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REFERENCES COMMITTEE

Reference: Air safety - BAe146 cabin air quality

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SENATE
RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES
COMMITTEE

Monday, 1 November 1999

Members: Senator Woodley (*Chair*), Senator Crane (*Deputy Chair*), Senators Ferris, Forshaw, Mackay and O'Brien

Participating members: Senators Abetz, Bartlett, Boswell, Brown, Brownhill, Calvert, Chapman, Coonan, Eggleston, Faulkner, Ferguson, Gibson, Harradine, Hutchins, Knowles, Lightfoot, Mason, McGauran, McKiernan, Murphy, Parer, Payne, Tchen, Tierney, Watson and West

Senators in attendance: Senators Forshaw, O'Brien, Tchen and Woodley

Terms of reference for the inquiry:

To inquire into and report on:

- (a) the impact of Airspace 2000 on airspace users, operators and providers, including its safety implications;
- (b) the application of competition policy to services provided by Airservices Australia;
- (c) the impact of location specific pricing; and
- (d) the examination of air safety, with particular reference to cabin air quality in BAe-146 aircraft.

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Committee met at 12.02 p.m.

CHAIR—I welcome everyone to this public hearing of the Senate Rural and Regional Affairs and Transport References Committee and declare the hearing open. The committee today commences its inquiry into air safety, with particular reference to cabin air quality in the BAe146 aircraft. On 22 March 1999, the Senate referred the following matters to the committee for inquiry and report: (a) the impact of Airspace 2000 on airspace users, operators and providers, including safety implications; (b) the application of competition policy to services provided by Airservices Australia; (c) the impact of location specific pricing; and, (d) the examination of air safety, with particular reference to cabin air quality in BAe146 aircraft.

The inquiry was widely advertised throughout Australia in mid-July 1999. It became apparent, as submissions were received by the committee, that there was a great deal of interest in the BAe146 element of the inquiry and, as a result, it was decided to deal with item (d) separately. A report on this matter is expected to be tabled in the Senate by the last sitting day of February 2000. To date, the committee has received a total of approximately 38 submissions—20 public and 18 confidential—dealing with the BAe146. These submissions have come from individuals, companies involved in the aviation industry and government agencies and, I might add, also from some of the unions involved.

Today and tomorrow the committee is holding public hearings in Canberra into this matter. The committee will hold further public hearings on the BAe146 at a later stage and possibly early next year. A *Hansard* transcript of the proceedings is being made. The *Hansard* will be available shortly in hard copy format from the committee secretariat or via the Parliament House Internet home page. It should be noted that the committee has authorised the recording, broadcasting and rebroadcasting of these proceedings in accordance with the rules contained in the order of the Senate of 23 August 1990 concerning the broadcasting of committee proceedings.

Before the committee commences taking evidence, let me place on record that all witnesses are protected by parliamentary privilege with respect to submissions made to the committee and evidence given before it, and I underline this. Parliamentary privilege means special rights and immunities attached to the parliament or its members and others necessary for the discharge of the functions of the parliament without obstruction and without fear of prosecution. Any act by any person which may operate to the disadvantage of a witness on account of evidence given by him or her before the Senate or any committee of the Senate is treated as a breach of privilege.

While the committee prefers to hear all evidence in public, a witness may seek to give evidence in camera. If the committee accedes to such a request, the committee will take that evidence in camera and record that evidence. Should that committee take evidence in this manner, I remind the committee and those present that it is still within the power of the committee at a later date to publish or present all or part of that evidence to the Senate. The Senate also has the power to order the production and/or publication of such evidence. I should add though that any decision regarding publication of in camera evidence or confidential submissions would not be taken by the committee without prior reference to the person whose evidence the committee may consider publishing.

Before commencing today's hearing, I draw your attention to two corrections to the program. As you are aware, the Ansett Pilots Association will not be appearing today. They were unable to obtain representation for today's hearing. There is also one correction. The program shows Ansett as not having supplied a submission. Ansett did supply a submission addressing all the terms of reference of the inquiry and that submission is available on the table with the other documentation. I apologise for that error. We are going to commence the hearing with evidence from Professor Winder.

[12.07 p.m.]

WINDER, Associate Professor Chris, Head, School of Safety Science, University of New South Wales

CHAIR—Welcome. We have your written submission. Would you like to make any opening remarks?

Prof. Winder—I would like to say at the outset that I am not medically qualified but that I have a PhD in toxicology and I am an occupational health and safety professional with a particular expertise in workplace toxicology. I would like to present my introductory remarks in three areas. One is related to the jet oil used on the BAe146 and its toxic ingredients. A second point is related to exposures to jet oils on aeroplanes that may produce health problems and a third is related to occupational health and safety in the aviation industry.

Firstly, I will go to jet oils. Jet lubrication oils as a class are known to contain certain toxic ingredients of which the most notorious is a material called tricresyl phosphate. Tricresyl phosphate is in fact a mixture of 10 separate, similarly structured chemicals and it is also fairly well known that the groups that make up this diverse group of materials are either called ortho, para or meta. Six of the 10 substances which make up tricresyl phosphate have at least one ortho group and it is also well known that tri-orthocresyl phosphate—that is, the phosphate with three ortho groups—is known to be quite toxic and much effort is carried out by chemical manufacturers supplying tricresyl phosphate materials to minimise the toxicity of tri-orthocresyl phosphate.

What is perhaps not as well known is that the other ortho containing molecules in the mixture of tricresyl phosphate are in fact sometimes even more toxic than tricresyl phosphate. The monocresyl phosphates have a toxicity 10 times that of tri-orthocresyl phosphate and the di-ortho molecules have a toxicity five times that of tricresyl phosphate. So an emphasis on controlling the amount of tri-orthocresyl phosphate in the material actually displaces information about the toxicity of the whole product, and I will come back to that later. My main point is that the presence of other orthocresyl containing molecules, not just tri-orthocresyl phosphate, and of other chemicals with other toxicities needs consideration when you consider the evaluation of the entire product. As I say, much has been made of tri-orthocresyl phosphate but that particular material is not the only ingredient that is toxic.

Further, because the effort has gone into identifying the tri-orthocresyl phosphate materials in the jet oils used in the aviation industry, the information that is coming to the industry from product suppliers is not as forthcoming about safety as it might be. The chemical industry supplying products into the aviation industry admits that in products of proven performance it is reluctant to replace ingredients, even if they are known to be toxic. Chemical industry attempts to reduce the toxicity of TCP date from at least the 1950s and have been partially successful, but commercially available jet oil materials were still being identified as being toxic in 1988.

More recently, purified fuel stocks have been used and refinement and purification of blends has lowered the toxic content of some TCP containing products. However, pre-1990s materials are still on the market unchanged. I note that Mobil USA have revealed that Mobil jet oil 2, which is the chemical in question here, is manufactured at one location in the United States and is essentially unchanged since its development in the 1960s. So it is not a new material. It probably contains many of the orthocresyl containing materials that were present in the earlier blends of TCP. For that reason, it is still likely to have an appreciable toxicity.

Chemical industry advice in the form of labels, material safety data sheets and so on minimise the toxic properties of these products. For example, a very common statement on material safety data bulletins would be the expression 'Safe under normal conditions of use.' That may be true; certainly I would not want to argue with it. However, 'safe under normal conditions of use' would indicate that Mobil thinks the only people handling these materials would be maintenance and engineering personnel who might use the chemical in topping up engines or in maintenance procedures. Such a statement—that is, 'safe under normal conditions of use'—does little to indicate safety under, for example, abnormal conditions or emergency situations. It does not cover any safety at all in areas where people may be exposed to such material and are unaware of what they are being exposed to.

So the information on labels and material safety data sheets needs critical review by users, but is often used uncritically. For example, the airlines in Australia have accepted advice from chemical suppliers, such as 'safe under normal conditions of use', without evaluation of what might happen if exposure to such material occurred under non-normal situations. That was my first point.

My second point relates to exposure on the BAe146. I am not an aeronautical engineer, so I have no expertise in what engines, seals and filters might do, but it is certainly true that there is a range of ways in which the cabin air of an aeroplane can get contaminated. I note that ASHRAE—the American Society of Heating, Refrigeration Air-conditioning Engineers—is releasing a standard on air quality within commercial aircraft. They are working on it at the moment. It lists a range of situations where aeroplane environments can be contaminated, including engine oil leaks and hydraulic fluid leaks.

In the case of a seal leak in an engine at high pressure, most of the leak would be in the form of a particulate such as an aerosol or a mist. Particulate contamination must be distinguished from vapour contamination as much higher concentrations of poorly volatile chemicals are possible in mist-type exposures. Such particles may then coalesce onto surfaces where they may thereafter slowly evaporate and present a residual vapour problem. Further, they can settle onto skin and in the upper airways where they become available for absorption.

If the air of a passenger cabin or a flight deck on an aeroplane is to become contaminated with an engine oil material and these materials are toxic, this poses health and safety problems. Air safety can be compromised by incapacitation of pilots who may be unable to fly properly or flight attendants who might be unable to direct emergency evacuations. The health of staff and passengers may be compromised by low level exposure

that can incrementally affect nervous system function and other body systems may also be affected.

I do not know why the BAe146 is an airplane prone to leaks in the cabin. The configuring of engines and auxiliary power units may be a factor. Other submissions to this inquiry note that 90 per cent of all air quality problems occur in a small group of models and that the BAe146 is in this group. The same proportion of planes accounts for 3 per cent of world flights. The BAe146 seems particularly prone to such problems.

In an attempt to identify what those problems might be, there have been a number of air monitoring surveys which have been carried out to assess the problem of contamination of airplane cabins. In the main, these surveys use inadequate methods or inappropriate technologies to measure for all toxic contaminants. For example, surveys have been carried out on the ground with doors open. Further, collection of contaminated air into sample containers for subsequent analysis underestimates the problem, as mist particles will settle and coalesce on the walls of the container, leaving only small amounts of vapour to be analysed at a later date. Further and perhaps most critically, there has never been a monitoring survey conducted during a leak event to actually identify what the actual contaminants might be.

Airline claims that the results of monitoring indicate that exposures are within recommended exposure standards and that there is no problem are nonsensical. Survey methods are inadequate and the results severely underestimate exposure. Exposure standards only apply in the case of single exposures or should be reduced where there are exposures to more than one chemical. Air monitoring does not measure skin exposure at all and therefore exposure from another route is completely ignored. Lastly, and perhaps most critically in this particular area, is that the operation of exposure standards is not allowed at altitude. So statements that exposure standards are being met go beyond what the exposure standards bodies recommend that they be used for.

Worst case scenario modelling using data from engine top-up rates and using available data on ventilation flow rates, proportions of toxic ingredients and so on shows that if all top-up volumes enter the cabin—that is, if six litres of a leak which had to be topped up on subsequent maintenance actually entered the cabin in the form of a mist—then estimated exposures are orders of magnitude above any measure of acceptable exposure.

In some cases, the airlines claim that modifications to airplanes and engines have been carried out to address this problem. However, bearing in mind aircraft manufacturer warranty arrangements and aircraft leasing requirements, I do not know how extensive or how efficient they have been. Further, I am unsure as to whether modifications comply with regulatory requirements and I do not believe they have been evaluated for effectiveness.

My last point goes to occupational health and safety. Health problems began arising in staff working on the BAe146 in Australia from about 1993. The range of reported symptoms is quite broad, affecting many body systems. It is possible to separate out long-term and short-term effects. Symptoms from single or short-term exposure include symptoms of irritation of eyes, nose and upper airways, symptoms of neurotoxicity, neurobehavioural problems, gastrointestinal symptoms, respiratory symptoms and cardiovascular symptoms.

Neurotoxicity is a major flight safety concern, especially where exposures are intense. I am aware that this inquiry will be closely studying a Bureau of Air Safety Investigation of one such case.

Symptoms of long-term exposure or residual symptoms from exposure events occur in all the systems noted in short-term exposure plus skin problems and hair loss, signs of immunosuppression, chemical sensitivity and generalised symptoms of fatigue, exhaustion, muscle weakness and pain. It is also apparent that some symptoms occur immediately or soon after exposure, for example some of the irritant gastric, nervous system and respiratory complaints. However, others such as nervous system impairment, immunosuppression and chronic fatigue develop later, perhaps months after exposures have ceased. Further, whilst some of these symptoms are fully reversible, others appear to persist for longer.

Debate is also continuing about the links between exposure and some of the longer term symptoms such as chemical sensitivity. The symptoms reported by individuals showing symptoms from exposure events are sufficiently consistent to indicate the development of a discrete occupational health condition, and the term 'aerotoxic syndrome' is introduced to describe it. Aerotoxic syndrome is a syndrome which is associated with aircrew exposure at altitude to atmospheric contaminants from engine oil or other aircraft fluids temporarily juxtaposed by the development of a consistent symptomology of irritancy, chemical sensitivity and neurotoxicity. This syndrome may be reversible following brief exposures, but pictures are emerging of a chronic syndrome following significant exposures.

In 1997 I met and interviewed a flight attendant with toxic symptoms from exposure to smokes or mists or fumes while flying in a BAe146, dating from 1992. In my own research I am used to seeing a small number of individuals from various industry sectors and they often have symptoms of toxicity to exposures that do not affect their co-workers. However, what has concerned me in this case is an apparently significant number of similar cases in cabin crew and flight crew in Australia. My concern deepened into alarm in 1998 when I became aware that this problem was not unique to Australia when I learned of similar cases in Canada, the USA, the United Kingdom and France on different aeroplanes and on different airlines. Litigation has started in Australia and mirrors developments in North America.

As a general point, successful occupational health and safety management is a formalised system of open commitment, clear consultative mechanisms, systems for the identification and control of workplace hazards and risks and review of occupational health and safety procedures. These do not appear to be systems used by the airlines. The response of the airlines to staff showing symptoms of toxicity has shown a lack of understanding of duty of care to employees. Information issued to staff on the issue has attempted to minimise the problem using the language of public relations. The basic approach to injured staff appears to be adversarial. Staff have been bullied and have been victimised. One flight attendant was followed by a private investigator. Another was met disembarking from a flight in a wheelchair, incapacitated by fumes, by airline management who did not believe she was sick. Workers have been forced to persevere working in conditions that continue to aggravate their health, in some cases to permanent incapacity. Other staff have been offered demeaning duties, and genuine attempts at rehabilitation have been lacking.

This is a hidden issue. Staff of the airlines are worried about job security and what might happen to them if they complain about working conditions and make their symptoms public. At present, with only a few cases proceeding in the courts, little compensation has been awarded to airline workers affected by toxic fumes. Therefore, staff are reluctant to come forward until their health is jeopardised sufficiently that they can no longer fly without compromising their health and safety. There is no question that these leaks and exposures occur. There is no question that symptoms of toxicity occur in exposed personnel. The airlines have admitted that cabin air contamination does occur on the BAe146, and Ansett Australia formed an expert panel in 1998 that admitted that such exposures may be irritating or produce transient health symptoms. It is from here that we should depart.

CHAIR—Thank you, Professor Winder. Senator Forshaw.

Senator FORSHAW—I am happy to start. I was assuming that the chairman might have some questions at some stage.

CHAIR—Do you want me to start?

Senator FORSHAW—It might be better if you did, given that I think you initiated the reference.

CHAIR—I will begin, then. Professor, one of the arguments that arises in all of the submissions is an argument about whether the oil mist entering the passenger cabins and cockpits is toxic. The airlines and the engine manufacturer say that the fumes are not toxic and that there are no long-term effects other than minor irritation. They say that their independent medical panel, which includes Professor Chris van Netten, say there is not enough tri-orthocresyl phosphate in the oil mist to be toxic. Would you like to comment on that? I think the point that is being made is not that the oil is not toxic—I think they are admitting that—but that when it arrives in the cabin via a mist then the toxicity is gone or insignificant.

Prof. Winder—I am interested in Professor van Netten's comments because, if what he is saying is true, he is saying there is little tri-orthocresyl phosphate present. But his own research has indicated that there are higher levels of other isomers of orthocresyl phosphate emitting from hot oil, although he is unable to identify which ones. As I noted earlier, the mono-orthocresyl phosphates are 10 times more toxic than the tri-orthocresyl phosphates and the di-orthocresyl phosphates are five times more toxic. If he is saying there is not enough tri-orthocresyl phosphate for there to be toxicity, I do not read in this statement what there is about mono-orthocresyl or di-orthocresyl phosphate molecules in the tri-orthocresyl phosphate mixture.

CHAIR—I understand that the label on Mobil jet oil 2, which does contain toxins, says something like inhalation will cause paralysis and nervous system disorders. I imagine that then is established and that the dispute is about the level of toxins present in the oil mist entering the cabin. Do you know of any tests which have been done which might establish that one way or the other?

Prof. Winder—I brought a container with me for the committee to see the label.

CHAIR—I am sure the committee would be happy to see that.

Prof. Winder—This is a container of Mobil jet oil 2 with a pre-1992 label which states:

Warning!

Contains Tricresyl Phosphate.

Produces paralysis if taken internally.

Do not use as a medicine or food product.

Wash thoroughly after handling.

The label was modified after 1992. The small square is the warning on the pre-1992 label and the warnings are now in this white box in 13 languages. It says:

Warning!

Contains Tricresyl Phosphate.

Swallowing this product can cause nervous system disorders including paralysis.

Prolonged or repeated breathing of oil mist, or prolonged or repeated skin contact can cause nervous system effects.

There are a whole load of other things there as well. The important thing is it is recognised that the tri-orthocresyl, especially the orthocresyl phosphate containing molecules in the tri-orthocresyl mixture, cause nervous system effects. They cause paralysis, they cause nerves to die, they cause a whole range of associated problems with that. However, the latest one is a bit more revealing. The first one says that swallowing causes problems and the later one says that ‘prolonged or repeated breathing of oil mist, or prolonged or repeated skin contact can cause nervous system effects.’ So we have swallowing causing paralysis and breathing or skin contact causing nervous system effects. That is important because the argument has always been this very significant syndrome of neurotoxicity reported by tricresyl phosphate.

However, to get that particular syndrome of dead nerves, paralysis, muscle wasting and so forth, there has to be a number of steps before we come to the clinical disease. There has to be a gradual loss in nervous system function, and a range of pre-clinical symptoms that can occur. These pre-clinical symptoms can be things like behavioural problems, memory loss, sleep problems, fatigue and so forth—some of the symptoms that have been reported by cabin crew potentially exposed to this problem. While I accept it is unlikely that anybody flying and exposed to this material is going to get paralysis sufficient that they would need to be put in a wheelchair for the rest of their lives, I do not accept that lesser exposures do not cause other nervous system or even neurobehavioural effects.

CHAIR—Have you any explanation as to why in the submissions that we have received from National Jet Systems, Ansett, the Civil Aviation Safety Authority and British Aerospace they say that all fumes entering the cabins of BAe146s are non-toxic and that there is no threat to passenger or crew health or safety but that the submissions from eight individual pilots, pilot associations, several flight attendants and several medical and occupational

health and experts say that the fumes are causing long-term health problems and present a risk to passenger safety? It seems to me that what we have are two totally different opinions and no connection between them. I think the committee will want to explore how you can have two opinions so dramatically opposed to one another. Would you comment on that.

Prof. Winder—Yes. I believe that what we might call the denial of symptoms of long-term problems by the airlines—certainly, I do not know about the authorities—really relates to the fear of litigation and perhaps a defensive posture from which to deal with this particular issue. I do not believe that if pilots have become incapacitated once they have been exposed to some form of atmospheric contaminant while flying or if airline flight attendants are incapacitated, such that they have to be given oxygen and wheelchair off planes, or have subsequently developed such fatigue that they cannot function normally that they have not been exposed to a toxic material. So, I believe that if somebody has been exposed to something that has impaired their health, they have had a toxic exposure. I do not know why the airlines, for example, are saying that there is no known toxicity when they are already saying that, as well as there being no known toxicity, in fact there are irritant and transient health effects.

Whether they see irritancy and transient health effects as not being a sign of toxicity, I do not know. But, to me, they are all enveloped in the same problem and it is only a small jump to say that these short-term transient effects can become long term if exposure is sustained. To that effect, it is just one extra step. The airlines said there was no problem, but then they actually admitted that there was a problem with the engines; they said there was no problem with health, and then they admitted there were short-term and transient effects. It seems to me to be an evolving position as the evidence becomes more and more substantial.

CHAIR—Have you had a chance either to look at the medical records or to interview any of those who have reported these health effects yourself?

Prof. Winder—Yes. I have interviewed nine individuals in Australia. They come to me mainly via word of mouth. As an occupational toxicologist I am often the last person after a whole sequence of medical advisers and advice, and they come to me to ask what I think has happened and for advice on what they can do to make their symptoms go away. So I have seen a range of individuals. In fact, I am currently endeavouring to collect information in a more systematic fashion so that I can establish whether or not there are common symptoms in aerotoxic syndrome. Already it is apparent that headaches, nausea and cognitive problems seem to occur in most exposed staff, although it is a very small group, I admit. Certainly, I am collaborating now with people overseas and I am hoping to obtain more information about what appear to be cases of aerotoxic syndrome.

CHAIR—So would you say that the people you have seen have a real problem?

Prof. Winder—I believe that the pilots I have seen are unlikely to fly again. I believe that the impairment of their health is certainly long term. When I say long term, I mean more than two years and possibly permanently. Most of the flight attendants I have seen are already out of the industry, or are about to go out of the industry because they can no longer tolerate working in aeroplanes. That seems to be an evolving problem.

CHAIR—And you would attribute those very obvious health problems to the toxicity of the fumes in the cabin.

Prof. Winder—Yes, I would.

CHAIR—Do you believe that the procedures for dealing with the fume incidents—and, of course, there are not just the nine you have spoken about; the committee has at least been told of hundreds of incidents around the globe—are adequate? Are you aware, for instance, that pilots and flight attendants have generally, as a way of overcoming any problems they have in-flight, put on oxygen masks in-flight?

Prof. Winder—I am aware that that happens sometimes. But I have interviewed one pilot who said that she was so incapacitated that she did not think either to put on an oxygen mask or to hand over to the officer sitting next to her. She managed to land the plane, but she realised after the event that that was not a particularly good thing to have done. So, while these systems may be available, sometimes they are not used.

CHAIR—In the submission we received from Electric Force Management it said that ‘70 per cent of aircraft accidents are due to human error during descent and ascent, when cabin air quality is most likely to suffer.’ Do you believe that poor cabin air quality could explain increased human error during unexplained aircraft accidents? Is there a connection? Are you able to tell us anything about that?

Prof. Winder—I have no expertise to answer that question, except to say that perhaps hidden in all of this is that over the last two decades there has been an ever increasing amount of air travel and that, when you have an ever increasing amount of air travel, support infrastructure and systems may get strained and the potential for more accidents occurs. I note that there was an accident this morning in North America, but the reasons for that have not yet been identified. If there are 20 flights, then the rate of accidents is very low; you do not notice them. But if there are 2,000 flights, you become more aware of these things. But I cannot answer the question.

Senator FORSHAW—You said during your opening remarks, and it appears from your written submission, that you believe this is a problem confined to British Aerospace and maybe one or two others. Why is that?

Prof. Winder—I do not know. This particular material, or materials like it—all containing about three per cent TCP—is used extensively in the aviation industry. As I said earlier, where it seems to be kept in the engine, there do not seem to be any problems. But I am aware of possible problems with neurotoxicity in 767s and in other planes. But the one that is normally bracketed with the BAe146 is the MD80. They appear to be the two planes that appear to have the most problems. I am guessing that, because of engine auxiliary power unit configurations, they appear to be particularly leaky, although I do not know why.

Senator FORSHAW—There are a lot of planes flying around the world, and there are a lot of British Aerospace planes. There are a lot of airbuses, which have also been mentioned, and I am assuming that McDonald Douglas also have quite a few. There is a reference in your submission to the US Air Force. I think you said there were something like 89

incidents. But there is no mention in that section of what type of aircraft were involved, what type of manufacture. Do you know what they were?

Prof. Winder—No, I do not.

Senator FORSHAW—It appears in the same section where you say, ‘Sources of exposure events on BAe146s,’ and then in that section you use references to quite a number of incidents on these United States Air Force aircraft, but it does not say what type of aircraft they were.

Prof. Winder—No. I think the point I am trying to make is that it is less the aircraft and more the potential of an oil to get into the places where pilots and passengers might be. I am not aware of what those planes might be. I have the paper here if you want to have look at it, but I am not familiar with what those aircraft might be. To me the issue in that particular paper is of smoke or fire in the cabin. So there is exposure to some sort of material that produces the toxicity. I have no reason not to suspect that it is not a TCP containing jet oil.

Senator FORSHAW—You made quite a number of statements in your submission, and you have said this morning, referring to the various studies and tests that have been carried out over the years and that you believe their methodology is flawed. One of the difficulties that we as a committee have to face in any inquiry is the problem of anecdotal evidence. You have also, for instance, referred to your belief and what you have been told by employees about their being bullied—I think that is the word you used.

Prof. Winder—Victimised.

Senator FORSHAW—That is your anecdotal evidence. In respect of all the testing, for instance, can you give us any more evidence to show that these tests are flawed or that the methodology is unsound? I am not making any judgment as to your expertise but, as the chairman said, we have some major companies and some, what people would regard as, reputable authorities in the airline industry putting an alternative proposition.

Prof. Winder—Again I come back to the issue of: we seem to have a problem, but what do we have in support of it? There was a study conducted by the US National Transportation Safety Board—‘We’ll use that in support even though the study was conducted before the BAe146 was operational.’ Another study by some engineers looked at some contaminants in fume, but the oils that were used were not the ones that were being used on the BAe146. A study was commissioned which looked at samples collected by aircrew on planes without understanding that the mist that they would be collecting would have coalesced onto the sides of the container that they are carried in and therefore would not measure what was collected. We have a study from—I think it was—the Queensland department of health who actually put a gas chromatograph onto a plane and measured air while it was flying around. Again there was no leak of contaminants that day, so not surprisingly there was very little found.

Senator FORSHAW—Part of the evidence that we have received—it might have been the same one—was that a study or test was done in Queensland on—

Prof. Winder—That is the one I am referring to. In that particular study, the person doing the test actually decided to do something quite novel, which was to take the air in the cabin and pump it through liquid nitrogen which would in fact pull out all the contaminants that might be in the air in that plane, and he found a very small amount of tricresyl phosphate. So maybe the methods that are being used might be appropriate for materials that have a high ability to dissolve into air, but inappropriate where you are looking for semivolatile materials that are in the air in high concentrations only when they are in particulate form. So we do our analysis when there is no particulate form in the air, and that is the problem. The problem I have is that there is extensive information available, but most of it—if it is examined properly—would indicate that perhaps it should not be used at all.

Senator FORSHAW—Through your submission and a number of the other submissions and from what we read generally it seems that it is the aircraft crew who are claiming to be affected—pilots and other cabin crew. Firstly, if there is a toxic fume or some toxicity in the air within the cabin, why wouldn't all of the crew be affected? Secondly, what is the situation with passengers? We do not seem to have much evidence, if any, of lots of passengers being affected—and I note that, in your own submission, you state that this situation can result from both short-term and long-term exposure. As we know, crews might change on a plane every eight or 10 hours on a long haul flight, but the passengers might be sitting in that same plane for 24 or more hours. Why does it seem to be confined to only some people?

Prof. Winder—Let us examine what you are asking. Firstly, one of the principles of workers compensation legislation is that what you have is what you have. So some people will be affected more than others. It is certainly true that, from some of the discussions and interviews I have had with former cabin crew—and when I say cabin crew I mean flight attendants or pilots—on occasion other members of staff have been affected. It certainly seems to be the case that, with the Queensland-Cairns flight staff, there were a couple of occasions when three cabin crew were affected, some worse than others. Sometimes other cabin crew are affected. In the BASI case I believe that two pilots were affected. If you examine the symptoms I am reporting from the people I have interviewed, you find that they have headaches, they are fatigued and they have a range of what may be argued to be subjective symptoms. If you fly 24 hours from here to London, my guess is that you are going to be tired and perhaps you are not going to notice an exposure that might be affecting your health.

The basic principle that I am trying to articulate today is that ongoing exposure, sometimes without too much time to recover, may lead to the development of a progressive disease which could eventually become permanent. So, even with frequent flyers, their exposures may not be to continual flights where there are cabin exposure events and therefore their exposures are orders of magnitude less than they might be for staff flying. I think that would be the answer to your question.

Senator FORSHAW—My point in asking that question was not so much to suggest that it is not arguable that there is a problem but rather whether, in the context of toxicity which could be significant enough and serious enough to affect somebody's performance, it might be something which might manifest itself in one person but not in another. I would have thought that, like radiation exposure, people would show the same symptoms.

Prof. Winder—One of the points I guess you are arguing is why some people are more susceptible than others.

Senator FORSHAW—I am trying to find out whether you are saying that that is a possibility.

Prof. Winder—Yes, it is; very much so. There are issues of susceptibility. There are also issues of personal exposures. Let us say a vent in a galley was leaking more fume—and the galley is further towards the front of the plane—then it is possible that that particular individual on that particular day got more sustained exposure. There are issues related to personal hygiene. It may increase exposure if people do not wash their faces until they get up the next day and have a shower. There are a whole range of individual reasons why exposure may be increased and also a whole range of issues related to susceptibility. It might be that a person has an impaired liver function and therefore are less able to cope with chemical exposures than other people. There are a range of different factors which may underlie why some people are more affected than others.

I will just make one more point about passengers. In my own research on individuals with low chemical exposures in other industries, I see a number of people who are exposed—painters, office workers and so on—who get similar symptoms: fatigue, headaches, problems with cognitive function and so on. They all invariably ascribe it to some other exposure—perhaps in their work environment or where they live—but many of those people may have flown at some stage in their recent past and have not thought to make the link. That is something we do not do. We do not think, ‘I flew to Coffs Harbour the other day; why am I so sick?’ We say, ‘I’m a painter; there must be something wrong with the chemicals I use at work,’ without thinking about what other causes there might be. So passengers are less likely to make an association that the exposure to that oily, smelly stuff on the plane might be causing the problem six weeks later. That is the other reason.

Senator FORSHAW—You are talking to people here who fly regularly.

Senator O’BRIEN—In terms of the toxicology issue of the TCP and the other associated chemical materials you are talking about, I note you have extensive qualifications in toxicology and pathology. What tests of individuals might reveal whether there was some residual presence of the chemicals you are talking about? For example, could you blood test flight attendants and pilots regularly to establish whether these chemicals were present?

Prof. Winder—There are some standard tests which can be used in cases of organophosphate exposure, such as cholinesterase levels and so on. They tend to be non-standard. Most airlines have been reluctant to send a flight attendant or a flying officer who comes off a plane showing signs of some sort of impairment off for a measurement of cholinesterase function. It is possible that, in a case of paralysed or materials that might have been burnt, it is not to do with any of these things, but it might be to do with carbon monoxide exposure so they could be sent off for carboxyhaemoglobin measurements. These things have to be done straightaway because they can either return to normal or do something else.

The problem with the cholinesterase measurements is that cholinesterase levels vary significantly in human populations, and you need a pre-exposure measure. It is no good sending somebody off who you think has been exposed for cholinesterase tests, because you do not know what their original level was and how far it has come down. So there are those sorts of problems, and no airline is going to say, 'Let's send all of our flight attendants for cholinesterase levels so we can have a basal cholinesterase level.' That probably would not happen.

Senator O'BRIEN—There are some industries that routinely test for exposure problems revealed by a particular substance's presence. Is what you are telling us today suggesting that it would be very difficult to do that?

Prof. Winder—Yes, it would. There are two forms of biological monitoring. You monitor for the contaminant—as you would in the lead industry where you measure for lead in the blood—or you measure the effect. A pesticide sprayer spraying organophosphorous pesticides would have a cholinesterase level done before and during the season he or she is working in. In this particular case, if you are going to do anything, it has to be biological measures of effect, not biological measures of absorption, and it has to be done very, very quickly. There are constraints on how those things are done.

Senator O'BRIEN—Your submission suggests that exposure to these chemicals could be a safety hazard for the aviation industry. Is it fair then to say that, if such exposure could be hazardous to not only the crew but possibly the passengers, testing should be routine?

Prof. Winder—It is a matter of cost. Under occupational health and safety legislation, there is a test of reasonable practicability, and reasonable practicability includes cost. It may well be that it could be quite justifiably argued that such costs are prohibitive and therefore not to be recommended.

Senator O'BRIEN—Can you give us some idea of the cost per person for a regime of such testing?

Prof. Winder—I cannot tell you what it costs to do a test. I am guessing in the order of less than \$100 but, if you need a physician to interpret the tests, they come at about \$130 an hour. So if you are dealing with a plane full of people, that is a significant cost. If you are dealing with an entire staff, I do not know what that would be, but that is the sort of thing you are looking at.

Senator O'BRIEN—In terms of the cost issue and the timing of the tests, are you also saying you would have to time the tests to almost coincide with an alleged exposure incident?

Prof. Winder—Yes, almost within an hour of them coming off the plane.

Senator O'BRIEN—So there would not be a way of finding whether there was a presence of the substance in blood or tissue, for example? The effects can be prolonged, although you cannot detect a substance having a residual presence. Is that what you are saying?

Prof. Winder—No, you were implying measures of effect rather than measures of absorption. We are looking at enzyme levels, nervous system function and so forth.

Senator O'BRIEN—Does that mean that the substance—the TCP, for example—is not retained in the body or that there is no way of ascertaining whether it is or is not retained?

Prof. Winder—I do not think the tests are sufficiently sensitive to measure it.

Senator FORSHAW—On that issue, we have not heard from Ansett yet, but as part of their material they have included a copy of a notice issued in November 1998. It provides for medical examinations to be available to any crew member who is feeling ill after duty on a BAe146. Are you aware of that?

Prof. Winder—Only third hand. I am not aware of the specific details.

Senator FORSHAW—I was just interested in whether you had a comment about whether you believed that was satisfactory or not. As I said, we have not heard from Ansett yet, but it is interesting in the light of Senator O'Brien's questions.

Prof. Winder—There is a list of doctors to which cabin crew can go if they feel they have symptoms from exposure. Is that what you are suggesting?

Senator FORSHAW—This is something that the airline has apparently introduced themselves.

Prof. Winder—Again, it depends on the expertise of the individual practitioners concerned whether or not they are capable of delivering a service which is appropriate to the effect.

Senator FORSHAW—It is not routine testing, but it is presumably available for crew.

Prof. Winder—You want a list of practitioners and a list of tests that might accompany somebody who appears to show some signs of toxicity.

Senator FORSHAW—Thank you. I thought I would raise that, given that we have just raised that issue.

Senator O'BRIEN—Briefly, in your submission, you say:

... aircraft fluid leak/fume smoke events are estimated to impact over 300 flights per year worldwide, resulting in exposures to an estimated 40,000 or more crew and passengers.

I am looking to where you source that material.

Prof. Winder—That information comes from a collaborator with me—a person in Paris called Jean-Christophe Balouet. I understand he has made a submission to this inquiry. It is sourced from him.

Senator O'BRIEN—Can we assume that those incidents are limited to certain aircraft?

Prof. Winder—Again, it is his data, but he says that 90 per cent of all these incidents occur on a small group of planes to which the MD80, the A320 and the BAe146 belong. Of the 90 per cent of cases, they relate to three per cent of the flights. That is his point which I outlined.

Senator O'BRIEN—Thank you.

Senator TCHEN—Professor Winder, Senator Forshaw asked you whether it was significant that passengers do not seem to have been affected. You suggested that it is possible that the passenger may have been affected but does not make the association. On the other side of the coin, I wonder whether there are other common factors, where the air crew who were affected—the cabin crew and the pilots—might have been exposed to contamination outside of the aircraft cabins in the airport environment. Not everyone has been affected. Also, I notice that the BAe146 is a short-haul aircraft. The pilot and the air crew are probably spending more time on the ground than in the air.

Prof. Winder—That is a good point. I can only offer information from the interviews I have had with former, and soon to be former, staff of the airlines. They have their initial health effects. They tend to be reversible. Exposure continues. The effects become more significant. Eventually, at some stage, they become permanent. Some of the people I have spoken to who have what I see as permanent incapacity actually cannot enter the airport environment, though not necessarily the airport environment itself. For example, one of them says that aviation gas immediately brings out what she calls a grip headache. Sometimes she gets those symptoms not just going to an airport but actually driving past it. For instance, if you go around Qantas Drive in Sydney, there is a AVGAS store there. She suddenly finds herself with an intense headache and then realises she has driven past the AVGAS store. In some cases, that may be the case.

Senator TCHEN—I noticed that in your submission most of the comments refer to tricresyl phosphate. Have you identified that as the likely principal culprit?

Prof. Winder—I believe that tricresyl phosphate is the particular chemical that causes the neurological problems that staff on planes have been exposed to. But I consider that in many of these exposures there is also a hydrocarbon component context, and it is possible that the hydrocarbon exposure may either exacerbate the effect or assist in increased absorption. I do not think it is necessarily one chemical. It may be one chemical, but it is possible that it could be exposure to other chemicals as well.

Senator TCHEN—Yes. You make some comments about the inadequacy of other monitoring tests and so on. I take it that multifactor testing, which is what you are suggesting, is not a common practice yet.

Prof. Winder—No, not anywhere. If you could predict that there was going to be an exposure event on a plane and you could put in a monitor to measure it, you would of course control the leak first. You would not do that. To put expensive equipment on a plane and fly it around waiting for an event to happen is probably not cost-effective.

Senator TCHEN—Are you suggesting that there should be some sort of change in practice in the industry in terms of testing?

Prof. Winder—I am suggesting that everything that can be done to stop the leaks will circumvent this particular problem for new people. For the existing people who are already exposed, it may have a legacy of health effects—sometimes permanent and sometimes transient, some irreversible and some permanent. It is too late for those individuals. They are incapacitated, they have health effects and we must do what we can to help them. If we want to stop this problem recurring, we have to put in engineering systems and try to reduce the toxic ingredients in the material and do all the things that are required so that these particular exposures do not occur. Measurement will not control the problem. Control of the exposure will.

Senator TCHEN—Thank you.

CHAIR—I have two more questions. I understand the particular jet oil which is being used is a very effective lubricant. I presume that is one of the reasons why airlines are reluctant to replace it, but are there replacements available?

Prof. Winder—In 1988, Mobil identified that one of its products was toxic. It caused neurological problems in experimental animals. They notified the USEPA under section 8 of the Toxic Substance Control Act that they had found this particular toxic product, and they instituted steps to introduce what they saw as less toxic jet oils. There has been significant effort, as I mentioned in my opening remarks, to reduce the tri-orthocresyl phosphate in these products. Whether the di- and mono-orthocresyl phosphates have been reduced at the same time I do not know. There does not seem to be any evidence that that is the case. Certainly, monitoring studies conducted by Professor van Netten indicate that there are at least five of the tricresyl phosphate groups in both Mobil jet oil and some of the new generations of materials coming through, like Mobil jet 291. Mobil jet 291 and Mobil jet oil seem to be very similar chemically, except that one ingredient, the naphthylamine, has been removed.

So it is quite possible that new generations of jet oils will be less toxic. They should be, that is what this is about. But there does seem to be an overlay, as you pointed to, with, firstly, the reluctance of formulators to change chemicals of proven performance and, secondly, the approval process by which mandated or regulated materials can be replaced in the aviation industry—they have to go through testing. I do not know what they go through, but it takes a while to get a new product approved, therefore they tend to persist with the old stuff. Wherever it is possible the practice of leaving toxic ingredients in chemicals which workers may be exposed to should be discouraged. The attitude, ‘This stuff works really well; we won’t worry about the fact that it has something nasty in it,’ is almost contemptible. That does not seem to be the right approach to safety, and it leads to problems further down. If you fix the problems here you do not have the problems further down. That would be the way to go.

CHAIR—At the moment we seem to be stuck with that stuff, though.

Prof. Winder—Yes, we do.

CHAIR—Over the last few months I have spoken to many flight attendants and pilots, as have my staff. I have smelt the smell occasionally—old socks, or however you describe it—but I have not had any health effects myself. A lot of us fly, particularly here in Brisbane. The evidence I got—and I am very much a layman so I am using layman’s terms—seemed to indicate that it is a long-term health problem and has an accumulative effect. In other words, it is the long exposure over a fair period of time that builds up and does not go away. Is that a fair description, in layman’s terms, of the effects?

Prof. Winder—It is a fair description.

CHAIR—Have you seen the BASI report on the one incident that we referred to?

Prof. Winder—Yes, I have.

CHAIR—Are the sorts of symptoms that the two out of three pilots experienced fairly consistent with the evidence you have from other people you have interviewed?

Prof. Winder—Yes, they are. The pilot of that plane reports vertigo. That is not something I have seen, except in that one case. All the other symptoms they are reporting are fairly consistent. The other pilot on the plane was affected by nausea. That is a symptom I see in virtually every case. The most common symptoms are nausea, intense headache and problems like not being able to give the passenger the right drink, not being able to add in the head or not being able to drive home from the airport. These are all things that indicate there has been some form of neurotoxic exposure. Whether that is transient depends on whether there has been previous exposure and subsequent exposures, but certainly it can be transient and if it is sustained it becomes more permanent.

Senator FORSHAW—You mentioned that a standard for air quality was being developed by ASHRAE, the American Society of Heating, Refrigeration, Air-conditioning Engineers. Do you have any further information about that? Have you or your colleague in France had any input into that?

Prof. Winder—No.

Senator FORSHAW—What is your feeling about what is likely to come out of that process?

Prof. Winder—A copy of the draft standard was provided to me by Dr Balouet in Paris. There is an appendix to the standard that says, ‘This is how cabin air can be contaminated.’ That is saying that an authoritative engineering society mentions that cabin air contamination is possible. I have a copy of the standard here that I am happy to leave with the secretariat. The details in the standard are beyond my expertise.

Senator FORSHAW—We can ask other witnesses about this, but would I be correct in assuming that that would establish minimum levels of exposure or minimum residue levels and all those sorts of things? From what I gather is your perspective, that may not necessarily be a total solution.

Prof. Winder—Rather than go to the actual standard, which is something the airline industry can do, there is no reason why the civil aviation regulations should not be applied here, and they say quite clearly that crew and passenger compartment air must be ‘free from harmful or hazardous concentrations of gases and vapours’. I do not see any need for anything additional. There is enough in the regulations to control this particular problem. Maybe they are not being applied appropriately, or maybe because they are saying that it is not toxic they do not cover it. I am not saying that you should not use the ASHRAE standard—that is a very important document. I am saying that we already have regulations in Australia that allow this particular issue to be addressed.

CHAIR—The enforcement of the statement you read out would depend on the definition of harmful and hazardous. In any industry that always tends to bring you back to the possibility that there can be exposure as long as it is below a minimum. As we know, in just about every industry that I am aware of the concept of absolutely no exposure whatsoever is pretty much unachievable.

Prof. Winder—I accept that. The words used here are ‘uncontaminated air’, but again, what does that mean?

Senator FORSHAW—You have indicated that you have spoken to quite a lot of aircrew about this and we are aware that some litigation is going on, and you referred to that earlier. Are you involved in any way, for example, as an expert witness or supporting witness, in any of those cases?

Prof. Winder—I am involved in two cases at the present time.

Senator FORSHAW—I do not wish to ask what they are—we may need to ascertain that later—but it is necessary for us to understand your involvement. Thank you.

CHAIR—Thank you, Professor Winder, for your evidence. It may be that we will come back to you towards the end of the inquiry with some further questions. A copy of the *Hansard* of your evidence will be forwarded to you next week for checking. We thank you very much for your time and valuable experience.

Prof. Winder—Thank you.

Proceedings suspended from 1.12 p.m. to 2.03 p.m.

BOUGHTON, Ms Carol, Director, Safety Investigations, Australian Transport Safety Bureau

LEYSHON, Mr Brett, Team Leader, South East Operations, Australian Transport Safety Bureau

SARGEANT, Mr Barry Arthur, Deputy Director, Australian Transport Safety Bureau

CHAIR—I welcome the witnesses from the Australian Transport Safety Bureau—ATSB instead of BASI. BASI was easier to say. I think you know the drill on parliamentary privilege. We do not have a written submission. Do you wish to make an opening statement?

Ms Boughton—We would like to make some opening remarks, if we may. Given that this is the first time that the Australian Transport Safety Bureau has appeared before a Senate committee, I thought that perhaps it might be worth while providing a little explanation at the beginning as to the relationship between what you have known as the Bureau of Air Safety Investigation, BASI, and the new Australian Transport Safety Bureau.

The ATSB, as we tend to refer to it, was created on 1 July this year. It integrated BASI, the Marine Incident Investigation Unit, the non-regulatory parts of the Federal Office of Road Safety and a new Rail Safety Unit. The functions that are defined as part 2A of the Air Navigation Act that were previously undertaken by the Bureau of Air Safety Investigation are now undertaken by the ATSB. The position of Director, Safety Investigations, which I occupy, is the position that is designated within the Air Navigation Act as the Director of Air Safety Investigation. So basically it is my group that is performing the functions that you previously would have attributed to the Bureau of Air Safety Investigation.

I wish to make a couple of other opening remarks. In terms of your particular investigation which we are appearing before the committee in relation to today—the BAe146 and cabin fumes issue—we thought that it was probably important from our perspective to indicate that we thought there were potentially two issues on the table for discussion. The first is whether there is an immediate safety of flight issue; this is something that relates to the report that the bureau has recently published. The second issue is the general quality of air issue, which tends to be a long-term occupational health and safety matter.

In terms of documentation which is published by the former Bureau of Air Safety Investigation, now the ATSB, I thought it might also be worth while running through that process for you, seeing that it has come up in a number of the submissions. One is that, when an occurrence occurs, it does have to be reported to the Australian Transport Safety Bureau for us to know about it. Once that occurrence is reported, it may or may not be investigated, depending on its severity and the seriousness of the occurrence, which might either be an accident or an incident.

Senator FORSHAW—Who has the responsibility to report an incident? Is it the airline?

Mr Leyshon—There is a joint responsibility outlined in the act. It runs from pilots and crew involved through to the owner of the aircraft, the operator of the aircraft—quite a number of people.

Senator FORSHAW—I will not interrupt you again. I just thought that was important to know.

Ms Boughton—That is right, Senator, and you would also be aware that there is a separate confidential accident incident reporting system where anybody who observes something is able to report it. So having an occurrence there, there may or may not be a detailed investigation. There is usually a preliminary report put out once there is some kind of investigation. Other additional information is collected after that preliminary report is published. Once that additional information has been analysed there is a draft report distributed to interested parties, and it tends to be referred to in our terminology as the IP report. That enables anybody who has a particular interest in that report to provide comments back to the bureau. Those reports are then analysed in context and a final draft report is published.

It might be worth while the committee noting that, in moving from the interested party draft to the final, what comments are accepted or not accepted from the various parties are not actually conveyed back to the people who had provided that comment. So the final is an amalgam of the comments that we have received, plus our initial thoughts on the matter. It is really an opportunity for those interested parties to ensure that the information that we are using is absolutely correct.

There was a little delay—an unfortunate delay from our perspective—with regard to the particular BAe146 incident which has resulted in a Bureau of Air Safety Investigation report. You might recall that the incident occurred in July 1997 and that the report was not released until September 1999. That occurred partly because of that complex process that we go through with all of our activities and the considerable information which was provided to the bureau, and I am sure the senators and your support staff are aware of the volume of information that is around in terms of the BAe146.

We thought that, in providing that information, we should also indicate to you the volume of reports that we have had. We have a document that we could table, if it would be of value to you. We extracted the number of incidents that have occurred since 1991 that have involved turbine powered passenger aircraft and broke those down into the different aircraft—the main ones flying in Australia at the moment. The figures are that 12 BAe146s, thirteen 747s, twenty-two 767s, thirty-one 737s and seven A320s reported smoke or smell or fumes in either the cabin or the cockpit of the aircraft. So a total of 93 occurrences have been reported to the bureau over the nine-year period from 1991 to today's date. That might give you a little background to some of the matters relating to your investigation.

Senator O'BRIEN—You have advised that ATSB now comprises the old BASI together with a number of other functions—maritime, road and rail. Has the aggregation of functions coincided with an aggregation of previously existing resources?

Ms Boughton—Yes.

Senator O'BRIEN—So the resources which were applied to the task in the various forms in the past remain with the new body in the same numbers?

Ms Boughton—Yes. The exact proportion of staff and support resources that were with the four previous groups were brought together.

Senator O'BRIEN—Does that mean your function would be overseeing the sectors rather than having any special interest in a particular sector?

Ms Boughton—Yes.

Senator O'BRIEN—I know when BASI existed that it was the practice to circulate draft reports for comment. There is an interface between your organisation, BASI, previously, and CASA about aviation safety matters. As I understand it, there is no obligation on CASA to accept a recommendation from BASI. Is that correct?

Ms Boughton—There is no formal obligation, that is true.

Senator O'BRIEN—In fact, in the past, quite a number of BASI recommendations have not been accepted by CASA—that is, they have either not been accepted or they have been modified by CASA.

Ms Boughton—In some situations, the recommendations are still in the open stage in that they are still being considered by CASA in terms of what needs to be undertaken.

Senator O'BRIEN—We have evidence about an incident report of 'fumes', for want of a better term, causing alleged incapacity on a BAe146. It was a regular public transport flight and the evidence that we have is that CASA has not accepted the BASI findings in that matter. Is that a correct statement of the situation?

Ms Boughton—I think you are referring to the recent publication in September?

Senator O'BRIEN—Yes.

Ms Boughton—It was a freight aircraft; it was not a passenger activity.

Senator O'BRIEN—Sorry, my mistake.

Ms Boughton—At this stage, the final report has gone to CASA and the authority has 60 days in which to respond to those recommendations. At this stage, we have not had a response from the organisation.

Senator O'BRIEN—When does the 60 days expire?

Ms Boughton—Later this week.

Senator FORSHAW—Are we talking about the document that I have here titled 'BASI Occurrence Brief 199702276'?

Ms Boughton—Yes.

Senator FORSHAW—I am not sure whether that has been admitted into the evidence, Mr Chairman. If it has not, I suppose that it should be.

CHAIR—It has been tabled in the Senate.

Senator FORSHAW—Has it? It was just that it was said that BASI had not made a submission.

CHAIR—I confirm that the committee accepts as an exhibit the occurrence brief of the Bureau of Air Safety Investigation, as described by Senator Forshaw.

Senator O'BRIEN—There is evidence before the committee about alleged multiple incidents of exposure to fumes or smoke in cabins of the BAe146 but, to quote from the submission from the AFAP:

Many of the incidents that are occurring do not even generate the correct reporting format as required and BASI and CASA never find out that incidents have occurred.

What steps did BASI and will ATSB now take to ensure that there is reporting as required until legislation and what protection is available to employees of aircraft operators reporting incidents?

Mr Leyshon—To answer the first part of your question concerning the powers that we have to make people report, we can ask people to report and we can put a little bit of pressure on them but, in the end, if they do not want to report, for whatever reason, the option then is—to move to the second part of your question—to submit a confidential aviation incident report. It is well-known in the system and forms are available in our publications and magazines or on request, and that approach affords the confidentiality aspects that people may be failing to report under. Based on quite a lot of the conversations that we had with people who perceived they were affected by fumes, we commented in our report that these people did not want to report it, and they did not want us to disclose it any further for fear of whatever reprisal. So we suggested that they submit a CAIR report, but none of them were forthcoming.

Senator O'BRIEN—But would a flaw in that system be—and I am asking this question for comment rather than trying to make a statement—that, if someone confidentially reports an incident in an aircraft where you have a very limited number of crew, the likelihood is that they will be identified should you investigate? Would those crew members be making a fair assumption here?

Mr Leyshon—That is a fair assumption, depending on how they report it.

Senator O'BRIEN—Perhaps you could expand further on what you mean by that.

Mr Leyshon—There are ways of reporting confidentially that may not lead to the identification of the parties or operators involved. In those cases, in a confidential aviation

incident report, we must have the reporter's name. The particular section will not act on anonymous reports. Once the report is submitted and if it has a contact name, the manager of the CAIR office will contact that person confidentially and, should they think it necessary, ask them for additional details.

Senator O'BRIEN—In the investigation of the incident that we were talking about, did BASI make any contact with the aircraft manufacturer?

Mr Leyshon—Yes.

Senator O'BRIEN—Could you tell me how BASI's recommendations would impact on the manufacturer?

Mr Leyshon—The recommendations as outlined in the occurrence brief are for the aircraft manufacturer and the Civil Aviation Safety Authority to jointly investigate deficiencies within the aircraft systems that allow the entry of fumes into the cabin. The total impact in terms of manpower, resources and cost would be considerable, but I would not be able to put a figure on it.

Senator O'BRIEN—What rights and obligations apply to the manufacturer in relation to the BASI report?

Mr Leyshon—They are the same as for anyone who receives a recommendation from the bureau—that is, they have 60 days in which to consider the recommendation and provide a response. There is no obligation on them to adopt or accept any of the recommendation.

Senator O'BRIEN—So they have to respond by the end of this week?

Mr Leyshon—Yes, I believe so.

Senator O'BRIEN—Thank you. I will leave it there at the moment.

Senator FORSHAW—To follow on from that, could you indicate the qualifications, experience and expertise of the people who conducted the investigation and prepared the report on behalf of your organisation?

Ms Boughton—The investigators employed—and I am talking about BASI, in that they were BASI employees at that point in time—can come from a range of disciplines, not necessarily aviation related. We do have a lot of human factors people who are employed in the organisation. Once they come on board, they are put through an intensive investigator training program that covers all aspects of aviation safety investigation.

Senator FORSHAW—This is the first and, I take it, only report or investigation that has been conducted by BASI on this issue?

Ms Boughton—In terms of a fumes incident that had a potential impact on safety?

Senator FORSHAW—Yes—and that has led to a specific investigation and report of this nature by BASI? Is that the case?

Ms Boughton—I believe so.

Senator FORSHAW—Because you mentioned a number of other incidents—but maybe we should go back and revisit that. You referred to 93 incidents, or were they occurrences? I am just trying to distinguish between a report and what might be seen as a serious issue.

Mr Leyshon—The 93 occurrences all fall into the general description of smoke, fumes or fire within the cabin or cockpit of an aircraft from whatever source. That information was taken from our database over the nine-year period from the beginning of 1991 to today's date. Those occurrences could be as simple as the spillage of food in a galley causing a fire to failure of an electronic component causing fumes to this particular occurrence—that is, the ingress of fumes from a failed seal within an engine—to multiple reports of 'nothing found' on investigation by the operator.

Senator FORSHAW—Are you able to indicate how many of these 93 occurrences might be categorised as similar to the matter that you investigated—that is, might be related to, as I understand it, fumes which apparently contained some oil or substance from the oil.

Mr Leyshon—Not at this point. We have not gone that specific. But we can take that on notice and provide that to the committee.

Senator FORSHAW—Would you give us a breakdown of how you would describe various categories within those 93. From other evidence that has been put forward, and we have heard from Professor Winder this morning, it is alleged, stated, put to us—and it is a bit hard for me to describe it, because I am not technically qualified—that this oil fume related problem has occurred quite a lot around the world. Therefore, I would have expected that your organisation would be aware of the overseas evidence. Do you have any information you can give us about what has happened in other countries in regard to this problem, how many investigations might have occurred similar to what was undertaken by yours and what were the results?

Ms Boughton—If you are specifically referring to BAe146 aircraft and the fumes that are alleged to be attributable to oil seals and what have you—

Senator FORSHAW—We will start with them.

Ms Boughton—then we do not have documented numbers of incidents in terms of international operations.

Mr Leyshon—It might be prudent to point out at this time that we did approach the UK CAA and our counterpart in England, the AAIB. Under their legislation the AAIB do not get involved in incidents, so they referred us to the UK CAA, and they told us that this was the first that they had heard of crew becoming incapacitated.

Senator FORSHAW—Our specific terms of reference relate to particularly the BAe146 aircraft, but certainly a number of other witnesses and some of the written evidence suggest that it is not confined to those aircraft. In the nine years or so that you referred to, did it come to the attention of BASI prior to this incident that you inquired into that there was an alleged problem that was affecting crew, pilots and maybe even passengers?

Ms Boughton—I think it would be impossible to say that people in the aviation industry were not aware that there was concern.

Senator FORSHAW—It would be not impossible?

Ms Boughton—It would be impossible to say people were not aware—in other words, people were very much aware that there were comments being passed about the air quality of this aircraft. My understanding is that air quality is an issue in all aircraft that are pressurised and that fumes do become a problem at different times, and different methodologies are used to try to ensure that the quality of the air is maintained at an operationally safe level. But it is not something that we have a lot of information about in terms of our Australian experience.

Senator FORSHAW—But if it was considered to be an issue of such significance that it jeopardised safety, surely then it would be something that the BASI—and I assume we can also ask CASA—in its operating both now and under its former name would have had to have focused on. We have had Professor Winder give us evidence—and you can read his submission—that this is not just some isolated occurrence, in his view; that there has been a big problem here and that there has been plenty of people, particularly airline crew, around the world reporting effects upon their health, both short-term and long-term. In that sort of environment I am trying to understand why it would not have been a top order issue for the regulators of air safety both here and overseas.

Ms Boughton—From an accident investigator's perspective, though, this was the first occurrence that had been reported to the Bureau of Air Safety Investigation that indicated that there was a safety of flight issue, and that is why it was investigated.

Senator FORSHAW—I appreciate that your role is largely to investigate incidences and occurrences, but in doing that you presumably have to have some stored information, et cetera, which relates to air safety.

Ms Boughton—In the sense that—

Senator FORSHAW—You have to be aware of the issues that impact upon air safety, surely.

Ms Boughton—And the general operation of aircraft and the operational procedures that are put in place to ensure that the aircraft can operate safely if something fails.

CHAIR—Can I just interrupt, so I can clarify this. The distinction you are making is that this incident involved clear air safety implications, rather than health implications for people. So you would not investigate all of the claims that have been made in terms of whether or

not people's health was affected; it is only when it is a safety issue that you would have investigated.

Ms Boughton—That is right. It is when the people on the craft are influenced in such a way that their health is affected and it could have an impact on the safety of that flight.

Senator O'BRIEN—Can I just ask one thing. Do you require an incident to initiate investigation, or can your own sources tell you that there should be an investigation?

Ms Boughton—The answer is both—in that, if there is sufficient information coming to you from different quarters, then an investigation can be put into train, but it would be investigating the issue if affecting safety.

Senator FORSHAW—I think it was you, Mr Leyshon, who mentioned that the manufacturer has 60 days in which to respond to the recommendations. Who precisely is the manufacturer?

Mr Leyshon—The manufacturer of the aircraft is British Aerospace.

Senator FORSHAW—Okay. What about the other companies that appear to be involved in the issue here? We have had evidence regarding the oil which is manufactured by Mobil and also I understand the engine, if there are leaky or faulty seals or something of that nature. Whilst BAe manufacture the aircraft, what about the manufacturers of the engine itself? Do you make recommendations to them as well?

Mr Leyshon—Yes we do. Our second recommendation in the occurrence brief is jointly addressed to British Aerospace and AlliedSignal, as the engine manufacturer in this case, to identify deficiencies that will allow this situation that we investigated in this occurrence to occur and to find out ways to rectify the situation.

Senator FORSHAW—That is not in any way to take away the primary responsibility of the aircraft manufacturer, as I understand it.

Mr Leyshon—No, it isn't.

Senator FORSHAW—What about the airline operator? In this case, was it Ansett? I am not sure, but I mean the actual owner or the operator of the aircraft. Do they have a role or a responsibility in terms of responding to the report recommendation?

Mr Leyshon—The operator is normally part of the interested party process and they provide comments where appropriate during that phase. In the longer term the operator is obliged to maintain the aircraft within a certified schedule, and that is their obligation. If we found, as a result of the investigation, shortcomings in any of the operator's procedures, policies or practices, then we could recommend to the operator to revise those.

Senator FORSHAW—Okay, I suppose we have to now await the response from the companies to you before we can take the matter any further. What happens if the companies say to you, 'We do not accept your recommendation'? What happens then?

Mr Leyshon—If the addressees of the recommendation respond that they do not believe that the recommendation is appropriate, they will supply appropriate documentation and evidence to say why. Once we have that, in light of the investigation and the response to that recommendation, we will review it and then classify it under our internal procedures to determine the next course of action.

Senator FORSHAW—Does the impact of that recommendation only apply in Australia? What is the impact in other countries? Does it have any standing at all?

Mr Leyshon—That will depend upon the manufacturers themselves and any requirements imposed on them by the original certifying authority, which in this case I believe is the British CAA.

Senator FORSHAW—Obviously, I would be interested at a later date in ascertaining further information.

Ms Boughton—Chairman, can I interrupt to make a clarification here in that I do not want to be seen to have misled the committee. The reason that in this particular instance the aircraft manufacturer and the engine manufacturer are involved is that the two recommendations in the occurrence report are written to say the civil aviation authority ‘in conjunction with’ the manufacturer of these two parts. The 60-day obligation is on the Civil Aviation Safety Authority in terms of a memorandum of understanding that we have with the authority. I did not want you to go away believing that the manufacturer independently would be responding to the bureau.

CHAIR—Thank you.

Senator FORSHAW—Whilst your recommendations relate specifically to British Aerospace, what about the potential impact upon other airline manufacturers? Because you have just investigated this one instance, do you confine it to that company or can you also, arising out of this, make a similar recommendation to all other companies or manufacturers that have planes operating in Australia? It is argued that this is not a problem that necessarily is confined to BAe and that other manufacturers have been mentioned.

Ms Boughton—You would want to have additional evidence and information that it is impacting broader than a particular manufacturer before you would go that next step. In this particular instance, my understanding is that we do not have additional information.

Senator FORSHAW—I suppose the question is whether one takes a reactive or a proactive role. Wouldn't you want to say, ‘Look, if you think there was a problem that needed examination and some remedial action,’ and to say to another company, ‘You should check your systems as well and if necessary adopt the same remedial action if there is a possible problem’?

Ms Boughton—I think you would only do this if you believed that the information from a particular investigation could be directly translated to something else. You would have to ensure that you had some solid grounds for doing that.

CHAIR—I want to come to your report itself. You say in the report:

The investigation found that smoke and fume contamination of cabin air is neither a new phenomenon nor a particularly rare event and that over time, it has been experienced in many aircraft types.

You go on to talk about the BAe146, which is the thing that you investigated. Are you saying in fact that the whole problem of odours is a reasonably common occurrence?

Mr Sargeant—Yes, that is our experience. It is a relatively common occurrence throughout the world in various aircraft types. There have been various reports in various formats over the years about these sorts of issues.

CHAIR—In terms of those reports, what is the most significant element in them? Is it the health aspect obviously to do with pilots and flight attendants or are you aware of other instances where air safety has been imperilled?

Mr Sargeant—To the best of my knowledge I am certainly unaware of any report that relates to the in-flight incapacitation of flight crew members. The thrust of the reports that I have seen and that I am aware of rather relates to the longer term exposure to contaminants or odours or smells, whatever they may be.

CHAIR—And then that relates to the medical conditions of air crew?

Mr Sargeant—There are certainly reports that would suggest that is the case.

CHAIR—You go on in this report to describe some of the symptoms and so on. You say:

Other reports were made directly to medical personnel, some to employee representatives, and some were made verbally to the Bureau. Some reporters advised that they would not report to their employers because they feared reprisals.

Did they describe the nature of those reprisals to you?

Mr Sargeant—They certainly did not describe them to me. I was not the investigator in charge. The investigator in charge has since left the bureau. But they were the sorts of responses that he was receiving. In fact that was one of the reasons why the investigation took as long as it did: he was conscious of these sorts of issues and he wanted to get more information on them.

CHAIR—Was the investigator Clive Philips?

Mr Sargeant—Yes, it was.

CHAIR—Was he happy with the final report?

Mr Sargeant—Clive was involved with the production of the final draft. Yes, to my knowledge he was.

CHAIR—You say that CASA are due to give you a final response by 6 November. I presume that because this is dated 6 September. It has been made clear to me that CASA's criticism of this BASI report is that the changes they suggested were not included.

Mr Sargeant—I have seen a letter relating to that that came during the interested party process, but some of the issues that they raise we do not believe are correct.

CHAIR—Some of the issues that CASA raise are not correct?

Mr Sargeant—That is right.

CHAIR—Can you give us some idea of which issues?

Mr Sargeant—There is certainly one issue that comes to mind. There was reference made to the recording of the defect that the crew should have been aware of and, in fact, they operated this particular aircraft on this occurrence without regard to that maintenance action or defect. That was not the case. The aircraft had been cleared for normal flight operations. Mr Leyshon might be able to help me with a couple of other matters.

Mr Leyshon—The crew were operating the aircraft without any restrictions whatsoever. The assertion from CASA was that the crew had a restriction but they did not comply with it, yet the documentation showed no restrictions whatsoever.

CHAIR—I understand that CASA has said that the aircraft are safe and they will not be taking up your recommendation. Are you concerned about that?

Mr Sargeant—We have yet to receive a formal response on the recommendation, so perhaps it might be in order to wait until we get that formal response before making any comment.

CHAIR—I am happy to do that. I realise my question was probably a little out of order at that point, but we will have to return to this when we get the CASA response.

Ms Boughton—Another question that we would like to have some information from CASA on is that there have been a number of modifications developed for this particular aircraft, and it would be important to know whether those modifications have in fact been made to all the aircraft that are being used in Australia.

CHAIR—Certainly. That is one of the issues that this committee will have to address, because, for example, Ansett have described to me the modifications they have made. One of the issues we have to look at is: are those modifications working? Are there still problems? That is one of the issues we will certainly have to try to address in the course of this inquiry.

Do you think there is a need for clinical testing in terms of the human health effects of the leakage of oil fumes into aircraft like the BAe146?

Ms Boughton—You used the word ‘think’. We come from an organisation of accident investigators. We are meant to base our work on scientific analysis. In terms of the information that we have to hand at the moment concerning the potential impact on safety of flight, then we do not have any information to suggest that course of action at this point in time.

CHAIR—Except that your report here has quite significant recounting of obvious health problems for aircrew. It would seem to me that, if you are identifying very strong health problems arising out of the fumes, et cetera, then surely you have a comment about those health problems? You have identified the health problems in your report and detail them at some length.

Ms Boughton—The reason there is a specific recommendation relating to that is that we did not have that scientific information to back it up.

CHAIR—What your report actually does is recount the problems that have been documented.

Ms Boughton—That have been put to us, but we did not have any evidence to actually take that any further.

CHAIR—You have not done any tests that would confirm one way or the other what the source of those health problems are, but you recount that there certainly are health problems being encountered?

Ms Boughton—That is right, whereas the particular occurrence—and in this case it was an incident—was a very specific issue that was identified. That has been identified and hopefully will be addressed.

CHAIR—Senator Tchen, would you like to ask any questions?

Senator TCHEN—No.

CHAIR—Senator Forshaw, do you have any questions?

Senator FORSHAW—No.

Senator O’BRIEN—I do. This has been touched on. The letter from the Civil Aviation Safety Authority to the secretary of this committee on 16 September says:

I note that the Bureau of Air Safety Investigation (BASI) has now released its Occurrence Brief (reference 199702276) relating to an incident which occurred on 10 July 1997 involving a BAe 146-300. On 18 May 1999, in accordance with BASI policy, CASA was given the opportunity to comment on a draft of the Report. In a letter dated 3 June 1999 (refer attached), CASA responded expressing concern about aspects of the draft and seeking additional information about certain claims made. CASA also proposed a meeting to discuss the matter.

I am most concerned that CASA did not receive a response to its letter and that the final Report in no way acknowledges our comments which, in my view, provided information which should have significantly influenced its content.

You have in part commented on that. Do you have any comment about the suggestion that you did not respond to them at all?

Ms Boughton—We did, actually. There was not a specific meeting held after the interested party comments were received, but, as I indicated to you earlier, it has not been standard BASI practice to go back to an interested party with a comment on whether or not various comments are being accepted or otherwise. There was a subsequent letter that was sent to CASA. They received it before they actually wrote to the committee. We indicated a number of aspects where their comment had not been taken into account in the final report because we did not have copies of any of the information that they were referring to and we had asked for that to be provided. At this stage, we still do not have any additional information to suggest that the existing report should be changed in any way.

Senator O'BRIEN—Is the committee able to be supplied with a copy of that letter?

Ms Boughton—The letter that went to CASA?

Senator O'BRIEN—Yes.

Ms Boughton—Yes.

Senator O'BRIEN—I am asking because there is a suggestion in the comments made to the committee that BASI perhaps did not give proper consideration to CASA's view on the matter. You have answered that in part, but I think it would be appreciated if we had that comment on the record. On page 3 of the CASA submission dated September 1999 they say:

CASA is entirely satisfied that the BAe 146 aircraft in service with QANTAS and Ansett are safe for public transport and that the airlines have discharged their responsibilities to the public and regulator in maintaining the aircraft to the standards required. CASA will not be introducing any additional requirements against the BAe 146 environmental control systems following these investigations.

That is pretty conclusive. It seems that we already know the response to your recommendations. If that is the case, what role does ATSB have in the matter for the future?

Ms Boughton—Given that at this stage it appears CASA has information which we do not have access to, we would be going back to them and trying to resolve what that information is and whether it does suggest that the comments that CASA has put in its report stands as is, or whether we would still leave the recommendation that we have in our report open.

Senator O'BRIEN—That information was referred to in your letter to CASA when you requested that further information?

Ms Boughton—Yes.

Senator O'BRIEN—I think you have already said that that has not been responded to. That is all I have at this stage. Thank you.

Senator FORSHAW—I have a couple of follow-up questions on that matter. I was tempted to say that we have that information and it is not actually a leak. It is on the record. I want to ask you: what happens if the company decided, for instance, that it would implement the recommendation, notwithstanding the position that has been put to us by CASA? The other words, your recommendation is to CASA, in conjunction with the aircraft manufacturer, to address deficiencies. This may be something that you have to respond to after you get the response from BAe. Presumably CASA can have a view, but BAe could nevertheless say, ‘Right, we’ll take notice of this anyway.’

Ms Boughton—Senator, I think if it were a positive outcome for safety, we would be encouraging it. You are probably aware that sometimes CASA accepts a recommendation, but things take a while to go through the regulatory process. We often encourage airline operators to do things in advance of a particular regulation coming into effect.

Senator FORSHAW—But it would appear from this recommendation that, whilst there is a responsibility upon CASA, and they have expressed a view which does not seem to sit with your findings, at the end of the day it is going to be the company or the manufacturer that would be expected to take action as a result of your findings.

Ms Boughton—Either voluntarily or as part of a regulatory process.

Senator FORSHAW—Yes.

CHAIR—Part of the conclusion in your report states:

The Bureau of Air Safety Investigation is particularly concerned about the potential for further BAe 146 flight and cabin crew to become incapacitated during flight due to exposure to odours being introduced into the aircraft cabin environment.

Then:

The implications of long-term exposure to cabin air contamination for the health of passengers and crew requires further examination, together with the development and implementation of suitable counter-measures.

You did not make that a recommendation; it was part of the conclusion. Do you believe BASI should have some responsibility to recommend that further examination should happen? You have not referred it to anyone. Who should do that examination, do you believe?

Mr Sargeant—Perhaps I should go back a little bit just to make it clear why we carried out this particular investigation. This was the first time we had been advised of an occurrence where flight crew had been incapacitated. During the course of the investigation, we also came across considerable amounts of information from various sources suggesting there may be a wider issue. As Ms Boughton indicated earlier, we did not have sufficient information to be able to go further on that, but clearly we could not ignore that information either. That is the reason why we flagged that particular issue, that wider issue. We do not see that as an immediate air safety issue. Rather, we see it as a longer term possible health issue. We are not coming up with any conclusions on that at all. We just do not have the

information to do that. But we believe it is worthy of a wider examination by the competent authority, which we believe in this case should be coordinated through the regulator.

CHAIR—Through CASA?

Mr Sargeant—Yes.

CHAIR—One of the critical questions for this committee is the issue of health. I can understand the distinction you make between health and air safety. That was not clear to me before, but I can see the point you make there. This committee is going to have to make a judgment about the long-term health of passengers and crew. I am not sure anyone is going to be able to give us a final judgment on that. So you can see why I am pressing you on that. It is helpful that you have said there should be a further examination, but our problem is going to be to work out who should do it and whether anyone will and those sorts of questions. That is just a rhetorical response, unless you want to comment on what I have said. You can see why I asked that question, because it is one of the things this committee obviously has to address.

Mr Sargeant—Yes, of course.

Senator FORSHAW—Can we put you on notice that, as you would have no doubt guessed, we would appreciate being advised of the formal responses from the company and from CASA to this recommendation, even though we are likely to know what they are from the evidence today and tomorrow. It may be that we need to put some further questions to you at a future hearing or in writing following that response. If you get the responses in the next week or so, what is the time frame from then on in terms of any further consideration by BASI?

Ms Boughton—Given this is an issue that the committee is looking at, it is something that we would obviously address fairly quickly.

Senator FORSHAW—I am just contemplating when we are likely to have further hearings, but there will be time.

CHAIR—Thank you very much for again giving us valuable evidence. We appreciate your appearance. I expect that we may talk to you again.

[3.03 p.m.]

ELDER, Mr Rob Stephen Toti, Executive Manager, Government, Industry and International Relations, Civil Aviation Safety Authority

SMITH, Mr Michael, Assistant Director, Aviation Safety Promotion, Civil Aviation Safety Authority

TOLLER, Mr Michael, Director of Aviation Safety, Civil Aviation Safety Authority

VILLIERS, Mr David Alan, Airworthiness Engineer, Civil Aviation Safety Authority

CHAIR—Welcome. Would you like to make an opening statement?

Mr Toller—I have very little to say, Mr Chairman, in terms of an opening statement, other than that I think it is fairly clear that we are not in a position, as the Civil Aviation Safety Authority, to recognise that there is a significant aviation safety authority issue here, but we do recognise and have had concerns from the outset about other issues, particularly health issues. We have done a lot of work pro-actively with the airlines, with the manufacturer in investigating those over the years. Having reached the position that we have reached, it is not one that has been arrived at lightly. It is one that has come under great consideration. We welcome the opportunity to explain our position.

Senator O'BRIEN—Mr Toller, your letter to the committee of 16 September says a number of things. Firstly, at the beginning of the third paragraph it says:

The matter was also considered by the CASA board earlier this year.

I take 'the matter' to mean the subject of the then BASI investigation.

Mr Toller—In general terms, the whole issue of 146 cabin air quality.

Senator O'BRIEN—Was that in response to the BASI investigation or at the initiation of the board on information which had come to the board other than through BASI?

Mr Toller—It was at the initiation of the board as a result of an approach to one of the board members.

Senator O'BRIEN—So it was not in response to the BASI—

Mr Toller—No. At that stage we had almost forgotten about the BASI inquiry. The last time we had heard about it would have been about 16 or 17 months previously, and we were aware of the fact that it was ongoing.

Senator O'BRIEN—When you say 'in response to an approach to a board member', I take it that is an approach from someone within the industry. Can you tell us whether it was an approach on behalf of an operator or on behalf of an organisation representing participants in the industry? Was it just an individual approach?

Mr Toller—It was an approach by an individual who asked that their name not be used.

Senator O'BRIEN—I appreciate that. I am not seeking a name, but you can appreciate that this matter can be approached from a number of angles.

Mr Toller—Certainly. It was an individual who approached one of the board members.

Senator O'BRIEN—Given that the issue was considered by the board some time earlier this year, when was it considered having regard to the BASI activity on this subject—a long time before it; shortly before it?

Mr Toller—It would have been shortly before.

Senator O'BRIEN—Apart from a discussion at board level, what action did the authority take in relation to the matters discussed by the board in relation to the 146 issue?

Mr Toller—The board itself elected two of its members, one with an engineering background, one with a more general background, to completely review all the files within the authority about the 146 to see if they believed we had handled it sensibly and correctly, and whether there were any further issues that we should be looking at. Those two board members reported back to the board that they were satisfied with the approach that the authority had taken.

Senator O'BRIEN—Presumably the relevant matters are contained within the minutes of the board meeting.

Mr Toller—They will be, yes.

Senator O'BRIEN—You would have heard me earlier refer to the passage in your letter to the committee where you express concern at not receiving a response to a letter of 3 June to the then BASI, and their response that they have written to your organisation seeking some information to which you have not responded. Have you got any comment to make about that?

Mr Toller—The only comment I would make, Senator, is that we wrote to the committee on 16 September. We received the letter from BASI, and I believe it was hand delivered on 17 September. So at the time I wrote to the committee we had not received a response.

Senator O'BRIEN—Would you care to respond to the suggestion that they had requested some information which they have not yet received?

Mr Toller—We are happy at all times to discuss the matter with them. Mr Smith has the role of liaising with them. If they ask for any information, we will be delighted to give it to them.

Senator O'BRIEN—Apparently they have asked in a letter. I have not seen the letter.

Mr Toller—I am not aware of the fact that they have requested a meeting or what specifically they have asked for. We obviously have some details, some of which they will have had from other sources.

Senator O'BRIEN—As I said, I have not seen the letter. I suppose we could come back to it at some stage. Mr Smith, you might be able to help us.

Mr Smith—I do have the letter here. They do seek information that we offered to provide in my letter of 3 June, and we are still happy to provide that information.

Senator O'BRIEN—So it is just a matter of when you provide it, not whether you will provide it.

Mr Smith—That is correct. It is not a case of us attempting not to provide it; it is just a case of when we provide it. I expect the appropriate time is in our response to their report.

Senator O'BRIEN—I am not sure who should answer this, but will you be responding this week?

Mr Smith—I would have to reserve comment on that. One of the issues that has caused us to leave our response until towards the end of the period nominally notified for response has been the significant evidence that we expected to come before this committee that may have an impact on our response to the bureau.

Senator O'BRIEN—Forgive me for saying this, but it sounds as though you either expect that we have accessed information that you do not have access to or that there is some deficiency in someone's ability to obtain information that CASA, as the authority, ought to have access to.

Mr Smith—No, that is certainly not correct. What I would not want to do is to make a response to the bureau which did not consider any new information that may come to light as a result of the process that we are participating in now. I would expect that CASA's response to the bureau would be a full and complete response in terms of the latest available information to us. I think it is only appropriate that we respond in that way.

Senator O'BRIEN—In the submission to the committee, which is a 2½ page document that I am referring to, there is a statement in relation to the BAe 146. It is pages 140 to 142 of the numbered submissions that we have. It is simply headed 'Civil Aviation Safety Authority, submission of the Senate Rural and Regional Affairs and Transport References Committee inquiry into the examination of air safety with particular reference to cabin air quality in BAe 146 aircraft'. You say in the second paragraph:

Modern jet transport aircraft fly at such altitudes that a cabin airconditioning and pressurisation system is essential for human life. These environmental control systems are complex, their design is governed by internationally accepted standards, and the systems are subject to a rigorous design approval process.

Another submission to the committee, that of the Ansett Pilots Association, states:

There is no current standard for air quality on commercial aircraft today.

Perhaps you could supply the committee with a copy of the document which sets out the internationally accepted standards, and let us know whether they are binding and applicable on aircraft use in Australia.

Mr Villiers—Senator, the design standards for aircraft that we are talking about, transport category aircraft, are specified in a series of design standards. Australia subscribes to a number of those at present: US federal aviation regulations section 25 and the Joint Aviation Regulations section 25. That is the European requirements. Both of those have requirements on cabin ventilation and contamination, but they are limited. They address only carbon dioxide, carbon monoxide and ozone levels within the cabin.

Perhaps an important section is a statement under section 25.831 of FAR 25, which says that:

Crew and passenger compartment air must be free from harmful or hazardous concentrations of gasses and vapours.

That is the only statement that is in there at present. What constitutes ‘harmful’ or ‘hazardous’ is left up to other standards, and generally they are getting into the health standards.

Senator O’BRIEN—So those passages that you are referring to are the ones that are referred to in the submission document that I read out?

Mr Villiers—Yes.

Senator O’BRIEN—Could we get copies of that?

Mr Villiers—We could provide those.

Senator O’BRIEN—That would be helpful. It would save us chasing around libraries to get our copies. Page 33 of the submission says:

The cabin environment in the BAe 146 aircraft is as chemically clean, if not cleaner, than other transport aircraft in service today.

We have heard evidence today which suggests the contrary that the BAe146 is one of a small number of aircraft that has a cabin air quality problem, if I can put it that way. I want to ascertain the basis for the statement in the submission that you make that the BAe146 aircraft is ‘as chemically clean, if not cleaner, than other transport aircraft in service today’.

Mr Villiers—The information that we are using there is derived from some studies that were done on behalf of Ansett airlines. The concentrations of the chemicals that we were looking for at the time were measured in levels which were a maximum of a tenth of the allowable levels and many times they were a thousandth of the allowable levels of those chemicals. The sorts of chemicals that we are finding are standard chemicals used in cleaning, dry-cleaning fluids, deodorants from various other parts of aircraft. These are used

in all aircraft. There is nothing special about the 146 in this regard. There is nothing that I am aware of that would indicate that we have other than the same atmosphere in the 146 as we have in any other transport category aircraft. We do have some areas of poor cabin ventilation, generally concentrations of carbon dioxide and stagnant air. Those have been addressed by a series of modifications which both Australian operators are in the process of embodying in their aircraft.

Senator O'BRIEN—You said that this statement is based on the Ansett study. There has been some criticism of some of the methodology of that study—nevertheless that is in evidence before this committee. I take it you will be taking that into consideration in your response to the BASI report?

Mr Toller—One of the problems we have is that this is outside our area of expertise completely. I note your comments that obviously not everybody agrees with that study but we are not in a position to judge. The study was done by experts and we were prepared to accept that study.

Senator O'BRIEN—I take it from your comment that you are not in a position to judge but you feel bound to accept the Ansett study.

Mr Toller—I would not say I feel bound to but, at this stage, it is the only evidence that we have that we can consider.

Senator O'BRIEN—You say of that evidence that it is probably:

... the most intensive ever carried out on in-service aircraft anywhere in the world and will certainly be used in setting even higher standards for future airliners.

What higher standards do you expect to flow from that study?

Mr Villiers—In the documents before you, in the public booklets, there is a submission by an organisation called the American Society for Heating, Refrigeration, Air-conditioning Engineers. They currently have under way two proposals for study into this very problem because there are no worldwide standards for air quality in aircraft. Standards that have been applied to date have effectively been for buildings such as this one where there are requirements for the amount of air that has been shifted around. Aircraft, obviously, are an entirely different environment.

For instance, they operate in an environment where humans cannot live without artificial support. If machines are involved in doing that, there has to be some compromise in terms of the amount of air you shift and the quality of that air. No studies have been done. ASHRAE have undertaken those studies, and I am aware that other authorities overseas are seriously looking at the problem of cabin air quality and whether they need to address and improve the standards that are currently applied. As I mentioned earlier, in reading from the US regulations they are very general and in particular only discuss carbon dioxide, carbon monoxide and ozone.

Senator FORSHAW—On that last point about the work done by the ASHRAE, we were told earlier that they were actually proceeding to develop a standard. Is that your understanding, or it is not as definite as that?

Mr Villiers—I do not have an indication that they are developing the standard. What I do have documentary evidence of is the research that would lead to that.

Senator FORSHAW—Are there any moves under way, or is there any intention to try to develop a standard within it that would operate in Australia for air quality; or is that something that would possibly, as a matter of course, flow out of the working done in America?

Mr Villiers—Yes, it would flow out of the work being done in America. We are not in a position in Australia to enforce our own unique requirements. We have to accept what is done overseas in these regards so that we can get the aircraft and use them in Australia at a reasonable cost to the operators. We would adopt whatever comes out of the Americans and the Europeans, and the Europeans and the Americans work very closely towards harmonising their requirements. So I would expect a single world standard to come out of this work.

Senator FORSHAW—Can you give any indication of the time frame that this might take?

Mr Villiers—Sorry, I have attempted to contact ASHRAE, but they have not responded to me at this stage with any further details. I know that they have let contracts for one of the studies.

Senator FORSHAW—In previous evidence given from the organisation formerly known as BASI, reference was made to the submission that you made, which is contained in the letter from Mike Smith dated 3 June to Dr Rob Lee. The second paragraph of the letter suggests that the crew did not comply with a restriction:

The faulty components which allowed fumes to enter the cockpit had been identified prior to the incident, and correctly recorded in the aircraft's documentation as not to be used. The crew did not comply with that restriction. The report does not comment on whether the crew action was appropriate.

I took it from BASI's evidence that they did not accept that proposition and that in fact there was no restriction in place. Did you hear their evidence?

Mr Toller—Yes. At the time that we wrote that, we were relying on hearsay evidence. We have since been able to find a copy of the maintenance log with the defect in it. It is correct: there was no actual crew restriction on operation put on it. It was written up as a defect that could bring oily fumes into the cockpit, but it did not say 'Do not use'. We have the exact wording there, if you like.

Senator FORSHAW—It would be useful if you provided that to us. Could you give us a copy of it?

Mr Toller—It is a very poor copy, Senator.

Senator FORSHAW—Maybe you should read it into the record at this stage, and we will take it from there.

Mr Toller—It is called the ‘acceptable deferred defect’, which is in the back of the maintenance log. It is defects that are ongoing; some of them require particular operations from a document called the ‘Minimum Equipment List’. You look these up in the Minimum Equipment List and it says you can go as long as you do this.

Senator FORSHAW—Did you say it is called ‘acceptable defects’?

Mr Toller—It is a deferred defect report. Sorry; I am lapsing back into my former airline terminology where we called it an acceptable deferred defect. Here in this particular airline it is actually a deferred defect report, and it says for 17 June:

Oil smell in cabin with #2 pack selected. Suspect #3 or #4 engine. Defect confirmed. #4 engine has oil residue at N2 inlet. *Repair at company convenience.

There is not actually anything there which says, ‘Do not use it,’ but it is a pretty strong indication of the problem that arose.

Senator FORSHAW—All right. Let’s just go through this. Who made that report?

Mr Toller—This is the maintenance release of the aircraft, and so the report would have come from one of the previous crews; and the statement which says ‘Repair at company convenience’ would have been signed off by the engineer who was signing off the aircraft at the time. A report has just been pointed out to me in the maintenance release on 13 June—four days prior to that and, I believe, from the same captain—which says:

Toxic oily odours from airconditioning system. Pack 2 seems worse. (Engine Air)

The aircraft had a history of this particular problem: that is all we are trying to say at this juncture. That one-off aircraft had a technical defect which was giving particular problems.

CHAIR—Can you tell me what ‘Repair at company convenience’ means?

Mr Toller—I guess it means whenever they have got the aircraft down for long enough to repair it and have the spares in place. As a result of the incident on that particular night, they subsequently took different action, but obviously the company had not decided at that stage that it was sufficiently serious to require immediate repair.

Senator O’BRIEN—If I could make a point, it seems to me that CASA’s evidence identifies that you expected a problem with air quality arising from the oil leak.

Mr Toller—No; we did not ‘expect’: there was evidence of a problem with air quality arising from the oil leak, and it is documented in the maintenance log. That is not unusual: it is the same on any jet aircraft; if they have an oil leak, they will have a problem with oily fumes. That is not 146 orientated; that has been the same on every aircraft I have flown, including the 747.

Senator FORSHAW—So this is an unusual one: is that what you are saying?

Mr Toller—I am saying that there was a particular defect on this engine which, it is certainly not surprising, led to fumes being introduced into the cabin system. It was possible by trouble-shooting to determine certainly which of the two airconditioning packs those fumes were coming from. Frankly, I would have anticipated that, with a freighter aircraft, which has reasonably low ventilation requirements, for obvious reasons, it would have been perfectly acceptable for them to have operated with just the one pack.

Senator FORSHAW—That would have been the restriction that you incorrectly referred to earlier: they could have been required to operate without using all the air packs.

Mr Toller—That is right. There are two packs. They had identified the problem as coming from the right-hand side of the aircraft. It would have been perfectly acceptable to simply switch off the No. 2 pack on the right-hand side and just use the No. 1 pack. In fact, I believe that is how they continued the flight that night.

Senator O'BRIEN—I must say that I took it from the evidence that has been given about this that there was an acceptance that an oil leak of the sort identified would cause a fume problem in aircraft. Is that unfair?

Mr Villiers—That is a true statement, Senator. In fact, in all gas turbine engines, a failed oil seal in the front compressor part of the engine will result, in many cases, in some oil fumes passing through the air-conditioning packs; and some residue of that may well end up in the cabin. But that is the result of a failed seal in the engine. It is not limited by engine type: it occasionally happens to all seals.

Senator O'BRIEN—I take it that it is rare to have an incident report arising from such an incident.

Mr Villiers—I am not aware of, and we have not received, any defect reports on failed seals on gas turbine engines leading to this sort of incident.

Senator O'BRIEN—Prior to this incident?

Mr Villiers—Even since this incident. The only thing I have seen is the BASI initial reports and the follow-ups therefrom, and a handwritten report written by a female pilot who suffered incapacitation some 14 months before she reported it. That was basically anecdotal evidence, so old that it provided us with no information that we did not already have.

Senator O'BRIEN—I take it then that you would be aware if that were a matter of international concern. CASA would keep up to date?

Mr Toller—Yes, indeed. From late 1997 onwards and right through to the first half of 1998, we were following this one very closely. We liaised particularly with the UK's CAA, the authority responsible for the BAe146, as was discussed before. As it is a British built aircraft, the UK CAA take that type of responsibility. They responded to us thus: 'While anecdotal reports have been passed on to me, I have not received any specific or

substantiated reports of crew member sickness from any other airworthiness authorities.’ There are 206 146s flying worldwide. Of those, I believe there are 29 in Australia, so we have got about 15 per cent of the world’s fleet; but it does appear that the only country where we have any evidence of any reports being made is Australia.

Senator FORSHAW—I was going to ask the manufacturer, but you could comment on this now. The incident that occurred affected the crew, particularly the pilot. I understood that, in a plane, the air circulation system that operated in the cockpit was distinct from that which circulated through the cabin. Can you inform me as to—

Mr Toller—I cannot comment on the 146, in that I have not actually flown that one; but, on all other aircraft I have flown, that is correct. Precedence is given at all times to the cockpit air-conditioning and ventilation system over that of the cabin.

Mr Villiers—In the 146, there are two air-conditioning packs. One feeds only the passenger cabin, and the other feeds the passenger cabin and the cockpit. And there is a cross-feed available.

Senator FORSHAW—What does that mean? I am not with you.

Mr Villiers—It means that generally one pack feeds the cockpit but, in the event of a failure of that pack, the other pack can take over the load for the cockpit.

Senator FORSHAW—Does that mean that the cockpit is supposed to get better quality care than the cabin?

Mr Villiers—It gets air from exactly the same source as the cabin. There are only two air conditioning packs.

Senator TCHEN—Mr Smith, in answer to a question from Senator Forshaw, you mentioned that you actually have additional information which BASI—and, if you do not mind, I will use the old term, as the other is much harder to pronounce—did not have. Is that correct?

Mr Smith—Yes, that is correct. As you heard today, we have had discussions with the airframe manufacturer and the certifying authorities in the time between the incident occurring and our receipt of the draft of the BASI occurrence report. That is the information that I was referring to. It is a substantial body of work.

Senator TCHEN—Is that confidential information?

Mr Smith—Not at all. I actually felt, in my response to BASI’s interim report, that they would seek to discuss this information with CASA and that we would arrange a meeting where we would have presented that information. Given the high public profile of this issue, that seemed to me to be a responsible and sensible way to go, and it is certainly the reason that we offered that means of progressing BASI’s report. Given that the report had been some two years in production, I did not believe there would be any unnecessary delay

imposed by the simple action of arranging a meeting that required us to walk a block and a half with that information to discuss it with the bureau, as they were called then.

Senator TCHEN—You offered the information to them?

Mr Smith—Indeed. I can read a part from my letter if you would like.

Senator TCHEN—No. I heard that, and it is already in the *Hansard*. Why didn't you just give it to them? Did they refuse it?

Mr Smith—They would not have refused it. But it seemed to me that, because there was a substantial amount of work that had been done, my offer to meet with them to clarify those issues would have been the way that we would have done this. And let me say that, in the past when such offers have been made, it was regular for CASA staff to meet with bureau staff to further explore these issues, particularly when it involves such a high-profile issue. It is the routine way that we have done business. I was extremely surprised to receive the final report without that meeting having taken place and without the information in my letter being considered. There were a number of other things I would have liked to discuss with them but I was not given that opportunity, despite, as I said, my very clear offer to meet them and discuss it.

Senator TCHEN—Thank you, Mr Smith. Mr Villiers, you said that there are standards for fumes that apply to air safety but not to what type of fumes.

Mr Villiers—No. The statement is quite general. I read again from the US federal aviation regulations—

Senator TCHEN—Is that applicable in Australia?

Mr Villiers—Yes. In October 1998 we adopted part 21 to the Australian regulations. As part of that, we adopted the American FAR regs for design standards for aircraft as our own design regulations, amongst others. The European regulations are very similar and, in fact, in this regard are word for word. It says:

Crew and passenger compartment air must be free from harmful or hazardous concentrations of gases or vapours.

That is all it says. There is no further documentation that tells you what those harmful levels are. As a result of that, you fall back on the national health standards.

Senator TCHEN—There are two ways that you can interpret that. One is that if there is a fume present, it has to be identified as hazardous before it contravenes the guidelines and standards. Alternatively, you could look at it and say that any fume could be hazardous, in the absence of knowledge.

Mr Villiers—The general approach to this is to endeavour to avoid getting any fumes through the system by ensuring that the seals, particularly the oil seals in the engines, are good. They are subject to maintenance and ongoing observation throughout the life of the aircraft. Unfortunately, with many of these components, the first warning you get of a

problem is when it fails. That is why we have troubleshooting techniques for both the air crew and the maintenance people, so that they know what to do in the event that they do get a failure.

Senator TCHEN—Thank you. Mr Toller—again, in an answer to Senator Forshaw about the testing that was done on the aircraft—we had earlier evidence that questioned the methodology used in testing and you said, quite rightly, that it was outside your expertise and that you accepted the expert evidence. I am just wondering who provided the brief for the testing, for the investigation, to be carried out. Was it CASA?

Mr Toller—I believe that was Ansett.

Mr Villiers—It was done by a group on behalf of Ansett Airlines.

Senator TCHEN—Yes, but someone must have written the brief for them. One of the criticisms directed at those investigations was in fact that there were no tests done in an identical environment; I repeat: an identical environment—in other words, high altitude tests. The tests were done on the ground. It seems logical that, if there were problems when the plane was in the air, the conditions should be repeated.

Mr Villiers—If you run the engines on the ground at the appropriate power with the airconditioning systems on it makes no difference, because the fumes will come through the aircraft on the ground as if it were in the air. Where it may make a difference is in the medical effects of those fumes. I am sorry, but that is outside our purview. We simply do not fully understand what those effects are. In mechanical terms, what happens is that, if the fumes are generated in the air, they will be generated on the ground.

Senator TCHEN—And the ambient temperature does not make a difference?

Mr Villiers—Where these fumes have been generated is inside the engine and, while there may be some minor differences, the temperature changes from ambient to the inside of the engine are very significant. While they will be different altitude, I do not think they are going to make a great deal of difference to what we are looking at.

Senator TCHEN—Captain Toller, on that particular plane, and going to the question of whether there were any restrictions on the crew, I was a bit surprised to hear that in fact the same incident was reported four days before by another pilot. I assume the pilot was experienced.

Mr Toller—I believe that it was actually by the same captain.

Senator TCHEN—He or she actually used the term ‘toxic fumes’, rather than just odorous or smelly fumes or something like that. And yet the plane continued to fly. Is that within the CASA guidelines?

Mr Toller—At this stage, that is a matter clearly for the airline maintenance people. Our rules are much more general, if you like, as to when an aircraft can or cannot fly. You are correct. The phrase in fact was:

Toxic oily odours from airconditioning system. Pack 2 seems worse.

In endeavouring to explain the smell, that was the expression used.

Senator TCHEN—It seems somewhat lax.

Mr Toller—Yes, I think it is. There are issues of a number of defects that go on for some considerable length of time that their existence is known. As I say, there is a document for each aircraft known as the ‘Minimum equipment list’, which basically states which deficiencies are not acceptable for flight, and that is the one that we effectively control. You will always get grey areas within a document like that, and I would describe this as being one of those classic grey areas in that, to a certain extent, different engineers within the same company or different companies would take a different approach to the same recurring problem.

Senator TCHEN—Captain Toller, you must forgive me for perhaps being too concerned about it but, in my current occupation, I do have to fly a great deal.

Mr Toller—So do I.

CHAIR—I do not mind who answers this question: are you aware of a company called Electric Force Measurement?

Mr Villiers—I am.

CHAIR—Are they credible?

Mr Villiers—I am aware of Electric Force Measurement only as a vendor of oxygen equipment for light aircraft. That is the only information that I have on the company.

CHAIR—Are you aware that they have made a submission to this inquiry?

Mr Villiers—Yes, I am.

CHAIR—Have you read it?

Mr Villiers—I have glanced over it. Andrew Thom is the man I normally deal with there. I was not aware of his partner or even the fact that he had a partnership.

CHAIR—I noticed in part of that submission comments such as:

Surveys of accident investigation records attribute about 70 per cent of aircraft accidents and incidents to human error. Of these, the greatest number occur in the later phases of flight, during the descent, approach and landing. This is, recent research suggests, when the crew are most likely, even when complying with current regulations, to be subject to a degree of incapacitation due to hypobaric hypoxaemia, or lack of sufficient oxygen.

We are yet to test whether this is a credible submission, particularly if we are going to receive them as witnesses, but the assertion this particular submission is making is that there are real problems in terms of flight air quality, particularly in landing. If that is true, are you

sure that you are entirely satisfied that the BAe146 aircraft in service with Qantas and Ansett are safe for public transport and that the airlines have discharged their responsibilities to the public and the regulator in maintaining the aircraft to required standards? I am linking what they say, of course, to the incident which is the subject of the BASI report that we have been debating for some time. It just concerns me that maybe CASA may want to revise that rather confident assertion in their submission, or are you happy to stand by it?

Mr Toller—I think that there is a dangerous logic within that submission as you read it just then, and I noticed it when I read it earlier. Yes, of course, the majority of accidents happen during descent, approach and landing. There are a number of reasons for this. A lot of these incidents happen during the approach when human error is made and at the approach level when you are down amongst the hills again. Equally, it is when crews are at their most tired and therefore most susceptible to making mistakes. I believe that there is a flawed logic in saying that, just because we believe that there is a higher chance of fumes or a higher chance of oxygen deprivation we can link that to the fact that most accidents happen during the approach and landing phases, because it does not take into account all the multitudinous other factors that affect crews at that time.

CHAIR—I accept that. I would have to read the whole submission into the record, but it would be my request that perhaps CASA might read that submission. If there are comments that you would like to make, I think it would be useful for this committee to see them.

Mr Toller—We will, happily.

CHAIR—I say if you are able to, because I am not wanting to put on you monstrous tasks. But it would help the committee if you could do that. I will just return to the incident that we have been discussing—the landing in Melbourne. I was concerned that there were three pilots in the cabin and two were incapacitated. I am glad that the three of them were not incapacitated, because there would not have been anyone left to land the aircraft. I am sure you would agree with me.

Mr Toller—And did.

CHAIR—The other concern I have, however, is that there is a weight of evidence coming to this committee—from doctors, from Professor Winder, from Professor Balouet from France and even from Professor van Netten—which suggests that there is a real problem with toxins in the BAe146. Have you examined that evidence or are you able to give us some comment on that?

Mr Toller—The comment that I would make—and which I made in my opening submission—probably reflects in some ways the thoughts that you were expressing earlier. In looking at the incident in Melbourne, where there was a crew incapacitation but it could be traced to a known problem that affected—almost predictably, if you like—the airconditioning system, I think that, although it happened to be the catalyst for the BASI review, one should almost take it out of the equation.

When you start talking about the general subject of toxins in atmospheres, and specifically in this case in the atmosphere within an aircraft, then it is outside CASA's area

of expertise. We are responsible for aviation safety. I think we are now getting into occupational health and safety issues which I think you need an expert in occupational health and safety to consider rather than an aviation safety authority.

CHAIR—That is good advice, and we will certainly continue to seek that advice. Are you concerned that Ansett has withdrawn from the ASHRAE inquiry?

Mr Toller—I am a little disappointed but I do not think it will affect the long term, and I am aware that they have their reasons. I am sure that they will discuss that with you tomorrow.

CHAIR—We can ask them. I presume from what you said previously that CASA are nevertheless monitoring that inquiry.

Mr Toller—We will be monitoring that inquiry. We will also be continuing to exchange information with all the other major air worthiness authorities.

CHAIR—That is good.

Senator O'BRIEN—In the letter that you sent to BASI on 3 June you said:

CASA has conducted considerable work on this subject—

that is, the faulty components which allowed fumes to enter the cockpit—

since this incident, often in conjunction with your staff. To provide a complete picture of the issue, the report should note that work.

Could you give the committee details of that work—who did it; what particular work was done; whether it was scientifically based?

Mr Villiers—One of my staff, who has unfortunately since left the organisation, was the one who carried out this work with the investigators in the Melbourne office of BASI. I think the BASI people have already told you that those people have since left their organisation. Quite a lot of work was done in terms of meeting with the airlines and discussing with them what they were doing and looking at the modifications that I mentioned earlier in terms of improving airflow through the aircraft and improving the reliability of the oil seals in the engine.

There are a number of modifications which address a range of different issues within the aircraft. All of those have been discussed with BASI, the airlines, British Aerospace and another manufacturer who, for a time, was producing the aircraft. They in fact sent people from England and France to talk to us on these subjects, and BASI was kept informed of that as it happened. We have a very good relationship with BASI and endeavour at times—particularly on incidents like this—to involve them in what we are doing. It helps to share the information.

It might help your deliberation, Senator, to realise that more than one problem has been identified with the 146. The problem with the oil seals is the one that is generating the toxic

problems that are being alluded to by many crew. But the aircraft has other ventilation problems, as I mentioned earlier, with carbon dioxide and the like. Smells were also being generated by all the usual suspects, such as bodily odours, cooking smells from the galleys and a little bit of Heath Robinson engineering in the ventilation of the aircraft's toilet which resulted in the airflow being in the wrong direction. When this problem was initially investigated, it was not a very pleasant place to work. The airlines have done a lot of work in overcoming those problems. Some of them have been fairly simple fixes.

Senator O'BRIEN—I was going to ask you what you had against the airline food, but that answer was probably self-explanatory.

Senator TCHEN—Just as a matter of interest, is it common to have three qualified pilots in a BAe146 freighter?

Mr Toller—No, the standard crew complement would be two. The third one could have been a training pilot or a new pilot observing the operation prior to doing his conversion course.

Senator FORSHAW—Can I ask another question: I, like a lot of other members of parliament, from time to time get to travel on smaller planes—charter planes, et cetera—and I have to say that oily smells are more noticeable on them. I must admit that I have never worried about it, but maybe I should. Whilst we have been focusing just on this BAe146, do you have a comment about similar problems that can occur and do occur in light aircraft or small aircraft?

Mr Toller—The majority of small aircraft are not pressurised, so they are not actually taking any specific offtakes from the engine. That is just exhaust fumes leaking through the various seals in the fuselage, I guess.

Mr Smith—Another point to make, in particular for aircraft operating out of Canberra, is that many of these light aircraft have fuel burning heaters and they get very hot. Particularly when you first start them up, they introduce odours into the cabin that disperse fairly rapidly.

Mr FORREST—I must admit that that is when I have noticed it.

Mr Smith—Those are the types you would be talking about. Just after take-off when the pilot switches on the heater in that type of aircraft, the cabin heater burns fuel. It is usually located in the nose of the aircraft, and that is used to heat air coming into the aeroplane. It is just like anything: you turn on your toaster at home, and the same sorts of things happen; or you first use your radiator after winter—it is the residue of dust and so on that burns off in the first few minutes, and then everything is fine.

Senator FORSHAW—You have reassured me. Thank you.

Mr Smith—The other thing is that in those types of aircraft where they rely heavily on ventilation from outside air, as you taxi past the jet efflux from 737s and so on taxiing around, you are going to smell the kerosene fumes from those aircraft.

CHAIR—Thank you for your assistance. A copy of the *Hansard* of your evidence will be forwarded to you next week for checking. That concludes today's public hearing. The public hearing will reconvene tomorrow morning.

Evidence was then taken in camera—

Committee adjourned at 6.05 p.m.

