

REPORT OF PROCEEDINGS BEFORE

GENERAL PURPOSE STANDING COMMITTEE No. 5

**INQUIRY INTO NORTHSIDE STORAGE
TUNNEL —SCOTTS CREEK VENT**

**At Sydney on
Monday 9 October 2000**

The Committee met at 10.00 a.m.

PRESENT

The Hon. R. S. L. Jones (Chair)
The Hon. A. Fazio
The Hon. J. H. Jobling
The Hon. J. R. Johnson
The Hon. M. I. Jones
The Hon. A. B. Manson
The Hon. J. F. Ryan

This is a privileged document published by the Authority of the Committee under the provisions of Section 4 (2) of the *Parliamentary Papers (Supplementary Provisions) Act 1975*.

CHAIR: I welcome the media and members of the public to this hearing of General Purpose Standing Committee No. 5 which is inquiring into the Scotts Creek vent of the Northside storage tunnel. Under Standing Order 252 of the Legislative Council, this Committee has resolved to authorise the media to broadcast sound and video excerpts of its public proceedings held today. The Committee's resolution conforms with the guidelines governing the broadcast of proceedings adopted by the Legislative Council on 11 October 1994. The attendant on duty has copies of the guidelines.

I emphasise that only Committee members and witnesses before the Committee may be filmed or recorded. People in the public gallery are not considered to be part of the proceedings and, therefore, should not be the primary focus of any filming or photographs. In reporting the proceedings of this Committee, as with reporting the proceedings of both Houses of Parliament, the media must take responsibility for what is published or what interpretation is placed on anything that is said before the Committee.

I wish to advise members of the public that our committees are regarded as extensions of the Legislative Council, governed for the most part in the proceedings by the same rules which prevail in the House. Whilst the Committee welcomes members of the public, they should observe the same courtesies as are expected of the public attending the House when it is sitting. Visitors in the public galleries are required to refrain from any interruption to proceedings or discourtesy to the Legislative Council, particularly any interjections or demonstration of support or dissent in relation to these proceedings. Should members of the public have any particular requests, they should advise the Committee staff.

DONALD ANDREW JOHN WILSON, Chief Health Officer, NSW Health, 73 Miller Street, North Sydney, and

DOMINIC EDMUND DWYER, Medical Virologist, Institute of Clinical Pathology and Medical Research, Westmead Hospital, Westmead, sworn and examined:

GWENDOLYN LESLEY GILBERT, Medical Microbiologist and Infectious Disease Physician, Centre for Infectious Diseases and Microbiology, Westmead Hospital, Westmead, affirmed and examined:

CHAIR: In what capacity are you each appearing before the Committee?

Dr WILSON: As the Chief Health Officer of New South Wales.

Dr DYER: As an expert witness.

Professor GILBERT: As an expert witness.

CHAIR: Did you receive a summons issued under my hand in accordance with the provisions of the Parliamentary Evidence Act 1901?

Dr WILSON: I did.

Dr DYER: I did.

Professor GILBERT: Yes, I did.

CHAIR: Are you conversant with the terms of reference of this inquiry?

Dr WILSON: I am.

Dr DYER: Yes.

Professor GILBERT: Yes.

CHAIR: If any of you consider at any stage during your evidence that in the public interest certain evidence or documents you may wish to present should be heard or seen only by the Committee, the Committee would be willing to accede to your request and resolve into a confidential session. However, I warn you that the Parliament may override that decision at any time and make your evidence public. Do you wish to make an opening statement?

Dr WILSON: In my role as the Chief Health Officer of NSW Health I undertook to establish an expert panel to provide advice to this Committee with regard to any possible health impact that may be associated with the northside tunnel and the vents associated with that tunnel. I undertook that because I believed that the Committee would appreciate the advice of that group. I have forwarded you a letter setting out the advice that has been given to me from that committee as a summary of its findings.

The Hon. M. I. JONES: Dr Wilson, have you been in receipt of any transcripts of evidence or copies of submissions from any member of this Committee?

Dr WILSON: From anybody on this Committee?

The Hon. M. I. JONES: Yes.

Dr WILSON: I have received no submissions from a member of this Committee that I am aware of.

The Hon. M. I. JONES: Can you say for certain?

Dr WILSON: Personally I have received no contacts and I am not aware that anyone in the department who is responsible to me has received a transcript of evidence received before this Committee, other than those that would be available to us through Hansard.

The Hon. A. B. MANSON: You established an expert panel. Are the members of the panel experts in New South Wales, Australia or internationally? How broad is their experience?

Dr WILSON: The members of the committee who are not members of the Department of Health would have international reputations in the area in which they work. I would consider them to be the top people in the field in which they are being asked to advise.

The Hon. A. B. MANSON: In the world?

Dr WILSON: In the world.

The Hon. M. I. JONES: What information can you provide the Committee with at this hearing that was not available at the previous hearing?

Dr WILSON: The information we bring today is the advice of the group of experts that I convened to advise this Committee. As I say, a summary of their findings have been provided to you.

The Committee subpoenaed two members of that group to represent the expert panel so that you may have the opportunity to question the basis on which they have provided that advice. I have laid before you the information that I have received and the Committee also has a copy of all the papers that the department is holding in relation to this matter.

The Hon. M. I. JONES: Why is this information available at the second hearing but was not available to be brought before the Committee at the previous hearing?

Dr WILSON: The advice you have received is from the expert panel which was convened as soon as I was able to do so for the purposes of informing this Committee. It may have been unfortunate that it was not available to you at that time, but as soon as I became aware that this information would be useful to you I convened the committee as soon as I could.

CHAIR: Were you not aware until after that hearing that the information would be useful to us?

Dr WILSON: At that point in time the information we had already provided to you was that it was the department's opinion, based on an assessment of the evidence, that there are little or no health consequences associated with the venting.

CHAIR: Little or no health consequences?

Dr WILSON: I was concerned that as well as that advice the Committee should have some independent advice from people with international reputations. I believe that what we were giving you was additional information of some substance in that regard.

The Hon. A. B. MANSON: Professor Gilbert, in evidence to the Committee, Associate Professor Kearney has stated that there is potential risk of other pathogenic organisms, including golden staph, being emitted from the vents and causing a health risk to the community. Do you agree with that assertion?

Professor GILBERT: No, I do not. I think the chances of any pathogenic micro-organisms at all being released from the vent are extremely small. Therefore, it is difficult to make any assessment of what organisms they would be because, to be honest, I do not think that there will be microbiological organisms released from the vent.

CHAIR: Did you inspect the filters yourself?

Professor GILBERT: No, I did not.

CHAIR: Are you aware of the filters?

Professor GILBERT: Yes.

CHAIR: Are they actually filters or deodorisers?

Professor GILBERT: If I could perhaps go back a step, I think the chances of micro-organisms even getting to the filters are negligible. As I understand the set-up of the tunnel, the flow of air and sewage and so on, the filters are really a back stop, mainly to remove odours, and they will not be needed to remove micro-organisms because they will not get even to the bottom of the filters, let alone through them.

CHAIR: They will not get even to the bottom of the filters?

Professor GILBERT: That is my assessment from what I have read of the information and I have seen the model of the system.

CHAIR: You have not visited the plant?

Professor GILBERT: I have been to the northside tunnel installation and looked at the model. I have not visited the plant itself, no.

CHAIR: How was the panel provided with its understanding of the operation of the northside storage tunnel, the operational characteristics of the activated carbon filter and the trade waste chemicals likely to be present in the sewage? What other independent inquiries did the panel make into these matters, particularly concerning the measures taken to prevent the emission of aerosols and the operational characteristics of activated carbon filters used to treat humid sewer ventilation air? Perhaps all three of you might like to answer that.

Professor GILBERT: We were provided with information from Sydney Water and the Northside Tunnel Alliance. We saw the operation of the tunnel. We have reviewed a number of relevant references, although my understanding is that there is relatively little information about the exact mechanism of the operation of carbon filters as far as microbial aerosols are concerned. However, they are regarded as being effective depth filters in rather different circumstances from the current one but they are regarded as being an efficient barrier to aerosols. I guess our sources of information are that we have been briefed by Sydney Water, the Northside Tunnel Alliance and New South Wales Health and we have made an independent assessment of what literature is available.

CHAIR: What evidence was given to you that there were efficient barriers or did you have this understanding yourself?

Professor GILBERT: I had this understanding myself. I have reviewed a chapter from a well-respected textbook written by a colleague of mine from Melbourne.

CHAIR: Who is that?

Professor GILBERT: Dr Margaret Peel, who is the co-author of a standard text on sterilisation and disinfection. She mentions carbon filters relatively briefly, I must say, and she told me in a conversation last week that there was a fairly small amount of evidence in the literature where these have actually been tested as microbial filters. I hasten to add that that is not their main purpose in this situation anyway.

CHAIR: Is it their main purpose at all?

Professor GILBERT: As far as I understand it, it is believed—and certainly on the evidence that I have seen it seems fairly reasonable to believe that there will be no need for microbial filtration at this point. Removal of some aerosols may be necessary and my understanding is that the carbon filters will do that quite efficiently.

Dr DWYER: I joined the expert panel the same time as Professor Gilbert and I have received the same information concerning the tunnel as Professor Gilbert and every other member of the expert panel. In terms of the workings of the tunnel, I have seen the model. I have not visited the site formally. As regards the filter, my understanding is that the filter is there primarily as an agent to remove odours and gases. Its main function is not as a microbial filter, although there is no doubt it would have some effect as such. My understanding of the model and the documentation we have

received is that the likelihood of significant numbers of micro-organisms actually getting into the filter is low, given the various measures that have been put in place to prevent that.

CHAIR: What measures are those?

Dr DWYER: The heights of the tunnel and the way the air flow and water flow are designed in the tunnel, the various small chambers that air and so on goes to prior to reaching the filter, as explained on the model from Sydney Water. My personal feeling is that the risk of significant amounts of organisms emerging from that vent are very low.

CHAIR: Were you told that the volume of air that would pass through it would be at maximum flow at times?

Dr DWYER: We certainly received information on air flows and so on at various stages of the use of the tunnel, ranging from when it is not in use, which I understand to be the great bulk of the time, to the few occasions that it would be in maximum use, and I certainly saw information about air volumes and so on.

CHAIR: You would not be able to recall what information you were given about the airflow?

Dr DWYER: Not formally, no.

CHAIR: It is actually eight metres per second apparently.

Professor GILBERT: Might I just interrupt. I was certainly given that information and I reviewed it over the weekend. I found it of interest that I had not realised up until this point that eight metres per second is the absolute maximum air flow and that is said to be likely to occur a few hours per year, something like 30 hours per year, and even in the relatively small number of days per year that any air will be coming out of the vent, it is likely to be well below the maximum.

The Hon. J. H. JOBLING: I would like to put two specific questions to each of you in turn and ask you to think carefully about them. I put the questions firstly to Professor Gilbert as the Chair of the expert panel on the basis that she is an expert witness before this Committee. Are there any matters that you are aware of that relate to the northside tunnel and specifically to the Scotts Creek vent either personally or that were discussed by the committee that are of concern to you personally and should be brought to this Committee's attention or any other matters that are known to you and that you may wish to bring to this Committee's attention today?

Professor GILBERT: No, there is nothing other than the documentation that I think you have all seen and we have all seen that I know of. Apart from what is documented I know of no other matters that I think are relevant.

The Hon. J. H. JOBLING: Dr Dwyer?

Dr DWYER: No, I have no other matters to bring forward to the Committee. To my way of thinking the whole process was perfectly appropriate.

The Hon. J. H. JOBLING: Dr Wilson, on behalf of the New South Wales Health Department I put the same two very specific questions to you.

Dr WILSON: No, and my department has not provided any advice to me that suggests there are any concerns other than those being discussed around the table which are in the *Hansard* recorded

proceedings or in the other papers that have been circulated to you associated with the deliberations of the expert panel.

The Hon. A. B. MANSON: Professor Gilbert, can you provide the Committee with a brief overview of the expert panel's findings and the processes that have taken place?

Professor GILBERT: The expert panel has had two meetings and we have exchanged a number of documents relating to the proceedings. We have reviewed the mechanics of the northside tunnel and the rationale behind it, the various structural measures that have been put in place to review it and we have also looked at, at least on paper and on video, the alternatives and what the tunnel has been built to replace and to overcome. We have discussed at some length possible problems that could arise, particularly in relation to worst case scenarios. We have reviewed the precautionary principle document, which I think outlines the worst case situations with a combination of worst case scenarios each compounding the other. We have reviewed literature related to organisms in the air relating to sewage treatment works, which we think are not directly relevant to the situation but are still of some interest. We have reviewed a number of studies that look at the health of people associated with sewage treatment plants. To my knowledge there are no such studies in relation to this sort of air vent.

We have reviewed Professor Kearney's concerns, both on paper in that we have reviewed the transcript of his evidence to this Committee, and we met with him at one of our meetings. The conclusion that we have come to is that notwithstanding all the concerns that have been raised by the community, which are understandable, and other concerns raised by others, we feel that there is no risk to health. It is always very difficult to be absolutely dogmatic about a situation that is unique—and all these situations are unique and complex—but we feel there is no plausible risk to the health of the children at the school in the area or to any of the local residents, including any who may be elderly or otherwise ill.

CHAIR: So you can state unequivocally that there will be no health risk to the schoolchildren or the residents from emissions from this vent?

Professor GILBERT: That is not quite what I said. I said that we feel there is no plausible reason to believe that there is no evidence that there would be—as I said it is a very complex situation.

CHAIR: There is no evidence because no evidence has been taken?

Professor GILBERT: I guess the evidence that we looked at was the situation of sewage treatment plants and the studies that have been done in relation to that. Now we believe that although a sewage treatment plant is a completely different situation, if anything it is much worse in terms of the amount of aerosols and organisms released into the air.

CHAIR: But there have been no studies that you are aware of.

Professor GILBERT: There have been no studies that I am aware of in relation to a vent like this.

CHAIR: So there would not necessarily be no risk. There have been no studies to give evidence of risk.

Professor GILBERT: That is exactly what I was trying to say but to go back one step further, we have also reviewed this and given that we are not engineers or experts in engineering, we have no reason to doubt the very plausible precautions that have been taken in the construction of this tunnel to prevent the exit of contaminated air, particularly from this vent. We believe that the air that is

actually vented from this air vent is unlikely to contain microorganisms and, of course, if it does not contain micro-organisms there clearly can be no risk.

CHAIR: You cannot say there is no risk.

Professor GILBERT: All I can say is there is no plausible risk as far as we are concerned as experts. We believe that there is not any reason to believe—and I guess that is different from saying there is no risk. You can never say there is no risk under any circumstances and that is a reasonable thing to say but I can say that there is no plausible risk.

CHAIR: And Dr Dwyer, you would have the same view?

Dr DWYER: I have the same view that there is no plausible risk of transfer of organisms into the environment and, going from that, the development of clinical disease in people who should be exposed to such organisms. This tunnel also appeared to me to be a significant improvement on what has previously been in place.

The Hon. J. F. RYAN: When you say this is a significant improvement to what else has been in place, two factors are involved there and I am wondering how much weight you gave to them. First, this is not like any ordinary sewerage vent in that the material which passes through it is going to be collected from a fairly wide area and forcibly ventilated by fans, so the volume of air going through this vent will be significantly greater than one would get from the ordinary stink pipes one sees around the place. That is a significant and genuine concern of the community. This is not a vent that will operate with the distribution of air that we would normally have. The air from this vent will be fan forced into the community at a concentrated local point and with a wide area of distribution. What weight did you give to those additional perhaps risk factors?

Dr DWYER: I think that was considered quite carefully. What was striking about, for example, the video showing the current system, with an overflow of sewage out through an overflow pipe, at Scotts Creek anyway, quite close to a school and other houses, looked to me, both in terms of the number of days per year that that system was operating, and the sort of shower of water and so on that was occurring, to be a potential risk as it stood.

CHAIR: What sort of risk are you talking about?

Dr DWYER: I guess I was talking about the spread of droplets of aerosols into the air from a jet of water containing sewage.

CHAIR: What risk is contained in that?

Dr DWYER: I cannot quantify that risk, but one could assume that the generation of aerosols from water containing sewage may be significant.

CHAIR: Would there be a plausible risk from that?

Dr DWYER: I would imagine there would be a plausible risk from the current situation, yes. But I cannot quantitate that.

The Hon. J. F. RYAN: You took into consideration the volume of air that would be ventilated and the distribution. One of the factors put to the Committee earlier was that people do get more used to the bugs that are close around them than they are to ones that are perhaps gathered from elsewhere.

Over a period of time the potential risk of that spray may have been something to which local people had immunity.

Dr DWYER: I do not know of any evidence to show that people in one part of Sydney are more used to organisms in that part of Sydney than from any other part of Sydney, nor on any other comparable study elsewhere.

The Hon. J. F. RYAN: The other area of concern is that, whilst the spray has a dramatically greater capacity to create aerosols, it is an event about which the local members of the community say: well, it comes and goes, and the sewage that is distributed is, for want of a better word, fresher than perhaps stuff that has been left in the tunnel for a period of time. They are getting a very different sort of sewage because the material in the tunnel will be different from what is discharged in terms of its age.

The Hon. A. B. MANSON: That is because it comes from the western suburbs? Is that what you are saying, John?

The Hon. J. F. RYAN: I am not trying to be funny. These are serious matters. The tunnel is not going to be vacuum cleaned each time it is used; it will have left in it an element of material that will be able to grow cultures and so on. The argument runs that the very first flush of material that goes through the vent will be material that has been in the tunnel for some period of time, unlike a sewerage system that simply carries sewage that is not materially different from that which is discharged from a water closet in a person's home. It is not changed in its nature in terms of its freshness. Material that has been left to grow for a while is what they are worried about; it is not sewage per se.

Dr DWYER: I am not sure what the answer to that is, except that my initial feeling would be that fresh sewage is of more concern in respect of all organisms that are dangerous to humans than is sewage that has been left for long periods of time. We are quite happy to put relatively old sewage in gardens, and that sort of thing. It is raw, fresh sewage that is more likely to contain significant microorganisms.

The Hon. J. H. JOBLING: But the material put into the garden has been treated scientifically with ultraviolet and heat processes.

Dr DWYER: I am not sure. Again, the relative merits of fresh versus stale sewage is not my area of expertise.

The Hon. J. F. RYAN: Isn't that something you should have considered? You say it is significantly better than the previous situation. I am trying to tease out—because all we have are odd notes—what consideration have you given to the question that there may have been some material difference in the comparison?

Dr WILSON: One of the elements that was considered in this regard is that there is a very, very substantial dilution effect with the material that is going into the northside storage tunnel. Only a small proportion of what is going in is actually raw sewage. A large proportion of what is there is stormwater run-off.

The Hon. J. F. RYAN: But that was the case with the previous position, too.

Dr WILSON: Here, there is a very large amount of dilution the material that is in the tunnel.

The Hon. J. F. RYAN: That was the same in the previous instance. The aerosol spray that was there before the tunnel was commissioned was also heavily diluted.

Dr WILSON: But, just to come back to the point put by both Professor Gilbert and Dr Dwyer, if I may: That issue was not the major issue for the consideration of the expert panel or for the department in looking at this. The issue here was: Was there likely to be an escape of pathogens from the tunnel as proposed? The expert advice that I have received from the expert panel is that they believe that is very, very unlikely. The expert advice that we have received in terms of design of the tunnel from Sydney Water people is that that is very unlikely. So, while that is, obviously, in the overall scheme of things, a consideration that would need to be taken into account, that is not the principal piece of advice that the expert panel was asked to provide.

The Hon. A. B. MANSON: Professor Gilbert, you said you reviewed Professor Kearney's evidence given at a meeting that he attended. At that meeting did he provide any new scientific evidence, and provide copies of any scientific studies or any research that he had undertaken?

Professor GILBERT: No, he did not. We discussed matters that he had already mentioned at this Committee that we had gleaned from the transcript of that and from things that he had been reported in the press as having said.

The Hon. J. R. JOHNSON: Did you consider the process to be constructive?

Professor GILBERT: Not really, no.

The Hon. J. R. JOHNSON: Would you like to elaborate on that?

Professor GILBERT: I think we felt that we disagreed with Professor Kearney's concerns, and we were really not able to discuss this in a particularly constructive scientific way. I think we felt that his concerns did not have a scientific basis, and we reiterated to him, as we have today, that we do not believe that there is a problem with organisms getting to the filter, let alone through it, because of the engineering construction of the tunnel and all of the things that have been discussed in terms of dilution of sewage, and not only dilution of sewage but dilution of air. I think one of the points that was raised was that air is being pumped out actively. My understanding is that most of the air pumping is actually going in for most of the time and that all of the air immediately above the sewage is being diluted and actually vented at North Head, and it is only once that has all been replaced with fresh air and the tunnel actually fills that there is any venting of essentially fresh air from the vent.

The Hon. J. R. JOHNSON: That venting of the air would be, the figure floating around in my head years, no more than 150 hours in a year.

Professor GILBERT: That is my understanding, 150 hours in total, and maybe 30 to 40 hours at maximum velocity.

The Hon. J. R. JOHNSON: Out of 8,504 hours per year.

Professor GILBERT: I have not done the calculation, but I know it is a lot.

The Hon. J. F. RYAN: But how many hours it works is not really significant. It only needs to be dangerous for an hour, does it not?

Professor GILBERT: On the contrary, I think it actually is significant. The evidence, for what it is worth—and I hasten to add it is not completely applicable to this situation, but for sewage treatment

plants—is that visitors to sewage treatment plants, even though they are often exposed to high concentrations of organisms for significant periods, do not suffer problems.

CHAIR: What evidence have you got to prove that? What studies have you got to prove that?

Professor GILBERT: I cannot quote the exact details, but there are studies quoted in some of the material.

CHAIR: That is anecdotal, surely.

Professor GILBERT: I guess it is anecdotal. There are almost certainly no controlled studies. I am sure it is anecdotal.

CHAIR: So you cannot really say that, can you, as a professor?

The Hon. A. B. MANSON: Other people have said it.

CHAIR: Please do not interrupt.

Professor GILBERT: I guess there is a lot of anecdotal evidence here, but there is no doubt that the more hours that one is exposed to potential pathogens—and we are talking about extremely dilute pathogens and the number of organisms required to cause disease—in most cases, even a cloud of organisms very close to the surface of liquid will not deliver enough organisms in a form that will be ineffective. Most of the organisms we are talking about here are organisms that cause intestinal disease, not respiratory disease, and therefore they need to be actually taken into the mouth in food or water. So even an occasional inhalation of these organisms will not be a clinical problem. Personally, I do not think that is going to occur.

The Hon. J. H. JOBLING: That will depend on the medical health and condition of the patient though, would it not? You must qualify it on that ground, and then perhaps I might not disagree.

Professor GILBERT: Not necessarily. Even highly susceptible people will not become infected if the organisms—

The Hon. J. H. JOBLING: May not, please.

Professor GILBERT: Okay. I was going to say if the organisms are neither viable nor in a form that can cause disease. But, yes, I guess one has to say that more susceptible people are more likely to become infected. But, if they are not exposed to the organisms in the appropriate form, even they will not become infected.

CHAIR: What observations or investigations has the panel made concerning the condensation of moisture in activated carbon filters and the emission of aerosols resulting from that condensed moisture? What testing did the panel undertake?

Professor GILBERT: We did not undertake any. That is not our area of expertise.

CHAIR: So you had no information on the question of condensation and moisture on activated carbon filters given to you?

Professor GILBERT: No.

CHAIR: That is a big gap there.

Dr WILSON: That was an issue that was considered by the expert panel.

CHAIR: But no information was given to the expert panel, apparently.

Dr WILSON: I am sorry. It was an issue that was considered. I did not say that any expert advice had been provided to the committee. It was an issue that the committee considered in that regard.

CHAIR: But what information was given? Apparently there was none.

Dr WILSON: As an issue in that regard? We keep on coming back to the filters as a form of bacteriological control. What we have said is that the filters are there to deodorise the air. They are not there to act as a filter for it. Now, they may have an extra, additional benefit over the engineering design which is already put in to convey this.

CHAIR: Accidentally?

Dr WILSON: I am sorry, Mr Chair. It is important to remember that the organisms will only be transmitted if there is some form of carrier for it, in this case an aerosol. Germs, bacteria, viruses do not float around in the air independent of some way of carrying them. It was the view that we believed—and certainly I have been advised in relation to this—that it is highly unlikely, highly, highly unlikely that there will be aerosolisation, which is absolutely essential to the transmission of a virus or of bacteria.

The Hon. J. H. JOBLING: Who provided to you that expert advice to which you referred in your last statement, Dr Wilson?

Dr WILSON: We took advice from the people who are responsible for designing the tunnel. We have tried to seek advice on what impact the filter might have in relation to the tunnel. But, as I say, that is really, I think, not the key issue here. The key issue is whether or not you are getting aerosol arising from the tunnel. We believe, looking at the design of the tunnel, that there are multiple traps and design features that have been put in place to minimise the risk. Compared to any other form of venting that is available at the moment, it appears that may have gone to substantial lengths to prevent any aerosolisation even reaching the filters.

The Hon. J. H. JOBLING: This information was obviously available and specifically supplied to your panel when they were considering this matter.

Dr WILSON: The issue of the design of the tunnel?

The Hon. J. H. JOBLING: Yes.

Dr WILSON: That was one of the first bits of information that the committee looked at. It was to look at the actual design of the tunnel and understand what could actually arise from the sewage there. The panel treated this matter—

The Hon. J. H. JOBLING: Dr Wilson, you have indicated, as have your colleagues, that you are not experts in engineering. You have indicated that that is not your field of speciality. I come back to the question that, having had this matter raised and bearing in mind the concerns that were there, what

specific steps did you or the panel take to bring experts in to advise you on these matters so that you could satisfy yourself on your conclusions?

Dr WILSON: The committee has been provided with a range of expert opinion—

CHAIR: The panel.

Dr WILSON: I am sorry, not the panel, your Committee has been provided with a range of information—

The Hon. J. H. JOBLING: I am referring to your panel, not this one.

Dr WILSON: Your Committee has been provided with a range of independent, expert opinion about whether that tunnel was available. That information is recorded in *Hansard*. That information is available to the expert panel. But, just to be absolutely clear that I am not avoiding your question, the panel did not seek independent advice about that other than the advice that had already been provided to this Committee and that which was provided in the description of the tunnel and its working.

The Hon. J. H. JOBLING: It is fair assumption that you and your colleagues agree that scientific investigations and reviews in this field are somewhat slight or very limited. On that basis it would seem to me that you are taking what might be called a reasonable person's approach, and on the balance of probabilities you are assuming that it will be okay.

Dr WILSON: It is slightly more than that. It is not a reasonable person. I have sought advice from people who are international experts in the field of transmission of infectious diseases about the likelihood of this being the source, plus information about the only forms of relevant sorts of features like this, for instance around sewage treatment plants, but as we pointed out those are not the same things, plus the advice that has been provided to the Committee about the design of the tunnel. That goes a little beyond the reasonable person's position.

The Hon. J. H. JOBLING: On that basis it might be reasonable to assume that as these concerns were raised you would have raised specifically Sydney Water and/or its engineers questions relating to what they might be able to do to reduce the concern about transmission of organisms into the environment as Scotts Creek. Did you do that?

Dr WILSON: Can I go back a step? At what point are you asking about this information? The department provided an assessment of the original environmental impact statement three or four years ago.

The Hon. J. H. JOBLING: No. You had a specific panel of experts brought together to consider and review another expert's views that were put do you and to satisfy concerns in the community. Did you with this panel, at any stage, seek or ask Sydney Water or its engineers any questions relating to what they would do to reduce any possible transmission of organisms into the environment from the Scotts Creek vent, or what they would propose to allay the concerns of the residents?

Dr WILSON: The experts may wish to comment on that, but the view the expert panel formed was that there was so little risk associated with this that it would be almost impossible to achieve any further controls above and beyond what was there.

The Hon. J. H. JOBLING: The answer is obviously "No", is it not?

Dr WILSON: That is not quite what I said. What I said was that the panel—

The Hon. J. H. JOBLING: Did you consult with them? You did not.

Dr WILSON: We did consult with Sydney Water.

The Hon. J. H. JOBLING: Did the expert panel actually ask Sydney Water those questions?

Dr WILSON: Why would the expert panel ask Sydney Water question about reducing the risks if they do not believe a risk is associated with the vent?

The Hon. J. H. JOBLING: You will recall the first specific question I asked you, and I asked you this very specifically. You should have been taking out insurance that there were no risks or, if there were, you reduced them because the scientific evidence is rather short. In your statement you also say that there is no direct evidence in scientific literature of microbiological or disease risk associated with a filtered storage tunnel vent. You then go on to suggest that you have now found similar vents in North America. You deal with that, you deal with the expert views on the filter of regulated carbon and say that it is largely irrelevant, and you agree that notwithstanding this there is low microbial risk. There are number of factors in there and I would have thought a reasonable person, as a professional and very scientific person, would have attempted to ensure that all bases were covered. I would have thought you would have specifically asked Sydney Water for its advising on these matters.

Dr WILSON: I am sorry. Maybe I am missing something in here and maybe the members of expert panel, the representatives, can pick up what you are saying. I do not know what we would be asking Sydney Water.

The Hon. J. H. JOBLING: You do not know what you would be asking?

Dr WILSON: I am sorry. I do not understand what it is you are asking of us. But maybe I am missing something here.

Professor GILBERT: We had some discussion with Sydney Water about the function of the prefilter and the filter. I cannot remember the details, but we have some statistics about the amount of particles of various sizes that would be removed by that. I do not know whether that is what you are alluding to. But, as I mentioned before, the other thing we did was to review the most reputable standard textbook on the subject of filters in a medical situation, which is rather different from this but nevertheless it has some relevance. I spoke with the author of that chapter. Carbon particle filters have been in use for many, many years as a way, if you like, of cleaning air and even effectively sterilising it, but nobody really knows—

CHAIR: Sterilising the air?

Professor GILBERT: Well, it is interesting—

The Hon. J. F. RYAN: But it is only gas. It seems to be generally agreed that there was no sterilisation provided by the filter.

CHAIR: We need to be scientific about this.

Professor GILBERT: I probably have the chapter. I can quote. I say that in inverted commas because that is what some people believe. I agree with you.

CHAIR: But that is not true, is it?

Professor GILBERT: We are not talking about sterilisation here, we are talking about removal of aerosol particles that will carry bacteria. I have spent 30 years of my professional life trying to make students not use the word "sterilisation", but I am saying that in inverted commas because that is what some people use carbon filters to attempt to do. You are quite right, they do not do that, but they obviously remove gases and they clearly remove particles not necessarily related to the size of the particles but to the very tortuous route that they have to go between layers of particles, and the fact that these water droplets coalesce and therefore become larger and deposit on the surface of the carbon particles seems to be well accepted in the literature, but there is very little evidence for this. I certainly have satisfied myself by at least what we have heard from Sydney Water about the specifications of the filter, and what I have read and discussed with a colleague who is an expert in this. It is very difficult to explain how it works, but they do appear to work.

The Hon. J. H. JOBLING: Subject to being well maintained?

Professor GILBERT: Absolutely, but that is true of any system like that.

The Hon. J. H. JOBLING: I just want to place that—

Professor GILBERT: Absolutely. We cannot expect them to work if they are dirty.

CHAIR: The Health Department gave evidence to this inquiry on 9 August to the effect that when the expert panel had been convened originally, the panel had concluded there would be a health risk if moisture condensed in the carbon filter and this moisture was emitted in the form of an aerosol. The Health Department, in its evidence, said the panel had concluded that the emission of aerosols from activated carbon filters could be tested empirically, and this should be done. Is the Health Department evidence of 9 August correct and if so why has the department not carried out empirical testing to measure aerosol emissions from the activated carbon filters? Why is the Department of Health now contradicting its previous evidence?

Dr WILSON: I am not sure that I have contradicted anything, but I would like to clarify something. Just to be absolutely clear on this, the basis of the advice that has been given to the Committee is on the basis of the assessment of the expert panel in terms of aerosol actually even reaching the filter. That is the basis on which the assessment has been made. The filter is then, if you like, an extra thing on top of that, which may have some additional benefits. Professor Gilbert has given you an opinion based on her assessment of the information available on microbiological filters in the situation. We are trying to seek some additional information about charcoal filters from experts about this issue. To date we are not able to provide you with that advice because we have not been able to find the relevant expertise, the expert advice to be able to give you that, but we are seeking that information.

CHAIR: What information are you seeking?

Dr WILSON: About the capacity of these charcoal filters to filter particulate.

CHAIR: So you will be testing these filters, will you?

Dr WILSON: We are putting to you that that is something that we believe is testable. I would like to be able to say that today I could bring you the expert advice to say how that could be done, but so far we have not got that. We have spoken to experts in the CSIRO about how you might go about doing that, and we are seeking that advice. If I had that information to hand I would obviously table it

for you today, but we have not actually got that information. We believe it is possible to test the filters as to whether they will transmit any particles, but I stress—and I come back to this—that that will be an added bonus, if you like, on top of the precautions that are already in there, as we understand it.

The Hon. M. I. JONES: In your experience how long would such tests take?

Dr WILSON: I am sorry, that is the expert advice I would have liked to have brought you today, but I do not have it. We will get it to you as soon as we can. We do not have that information with us today.

The Hon. M. I. JONES: How long do you think that will take?

Dr WILSON: I am sorry, we would need that expert advice to be able to give you that. The limited advice we have at the moment is that it is possible to do so. I cannot give you any further information.

The Hon. A. B. MANSON: I understand that the manufacturers of the carbon filters have confirmed that the filter may operate in moist conditions. Accordingly, how do you respond to claims that they will not remove odours in humid weather?

Dr DWYER: I do not understand the exact mode of operation of the filters in terms of removing odours. That is not something I have investigated.

The Hon. A. B. MANSON: When we talk about their being emitted from Scotts Creek funnel, I understand that it will only happen five or six times per year. I also understand that the first flush of air to be emitted will go through North Head, not Scotts Creek.

Professor GILBERT: That is my understanding, that as the tunnel begins to feel there will be vented through the tunnel itself and out so that any air that has been stagnant over whatever residual pools of sludge or whatever remained in the tunnel will be well and truly gone before there is any venting. There is a lot of pollution of air by fresh air being joined in through the tunnel initially. It is not until the tunnel is actually full that air is going out of the vent.

(Short adjournment)

The Hon. A. B. MANSON: Dr Wilson, I notice that only three members of the expert panel are present today. Would you provide the Committee with some advice on their expertise? How long have they practiced and what is their overall experience?

Dr WILSON: I am happy to do so. These details are incorporated in advice which has previously been provided to the Committee. The other members of the Committee who not represented here today are Professor Adrian Lee, who is currently Pro Vice-Chancellor of Education at the University of New South Wales. However, his expertise in this area comes from the fact that he is an expert in the area of microbiology and immunology. He was formerly head of microbiology and immunology at that university and he continues to have an active interest in the area. Professor Tania Sorrell is a Professor of Clinical Infectious Diseases at the University of Sydney and Director of the Centre for Infectious Disease Medicine at Westmead Hospital. She is an international expert particularly in the field of viral infections and other forms of communicable diseases. Dr David Cunliffe, who is a public health microbiologist from the Department of Human Services in South Australia, has much credibility in this area.

Two members of the department also participated in the expert panel—Dr Jeremy McAnulty, a medical epidemiologist whose specialty is the area of communicable diseases, trained at the Centre for Disease Control in the United States of America and also trained in Australia, and Dr Stephen Corbett who has previously appeared before this Committee. It may not be known to members of the Committee that Dr Corbett is an expert particularly in the field of environmental air pollution. He has an international reputation in that field. He is shortly to go to India to conduct a training program for the World Health Organisation on that issue. He has done so previously. These people have a mix of skills which I believe from the public health side have helped to form the issues which are important to the Committee.

The Hon. J. F. RYAN: Has the report given by the panel to the Committee been seen and signed off by all members of the panel?

Dr WILSON: It was circulated to all members prior to my letter being forwarded to the Chair of this Committee, which contained a summary of that information and a copy of the report.

The Hon. J. F. RYAN: Were they asked to respond to it?

Dr WILSON: They were asked to make any corrections or changes that they believed were necessary and they were asked to agree to the report being circulated. I understand that some minor corrections were made to the report before it was sent but there was nothing substantive.

The Hon. J. F. RYAN: One would imagine that members of the panel would be employees of the Department of Health. But other members of the panel, for example, Mr Dwyer, are from Westmead Hospital. It would be fair to say that Mr Dwyer would be regarded as an employee of the Department of Health, or at least he would be on the payroll of that department. That would apply also to Dr Gilbert and Dr Sorrell. They are in the same position, are they not?

Dr WILSON: Members were asked to indicate whether or not they had any conflict of interest which may interfere in this process. No member indicated that he or she had any conflict of interest. These people are not under my control or under the control of the Department of Health in any sense at all. Their reputations are such that I think it is highly unlikely that they would provide anything but truly independent advice to this Committee.

The Hon. J. F. RYAN: Concerns were expressed by community members in relation to two members of the panel—Mr Lee and Mr Cunliffe. Apparently Mr Lee made some reference—

The Hon. J. R. JOHNSON: I take it that you are referring to Professor Lee?

The Hon. J. F. RYAN: I am referring to Professor Lee. It was said that during discussions he made comparisons between cottonwool and a test tube and the carbon filter. Is that correct? Does that not suggest a fairly fundamental misunderstanding about how the carbon filter would work? Does that mean that Professor Lee may not have fully understood what he was looking at?

Dr WILSON: I will not try to interpret what Professor Lee said. The members of the expert panel who were present for those discussions may have some view on that. I cannot elaborate other than to say that Professor Lee is a noted microbiologist. If he was making a point it would have been to try to convey some sense of what the issues were.

The Hon. J. F. RYAN: One of the fundamental issues that needed to be understood by the panel was, clearly, the operation of the carbon filter and how it would respond to various environmental conditions.

Professor GILBERT: Professor Lee did make that analogy. I guess that all of us on that expert committee actually thought that it was a good analogy although, as we have said, we are not experts on filters. When I was talking to Dr Margaret Peel to whom I referred earlier as the author of the book on sterilisation and disinfection and the chapter specifically on filters, I mentioned that Professor Lee had made this analogy. She said that she thought it was a good analogy. The fact that the cottonwool and carbon are different substances are less relevant than the fact that they require particles to take a tortuous pathway through them. That is the mechanism by which they work. Those are actually good analogies. She admitted that there is as little known about how cottonwool prevents the passage of micro-organisms as there is about carbon filters. But probably it is a mechanical mechanism which works in similar way.

The Hon. J. F. RYAN: Another question that arises from the operation of the panel is the presence or otherwise of representatives of the Sydney Water Corporation at various stages of your deliberations. The memory of community members who addressed the panel was that members of Sydney Water were present both before and after they left. At what stage did representatives of Sydney Water leave the panel to consider their findings? Were they present during the entire meeting of the panel, or was there some period within which members of the panel were able to independently discuss issues without a representative of Sydney Water being present?

Professor GILBERT: I can answer that as chair of the panel. They would not present right at the beginning. We had a period of discussion before they arrived and subsequently they left before the end of the meeting.

CHAIR: For how long?

Professor GILBERT: So we had two periods—before or at the beginning, and at the end of the meeting.

CHAIR: How long were those periods?

Professor GILBERT: At least half an hour, I think. I cannot remember—

CHAIR: For half an hour?

Professor GILBERT: —the exact time.

The Hon. J. F. RYAN: Was Sydney Water invited to comment on submissions which had been made by the two representatives of the community, Professor Kearney and Mr Lee?

Professor GILBERT: There was some discussion between them. I cannot remember the exact details. I think it was largely to do with various things that had occurred before the committee was formed in relation to mediation and offers that had been made by Sydney Water to the community in the past. There was some discussion about that.

The Hon. J. F. RYAN: Given that the panel was discussing something that was under the control of Sydney Water, do you not think that Sydney Water should have been treated by the panel in the same way as were the community members; that representatives of Sydney Water should have made submissions to the panel and then left, rather than being present to assist your deliberations and investigation of the matter?

Professor GILBERT: I guess this was an informal meeting which was designed to assist the expert panel get to the bottom of what facts were known. It did not feel like the sort of confrontational or adversarial situation that you seem to be describing. There were certainly periods, as I indicated—both before and after the Sydney Water people came—for the expert panel to have an independent discussion, but nobody was treated in any particular sort of organised way.

The Hon. J. F. RYAN: Some of the members of the community felt that there were elements of the discussion that were at least confrontational and aggressive. For example, they said that at the beginning of their submissions, they were not even given the opportunity to be seated.

Professor GILBERT: It may have been mildly incompetent that there were not enough chairs at the time, but that was certainly not intended to make people feel uncomfortable. It is unfortunate that that occurred.

The Hon. J. F. RYAN: Do you not think that it would be uncomfortable?

Professor GILBERT: I suppose it would have been, but we were a very unthreatening—possibly mildly disorganised, but very unthreatening—group.

The Hon. J. F. RYAN: Do you think that Mr Lee would have found it unthreatening to enter a room which contained about 16-odd scientists and public servants and give his submission without being seated? I do not think I would have found that unthreatening.

Professor GILBERT: He was not asked to give a submission. First of all, he was not asked to give a submission to the committee at all and certainly no discussion began before—the meeting was largely held up until the seats were found. I do not want to diminish this and it is unfortunate, but it really did not seem to be a major issue at the time. This was not an adversarial inquiry. It was set up really to discuss with Professor Kearney some of his concerns in an informal way. Mr Lee came at Professor Kearney's request. Sure, there should have been some chairs there and it was unfortunate that there were not, but that was a very mechanical or practical breakdown of organisation rather than anything else. It certainly was not designed to make anyone feel uncomfortable.

The Hon. AMANDA FAZIO: Dr Dwyer, you probably heard Professor Kearney talking in the media about burst appendices in relation to the Scotts Creek vent. What response do you have to these and other statements that he has made? I suppose one of the issues that I am trying to draw out is: Should this committee believe the expert panel, or Associate Professor Kearney? We are getting conflicting statements and fairly provocative statements, including the one about the burst appendices. Could I have your comments on that please?

Dr DWYER: My opinion is that comments about burst appendices and so on are alarmist, irrelevant to the discussion and of no help to anybody, either the expert panel, the community or anybody else. In fact, I was honoured to be asked to be a member of the panel. In terms of previous comments, it was particularly good, I thought, to have Professor Lee who really is one of the most outstanding microbiologists that Australia has produced in the last 20 years, with very much an international reputation in precisely the sort—in gastrointestinal organisms of one form or another. I spend a lot of time working in Department of Health committees, hospital committees, health committees of one form or another and the intention of everybody there is to provide expert opinion in a non-threatening way and in a consultative way with the aim of finding the best answer for the community. I mean, that is our job as doctors and public health people. My feeling is that alarmist comments of burst appendices and so on are actually unfortunate and inappropriate to this discussion.

The Hon. M. I. JONES: The panel has already admitted, to quote Professor Gilbert, that you are not engineers. With regard to the self-imposed terms of reference of the committee, was there any discussion about pathogens that break down into a whole series of noxious substances, which we have not really gone into at any great length today. In the discussion was there mention about other types of preventive filters or installations that could be added to the carbon filters which would appear to be somewhat lacking?

Professor GILBERT: There was some discussion which I gather arose from the mediation process in which Sydney Water had offered to install high efficiency particle absorption [HEPA] filters. These are filters that are used specifically to remove micro-organisms in circumstances such as a laboratory or a safety cabinet in a laboratory where organisms are being vented into the external atmosphere or air is being vented into the external atmosphere which may contain significant pathogens. These are high efficiency filters which remove bacteria. That was, I gather, offered by Sydney Water to the community despite the fact that it was not regarded as essential or necessary. I understand that that was refused for reasons that I am not quite sure of.

The Hon. M. I. JONES: Refused by whom?

Professor GILBERT: By the community. Sydney Water, I understand, offered this. There was some discussion about this at the meeting that we had. This has certainly come up in the expert panel a number of times—the suggestion that maybe a HEPA filter could be added to this. But I think that everyone believed that that is not necessary or appropriate because it is not regarded as being necessary to have another barrier beyond the carbon filter when we really believe that there will be no organisms coming out.

The Hon. A. B. MANSON: Dr Wilson, as the chief health officer are you satisfied with the expert panel's current scientific opinions about the so-called health risk associated with this development?

Dr WILSON: I believe that the committee that we have put together is of high integrity and highly skilled. Its members have been invaluable in dealing with public health issues in the past. I have had to rely on these people in other circumstances where it has been very difficult. They are extremely cautious. These are people who, for instance, advised me during the Sydney water issue around cryptosporidium. They are not people who take these issues lightly; they are cautious in their interpretation of what goes on.

The Hon. A. B. MANSON: It has been stated during previous Committee hearings that New South Wales Health has been bypassed. I note that New South Wales Health provided a submission to the northside storage environmental impact statement [EIS] on 17 October 1997. How do you respond to the claims that you have been bypassed?

Dr WILSON: I do not believe we have been bypassed. We provided initial advice in relation to the original EIS and where we have been asked to do so we provided that information. I believe that where we could do better next time is by becoming involved in the community consultation process earlier and being involved earlier in understanding the community's concerns and where they are coming from. My understanding is that we first became involved at the time when mediation was already under way and it may have been better for us to have been involved earlier. Otherwise, I do not believe that we have been formally bypassed in any way.

CHAIR: You referred earlier to most pathogens having to be ingested through the gut. You are no doubt aware of coxsackie A and B virus and how it can affect people?

Professor GILBERT: Yes.

CHAIR: It can be inhaled, is that right?

Professor GILBERT: That is right.

CHAIR: What do you suggest can be done to monitor the situation for the community with viruses such as Coxsackie, legionella and so on?

Professor GILBERT: As I mentioned before, this is a very complex situation and the rates of particular sorts of infection in a community group are influenced by a lot of factors, including socioeconomic, status, diet, general health—a whole range of factors. One of the things I was thinking of over the weekend was whether there would be a possibility of initiating some sort of health study for people in this area, using a suitable control group of some sort. This would require considerable thought, but I think that the only way you could prove whether or not there was an effect on the health of the local community—which I personally believe would be highly unlikely—would be to do some sort of controlled study using a comparable community or school community somewhere else as a control group.

This would have to be reviewed by epidemiologists and statisticians, but my belief is that any effect on the health of either the school or the community related to Scotts Creek would be so small that to get a statistically significant difference between that another control group would be quite difficult and would require a long-term study. It may be very difficult to prove one way or another, but that would be one possibility that perhaps could be considered.

CHAIR: I ask each one of you: Why does the panel believe that the tunnel, associated vents and the filter system will not favour the proliferation of legionella and pneumophilia? Is the use of caustic-impregnated activated carbon in the filter a factor in forming this opinion?

Dr WILSON: I would have to take expert advice on that.

Dr DWYER: My opinion is that that would not be important, because I do not think the filters are part of the system for preventing the transmission of legionella. However, Professor Gilbert is the legionella expert.

Professor GILBERT: It so happens that I do have a particular interest in legionella and one of the frustrating things about it is that there is still an awful lot we do not know about it. We know that legionella is most commonly associated with airconditioning towers and warm water systems. We certainly know that legionella breed best at temperatures at around 30 degrees celsius and that what they require in order to be infective is not so much the numbers but the condition they are in. They need to be in a particularly virulent format and that often involves them actually being inside free-living amoebae which are often present in water.

Although there has been very little work done on the presence of legionella in sewage, certainly they can occur in sewage and so can the amoebae which are the particles that actually carry the legionella into people's lungs. It is quite likely there will be some legionella, although they will be in relatively small numbers at the temperature of the sewage in the tunnel. In order to multiply they need warm, moist conditions and nutrient, and so do the amoebae that carry them. My understanding from what we have heard about the filters is that for all but the small number of days per year during which the filter is functioning so that air is coming out of it, the filters will be subject to air being drawn in specifically to dry them. I think that the presence of sodium hydroxide on the surface of the carbon will inhibit both the organisms and the amoebae; that there will be virtually no nutrient for those organisms

to multiply; and that they will die very rapidly in the unlikely event that any actually get to the carbon filter.

CHAIR: Have you been advised that the filter will actually dry out?

Professor GILBERT: Sydney Water tell me that fresh, dry air will be drawn through the filter and that that will dry it out, yes.

The Hon. J. F. RYAN: Did Sydney Watery give you any impression about how long it would take for the filter to dry out and how frequently it would dry out?

Professor GILBERT: I cannot answer that, except that the period of time during which dry, clean air will be going through it will be much greater than the period of time during which—

The Hon. J. F. RYAN: Is that not just a bit unpredictable in that it will obviously be a feature of what the weather conditions are like. For example, if we have a fairly wet week, followed by a dry week, followed by a wet week, it is quite possible that the filter will not dry out between those incidents, is it not?

Professor GILBERT: I guess that that is possible. That is not something I can really comment on. I gather that the modelling has been based on previous weather conditions. Notwithstanding that, legionella really do need very specific circumstances, including warmth and moisture.

The Hon. J. F. RYAN: Carbon filters are in the air, they are in the tunnel and there will be hot days during which it might be possible for them to get to that temperature.

Professor GILBERT: All I can say is that it is very hypothetical. A lot of work has been done on what circumstances cause legionella and to my knowledge there have been no situations other than basically those situations I mentioned—cooling towers, warm weather systems, showers and so on.

The Hon. J. F. RYAN: Are you telling me that the panel was not accurately and specifically informed as to how dry these filters would be, how often they would be dry and other features of the airconditioning? That appears to be a fairly significant part of why you are telling the Committee that the filters are safe in this regard when what is suggested is that the filters themselves are a breeding environment for legionella. The primary argument against that is that the filters will be dry from time to time. What you appear to have told the Committee is that you have not inquired of Sydney Water as to how frequently they will dry out, for how long they will be dry and whether that will be sufficient time to guarantee that the assurances you have given the Committee have due weight.

Professor GILBERT: My understanding is that they will dry for all but the 25 to 30 days per year.

The Hon. J. F. RYAN: Have you seen the filters? They are very large.

Professor GILBERT: I have not, no.

The Hon. J. F. RYAN: They would take a considerable period of time to dry out.

Professor GILBERT: As I say, I think this is not a circumstance which would favour—even if they were moist, and I do not know the answer as to how long they would be dry, there would be virtually no nutrient and no set of circumstances in which legionella would actually multiply in that situation.

The Hon. J. F. RYAN: One would imagine that the air will be reasonably humid, notwithstanding the passage of air. I am not sure that I entirely understand what Sydney Water means by the word "dry". Does it mean dry like washing or dry as to what the particular humidity rating would be? Has Sydney Water said that to you?

Professor GILBERT: No. I do not know the answer to that and I think it is pointless my getting into an argument about how dry or whatever. I think based on what I know about legionella, which requires warm, moist and still conditions, these organisms are hardy in one way in that they survive very well in some environments. But, despite being ubiquitous in the environment, in many environments they rarely cause disease and clearly there is a particular format—that is still poorly understood, but a particular format—in which these organisms are virulent, which is associated particularly with the circumstances I have mentioned, cooling towers and warm-water systems. Although they are there in small numbers in other situations, we know they are there. They have been detected in sewage but they have never, to my knowledge, been associated with disease in relation to sewage.

The Hon. J. F. RYAN: May I put to you that one of the concerns of the community is that there appear to be two important areas of expertise that need to be brought together in giving an opinion in regard to the health safety aspect of this feature. One is an adequate understanding of the scientific information and the microbiology. The other is an adequate understanding of the engineering and actual operation of the tunnel and the ventilation shaft. It appears that what we had coming together was a group of people who are very expert in their part of the field. I am not convinced that there has been a sufficient transfer of that expertise, or that all parties have a very good idea of exactly how this thing works and exactly how their level of science is going to apply to it. One of the things I am interested in is a report produced by the community members of Scotts Creek, entitled "The Precautionary Principle Audit". It appears to be a fairly thorough-going analysis of all sorts of concerns that the community might have.

I do not know what its value would be to a scientist. I am not a scientist or an engineer. Nevertheless it does appear to be an attempt to very specifically point out all of the issues that are of concern to the community. The members of the community who addressed your panel appear to be of the view that no-one had had the chance to read this particular report in detail when they addressed you. There does not appear, at least from my perspective, that an attempt has been made by the Department of Health to specifically address this document, to either say that the issues contained in it are not except in the most general terms. With that be fair?

Professor GILBERT: I should reiterate that this expert panel was not intended to meet with members of the community; it was specifically intended to meet with Professor Kearney, but I suppose that it beside the point. The point is that we had not at that stage read the precautionary principle document. I have now read it and I believe other members of the panel have also done so. My feeling about that is that there is a list of so-called false assumptions, all of which appear to in themselves be extremely hypothetical, to contradict all of the specifications that have been indicated by Sydney Water. It is difficult, admittedly, as a non-expert in this area to weigh up whether it is likely that what appears to be a series of worse case scenarios which may compound each other could even possibly occur. Certainly from reading the precautionary principle document it seems to me that every one of them is extremely hypothetical and is very unlikely to occur individually; and that for them to occur simultaneously is statistically just not possible.

The Hon. M. I. JONES: In the likelihood that we have conditions where there would be a great deal of gas being egressed through these filters, all these hypothetical situations can only be dealt with hypothetically, because the thing has not been commissioned yet and is not functioning. Also, the

conditions of the worst-case scenario are likely to manifest at the one time because most of the time it would seem that the filters are not functioning. Therefore, that gives more weight to their argument. Secondly, given the scenario where the filters are functioning, what would you anticipate their temperature to be?

Professor GILBERT: I assume it would be the same as the ambient temperature, whatever that is. If I could go back to your original point, it is true that you have to look at perhaps the worst-case scenario and treat it hypothetically. But it seems to me that the precautionary principles specifically put up scenarios that are virtually never likely to happen—for example, the scenario where raw sewage accumulates in the tunnel because of malfunctioning or downtime at North Head at the same time as a very heavy downpour which continues for a long time.

The Hon. J. F. RYAN: What is so unlikely about that?

Professor GILBERT: My understanding is that power outage at North Head occurs very rarely, that it is virtually always—

The Hon. J. F. RYAN: Power outage occurs very often at North Head. There have been celebrated incidents where sewage has poured into the sea for hours on end and Sydney Water has been fined for that.

Professor GILBERT: There is not a lot of point in my getting into an argument about that because, to be honest, I do not have the statistics.

The Hon. J. F. RYAN: That is partly what bothers us because you do not seem to have—

Professor GILBERT: The statistics we have been given suggest that it is very rare and that it is very rare for it to occur for more than a short period, which would be the sort of period during which the tunnel would not fill. Obviously, that would need to occur at the same time as a major downpour of rain. I am not in a position to make a statistical assessment of how unlikely that is to happen.

The Hon. A. B. MANSON: I put this question to any of the witnesses. As to the precautionary principle report commissioned by the community members, do you know who is the author of the community report that was presented to you? Did it have any scientific expertise and was the study done on a genuine scientific investigation?

Professor GILBERT: The copy that we have is attributed to community members at Scotts Creek. We do not know who the individuals are. I have no idea of their qualifications or expertise.

The Hon. A. B. MANSON: Would some of them have signed it?

Professor GILBERT: They may have done. If that is so, the copy I have does not include them.

The Hon. A. B. MANSON: It is an anonymous report?

The Hon. J. F. RYAN: No, it is done by the community. Mr Lee, Mr Kearney and others have probably helped to produce it. No-one is suggesting that the report is beyond doubt scientifically. It is simply in the same way that members respond to matters that come from the community, one hopes the Department of Health does the same thing.

The Hon. J. R. JOHNSON: Professor Gilbert, I understand that the temperature in the tunnel would rarely be above 20 degrees Celsius. Is legionella likely to breed at that temperature?

Professor GILBERT: Legionella multiples best at around 30 degrees Celsius. At 20 degrees Celsius it will survive in small numbers. Interestingly, there is some work that suggests that at those numbers, although it survives, the amoebae that live quite happily at that concentration actually ingest and kill them. It is only at higher temperatures that they survive within the amoebae. That is probably one of the reasons why the higher temperatures are more potentially dangerous in terms of infection and why warm water systems and cooling towers are more likely to be the cause of legionella rather than sewage where the temperature is generally too low for the combined effect of both the amoebae and the legionella to survive.

The Hon. J. F. RYAN: The temperature in the shaft might be different to the temperature in the tunnel. Given that the shaft is built above the ground, it is subject to the conditions in the environment.

Professor GILBERT: Neither bacteria nor amoebae multiples in wind effectively.

The Hon. J. F. RYAN: I am talking about the carbon-activated filters. The filters are built above the ground in a concrete vessel.

Professor GILBERT: I get back to the point that, first of all, I think the number of organisms present will be few and the opportunities, once they are released from the surface of the sewage, for multiplication will be negligible because of the lack of nutrient. The only thing that can possibly be a problem is what is actually released from the surface of the sewage. By the time that has been diluted by air rushing down the tunnel towards North Head and the low concentrations that are likely to be in the fluid phase of what is in the tunnel anyway, there will be no organisms and certainly no amoebae that will survive and multiply, even if they are deposited on the—

The Hon. J. F. RYAN: Do you understand that there are different concerns about what comes from the sewage and what might grow in the carbon activator?

Professor GILBERT: I do understand. What I am trying to say is that I do not believe that these organisms, after being spread up the tunnel, exposed to the surface of activated carbon with sodium hydroxide and dried out without nutrients, will be in a physical condition to multiply. That would be expecting far more of the organisms than my understanding of legionella. They are pretty hardy but they are not that hardy.

The Hon. J. F. RYAN: Do you think that there is no chance of legionella growing inside the activated carbon particles?

Professor GILBERT: Without literally testing it, I do not know that. What I know of the conditions under which legionella grow in the environment in general, these will not satisfy those conditions.

The Hon. J. F. RYAN: Do you think it would be useful to regularly test the activated carbon particles for legionella?

Professor GILBERT: As Dr Wilson indicated earlier, the department is currently seeking that sort of advice to try to work out how that can be done. It seems a reasonable thing to do to specifically inoculate legionella into them and see if they survive. My guess is that they will not, but we will have to wait and see.

CHAIR: In your report you said that the expert panel does not believe it is likely regrowth of pathogenic bacteria will occur in this filter because it will be a dry environment between storm events, there will be no nutrients and the high pH level will inhibit bacterial growth. Yet you do not know how long the filter will be dry, do you?

Professor GILBERT: As I said, my understanding was that it would be dry except during the few days per year in which it was actually functioning, which would be 320 out of 365 days.

CHAIR: Have you received an assurance from Sydney Water that it would be dry?

Professor GILBERT: Yes.

CHAIR: What if that assurance cannot be substantiated?

Professor GILBERT: I guess we would have slight reservations, but I still do not believe that there would be nutrients or the other appropriate circumstances for legionella to grow.

CHAIR: Is that opinion based on any research?

Professor GILBERT: It is based on knowledge of the growth conditions of legionella.

CHAIR: You would not know whether they would be nutrients in that filter.

Professor GILBERT: The nutrients would have to be in the form of a large amount of particulate matter that is being deposited in the filter which has reached the filter from 60 metres or more below.

CHAIR: It is being forced up at quite a rate, is it not?

Professor GILBERT: It is being forced up at quite a rate for brief periods, and highly diluted by incoming air.

CHAIR: That will not dilute particulate matter.

The Hon. J. F. RYAN: It is obviously going to accumulate over time, is it not?

Professor GILBERT: If it were left without being properly maintained it could accumulate.

CHAIR: Do you not think it should be tested?

Professor GILBERT: I guess that is up to the expertise of the people that the Department of Health is consulting at the moment to work out how that can be done. I think you are right that that would be the only way to resolve what is a very hypothetical discussion, because we do not have the information.

CHAIR: There is a fair bit of guesswork. We are not sure how many days it will be dry, the quantity of particulate matter or the temperature for most of the year. It seems to me that we are guessing, to a certain extent.

Professor GILBERT: I may be guessing but I do not think that Sydney Water is guessing.

Dr WILSON: There is a difference here between dry and pooled water. There are a number of issues about the filter that are being hypothesised, such as if there is even enough droplet formation at all within the filter. The fact that they are not stony dry may not be the critical issue in terms of legionella. Could I reply to an earlier question or statement about the precautionary principle audit? I would not like the impression to be given to the department treated this lightly. The department did not receive a copy of the document until late August, and we got that through Sydney Water at that time. It is by no means the case that we are treating this lightly and we are more than happy to provide you with a detailed analysis, if you want, of the content of the document. We can do that fairly rapidly.

CHAIR: What is your understanding of the meaning of "precautionary principle"?

Dr WILSON: My understanding of the precautionary principle is that if there is any significant doubt about the health effects, then you take the most conservative approach.

CHAIR: Any doubt or any significant doubt?

Dr WILSON: I think you have to have some basis for the doubt. There is always some question in these situations of some risk. You have to have some basis on which that decision is made. The advice that has been provided to me by experts in the field is that they do not believe there is any significant risk associated with this. Therefore, I would see in this situation that is a reasonable basis for the decision to be made.

CHAIR: Professor Gilbert, what is your understanding of it?

Professor GILBERT: Essentially the same, yes.

The Hon. J. H. JOBLING: Dr Wilson, in view of your answer and the obvious concerns that have been expressed by both this Committee and members of the community, do you think it would be a reasonable action by the Department of Health to request as an additional condition that these carbon filters, perhaps on a six-monthly basis for two to five years, be examined by someone such as Professor Gilbert or Dr Dwyer to ascertain the veracity or otherwise the nutrients and legionella or other viral matters that may occur? Do you think this would be a reasonable precaution that your department should be seeking now to have adopted?

Dr WILSON: I would like us to reach a point where we can decide on some measures which will help reassure the community about what we believe to be the case in relation to these vents. Our belief is that they pose no health risks to the community. I would be looking to any measure that we could take to help reassure the community that was the case. It seems to me that is one of the measures that could be undertaken which would help clarify that situation.

CHAIR: Are you aware that Dr Corbett was given a copy of the precautionary principle audit document as part of the mediation expert panel in October 1999?

Dr WILSON: I was not aware that was the case. As I said, I was advised that we had not received a copy until August. If that is the case, I apologise to the Committee for misleading it. As I say, I do not have an analysis that I can make available to you. I am happy to provide it on that basis.

The Hon. J. R. JOHNSON: Dr Wilson, I note your answer to my colleague the Hon. A. B. Manson. I am surprised that some in the community are continuing to spread misinformation that the New South Wales Department of Health became involved in the northside storage tunnel at a late stage. How do you respond to these erroneous claims of lateness or tardiness?

Dr WILSON: The department responded to the initial environmental impact statement back in, I think it was, 1996 when it was originally put forward and we provided a response as to what we believed was the situation at that point in time. Dr Stephen Corbett was invited to a mediation session somewhat later in the piece—I understand it was in 1999—and that was the next point in time at which we became involved. In terms of the department's involvement, I do not believe in any of the formal steps that were undertaken that we were in any way left out of the process.

The Hon. J. F. RYAN: We have largely focused on the bacteriological risks from this. What are the relevant questions to ask of the ventilation shaft with regard to the potential for virus infection? Is there any risk? What risks did the panel or the Department of Health examine and can you inform the Committee to what extent you have ruled out those risks as being of concern?

Dr DWYER: Obviously, a number of viruses are transmitted in sewage and number of viruses are transmitted by what we call the faecal oral route, in other words, direct contact with contaminated sewage or faeces. These are the viruses that would be of concern in any discussions about sewage, diluted sewage or overflows. I think that in the context of this tunnel one would consider viruses, even though they are obviously different, in the same way as one would consider bacteria and the micro-organisms that may go up a very large vent, go through a moderately complex system and potentially go out. They do not float around, in the same way that bacteria does not, without some sort of droplet or particulate matter. It should also be pointed out that viruses present in sewage are obviously about but may not necessarily cause any human disease. There have to be some breakdowns, should viruses go out into the community, of what I would regard as basic infection control and housekeeping. It should also be pointed out that some of the viruses that are transmitted this way are vaccine preventable. For example, polio is one that used to be a scourge in Australia but it is not now. That needs to be considered. The risk of viruses is no different to the risk of bacteria in the system.

The Hon. J. F. RYAN: So which viruses did the Department of Health express concern about and how did you rule them out as being matters of concern?

Dr DWYER: We discussed in the panel the source of viruses that are associated with sewage and they really relate to the family of viruses that the Chair mentioned, the Coxsackie virus and its related members, which also includes polio. There are other viruses such as hepatitis A and those are really the main groups that are transmitted from sewage and for any community that does not have good sewerage, these pathogens are particularly important. Those viruses were discussed. Other viruses are not really an issue because they do not survive in sewage very well. Most viruses have an envelope around them, which means that they are relatively sensitive to the environment. Therefore, viruses such as hepatitis C, HIV, and influenza are not transmitted this way and are completely irrelevant to the discussion. The discussions were really limited to these gastro and testinal viruses.

The Hon. J. F. RYAN: So what consideration was given by the Department of Health or the panel to the fact that not everyone living in close proximity will be in perfect health?

Dr DWYER: Those concerns were discussed, such as what happens to people in nursing homes or people in the community whose immune systems are depressed for whatever reason. That is an important part of the discussion because obviously it is one thing to consider risks for the normal population but for the immuno-compromised patient there other discussions that occur, as occur frequently in hospital. There was discussion of both bacteria and viruses for those different groups in the community but the overriding feeling of the expert panel was that this did not seem to pose any significant risk to the community of either viruses or bacteria for either the normal population or the immuno-suppressed population.

CHAIR: What about children?

Dr DWYER: Most children are normal in terms of their immune system. It may be different as the immune system matures. There is no doubt that children at child care and in early schooling do acquire more infections because of the way they play, their personal hygiene, sharing of toys and those sorts of things. Yes, children do catch disease. In broad terms some of the gastro and testinal pathogens, for example hepatitis A, are much more of a problem for adults than they are for children, but that is not really relevant to the discussion. I think children require the same consideration as adults but with particular attention to personal hygiene in the school or childcare environment.

CHAIR: Does any member of the panel have expertise in children's diseases and their susceptibility?

Dr DWYER: Absolutely. Professor Gilbert is an international figure in paediatric health.

The Hon. AMANDA FAZIO: I have in front of me a recent news article from the *Daily Telegraph* of 25 August which talks about exposure to pathogens in the dirt at an early age assisting the development of immunity resistance in children. The article in the *Daily Telegraph* refers to the *New England Journal of Medicine* and Dr Christine Jenkins from the Institute of Respiratory Medicine at Royal Prince Alfred Hospital also concurred, saying exposing children to bacterial infections early in life primed their immune systems against allergies. Can you give me your views on that article?

Dr DWYER: There is an interesting hypothesis around at the moment that the absence of exposure to this may predispose children to getting in later life diseases such as asthma, that there is not the same changes to the immune system in that regard. There is some minor research suggesting that is the case. That has been reversed in some people's minds to suggest the opposite, that is, that if people are exposed to this, it may protect them against that. Is that a reasonable summary?

Professor GILBERT: I was going to say that notwithstanding that, I think most children are exposed to enough things in their normal day-to-day activities without it coming out of a vent. I can assure you that we were not advocating that any of the children in the vicinity should be exposed to micro-organisms coming out of the vent to protect them out from asthma. Far from it.

The Hon. J. F. RYAN: One of the community's concerns about viruses is that viruses are apparently much smaller than bacteria and are capable of passing through a filter. Much of what we have argued has been about how difficult it is for bacteria to make its passage through the carbon filter and that it would require nutrients and other conditions. In what way do they still apply to viruses, given that viruses are small and apparently even a HEPA filter would not stop a virus, much less the activated carbon filter?

Dr DWYER: You are quite correct in saying that viruses are much smaller than bacteria and they were first identified by virtue of their size. They will pass through a whole range of different sorts of filters, although filters are in place that will filter viruses, certainly in the laboratory environment. The answer to that question depends on whether you think the filter is actually put there to filter out these pathogens. My understanding from this is that the filter is not, so really discussion about whether viruses can go through filters is not relevant to this, but, again, even if viruses should pass through a filter, they still have to get to the filter and beyond it anyway.

Viruses are not going to be present just on their own in the air. They are going to be part of a droplet or part of some particulate material anyway. In fact, that particulate material, even if it went through a filter, may well stick to the filter itself and the virus will be stopped. Yes, viruses are small and can go through filters. That is true.

Dr WILSON: The issue here is that viruses do not travel by themselves; they have to be in some form of carriage like a droplet or whatever. Colds and influenza are spread when people sneeze. There is a droplet formation when you sneeze and if you do not cover your mouth those around you catch a load of it. That is the situation we are looking at here as opposed to a situation in which we are asking whether, for instance, we can filter out in water viruses from the material.

The Hon. J. F. RYAN: So if there is anything coming out of the ventilation shaft other than air, clearly it has the potential to have viruses attached to it, does it not?

Dr DWYER: If they should get out, I suppose so, yes. If there is particulate matter coming out of the shaft it may have viruses in it.

The Hon. J. F. RYAN: Does it have to be particulate matter? Can it not be moisture?

Dr DWYER: Droplets, yes.

The Hon. J. F. RYAN: Would monitoring the amount of moisture that comes through the shaft as opposed to the tunnel be an important safeguard?

Dr WILSON: Through the tunnel or the filter?

The Hon. J. F. RYAN: I am talking about after the filter, out through the shaft. Is it important to measure and monitor what comes out of that process into the air for a period of time to ensure that viruses are not escaping into the air, given that this is not just an ordinary shaft but one that has accelerated air going through it?

Dr WILSON: One of the things we are trying to get advice on is how you would measure either particle or aerosol coming through a filter at the other end so that you could actually measure the effectiveness of the filter in achieving that. I think that is what you are alluding to.

The Hon. J. F. RYAN: There will be occasions when the filter will be emitting air, the tunnel will have overload and sewage will be overflowing into Scotts Creek as it does currently. Does that create special complications, given that the community is getting a double dose: the air plus the same old performance of the sewer overflow into Scotts Creek at the same time?

Dr DWYER: If you get heavily diluted raw sewage overflow in whatever system, either the current or the new one, then there may be pathogens in that. That is true. Another important issue is that just because you detect pathogens in that material does not mean that anyone is actually going to get sick from it. For example, if under the current system we knew there was an increased rate of disease, that would draw attention to the fact that the current system is allowing pathogens to go out and go on to infect people who may be some fair distance away. I have not heard of any disease associations around the current sewage systems, either at Scotts Creek or anywhere. Therefore, to my way of thinking a system that has less discharge would be even less likely in the future to be associated with human disease, which is what we are talking about.

The Hon. J. F. RYAN: Certainly less discharge over a period of time but at the specific time at which the tunnel is discharging the sewer overflow and the ventilation shaft is discharging air, there is an accumulation for that moment of something that is even worse than was previously the case.

Professor GILBERT: That is only the case if there are organisms coming out of the vent and we are putting the argument that that is highly unlikely to occur. It would have to be an extremely unusual circumstance for both those things to happen.

The Hon. J. F. RYAN: When you say organisms, what do you mean?

Professor GILBERT: Bacteria or viruses.

The Hon. M. I. JONES: What noxious gases that are harmful to public health could be in the storage tunnel and could be emitted through this filter?

Dr WILSON: The charcoal filter clearly has a very good capacity to clean air. Charcoal filters are considered one of the best forms of air filtering that you can get. Certainly, in the department's assessment of the situation, we believe that it is highly unlikely that any emissions of gas from the tunnel would be of a concentration that would cause health effects.

CHAIR: I have a question regarding the possible growth of bacteria in the filter. Professor Gilbert, on what basis does the panel assume that nutrients will not be present in activated carbon when the aerosol materials containing nutrients are intended to be retained in the filter and volatile organic compounds are intended to be absorbed onto the surface of the carbon? On what basis does the panel believe that high pH will inhibit bacterial growth when condensed water will wash soluble caustic agents from the surface of the activated carbon granules, and the caustic agent in any case will be consumed by reaction with hydrogen sulphide and even by reaction with carbon dioxide from the atmosphere? Will not elemental sulphur be deposited on the surface of the activated carbon as a product of the reaction between hydrogen sulphide and the caustic agent? Will not the elemental sulphur deposited on the activated carbon granules provide an excellent surface for microbial growth?

Dr WILSON: Mr Chairman, that question—

CHAIR: It was directed to Professor Gilbert.

Dr WILSON: The question is rather long. Could Professor Gilbert have it in written form, so that she may look at it?

CHAIR: Could we have an attempt to answer it first of all?

Professor GILBERT: It is a very long and complex question.

The Hon. A. B. MANSON: Could you repeat the question, Mr Chairman?

CHAIR: Do you want me to repeat the question, Professor Gilbert?

Professor GILBERT: If I could summarise the question and you could tell me whether it is a fair summary of it. Really, what you are saying is that, given that the filter is supposed to trap particles, nutrients and hydrogen sulphide, then all the things that I am saying might prevent organisms from growing may be reversed by the very process that it is going through?

CHAIR: Precisely.

Professor GILBERT: I think that is a fair question, except that I still go back to the original situation, as I understand it, that we have got highly dilute sewage.

The Hon. J. F. RYAN: How dilute is "highly dilute"?

Professor GILBERT: I understand it is roughly 100 milligrams per litre of solids in the circumstances which are going to occur. We have a situation where any air that has been there for any length of time has been largely exhausted through North Head, where at most 10 percent of sewer air with the rest fresh air that has been drawn in is going out through the vent. We are talking about organisms in this circumstance that were really only a short distance above the surface 60 metres below, of organisms and particulate matter actually getting through this long distance upwards. So that we are talking about not only organisms but particulate matter and aerosols being deposited on the carbon filter. My understanding of this whole situation is that all of the other things that have gone before this are the major protectant, if you like, against large amounts of nutrient matter ever getting to the carbon filter surface.

CHAIR: It is a matter of faith, really, isn't it?

Professor GILBERT: Well, it is not only a matter of faith; it is a matter, as I understand it, of there being a large number of engineering devices to prevent this happening. That is, presumably, how things are designed. As I keep on telling you, I am not an engineer, but it sounds extremely plausible to me that the depth of the tunnel, the mechanisms to prevent aerosolisation happening in the first place by creating a vortex, with the air being pushed out towards North Head and a lot of fresh air being drawn in to dilute any air coming from the sewage, all are designed to reduce the amount of particulate matter and aerosol, and therefore microorganisms that can get anywhere near the carbon filter. And there is a pre-filter before that that will reduce, I understand, 85 per cent of particulate matter of five microns or greater, which is the sort of size that these particles will be. As someone has already said, clearly this depends on the whole system being properly maintained. I do not know enough about the chemistry of it to know how long it takes hydrogen sulphide to neutralise the sodium hydroxide on the surface, but I assume that part of the maintenance is to renew that or to reverse the chemical reaction.

CHAIR: And what about the sulphur as a surface for microbial growth?

Professor GILBERT: I would have thought, on its own, it would have been a pretty lousy surface for microbial growth. You need sources of organic carbon, not pure activated carbon but organic carbon and hydrogen. You need a lot of complex nutrients for microorganisms to grow in this sort of situation. The sulphur on its own is not helpful.

Dr WILSON: Mr Chairman, can I intervene to say that the purpose of convening a panel is to have a mix of skills that can provide advice to the committee. For a question such is the one that you have just asked, I would request that we have the opportunity to prepare a response that actually brings together the full range of expertise. We are more than happy to do that as quickly as we can, and to get any additional advice that we might need in relation to those other elements. I am more than happy to take the question away and to give you a more detailed answer, if you would find that useful.

CHAIR: And on the question of hydrogen sulphide itself being an issue for the growth of some bacteria as well.

Professor GILBERT: I agree with Dr Wilson: it is easy to get carried away with hypothesising, but it needs to be looked at more carefully.

CHAIR: I accept that offer.

Dr WILSON: So the Committee will transcribe the question for us?

CHAIR: Yes. If you could get the answer to us within seven days, if that is possible.

The Hon. A. B. MANSON: Dr Wilson, Dr Stephen Corbett has confirmed that there is no evidence of public health impact of populations near the normal green vents. Do you share Dr Corbett's understanding in this matter?

CHAIR: Green-painted vents.

The Hon. A. B. MANSON: The normal green events.

Dr WILSON: They are not green in the sense that they are environmentally green; they are painted green. I do not know whether all of them are painted green.

CHAIR: Most of them are.

The Hon. A. B. MANSON: As I live near one, I am interested.

Dr WILSON: These vents have been around for a long time. We carry out a lot of monitoring in the community of disease, including for instance *Legionella*. We are not aware of any cluster formation or any disease patterns that have been identified in relation to these. Remember, this goes well back, to the turn of the century. There were issues raised around the vents in the sewerage system at the time it was put in place. But we are not aware of any such health problems. We are not aware of any documentation anywhere else of such health problems.

The Hon. A. B. MANSON: I want to follow that up with a question, addressed to Professor Gilbert, with regard to the sewage gases that also are emitted from these normal green vents. Is there any evidence of risk to public health posed by those gases?

Professor GILBERT: I can only reiterate what Dr Wilson said. There is a very sensitive system of reporting disease, particularly clusters of gastrointestinal disease, and to my knowledge there is no evidence at all of any localised clustering of disease associated with that. Outbreaks of gastrointestinal disease are almost always associated with food poisoning and other identifiable diseases.

The Hon. M. I. JONES: Dr Wilson, the specific geographic location of the filters and the fans that will take this sewage gas into a valley may, because of its unusual topography, result in the actually trapping of the air in the valley. I am not talking about green flues here, but about a concentration of gas coming into a valley so that there could be trapped stagnant air. Can that, in a worst case scenario, become a public health risk?

Dr WILSON: The most likely scenario, if the air is trapped, is that anything in it will settle fairly quickly. Our belief is that there will be nothing in that air to trap. So, from a public health perspective, there is nothing there that is likely to be trapped in that regard. So, while theoretically having something in a valley may lead to some degree of trapping, in this situation I do not believe there will be anything there to trap.

The Hon. AMANDA FAZIO: I direct a question to Professor Gilbert. Sydney Water has advised that it is not aware of any of its plant operators falling ill. As you are aware, several studies have been conducted in the United States of America in the 1980s in relation to this topic. Odor and Corrosion Technology Consultants Inc examined the literature on health effects and concluded that exposure to raw aerialised wastewater posed no serious threat to human health at large, and therefore it can be stated that exposure to such aerialised substances through enactivated carbon media systems would be even less likely to pose a serious health threat to the local community. Are you aware of any other reputable research that may cast doubt on those findings?

Professor GILBERT: No, I am not. As far as I understand the literature on health effects related to sewage, it has been in relation to sewage treatment plants, which is a very different situation from the tunnel. But, if anything, it would be much more of a risk than the tunnel.

The Hon. J. R. JOHNSON: Dr Wilson, do I take it that the department will have a continuing watching brief over the operations of the tunnel?

Dr WILSON: I think one of the things that I would like to see come out of the Committee is a suggestion or recommendation that we do have an ongoing role in relation to that. Even if the Committee does not so recommend, we will have such an interest because I believe it is important that we do whatever we can to reduce the concerns of the community.

The Hon. J. F. RYAN: One of the things about the ventilation shaft that is of concern is its close proximity to a school. For any sort of public infrastructure of this nature, that is a fairly provocative placement. Do you think that the issue of it being near a school has been adequately taken into consideration? I think we would normally try to avoid putting a structure like this anywhere near a school, and this structure will be only 40 to 80 metres away from the school.

Dr DWYER: This was certainly discussed, as I said before, in terms of what might be adjacent to such a site, be that what we might call the normal healthy population, which includes children and people whose immune systems are impaired to some degree, for example, residents of a nursing home or otherwise ill people. I think the feeling amongst the panel was that, given the discussions about the tunnel, this did not pose a risk to the general population, be that population in a school or in a nursing home or in the general community.

The Hon. J. F. RYAN: I guess what is different about the school compared with a residential housing area is the large concentration of children who will be playing in close proximity to this tunnel, which they will be able to see from the playground.

Dr DWYER: Sure.

Professor GILBERT: I am much more concerned about the current situation, where a sewage overflow occurs much closer and is even more obvious.

The Hon. J. F. RYAN: I do not think anybody has a lack of concern about that, Professor Gilbert. The worry is that we might be replacing one bad situation with another.

Professor GILBERT: I can understand that that is a worry, but I must say I do not share it.

Dr DWYER: To my understanding, there has not been any publication of illnesses at that school related to the current situation, which we would all admit is perhaps unsatisfactory. Therefore, a system that looks potentially better I think would be less likely to cause any problem to the school.

The Hon. J. F. RYAN: Professor Gilbert, you said at some stage you were assured that most of the air inside the tunnel would be ventilated through North Head before it is ever discharged from the shaft. Are you aware that the ventilation to North Head stops altogether after the tunnel is 15 per cent full, which would mean that if the weather circumstances were such that the tunnel was filled for a period of time, air would be going straight from the tunnel and up the shaft? It is not inconceivable that weather conditions might keep the tunnel more than 15 per cent full for a period like a week or two.

Professor GILBERT: Sure.

Dr WILSON: That is incorrect. The material never goes straight up the tunnel. There are traps all the way through the tunnel. There is not actually at any point in time a direct discharge of material up into the venting system.

The Hon. J. F. RYAN: We were talking about the precaution that the bulk of the air is filtered out of North Head before the shaft comes into operation. There will be circumstances, it would appear, when that will not be the case given that the tunnel might be more than 15 per cent full before the storm occurs that brings about its being filled to an 80 per cent level to cause the ventilation to commence.

Professor GILBERT: That is also something that I would have to check. My understanding is that that was extremely unlikely to occur, if ever. The other situation is that there has been concern about stale air. Whatever is there under that circumstance will be highly diluted sewage and the air over it will be relatively fresh. But the exact modelling of how likely it is that that a fairly extreme situation will occur, I cannot really comment on.

The Hon. M. I. JONES: You just mentioned other trapping devices prior to the filter. I have visited the site and I have been in the tunnel. I am not aware of any such devices, other than in the Scotts Creek flue. If it is going to carry a flow of fluid these devices, one would assume, would be some sort of supplementary filters. Can you tell us about these and how they would work?

Dr WILSON: My understanding is the vent shafts have been designed to reduce the possibility of aerosolisation, and that is the way it is designed. I may have loosely used the word "trapped " to do that, but those events are specifically designed to reduce the possibility of aerosolisation regardless of how much volume varies in the tunnel itself. But you have access to Sydney Water to confirm that advice.

CHAIR: I have never heard of that.

The Hon. M. I. JONES: Nor have I.

The Hon. J. F. RYAN: It is news to me that there was any other barrier other than the carbon filters.

Dr WILSON: The way that the system is designed, it reduces the possibilities of aerosolisation. That is my understanding of the system.

The Hon. J. F. RYAN: There was some question of creating a vortex. As I understand it that is something that might have been the case.

Professor GILBERT: But that is at the bottom of the shaft. I think Dr Wilson is referring to the multiple changes of direction within the outlet to the vent and within the building that is above ground before it gets to the filter.

Dr WILSON: That is what I meant, that it is trapped, not that there were physical barriers in the sense of having another filter there. But that is my understanding of the design of the shaft. But Sydney Water can provide you with that expert advice.

The Hon. J. R. JOHNSON: In layman's terms do you have any suggestions that will allay the Community's major fears?

Dr WILSON: In layman's terms?

The Hon. J. R. JOHNSON: Yes.

Dr WILSON: For a start, I have tried to convene a group of people who have expertise and international reputations in the area of communicable diseases. They have provided advice on their assessment of all the information available that there is minimal, if probably no, risk associated with health. We have tried to look at the things that may also help address some of the other issues that the community has raised at this point in time, particularly issues around the filter. We sought further expert advice about how we might be able to assess the ability of those filters to do two things: one is whether they actually prevent aerosols passing through as part of what is there and the initial advice we have had, which is extremely preliminary, is yes that should be assessable. The second is—

CHAIR: Extremely preliminary?

Dr WILSON: Basically we have had an email from an expert at CSIRO that said, "yes, you can measure those sorts of parameters." We are now seeking some further advice about how we could actually do that. The second element is the issue around whether anything can actually breed in the filter. That is clearly an issue that has come up today, and I am happy to go back to the expert panel and ask for further advice about whether that could happen. Professor Gilbert has raised the possibility that in the longer term it may be possible to design a study to monitor any ongoing health impacts from this, although pragmatically it is like a given, that the health risk will be so low that it will be extremely difficult to measure. But again we are more than happy to come back with expert advice about that.

The Hon. J. H. JOBLING: Given that the original environmental impact statement proposal, as I understand it, was to return the air from the tunnel at Scotts Creek and to exhaust it at North Head and looking at the possibility of minimal risk, from the position of the Health Department would not perhaps the sensible way to resolve the situation be for you to support, as a department, the proposition that we should reinstate the original proposal and vent all the air in the tunnel back through North Head.

Dr WILSON: On the basis of the advice I have at the moment, the risks are so minimal you would have to ask why you are doing that. Why would you do that? Questions about what drove the changes, et cetera, in the past, I am sorry, I am unable to answer.

The Hon. J. H. JOBLING: As a department, on a precautionary principle, if you had the opportunity to remove any possibility of risk is that not a sensible way to go?

Dr WILSON: The advice that has been provided to me at the moment is that there is no risk.

CHAIR: Not no risk.

The Hon. J. H. JOBLING: Minimal risk, surely?

Dr WILSON: Risk that is probably so low that it is impossible to measure, put it that way. I do not know what you call no risk.

CHAIR: On 9 August the Health Department said that it would be a good idea to test these filters. You have not actually tested them in the past two months, have you?

Dr WILSON: No, we have not, no.

CHAIR: Why not, given that you have had two months in which to do it?

Dr WILSON: We have sought advice about how to do that, but we have not done that. We do not have the internal expertise to be able to do that. It would have to be commissioned from somebody outside to be able to achieve that.

CHAIR: And that will be done?

Dr WILSON: As I say, I apologise that these things have not been done, but we have had a small event in the middle that has taken up most of our expertise in environmental health and food.

(The witnesses withdrew.)

(Luncheon adjournment)

RAY KEARNEY, Associate Professor of Infectious Diseases, University of Sydney, on former oath.

CHAIR: Professor Kearney, do you wish to make a statement?

Professor KEARNEY: Mr Chairman and honourable members, I refer to the New South Wales Health report dated 30 August this year and signed by the Chief Health Officer, Dr Andrew Wilson. This document, with the stamp of receipt by the Legislative Council, has been widely circulated in the community by Manidis Roberts Consultants on behalf of the Sydney Water Corporation. I note that the Chief Health Officer convened an expert panel to advise him on possible health problems related to the commissioning of the Scotts Creek and Lane Cove vents of the northside storage tunnel. I draw to the attention of members of the standing committee the second of the three terms of reference which states:

The terms of reference of this Expert Panel are to:

- Review relevant literature and attend appropriate briefings to ensure that the advice available to the Chief Health Officer is accurate and evidence based.

I hasten to say that I believe the report has many inaccuracies and it is certainly not, in my view, evidence-based. Nothing that I have heard this morning has changed my view. The New South Wales Health report refers to me by name and states:

At the most recent meeting of this Expert Panel on 23 August 2000 A/Prof. Kearney was in attendance. He was able to put his views to the assembled group.

In characteristic behaviour, even that statement is crafted in a misleading and deceptive fashion, in my view. This so-called expert panel comprised seven persons but the "assembled group" to whom I am alleged to have put my views consisted of 15 people. I was informed untruthfully and deceitfully by Mr Ross O'Donoghue, Executive Officer and Director, Health Protection, about whom I was to really meet on 23 August this year. He even confirmed by a letter of thank you that I was to meet only the expert panel. Therefore, since the New South Wales Health report makes reference to a meeting with the expert panel on 23 August and it has made certain allegations about what took place at that meeting, I believe it is relevant to this inquiry that I comment briefly on that meeting and the relevant events.

Late afternoon on Monday 21 August I received a phone call from Mr Ross O'Donoghue who requested that I meet with an expert panel. In response to my inquiry he named about five persons. To my question, "Was each familiar with the design and operation of the tunnel", Mr Ross O'Donoghue responded to indicate that, in case they should not, he would invite a member of the Sydney Water Alliance to clarify questions. My immediate response was that he also invite Mr Marc Lee, a design engineer and a spokesperson for the parent committee of Glenaeon school. Apart from Mr Lee's expert knowledge, I felt that it would be prudent of me to have Mr Lee as a witness—someone who is not beholden to the New South Wales Health Department. Ross O'Donoghue was given Mr Lee's phone number to contact him urgently. Within an hour, about 5.00 p.m., Mr Ross O'Donoghue phoned me to say that he had organised a briefing meeting for 9.30 the next morning, Tuesday, in the Artarmon office of the Sydney Alliance for the Chair, Professor Gilbert and Professor Adrian Lee, a guest. I

assume that Professor Lee was called in to replace Professor Charles Kerr who deferred to me. I know Professor Kerr to be a forthright gentleman and one of impeccable character.

Mr O'Donoghue invited me to attend the briefing but I indicated that I had teaching commitments that morning until 1.30 p.m. He was also advised that I had a set of design plans of the tunnel and because of such late notice I would have to decline the invitation on this occasion. The next day, Tuesday, I faxed a letter to Mr O'Donoghue and requested that the meeting with the expert panel be tape-recorded and that I receive a full transcript. I also requested that each person present declare any conflict of interest. I note this morning that Professor Lyn Gilbert, Chair, indicated that there were no conflicts of interest. The fact of the matter is that both Professor Gilbert and Professor Dwyer are recipients of grants from New South Wales Health. I will come back to that later. Finally, my letter also confirmed my request to have Mr Marc Lee and/or Mr Ralph Kaye to be present.

On the day of the meeting, Wednesday, 23 August, at 12.45 p.m., Mr Marc Lee and I were met by Mr Ross O'Donoghue, who we followed into the conference room. Seated around the table were not only seven members of the expert panel and another on a phone link to Adelaide, Dr Cunliffe, but also three so-called observers who did not remain silent—Mr Geoff Noonan from the Department of Urban Affairs and Planning, Dr Julia Brotherton, public health officer trainee, New South Wales Health, and Ms Vicki Shepherd, Environmental Health Branch, New South Wales. Also present were three so-called invited guests—Mr Alan Henderson, Sydney Water, Mr Alex Dietsch, Tunnel Alliance and Mr Andrew Wild, also Tunnel Alliance—a total of 14 people that Mr Marc Lee and I were to meet. Both Mr Lee and I were left to stand a considerable time whilst chairs were found. At no stage during the ensuing one hour were either Mr Lee or I offered any of the generous servings of food, fruit or drink set along the entire length of the table.

At no stage had I been informed by Mr O'Donoghue that I would be confronting 14 people in what I believed was a confrontational assembly. My request to have the meeting tape-recorded was refused by the Chair, Professor Lyn Gilbert, who instructed Mr Ross O'Donoghue and Dr Stephen Corbett, that is, members of New South Wales Health, to take minutes. Our meeting with the assembly ended shortly after 1.45 p.m. and Mr Lee and I were led from the room by Mr O'Donoghue who was observed to return to the conference room and close the door behind him. Whilst we waited some time for a lift in the lobby nobody followed. The next day, 24 August, I sent a fax to Mr O'Donoghue that summarised the key issues that were raised and discussed as well as comments which were relevant. On Friday 25 August I received from Mr O'Donoghue the so-called draft minutes of the meeting. I was horrified to read what I believed was a deceitful and defiled record of a meeting. It was, in my view, an utterly fraudulent and corrupt document. A covering letter also indicated that it was sent to members of the expert panel. I responded with a 15-page document, which I can table, and requested that the draft minutes be amended to make them an accurate and a truthful record. My response concluded with the following statement:

I have never in my entire 28 years of professional academic life seen such an appalling record of a meeting at which I attended. From beginning to end the Minutes are filled, I believe, with gross inaccuracies, falsehoods and downright lies. The record has many internal inconsistencies and is written in a manner that is flawed not only in what it purports took place but by its blatant omissions of what actually did.

The record is highly defective also in the sequence of points made and of the context in which they were discussed. I believe the Minutes are clearly a prefabricated patchwork of disjointed comments of which most have no truth or validity in content. They are written, I believe, in an extremely subjective manner with clear elements of trying to present evidence falsely to entrap myself and I believe, to discredit my standing.

The lack of probity that has given rise to such a false record and of its intent should, I believe, be a subject of inquiry.

That is the conclusion of my letter.

This morning I heard Mr Wilson state in evidence that he had all the documents before he had signed off the report that was sent to this Committee. Mr Chairman, if he had in his possession a fraudulent and corrupt document that is purported to be the minutes of that meeting, what more do I need to say? It was not until about mid-September that this so-called amended version was prepared—long after Mr Wilson had sent in his report. Mr Chairman, I also believe the authorship of such a false and impure record also had a major input in the preparation of the report for the Chief Health Officer that was signed by him on 30 August, and we have documented evidence for that.

On 12 September this year I received from Mr Ross O'Donoghue what is purported to be the so-called amended minutes. That is almost a fortnight after the Chief Health Officer had sent his report to the standing committee. Whilst there are some minor adjustments incorporated in the so-called amended version—Mr Ross O'Donoghue also declared he wrote them—the new additions which were omitted from the draft minutes corrupt even further the record in my view. For example, point 3.17:

A/Professor Kearney, Mr Lee and Sydney Water/Tunnel Alliance staff left the Expert Panel meeting at approx. 1.40pm.

That is false. This morning we heard from Professor Gilbert that they stayed for up to a half an hour or more after that meeting. That is a false statement, Mr Chairman, and this is in the amended version. These statements were not in the original draft. This was requested by me to try to make more truthful the record of that meeting. In the original draft, it was stated, "These are the minutes from 12 noon until 2.00 p.m.", and yet all that was recorded was the hour in which Mr Lee and I were present. 3.18 states:

The Expert Panel continued their discussion and agreed that a draft Report to the Chief Health Officer be prepared by the Department—

Not by the expert panel. It was agreed that the draft report to the Chief Health Officer be prepared by the department "for their review".

In his covering note with the purported amended minutes, Mr Ross O'Donoghue invites me to attach comments, should I have any concerns. Is this proper conduct, to attach statements to a corrupted document? How can I be assured that the two are not ever separated? In my reply, I drew his attention to further major areas and false statements and, finally, in response to his invitation to attach comments, I recommended that all my previous correspondence of key documents be attached. Mr Chairman, it gets worse.

On 21/9, I wrote a recorded message on my office phone. The transcript is available here, Mr Chairman, as a statutory declaration.

CHAIR: Do you wish to table that?

Professor KEARNEY: I do.

Motion agreed to.

Professor KEARNEY: The statutory declaration simply records the fact that Mr O'Donoghue had lost a key document of mine.

CHAIR: Did you wish to table the previous document, the one you mentioned before?

The Hon. J. F. RYAN: You were talking about a 15-page one.

Professor KEARNEY: Yes.

CHAIR: Continue.

The Hon. J. R. JOHNSON: Mr Chairman, could I just ask Professor Kearney this: It would appear that you have about another 20-odd pages?

Professor KEARNEY: I only have one and a half more pages. The rest are my notes.

The Hon. J. R. JOHNSON: Thank you.

Professor KEARNEY: Thank you. On 21/9, I received this message. The transcript is in the form of a statutory declaration. The message discloses that a key document dated 22/8 sent to Mr Ross O'Donoghue was now missing and could I fax him a copy. This I did with a covering letter on 21/9 to record that the copy had been lost in his office. On 22/9 I received by post the so-called amended version with its remaining inaccuracies and falsehood uncorrected, together with my attachments.

The Hon. AMANDA FAZIO: Professor Kearney, can I just ask you this: You have spent the bulk of your time of your opening statement talking about what you perceive to be inadequacies in the way in which a meeting was organised and in the way in which you were informed who you would be presenting your evidence to. You have not given us any idea at all of what difference it would have made whether you were giving your evidence to seven people or 14 people. You have not broached that issue at all. Earlier this morning it was noted that there may have been a slight incompetence in terms of providing chairs to people giving evidence to that meeting on 23 August, but you have given us all this material in written correspondence already. I am assuming that everybody on this Committee takes his or her responsibilities seriously and has taken the time and made the effort to read all the correspondence that we have been given here today.

What I am interested in is in finding out if you have in the new evidence to provide to this Committee about the Scotts Creek vent? Have you got any further evidence? Have you got any scientific evidence you can present to us today that will show that the expert panel's finding and the Chief Health Officer's report is flawed? Rather than complaining about the process in minute detail, I think that Committee members and members of the public who are here today would be far better served by hearing technical evidence about what you perceive to be any health risks brought about by the northside storage tunnel or by the Scotts Creek vent rather than by going into detail about correcting minutes and how you wrote to somebody complaining about the corrected minutes. I am not interested in that. I am interested in the health impacts, if any, on the community of the North Shore.

The Hon. M. I. JONES: Mr Chairman, I would suggest that the evidence we are receiving at the moment is highly appropriate. Falsification of minutes is tantamount to corruption. If the minute taking has been conducted corruptly, what is the corruption hiding? I would suggest that we allow Professor Kearney to continue giving his evidence on the basis that he so chooses.

CHAIR: Professor Kearney, you may continue as you wish.

Professor KEARNEY: Thank you. I only have a couple more paragraphs in my statement and then I am quite happy to address the concerns of the Hon. Amanda Fazio. Mr Chairman, this is about truth. I am here to talk about the truth. It is my duty to also report what I believe is not the truth. That may impact and effect the outcomes of this whole process that is now under inquiry. I made reference to the fact, Mr Chairman, that I had sent back this copy of a missing document. On 22/9, I received all my correspondence with the respective covering note, except the one which was purported to be missing. The fact of the matter is, Mr Chairman—and I will read on here—that I also note that my missing key document is attached but is not accompanied by my covering letter, as all the others are. As it is presented with a fax date imprinted—when I sent it, the date was received with an imprint—it indicates that it was actually received "late" on 21/9. And this can be used as a fraudulent alibi to confirm what is in the draft minutes—that my request to ask Mr Lee to come in fact was received late.

Item number 2.7 in the draft amended minutes, still not corrected, states:

Mr Lee's invitation to the Expert Panel was at A/Professor Kearney's suggestion which was received by the Department too late to allow Mr. Lee's inclusion in the briefing.

I believe the New South Wales Health Department has filed a fake and bogus set of minutes of a meeting of 23/8 and it was the fake and bogus set of minutes that I would expect the Chief Health Officer has in fact sighted. Mr Chairman and honourable members, I believe evidence shows that within New South Wales Health, at least within this section and in this case, there is a deliberate—and I mean deliberate because every opportunity was given to change the inaccuracies—falsification of records; that there was deceit or fraud; loss of purity, breaches of probity, corruption and, finally, courtesy bidding, that is, to the contractors who become beneficiaries of New South Wales Health decisions.

Mr Chairman, is this the character of this section of the Health Department to whom all the other regulatory departments have deferred on health risk issues, not only those of the Scotts Creek vent but also health issues related to the M5 East and cross city tunnels? Mr Chairman, I am quite happy to address the document in all of its sections and to respond in terms to show that I believe in fact it is inaccurate and is not evidence based.

The Hon. J. F. RYAN: Could I just ask a couple of questions by way of clarification? I am just not sure that I understand the significance of the changes in the minutes. I am not trying to be difficult or anything, but Mr Lee, as opposed to Professor Adrian Lee, from the local community was actually admitted to the meeting.

Professor KEARNEY: Correct, yes.

The Hon. J. F. RYAN: I was not quite sure that I understood entirely what was missing from the document.

Professor KEARNEY: I can appreciate that. At the original meeting on the 23rd, Mr Marc Lee had raised the question of why he was not invited to the briefing session on the Tuesday, the previous day, along with Professor Gilbert and along with Professor Adrian Lee.

The Hon. J. F. RYAN: Right.

Professor KEARNEY: On the same day that Mr O'Donoghue had received confirmation of that request on my part—because he had a phone call the previous day—in the minutes of the draft set.

He declared that he did not, or that they did not, have sufficient time to ask Mr Lee, and that is not true. And now he has evidence to say that my letter now came late.

The Hon. A. B. MANSON: Mr Chairman, can I ask a question in clarification as well?

CHAIR: I would like to ask a question before that, if I may. Perhaps you could give us your reasons why you think that the Chief Health Officer's expert panel's report itself is flawed and the findings are flawed?

The Hon. A. B. MANSON: I wanted to ask Professor Kearney a question about his opening statement, which continues from the Hon. J. F. Ryan's question.

CHAIR: Let us start with this question and then we can go back to that in a moment.

Professor KEARNEY: Mr Chairman, I think it would be easier if I just simply take some of these sections from the report. For example, it says:

Diluted sewage overflow in the Northside Storage Tunnel although likely to contain a number of potentially harmful bacteria, is considered a low microbial risk in the context of the Scott's Creek Vent.

My response, Mr Chairman, is that in microbiological terms, so-called diluted sewage does not necessarily imply a significantly less risk of harm. If we have something like 10 million organisms per millilitre and it is diluted one in 20, for example, 500,000 organisms per millilitre is not a significant reduction of risk in microbiological terms. We have heard various comments about what the dilution factor is. Some have said it is 2.5, some have said one in 20. We have heard today that there is a certain amount of solids per litre. The fact is to use the expression "diluted" ought not to be in the sense that it is removing or reducing the harm.

The second point is that the document ignores the fact that raw sewage will also be stored in the tunnel on occasions. We heard that previously, that when they are undertaking maintenance work in the main tunnel, for example, raw sewage would be there. Again, it is somewhat inadequate. The term "harmful bacteria" excludes the positively harmful viruses and toxins. The panel has produced no documented evidence to conclude "a low microbial risk". This morning we heard guesses. Dr Dwyer expressed his view in terms of feelings—"I feel" that such and such will be. The Chief Health Officer's report was requested on the basis of accurate and evidence-based information. The panel has not produced any documented evidence to even justify the statement "a low microbial risk". In fact, there has been a switch in that statement from bacteria to microbes. Bacteria are microbes, but not all microbes are bacteria. There are viruses and there are other agents there as well. It is very, very equivocal.

The research literature documents up to a 10 thousandfold error in determining viable counts of organisms in sewage aerosols—up to a 10 thousandfold error in sewage aerosols. The next point I want to address is that the document says that legionella pneumophila, the organism that causes legionnaire's disease, may, for example, be present in low numbers. I heard Dr Gilbert's discussion this morning about the legionella organism and I can say emphatically that it was very equivocal. If all the information was put to hand a different picture would be created, with all due respect to Professor Gilbert.

The term says "it may be present", but it needs to be qualified. Where? In the tunnel? In the sewage? In the vapour above the sewage? In the vents? The panel has not disclosed any data or documentation to say they will be present in so-called low numbers. This morning we heard guesswork.

The organism will flourish under conditions in this tunnel. We remember that there was a change in the construction of this tunnel not to line the walls of the tunnel. In fact, it is porous. It is constantly wet. There is a biofilm. Condensate from the bottom will settle on the ceiling and will feed the system. There will be residual sewage on the walls.

It is documented in their literature that the fact of not lining the walls will lead to poor cleaning. Cool temperature of about 20 degrees celsius will allow legionella pneumophila to flourish and multiply. That is documented evidence. Persons have been infected by fresh water contaminated with legionella organisms. Patients have been infected by the aerosols generated by anaesthetic machines. The conclusion on that point is that the so-called strong view of the panel, I believe, is not evidence-based.

The expert panel has noted, and I quote from their statement, that notwithstanding this so-called low microbial risk, the design of the tunnel and its vents are likely to capture any aerosols that may be generated within the tunnel during high rainfall events. The word "any" means no matter which. Professor Lee compared the granulated activated carbon filter to a cottonwool plug in a test tube, but conceded he did not know the mesh size—which is three to six millimetres of the granulated activated carbon filter. That diameter of three millimetres will allow 1,500 single cells of golden staph to line up across that diameter. The activated filter is not a microbial filter and has never been rated as such by the companies or by the reports.

The so-called "low microbial risk" in that document is without evidence and therefore is speculative. The panel seems to consider aerosols as only vapours and fine mists. By definition an aerosol is a description of fine particles of liquid or solid substances suspended in the air or in some other gas. The particles are so fine they remain in the air for a long time. I have here an aerosol pack just to illustrate the fact. What you see is vapour; what you do not see are the bioaerosols or that level of dimensions of the aerosols that are carrying infectious organisms. What you see there is not what we are talking about. It is when that has dispersed into particles that you cannot see; of a dimension of five microns and less is what we are discussing here.

The whole document is written as though this is what they are trying to eliminate. They talk about settling tanks; they talk about vortexes and so on. Well, talk about that if you like. Nowhere is the tunnel designed to literally capture any—I mean literally "any", which means no matter which aerosol—aerosols that are now in that atmosphere. If that was a suspension of bacteria and if we placed bacteriological plates on the corners of this room, within half an hour you would have them depositing on those plates.

That is the kind of aerosol we are talking about, invisible. The aerosols we are concerned about are mainly the invisible ones or five microns or less in diameter. It is noteworthy that in the so-called draft minutes, the writer eliminated reference to five microns bioaerosols in the diagram that I had drawn. Those sorts of bioaerosols do not seem to figure in the mindset of the panel. The aerosols we are concerned about are mainly the invisible ones, five microns or less, and it is already documented that 88 per cent of the infectious particulate matter in sewage aerosols are of that size. The vents are not designed to capture any aerosol. "Any" means no matter which. They are not designed to capture those aerosols, and that includes the granulated activated carbon filter.

Might I point out that Sydney Water has offered now to put in a final filter, a third filter, of retention capacity of 0.3 of a micron. Why? There must be some doubts. That offer was made the day after I had met the expert panel. It is dated 24 August and addressed to Hunters Hill Council. The document is here. The Wollongong legionella outbreak where 45 people were affected, nine of whom died, the shoppers went in the cafeteria in the basement of a building 200 to 300 metres away from the actual source of the legionella. The ducting that went through that building and ultimately into the cafeteria carried those bioaerosols, the invisible aerosols.

The Hon. AMANDA FAZIO: Mr Chairman, could I ask a question? The witness seems to be just going on and on. In relation to the matters that you raised in your opening statement—

CHAIR: The witness has not concluded his answer, by the way.

The Hon. AMANDA FAZIO: I do know that he is still giving his evidence.

CHAIR: He is answering a question that I asked earlier. Please continue.

Professor KEARNEY: I was asked to address the report. I have already said that I believe the report is filled with inaccuracies and is not evidence based.

The Hon. AMANDA FAZIO: Do you have some evidence to support your views?

Professor KEARNEY: With respect, and in terms of the precautionary principle which states that when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof.

The Hon. AMANDA FAZIO: Fine. You have raised that report, which came out with no names of the authors. Can you advise the Committee whether you helped to prepare that report?

Professor KEARNEY: Which report?

The Hon. AMANDA FAZIO: The report you just quoted from.

The Hon. J. F. RYAN: The document called the precautionary principle.

Professor KEARNEY: No, I had nothing to do with that but I have read it and it is an excellent document. You are referring to the precautionary principle audit prepared by the community at Scotts Creek and I believe it is an excellent document. I have had nothing to do with its preparation.

CHAIR: Would you mind continuing with your answer to my question. We can continue until 3.30 p.m. because Mr Kaye has agreed to cut short his time. We still have time available.

The Hon. J. F. RYAN: Since you have been interrupted, you made reference to studies having shown that aerosols have caused the spread of legionella virus. I think you made some reference to breeding in hospitals and so on. Are you able to supply the Committee with the documentation relating to that?

Professor KEARNEY: Absolutely. I have the documentation here for you.

The Hon. J. F. RYAN: Will you tender that documentation?

Professor KEARNEY: I will, yes.

Documents tendered.

CHAIR: What do you think is wrong with the panel's report? We are halfway through that.

Professor KEARNEY: The report also states:

Several design features of the tunnel, such as vortex flow, a series of settling chambers, air flow in the main tunnel and re-entrainment of discharging air with the inflow, will reduce the concentration of aerosol in the discharging air flow.

My response is that none of these so-called design features can be seriously considered to significantly reduce or remove the invisible bio-aerosols, those that are currently in the air at the moment, from that pressure pack. The vortex flow, which means the whirling motion forming a cavity in the centre, may in fact increase the number of invisible bio-aerosols. We must understand here that there is a drop shaft which brings raw sewage down into the tunnel about six metres away from the vent or the duct that takes it up. That sewage coming down that drop of about 50 metres or so will generate aerosols. That is documented in the literature. *Holmes Air Sciences* stated the same—that aerosols will be generated by the flooding of sewage down the drop shaft. Six metres away is the intake up to the vent.

The panel has not produced any validation to prove that the vortex flow "reduces the concentration of aerosols". The literature documents that legionella pneumonia has been contacted from the vortex effect of a spin dry washing machine. For example, they also say that there is a series of settling chambers. As I understand, these are designed to capture droplets, which we saw visibly, or fine mist. They are not designed to arrest invisible bio-aerosols. The panel has not disclosed validation data that so-called settling chambers capture the invisible bio-aerosols. As I understand, the so-called settling requires a time period of stillness. This is not the situation here during the operation of the vent in a stormy period.

The so-called invisible bio-aerosols are likely to be generated from the action of air movement in even a wet chamber. For day-to-day reference, a child in a room who has whooping cough is coughing. As we heard from Dr Wilson this morning about other infections, those aerosols evaporate. The point is that anyone who walks in that room who is not immunised or a child will be at risk of acquiring that infection via an aerosol.

I think there would be some questions raised about the experience I have had. Just to take a minor break, in 1974 and 1975 I was commissioned by the World Health Organisation to undertake a study to compare smallpox virus with one that was isolated from monkey pox or monkeys. The problem was trying to distinguish between the two types. I went to England working in a laboratory. In an adjacent laboratory was a PhD student. Whilst he was carrying tissue cultures through a door, the cultures suddenly slipped and fell on the floor. I went to help. I asked, "What are you doing?" He said that he was working with a new strain of virus called the Mount Elgon bat virus. He said, "It belongs to the rabies family and we are also working with rabies here."

I said, "Is it pathogenic? Does it infect human beings?" He said, "No." I said, "Why?" He said, "We have injected it into mice and hamsters and it does not kill them." The professor, who is an adviser in virology to the World Health Organisation, agreed that it was not pathogenic. I said, "These are neurotrophic viruses you are working with. Have you tested it by inoculating intranasally?" He said, "No." I said, "Well, you should." The end result was that every animal inoculated intranasally died and from the brains of those animals the same virus was isolated. The controls all survived.

I was invited to go to Pirbright Institute where they work with foot and mouth disease. The Deputy Director, Dr Fred Brown, disclosed that one to two kilometres away from that institute, a high containment area, the agents infected cattle in a dairy herd. He conceded that the agents, the foot and mouth disease, had been transmitted by aerosol from infected cows held in the institute that had been drifting in the mist. At the end of my term I handed over all of my smallpox cultures and stocks to the head of the department and returned back to Australia. I was horrified to learn that in the Birmingham

University a professor undertook to continue the work. An assistant was working in the laboratory with the smallpox strain. Aerosols allegedly had been created by passing suspensions out of a pipette. That aerosol, like this, drifted into an airconditioning system and was exhausted out into the outer atmosphere. At that point it would have been extremely dilute. It was then sucked in an intake some distance away into a photographic studio. A person in the studio was infected and died. The professor committed suicide.

My point is that we can sit around this table and speculate. The fact of the matter is that these agents can infect long distances from their source of generation. Thankfully, smallpox no longer exists. But I put to the panel: What is the cause of dementia? What is the cause of Alzheimer's disease and neurological diseases? Are they associated with some of the eco-viruses that are found in sewage vapour and are inhaled and enter the olfactory nerve? We do not know. So we return to the precautionary principle. Without that knowledge, and when in fact we know the diseases are there, we cannot stand here with all confidence and say there is no risk.

The Hon. AMANDA FAZIO: Can I ask a question following on from comments you have just made? You have been talking about legionella as being a cause for concern, in your opinion, in relation to the Scotts Creek vent. When you gave evidence before, you referred to the Bible in terms of scouring would not decontaminate the walls of the tunnel. Do you have any more appropriate evidence rather than referring to the Bible in terms of the decontamination of the tunnel? It is interesting to hear what you did in 1974 and 1975, but I think you should be getting down to the issues.

Professor KEARNEY: For the honourable member, I will get down to the issue. The fact of the matter is that the statement was made thousands of years ago before a microscope was ever invented. I do not stand here with the temerity and challenge the Almighty God and say, "You have got it wrong." The point of the comment was that where a person has an infectious discharge and contacts a porous earthenware pot, as opposed to a wooden article, the instruction was to smash the pot and take it out of circulation because you cannot get rid of the absorbed infectious agent. That was the very sound instruction. Would you wash it or use it as an implement to cut vegetables on? An unglazed pot will withhold and absorb infectious material. The instruction was: Do not wash it. Smash it and take it out of circulation. That is the point here. This tunnel is unsealed, underlined and absorbent. The analogy was simply to instruct the reader that I am not saying this; the instruction came, as you read, to the Israelites. That is a scientific fact.

The Hon. AMANDA FAZIO: Is that what you base your science on?

The Hon. J. F. RYAN: The Hon. Amanda Fazio is being rude.

The Hon. AMANDA FAZIO: I asked Associate Professor Kearney did he have any more recent scientific evidence.

The Hon. J. F. RYAN: He has just tabled a large amount of material.

The Hon. AMANDA FAZIO: I do not think so. He has just gone back to his involved statement.

Professor KEARNEY: The fact of the matter is if you read any literature regarding legionella pneumophila and the other species of legionella you will find that they thrive in algae, sludge and slime. We heard this morning of amoebae. Not necessarily essential. They can thrive without amoebae. You can get legionella from cleaning out the fishbowl. My point is how much more recent evidence do you need to establish the fact?

The Hon. A. B. MANSON: I have listened with great interest till now. I have been trying to ask questions for the past 45 minutes.

CHAIR: The most important question we wanted to ask was being answered as to why Professor Kearney thought the report was flawed. He was giving that answer.

The Hon. A. B. MANSON: Do you think that this side of the table might be able to ask a question or two?

CHAIR: Professor Kearney, had you finished your answer to the question I asked about the report?

Professor KEARNEY: We have not completed the report. We were about to talk about re-entrainment, of discharging with the air flow. That is in the report. Re-entrainment means mixing an aerosol with another aerosol. If, in fact, they are re-entraining and they are talking about a filter that is absorbing aerosols, how do you re-entrain? It just does not sound logical.

The Hon. AMANDA FAZIO: Why not?

Professor KEARNEY: The answer is that if there is a filter, this granulated activated filter which allegedly—and I do not believe so—is capturing all the aerosols, then what is going to come out to be re-entrained? What is going to come out to be mixed with the human atmosphere that is drawn in from outside? That is the meaning of re-entrainment here. It means to mix the aerosol that is coming out with the human atmosphere during a storm event and it is vented out. That is what it means. So there is inconsistency. It cannot have the argument that the filter is going to remove all the aerosols when, in fact, *Holmes Air Sciences* already says the aerosols will be there and the microbes will be there as well. So the panel is inconsistent with the evidence *Holmes Air Sciences* has already documented.

The Hon. A. B. MANSON: You make some strong comments in your opening statement about the way you were treated by the expert panel. Did you complain to them about your treatment at that meeting?

Professor KEARNEY: I have a 15-page document here that was sent within a day or so after seeing such a corrupted document. How much more do I need to complain about? I got no responses to any of those documents. I have no evidence to indicate that the other members of the panel in fact saw my rebuttal.

The Hon. A. B. MANSON: I meant at the meeting. You said they did not give you a chair, they did not give you a sandwich or a glass of water. Did you say, "That's a bit rough"?

Professor KEARNEY: With respect, let us not just reduce this down to simple terms of—

The Hon. A. B. MANSON: I did not raise it; you raised it in your opening remarks. I thought the way they treated you was a bit unfair, if that is so.

Professor KEARNEY: The questioning and the interaction revolved principally around granulated activated carbon filter and when I returned the question to Professor Adrian Lee—and this is documented—did he know the actual mesh size, which is the space between the net by definition, he said no he did not. I asked the panel who did know and no-one knew, including the Chair. I said, "It is between three to six millimetres in diameter" and then I turned to Mr Andrew Wilde and I said, "Andrew, in your report you are confused about sieve size and the size of the granules."

The Hon. A. B. MANSON: So you did not raise the minor problem at the meeting. I can understand that answer. Have you raised these questions previously with Mr Richard Jones, the chairman of this Committee?

Professor KEARNEY: What questions?

The Hon. A. B. MANSON: About your treatment at the meeting, about the allegations you have made about the minutes. Have you raised that question previously with Mr Richard Jones, the chairman of this Committee?

Professor KEARNEY: I certainly did and the reason is that I believe that what was happening here in terms of me being asked to meet the expert panel was to subvert this process and so, therefore, I had an obligation to advise Mr Jones accordingly.

The Hon. A. B. MANSON: I am not questioning your obligation. The point is I thought the chairman might have asked the expert panel this morning to explain their actions or the allegations that you have made. However, if you believe that the expert panel's report to the Committee is based on fabrication and lies, do you then believe that your colleagues Professors Lee, Gilbert and Sorrell thus colluded in these lies?

Professor KEARNEY: I did not say that. I have no evidence to even say whether Professor Lyn Gilbert had actually read the report written by Mr O'Donoghue before Mr O'Donoghue sent it out. It was sent out within two days. I have no idea whether that was done by the Chair, as it is conventional practice to at least read them before they go out.

The Hon. A. B. MANSON: Do you believe that the expert panel should be called back or should give an answer to your allegations? Would that be a fair thing for this Committee to do?

Professor KEARNEY: The expert panel has a copy of my response. It was attached to the so-called amended minutes. There has been no feedback, no response, no letter, no debate, no discussion at all.

The Hon. A. B. MANSON: Can you tell me why you are not convinced that the many engineering components included in the design of the tunnel, such as the vortex flow to reduce aerosol generation, the settling chambers to capture aerosols, the 60-metre shaft for aerosols to travel up and the further series of condensation chambers, will not reduce to zero the airflow before it even gets to the carbon filters?

Professor KEARNEY: I have already addressed half of those. I have already illustrated the fact that a shaft six metres deep is not going to be a means of capturing aerosols of this dimension. I used the reference to the Wollongong ducting, where 200 to 300 metres of ducting from the source to the patient would be equivalent in a sense, so a 60-metre drop shaft or vent shaft is certainly not going to impede such bio-aerosols. I have already addressed the matter of the settling chambers and I do not believe the settling chambers are designed to capture those invisible bio-aerosols—yes, water droplets. Drops fall to the ground and they will be captured in the settling chambers but not the invisible bio-aerosols.

The Hon. J. F. RYAN: To put it in context, if I remember rightly the evidence we received this morning was not perhaps as strong as the evidence you have related in the report by the chief health officer. What they said this morning was not that the vapour would be reduced to zero but that the series of events required to actually result in an infection of anybody was unlikely to occur, given that in order for them to infect you have to go through all of the engineering design features of the shaft and

then go through the activated carbon filter and then still get discharge to the atmosphere. It would need nourishment all away through; it would need a series of other microbiological conditions before it finally made it to someone, who was infected. I am not sure that the evidence this morning was that there would be none but simply that all the circumstances, required together, were so unlikely to occur at any one time that it was plausible to believe that the health risk was sufficiently minimal that it was not worth spending another \$30 million to fix the problem.

Professor KEARNEY: The fact of the matter is that in the Holmes report if an activated carbon filter was not put in at that point the odours would be unacceptable, which implies that even at that point the accompanying sewage vapour was unacceptably high so, therefore, if we are now going to use the argument that everything that went on before is adequate, then it is flawed because they have already conceded that the H₂S levels at that point where the filter is to be installed or has been installed will be unacceptably high for a local community.

The Hon. J. F. RYAN: But I guess it can be said that H₂S does not need nutrients or particular air conditions in order to eventually get into the atmosphere whereas a microbiological organism might.

Professor KEARNEY: The organisms that we are talking about have arisen largely from the sewage and are in the vapour. Some will arise from biofilms in the system. We are now looking at a period of time where there is a sudden surge of pressure differentials and with this tunnel, which is over three kilometres long with a contaminated atmosphere that goes back into the main tunnel, all of that is being sucked out and then discharged under pressure at the rate of up to eight cubic metres a second. It is a different situation to what is happening with a green vent.

The Hon. J. R. JOHNSON: But would it not be gradual? Would it not rise and gradually go?

Professor KEARNEY: The tunnel is filling at the time of the storm event and the pressure in the tunnel has to be released as that water rises and during that turbulence, during that time when there is movement, that vapour, that atmosphere, will be highly contaminated and we are asking these people in the Scotts Creek area to accept blown out into their face all of that atmosphere over at least a three-kilometre stretch within a short time period. To come back to your question, it is already documented that such vapours, such aerosols, have not only bacteria but also viruses.

I hear the argument that this is not the same as a sewage treatment area. I totally disagree. In a sewage treatment area—and we are looking at those vats in some cases that are stirred—there is a dilution effect drifting out. Here we have a captured tube. Everything is captured in that tube above a turbulent, bubbling sewage suspension and it is captured—it is not being diluted at that point in time—and then it is blown out into the face of residents at Scotts Creek. That is different. It is more likely that the organisms are going to be concentrated in a smaller area in that situation than from a sewage treatment area.

The Hon. J. F. RYAN: Are you saying that the turbidity which is going to exist inside the tunnel will make that different to what might happen at a sewage treatment plant?

Professor KEARNEY: Yes, different in the sense that the vapour going up is not being drawn away, it is being directed out through a vent into a defined area.

(Short adjournment)

CHAIR: A number of experts—including Dr Dwyer, Professor Sorrell, Adrian Lee—feel, apparently, that there is no plausible risk posed by the emissions from the Scots Creek vent. You have a contrary view. Why should we listen to you and not to them?

Professor KEARNEY: Dr O'Donoghue put forward a very compelling case with a dissenting view from that of the expert panel. We have heard also Clive Broadbent has cautioned the need to take measures to prevent *Legionella pneumophila*. All I have done is simply to pull together facts, knowledge and experience, coupled with a proper understanding of causes of the effects, and I have made certain decisions. The advantage that I have is that I am not beholden to the health department. I do not receive grants from the health department.

Professor Gilbert does receive grants, as documented in her declaration of conflict of interest. So does Dr Dwyer receive grants from the health department. The department under Professor Gilbert's control is essentially a service department to sections of the health department. You have also colleagues such as Professor Tania Sorrell working in the same department. Dr Dwyer is a subordinate in the same department. This is not a question, in my mind, of a knowledge situation; it is a question of patronage.

The Hon. J. F. RYAN: Professor Kearney, that is a reasonably serious accusation to make of either professionals, that they have basically had their opinion bought from them. Is that what you are implying, or is it something less than that?

Professor KEARNEY: What I am simply saying, Mr Chairman—and it extends beyond the panel, it includes the consultants; and we see also documented in the consultants' report a level of patronage, and I have got that document here—is that once the health department makes a decision it is in the interest of those who are beholden to the health department to toe the party line, to be consistent with the view that is expressed. In this case a decision was made too early in the piece about the issue of health risk. The issue is mainly odour, and the design of the tunnel has been essentially around the question of reducing odour. Only late in the piece did the matter of infection come up for review. By that time one can see consultants who had already been commissioned adopting the party line. We see in the report from *Holmes Air Sciences* just that. I do not have to say that consultants who are not prepared to toe the party line are not going to take an opposite view. It is not in their interests of viability to do the opposite.

The Hon. J. F. RYAN: Professor Lee and, I think, Professor Cunliffe from South Australia could hardly be said to be subordinate to the Department of Health. Let us imagine that people in the Department of Health are simply defending a decision that has already been made by officials of the Department of Health. They would not necessarily have been drawn into that, would they?

Professor KEARNEY: If one is defending a position, provide the evidence. I have not seen evidence put before this Committee that shows unequivocally that there is no health risk.

The Hon. A. B. MANSON: Professor Kearney, you were in the audience here this morning and you must have heard the Chief Health Officer state that the report was received by all members of the panel. If you maintain their support is based on lies and inaccuracies, then those experts must have approved those lies. That is what you seem to be saying to me.

Professor KEARNEY: Absolutely.

The Hon. A. B. MANSON: That they are all in it together.

Professor KEARNEY: What took place at that meeting, where I had a witness Mr Marc Lee in front of that assembly, is not borne out in the minutes.

The Hon. A. B. MANSON: There are very serious allegations about corruption and deception. Are you actually calling for another inquiry?

Professor KEARNEY: I would call for a royal commission.

The Hon. J. R. JOHNSON: Professor Kearney, you have said that a temperature of 20 degrees centigrade will allow *Legionella* to grow. This morning, Professor Lyn Gilbert disputed that. Why should we place greater credence on your submission than on hers?

Professor KEARNEY: That is a very sensible question. The answer? Don't believe me. You read the literature. I will provide you with the documentation that these organisms thrive in ranges of temperature from the Alpines of Switzerland to the hot springs of Yellowstone National Park. So it is false to say that they only grow at 30 degrees. It is documented information that they grow and flourish at other temperatures. The fact that you have cooling towers contaminated indicates that they will grow at temperatures of other than 30 degrees. That is a matter of commonsense. So I disagree with Professor Lyn Gilbert. But don't believe me. You confirm my statement with the literature.

The Hon. J. R. JOHNSON: Can you table documents that support your various assertions?

Professor KEARNEY: Can you be more specific, sir? I can table a lot of documents, but if you want me to be specific please nominate something you want me to address.

The Hon. J. R. JOHNSON: I am particularly concerned with the question of *Legionella*, but there have been others. I must admit that I did not take notes of them. But I am concerned particularly with your reference to what took place at the meetings and where you disagreed with the assertions of the expert panel. Have you got evidence that you can produce to the Committee that would give credence to your position?

Professor KEARNEY: What was discussed at that meeting was not *Legionella pneumophila*. We were talking about, mainly, the granulated activated carbon filters. Professor Lee made a remark about a reference that I had submitted to this standing Committee as being somewhat irrelevant. I disagree, because it has relevance.

The Hon. J. R. JOHNSON: It has?

Professor KEARNEY: It has relevance, and you have that from the last meeting. The fact is that as was recorded in the minutes of the Community Liaison Committee at the meeting with Dr Stephen Corbett. The minutes are documented for 28 June. It is stated that New South Wales Health acknowledges that the northside storage tunnel is a unique facility—a unique facility. It stands alone. So where is all the evidence that comes up to declare risks when it is a unique facility?

The Hon. J. F. RYAN: Speaking of the uniqueness of the facility, there is a reference in the report by the Chief Health Officer that similar vents in North America have been operating for some years with no reports of public health problems. Do you have any idea what that is a reference to? Was that discussed by people present?

Professor KEARNEY: When it says there are no reports of a health problem taken literally it means that the studies were never done to produce a report, and so the evidence does not exist to prove the point.

The Hon. J. F. RYAN: But were similar vents in North America discussed with you by the committee when it met with you?

Professor KEARNEY: No.

The Hon. J. F. RYAN: Did they name any?

Professor KEARNEY: No.

The Hon. J. F. RYAN: Did you discuss the relative merits of those studies?

Professor KEARNEY: No.

The Hon. J. F. RYAN: Do you have any idea what is meant by, "A number of studies have demonstrated that mechanically agitated sewage can generate micro-laden aerosols that can travel up to several hundred meters." That sounds something like the evidence that you gave earlier.

Professor KEARNEY: Correct.

The Hon. J. F. RYAN: "The expert panel has reviewed this evidence and is of the view that they are of limited relevance to the situation as Scotts Creek and Lane Cove." Is that—?

Professor KEARNEY: I totally disagree with that for the simple reason that what that paper was illustrating was that where you have turbulence in the sewage treatment area that has been mixed by some mechanical device, the amount of infectious aerosols generated by that process was far, far greater than if it were just bubbling through that suspension, or the aeration was just bubbling. That was the essence of the paper. It showed that where there is agitation the aerosols in the atmosphere above that sewage was far greater and that is the situation we have here.

The Hon. J. F. RYAN: The other point that the Department of Health makes constantly is that the current arrangements whereby the sewer overflows, in fact discharges in an enormous cascade fashion just above Scotts Creek, possibly produces conditions that are possibly worse than anything that might come out of the ventilation shaft, in that clearly aerosols are produced, clearly they are in aerosols of sewage, it is probably located closer to the school and some of the other more sensitive places. But it would argue that that, to some extent, provides something of a controlled experiment, if you like, as to what might happen with the discharge of microbes and viruses under those circumstances. And it generally argues that since nothing terrible has happened under those circumstances a vent is likely to be a better situation rather than that rather horrific—

Professor KEARNEY: One has to concede that there is a risk factor there. But, when you compare the amount of vapour that is produced from that situation, and admittedly there is a risk factor, to the situation where you are now drawing out a three-plus kilometre tunnel vapour that is contaminated and blowing into that particular valley, it is not comparable. The latter is much more of a risk than the former. The former certainly would carry a risk, but I would say the latter, where you are actually pulling out all that atmosphere, discharging it out of that vent into that defined area within a valley, under a cloud will have a greater risk.

The Hon. AMANDA FAZIO: I understand that some of your answers at the previous public hearings indicated that you did not have a very well developed understanding of how the tunnel system would operate. I am led to believe that you have not taken the opportunity to visit the northside tunnel, or to take up an offer of a briefing from the Northside Storage Tunnel Alliance. You have been rather inflammatory in some of the comments you have made in public, and I refer to examples in which you have emotively compared to the breaching of a whale or an inflamed pus-filled human appendix that bursts. That is your comparison to the venting of air from the Scott Creek event.

For example, you have often said that an enormous volume of air will be propelled out of the vent at eight metres per second. Are you aware that the average vent rate when air is being vented from Scotts Creek is 2,000 litres per second? The vent rate exceeds 6,000 litres per second for less than 2½ per cent of the time that the Scotts Creek filter vent system is in use, and there will be no discharge from the vent 60 per cent of the time. Ventilation rate at Scotts Creek is at maximum 8,000 litres per second for approximately only four to eight hours per year. Does not this basic misunderstanding on your part of the tunnel of the vent cast doubt on your understanding of the operation of the tunnel in total? Do you not think you should take some responsibility in your comments, rather than causing fear and consternation in the community with inflammatory and fallacious statements with which you intend to inflame the community and mislead this Committee?

Professor KEARNEY: Thank you for all those prejudicial comments, madam. I referred to this particular tunnel as being a branch of a main sewer line. Your intestines will have a branch off that system known as the appendix. When that appendix gets an abscess it bursts. What we have here is a three-plus kilometre tunnel branch off the main sewer system that is venting out toxic gas, including organisms that can be responsible for abscess formation. The analogy is not too inflammatory, although the actual example is one of inflammation.

In terms of the allegation that I had limited knowledge of the function of this stack, what I did for the purpose of discussion, madam, was that I reduced a very complex picture in terms of the design and operation to what I described as a stylised concept drawing for the purpose of discussion. That is teaching principles. I do have the original design plan. I understand it. I could have tabled it. It would have meant very little. So what I did, I pulled out of that the concepts of relevance to the question of what are and where are the risk factors, the prefilter, granulated activated filter. They were the essential points that I believed needed to be addressed. It was not a question: this is what I got out of it. It was simply to reduce a very complex design into something that had a talking base.

(The witness withdrew.)

RALPH KAY, Air Pollution Consultant to Glenaeon Rudolph Steiner School, on former oath:

CHAIR: Do you wish to make a statement?

Mr KAYE: Yes, I would like to make a statement and after I have made my statement I would be very happy to answer any questions.

CHAIR: Go ahead.

Mr KAYE: I previously gave evidence that potentially infectious aerosols would be created during the operation of the activated carbon filter at Scotts Creek. In my evidence I describe my observations of substantial aerosol emissions from similar activated carbon filters operated by Sydney Water. In my evidence I discussed the mechanisms for the growth of microorganisms in caustic impregnated activated carbon. I gave evidence that this phenomenon was well known to Australian suppliers of activated carbon, and I also provided supplementary documentary evidence concerning laboratory and field observations that confirm this. What I have heard from the expert panel this morning is only conjecture about the growth of microorganisms in activated carbon filters. Consequently, I would now like to discuss the results of some further inquiries that I have made.

I had a telephone conversation on 11 September with Diane Bramble, who is the Activated Carbon Product Manager for the APS company. She advised that all types of activated carbon, including the caustic impregnated varieties, support microbial growth. Incidentally, APS is the Australian supplier for the specific calgon activated carbon product that is used at Scotts Creek. In a further telephone conversation on 11 September I spoke with Mr Mark Peters of Siemens Limited. He advised that he has personally observed visible growth on caustic impregnated and on non-impregnated activated carbon used to treat emissions from sewage pumping stations. The growth appears most prolifically during periods when the fans are shut off. Siemens other maintenance contract is for South-East Water in Victoria, and Mr Peters has substantial first-hand experience in the maintenance of activated carbon filters.

In a further telephone conversation on 5 October, Professor David Trimm of the Department of Chemical Engineering at the University of New South Wales advised that biological growth in caustic impregnated activated carbon filters is a well-known phenomenon. Professor Trimm stated emphatically that the caustic agent is consumed on the surface of the activated carbon and that elemental sulphur is a reaction product. He said the sulphur is deposited as a coating on the surface of the carbon and provides favourable conditions for microbial growth. Professor Trimm said that microbial growth is only now being studied and understood as an important mechanism for hydrogen sulphide removal in activated carbon filters. That is to say that microbial growth in activated carbon filters occurred prolifically, and is an important factor in the performance of the activated carbon filter. He referred to several unpublished papers on the topic that he has referred recently.

There have been no investigations into the growth of legionella bacteria and other pathogens reported in the literature. Nevertheless, the available evidence shows that microorganisms do grow on caustic impregnated activated carbon. Apparently, there must be sufficient nutrient there for this to happen. Consequently, there is no reason to believe that potentially pathogenic organisms could not also grow under similar conditions. In the Health Department's original evidence of 9 August Dr Corbett acknowledged that the formation of aerosols in activated carbon filters was a critical factor in assessing health risks. Dr Corbett said that the emission of aerosol from activated carbon filters was very testable, those are his words. And he did say that the Health Department would follow through on that and carry out those tests.

I should say as well that I first spoke with Dr Corbett about this on 18 May. Even though we have had the Olympics intervening there has still been substantial time. I am concerned that the Health Department and its expert panel have not carried out experimental tests that were recommended in Dr Corbett's evidence given on 9 August. Instead, they have reached conclusions that rely on pure conjecture. This conjecture arises from an incorrect understanding of operating conditions and seemingly deliberately ignores the available evidence. This evidence is readily available from activated carbon suppliers, from practitioners in the field, and also from the submissions that have already been made to this inquiry.

The Health Department is well aware that Sydney Water already operates similar activated carbon filters at Hoxton Park in Padstow, yet the emission of aerosols from these existing facilities apparently has not been investigated, nor have the caustic impregnated activated carbon media at these facilities been examined for microbial growth. That concludes my opening remarks. I would be happy to answer any questions.

The Hon. J. F. RYAN: You said that the conclusions this morning were based on conjecture. Could you give us some examples of what you meant when you said that they were based on conjecture?

Mr KAYE: Yes. We were told that microbial growth would not occur on activated carbon filters, based on some conjectural reasoning, for example, that there would not be sufficient nutrient, that it would be dry, and that sort of thing.

The Hon. J. F. RYAN: Would the misunderstandings relating to operating conditions be related solely to the fact that it is possible for microbiological growth to occur in activated carbon filters, or are you thinking of other things as well?

Mr KAYE: No, that is what I am thinking of. I am thinking that the activated carbon will get quite wet in operation.

The Hon. A. B. MANSON: Mr Kaye, what is your area of specialisation? Are you an engineer?

Mr KAYE: I am an engineer.

The Hon. A. B. MANSON: Do you have any qualifications in microbiology or health risk assessment? Are you a member of any national or international advisory bodies? Do you have any advice on public health issues? What experience or involvement do you have in the public health application of microbiology?

Mr KAYE: I am a chemical engineer and I am an air pollution consultant. My expertise is in air emissions and odours. I have no formal qualifications in microbiology.

The Hon. A. B. MANSON: You raised some concern about the possibility of legionella associated with the vents. This morning we heard from the Chief Health Officer that this would be negligible. Do you have any evidence or experience to suggest otherwise?

Mr KAYE: No. Studies simply have not been done in this area. However, I should say that this is being recognised as a risk factor. My understanding is that one of the Melbourne water authorities is now beginning to monitor legionella in activated carbon filters and biofilters.

The Hon. J. R. JOHNSON: You had conversations with sales persons from a number of private companies and unnamed published papers. What documentary evidence can you provide to the Committee to substantiate your assertions? I recall a similar question being raised at a previous public hearing.

Mr KAYE: Yes. In fact I have provided two supplementary documents as a result of the questions that were raised at that previous hearing.

The Hon. J. R. JOHNSON: Do you have information additional to that which you provided?

Mr KAYE: No. Work is only recently being done in this area. Documents are not yet published, although I understand that some are on the press. I would be happy to provide those documents when they are published and I receive them.

The Hon. J. R. JOHNSON: Do you assert that legionella can grow at 20 degrees centigrade?

Mr KAYE: That is outside my area of expertise but I am happy to accept Professor Kearney's advice to the effect that that can occur.

The Hon. J. R. JOHNSON: But, with due respect, at the last gathering or the penultimate gathering, Professor Kearney made a statement in answer to the following question asked by the Chair of this group:

What is the lowest temperature legionella will grow at?

Professor Kearney stated:

You are asking me the temperature it grows at as opposed to the temperature it survives in. There is a difference and it is important to make that distinction here. It will probably not grow to the point where large numbers will occur under 20 degrees centigrade but it will certainly survive under that temperature.

Mr KAYE: Fine. I cannot comment on that. The only evidence that I have presented to this Committee is that aerosols are formed in activated carbon filters when they are in operation and micro-organisms can grow in the activated carbon. Obviously, the water that is emitted as an aerosol is in contact with those micro-organisms that grow in the activated carbon. The presumption that I would make is that if some types of organisms can grow then other types of organisms can grow. Temperatures in sewage can exceed 20 degrees centigrade during summer periods. In fact, they can be as high as 26 or 27 degrees centigrade.

The Hon. J. R. JOHNSON: What would you be using as your basis in providing information as a result of your consultancy at the Glenaeon Rudolph Steiner School?

Mr KAYE: I can only repeat what I have said. Aerosols are emitted from activated carbon filters—something that I have seen—and micro-organisms can grow in activated carbon filters. I have presented evidence to show this. But as to the nature of the potential pathogens and under what conditions they may grow, I will have to defer to other people who are more learned than I am.

The Hon. J. F. RYAN: I suppose it is possible that some of the micro-organisms that could grow in an activated carbon filter might not necessarily be harmful to human health?

Mr KAYE: Of course.

The Hon. J. R. JOHNSON: Do you have any evidence of 26 degree or 27 degree centigrade tests?

Mr KAYE: Not in my possession, but I am sure that Sydney Water could provide that evidence.

The Hon. J. R. JOHNSON: Would you rely on its credibility?

Mr KAYE: It would depend on the source of that evidence, where the monitoring was done and when. I might see whether I can obtain such information from my contacts in the industry.

The Hon. J. R. JOHNSON: I would be grateful for it.

Mr KAYE: Okay, but I should tell you why I am quoting those numbers. I did not make them up.

The Hon. J. R. JOHNSON: I was not suggesting that.

Mr KAYE: I ran some pilot studies at the Bathurst sewage treatment plant some years ago. That would have been in the early 1990s. We monitored inlet temperature and we recorded temperatures of up to 26 degrees centigrade during the summer.

The Hon. J. F. RYAN: The sewer overflow material obviously includes a level of stormwater.

Mr KAYE: That is right.

The Hon. J. F. RYAN: Is that likely to get to a temperature of 27 degrees in view of its dilution?

Mr KAYE: No, but I think the issue in this case would be the temperature at which the activated carbon filter is operating. The temperature of the sewage on a particular day, because of stormwater ingress, might be quite a bit lower, yet the activated carbon in the filter may be sufficiently warm to have grown micro-organisms.

The Hon. J. F. RYAN: One of the remarks that has been made is that the filter dries out from time to time. In fact it dries out when it is taking in air during the time it is not in operation. Do you think the activated carbon filter would be completely dry, or would it still retain a level of humidity?

Mr KAYE: I do not believe that it would dry out sufficiently to kill micro-organisms. In fact, this activated carbon filter is designed for optimum performance at an inlet relative humidity of 85 per cent. It will get quite wet in operation. In my understanding of the design, as it is configured now, air is not intended to be drawn through the activated carbon during, let us say, non-operating periods. I do not know whether there is an intention—

The Hon. M. I. JONES: Will the air still be sucked into the tunnel but not go through the filters?

Mr KAYE: It will be sucked in, but not through the activated carbon media. But even if it were, one is not passing desiccated air through the activated carbon. The air that is being passed through the activated carbon can only have the relative humidity of the ambient air which, under Sydney summer conditions, can still be quite moist.

The Hon. M. I. JONES: If that is true it would totally negate a lot of the evidence that we heard this morning.

Mr KAYE: That would probably be the case, yes.

The Hon. AMANDA FAZIO: What do you understand Professor Kearney to mean when he talked about a three-millimetre to six-millimetre mesh size? He has referred in the past to capturing tea leaves with a shark net. That implies a net with three-centimetre to six-centimetre holes. Do you agree that that is what a bed of activated carbon looks like? Have you seen a bed of activated carbon?

Mr KAYE: Yes, but I have never measured the interstitial spaces in an activated carbon filter. I have confined the comments that I have made today to the actual generation of aerosols in the activated carbon filter, not the capacity of the activated carbon filter to capture aerosols that are generated elsewhere. The net effect of capturing those aerosols would be to inoculate the activated carbon filter with the micro-organisms that would be carried in those aerosols.

The Hon. AMANDA FAZIO: Are you aware that there is a misconception when these matters are being discussed about the size of particles and the spaces through which particles can go in carbon filters?

Mr KAYE: I have not made any measurements. So to answer that question would be pure conjecture on my part.

The Hon. AMANDA FAZIO: The particles of carbon are irregular in size but in general they are between three millimetres and six millimetres in length. Those particles are packed together layer upon layer. So at no point in that carbon filter would you get a hole anywhere near three millimetres to six millimetres in size. In view of that are you prepared to review any of the comments that you have made to us.

Mr KAYE: No. As I have said, I have not measured those spaces in the activated carbon filters. But that would have absolutely no bearing on the condensation of moisture in an activated carbon filter. Moisture being discharged as an aerosol would have absolutely no bearing. So I guess that the answer to your question would be no. It would have absolutely no bearing on my comments at all.

(The witness withdrew)

(The Committee adjourned at 4.00 p.m.)