2, p 44 Arnold Dix: A question has been asked about running costs?

Mr Bockman: I haven't looked into that but I would think that the additional power you would use to overcome the pressure loss across the cleaning plant would be in the magnitude of I would think 1 megawatts. Again, I don't know what the total power consumption or the ventilation system is. What I would like to point out is I should come back to it but just let me comment on it, I think that the cleaning technology would permit you to reduce the ventilation air volume used in the tunnel simply because a car driver he will pass through that 4.5 kilometre tunnel in a matter of minutes, but so I mean he is not endangered by the pollution in the tunnel so we have to more into consideration people who are living around the outlet all and get this shit all the time. But I think you could save energy by reducing the ventilation volume instead.

Day 3, p 79 Hans Anderl, Clean Air Tunnel International AS, Norway/Austria First of all by using electro-static precipitator you would not get higher electric costs. I'll just make a quick calculation, for to handle your 856 cubic meter of air per second you will need approximately 360 electro-static cell, 845mm wide, 610 high and 580 deep and each one of them is taking 78 Watt for the total operation time. So we're talking here, for more than 800 cubic metre per second, if you multiplied it with 3,600 you'll figure out there is no building the world, that have a ventilation system that is that big...

Nick Agapides, EPA: So you're saying no added electricity?

Hans Anderl, No, so if you give me 25 kilowatt that is more than enough.

⁵⁰ **Day 1, p68 Lutz Sengbusch, DEUS Energie-und Umweltsystem GmbH, Germany –** We know that in Europe, due to increased and improved diesel technology, we have an far-increased number of very small particles. Those with a combustion, we're are destroying, better combustion we are destroying larger particles, but we are creating or generating more smaller particles.

⁵¹ **EFFECTS OF EURO STANDARDS AND OTHER REGULATIONS**

Day 2 P 58 Franz Zumsteg What I show you here is a copy of the original of the new directive for tunnel ventilation in Switzerland. ..What you can see here is the CO emission per hour and per person car over the range of 1980 to 2030. This is the zero line and it comes down from this 10.6 to almost nothing. The reason for this is the introduction of several new emission standards. This is the US '83 Standard that was introduced here. There is a Euro 2 Standard, Euro 3, Euro 4. What I have heard yesterday is quite similar to this, just at the beginning is later. But the introduction of Euro 4 and 5 is approximately at the same time that we will have it in 2005 to 2008, so the emissions in what you can expect here are presently higher up probably, will be coming down later, but it will end up at the same level as these. I assume as what I have seen on the street that the cars are about five years older than what we have as an average, maybe three to five years, so this gives a time lag of additional three years so I guess that in the Year 2020 you would get at this point.

..Oh there is an important point. These lines are only valid if there is a governmentally forced maintenance every year, every year you have to or every second year the cars have to be checked. If this is not the case, especially back down here then one car could emit 100 times more than what you see here. There is a, there is checks in Switzerland, it is every year for personal cars, it depends on the age. For a drive .. a distance of about 300 kilometres the price for such a journey will raise from 40 francs to 325 francs. And now what is special is that the basic price is not only dependent on the mass that is transported, nor on the distance that this mass is transported, but also on the emission standard of the motor of the engine of this car. And this difference is tremendous. So there is a big difference if you are driving with an old car or with a new one. And this will strongly, since this is introduced only next year, this will strongly influence the structure of the trucks that will drive in Switzerland so this is just to mention additional means to influence the emissions.

Day 2, p 54 Bernhard Falconnat Environmental condition outside the tunnel so it is something which is very viable and sensitive according for each country. Even if there are some similar trends which appear within European guidelines. Improvement planned air quality because all the cities or a lot of cities have less than 100,000 inhabitants and some part also in the country which you may have some air quality problem even if you are for example in mountains, if you are in a valley you may have some air quality problem even if you have only 2,000 or 3,000 inhabitants. This law in France defines also a plan, each regional plan has to make a plan for protection of the atmosphere. There are legal measures in case of overpassing the [air quality] limit. For example last year in Paris the traffic was stopped for 1 car and 2 car [odds and even numbers], so its mean all the vehicles which has for example a plate with a 6 they have the positive to run but the other one was stopped... There are also in this law a lot of technical specification for the oil industry in order for example to put out the sulphur from the oil and there are lots also of new technical specification for all new infrastructure.

⁵² **DILUTION OF POLLUTION APPROACH OUTDATED**

Day 3, p 108 Ole Bockman: The other thing I like to remark when I listen to this discussion, I'm working on air pollution control company, first ten years, that is more than thirty years ago, we did not have so much to do because the way the industry solved their pollution problems was to build higher and higher stacks. So to dilute and disperse the pollution so that in principle you could calculate that it gave no significant impact on the quality of the air at ground level, so the industry after some time learned otherwise. We have seen when it comes to the road traffic, tunnel building and so on, we are at the moment at the stage, which the industry was thirty years ago, maybe this will change.

⁵³ **AIR QUALITY GOALS AS A LICENCE TO POLLUTE**

Day 1, p 15 Dr Chris Winder – University of NSW If we say for example on the case of PM10 this [the standard] is 50, then numbers at 49 and 48 are, by default, are satisfactory, sorry are acceptable. .This is a major problem with the idea of operating a standard. So when we say 50 what we should be looking at is saying, well 50 is the upper the limit that we must not go above, therefore our average our mean must be

much lower than that, it must be in the range 10, 20 something like that. And that's the kind of thing we should be seeing in this debate, not OK we're creep up to 50 and that's OK, we should be saying we'll be trying to get our levels as low as possible and that is contemporary risk management – that's what risk management is about. We don't work up to a standard we work down to a risk, and that's not what's happening in this process.

Day 1, p8 Mark Curran – M5 East Residents Against Polluting Stacks (RAPS) The lowering of an air quality goal implies a desire to lower pollution levels generally, at all times. And the goal represents the maximum upward excursion in the range of measurement that should occur. Now when it's used in the way in which it's used in the conditions of approval, it naturally becomes an Engineers performance goal, which is a completely different thing. When it's used in that way it's a defacto licence to pollute, you can pollute up to that level and get away with it. Now the NEPM goals are not set at a safe or zero effect level, they're set, they're not set at a level of which there is no detectable health impact, they're set at a level which is acceptable, where you look at the effects on the whole of the population.

⁵⁴ **REDUCTION IN NEED FOR FANS AS EMISSIONS IMPROVE**

Day 2, p 22 Franz Zumsteg Ah It is an in-tunnel ventilation system combined with exhaust shafts, but there are big dampers where the air can be extracted before it leaves the portal. And it is not an urban tunnel and according to how it was designed, ah three or four years ago, they still use the ventilation system and I don't know actually why, so they they are just burning electricity. So I told them to stop it. Probably they did already.

⁵⁵ **Lakshmi L. and Hutchinson, J.,** Response to draft report, 17.7.00. International experts pointed out how they would do things, and not one of them would do it this way, especially for the M5 East. Yet the RTA tells us this is best practice!! International Tunnel Ventilation Workshop CD

⁵⁶ **FIRE SAFETY PRINCIPLES**

Day 3 P8-9 John Day: Electrowatt Engineering Switzerland –The number of people killed in road tunnel fires ever, anywhere in the world is 100 people. I've talked about ventilation but that is just one of many, a whole raft of things which you can use to improve the safety in tunnels. Obviously the ventilation concept is designed, .you have to build in redundancy. The other items here are all active passive safety measures. A fire detection system.. firefighting equipment, fire extinguishers, hydrants, this sort of thing are installed in most countries. Both for the tunnel users and for the fire services to use for. Hydrants, video surveillance, telephones communication. Mobiles as well. ...The subject of sprinklers and water deluge systems is particular almost entirely to Australia.

P11 So why do we have to invest money to improve safety in the tunnels when nothing goes wrong? And I can guarantee 18mths ago in Mont Blanc they made exactly that statement. Absolutely guaranteed.

P13 The other thing about safety and security is it cannot be added on to a tunnel. .. It starts from the day you think about digging your hole in the ground. Safety starts before the first time a cross section is drilled because you got to integrate it. It is a total design concept of the whole tunnel and all of its systems.

⁵⁷ **COST BENEFIT RATIONALE FOR FIRE SAFETY**

P 18 John Mayger RAPS ..If we are talking about the cost of human life surely the increases in mortality caused by minor increases in PM10 around stacks and portals, the installation of filtration equipment would give it very very good value.

John Day: Thank you. That's exactly the point we were, I was trying to get to. You have linked it exactly. Thank you. If you put the value of a life or part of a life, or increase or decrease in life function, okay and compare that because you have got large numbers.I agree with you totally. You have got large numbers and if you multiply that with the decrease in the actual fact of number of people killed per year etc and compare that with the total cost, capital, operating etc of doing something to try and alleviate that. If you could put a number to a life, reduction and morbidity and everything else ..terms are wrong I know, you see where I am going..then you can make a quantified judgement as opposed to a non-quantified judgement

19. Bernhard Falconnat - Scetaroute. What I want to say is the ways that you took in Switzerland to make the comparison of improvement between .human life and the price for improvement not agree. It is not the way it is taken in other country. I give you 2 examples. For example 10 years ago, when the Mont Blanc company in French / Italy decide together to invest to put 250 million Australian dollars to improve the safety of the tunnel. They don't think about this comparison.Second example. We were involved in the French group of French Committee which investigated all the faulty tunnels in France more than 1 kilometre to fix all which has to be removed from inside the tunnel in matter of safety and in this group, not one time it has been spoke about the cost of investment and the cost of the work to make the renovations. The cost was seen at the end but it was never a position to take a decision. Even if it cost us much more than 1.5 billions of Australian dollars.

⁵⁸ In June 2000, the 800m exhaust tunnel from the motorway to Turrella was in the very early stages of construction.

⁵⁹ **EXPERTS' RETICENCE DUE TO EXTENT OF WORK UNDERWAY**

Day 3, p 83 Bernhard Falconnat And at this moment it is not possible to change completely the design of the tunnel to put as you have shown for example in Norway the electro-static precipitator inside the tube. So it means at least that part of the design has to be kept, but even if part of the design has to be kept it is not, it is possible to make some improvements ...

Day 3, p 104 Norman Rhodes, Mott Macdonald Great Britain... Suffice to say that tackling the portal emission problem might be an easier one than redesigning what's been designed but it would require a big change in philosophy, but maybe a feasibility study should be done for that in future tunnels.

Day 3 p115 Arnold Dix [Question] nine, "what are the implementation strategies and implementation timeframes?" I don't know. I know that you've got a project which looks like they're digging like hell out there at the moment so that suggests to me that we've got something happening. On day one a number of our international guests said, "this kind of looks like it's being built". And I think it was Franz Zumsteg came up to me and said, "you tell me again what it is we are discussing. What options we have here?" And as we're peering in the hole and I think...

⁶⁰SUGGESTIONS FOR IMPROVEMENT OF CURRENT PROJECT

Day 3, p69 **Ole Boeckman:** Now what you have here, I think I should mention it, is 4500 metres of highly traffic motorway. What you do is that you are collecting all the exhaust gases being emitted in this distance and you are sending it out, concentrating it highly compared to the environment around and sending it out through a 7x 7 metres opening, extremely concentrated. There you have the possibility to do something about it. You have along the roads you have no possibility to do anything about the exhaust gases but only hope that the cars eventually shall be better and also hope that the increase in traffic should not eat up that improvement so if you should think also not only about the valley but about the city, I think it is an extremely good chance to do something with the pollution of the whole area. To put the traffic down in tunnels, to concentrate the gases so that you have the possibility to clean them.

Day 3, p 103 Art Bendelius: I know the first reaction I had when I first looked at this was why put one stack in a valley...I'm not a total fan of the total system you've got, but the system appears that it will work from a standpoint of ventilating the tunnel. ... The real issue is what do you do with the discharge or where do you put it. We've always tried to put them as high as possible, not in a valley.

Ole Bockman: yes I am quite sure that there exists cleaning equipment that will clean this air. ..

Hans Anderl: I have comments. I agree with Bockman and also with our friend from America, why put that stack in a valley. I'm really confused and as I said, I would find another place where I would place it and probably hide it much better too. Besides that, I have seen a lot of tunnels through my approximately fifteen years, more or less now, and you have made a very roughly complicated system, and as he said, it is very difficult to change it, but still you have the possibility to clean the air either out from the stack or whichever other way you want to do it.

Norman Rhodes, Mott Macdonald Great Britain: I would like very much to add, to other previous speakers as said. Suffice to say that tackling the portal emission problem might be an easier one than redesigning what's been designed but it would require a big change in philosophy, but maybe a feasibility study should be done for that

Franz Zumsteg: I agree with what Norman just said but we have a situation that we have to deal with and it is obvious that the position of the stack is not the best. How can we improve that? Norman mentioned before that, by increasing the stack height usually we don't get much better situation. I agree with this in general but I assume that in this special topography we might have quite considerable improvements in certain locations right on the edge.

106 Mr Falconnat: First thing, what I've seen in the documents, ..is that the goal it meets, because if you see the pollution you are just a little under the barrier. I don't see that it is a good thing. I think if you want to have better air quality, it's an internal debate that you have to have inside the Australian society. It is something that is completely different as a technical problem. Second, to improve the solution there are some technical possibilities. First, Franz said it is possible to improve the height of this stack, its particular position of the stack, I agree with him. ... Improvements concerning the particle air cleaning, it is possible for a EP precipitator, it's possible to put that, although improvements, I think they are no more possible, I think about for example, save of energy.

John Day:...Well what we can do with today's system, the only thing we can do economically is as Franz suggests, and that is to split the chimney up into sections driven by the separate fans so that you keep the force velocity as high as possible. It will put up the energy costs a bit but it will be certainly the most cost effective way of keeping the emissions down as low as possible.

⁶¹ **See for example, L. Lakshmi and J. Hutchinson response letter, Op Cit.:** "We are concerned that there were no resolutions made at the end of workshop with agreement come to by those participating. The facilitator's report seems include a series of his reflections and interpretations. We had believed that the workshop would work towards formal resolutions and outcomes not just inconclusive discussion. Many of the sessions ran over time, there was very little formal summing up of each day, and no one, especially the community groups did not get a chance to respond in anyway to the facilitator's summing up at 5.30 on the last day! There was certainly no way forward identified although an item in the Agenda referred to it".

Kearney, R and Hefferan, J. Lane Cove Tunnel Action Group, response to draft workshop report, 14.7.00 "From a community perspective, many of the recommendations are not framed so as to encourage action. They concentrate on asking for more information, or seeking changes to regulatory standards and practices, or conducting further research. The need is for action, not prevarication. ...The recommendations should have been outcomes from motions or issues clearly put to the attendees. As it stands, they are really only the author's opinions and are not always justified by the facts. In several instances the Draft Report claims inadequacy of data or information from the Workshop. Some of this data could have been provided if requested by the Facilitator who visited each overseas guest before the workshop. In some cases the workshop was not an appropriate forum for such data (eg specific costs of technology). Unfortunately, this "lack" of data is sometimes treated as though the author believes it does not exist at all. This (often fallacious) inference prompts recommendations for more

research. If the facilitator had a clear idea of what information was required from the workshop, he should have informed the relevant participants before they came. International Tunnel Ventilation Workshop CD

⁶² Dix draft workshop report, June 2000, p 1, Dix, July 2000 p 10

⁶³ Dix, July 2000, p 48.

⁶⁴ Day, J. Response to Draft report, July 2000. International Tunnel Ventilation Workshop CD

⁶⁵ Ibid, p2-4; 46-50 **WORKSHOP REPORT EXECUTIVE SUMMARY AND RECOMMENDATIONS**

FINDINGS (p2-4)

- 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.

Summary and Recommendations (P46-48)

The design and design review of tunnel ventilation systems for long urban tunnels in Sydney has been undertaken by competent local and international experts. The designs of these ventilation systems are primarily a response to the comparatively strict environmental performance requirements of projects in Sydney. It is these comparatively strict standards which have in substantial part resulted in the ventilation designs for Sydney's road tunnels.

The experts on tunnel ventilation design at the workshop generally agreed that the results of the design analysis meant there should be confidence the M5 East project would meet the comparatively strict environmental standards set. (It must be remembered that each expert was provided with comprehensive technical data for review well before the workshop.)

However it also became clear that other issues are relevant in considering the appropriateness of a particular tunnel ventilation design.

The location of the M5 East stack in a broad valley, distant from the tunnel, in full view of homes was criticised by the international presenters. Given the tunnel is being built under hills which are the optimal place to locate ventilation stacks from a strictly engineering perspective, the current location could be expected to generate discontent. However the tunnel ventilation engineers maintained that while the location was not "optimal" it would still function appropriately.

It was determined at the workshop, following a site inspection and general discussion, that the tunnel ventilation design of the M5 East project has been configured so as to allow devices such as electrostatic precipitators and/or NO₂ gas conversion plants to be installed in the future.

The discontent from the local community appeared partly the result of a failure of the approvals process to adequately deal with community concerns about scientific, engineering and health issues but perhaps even more importantly, consultation, property values and the physical/visual intrusiveness of a ventilation stack into their environment were also relevant.

Given the limitations of the Workshop 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.

Information and methodologies arising from the detailed recommendations of this report are intended to provide a sound basis upon which decisions about tunnel ventilation design and the use of technologies for altering the composition of tunnel air can be made in the near future.

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.
- 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.
- 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.

- 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.

- 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.

- 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.

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

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.
- 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.
- 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.
- 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.

It is recommended in relation to this report and the materials associated with it that:

- they be made freely accessible to the public.
- In relation to the recommendations of this report:

- that any responses to the recommendations be made available at the same location as the report.

COMMUNITY CONSULTATION

I recommend that there be a review of community consultation practices, particularly with respect to the substance of such practices as compared with what is written in legal and practice documentation.

⁶⁶ Ibid, p3-4.

⁶⁷ RTA welcomes Recommendations of International Tunnel Ventilation Workshop Report. 7th August. NSW RTA.

⁶⁸ See International Tunnel Ventilation Workshop CD for EPA and Health Department responses.

⁶⁹ Ibid, p2

⁷⁰ Ibid, p3.

3. THE 2000 CSIRO REVIEW OF THE STACK

The CSIRO report entitled 'Air quality impact of the emissions from the M5East tunnel' was prepared at the request of the Department of Urban Affairs and Planning prior to its approval of the height of the M5East stack.

The terms of reference for the inquiry were to examine:

- 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;
- if the procedures and data have been used appropriately;
- if the conclusions in the report are credible;
- what stack height is required to meet the air quality goals;
- other considerations.

Excluded from the inquiry were 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.**

The report has been quoted regularly as a justification and validation of the whole of the current ventilation system design.

This claim is not justified

Although the report found that the methods used to make an assessment of the likely impacts of emissions were 'appropriate', there were a number of issues which they raised which cast serious doubts on the conclusions drawn in the report prepared by Hyder Consulting, upon which the RTA based its submission.

The extent and breadth of the concern expressed by the CSIRO can be summarised by the following direct quotations from their report.

- In our view, it is quite possible that **actual PM₁₀ emissions could be a factor of two or more higher** than the PIARC estimates at full engine load as the majority of the emission will in fact, come from high power operation.
- Although GDI (gasoline direct injection, a new motor technology expected to be introduced in cars soon) gives a 20% improvement in fuel economy, **it will lead to an increase of particle emissions of three to four times as great as present conditions (SAEA, 2000).**
- although the modelling (by Hyder) shows that PM₁₀ Standards are not exceeded, it is possible that at other times **this may not be the case,**
- However if PM₁₀ emissions were a factor of two or so higher, **there would be exceedences.**
- 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.
- We also believe the reliance on the wind tunnel results to support **a claim that the numerical modelling is conservative, has not been justified.**
- The obvious differences between day-by-day levels of NO₂ and PM₁₀ for 1995 and 1998 support a conclusion that we wish to make strongly: **We do not agree with the approach followed in the Hyder Reports.** ..., there is far too much variation in the real atmosphere for the Tier 3 methodology to be considered conservative.
- It would be advantageous to have **an effective plume height .. that was at least 50 m above the stack base.** This could be achieved either by having a physical stack height of 50 m with the current diurnal pattern of stack

exit 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 50 m.

The tenor of the CSIRO report is certainly not one of general approval and gives little confidence, especially considering that the **contents of the report has been effectively ignored, trivialised or dismissed by the RTA and that no changes have been made to the design or operating systems which result from the findings.**

The Department of Urban Affairs and Planning used the report as the basis for their approval of a 35 metre stack (as opposed to the 25 metre stack proposed by the RTA), in spite of the fact that the CSIRO experts had clearly indicated that the effective height of the stack should be increased to 50 metres by increasing the exit velocity of the stack at specific times of the day.

We find this failure and the continued refusal of the RTA to adopt this simple operational improvement to be completely irresponsible and demonstrating a callous disregard for the wellbeing of the surrounding population. The failure goes against all principles of prudent harm minimisation.

The response made by the CSIRO experts to the question posed by community representatives is appropriate to note:

Question: To what extent can air quality impacts be reduced further even if the goals are met to minimise impacts? That is, the project should not be designed to pollute up to the goals.

Answer: Theoretically, a reduction in concentrations could be obtained by increasing the effective plume height (via stack height, stack exit velocity, stack exit temperature), or by reducing emissions. The degree to which some of these measures are explored is up to the regulatory authorities. For pollutants that already have a high background concentration (such as PM10), even zero emissions from the M5 development would still result in concentrations close to the goals due to existing background concentrations.

The responsibility for action has been put squarely on to the ‘regulators’, namely the RTA, DUAP and EPA. To this time they have failed dismally to act in an appropriate manner to address the needs and desires of the community.

The CSIRO report cannot be claimed, as it has been, to be a justification and endorsement of the design of the design of the ventilation system. In spite of claims to the contrary, the only endorsements of the modelling procedures carried out by Hyder are the comments:

“The methods employed by the Consultants are appropriate for making an assessment of the impacts of emissions.” and

“Whilst the Hyder Reports have presented a reasonable estimate of the air quality impacts of emissions from the M5 East tunnel, there are some gaps and clarifications that could benefit from some extra modelling work, because of the potential for exceeding air quality goals.”

At no stage is there any suggestion that the CSIRO experts agree that the Hyder modelling has established that exceedences will not be caused by the stack or that the design is unequivocally safe; in fact the contrary is the case.

The CSIRO experts were specifically excluded from making findings on

- **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**

These are the three main issues which are of concern to the community, and are key issues in reviewing the adequacy of the ventilation system.

None of these issues have ever been investigated by any authoritative body or professional expert independent of the RTA, nor have they ever been examined as part of an environmental impact assessment, open to public scrutiny.

Is it any wonder, given the narrow scope of the review, that the only modification possible was to raise the height of the stack.

The response of the RTA and its consultants was to question and attempt to trivialise as 'academic' the concerns expressed by the CSIRO experts, rather than to address them.

4. DUAP'S CONDITIONS OF APPROVAL

4.1 DUAP's Original Conditions of Approval (1997)

In approving the M5 East motorway with the single stack proposal, the Minister for Urban Affairs set over 150 conditions for the project. Conditions 70 to 81 covered air quality issues, and most of them required further verification and approval from the Director General of DUAP, for example¹:

- Conditions 70 and 71 required the design of the ventilation system and portals to be independently verified to the satisfaction of DUAP.
- Condition 73 required DUAP to approve the **height of the stack**, following wind tunnel testing and EPA advice.
- Condition 74 required the tunnel ventilation system **to make provision for the installation of treatment systems**, which DUAP may require to be installed in the case of exceedences, after considering the results of independent monitoring, input from the Community Consultative Committee, the EPA and investigations of international developments.
- Condition 75 required DUAP to approve the establishment of a **comprehensive monitoring network**.
- Condition 76 required the exhaust stack and air intakes to be designed in consultation with relevant Councils and consistent with set **urban design** principles.
- Condition 78 required the RTA to establish a **Community Consultative Committee** to have input into defining air quality monitoring requirements, accessing and disseminating monitoring results and information on air quality issues and impacts.
- Condition 79 required the RTA to examine and report annually **on international developments** in tunnel emission treatment (including the cost effectiveness of systems).
- Condition 80 and 81 required the RTA to investigate, implement and fund strategies to improve **subregional air quality** in consultation with the EPA, DUAP, the Department of Health and the Department of Transport.

These are the fundamental conditions upon which the ventilation system is based. We understand that while they cannot be changed, further conditions could be applied.

4.2 Whose Responsibility was it to Make Modifications?

The DUAP August 2000 approval submission states that *"the RTA originally requested approval for the construction of the ventilation stack on 5 April 2000. This original request was deferred by the RTA pending its consideration of an international workshop on tunnel ventilation. The RTA has now written again to the Department confirming its original request to pursue the ventilation stack at Turrella."*¹ **DUAP clearly put the onus on the RTA to propose any modifications, and did not demand any change to the design.**

Yet, as pointed out earlier, **Minister Scully** had assured members of Parliament and the community that he had asked for the submission of the M5 East ventilation system for DUAP approval to be delayed *"until after the workshop is held so that any recommendations arising can be considered in DUAP's assessment of the ventilation design"*² (our emphasis). It would seem that following the Workshop, **the RTA simply resubmitted its unaltered proposal to DUAP.** DUAP, who although had clearly indicated it appropriate to fit filtration equipment in 1997³ and has continued to raise this as an option, **considered that it was not within their power to mandate its use, or any other significant changes to the design.**

In fact, DUAP **redefined its review role to only examine the height of the stack**, despite earlier assurances by **Minister Refshauge** that he would be ensuring his Department undertakes *"a comprehensive and thorough analysis on all aspects relating to the stack prior to allowing any construction works or allowing emissions from it."*⁴

In commissioning the CSIRO to review the ventilation system, DUAP restricted the scope of the review to the “reliability of the air quality predictions and the preferred height of the stack” and its August 2000 review report is entitled: *M5 East Motorway Condition 73 Report on **the Height** of the Ventilation Stack Located at Turrella* (our emphasis). Yet, despite this title, the report also deals with conditions 70-71, 74, 75 and 80, and its acknowledged aim is to approve the viability and acceptability of the entire ventilation system, not simply its height.

This self-imposed limitation of scope or influence is stated a number of times in the assessment report and associated documents, stressing “Any substantial changes would need an application for modification from the RTA⁵”, regardless of whether these changes applied to the location of the stack, the number of emission points or the air quality standards.

4.3 The Basis for the Hasty Approval - Problems Too Technical and Not Enough Certainty

Following a meeting organised on 17th August with senior DUAP managers to provide community representatives with feedback on the approval process, the final CSIRO report was released to community representatives who had attended the Workshop four days later on 21st August. At that meeting the CSIRO report was not discussed and community representatives made it very clear to DUAP that the RTA and Minister Scully were considering proposing modifications to the project, following approaches by members of the Cross Bench and the community.

Yet, the final approval of the stack was announced only two days later, on 23rd August, effectively preventing any community input into the process, or any opportunity for many of the concerns identified by the CSIRO to be satisfactorily addressed.

DUAP justifies its dismissal of the CSIRO’s criticisms by claiming the report is too technical:

“It is noted 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 fact⁶.”

It would seem that DUAP did not seek further clarification or simplification from the CSIRO as to the RTA’s responses, and actually preferred to accept the RTA’s opinions over those of the CSIRO. It gave approval to the stack within 48 hours of having released the CSIRO report to the community.

In its report, DUAP summarises a number of criticisms and reservations made by the CSIRO, but concludes that

*“There is a high degree of confidence that the predicted ground-level concentrations for NO₂ would be below the NEPM standards **if the stack height is 35 metres and there are enhanced stack exit velocities at night**. However, with respect to PM₁₀ goals, the level of confidence is less⁷”. (Our emphasis)*

However, DUAP **does not** require the RTA to enhance the stack velocities, but simply to raise the stack to 35 metres, and to **only assess** the option of enhancing stack velocities.

Instead of coming to terms with the serious technical issues identified both by the Workshop and the CSIRO, DUAP seeks to justify its decision by claiming that the community will be outraged anyway, so there is little merit in addressing these concerns:

“It is fully understandable that local community will be outraged by both the process and the outcome of siting the stack, notwithstanding the outcome of any technical evaluations.....The Department has accounted for the community concerns in the circumstances by ensuring an independent and transparent monitoring mechanism and very clear provisions for the installation of treatment equipment and monitoring indicated exceedence⁸.”

Instead, DUAP proposes more monitoring, and supposedly clear provisions for treatment systems should their necessity be demonstrated. To do so, it relies on two principles to justify its decision - lack of scientific certainty and the reversibility of the decision:

“At this stage there appears to be insufficient scientific certainty to confidently conclude that the construction of a ventilation stack at 35 metres will not be able to meet the conditions of approval.

The precautionary principle is ‘that where there are threats of serious or irreversible environmental damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation’. Whilst there does appear to be a degree of scientific uncertainty (at least in the scientific opinion of the CSIRO) the degree of uncertainty for compliance does not appear to be large. Moreover, there is clearly an ability to reverse the decision through the retro-fitting of electro-static precipitators...Recommending construction of the ventilation stack (to an increased height of 35 metres together with possible other operating measures) would not contradict the precautionary principle⁹⁷. (original emphasis)

Such a position seems entirely contradictory and turns the precautionary principle on its head. The environmental degradation was identified as being very serious by the workshop, in terms of the pollutants emitted by the stack, the excessive energy requirements and the visual degradation of the regional park and the residential areas. The effectiveness of electro-static precipitators in addressing the problem of particulates is still being disputed by the RTA, and retro-fitting this equipment would only address part of the problem. It would not address or reverse the serious and permanent damage caused by the other pollutants and the visual degradation.

Furthermore, while DUAP argues that it is unable to vary the conditions of approval, it seems to have no difficulties in imposing new additional conditions, as part of condition 73. However, careful analysis of these new conditions of approval clearly demonstrates their total inadequacy in protecting the health of the local communities and the environment.

4.4 Inadequacies of August 2000 Conditions

The additions to conditions 73, 75 and 80 are seriously flawed and inadequate.

Condition 73

1. The stack shall be constructed to a minimum height of 35 metres.

In the light of information which they had received from the CSIRO recommending that a ‘virtual height of 50 metres’ be obtained (by increasing fan speeds at night), **DUAP could and should have called for modifications to heighten the plume or to use supplementary emission outlets, or a radical review of the ventilation system.**

2. The final materials and finish of the stack shall be approved by the Director-General.

3. The RTA shall prepare detailed Plans and Specifications for the construction of electro-static precipitators prior to the opening of the tunnel to traffic.

There are no directions **to prepare specifications or plans to install gas treatment systems**, yet they are also required to be installed under the 1997 conditions.

4. Should the results of monitoring required under Condition 75 and from the Community based monitoring station (referred to below) show that the PM10 contributions from the exhaust stack results in exceedance of the goals specified in Condition 72, the RTA shall install electro-static precipitators within 6 months of the direction by the Director-General (or within other such time as agreed by the Director-General). The RTA shall establish a Protocol outlining procedures for deciding how an exceedance due to the stack will be determined. This Protocol, which is to be made publicly available, shall be developed in consultation with the EPA and the Air Quality Community Consultative Committee and require approval from the Director-General at least 3 months prior to opening the tunnel to traffic.

As yet, **no discussion has occurred in the AQCCC** although a paper on this was requested in February 2001. It is likely that the determination of an exceedance will actually be very difficult and few of those actually occurring will be detected by the monitoring stations. This is because the stations will only detect the emissions from the stack when they are directly down wind of the stack and a change in wind direction of more than a few degrees will make the monitoring station insensitive to the emissions of the stack. **The complex topographical and meteorological characteristics of the area will make it difficult for regular patterns and causal relationships to be demonstrated¹⁰.**

5. *The RTA shall establish a mechanism regarding the potential for complaints about air quality impacts resulting from the stack. If complaints are received from areas where there is a reasonable potential for localised air quality impacts resulting from the stack, independent local monitoring of PM10 shall be undertaken. Prior to undertaking localised monitoring, the timing and nature of the complaint shall be compared with corresponding in-stack (as specified below) and external monitoring to assess whether there is a reasonable correlation with stack emission levels. Any complainant not satisfied with the RTA's response may raise the concern with the Director-General whose decision on the need for monitoring shall be final. Should monitoring of PM10 indicate localised exceedance of the goals as specified in Condition 72, the RTA shall immediately undertake such measures to meet the goals, mitigate the concerns of the resident(s) raising the complaint(s), or retro-fit electro-static precipitators.*

This condition is particularly pernicious as it appears to empower an individual affected by the stack emissions, without actually providing any relief. The affected individual, who almost by definition will not be expert, will have to:

- Become aware that they are suffering some ill effect which may have been caused by the stack emissions.
- Become aware that there is some mechanism for redress and discover the appropriate person or group in the RTA to approach.
- Establish that there is or had been 'a reasonable potential for localised air quality impacts resulting from the stack' in existence either presently or at some time in the past.
- Demonstrate a "reasonable correlation with stack emission levels" by specifying a time when they believe the ill-effect occurred. Yet most documented effects of vehicle exhaust exposure are cumulative or have delayed onset. The medical literature contains a number of documented acute illnesses caused by vehicle exhaust where the onset is correlated to exposure one or more days prior to onset.
- Presumably, establish a pattern of ill-effects, which could be difficult as the same conditions may not regularly occur.
- Report it to the RTA and await their response. Even if an exceedance is demonstrated, the RTA is not compelled to fit filtration but can choose to "undertake such measures to meet the goals (or) mitigate the concerns of the resident". This is left undefined, and could range from installing air-conditioners to buying out homes. Considering that the RTA has already undertaken to meet the 'goals' any such assurance is obviously meaningless.

The whole of this condition is worthless and a cruel attempt to mislead the public. It has been appropriately described by a local resident as 'All smoke and mirrors.'

6. *Subject to the agreement of the Air Quality Consultative Committee, the RTA shall, within six (6) months of this approval, provide all necessary funding for the establishment of a community based monitoring station to monitor PM10, NOx and CO. The RTA shall thereafter, on an annual basis, meet all operating costs associated with the station. The community based station is to operate independently from the RTA and all other authorities and its establishment and operation shall be overseen by the Air Quality Community Consultative Committee on behalf of the community. The establishment and operation of the station is to be undertaken in accordance with recognised Australian standards and undertaken by a consultant accredited by NATA. The results of the monitoring shall be quality assured through a NATA accredited process prior to the data being considered as a basis for compliance/auditing purposes. The monitoring results shall be made publicly available. The need for*

continuation of the community based monitoring station shall be reviewed by the RTA in consultation with the EPA and the Air Quality Consultative Committee after a period of 3 years. Any recommendations resulting from this review shall require approval by the Director-General prior to implementation.

Again this apparently useful provision is seriously flawed.

- The siting of the monitoring station is made by the AQCC, **who are unable to call on independent expertise** for a thorough and objective analysis of the local conditions to help them in their decision making. Unlike the RTA, the AQCC has no funds to pay for such expertise.
 - The requirement that the station be operated independently of the RTA gives rise to difficulties in ensuring that data is strictly comparable. All monitoring should be carried out by independent organisations and be at arms length from the RTA.
 - The requirement that the establishment and operation of the station be in accordance with Australian standards is flawed because it does not define the standard to be used and indeed there may not be an appropriate one. The station does not fall under the provisions designed for regional monitoring, which contain limitations as to positioning, proximity to vegetation, buildings, roads etc.
 - The same limitations in the ability of point source monitoring to identify more than a tiny proportion of actual exceedences apply to this station as much as to those discussed previously.
7. *The RTA shall further investigate, in consultation with the EPA, options of partial ventilation of tunnel emissions at the tunnel portals to achieve energy costs savings as well as more widespread dispersal of emissions. Irrespective of this requirement, any potential emissions from tunnel portals shall not result in ambient air quality at the nearest residential properties to the portals exceeding the goals specified in Condition 72 nor a CO long term annual average goal of 9 ppm.*

The intent of this provision is unclear. The RTA, probably correctly, has rejected as impractical any significant use of direct 'portal emissions' in the ventilation of longer tunnels in urban areas. What is not made clear is that 'portal emission' is a technical term describing the horizontal ejection of tunnel exhaust (treated or untreated) from the tunnel portals. This technique is used in short tunnels in Sydney such as the Cahill Expressway and Kings Cross, but is unsuitable for larger tunnels because of its polluting effect on the local area.

In contrast, **vertical ejection of emission at the portals by using small dispersal structures was identified by the international experts at the Workshop as energy efficient and capable of reducing the impact of emissions up to 100 fold, compared to strict 'portal emissions'**.

It would appear that **no such investigation has been carried out. Moreover, investigation does not mean implementation** as has clearly been demonstrated by the RTA's "investigation" of international best practice.

Condition 70 and 71

The independent verification by TEC is approved. The in-tunnel monitoring and reporting system shall be approved by the EPA when construction of the tunnel is completed.

Condition 74

This condition has been satisfied (in terms of making provisions for treatment systems) on the basis that there shall be no additional development (including subdivision) on the land where the stack is located without prior approval from the Director-General. The need for retro-fitting is deferred subject to ongoing performance evaluation and other issues as defined in Condition 74.

The provision of a block of land is an extremely minimalist way of providing for the installation of treatment systems. The wording of the condition was at fault, if it had been intended that a serious provision be made for an easy installation without disruption of the service of the motorway. It is nonsense to claim that provision has been made when the installation of precipitators as envisaged by the RTA will entail the removal of concrete up to 35 cm thick!

It is evident from the local monitoring currently undertaken that exceedences will occur when the stack is operational, as has been predicted by the Child Report¹¹ several of the independent experts and the CSIRO. Under the provisions of this condition, DUAP could have required the RTA to apply both the precautionary principle, and their fiduciary duty of care and immediately install treatment systems at nearly half the cost of retrofitting.

Condition 75

Stage 1 of the monitoring network has been approved. Completion of compliance with this condition would be finalised prior to the operation stage as required by the EPA. Notwithstanding, results of hourly updated real-time monitoring of PM10, NO2 and CO at the approved monitoring locations shall be provided on the Internet and published regularly by other means acceptable to the Air Quality Community Consultative Committee. This data shall not be used as a basis for compliance/auditing purposes until the data has been quality assured by a NATA accredited consultant. The means and availability of this information shall be conveyed to the local community by way of newsletter and newspaper advertisement at least one month prior to the opening of the tunnel to traffic.

Although data has been provided to the AQCCC since July 2000, **a satisfactory final format for its presentation has not yet been achieved.** No data has as yet been made available on the internet, nor has a format been decided on by the AQCCC. Although a request for follow-up has been made by community members and suggestions submitted, no substantive discussion has occurred.

Condition 80

The AQMP shall specifically include a detailed assessment of a buy-back or replacement scheme offered to all owners of solid fuel heaters in the local air shed as part of the AQMP. The nature and extent of the buy-back scheme shall be developed in consultation with the EPA, relevant local Councils, and the Air Quality Consultative Committee. As part of the AQMP the RTA shall also undertake a detailed cost effectiveness comparison to assess the options for control of PM10 and NOx. The options shall include but not be limited to the solid fuel heater buy-back/replacement program, treatment options, the current ventilation stack, modifications to the current stack that would allow heightening of the plume during worst case conditions. The AQMP shall also include a detailed education and communication strategy.

This whole condition is objectionable. **The implicit assertion is that it is appropriate to respond to the problem of vehicle pollution by 'shifting the blame' to owners and operators of solid fuel heaters, and in some documents, barbecues.** For one thing, the ability to barbeque meat as part of family or religious festivals has vital cultural significance to many living in the area.

The RTA removed the requirements to assess options for treatment of emissions and modifications to the plume from the brief of the consultants hired to carry out the subregional air quality management plan at their final briefing before starting on the AQMP¹¹. Yet these are the two most effective strategies repeatedly identified by numerous experts, were explicitly required by DUAP, and constitute a clear contravention of the requirements of this condition.

Just as the CSIRO review was limited to comment only on the height of the stack, the scope of the AQM plan has been effectively restricted to limit its usefulness. The last minute change to an important and much

reviewed document so as to pervert its intent is a clear indication of the contempt with which the RTA holds the process of interdepartmental supervision.

It is very significant that in its August 2000 review of the ventilation system, DUAP ignored the need to review condition 76 (urban design) and 78 (community consultation)- both crucial and highly unsatisfactory aspects of the project.

4.5 Urban Design - A Case of "Masking Abhorrence"

The current location of the controversial polluting stack was determined in a highly charged political atmosphere and not according to sound planning, architectural or engineering practices and principles.

The positioning of the single stack at Turrella in a sheltered valley which experiences temperature inversions and which is surrounded by thousands of residences, was completely illogical. Since announcing the approval for the single unfiltered stack at the end of 1997, the RTA and the regulatory authorities have expended an enormous amount of energy and wasted huge sums of public money in defending this flawed, politically based decision. The urban design review is a clear case in point.

An independent urban design review, commissioned by DUAP was scathing in its criticism of the urban design undertaken for the RTA¹², pointing out its deceptiveness and inadequacy in addressing the fundamental concerns:

"The 35m stack seems more obscured in the photomontage than it would be in reality. Either the stack could be underscaled or the vantage point is chosen so as to mask impact..."

*It is clear that a twenty five metre **stack is not screened by trees** on a lower level. (page 5)*

*Although the level of **community anxiety regarding this issue is obviously very high, it seems not to be acknowledged** in this report. Nor is there any evidence in the report that the community's perception of air quality is being addressed elsewhere. Furthermore, it would appear that the urban design of the stack is being considered independently of the role that the stack is actually taking" (page.6)*

"All the crucial issues that a park environment raises - some of which are listed below- are somewhat overlooked, to the detriment of the process and resulting design¹³:

- *the scale of intervention when seen in the [Wolli Regional] park and valley context*
- *the various ways the proposal can be perceived and approached*
- *the ways it could contribute to the future design and structure of the park*
- *the impact of future residential development on the park*
- *the likelihood of increased need for public space and subsequent importance of park in the area*
- *how this large object may actually contribute to the park*
- *how the stack will be in likely future environments i.e. post future development (p.6)*

*'Though it is indeed possible to demonstrate, through carefully articulated and explained built precedent, that such infrastructure can be designed and built very well, this series of clumsily handled slides seems to have caused even greater community anxiety, perhaps reinforcing a perception that **the stack was poorly conceived** and like the images suggest, was **liable to be shoddily designed.**" (page 7)*

[Re consultation process] While many of the questions are elementary, they angered many of the respondents because they were not asked about the most fundamental aspect of the proposal, namely the impact of the stack on local air quality. Many of the respondents would like to know more about the process that the RTA and their consultants used to assess the issue of air quality and to approach the operational design of the stack. Because this issue appears not to have been seriously addressed, it continues to seriously undermine the design process¹⁴" (page 8)

It can only lead to more resentment of the RTA which could be perceived as using the community consultation process to legitimate a preordained outcome." (page 9)

*Considering the nature of the proposal and its functional role, the most positive benefit that could be pursued should relate to air quality..The public should be better informed and absolutely assured that the work to achieve best possible air quality has been done. **If these assurances cannot be made, then perhaps no architect should work on the project either.**" (page 15)*

*As a positive role in the local and greater environment has become a non issue, its benefit as a great piece of infrastructure has been downgraded and **the task has become one of masking abhorrence.** (p17).*

Following, or more likely because of this scathing review of the urban design, DUAP commissioned its own Urban Design Advisory Service (UDAS) to undertake "An Independent Consideration of the Randall Hill Background Report." While acknowledging many of the issues raised by Randle Hill & Associates (RHA), UDAS conveniently came to a totally different conclusion:

*"RHA in their report **have not adequately considered the nature of the project**, and as a result compare the current stack design with what might be achievable in more ideal circumstances. Clearly the process has been very difficult because the exhaust stack is an element the community simply do not want-whether it is well designed or not. **It is to the credit of the RTA and their consultants that they have achieved an acceptable outcome at all.***

Seen in this light, UDAS considers that there is still some potential for the design to be improved **without revisiting the entire consultation process**. The improvements relate to the proposed **materials and finishes of the stack**¹⁵.

Once again, DUAP redefines the process, scope and findings to reach the pre-determined outcome of approving a stack in a valley, regardless of how inadequate, ineffective, costly and abhorrent it might be. Seen in this DUAP light, attempting to engage or address the community's concerns is clearly pointless. **Unsatisfactory designs and processes are only revisited when they are acceptable to the community**. In approving the 35m stack, DUAP concludes:

*"A number of shortcomings have been identified in the design process. Nevertheless, this has been within the context of designing a structure which has been **completely unacceptable to the community**. Whilst there may be a case to revisit the design process **under normal circumstances, it is doubtful whether the community would be willing to contribute beyond what has already been achieved**. To some extent, a redesign with community involvement may only exacerbate current community hostility and grief towards the stack, however, at this stage, this aspect is extremely difficult to judge. **In the extraordinary circumstances of this case, it is considered that the current design outcome achieved is acceptable**"¹⁶.*

With this rationalisation, DUAP approves a 10 metre increase in the height of the stack without the inaccurate, inadequate and misleading design concept and impinging factors being revisited.

4.6 Community Consultation Issues Remain an Acknowledged Disaster

Given DUAP's stance on community involvement, it is not surprising that no modifications are made to the 1997 Condition 78. This condition required the RTA to establish a Community Consultative Committee to have input into defining air quality monitoring requirements, accessing and disseminating monitoring results and information on air quality issues and impacts. **The effectiveness of this mechanism should have been reviewed as part of the approval process, yet DUAP elected not to do so, or even to identify it as one of the 11 key issues discussed in its review.**

The disastrous nature of the M5 East community consultation process was noted by the Parliamentary Inquiry in 1999, the International Workshop, and the urban design review, with all making recommendations that this vital issue should be addressed. Furthermore, a number of letters of complaints were received by

DUAP, with three resignation letters from frustrated community representatives on the consultative committee, and a damning survey from dissatisfied residents. **Yet, from the RTA and DUAP's viewpoint, it seems that as long as these monthly meetings are held, community consultation is said to have occurred.** The fact that the RTA has consistently refused to hold any public meetings with local residents in relation to the stack has been repeatedly brought to the attention of DUAP, and ignored.

Such a deplorable stance is in direct contradiction with accepted practice and the 1992 Guiding Principles for ecologically sustainable development adopted by Federal and State Governments, which state that '*decisions and actions should provide for broad community involvement on issues which affect them*¹⁷'.

From the Departments' point of view it probably has been effective in distracting and redirecting the ire and frustration of large sections of the community by leading them to believe that they are being represented by their chosen delegates and that their concerns are being considered and addressed.

Nothing could be further from the truth. So far as any benefit to the community, the whole process has been a farcical, lip serving waste of time and money. The whole basis of power within the 'consultative process' as established by the RTA lies with the RTA¹⁸. The only public forum for consultation is the monthly consultative committee meetings, where:

- ❑ The chairperson, though nominally independent was selected by the RTA, is paid (indirectly) by the RTA and depends for further appointment on a performance which produces a satisfactory outcome for the RTA.
- ❑ The meeting agenda is fixed by the RTA and requests by community members to have particular items included or for them to provide direct input have been frustrated, ignored or refused.
- ❑ The discussions take place on premises provided by the RTA with 'hospitality' provided by them. The authority of 'ownership' pervades the whole of the proceedings.
- ❑ All discussion at community consultation meetings is limited, by the RTA and against the wishes of the community representatives to the 'approved project'. This means that any discussion of alternative technologies or ventilation systems is effectively prevented. As an example, during the discussions about the stack, no discussion was allowed about alternatives which may have made the stack redundant or about alternative positions for the stack. The only discussion was on the shape and general appearance of the stack. Other discussions and topics are only as a result of approval conditions and do not impact on the design of the ventilation system.
- ❑ The minutes of the meetings, though nominally under the control of the 'independent chair person' are effectively under the control of the RTA and have been a constant source of contention at meetings, where it is common for several hours to be spent 'correcting' the minutes. Not only has it proved impossible to make the minutes of the meetings correctly reflect the deliberations which occurred but the time used in the process of correction wastes valuable time available for discussion.
- ❑ In fixing the agenda, the RTA often provides 'overload' of detail, often not germane to the real concerns of the community, and can allow or even promote the pursuit of fruitless or trivial aspects of the project. Important information requested by the community regularly fails to be presented although it has been promised and the lack of this information has and will lead to the inability of the committee to properly discuss and decide issues. In this way the RTA is able to make essential decisions 'by default', without community input
- ❑ Because of its effectively unlimited budget, the RTA can 'overwhelm' legitimate concern and calls for information by the use of carefully selected consultants, known to be favorable to their position. Yet the RTA has no budget allocation for community representatives to disseminate information. Nor does it deem it necessary to put out regular media releases, except for three or six monthly advices of construction timetables.
- ❑ Discussion and survey results are reported as and when the RTA desires. As an example, when the designs of the stack were on public display, about half of the people who viewed the display refused to make comment, at least some on the grounds that they would not add legitimacy to the process. Of those who did comment, about one third were favorable, one third were against and the remainder were described by the RTA representative as 'rude'. This outcome was presented by the RTA as favorable and demonstrating acceptance.
- ❑ Several motivated and concerned members of the community have found themselves forced to resign from what they correctly saw as a tainted and pernicious process, while many elected representatives of the local councils rarely if ever attend.

- **Despite repeated complaints and expressions of concern to DUAP**, the ‘supervisor’ of the consultative process, no improvement has been achieved and the communications often go unacknowledged or are acknowledged months after the event.
- Members of the committee representing the community have been repeatedly criticised and accused of ‘disloyalty’ and improper practice for correctly relaying information released to them during the meetings to the press. Although the community representatives are told that it is their duty to inform the public, they are given no assistance to do so and the RTA has steadfastly refused repeated requests to hold any public meetings.

Recently, two committee members were accused by senior members of RTA staff of having organised the visit of a TV crew to one of the meetings. Although they repeatedly denied any part or knowledge of this, they were offensively and repeatedly accused in front of the meeting. The meeting was then aborted by the RTA against the wishes of the community members. Despite tabling statutory declarations denying these accusations, no proper apology was made to them, only a grudging expression of regret at the occurrence. This unacceptable and unprofessional conduct clearly shows the abject failure of the process and the contempt in which the community representatives are held. The behaviour of the RTA members would have been completely unacceptable if it had been used in relation to one of their colleagues or a member of their staff, yet deemed appropriate for two committed members of the community, giving freely of their time and effort.

DUAP were immediately informed of this intolerable behaviour, and while expressing sympathy, took no effective action to remedy the situation.

4.7 Emissions, Standards and ‘Strict Environmental Conditions’

It has been a continual claim by the Government and the RTA that the tunnel and its ventilation system is subject to the ‘strictest environmental standards’.

Why, then, does the community find them unacceptable?

They are unacceptable because the **community rejects the implicit assumption that it is proper to impose a significant, additional and avoidable toxic load of pollution on a portion of the community, even in the pursuit of improvements elsewhere.**

There is no argument that this will not occur. The outcome is freely admitted by the RTA and numerical estimates of the degree of extra pollution are documented and maps of pollutant exposure have been produced. The RTA and the Government argue that this is acceptable because the degree of extra pollution will not cause an ‘exceedence’ of the air quality guidelines set as conditions of approval for the project by the Department of Urban Affairs and Planning, on advice from the Environmental Protection Agency.

Are the air quality guidelines appropriate?

In effect the conditions state that the effluent from the tunnel is prohibited from causing the local air quality from showing levels of pollutants greater than the guidelines set by the NEPM. This is not appropriate because:

- The NEPM air quality guidelines are designed to describe and control **regional** rather than **local air quality**.
- Their use in the case of **point source emissions** (as is the tunnel stack) is specifically excluded in the documentation describing the use to which the goals should be put.
- The levels set are governed by what is reasonably achievable at the time and often vary widely from what is thought to be appropriate in other parts of the world.
- The levels are set at a level which is deemed to be 'acceptable' rather than at levels at which no ill effects occur.
- The NEPM documentation specifically accepts that **they do not give protection to 'sensitive' members of the population**. In other words, there are a significant number of people in every population who will be significantly affected by levels of pollution at or below the levels set.
- The conditions of approval are a *de facto* **licence to pollute up to the level of the NEPM goal. To the best of our knowledge such a licence is never given to an industrial or private polluter where strict quantitative limits are usually imposed**.
- The conditions of approval were set without public consultation or input.
- **No meaningful health risk analysis** has been undertaken of likely health impacts.

Furthermore it is now clear that the goal set for PM 10 (Particulate Matter) is irrelevant as the actual component of concern, **PM 2.5**, or those particles less than 2.5 microns in diameter, **are not adequately described or controlled by a standard which controls also the larger PM 10 particles**. This distinction is particularly important as it is now clear that the introduction of the EURO series of engine improvements, which it is claimed will lead to a significant reductions in vehicle pollution, will actually lead to increases in numbers of the smallest particles and potential increases in health risks.

Will the conditions of approval be met?

There is considerable doubt that the conditions will actually be able to be met, especially for PM 10. The claimed compliance is by a tiny 0.1µg and almost every competent expert who has commented on the predictions has expressed serious reservations about them. It is not unfair to comment that **the only air quality experts who seem confident that the stack will not cause 'exceedences' are those employed by the RTA.**

However it should be remembered that, so far as the local community is concerned, compliance with air quality guidelines will not ensure protection of public health. **Any additional load of pollutant imposed by the stack will cause an increase in the adverse health outcomes experienced in the area.** The only argument is by how much will they be increased.

Do the conditions of approval regarding air quality offer protection to the community?

Much has been made of the 'protection' offered by the fact that if 'exceedences' occur the RTA will be compelled to fit filtration to the stack and it is the common perception that this will be the case.

It is quite clear that even if an exceedence is established, the RTA is by no means compelled to fit filtration and that the community would still be left in exactly the same position as it is now, demanding that an intransigent government provide the appropriate protection for the maintenance of community health, and waiting for years in vain.

Will the monitoring measures called for in the DUAP conditions of approval provide any protection for the community?

Even with the monitoring stations provided for by the conditions, it will be difficult for the community to establish that an exceedence had occurred due to the complex meteorological and topographical features of the area. Due to the nature of stack dispersion, the monitoring stations can only sense the influence of the stack emissions when they are directly down wind of the stack and a shift in wind direction of less than 5 to 10 degrees will take them outside of any influence of the stack. To establish that the stack had caused an exceedence, the measurement of a station down wind of the stack would have to show levels in excess of the limit at the same time as a station upwind of the stack showed a background level below the NEPM goal.

There are two stations currently in use and a further 'community' monitoring station to be installed. All of these stations are fixed in position because they require power and are quite large (the size of a transport container). This severely limits where the stations can be positioned. It is also necessary for them to be away from busy roads or other potential sources of pollution, high or dense vegetation or the close proximity of buildings. It is inconceivable that any of the stations will be able to detect more than a small fraction of actual exceedences caused by the stack.

4.8 Conclusion

By its approval of the 35m 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. Instead of commissioning a health risk analysis and insisting on a meaningful review of the fundamentally flawed ventilation system, DUAP instead commissions more compliant reviews or trivializes criticisms.

The Department of Urban Affairs and Planning 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. The undertakings made by both Ministers Scully and Refshauge, that comprehensive and meaningful reviews would take place have proved to be empty promises.

FURY AT RULING

People protest DUAP's verdict

By JANE STRAIN

RESIDENTS opposing an official MS test stack were yesterday taking their fight to the droppings of some Parliament after a major setback last week.

As the date of going to court, organisers expect hundreds of people to turn up for a protest at Ellerslie yesterday.

Activists addressed the collection stack by the Department of Environment and Planning's 20-proposal plans for an exhaust stack at Turrella.

Residents Against Polluting Stacks (RAPS) activists gathered a "more substantial" report would have persuaded DUAP that Ellerslie was necessary and affordable.

However, the department decided air filters were not necessary to meet air quality and NOxO standards.

Instead, DUAP has required the stack to be 17m tall, 15m higher than originally planned.

The department believes the extra height will help disperse the fumes from the estimated 70,000 vehicles which will use the MS Road tunnel each day.

RAPS says the increase does not go far enough. They say the stack should be at least 20m tall to prevent the exhaust fumes flowing into surrounding blocks on the surrounding slopes.

The department has also required the MS to incorporate a local air quality monitoring system and to "consider" a lay-down or replacement scheme in all corners of central Turrella in the local area.

Department Director-General Sue Holliday said the conditions would ensure "the best possible operational, operational and visual results for the community and the MS road".

"The stack is consistent with best practice projects for emission management, technology and systems."

"The MS stack will meet world-wide standards for transport-related air quality for particulate matter."

"I know there has been considerable concern and the conditions on this planning approval reflect the community's concerns by requiring the best technology and monitoring systems possible."

Several independent and opposition MPs have criticised DUAP's decision.

Upper House Greens MP Len Hussen said the Government has not addressed the state seriously.

"The Government is consistently making fools of people protesting they can't do anything by suggesting the problem can be solved by building a road tunnel across," she said.

"We, personally, as third or fourth parties, do nothing, please should have to put up with this."



Residents protest lack of filters in the MS road stack.

¹ See Appendix 1 for copy of the relevant conditions

¹ Submission by S. Haddad and M. Hather, DUAP, 22.8.00, M5 East Ventilation Stack Assessment Report. p1

² Letter Hon. C. Scully MP to Members of the Cross Bench, 12.4.00

³ Appendix F, DUAP Director General's Report, Nov 1997

⁴ Letter Hon A. Refshauge MP to RAPS, 9.8.99

⁵ DUAP August 2000. M5 East Motorway Condition 73 Report on the Height of the Ventilation Stack Located at Turrella., p7, See also for example "As indicated elsewhere, it is not possible for the Department to relocate the stack at this point in the approval process" (p6)

"At this stage, it would be problematic for the Department to require the RTA to install treatment technologies such as electro-static precipitators as there is no clear and solid substantiation that the RTA is unlikely to comply with the specified goals. Furthermore it is not without question whether the Department could legally force the RTA to install ESPs at this stage anyway, if in the RTA's view, it has every intention in meeting the goals." (p15)

"The Department would have no legal ability to vary the goals specified under the conditions of approval at this stage of the approval. Any variation could only be initiated by the proponent, p 11.

⁶ Ibid p5

⁷ Ibid. p5

⁸ Ibid p 6

⁹ Ibid p5

¹⁰ For example, in the modelling carried out by Hyder Consulting, the maximum predicted impact of the stack for PM10 occurs on different days and in different locations depending on whether the stack is 25 or 35 metres high. This clearly demonstrates sensitivity of the measurement to external factors. The actual concentration of PM10 experienced down wind of the stack can be many times higher than the NEPM goal figure but the total exposure as measured by the monitor is determined by the time that the monitor is directly down wind of the stack. A variation in wind direction of 10 degrees could mean that houses within 30 metres of the monitoring station were experiencing exceedences but no elevated readings were being recorded by the monitor.

Furthermore, monitoring stations cannot be placed in the areas most likely to experience the highest exposures as they are occupied by housing.

¹¹ See RTA documents: Briefing Minutes M5 East Development of a Sub-regional Air Quality Management Plan, Request for Proposals, 19.12.00; Amendment to the Request for Proposals Brief for the Development of a Sub-regional Air Quality Management Plan, 19.12.00, Steve Isles, Project Manager, RTA.

¹² Randle Hill in Association with Stephen Collier, July 2000. M5 East Turrella Exhaust Stack Comparative Visual Assessment, in Ibid.

¹⁴ Community Consultation on the Urban Design

The following are just a few of the examples relating to the public exhibition of the urban design:

- When the project model and drawings was displayed at the RTA's Bexley North Headquarters, there were glaring examples of problems in the "artwork representation" with perspective and proportion. The stack, trees and figures in the drawing were individually under or over sized depending on the point of reference. As usual there was an underestimation of public intelligence and an obvious ploy to deceive the public. The model was not properly scaled contradicts this because it sought to deceive rather than inform.
- A third of respondents opposed the stack in a RTA questionnaire while another third were so disgusted that they made their feelings very clear. Many of the people most affected refused to complete the questionnaire because they did not want to be part of the flawed process. This is not acknowledged in the RTA which states that there was equal support for and against the proposal.
- The negative response to the questionnaire partly emanates from the fact that the issue of air quality was not discussed, only preferences for colour and materials for a structure that they feared.

¹⁵ Urban Design Advisory Service, undated July/August 2000?. M5 East Motorway Turrella Exhaust Emission Stack Independent Consideration of Randall Hill Background Report, in Ibid. p 8.

¹⁶ Ibid, p9.

¹⁷ 'Effective community participation can be defined a two-way investigatory and learning process or interaction and communication between the study team and the community. Basically, it is a process of collecting and analysing all the relevant facts, of presenting these data results and conclusions to the community, of obtaining the views and responses of all sections of the community, and of using all this information as input to the decision-making process.' - R T Underwood, 1978

¹⁸ Noam Chomsky aptly describes our experience of community consultation, RTA style: **"What is essential is to set the bounds firmly. Controversy may rage as long as it adheres to the presuppositions that define the consensus of elites, and it should furthermore be encouraged within these bounds, thus helping to establish these doctrines as the very condition of thinkable thought while reinforcing the belief that freedom reigns. In short what is essential is the power to set the agenda."** Noam Chomsky, 1991, Necessary Illusions, Pluto Press, p 48

5. DEPARTMENT OF HEALTH'S ROLE IN RISK ASSESSMENT FOR THE M5 EAST STACK

5.1 Advise Only When Requested

According to the Department of Health, it "...has **no legislative or regulatory requirement to participate in the assessment or approval of major developments such as the M5 East tunnel ..and..provides advice to other departments or members of the public when requested, in relation to such developments...**"¹. Thus, in the case of the M5 East single unfiltered exhaust stack, the Department of Health has defined its role as one of only commenting on the already approved the project when requested. It appears this criteria has been rigorously applied. **The Department of Health therefore seems to have been placed in the invidious position of having to support a proposal about which they may have serious reservations.**

Even when they express reservations about a project, their input appears to be ignored. For instance, in 1997, the Eastern Distributor proceeded without a supplementary EIS soon after Health warned that the RTA had failed to address serious air pollution, traffic congestion and damage to neighbourhoods in its plans.²

In addition **political interference seems to have precluded the Department of Health's involvement from an assessment of the health** outcomes of the M5East single unfiltered stack. In reply to a resident's concerns about the effects of untreated exhaust from three stacks on the M5 East, a senior officer of Health was prompted to write in a Departmental memo, "*My only concern is that this is a hot political issue at the moment and that by saying this we are weighing in against the RTA. It would not be a good look for us to be arguing with them in public...*"³

Given this situation and given that the approved ventilation system for the M5 East road tunnel was to exhaust the toxins from 70-80,000 vehicles a day, through a single stack located in a valley, subject to temperature inversions and surrounded by houses and workplaces, it is hardly remarkable that no independent verification of the pollution dispersion modelling was done nor is there any record of the Department of Health being asked to assess the potential health impacts **before** the roadway was approved⁴. It is obvious that Health would have the expertise to make such an assessment.

Drs S Corbett and V Sheppard would be aware of the difference between localised concentrations of emissions, which concerns averages over approximately 4 sq km in area and regional impacts, which concerns averages over 700 sq km, yet no challenge from the Department of Health to the RTA regarding appropriateness of the standard is recorded. Dr Corbett admitted, "**...There are real problems in applying these standards to local situations because all the assumptions that go into defining the standard at the scale of the city don't necessarily apply at the local level...**"⁵

Department of Urban Affairs and Planning officers had already appreciated the distinction when dealing with the Eastern Distributor stacks back in 1997 and sought the Department of Health's advice. Given the reservations, it is questionable why a regional standard was applied to the M5 East stack which is a point source of emissions?⁶

A Ministerial directive⁷ that material since the change from three stacks to one should not be distributed to local councils, government agencies or the public before approval may go some way towards explaining Department of Health's less than satisfactory involvement in the assessment of the health impacts of the stack.

5.2 RAPS' Approaches to the Department of Health

Alarmed by expert opinion and independent assessments of the single stack proposal, RAPS initiated a meeting with senior Health officers, which took place on 8 Sept 1999. Discussion during the meeting identified the need for independent wind tunnel testing and computer modelling of emission dispersion patterns for the M5 East stack. Importantly, these Health officers also indicated that a health-risk assessment would be appropriate and that this would be put to their Minister Craig Knowles. This request was confirmed in writing by RAPS on 18 Oct 1999.⁸ This appears to be the first time the Department of Health has stepped outside its brief.

Soon after, **Dr V Sheppard (NSW Health) is on record acknowledging very localised increases in PM10 and nitrogen dioxide levels close to the stack at Turrella identified in the, "revised EIA".** *"Modelling does not indicate that these increases will cause exceedences of current or emerging [regional] air quality standards. With increasing distance from the stack (0.5-1km) there will be little impact on current ambient levels of pollution. Electrostatic precipitators could be used to remove particulate pollutants from stack emissions. The use of such technology would reduce local levels of particulates, (RAPS' emphasis), but would principally impact on regional particulate levels."*⁹ Interestingly, this information was never conveyed to RAPS.

RAPS requested Department of Health involvement in the Parliamentary inquiry investigating the M5 East ventilation system in November 1999. Again, requests were made by phone and in writing.¹⁰

Concerned for the welfare of her students and staff, the Principal of a local primary school wrote to the Department of Health requesting a health impact study. The response was that NSW Health, **"...is satisfied that the risk to public health is minimised providing (RAPS emphasis) emissions from the stack do not result in ground level concentrations exceeding these levels.***[NEPM and Victorian EPA goals for toxic organic compounds and odorous compounds]. Therefore there is no current need to conduct a health impact study in your area..."*¹¹

Similarly the Properties Directorate of NSW Department of Education and Training could only offer a qualified reassurance as well, **"The conditions should be adequate (RAPS' emphasis) to safeguard the air quality of government schools in Turrella and Undercliffe areas.."**¹²

The fact that both Ministeries used words such as "providing" and "should be adequate" shows that certainty does not exist about the ground levels of pollution.

No Department of Health submission was made to the parliamentary inquiry and to our knowledge, no health-risk assessment was conducted.

In spite of the Department of Health's assurances that they would request an appropriate assessment of the health risks caused by an unfiltered stack, Dr V Sheppard's briefing note to the Director-General, Health, provides an entirely different slant. In response to a Parliamentary question on notice, May 2000, the briefing note states that *"Department of Health officers did not seek to conduct additional health-risk assessments, nor to make submissions to GPSC5 (General Purpose Standing Committee No. 5)."*¹³ **It would appear that either Health officers did not request a health-risk assessment as indicated verbally to RAPS or that this briefing note is designed to mislead.**

5.3 Health's Response to the 1999 Parliamentary Inquiry and 2000 Workshop

At the Parliamentary Inquiry 1999, the EPA discussed air quality standards. Dr Mc Phail was quick to point out that that his training was not in medicine, but in science and that he had learnt from his colleagues in Health that there were always going to be some very sensitive individuals within the population that these goals would not protect.¹⁴

In May 2000, the Department of Health, in response to a question in Parliament, states that it had not been informed nor sought the findings of GPSC5.¹⁵ **Another curious comment from Health concerning one of the Inquiry recommendations for a baseline health study was that even though it might be feasible to conduct a study it is questionable whether it would contribute anything significant to the current debate..**¹⁶ The likely outcome.. *"would be that there is either a negative or very small effect"*

NSW Health's belated public involvement in the M5 East project came in June 2000 at the International Tunnel Ventilation Workshop, two and a half years after the roadway with the single stack had been approved. Here participants listened to a senior Health officer's view on equity and the Department's focus on mortality to the exclusion of pollutants affecting morbidity and reduced life function.¹⁷

Discussion of the health impacts of air quality standards at the workshop was somewhat inadequate as the facilitator concluded, **"During the course of the workshop, professionals from government departments were unable, when asked, to fully explain the significance of the National Environment Protection Measures (NEPMs) in terms of the outcomes for the community."** ¹⁸

5.4 Health Justifies its Lack of Action

By September 2000, the Director-General was faced with the prospect of presenting before the Bar of the Upper House of Parliament. Health briefing notes now detail four officers', "...initial assessment of documents related to the tunnel proposal and provided responses on behalf of the Department of Health..." suggesting that the single stack proposal for the M5 East in fact was assessed by the Department of Health. This assessment has never been made public to our knowledge. Is it because Health's involvement was only to comment on issues concerning the "approved project.", Was it because the "assessment" was done **after** approval had been granted for the roadway (in Feb-Mar 1998)? Or does the reference refer to the M5 East project **before** the three stacks on a hill were changed to one stack in a valley, a different proposal with significantly different health outcomes? ¹⁹

The same memo states that, "Department of Health advice on this matter has consistently been that providing (RAPS' underlining) ground level air quality complied with health-based air quality goals, then the proposal was satisfactory." ²⁰ Aside from the likelihood that the National Environment Protection Measure air quality goals will be exceeded regularly ²¹, these air quality goals are not set at levels at which there is no risk and do not assure sufficient protection to children, the elderly or anyone with any pre-existing condition. ²²

As Dr V Sheppard stated, **"...the primary use of these goals is to gauge the effectiveness of air quality improvement programs" ²³ not as a design criteria for new projects"**

Equally its response to the CSIRO report of August 2000 was dismissive with comments such as, "Reviewed report. No change in impact...Net impact on local area still minimal, especially with 35 metre stack." ²⁴

The modelling of averages showed a number of exceedences of the standards each year, specifically not allowed by the approval conditions, and Health itself at the International Tunnel Ventilation Workshop, had stated that the adverse health effects [of vehicle exhaust] are additive and cumulative, with no safe exposure limit." ²⁵ No long-term cumulative health impact assessment was done and while Health notes that the, "...[stack approval] conditions reflect increased safety by requiring 35 metre stack, and monitoring against an annual average PM goal", **it was still not publicly suggesting the treatment of the vehicle exhaust as a safer alternative to a stack**, in a valley, within a few hundred metres of homes and businesses.

Health is more comfortable quoting reports compiled by legal experts than it is medical literature. As if to vindicate Health's position briefing notes now include, "An independent inquiry of a similar stack in Melbourne by Bongiorno QC, concurs with the position of NSW Health and the Tunnel Workshop" ²⁶ Significantly, **the scope of Bongiorno's study specifically excluded consideration of health impacts and Bongiorno QC, was not appropriately qualified to comment on engineering matters, a fact which he recognised.**

5.5 Conclusion

Various independent local and overseas experts, and the Department of Health's own studies have warned that health risks are considerable below air quality standards, and often associated with 15 minute peaks as well as long-term exposure to pollutants. The incidence of childhood leukemia, adult asthma and other heart and respiratory illnesses will rise in the suburbs of Turrella, Arncliffe, Undercliffe, Earlwood, Bardwell Park, Bexley and Marrickville as a direct result of the pollution imposed by the stack in combination with additional traffic on local streets and increase in aircraft traffic from Sydney airport. Those most particularly affected will be the children, the elderly and those with pre-existing conditions.

What is clear is that there is every reason to be worried about the effects of the stack emissions. For indisputable evidence, see Appendix 2.

¹ NSW Department of Health, Centre for Health Protection, briefing note, Vicky Sheppard to Director-General, 7 Sept 2000.

² NSW Health submission to the RTA on the Eastern Distributor, as reported by Simon Benson in, "East tollway dammed as health risk" in *The Daily Telegraph*, 12 March 1997. The report continues, "...the RTA refused to release advice or submissions provided by agencies such as the Department of Health, despite the documents being part of the public consultation process.

Simon Benson in, "RTA Clears Eastern Distributor" in *The Daily Telegraph*, 13 Mar 1997. "...It is understood that the Premier's office has intervened to quieten certain departments that had raised objections to the tollway and its environmental and social impact..."

Eastern Distributor; Northside Storage Vent quote no NSW Health assessment.

³ Infrastructure trust of Australia prospectus 1996, cited in Robert Wainwright's article, "Public's \$20m Bill For Delay in M5 East", *The Sydney Morning Herald*, 4 June 1998, page 2.

⁴ Internal memo from Rona Baruch to S Corbett, NSW Health, M5E - Air Quality Impacts,

19 Dec 1997). RAPS' comments: Approval for the roadway was announced on 9 Dec 1997, ten days before this memo. Is this half-page memo the entire health assessment done for the M5 East?

It begins, "I have reviewed the proposed M5 E Air Quality Impacts of the Ventilation Stack at Turrella Report, dated July 1997 by Holmes Air Sciences for the RTA and note the following:

The authors have carried out dispersion modelling exercises for a variety of stack design options. The options include varying the stack height, the stack diameter and exit velocity. It is important to note that varying the stack height, exit velocities and diameter, has the potential to change ground levels of NO₂ and PM₁₀..."

Nowhere are the health impacts of the expected emissions dealt with.

What impact will the emissions have on ozone formation?"

To date, there is no evidence that the impact of emissions on ozone formation has been investigated.

⁵ Dr Stephen Corbett, NSW Health, at the International Tunnel Ventilation Workshop, Day 1 transcript, page 40.

⁶ Footnote to internal memo from David Mutton, Acting Manager, Major Hazards and Assessments Branch, DUAP to Sam Haddad, documenting issues discussed at meeting with key agencies about Air Quality Issues-Roads, 15 July 1997: "the EPA does not have any standards/criteria for dealing with emissions from road tunnel vent stacks...Note that Health had originally specified that these ambient goals [for particulates and nitrogen dioxide] should be used as the standard for air emissions from stacks. Such goals are inappropriate to be used as a standard for a point source emission...Assessment of air quality issues for the M5 East is compounded by the recent changes announced by the RTA, in particular the reduction in vent stacks from 3 to 1, and its location in Turrella (ie a new site)..."

⁷ DUAP Major Assessments and Hazards Branch, minute. Subject: Issues of concern arising from meeting with RTA on 15/9/97, dated 17 Sept 1997. Meredith MacIntyre, DUAP, wrote "The RTA stated that it was not able, because of Ministerial directions, to distribute material on post-exhibition changes. Consideration should now be given to whether the Department [DUAP] should liaise with (and provide information to) other agencies such as Sydney Water and, in particular, the Hurstville, Rockdale and Canterbury Councils. Normally, the Department would rely on representations from such agencies in its assessments. However, in view of the post-exhibition changes and the lack of publicly available information, some discussion may be necessary."

⁸ Letter from RAPS to Dr Stephen Corbett, 18 Oct 1999, confirming discussions at meeting of 8 Sept 1999.

⁹ Vicky Sheppard, NSW Health to Manager, Environmental Health Branch, 9 Sept 1999.

¹⁰ Notation of phone conversation, 26 Oct 1999 and fax from RAPS to Dr Stephen Corbett requesting a NSW Department of Health submission to the Parliamentary inquiry, 8 Nov 1999. It was to be, "...a political decision..." whether or not Health made a submission to the inquiry. Yes, he had raised the issue of a health risk assessment with his Minister...

¹¹ Letter from Dr Stephen Corbett, Health, to Phyllis Frederick, Principal, Undercliffe Public School, in response to letter of 17 Feb 1999.

¹² Letter from David Rowland, Property Directorate, DET, to Phyllis Frederick, 4 Mar 1999.

¹³ NSW Department of Health briefing note to Director-General of Health, 7 Sept 2000, authors Vicky Sheppard and Stephen Corbett.

¹⁴ General Purpose Standing Committee No. 5 Transcript of M5 East Ventilation System Inquiry Evidence, 29 Nov 1999, pp46-47. Dr Mc Phail (EPA): "My training is not in medicine. I am a scientist by trade. However, what we learn, or what I have learnt from my relationship with my colleagues in Health is that, yes, there are always going to be some very sensitive individuals within the population that these goals may not protect...Certainly there may be asthmatics who will be affected by fine particles at levels below goal levels..."

¹⁵ NSW Department of Health briefing note to Director-General of Health, 7 Sept 2000, authors Vicky Sheppard and Stephen Corbett.

¹⁶ "Potential Studies on Health Impacts of M5 East" NSW Health document in RTA file, undated, but after June 2000. "While it may be feasible to conduct a study of health effects of pollutants around the proposed stack, it is questionable whether such a study can contribute to the current debate. The likely outcome of such a study would be that there was either a negative or very small effect from the proposed increases in pollutants. Either result would be contested."

¹⁷ Dr Stephen Corbett, Tunnel Ventilation Workshop, Day 1, p40. "There is a vast inequity of who is exposed to air pollution and who is not and that is a fact...Are we proposing to isolate a small group of people and relieve them of that inequity?"

p 66, "It just so happens that the studies we have done have focussed on acute effects, because I guess, rightly or wrongly, we believe that they would be the most sensitive indicators and the ones most likely to drive...regulatory processes..."

¹⁸ Arnold Dix, facilitator, in conclusion to International Tunnel Ventilation Workshop Report.

¹⁹ NSW Department of Health briefing note to Director-General of Health, 7 Sept 2000, authors Vicky Sheppard and Stephen Corbett.

²⁰ Chronology of Department of Health involvement in M5 East stack at Turrella, 7 Sept 2000

²¹ In the case of particulate matter, Australian research, supported by the NSW Department of Health and carried out in the Hunter and Illawarra areas, showed a range of adverse health responses in children between the ages of 8 and 10. All these responses were observed at levels below the NEPM goal limits, which were not exceeded during the course of the study. The findings, recently confirmed by a landmark US study, were that any increase in levels will cause an increase in the rate of illness. For example, an increase equivalent to 20% of the goal will cause an increase of chest cold incidence of 43% and night cough of 34%. Essentially, health risks are directly proportional to pollutant concentration and there is no 'safe' level of exposure.

²² International Tunnel ventilation Workshop, Day 1, page 38, Dr Stephen Corbett, "Is there a safe level or threshold for health effects rule in general? The answer for most of those pollutants is no. There are continuous effects above 0."

²³ M5 East stack briefing notes, 27 Feb 2001.

²⁴ Chronology of Department of Health involvement in M5 East stack at Turrella, 7 Sept 2000

²⁵ Day 1 of the International Tunnel Ventilation Workshop, June 2000, p36 Dr Stephen Corbett, NSW Health, "We conducted those studies in Sydney, Newcastle and Wollongong...what we were able to document was small but significant effects on important aspects of health at current levels of air pollution. We found effects on daily mortality and admission to hospital, in relation to ozone and NO₂ and PM₁₀. We found increases in admission for childhood asthma. We found increases in heart diseases admission for elderly for unit increases in particulates...effects of ozone on respiratory function in children. So at whatever kind of outcome we studied we were able to demonstrate small effects of the result of air pollution at current levels..."

²⁶ M5 East stack briefing notes, 27 Feb 2001.

6. THE 2001 PROPERTY VALUE GUARANTEE-EFFECTIVENESS, ADEQUACY, REASONS AND METHODOLOGY

6.1 Background to the Property Value Guarantee

When the current M5 East project was approved in December 1997, the RTA offered a property value guarantee to owners of residential properties within 100 metres radius of the tunnel portals or immediately above the tunnel¹.

In its submission to the 1999 Parliamentary Inquiry, RAPS argued that **it was inequitable that residents and businesses about to suffer equal or much greater damage to their health and property values due the unfiltered stack had not been offered any equivalent property value guarantee.** While RAPS from the outset identified the health issues as being of primary importance, the property value guarantee was sought as a last resort:

"If the RTA is determined, against all independent expert advice, and common sense, to proceed with this proposal as it currently stands, RAPS would urge the committee to recommend that:

- *any residential or commercial property affected be offered a property value guarantee equivalent to that offered in December 1997;*
- *the decision as to which properties are affected be made following a rigorous assessment of the air quality and visual impacts of the exhaust stack. Based on the very limited data available from the 1994 EIS, low lying areas up to a 2 km distance from the stack were identified as pollution 'hot spots'².*

The Parliamentary Inquiry in its report notes the good intention of the Property Value Guarantee but did not consider it should be extended. Rather, it recommended addressing the fundamental problem of unfiltered emissions³.

6.2 How the February 2001 Property Value Guarantee Came About

The Construction, Forestry, Mining and Energy Union began making representations on behalf of the local communities to the relevant government departments in September 1999. The union gave valuable assistance to local residents with **their campaign for over 17 months**, facilitating access to senior politicians and RTA officials, and supported their concerns about the unfiltered exhaust fumes and the unfairness of the adverse impacts on local residents' property values. Frustrated by the lack of progress in reaching a resolution, **the CFMEU placed an interim ban on the construction of the ventilation system on 12th December 2000.**

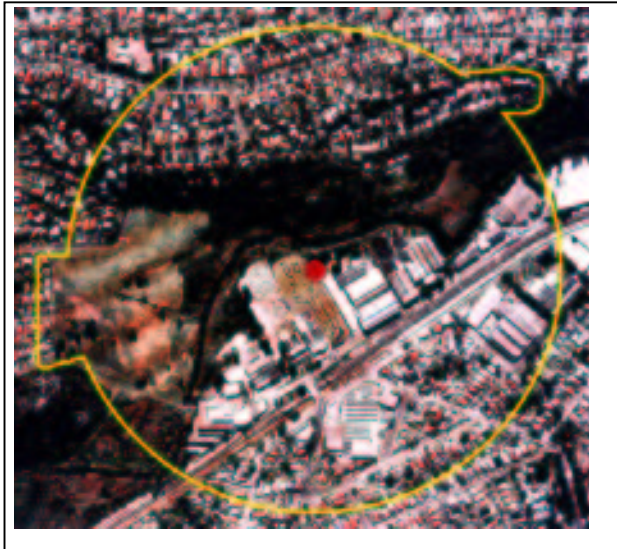
The new Property Value Guarantee was offered as a direct result of this industrial action. In its media release, following the announcement, **John Sutton, CFMEU Construction Division National Secretary, made it clear this concession was not the outcome it, or the community, had sought but at least it did provide a means of escape for some:**

"The agreement means that those most affected by the stack can now make the lifestyle choice to move out of the area knowing their properties will be valued at the market rate prior to the construction of the stack.

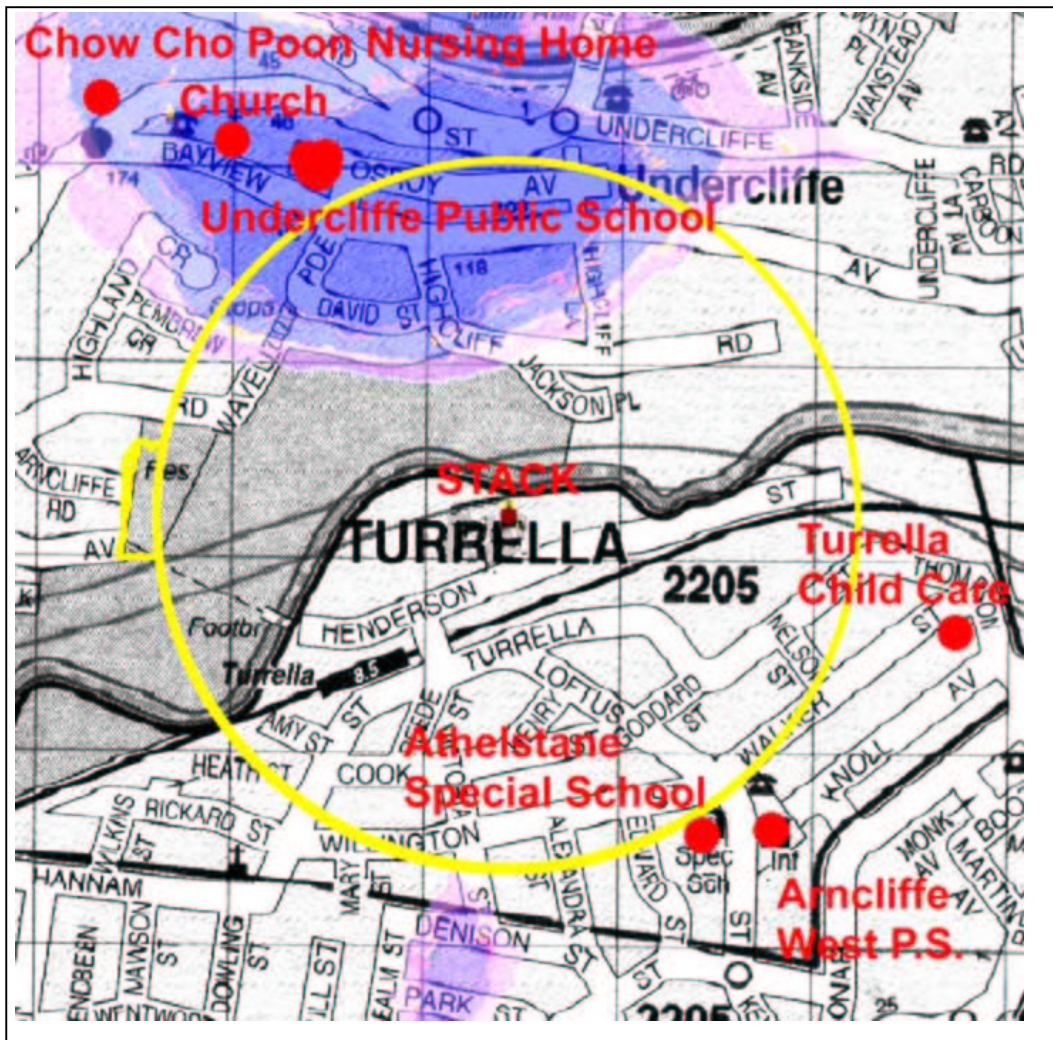
But the CFMEU is obviously disappointed that we have been unable to achieve the installation of a filtration system on the stack which was a primary objective of those affected. The Government wouldn't shift on that. The RTA's commitment to retrospectively fit a filtration system, if the air quality doesn't meet agreed standards is still in place."⁴

Minister Scully announced this offer on 13th February as a goodwill gesture, and clearly stated it was an extension of the existing 1997 offer.⁵ Home owners living within 400 metres of the Turrella stack would be able to sell their homes to the RTA at unaffected market value.

As the following two illustrations demonstrate, **there is no discernible logic behind the arbitrary 400m radius. It correlates neither with the visual catchment of the stack, nor the areas worst affected by pollution. In fact many of the worst affected homes, schools, child and aged care facilities are excluded. Furthermore, about 70% of the area comprises parkland, railway property and private businesses which are ineligible.**



400m radius superimposed on aerial photo of the area.



Map showing the top three (of six) pollution impacts from the stack .
Depth of colour shows impact.

6.3 Adequacy and Effectiveness

Despite its claim to being an extension of the existing offer, the conditions of the new guarantee differ significantly from the 1997 offer, and are much less generous. The following table is based on a comparison of the 1997 and 2001 offer documents⁶.

At two recent public meetings attended by over 700 affected residents, the audience has made its position absolutely clear. **They don't want to be driven out of their homes and local community, but may well be forced to do once the stack is operational. Furthermore, they see little sense in taxpayers' money being spent in relocating families around a toxic chimney.**

1997 OFFER

2001 OFFER

TIME SPAN	TIME SPAN
<i>"From the date of approval (9.12.1997) through the construction period" and "up to one year after commencement of the operation of the M5 East Motorway"</i>	<i>"12 months following the date of opening of the M5 East Motorway" Offer applies to property owners who owned and occupied their properties prior to DUAP stack height approval i.e. 22.8. 2000"</i>
WHO CAN GET IT	WHO CAN GET IT
<i>"Owners a of residential properties: Within 100 metres radius of tunnel portals at Bexley Road, Princes Highway and Marsh Street Located immediately above the tunnel"</i>	<i>"Owner-occupiers of properties that are generally located within 400 metres of the stack including all of Highcliffe Road, Undercliffe and properties at the end of Arncliffe Road and Findlays Avenue Turrella. "Property owners just outside the guarantee area who believe they should qualify for the scheme will be considered on a hardship basis"</i>
OFFERS AND CONDITIONS	OFFERS AND CONDITIONS
<i>"Prior to commencement of construction of the tunnels or permanent rock anchors the RTA will invite each registered proprietor of affected property to sign a lease for a period of four years at a non negotiable rental of \$3000.00 payable in advance. The lease will allow construction of the tunnel below the property.</i>	No compensation offered for noise and physical disturbance for stack pile driving, drilling to residents living within or outside the 400 metre radius.

OTHER BENEFITS	OTHER BENEFITS
<p>RTA offer also includes</p> <p>Stamp Duty \$300,000 home = \$ 8,994 \$400,000 = \$13,494 \$500,000 = \$17,994</p> <p>Combined legal fees of \$3,500.00 Removal allowance of \$3500.00 Survey fees of \$400.00 Building/Pest Report \$350.00 Disbursements \$250.00</p> <p>TOTAL: \$300,000 home = \$17,000, \$400,000 home = \$21,500 \$500,000 home = \$26,000</p>	<p>No compensation for stamp duty, legal fees, removal allowance, survey fees, building/pest reports or disbursements.</p>
OPEN MARKET AND OFFERS	OPEN MARKET AND OFFERS
<p><i>“An owner at all times is free to sell the property on the open market, if preferred”</i></p> <p><i>“If the owner does not agree with the RTA’s offer he may wait 12 months to request an updated offer or appeal to have the valuation determined by a mutually acceptable expert, valuing in accordance with this procedure. An offer will be updated once only.”</i></p> <p><i>Upon written request for appeal, the previous offer will lapse and the RTA will ask the owner to choose one valuer from a panel of independent valuers nominated by the Australian Institute of Valuers and Land Economists. The selected valuer will act as an independent expert.”</i></p> <p><i>“The RTA will commission the selected independent expert valuer and be responsible for payment of the valuer’s fees.”</i></p>	<p><i>“..the owner must be able to demonstrate that they have made a legitimate attempt to sell the property”</i></p> <p><i>“During the period of the property guarantee, the owner of an eligible property who has attempted to sell the property on the open market may request in writing the RTA to make an offer to purchase the property at current unaffected market value in accordance with this procedure.”</i></p> <p><i>If the owner does not agree with the RTA’s offer, the owner may at the owner’s expense obtain an independent valuation report from a registered valuer and submit it for the RTA’s consideration. If agreement cannot be reached between the owner and the RTA the owner in writing may request that the matter be referred to the NSW Valuer General as the final arbiter. This decision is binding.”</i></p>

As one resident put it, at best this buy out provides a means of escape out of a government-inflicted nightmare, but families will still **lose around \$20-30,000 in the process, and a great deal more in dislocating from their homes and neighbourhoods. Thousands outside the 400m radius will lose a great deal more-in property values, diminished health and public amenity.**

6.4 Conclusion

The offer is clearly inadequate, inequitable and ineffective. It was only made under the pressure of industrial action.

In the face of the RTA's intransigence, and the inadequate approval conditions, we would again urge the committee to recommend that:

'If the RTA is determined, against all independent expert advice, and common sense, to proceed with this proposal as it currently stands:

- ***any residential or commercial property affected be offered a property value guarantee equivalent to that offered in December 1997;***
- ***The decision as to which properties are affected be made following a rigorous assessment of the air quality and visual impacts of the exhaust stack. Based on the very limited data available from the 1994 EIS, low lying areas up to a 2 km distance from the stack were identified as pollution 'hot spots'.***

¹ See Appendix for "M5 East Property Value Guarantee Procedure", 1 December 1997. RTA

² RAPS Nov 1999 No Stacks near Homes, Submission to General Purpose Committee No 5, Legislative Council, p33-34.

³ General Purpose Standing Committee No 5, December 17th 1999. Report on Inquiry into the M5 East Ventilation Stack,. Report No 4, Parliament of New South Wales Legislative Council.p56

⁴ CFMEU Media Release: Workers' support pays off in M5 East Stack campaign 13th February 2001

⁵ "The decision extends the existing property value guarantee scheme for residents living close to the tunnel entry and exit points for the motorway now under construction." Minister for Transport, Minister for Roads Media Release 13th February 2001, Property guarantee for M5 East Stack.

⁶ **SEE APPENDIX 3 FOR "M5 EAST PROPERTY VALUE GUARANTEE PROCEDURE" DATED 1 DECEMBER 1997 AND THE "INFORMATION SHEET M5 EAST STACK – PROPERTY VALUE GUARANTEE PROCEDURE" DATED 6.3.01.**

⁷ RAPS Nov 1999 No Stacks near Homes, Submission to General Purpose Committee No 5, Legislative Council, p33-34.

7. ENERGY COSTS AND GREENHOUSE GAS IMPLICATIONS OF THE TUNNEL

7.1 State Governments Commitment to Green House Reduction

In November last year the following motion was put in the NSW Legislative Assembly:

CLIMATE CHANGE Urgent Motion

Ms MEGARRITY (Menai) [4.00 p.m.]: I move: That this House:

1. notes the suspension of the Sixth Conference of Parties to the Kyoto Protocol under the United Nations Framework Convention for Climate Change in The Hague;

2. commends the NSW Government for its leadership in providing workable solutions to global climate change such as carbon trading, anti-salinity measures and the rehabilitation of degraded lands; and

3. calls on the Commonwealth Government to take a similar leadership role and broker global co-operation on the most serious environmental issue facing the world today.

The motion was carried.

Although the motion is strange in that it did not mention the possibility of direct action by the NSW government to reduce the energy consumption of its enterprises, **it is obvious that the current government at least claims to be concerned about the excessive production of greenhouse gases.**

7.2 Energy and Greenhouse Implications of the M5 East Stack

From the time when the M5 East tunnel project was changed from having 3 stacks to the current single stack it has been known that the change would increase energy usage significantly.

Although the actual amount of extra energy was misreported by Evans and Peck in the documentation in 1997, the likely cost of the extra energy required was correctly reported as being **about \$2 million. This alone should have been sufficient to alert the RTA and the Government that there were serious problems with the design as it represented an almost 200% increase** in potential running costs.

The fact that the greenhouse gas implications of the proposed project were erroneously quoted as being between 25 and 40 tonnes by Evans and Peck and this error was repeated in the DUAP Director General's report Nov1997 and used as recently as last year, raises serious concern **about the competence of those concerned in the assessment process.**

The correct value for this impact is between **25,000 and 40,000 tonnes of greenhouse gas per year** and the propagation of the error in this way showed that those using it had no idea of its implications. 25 tonnes of greenhouse gas is equivalent to the domestic energy usage of two or three households.

Equally, in his evidence to the 1999 Inquiry the RTA Senior Project Manager, John Anderson could not identify the energy costs of the ventilation system. In June 2000, at the Workshop he was still unable to provide this information. As discussed earlier (see section 2.2 p7-8), the issue of energy costs and associated greenhouse implications was one that **received scathing criticism from the international experts, with some of them remarking they would not be allowed to be so wasteful by their governments.**

Yet DUAP's examination of energy and greenhouse concerns in its August 2000 report was a trivial reportage of gossip and misconceptions. It noted and then ignored the "extremely large" costs associated with the stack and showed a lack of understanding of the potential of available technology. In reviewing the design took no account of the information about costs, waste, operations and more viable alternatives made available by the international experts.

According to the NSW RTA, the energy cost of the ventilation system for the M5East will be 32 Gigawatt hours per year or about \$2 million, (@ 6 cents / kw. hr). This is equivalent to 32000 tonnes of greenhouse gas.

The Swiss experts at the June 2000 international tunnel conference, after referring to their government's insistence on energy efficiency, described a similar tunnel constructed recently with an energy consumption **between 1/50 and 1/100 of this**.

It is not unrealistic to suggest that the energy usage and consequently the greenhouse gas implications could be **reduced by 80%** by a more competent and innovative design using existing filtration technologies. Even without major change to the current design, it appears possible to obtain significant reductions in energy costs, by perhaps one third, according to some of the proposals made recently to the RTA by manufacturers. It is clear that energy costs are rising and will rise significantly in the future, especially for the peak load consumption which is required by the tunnel vent system.

The extent and justification of this claim of improved energy efficiency is shown in the comparison made of the current M5East design to three Japanese tunnels in current use.

7.3 Comparative Costs of Tunnel Ventilation

These figures are taken from a paper that was given at the World Road Congress at Kuala Lumpur in Oct'99 by some Japanese researchers who compared the costs of running a number of tunnels using different ventilation systems.¹ **Two of the tunnels are of comparable length to the M5 East and one is almost three times as long.**

Three tunnels were examined

- Sasago has a Transverse system with stacks.
- Fukuchiyama is a longitudinal ventilated tunnel using jet fans with electrostatic precipitators along the length and apparently no stack, but portal emissions. (Remember if only EP were fitted to the M5east, a stack somewhere would be needed to disperse NO₂ and CO).
- Kan-Etsu is a long tunnel with stacks which was refitted with EP inside the tunnel in by-passes and it still uses two stacks and portal emissions.

The authors also compared the cost of the old transverse system in the Kan-Etsu, and examined and analysed maintenance and replacement costs. They reported that the change from transverse to longitudinal ventilation with **electrostatic precipitators reduced electrical consumption in the tunnel by 53% and concluded that longitudinal systems with electrostatic precipitators had a life time cost advantage over transverse systems of 2:3.**

They also concluded that **"Continuous longitudinal ventilation systems using electrostatic precipitators consume relatively small amount(s) of electric power and are deemed economical systems in terms of total cost including the equipment maintenance and repair cost"**. This supports what John Day and Franz Zumsteg said at the tunnel ventilation conference.

As the information they gave was very detailed, it is possible to make a realistic comparison of the costs of the three Japanese tunnels and the M5 East, using information in the Air quality modelling documents and information supplied by the RTA on projected energy consumption by the tunnel ventilation system.

Comparison of the Cost of the M5 East and the Japanese Tunnel

	M5 East	Sasago – Transverse with stacks.	Fukuchiyama Longitudinal-Jet fans	Kan-etsu Longitudinal- Exhaust shafts
Exhaust treatment	None	None	Precipitators	Precipitators
Total length km (two tubes each)	8.2	8.8	7.2	22
Design Vehicle Per Day	76818	87400	55600	33400
Average VPD (actual)		45700	30900	21100
Heavy Vehicle %	14.7	26.7	34.1	26.6
V km per day (actual)	629908	402160	222480	464200
Installed fan capacity (Mw).	12	10.3	2.6	9.5
Annual power consumption. Gwh/yr	32.5	4.16	0.707	9.3
An. power cons per km tunnel. Gwh/km/yr	3.963	0.473	0.098	0.423
Av. Power Cons per day. Mwh	89.04	11.40	1.94	25.48
Av.power Cons/(actual) vehicle km (w)	141	28	9	55
Allowance for No. of heavy vehicles (1 Hv = 5 Lv)	1000293	831667	525943	958109
Av.power Cons/Light vehicle equiv. km (w)	89	14	4	27

The one thing which stands out above all others is that on every possible comparison, the M5East consumes 3.5 times more electricity than even the most expensive of the Japanese tunnels. Added to this, the complexity of the mechanical ventilation components, with its high proportion of axial fans, will put it in a class of its own regarding maintenance costs.

This is undoubtedly what the RTA meant when it claimed that the M5 represented 'world's best practice'!

¹ DUAP 2000 Op Cit, Page 9

¹ IWASAKI,T., YAGI,H., ERA.Y. & KODA.T.: Operation cost comparison between different ventilation systems based on actual cost data. PIARC XX World road congress. Kuala Lumpur 1999

APPENDIX 1

1997 DUAP CONDITION OF APPROVAL –AIR QUALITY ASPECTS

APPENDIX 2

SELECTED MEDICAL REFERENCES ON COMMUNITY HEALTH IMPACTS OF VEHICLE POLLUTION

Health Literature

1993. Dockery, D.W., Pope, C.A., et al. An association between air pollution and mortality in six cities. *NEJM* 329.24 pp1753-1759. After correcting for smoking, an association is noted between air pollution and mortality and specifically with fine particle pollution. "The 6 cities study"

1996. Seaton, A. particles in the air: the enigma of air pollution. *JRSM*.89(11) pp.604-607. Examines the plausibility of the evidence for an effect by small particles. Compares exposure to 'general' fine particles to exposure to specific exposure to smoking, asbestos, titanium dioxide and teflon.

1997. Rusznak, C.; Bayram, H.; Devalia, J.L.; Davies, R.J. Impact of the environment on allergic lung diseases. *Clinical and Experimental Allergy*. 27 sup1. pp.26-35. Notes delayed effects of up to 4 days after exposure to NO₂, SO₂, and PM₁₀ to asthma. Discusses effects of combined and pre-exposure. In conclusion: "Taken together, the findings of both epidemiological and laboratory-based studies provide evidence that exposure to air pollutants generated from petrol and diesel burning engines are likely to precipitate attacks of asthma and rhinitis and possibly contribute to the increase in prevalence of these disorders."

1998. Morgan, G., Corbett, S. and Wlodarczyk, J. Air pollution and Hospital admissions in Sydney, Australia, 1990 to 1994. *AJPH*.88(12)pp.1761-1766. Associates childhood asthma and heart disease with NO₂ and COPD with both PM₁₀ and NO₂. Heart disease in the elderly associated with NO₂, ozone and PM₁₀. Current levels of air pollution in Sydney are associated with increased hospitalization for respiratory and heart disease.

1998. Lewis, P.R.; Hensley, M.J. et al Outdoor air pollution and children's respiratory symptoms in the steel cities of New South Wales. *MJA*. 169: pp459-463. Significant adverse health outcomes in children between 8 and 10 years, related to PM₁₀ below NEPM goals. "These results provide evidence of health effects at lower than expected levels of outdoor air pollution in the Australian setting."

1999. Dora, Carlos. A different route to health: implications of transport policies. *BMJ* ,.318:pp1686- 1689.

Quote.-Air pollutants Current exposure to air pollutants found in European countries has serious effects on health. Particulate matter is a good indicator of the air pollution mix that people are exposed to and has been associated with short term and long term increases in mortality.

It is estimated that a change in air pollution from the highest to the lowest amounts documented in studies in the United States of the long term effects of air pollution (particulate matter smaller than 2.5 µm around 30 µg/m³ of air and 10 µg/m³ of air) could conceivably be associated with a change in life expectancy in the order of years. [12] Another estimate suggests that Dutch men could gain over a year in life expectancy from a reduction in the concentration of particulate matter smaller than 2.5 µm to around 10 µg/m³ of air.

Particulate matter is also associated with increases in respiratory symptoms, greater use of drug treatments in people with asthma, reduction in lung function and admission to hospital for respiratory and cardiovascular disease. No threshold could be identified below which health effects were not found. In northern Europe, about 40% of particulate matter comes from traffic. Small particles can get indoors freely and can travel long distances, so neither the indoor environment nor distance from roads offers much protection.

Ozone seems to have an independent effect on respiratory symptoms.

1999. Zmirou, D. MD. et al. Health effects costs of particulate Air pollution. *JO&EM*, 41(10) pp847-856. Estimates the cost of diseases attributable to particulate matter as FF107 million (Euro16.3million) per annum per million population. 67% of cost occurs at PM₁₀ levels below 50µg/m³.

2000. Bjornback, M.; Bylin, G, et al. Impact of NO₂ on Health: exposure in Road Tunnels. PIARC Committee on Road Tunnels WG No2 "Pollution, environment and ventilation". Reports delayed asthmatic reactions in 30 minute exposure to relatively low NO₂ (200 µg/m³) under simulated tunnel conditions, especially in asthmatics.

2000. N Künzli, R Kaiser, S Medina, M Studnicka, O Chanel, P Filliger, M Herry, F Horak Jr, V Puybonnieux-Textier, P Quénel, J Schneider, R Seethaler, J-C Vergnaud, H Somme. Public-health impact of outdoor and traffic-related air pollution: a European assessment *The Lancet*, Vol 356, September 2, 2000. A study of the impact of outdoor (total) and traffic-related air pollution in Austria, France, and Switzerland. Air pollution caused 6% of total mortality or more than 40 000 attributable cases per year. About half of all mortality caused by air pollution was attributed to motorised traffic, accounting also for: more than 25 000 new cases of chronic bronchitis (adults); more than 290 000 episodes of bronchitis (children); more than 0.5 million asthma attacks; and more than 16 million person-days of restricted activities. Although individual health risks of air pollution are relatively small, the public-health consequences are considerable. Traffic-related air pollution remains a key target for public-health for economic valuation, should guide decisions on the assessment of environmental health-policy options.

2000. Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma. *JAMA*, Vol 285, pp897-905. During the Olympic Games, the number of asthma acute care events decreased 41.6% (4.23 vs 2.47 daily events) in the Georgia Medicaid claims file. Peak daily ozone concentrations decreased 27.9%, from 81.3 ppb during the baseline period to 58.6 ppb during the Olympic Games. Conclusions . Efforts to reduce downtown traffic congestion in Atlanta during the Olympic Games resulted in decreased traffic density, especially during the critical morning period. This was associated with a prolonged reduction in ozone pollution and significantly lower rates of childhood asthma events. These data provide support for efforts to reduce air pollution and improve health via reductions in motor vehicle traffic.

2001. US Minnesota Pollution Control Agency www.pca.state.mn.us/hot/legislature/reports/2001/at-appendix-b.pdf APPENDIX B DRAFT Particulate Matter: Concerns and Trends. Comprehensive review of the research literature on adverse health impacts.

APPENDIX 3

- (a) 1997 PROPERTY VALUE GUARANTEE
- (b) 2001 PROPERTY VALUE GUARANTEE