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## SENATE

RURAL AND REGIONAL AFFAIRS AND TRANSPORT  
REFERENCES COMMITTEE

**Reference: Air safety - BAe146 cabin air quality**

**MONDAY, 13 MARCH 2000**

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**SENATE  
RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE**

**Monday, 13 March 2000**

**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, Crossin, Eggleston, Faulkner, Ferguson, Gibson, Harradine, Hutchins, Knowles, Lightfoot, Mason, McGauran, McKiernan, McLucas, Murphy, Payne, Schacht, Tchen, Tierney, Watson and West

**Senators in attendance:** Senators Crane, Eggleston, Forshaw, O'Brien and Woodley

**Terms of reference:**

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 BAe146 aircraft.

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**Committee met at 8.01 p.m.**

**BALOUET, Dr Jean Christophe, Chair, Occupational/Environmental Subcommittee of Aerospace Medical Association and Chair, Airborne Chemicals Committee of the International Society of Automotive Engineers**

**CHAIR**—I welcome everyone to this public hearing of the Senate Rural and Regional Affairs and Transport References Committee and I declare the hearing open. The committee today holds its fifth hearing in its inquiry into air safety, with particular reference to cabin air quality in the BAe146 aircraft. On 22 March 1999 the Senate referred several matters to the committee for inquiry, including the examination of air safety, with particular reference to cabin air quality in the BAe146 aircraft. The inquiry was widely advertised throughout Australia in mid-July 1999. There has been a great deal of interest in the BAe146 element of the inquiry and, as a result, it was decided to deal with this issue separately.

Due to the great interest in this inquiry and the technical issues raised by it, a report on this matter was expected to be tabled in the Senate by the last sitting day of February 2000. However, it is now more likely that the report will be tabled in April or May 2000. The committee is holding a sixth public hearing in relation to this matter tomorrow morning and we will be taking evidence from Dr Chris van Netten via a videoconference link-up to Canada. 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. I underline the fact that 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 because 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 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 the 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.

We have received some additional submissions. Is it the wish of the committee that the submissions be authorised for publication? There being no objection, it is so ordered. This evening we will take evidence from Dr Jean Christophe Balouet via a videoconference link-up to Paris.

We will also hear from the Civil Aviation Safety Authority and the Australian Transport Safety Bureau. I now welcome Dr Balouet. Before I ask you to speak to us and perhaps give us an opening statement, the deputy chair, Senator Crane, wishes to make a statement to the committee.

**Senator CRANE**—Thank you, Mr Chairman. I have to attend to an extremely personal matter so I cannot stay at this inquiry. I will probably be about 15 minutes. I propose that you go into a committee comprising yourself and Senator O'Brien for that period of time and then I shall return.

**CHAIR**—Does the committee agree to that?

**Senator CRANE**—It is agreed.

**CHAIR**—Thank you. Dr Balouet, would you like to make some opening remarks and then we will ask you questions.

**Dr Balouet**—Thank you, Senator, and thank you to the committee. As an opening statement, I should state that I am an independent environmental scientist with an interest in air quality issues. To establish to you my expertise in these matters, I am a member of the International Society of Automotive Engineers, SAE; of the Aerospace Medical Association, AsMA; and the American Society of Heating, Refrigerating and Airconditioning Engineers, ASHRAE. I chair, for example, the Airborne Chemicals Committee of SAE or the Occupational/Environmental Safety Subcommittee of Aerospace Medical Association.

As part of my opening statement, I would like to recall some key facts. The health issues we are dealing with include altered vision, altered coordination, loss of balance, slurred speech, shaking and/or tingling, impaired memory, trouble thinking, trouble counting. Such symptomatology is usually and logically considered and attributed to neurological dysfunction and can be identified as some degree in incapacitation versus performance decrement. Aviation authorities worldwide do work on reducing such risks, while several contributors to this committee apparently find them normal.

There is no doubt that such symptoms occur during smoke/fume events—and not just in Australia. There is also no doubt that engine oil or hydraulics can and do contaminate the cabin air. In fact, acknowledgment of such contamination events and associated symptoms is recorded by thousands of pilot reports and engineering logs collected by airline companies and aircraft manufacturers worldwide. Dozens of national and international organisations such as ASHRAE, SAE, AsMA, NASA or civil aviation authorities are aware and certainly consider the above as facts.

The following deals with evidence that may have been overlooked or eventual misrepresentation. How can the aviation industry insist that they failed to detect phosphated compounds when the sampling and monitoring methods they use are inappropriate or they have not carried out monitoring during an oil leak? How can aviation also claim that the exposures are minor when they keep top-up and oil consumption figures confidential? Limited data made available to me suggests these numbers are not small. Why would Mobil say that leaking oil is not normal?

Why do some parties maintain confusion by asserting that the health hazards of jet oil can be compared to those of mineral oils? I understand that evidence presented to this committee suggests that covering the entire surface of the body with oil would not be hazardous. This may be the case for a mineral oil but not for a synthetic oil containing toxic ingredients. I understand that evidence presented to the committee suggests that new generation modern jet oils have been modified so that the concentrations of some toxic ingredients will be reduced. Please note that these jet oils are still being tested and are not yet in commercial use. Jet engines still contain the older generation of jet oils, known to be toxic, while removing TOCP will not necessarily solve the problem.

Why do some parties maintain confusion by continuing to assert that the threshold limit values are not exceeded when threshold limit values only apply to exposures to single chemicals. Here we are dealing with blends of hundreds of compounds—there could be 500—and several of these toxics of course do have synergistic effects. Why do they support that, when the agencies that set such limits prohibit their application at altitude? I certainly do not accept the view of some parties who continuously deprecate/depreciate critical facts. The symptomatology reported by workers cannot be explained by exposure to carbon monoxide, nor the pill.

Dr Mackerer of Mobil recently claimed to me that clearly visible mist occurs at five milligrams per cubic metre. That was in a letter dated 28 February this year. I would then worry about the five milligram per cubic metre, set as a limit to bleed air contamination by engine oil, allowing a clearly visible mist. In the same documentation, in the same letter, Dr Mackerer wrote, 'Gastrointestinal effects and OPIDN are the only effect that we accept as being caused by human exposures to TCP.' My question is: is it a normal situation to see a company with vested interests deciding on the toxicity of a product while deprecating the results of a hundred of the most referenced studies; also not disclosing all the ingredients nor the concentrations of the compounds in jet oil?

Mobil recently supported the need for a solid epidemiological study on the exposed crew. This is a good idea, consistent with environmental protection agencies around the world. It begs the question: what is the purpose of such a study if there are no legitimate health problems to study? This is something that some parties to this issue are not admitting as they continue to discard many symptoms, including medium to long term.

On occasion, health and environmental agencies around the world call for epidemiological studies for such problems. This happens everywhere else in the world but not, apparently, for crew. Why don't aviation bodies complete appropriate medical tests after exposure? Why doesn't aviation fund medical examinations needed by exposed crew for medium- to long-term symptoms, or fund an independent epidemiological study of such workers? May they not want facts when such data may eventually support their views? Where does the Australian Senate stand for calling for such independent evidence?

I remain appalled that significant medium- to long-term symptoms have been basically discarded. I know of dozens of pilots and cabin crew who are still incapacitated, with clear neurological signs, years after exposure. A 'lucky' pilot has been able to fly after 'only' seven months off work. This definitely is not a short-term effect. Indeed, the amount of material received by the Senate inquiry from workers and former workers must seem in stark contrast to some bland

assurances given that no problem exists—nor are shaking, altered memory or blurred vision, trouble thinking or counting caused by mild irritants. I find it shocking to possibly attribute a flight problem to human error when crew clearly are showing neurological signs after exposure to oil smoke, mists or fumes.

Some evidence made to this committee claims that symptoms are transient. Yes, irritation signs are. However, some exposed crews have not recovered from neurological signs years after exposure. Even if some transient symptoms occur, the neurological signs are there and are most worrisome for flight safety. I have not been able to identify which official Australian body is in charge of airline crew occupational health and safety. I say this because CASA admitted in evidence to the committee that they were not involved with occupational health and safety but with air safety only. Does this mean that air safety does not include worker safety? If so, more relevant agencies should be involved and their role in occupational health and safety should be addressed by the committee.

Moving to the regulation side, in section 25.831 of the federal aviation requirements and JAR, the rule text clearly states:

The ventilation system must be designed to provide a sufficient amount of uncontaminated air to enable the crew members to perform their duties without undue discomfort or fatigue and to provide reasonable passenger comfort.

The civil aviation order, CAO 48.0, paragraph 1.4 states:

... a flight crew member shall not fly, and an operator shall not require that person to fly if either the flight crew member is suffering from, or considering the circumstances of the particular flight to be undertaken is likely to suffer from fatigue or illness which may affect judgment or performance to the extent that safety may be impaired.

Civil aviation requirement 6.16A states:

The holder of a medical certificate must not do an act authorised by the flight crew licence ... while his or her ability to do the act efficiently is or is likely to be impaired to any extent by an illness or injury, no matter how minor.

It does not sound as if the well over 800 reports gathered by Ansett/NJS do demonstrate compliance with the above rules.

Why are aircraft with leaking engines and contaminated air not grounded? Several air forces around the world ground such aircraft because oil is needed to operate the aircraft, if not for avoiding unnecessary emergency landings or jeopardising flight safety, including incapacitation sides. Some parties involved in this issue claim that they have 'solved' the problem and fixed the engines or modified the planes, while these modifications are described as 'optional' and without any corroborating evidence. The 1999 figures suggest an incidence of one fume event per 160 flights. In the same time Ansett estimates the odour reporting rate at 50 per cent, based on an analysis of reporting rates from general flight reports compared to fume incidence reports. This might show that the modifications are insufficient.

Why did maintenance staff not report to the Senate the mechanical problems they know? I have been told by four different representatives working on this aircraft that the original design of the engines for helicopter purposes is responsible for premature ageing of seals and failure frequency on BAe146. Even if the leaks are abolished, there is still a legacy of airline staff who



were injured when leaks were occurring. Should parties be made to face up to their responsibilities?

Senators, you may have noticed several significant discrepancies in the submissions, or that an amount of key information still needs to be given by industry. Corrections, as of today, are far from being sufficient. Incapacitated crew, years after exposure, remain uncompensated and new people keep being exposed. Can we let these issues remain unresolved? There are solutions to most of the aspects. I will be pleased to answer your questions. Thank you, Senators. Thank you to the committee.

**CHAIR**—Thank you very much. I will ask the first question. This is an issue which is very critical to this inquiry. It is the whole issue of a link between chemical fume links into the cabins and the short-term health effects and the long-term health effects of those who are exposed. Could you give us some overview of your findings in relation to what the short-term and long-term health effects are, if any?

**Dr Balouet**—Sure. Just a little history of when I was involved in that: I met with an exposed crew member in 1996. She was having a flight problem with a hydraulic leak, a major one with severe haze and major symptoms. She fell unconscious. She went through dizziness and everything, all the symptoms that you already know of, but when she reported that, this was clearly connected to a hydraulic seal hydraulic leak event. So for the first time we had a direct connection between the symptom and the leak. I went through then the content of those hydraulics and the engine oils and I figured out that this compound, this fluid, which contained neurotoxic war agents, had some other toxic effects, short term and long term, depending on the exposure and depending on the individual's susceptibility.

So clearly there are identified short-term problems. 'Irritation', for example, is transient. Neurological signs can be transient, but may not be according to the exposure, the significance of the individual's susceptibility. I know over 150 of the crew clearly have that symptomatology. The symptoms last for only during the flight or a few hours after the flight, and this can go up to years. Some of them I know have been exposed eight years ago and are still not totally recovered.

**CHAIR**—One of the debates here has been that there is a recognition of short-term effects but many of the air crew are arguing that that has had long-term health effects for them. You would confirm that, I presume, by your answer then.

**Dr Balouet**—I obviously do, and 150 people around the world could certainly testify as well. I understand that the industry want to limit their responsibility to a transient, short-term action, but if they are not looking at all at the long-term or medium-term symptoms, they are not going to view what is really happening. So we need these long-term and medium-term symptoms to be looked at, which I am doing with other people around the world. But apparently this is now to be looked at by the aviation industry in Australia at last.

**CHAIR**—That is true. Senator O'Brien will now ask you some questions.

**Senator O'BRIEN**—Thank you, Mr Chairman. Dr Balouet, I think it is a matter of fact that we have heard of incidents where on the same plane there has been what I think you describe as a smoke haze event and one individual may have had the very negative health consequences that you are talking about and others may not. How would you explain that to the committee?

**Dr Balouet**—There may be a number of different reasons for that which are particularly known to toxicologists around the world. For example, prime exposure may potentiate the other exposures. Secondly, individual susceptibility is not the same with all people around the world and even within a small population. Some people would be really allergic, for example, to a compound and others would not. That is particularly the kind of difference that can occur. If we look at the statistics, on some flights with severe odour events we have had 20 to 30 per cent of the passengers really complaining and most of the crew being sick. With odour events—fume events—with lower concentrations, of course, this ratio was much lower, two to three per cent.

There is another issue that I recently worked on in South-Western Medical University in Dallas. There might be genetic factors interfering with these problems. In fact, there are a number of enzymes, one of which especially play a major role in eliminating and controlling the effects of organophosphates. Particularly what we have seen from the preliminary studies is that the people sharing the two same genes will show very high effects, while those people who have either the R type or the Q plus R type will not have such severe symptoms. That might be another great explanation, but I think we are entering a very big ethical debate about that, and I leave it to you.

**Senator O'BRIEN**—Thank you for that answer. We have been told that almost all, if not all, of the major passenger turbojet aircraft use an air supply which is ducted through the aircraft engines and, therefore, all such aircraft have a risk of pollution of that air supply with engine oil. Have you any comment on that evidence?

**Dr Balouet**—I am not sure I understand your question. Can you make it more clear, please.

**Senator O'BRIEN**—I will try. The air bleed for the cabin for most modern jet aircraft comes through the engine.

**Dr Balouet**—Yes.

**Senator O'BRIEN**—And that is where the oil leak occurs to pollute the cabin air. I wondered what your view on that was. Is there some fundamental problem in your knowledge with finding another air source, or are we condemned to have this problem forever whilst we are using the current generation of oils?

**Dr Balouet**—First of all I may state that, in fact, the aerotoxic syndrome today is connected to two kinds of leakings, engine oil and hydraulics. Both of them contain organophosphates. The problems we have with engine oils are two sorts, maybe three sorts. There can be a leak in seals before the bleed air port where the bleed air is captured to be introduced into the cabin and then necessarily this oil will enter the cabin. The leak can occur also on what we call the auxiliary power unit and those leaks are very well known around the world. But apparently this is not much of a problem with the maintenance reports actually from Ansett and the BAe146. Some

other aircraft—you have heard of the MD80—have a number of problems. Basically, the reason for that is, of course, we have engine seal problems, we have hydraulic problems, but dealing with an aircraft with a rear engine, what happens is that the hydraulic leaks will be sucked by the engines. The APU would suck them as well. These fluids are accumulated in the aircraft belly. They would be sucked in by the APU unit—the auxiliary power unit. They are the different ways that the cabin air is contaminated by these fluids. Does that answer your question, sir?

**Senator O'BRIEN**—Yes, it does. What you are saying is that, to an extent, it does not matter that the air bleeds in the engine. While these oils are finding their way into the aircraft body, fumes could get into the cabin.

**Dr Balouet**—Yes.

**Senator O'BRIEN**—Thank you.

**Senator FORSHAW**—Good evening to you. I have a question which relates to safety. This inquiry that we are conducting is to examine the issue of air safety, with particular reference to cabin air quality in the BAe146. Whilst I understand what you have said about occupational health issues—and I do not want to comment about that aspect of it at the moment—in terms of safety it is argued that this plane has a very good record when you look at, for instance, its record of the number of planes operating around the world, its accident or incident reports and evidence relating to flying hours and performance over a long period of time. I would be interested to hear your view. Whilst it may be acknowledged that there is a problem with fumes, smells or odours in the plane—and we have had differing evidence about whether or not it is toxic or non-toxic, what the levels are, whether it does or it does not impact upon the short-term and long-term health of particularly the airline crew—do you think it can be sustained that there is a safety problem here with this aircraft when it appears to have had a very good record compared to others that I could name?

**Dr Balouet**—You mention good records for this aircraft. In terms of accident fatalities certainly, yes, it is one of the very safe aircraft. That is right. But if you look at the maintenance reports indicating leaks and the odour, fumes and smoke haze events, this is not one of the best aircraft at all. If you have at Ansett and NJS one leak in every 160 aircraft flights, that is probably one of the poorest statistics around the world. In 1992 the statistics for Ansett was one flight with an odour every 66 flights, and one flight leaking for every 160 flights. I can give you comparisons. Eight hundred reports in eight years time is basically 100 reports per year. Alaskan Airlines, which is another company with a high number of very significant problems has a fleet which is about three times the size of Ansett plus NJS and they only have 100 reports per year.

So statistically it certainly is Ansett that ranks first. It is a longer debate, but Ansett and BAe 146 here, in what you are talking about and working out, are statistically the highest ranking for leaking problems and the fume events. You ask me if one can correlate it to the safety issue. Everybody on this committee has agreed that there were adverse effects, even with the transient symptoms. We have three kinds of effects: we have irritation symptoms; we have toxic effects like nausea, vomiting, headaches, dizziness and those kinds of symptoms; and we have, clearly, neurological signs. Those neurological signs that are clearly identified and that are common to those people who have the aerotoxic syndrome, as I have stated in my opening statement, in-

clude altered vision, altered coordination, loss of balance, slurred speech, shaking or tingling, impaired memory, trouble thinking, trouble counting. I do not see how a pilot can safely fly such an aircraft. One needs to admit that this problem is not just in Australia. You have had witnesses at this committee talking about their incapacitation during such events. This is not in the USA, this is not in Canada, this is not in the UK, this is not in France. This has recently been demonstrated, another BAe146 problem, in Scandinavia on 12 November. All these pilots clearly identified that they could not fly the aircraft safely.

The US Air Force compiled numbers of reports concentrating on smoke fumes in the flight deck from 1970 to 1980. The President of Aerospace Medical Association, Dr Russ Rayman, studied those, published the results in 1983 and he clearly concluded that these symptoms were most worrisome for flight safety. After the studies were conducted, the air force decided not to fly but to ground, fix, repair and clean aircraft when such fume events were detected. Does that answer your question, sir?

**Senator FORSHAW**—Yes. I am not sure whether it completely resolves the dilemma I have, but I hear what you say.

**Dr Balouet**—If you want to put a more specific question, please do so.

**Senator FORSHAW**—I think you have covered it. It seems to me that what we are faced with is, on the one hand, a very strong, passionate argument that is being put that there are serious health effects being experienced by some people and one would, I imagine, naturally conclude from that that if that is the case then there is a real safety issue. However, when you look at the other side of the ledger you see the situation where, over a long period of time, this problem has presumably existed, but there is still what I would have thought of as an exceptionally good record in terms of this aircraft compared to others. It is a question of how you measure those competing factors.

**Dr Balouet**—I come back to the fact that the incidence and maintenance reports in Ansett are among the highest in the world, and that is the BAe146. Second, why don't we have the symptoms for years and years? Yes, we have some for years and years, but we could have them for years before that. Why don't we have them? Basically, because these crew gave up their job. They could not fly. Second, because the reporting systems were not making it possible to report those kinds of odour, smoke, and fume events, and connect them to symptoms. I have dozens of such reports that went to aviation authorities around the world, but they have never been used because these agencies were only working with flight safety and they were not taking those symptoms into consideration.

The US Air Force does, for example. They call them physiological reports. Whenever symptoms occur in connection with events, they just find them and they work on them. But civil aviation has not been doing it in the past few years, except in a very few cases.

**Senator FORSHAW**—Thank you.

**CHAIR**—I have one last question. I want to ask about ASHRAE, which I believe you are a member of. What sort of conclusions have ASHRAE made about fumes in aircraft? Can you

give us an overview of that? Do you think they have done an adequate job in assessing the problem?

**Dr Balouet**—Yes, I am a member of ASHRAE, SPC161, of ASHRAE Aviation Subcommittee and an international member to the Technical Committee 9.3. I have followed all of the SPC161 meetings since 1996. I think you need to understand that ASHRAE is not taking action on this issue. You need to know too that the composition of the Standard Project Committee is under complete reconstruction as ASHRAE found that the committee was totally unbalanced. In fact, out of 16 members, basically two or three may have been representing the users and all the others were representing the industry. It is not the practice in ASHRAE to have such biased committees. So this committee will be totally restructured, starting in the next meeting in June. I simply cannot say what the new committee will decide. But the previous structure did not want to enter abnormal conditions and considered that hydraulic or engine oil leaks are abnormal conditions, so that is probably one of the reasons why they did not enter it.

Second, whereas they might address the NASA spacecraft maximum concentrations as a guideline to ASHRAE SPC161, I can tell you that the organophosphates are not part of the SMACs, and one can note it with interest, then note the comments of some of the ASHRAE members. Some were describing some of the symptoms that occurred after smoke/fume events. Some of them termed it exactly, 'This is criminal,' and this was the aviation industry who said so. Does it answer your question?

**CHAIR**—Thank you very much. Is there anything else that you think this committee would benefit from? We obviously have your written submissions which we have read carefully and that is a big help to the committee, but there may be other issues that you think we should take note of before we conclude our hearing.

**Dr Balouet**—Sure. Thank you. I think that the issue of pack burnout had not been really worked on by the committee. It is a procedure that some airlines—very few, but including Ansett and NJS—use to clean the eject centres after a contamination event. They practically had these pack burnouts daily, on a daily basis, until the pilots union realised that they did it while crew were present in the cabin and they immediately requested that these pack burnouts be stopped. I think this is a key element in the debate: the threshold limit value that you apply to one single compound. For example, if you have a carbon dioxide level at 2,000 parts per million, you would say, 'It's fine. It's safe.' But if you have other compounds that are hazards, then it is not safe.

One needs to realise what we call the summation principle in terms of toxicology. If you have one low toxic compound, plus one low toxic compound, plus one low toxic compound in a blend, the real toxicity of the blend is the summation of all the added low toxicities of each of these compounds. We have 500 different compounds, particularly in cabin air. Over 150 of them are documented for critical low toxic effects. If you have one of these low toxic compounds at 10 per cent only of its threshold limit value, 90 per cent below, plus another one compound at 90 per cent below, that is already 20 per cent for the blend. But if you have 150 per cent compounds at 10 per cent below their TLV you are 15 times over the TLV

**CHAIR**—All right.

**Dr Balouet**—I think it is a big point.

**CHAIR**—Thank you, Dr Balouet. We have been rejoined by the deputy chair, Senator Crane. Because he has not heard the evidence, he may not want to ask a question, but I will give him the chance.

**Senator CRANE**—Not at this point.

**CHAIR**—Dr Balouet, could you email your opening statement to us, so that we are absolutely sure we have it accurately.

**Dr Balouet**—Sure. I will also forward to you a more recent bibliography on this.

**CHAIR**—Good. We thank you very much for your evidence. It will be very valuable to us in trying to assess some of these issues. The toxicity issue particularly, which you are an expert in, is one we have had to pursue at great length because it is a very new science over here in Australia and we seem to get conflicting evidence from the people we talk to.

**Dr Balouet**—I can see that.

**CHAIR**—Your evidence will add greatly to the committee's knowledge of the subject. I thank you again and we certainly will let you have a copy of the transcript of this particular hearing so that you can check it.

**Dr Balouet**—Please feel free to contact me for whatever questions you might have at the committee level and I will be pleased to reply to you. I would like to thank you, too. But do not forget that international bodies like world health organisations, environmental protection agencies, the United Nations Environment Program, around the world, work on reducing these toxic risks because they know that they are there and they know that they are a serious threat, according to the compound. I will forward you some documents on that. Thank you, Senator.

**CHAIR**—Thank you very much again. We will certainly stay in touch.

[8.42 p.m.]

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

**TOLLER, Mr Mick, Director of Aviation Safety, Civil Aviation Safety Authority**

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

**CHAIR**—I welcome the representatives of the Civil Aviation Safety Authority. Thank you very much for coming once again. We are grateful for the time that you make yourselves available to this committee because we know your time is very valuable but your evidence is also very valuable to us. Do you have any comments you want to make particularly on some of the previous hearings or evidence before we move into some questions?

**Mr Toller**—No, I do not think we have any further comments we wish to make, Senator. We are very happy to answer your questions as best we can.

**Senator O'BRIEN**—I am interested to know if you have any comments on Dr Balouet's suggestion that, indeed, cabin air contamination poses risks in the circumstances that he described, particularly where there were disorientating effects on cabin crew pilots and he cited a couple of your regulations. Has CASA looked at those regulations in the context of this inquiry?

**Mr Toller**—Yes, we have, Senator. At this stage I think it is safe to say that the evidence you are getting is weighed in the balance, shall we say. For every opinion in one direction there seems to be an opinion in the opposite direction. Therefore, I do not think there is anything that has stood out to us within the evidence to date as calling for an urgent change to any Australian regulations, bearing in mind that our regulations are very much tied to international regulations. As far as the professor's statement is concerned, in many ways he summed up what we all recognise as the situation. I was sitting there and thinking that, to a certain extent, this is almost like dealing with our other friend with the avgas contamination. There are bits there that are really unknown, that are certainly way outside our normal expertise; nonetheless, they have to be taken into consideration.

There is no doubt that all aircraft from time to time suffer fumes within the aircraft. I think we have accurately reflected that that is a feature of the basic design of airconditioning systems in aircraft, being bleed air from engines, and that on occasions engines leak. I think it is safe to say, by reputation, that the 146 engines historically have not been the best of the engines for that. They certainly do seem to suffer more oil leaks than others. We have a number of incidents on our books and certainly on the ATSB books as well which would appear to be attributable to faults within engines that can be easily detected.

There is also this other issue: are there the longer-term toxicity issues as a result of, as the professor says, the addition of the various minor toxic elements which in themselves would not cause a problem. The simple answer there is that at our level we do not know. We suggested to you last time that, to a certain extent—I think this is still true—this is an occupational health and safety issue. We are an aviation safety regulator. That is not meant to show in any way that we are not tracking the situation, aware of the situation, or concerned about the situation. But it is well outside the standard expertise of the aviation regulator who is concerned about what are, effectively, the short-term to medium-term effects on aviation safety.

**Senator O'BRIEN**—I am interested in the comment in Dr Balouet's written submission. I am not sure if you have read it. He quotes the Executive Director of the Aerospace Medical Association, Dr Ross Raymon, investigating 89 US Air Force incidents and he says that he states:

Smoke fumes in the cockpit are not a rare event and is a clear threat to flying safety because of acute toxic effects. If smoke/fumes are detected, crew members should immediately follow established emergency procedures.

Does CASA play any role in ensuring that such emergency or safety procedures are in place for airlines operating aircraft in Australia?

**Mr Toller**—We are responsible for certainly looking after the operations manual of the aircraft. That will have all the emergency procedures for how crews deal with smoke and fumes in the cockpit. They tend to be fairly standard throughout all types. Generally the first action is to put oxygen on. That is obviously a pretty wise one and we are very comfortable with that as a first action. To try and correlate the USAF statistics which I have not yet seen, you may be dealing with a slightly different situation from the standard civil airline type situation. I do not know. To say that it is not a rarity is getting into the semantics of what is a rarity and what is not a rarity. It is not, I would say, a common occurrence.

We look at statistics now from Ansett of one occurrence of fumes of some description in about 160 flights. But that, again, has to be looked at in the context of Ansett's productivity in trying to get statistics on this. They are actually going out and proactively trying to find reports on any signs of fumes or smoke. It is interesting to us that on a first analysis the level of incidents in Ansett seems to have decreased significantly, to the extent that with their modified aircraft I do not believe we have had a single result yet of an incident that is attributable to smoke or fumes in an Ansett modified aircraft.

**Senator O'BRIEN**—I think that may well be true. The evidence before this committee is that there have been reports of cabin fumes—whatever that means—on a number of occasions. I am wondering what event would cause CASA to reassess its current position in relation to this issue of smoke fumes or oil fumes or just fumes—however they are properly described—in the cabin?

**Mr Toller**—If we saw a higher level of incidents than we are seeing at the moment of the visible type fumes—these are the first category of our problems; attributable to leaking oil seals and things like that; easily diagnosed and quickly diagnosed—if we saw a rise in the incidence of that, it is an issue of a significant problem with the engine and it is treated as something that would have to be looked at very closely and probably action taken in terms of the reliability of that particular engine. The more complex one is this higher level issue of the fumes which can-



not be attributed to something simple. It is not when you switch off the air bleed from this engine or when you switch off that particular pack, then you have solved the problem. It is the more general one of people genuinely saying that they have felt ill over a period of time, with no apparent cause. If you have no apparent cause, it is obviously very difficult to take action.

**Senator O'BRIEN**—The evidence which this committee has heard—and I am sure you have—of the partial incapacitation of pilots on a BAe flight in one of the Scandinavian countries late last year. Has CASA endeavoured to get full details of the event and discover to what that might have been attributable?

**Mr Toller**—Yes, we have. I think also the ATSB have and it may be a question that is better directed to them, Senator.

**Senator O'BRIEN**—They would not report to you, so presumably you have taken advice on the relevance of that circumstance to Australian circumstances, have you?

**Mr Toller**—The advice that we had on that particular event, on I believe it was 17 November last year in Scandinavia, was that it was attributable to a specific engine fault. We understand that the Scandinavian authorities are still doing some tests on that aircraft, even some four or five months later, and the results of those tests, as I understand it, are not yet available.

**Senator FORSHAW**—Do you mean on that particular aircraft?

**Mr Toller**—On that particular aircraft, yes.

**CHAIR**—I have one question for the moment. I hear very clearly what you say and that is the evidence you have given us before—that really CASA is a safety authority and that occupational health is not really part of your portfolio. I am aware that the flight attendants union and the various airlines have occupational health and safety committees, but is there any overall body which deals with occupational health in terms of the aviation industry that would be more appropriate to ask?

**Mr Toller**—The problem we run into is, we believe, that that is a state issue rather than a federal issue. That makes it particularly difficult.

**CHAIR**—It has made it difficult for this committee because certainly the health issues have been admitted by British Aerospace and most of the authorities we have spoken to. But, again, there is no-one at a federal level who collects the information that may have alerted somebody earlier than this. While the safety issues may be containable, perhaps the health issues are more significant than has been recognised. Part of the reason for that is there is nobody collecting from all the different groups and bringing together in one place all the information about health.

**Mr Toller**—Yes, I agree totally. It is a problem.

**CHAIR**—Yes, it has been for us.

**Senator CRANE**—Have you had any information at all, or is it your responsibility, with regard to the programs of modification that Ansett and National Jet have got, as to where they are at, on their timetable and when they are likely to complete their program of modification? First of all, is that an issue that CASA would deal with?

**Mr Toller**—Yes, it is, Senator.

**Senator CRANE**—Secondly, what information do you have that would be useful for the committee, or that you can give to the committee? We will decide if it is useful.

**Mr Toller**—Ansett are clearly significantly further along the road than National Jet. I think that is a fairly safe statement. Ansett now have 12 aircraft in their fleet. I think they had 13 probably when they appeared before you, but they are now down to 12. All of those aircraft have had their APUs modified. I understand that, of the 60 engines that they have, one engine still has all the modifications outstanding so there has not been anything done to it. One has two of the modifications outstanding; four just have one outstanding. So of the 60 engines, 53 have been fully modified and, of the aircraft modifications, eight have been completed or, for various reasons, do not require modification because they were built later. The remaining four are due to be modified by the end of October 2000. So Ansett are well along the way.

National Jet Systems have a total of 21 aircraft. I think they probably had 20 before. Where Ansett have gone down, National Jet have gone up one. Only four of those aircraft have been modified for the aircraft modifications. However, our information on the engine modifications is that they only have four engines that remain to be modified. I think there is only one APU in National Jet that is outstanding. That is the latest information that we have been given. National Jet are talking about the aircraft modification being complete by mid-2001, so they appear to be about nine months behind Ansett on the completion of modification.

**Senator CRANE**—Do you have any power or authority by which you could hasten that program?

**Mr Toller**—We could. You would have to reflect on the amount of work that needs to be done. It could be done faster. It would mean grounding aircraft and there would be significant disruptions. But overall we certainly have the power to do that, yes.

**Senator CRANE**—You have not technically the authority to deal with that.

**Mr Toller**—We do. We would have to declare that the aircraft was unsafe. That in itself, of course, is a major step.

**Senator CRANE**—But in terms of that, you could have, I guess, a technical modification program and end at a certain date. Having had the evidence and statements that we have had before us, there certainly appears to be a pretty sound case that there have been some problems created for some people in terms of the older aircraft. That is the indication coming through on those that have been modified. In fact, the Air Pilots Association and others have said that while it has not gone away completely it has certainly significantly improved. At least the perception in terms of responsibility would be that you must get on with the job and get it done, otherwise

legally the ramifications, after having this knowledge, would appear to me to be more severe than what they were before you had that knowledge. Wouldn't the responsibility be back on CASA to do everything in your power to hasten the program?

**Mr Toller**—As you say, we would have to force it to be hastened.

**Senator CRANE**—Yes, I understand that. But isn't there some responsibility anyway?

**Mr Toller**—Certainly we have powers of persuasion which have varying degrees of success, as you know. Also the issue of publicity is a strong one; the story being out in the public arena—that it is taking a certain amount of time to do it— will put some pressure on.

**Senator CRANE**—Is there a test or some mechanism or monitor that could be put in the planes where CASA could, in fact, monitor toxin levels and identify that if they were? Have you done any work in this area in terms of any monitoring?

**Mr Villiers**—There is equipment that could do that, Senator. It has in fact been used by ASHRAE in some of their studies. I understand Ansett were using some of that equipment at one stage. We have not done that. It is something which was part of Ansett's study into what the problem was. The issue really is one of preventing oil leaks from the engines into the aircraft and that is what the engine modification program has done. It has replaced the No. 2 seals on the compressor end of the engines and that has had a major effect in reducing the incidence of seal failures and oil leaks into the airconditioning system.

**Senator CRANE**—My question is this: if this committee decides to think in terms of the modified planes which, certainly on the anecdotal information and evidence we have had and from what the Air Pilots Association said, are a significant improvement, and we say, 'Right, we think because of that we should have them monitored and we'll make a recommendation that it be monitored,' should that be CASA's responsibility? If not, who should take on that responsibility, bearing in mind I think it needs to be at arm's length or independent from the operators?

**Mr Villiers**—I would not see that as CASA's responsibility, Senator. I would have thought that was something which was an occupational health and safety matter which would better rest with the authorities charged with those issues. They are, unfortunately, mostly state based and that is complicated, as you know, by the itinerant nature of the industry. Aircraft take off from one state and land in another and you end up with all the problems—

**Senator CRANE**—It is pretty damned obvious that would not work—or would it? When you go across a border or something, you go into different jurisdictions and what have you. Is there anyone at all federally, other than CASA, who has a general responsibility in terms of air safety?

**Mr Villiers**—The only other national authority would be ATSB, Senator.

**Senator CRANE**—We have had a recommendation from the Air Pilots Association and a couple of others that, in fact, we should recommend the appointment of an independent expert

panel to cover this role. What would be your reaction to that and how would we find these independent experts?

**Mr Toller**—Would you like me to find a professor out of the hat again?

**Senator CRANE**—Can we pluck them off a tree?

**Mr Toller**—I could not answer you on that one, Senator, with the exception luckily of our previous professor in the other field. Undoubtedly, I am sure they do exist. When my colleague says he does not see it as a role for CASA, we can certainly collect information. The problem is that we do not have the expertise and, again, we are back to something similar to the EDA issue. We just do not have that sort of expertise within the authority and would not expect to have that sort of expertise within the authority, to actually understand the ramifications of the information that we are collecting. I would have thought some form of independent body or an independent professor would be a better way to go.

**Senator CRANE**—So in principle you do not have a problem with that approach?

**Mr Toller**—We certainly do not have a problem in principle, no. In fact, I would support it. We all want to get to the bottom of this. There is no deliberate buck-passing here. It is just a matter of trying to find the people who have the right expertise to understand what the issues are.

**Senator CRANE**—Do you know how expensive it is to put the monitoring equipment in a plane?

**Mr Villiers**—I could not tell you how expensive the equipment is, Senator, but I would not expect it to be a great cost to install the equipment. I would have thought it would be fairly portable and it could probably be installed fairly easily. There would not need to be a major aircraft modification in order to install it. It would be simply a matter of securing it and providing whatever power was necessary.

**Senator CRANE**—Thank you.

**Senator FORSHAW**—I would like to clarify a couple of things in your written submission. At page 2, the first paragraph, there is a reference to the review for the monitoring of the aircraft by an independent survey by Industrial Hygiene and Environmental Service of New South Wales:

A team of Australian medical experts has reviewed the test methods and results and has declared that there is no contaminant present in the cabin environment.

Then in the second paragraph you say:

The air quality of so-called smelly aircraft has been carefully analysed and the results were found to be no different chemically from the other aircraft types being sampled at the time. A review of cabin air circulation and air flow rates within the BAe146 cabin—

Are you talking about the same studies in the first paragraph? I was confused as to which specific study you were referring to when you referred to the BAe146.

**Mr Villiers**—The second study is based on the information obtained from the studies conducted by Ansett.

**Senator FORSHAW**—That was going to be my next question. It was the studies done by the airline. On page 3 you state:

The cabin environment in the BAe146 aircraft is as chemically clean, if not cleaner, than other transport aircraft in service today.

That is similar to what you say in the third paragraph on page 2:

The passenger configuration in the aircraft met the latest standards for conditioned air quality.

Coming back to this statement on page 3 'compared to other transport aircraft in service today', what is that based upon?

**Mr Villiers**—Again, it is the Ansett study, because Ansett looked not only at 146s; they also did some investigations of air quality in other aircraft to be able to compare across. The information we have is—

**Senator FORSHAW**—We can ask Ansett or go back to their evidence. It has been a while since they appeared. Which aircraft were they talking about there?

**Mr Villiers**—I could not say exactly what they would be, Senator.

**Senator FORSHAW**—Would they be their own?

**Mr Villiers**—They would be their own aircraft, yes.

**Senator FORSHAW**—Okay. So all of these comments and your conclusion that (1) they meet the higher standards set today and (2) they are as good as they can be, and maybe better than some of the others or all of the others, are based upon the results of the survey done by Ansett, are they, or the work done by them?

**Mr Villiers**—Yes. The aircraft have also been certificated around the world. Each country that certifies the aircraft checks it against some, if not all, of the standards which the aircraft has to meet. I am not aware of any country that has found a difficulty with cabin air quality in these aircraft in a certification sense.

**Senator FORSHAW**—When was the last time that CASA looked at that overseas data with respect to certification of this aircraft?

**Mr Villiers**—Once the aircraft is certificated in the country of origin, if it is one of the countries we accept—and that is where these aircraft would have come from—we would accept the

aircraft, on the basis that it had been certificated by the country of manufacture, without going into issues such as this in any great depth. Not every country does that. For instance, the United States does not do that.

**Senator FORSHAW**—You have said on page 2 that you have reviewed the certification of the BAe146.

**Mr Villiers**—Yes. We went back and looked at the reports which are produced as part of the top certification process to satisfy ourselves that those reports have actually been produced, that they did check the requirements of the standards and that they showed satisfactory compliance with those standards. Yes, we did that.

**Senator FORSHAW**—Are you aware of any instances in other countries where there has been a similar review undertaken by the appropriate regulatory body, such as CASA, for this same issue—in other words, they have had to review it because of complaints?

**Mr Villiers**—I am not aware of it having been done for this issue, Senator. I am aware that on occasion other authorities have done as we have done in this case and, if they have a doubt about a particular aspect of a design, they certainly go back and check that aspect. But I am not aware personally of any other authority checking an aircraft design for this particular problem.

**Mr Toller**—It is worth saying that when we were investigating it we were doing it through the UK Civil Aviation Authority. They were not divorced from or ignorant of the situation. They were fully aware of what our concerns were.

**Senator FORSHAW**—I was going to ask you whether or not there were other countries—if I can use the word; I am not sure if it is the correct way to describe it—relying upon or awaiting the outcome of what you were doing here. But that certainly appears to be the case. I presume that, given it was essentially a British company—if I can say that—we know they had an involvement in that respect.

**Mr Villiers**—Yes. The certifying country is the UK.

**Senator FORSHAW**—Yes.

**Mr Villiers**—So the authority that is responsible for the certification of that aircraft is the UK CAA. Therefore, if we have queries about the certification process or any details about the certification that we have acquired, we do it through the CAA and that is what we did.

**Senator FORSHAW**—There has been a lot of discussion in this committee about oil leaks and leaking seals. I think it has been fairly well acknowledged that that has been a problem, albeit more prevalent in the past than it may be today—I do not know, but certainly it has been acknowledged. If I can put it this way—it may be a bit too general. How serious is an oil leak in an aircraft?

**Mr Toller**—That is a broad question.

**Senator FORSHAW**—Let me add this. We know, for instance, that there are log reports that say, 'It'll be fixed up in the next routine maintenance.' It appears from evidence from a variety of sources that this has happened quite a lot in the past. Is it like my old Holden that used to leak oil all the time but I could still drive it and, except for the few spots of oil on the concrete and the garage, it was not something that radically affected the safety or the operation of the vehicle? Or are we talking about something that could be potentially very serious?

**Mr Toller**—I will not give you the full technical answer, obviously, but it might be of interest that on an E340 aircraft, say flying from Hong Kong to Europe—you are talking about a 14-hour flight—you would expect to burn anything up to two-thirds of the total oil in the tank at departure. So aircraft actually burn a lot of oil. It is quite normal for you to come in and put two or three quarts of oil in the engine after every sector.

**Senator FORSHAW**—Yes, but burning oil is not the same as leaks, is it?

**Mr Toller**—It is not quite the same as leaking, no. The problem with leaking is when the seals let the oil into the part of the engine that it is not normally in. That is when you have a potential problem, particularly in certain engine designs. We obviously have an example here with the No. 2 seal on the 146 engine, where it then can be ingested into the air bleed. Generally, that is when it becomes smelly. It is not the same smell, but it is almost like driving behind your Holden.

**Senator FORSHAW**—Yes. I understand that aspect of it, but I am trying to clarify this: it seems from what I am hearing here that it is not uncommon for an aircraft engine of this type, as a regular part of its maintenance requirements, to have to deal with oil leaks.

**Mr Villiers**—Certainly with an aircraft like the 146, which already has a rather poor name for No. 2 oil seal leaks, it is a normal part of maintenance to check that seal. It is not a particularly difficult job, I understand. You can get in there with a bore scope fairly easily to check the seal surrounds and, if it is wet, then that is an obvious sign that there is a leak there and something needs to be done about it. Most aircraft will use oil, as Mr Toller has already said. It is not unusual for an aircraft to use quite a lot of oil by perhaps automotive standards in flight. No seal is perfect, but there are a number of seals around the aircraft that have quite critical application and those are very highly maintained, they are very highly specified and maintenance and design is concentrated on keeping those seal integrities very high.

There are a number of places around the aircraft where you can expect to find oil leaking, dripping, and in some designs no oil is a bad sign; if the thing is not leaking, it is an indication that it might be empty. But in general, particularly in those critical paths, we endeavour to keep all the oil inside the engine where it is supposed to be. We particularly do not want oil in the gas path where it is going to end up inside the aircraft.

**Senator FORSHAW**—Can a faulty seal cause an oil leak? Can it cause a fire, or is that not possible?

**Mr Villiers**—It is possible but remote. The more likely case would be exhaustion of the engine oil, which would be indicated by the sensors mounted on the engine indicating in the cockpit, and the result would be that the engine would be shut down.

**Senator EGGLESTON**—I have taken an interest in this inquiry from a distance because I am a consumer of BAe146 services to the North-West of WA. I was looking through the Canadian report on the symptoms that people have reported as a result of these leaks and I noticed there was a Swedish incident where the pilots were both incapacitated and were only able to land the aircraft when they used oxygen to recover from the symptoms which they were suffering. I was a little bit concerned that you said the schedule for the National Jet fleet to make changes to their aircraft to prevent these leaks was given a time limit of mid-2001. It is said that this is an industrial health issue, rather than a safety issue, but although I suppose the Swedish experience is unusual in terms of the impact on the pilots, looking at the Canadian list of symptoms, it would still be a matter of great concern surely if another incident like the Swedish one occurred in Australia, especially in remote areas where there might not be the ability to land an aircraft or to get help if it was necessary.

It does seem to me that perhaps it really is an air safety issue, in the sense that if a pilot became incapacitated there would be a danger of the aircraft and its passengers being in jeopardy. I wonder if that schedule with National Jet is really in the public interest, or should it be brought forward and should stronger measures be taken of the kind you have alluded to, to ensure that the safety of the people who fly with National Jet is protected.

**Mr Toller**—Yes, I think that is a valid point. Maybe I should clarify a little bit what I was saying earlier. The most critical part of the modifications is the engine modifications, because that is the source of the fumes. The aircraft modifications are all about improving the ventilation in the aircraft; it is renowned for poor design for ventilation, so a lot of changes were made to the ventilation system. But the critical one was the engine. National Jet have told us that they will complete their engine modifications by June this year. So while the final modification may not go out until June next year, the critically important ones will be finished by June this year.

**Senator EGGLESTON**—Obviously you feel that is quite adequate and there is no danger to public safety with that time frame, because otherwise you would not have agreed to it, one presumes?

**Mr Toller**—That is right, Senator. All things are a balance, as we know, in terms of how big a threat they are to safety, how much work is required, how long does the aircraft have to be down, do you have to ground the whole fleet—all those sorts of things. There is a lot of work to be done. When you look at both National Jet and Ansett, we are talking about over 100 engines. In fact, the program has been a fairly expeditious one and I do not think it would be unreasonable to say that both companies are taking it very seriously.

**Senator EGGLESTON**—Is the Swedish incident the most serious incident that has occurred? I concede that I have not heard all the evidence at this inquiry and perhaps that has been addressed previously.



**Mr Toller**—I would say, although the Swedish incident happened on a 146, it could have happened on any aircraft. As we understand it, immediately after the incident the engine was changed and there was no recurrence. This is one of these classics where you get a problem but you can diagnose the fault and cure it immediately. I would not say those happen on a daily basis in aviation throughout the world, but they are certainly not uncommon incidents where you have that sort of an issue. As I say, as long as you can find the result—it could prove to be a one-off; this is not something that is going to happen on a daily basis—then arguably it is part of what aviation is all about.

**Senator EGGLESTON**—Is there a view that these sorts of leaks might have contributed to unexplained air crashes?

**Mr Toller**—I do not think I can comment on that, Senator. There is so much surmising in that. I do not honestly think I can say.

**CHAIR**—It has been surmised, but there is no proof.

**Senator EGGLESTON**—Thank you.

**Senator CRANE**—Mr Toller, I want to refer to this submission by Dr Balouet, who was on the box previously to us. I will read out the point he makes here:

*I have records of over 100 crew with long-term incapacitation following documented aviation leak exposure events and have regular contacts and have met with over 15 of them. They all share the cluster of symptoms described above.*

The sort of information that I believe has come through this inquiry is that it has basically been an Australian problem and, until I think the Swedish one reared its ugly head to us, we have not had much information, if any—and I have not attended all the hearings, but certainly very little from what I have read—on the fact that it is outside the shores of Australia. That would indicate to me that he is just one doctor making this particular comment. He also says it occurs in no more than, I think, three per cent or thereabouts of cases of flying. He says:

*They represent less than three per cent of world flights—*

and he goes through a number of aircraft. I do not know whether you have this report, but we will give you a copy and you may want to take this on notice to look at it a little bit further. He goes on and says:

*Ansett/NJS and BAe146's are traditionally the highest ranking for cabin air problems before Alaska—*

*I find that an interesting comment. Do you have any evidence, information or research—anything at all—that would indicate what has been happening overseas?*

**Mr Toller**—I will ask Mr Villiers to comment on that. We are certainly aware of problems that Alaskan Airlines have with their MD80s. I do not know if any other carriers are having the same problem with the MD80. That is the only significant similar occurrence that we are aware of on a volume basis, if you like, although all aircraft types from time to time will have incidents of this nature.

**Senator CRANE**—Yes, he makes that point here in the submission. Maybe we can get you a copy of this and ask you to have a look at it and examine it a little bit more thoroughly. It is really just one paragraph, with very scant information in terms of stating this, and you could let us know whether there is any information that we could get from elsewhere.

**CHAIR**—If you could take that on notice, please.

**Mr Toller**—We would like to read the submission and we will certainly take that on notice.

**CHAIR**—Thank you.

**Senator CRANE**—Thanks, Mr Chairman.

**CHAIR**—Thank you again for your evidence and your helpful answers. That question on notice will be useful also.

**Mr Toller**—Thank you, Senator.

[9.27 p.m.]

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

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

**CHAIR**—We welcome you again. We have certainly seen you before and valued your evidence. You have heard the formal introduction. Do you have any opening remarks to make?

**Ms Boughton**—No, thank you, Senator.

**CHAIR**—Thank you. I presume you will have read the evidence of Frank Colver in Brisbane, because he was the person in the incident report which you gave us, if you remember—a two- or three-page incident report. He is the pilot who could not land the aircraft in Melbourne. Since that incident, he has reported he has had another incident while flying which put him off work for a month, which included vomiting. Do you have any comment to make about that second incident? Have you been asked to investigate it? Have you any comment from the evidence he gave about that?

**Ms Boughton**—Senator, I will ask Mr Leyshon to comment specifically on the incident.

**Mr Leyshon**—From our last appearance before this committee until today's date, we have only been aware of three other incidents involving BAe146 fume occurrences in Australia. One of those was the catastrophic failure of the engine at Darwin and because of the mechanism of that failure it was inevitable that there would be fumes in the cockpit. So that was separate to what we were looking at. Two other occurrences have been reported to ATSB involving fumes in 146 aircraft. One of those was from Captain Frank Colver. We believe that occurred the week before last on a flight from Brisbane to Canberra and return. That incident has been investigated and the aircraft was not of a modified standard. The investigation as to the failure in the engine is still ongoing at this stage. But as to the specific incident where he has been off work for one month, which included vomiting, the ATSB has not had a report of that occurrence.

**CHAIR**—All right. We will look with interest for your report on the further incident you have just described.

**Senator FORSHAW**—There is a report that there were also other members of the crew that filed a report?

**Mr Leyshon**—Yes.

**Senator FORSHAW**—Including that report?

**Mr Leyshon**—Yes. We got a report from Captain Colver, a report from the first officer, a report from the flight attendant and a report from the operator.

**Senator FORSHAW**—And they were all—

**Mr Leyshon**—All for this.

**Senator FORSHAW**—That is what I wanted to ascertain.

**CHAIR**—Would you like to continue?

**Senator FORSHAW**—No. He just said Captain Colver and normally you would get the other members of the crew as well.

**Senator EGGLESTON**—I have questions of a similar nature to those you have been asked previously. Do you feel happy and satisfied that there is no significant risk to the flying public with the schedule of changes which are in place?

**Ms Boughton**—Senator, we can only go on the information that is provided to us. As Mr Leyshon has said, we are not receiving reports of incidents involving fumes in cabins from the BAe146s.

**Senator EGGLESTON**—So, in effect, you are satisfied that the program of modifications has significantly reduced the problem?

**Ms Boughton**—We have no reason to doubt that at this point in time.

**Mr Leyshon**—I might add that that formed part of our recommendation to the Civil Aviation Safety Authority and we have been working with them to look at the identified modifications and how they are improving. We have been feeding back to them any reports that we get. They are continuing to monitor it and it is the same as any recommendation we would issue: we would not just accept the word. We would continue our own internal monitoring program, after any modifications were suggested from any recommendation, to ensure that what was said was being done was addressing the problems.

**Senator EGGLESTON**—I have been told that these seals deteriorate due to climatic conditions in Australia; the dryness and harshness of the Australian climate perhaps affects the seals. What regularity of checking of the seals, the change to seals and modifications is in place? Is that something you can tell us?

**Mr Leyshon**—I would not know specific details. However, in our discussions with National Jet, they have indicated they have gone from an inspection program to a replacement program. So rather than inspect the seal for failure, it is a replacement program now.

**Senator EGGLESTON**—How often are they being replaced. Do you know?

**Mr Leyshon**—I would not know. You would have to address that to an airworthiness person or an engineer to look up the schedule.

**Senator EGGLESTON**—But you will be monitoring that replacement program. Is that what you are saying?

**Mr Leyshon**—We are not monitoring the replacement program. We are monitoring occurrences and, where an occurrence is reported, we then investigate to determine (1) the modification status and (2) whether it was a seal or whether it is something different. We would then provide this information to CASA and then together look at whether the modification program is addressing this problem or is something new occurring.

**Senator EGGLESTON**—What is the mechanism to require a time limit on the life of a seal before replacement? Is that an air service order, or whatever it is called?

**Mr Leyshon**—My understanding is that it would be called up—

**Senator EGGLESTON**—For the aircraft type.

**Mr Leyshon**—Yes. For each aircraft type it would be different. For each engine it would be different and, I believe, the requirements are called up in the maintenance schedule for the aircraft, which is designed by the manufacturer.

**Senator EGGLESTON**—Is it possible for an Australian regulatory body, though, to impose a schedule of specific time before a seal should be replaced within a safety margin?

**Mr Leyshon**—I think that is a question that would be more appropriately addressed to CASA. We are an investigation body; we are not a regulatory body.

**Senator EGGLESTON**—Thank you.

**Senator O'BRIEN**—In your last answer, Mr Leyshon—Ms Boughton, you may want to come in on this one—you talk about being a body to investigate incidents. I take it you mean particular incidents.

**Mr Leyshon**—We investigate any occurrence involving air safety that is reported to us. We have a notification system that makes us aware of these and then we investigate from that.

**Senator O'BRIEN**—If there is a suggestion that there is an endemic fault with a particular aircraft, you could only deal with that arising from a particular incident?

**Mr Leyshon**—Yes, we could.

**Senator O'BRIEN**—Does your charter enable you to investigate more widely if there is a suggestion that there are a number of incidents which might have the effect of compromising aviation safety?

**Mr Leyshon**—If we had one incident reported, we would investigate that incident to start. If, in the process of that investigation, additional facts came to light that this may be in another aircraft or it may be across a number of aircraft, at that stage in the investigation we would look at it. But if we did not come across it and no-one made us aware of it, it is very difficult to go through the records of some 20-odd aircraft.

**Senator O'BRIEN**—Obviously, if no-one made you aware of it, you would not be pursuing that line of inquiry. We have heard some evidence this evening from Dr Balouet about problems of air contamination in cabins of certain aircraft, including the BAe146, to be regular and that there was in Dr Balouet's opinion a question which arose as to whether there was actually an effect, certainly on the occupational health and safety of the cabin crew of the aircraft, but potentially effects which would compromise the pilots' ability to fly them. Would that be the sort of information which would justify ATSB conducting a more thorough inquiry into that aircraft?

**Mr Leyshon**—If we were made aware of it, yes, we would conduct a more thorough inquiry. But the only incapacitation event that we have been made aware of is Captain Colver's event in July 1997. That is the only incapacitation that we have—

**Senator O'BRIEN**—In Australia.

**Mr Leyshon**—In Australia. We are aware of the Swedish event. We are in touch with the Accident Investigation Board of Sweden and CASA are in touch with the regulatory authority Luftfartsverket and together we are sharing information on this particular incident because there appears to be a void out there. It is still under investigation and I believe there was a test flight conducted last weekend. We will not have any information on that yet because of the time change and the reporting on that particular test flight. But if it is an incapacitation, it is one of the things we treat very seriously. It is a removal of the safety net and, if that occurs, then you only have a certain number of defences. If you have a two-crew aircraft and you incapacitate one crew member, you only have one layer of safety defence remaining.

**Senator O'BRIEN**—I do not want to traverse material which is not relevant to this inquiry, but we have had a lot of evidence about oil leaks causing some sort of cabin air contamination in a variety of aircraft. It seems the only aircraft that ATSB have had its attention drawn to has been the BAe146. Is that correct?

**Mr Leyshon**—No, Senator, that is not correct. In additional information that we supplied to this committee last November, there is a table and a print-out of all occurrences involving cabin air contamination, for want of a general term, involving some 20-odd different turboprop aircraft and jet aircraft operated in Australia. We have not particularly focused on just the 146.

**Senator O'BRIEN**—But the 146 is the only aircraft where there has been some question of pilot incapacitation. Is that correct?

**Mr Leyshon**—Yes. There is only one recorded occurrence and that was in a 146.

**Senator O'BRIEN**—Is incapacitation of other aircraft crew—flight attendants, for example—an issue in aviation safety?

**Mr Leyshon**—I believe it is. The crew are not there simply to direct passengers to seats and to serve meals. They serve an important safety function throughout the flight, even a normal flight. Removing those removes a layer of safety to the passengers in the cabin.

**Senator O'BRIEN**—Presumably the ATSB and its predecessor had reports of at least incapacitation of cabin crew, other than pilots.

**Mr Leyshon**—Not specifically cabin crew. We have had lots of anecdotal evidence. We investigated the occurrence of Captain Colver in 1997, but to have it put down on paper and submitted as an incident report, we have no other crew member incapacitation reports at all.

**Senator O'BRIEN**—No such reports have been submitted to you?

**Mr Leyshon**—No such reports.

**Senator O'BRIEN**—Who could submit such a report?

**Mr Leyshon**—Under the legislation, the owner of the aircraft, the operator of the aircraft, the crew of the aircraft—anyone who becomes aware of a problem. There are quite a number of people.

**Senator O'BRIEN**—Presumably, if you had received a number of such claims, ATSB or its predecessor would have conducted a thorough investigation of the aircraft and the problem?

**Mr Leyshon**—If we had received them, yes. Anything we have received has been hearsay and anecdotal. No-one appears to be putting it down on paper and reporting it as an occurrence.

**Senator O'BRIEN**—Are you aware that Ansett has a reporting system for cabin fume incidents?

**Mr Leyshon**—Yes, we are aware of that.

**Senator O'BRIEN**—Does the bureau have access to that information?

**Mr Leyshon**—If it is a reportable occurrence then, yes, it will be reported. But, internally, if it does not generate a safety of flight issue, then they are not obliged to report that information to us.

**Senator O'BRIEN**—No. The question I asked was does ATSB have access to that as a matter of course?

**Mr Leyshon**—Not as a matter of course, no.

**Senator O'BRIEN**—Have you asked for access to it?

**Mr Leyshon**—We have asked for access in the past for specific occurrences that we were made aware of as a result of other investigations pertaining to a particular aircraft and that was made available, but not to go in and say, 'We would like all of your reported occurrences.' We have not done that.

**Senator O'BRIEN**—Thank you, Mr Chairman.

**Senator FORSHAW**—I would like to follow that up. Why haven't you done that? Is it because of the nature of your charter, which is investigating incidents or reports that have come to you, or is it because you did not feel there was a need to pursue an update from Ansett or from any of the companies about what was happening, if an incident was happening?

**Mr Leyshon**—Our charter is pure and simple safe aviation. If an occurrence generates an event where the safety of an aircraft is jeopardised, we will most certainly become involved, and very quickly. However, when we looked at all the information presented in the investigation of the occurrence, it became clear there were two distinct issues. One was the immediate safety of flight, where you jeopardise crew—and I use 'crew' in the general term of cabin and cockpit crew—and then there were the longer-term exposure problems in the workplace. As has been said, this is a problem everyone now acknowledges. There is a long-term occupational problem. The lack of overriding legislation from a federal perspective is a problem, but it can be addressed. All crew members on an aircraft are employed in a state somewhere; therefore, they are covered by that state's occupational health and safety legislation.

The trouble is the states have their own occupational health and safety legislation, so there is no common thread between them. That is where we said, 'Okay, we don't have the expertise. OH&S is not our charter. There is OH&S legislation. That is more appropriately addressed by those people,' and our report touched on that.

**Senator FORSHAW**—You have been following this inquiry and there has been evidence put to us on the public record that there have been allegedly some instances where crews say they have been affected—representatives of the crew—and they have reported that to the airlines, noted it in these reports or whatever. Having been made aware of those situations, do you think that any of what you have heard to date would warrant your bureau pursuing or seeking some further information on these reports?

**Ms Boughton**—Senator, I go back to a comment that Mr Leyshon has made. What you are talking about now is coming within the occupational health and safety arena in terms of the potential solutions.

**Senator FORSHAW**—No, sorry, I will have to stop you there. I am trying to recall precisely, but I think there was certainly some evidence put on the record to the effect that there were a couple of instances where members of a crew felt that they were overcome, incapacitated or had difficulty in performing their duties. That is distinct from an issue—

**Ms Boughton**—The issue that we are addressing is: at what point in time does a person become incapacitated to such an extent that it impacts on their duties and it becomes a safety of flight issue? We cannot make that judgment. It is only the crew who are there at a particular



point in time who are making that judgment against the training that they have received to recognise when they become incapacitated. The issue then becomes for us, if they have not considered it sufficiently important to report it to us, is it really a safety of flight issue. We cannot make those judgments.

**Senator FORSHAW**—Yes. But what we are looking at here is—and I think the line of questioning from Senator O'Brien was—where there may have been a report given to the company—in this case Ansett because they have set up this reporting system—and where air crew have put in an application for leave for illness which they allege or feel has been as a result of circumstances. We are told that has occurred and that report has been given to the company under the set-up that they have arranged. What you were being asked earlier was whether or not you sought to access that information to then consider whether or not you needed to have a look at this on a—

**Ms Boughton**—I know you have—

**Senator FORSHAW**—Let me finish.

**Ms Boughton**—Sorry.

**Senator FORSHAW**—What I am then asking you is— because this has been put to us and you have said there has been anecdotal evidence put to you—whether or not, as a result of everything you have heard or read through this inquiry, you would maybe now seek to want to inquire further, or are you still satisfied that the action you have taken to date is appropriate?

**Ms Boughton**—Senator, I would comment in relation to the legislation which says that there is a responsibility on the operator to report to us any occurrence which is considered to have an impact on safety of flight.

**Senator FORSHAW**—Yes. That is what you said earlier, Ms Boughton.

**Ms Boughton**—We can only go on their judgment. The operator has made the judgment that this was not of sufficient importance to report to us.

**Senator FORSHAW**—Yes, but earlier on Mr Leyshon said that if in the course of an inquiry into a specific incident, such as that which has been referred to, the bureau became aware, they may need to look at things further. That is the context in which I am asking the questions—in other words, if the bureau is made aware that there are reports to a company.

**Mr Leyshon**—The obligation under the act also extends to the crew member. If the crew member believes that the report submitted to the company may not have been forwarded on, the obligation is still on them to use an appropriate forum outside the company to report it to us. If they are worried about confidentiality, we have the confidential aviation incident reporting system where confidentiality can be maintained.

**Senator FORSHAW**—But I take it in any event that the bureau is still content with the situation as it is. In terms of the public evidence that we have heard, that you have had access to,

it has not raised with the bureau an extremely serious issue which you would now wish to be proactive and have a look at, rather than just rely upon your statutory duty, which is to investigate specific incidents that are reported to you?

**Ms Boughton**—Senator, if we go back to the investigation into Captain Colver's occurrence in 1997, there were two recommendations that came out of that, because we believed there was an issue that needed to be addressed.

**Senator FORSHAW**—Yes.

**Ms Boughton**—We have pursued those recommendations, in particular with CASA, and we have seen both the major airlines in Australia that have BAe146s adopt a program of addressing those concerns. From our perspective we had made recommendations. We were seeing that they were being operated upon. In terms of the incidents that were being reported to us, there weren't any. So from our perspective we were seeing that the action we had recommended was being taken and it appeared to be effective.

**Senator FORSHAW**—We are now getting to the point, I think, that I was raising earlier.

**Ms Boughton**—It is not that we would preclude undertaking analysis if we believe that there was a really serious issue out there that needed to be addressed.

**Senator FORSHAW**—Yes, fine. I put the final question on the table now. It is not something we have even discussed amongst the members of the committee and it may or may not be a recommendation, I do not know. If this committee was to have all the material that has been put to us and was to present it to ATSB and ask you to look at it, particularly with respect to the reports of incidents and so on on this issue, would that be within your charter to do so and to then report to the select committee or to government about whether or not this raised a particular issue about air safety? I come back to the terms of reference of this inquiry being in respect of air safety. I know that occupational health issues are important but, at least in the initial sense, this inquiry is about air safety, which is very much your domain. Would you be able to do that if we asked you to review these incidents?

**Ms Boughton**—Senator, it would not be impossible for us to do it. We do not have the expertise internally, in the same way as the committee here does not have the expertise amongst the members. We would have to go through exactly the same process that you have gone through, of going externally to try and find people who have the expertise to be able to do it. I am not sure whether we would, in fact, be repeating the exercise that you have currently undertaken.

**Senator FORSHAW**—Let me leave it there and we will consider what we can and we cannot do and what you can and maybe cannot do.

**Senator CRANE**—I want to go to the submission, first of all, by Dr Balouet and refer to exactly the same matters in paragraphs 5 and 6 of his submission. I will put this on notice to you. After what we have heard, I was certainly under the impression until just a little while ago that

this was basically an Australian problem. I will not quote from the same place, but I will quote something else, just to put it on the record, out of those two paragraphs 5 and 6:

It is estimated that 70 major smoke haze events, no fire but cabin air contamination by aircraft fluid leaks, occurs world-wide annually, with 25 to 30 for the commercial aviation in the US, and that the number of severe fume events is over 500 annually, 40,000 passengers and crew. Alaska Airlines has filed over 1,000 complaints in the past 10 years.

From this sort of information, it seems to me that it is possibly a lot more widespread than I understood it to be, or maybe this goes into a broader concept. I do not know in terms of that. But could I ask you to have a look at those two paragraphs in particular, and what is claimed there, and see whether or not you have any information at all in your records and respond to the committee at an appropriate time.

**CHAIR**—Can you take it on notice?

**Ms Boughton**—Yes, Senator.

**Senator CRANE**—The other question I wish to ask you—and if it was asked when I was out, Mr Chairman, please tell me and I will read the record—relates to the planes that have been modified. Do you have any information at all to give the committee on what has been done? Have you done any testing with regard to fumes in the plane or whether the incidents for X number of hours flown, or whatever, has decreased as a result of that? I am led to believe from the information given to me that in fact it has. But do you have any hard evidence or have you collected any information that would give us some guide to what has occurred with the modifications?

**Ms Boughton**—We have not done any testing ourselves, Senator.

**Senator CRANE**—What information do you have?

**Mr Leyshon**—The information we have is that the Ansett program is all but complete, bar a few small modifications to make the fleet complete. We have not had a report of occurrence from Ansett in the last three months. So on the basis of reported occurrences and talking to CASA and looking at our recommendation, we are monitoring that. Should there be an occurrence with Ansett, we will most certainly be interested in it. But it appears on the basis of reported occurrences that the Ansett modification program is working. With the other operator, who is National Jet, we had two occurrences the week before last. One of the first questions we ask is, 'What is the modification status of the aircraft?' Both of those aircraft are not of the modification status as yet. One will be at the end of this month and one will be in May.

**Senator CRANE**—If you went back to the corresponding three months last year—and you might have to take this on notice as well—what would be the status report at that particular time?

**Mr Leyshon**—We might have to take that on notice, Senator.

**Senator CRANE**—Let me ask you then for the corresponding three months last year and also two years ago—if you have that information—because that will give us a good clue as to what is happening. Thank you, Mr Chairman.

**Ms Boughton**—Senator, you are specifically looking at cabin fumes in BAe146s in terms of those periods?

**Senator CRANE**—Yes, the reports of incidents.

**Ms Boughton**—Yes.

**Senator CRANE**—I guess you have them in categories: if somebody has lodged a complaint because they have smelt something, if somebody has lodged a complaint because they were sick. There are different reports that are coming before us, and obviously when you fly around in aircraft, as I have been since I have been on this committee, this is why I have been asking questions. It is quite obvious from the answers that it affects different people in different ways—some people not at all—on the same plane when they have smelt fumes. What I am trying to get in terms of your reports is, firstly, whether they actually smelt the fumes; secondly, if you have that information, whether or not the people were sick or it had some impact on them, to enable us to get a picture of what has occurred. You have given us information for the last three months, so whatever information you have for the corresponding three months last year and two years ago would be appreciated. Thank you.

**Senator EGGLESTON**—You referred to paragraph 7 of Dr Balouet's report, did you not, Senator Crane?

**Senator CRANE**—Paragraphs 5 and 6, I think. I may have referred to paragraph 7 as well.

**Senator EGGLESTON**—Paragraph 7 begins with the comment:

What kind of consequences could be expected?

It goes on:

Flight safety is certainly a major concern. One cannot expect a pilot with disorientation, altered memory and concentration, blurred vision and blurred speech, loss of balance and coordination to fly and land an aircraft safely.

I must say, reading that, it seems very much to me as though this issue should be a matter of more active concern to you because it is clearly a question of flight safety. I am concerned that perhaps you should be taking more action to ensure that, for example, the National Jet program is expedited. It is not really an occupational health and safety issue. It really, I think, inescapably is a flight safety issue.

**Ms Boughton**—Senator, we have tried to make sure that the issue is recognised, that it is at an industry and people are taking action, but as you heard earlier this evening, it is the Civil Aviation Safety Authority—CASA—that has the legislative ability to take some action. Our re-

sponsibilities can only be in forms of recommendation or encouragement to people to do something.

**Senator EGGLESTON**—Have you made recommendations, though? One of the points Senator Crane made a minute ago is that there is an unpredictability about the way people are affected by these fumes and you are never going to be able to predict when a pilot or pilots might be severely affected and when an air crash might occur. Therefore, isn't there a responsibility on you to issue a recommendation that, say, National Jet's program of modifications be brought forward and completed quickly in the interests of air safety?

**Mr Leyshon**—We could recommend individually to operators to undertake modifications. However, you are then looking at the situation where operator A, for example, might accept the recommendation and say, 'Yes, that's a good idea. We'll do it, and we'll do it quickly.' Operator B may say, 'No. We have had no such problem and we're not going to do it.' Operator C may say, 'Well, we might do half of it,' and you end up with an aircraft that is modified to various standards. By addressing our recommendation to CASA, who has the overall responsibility, we catch everyone in the blanket.

**Senator CRANE**—When I nominated those paragraphs, I think I said 5, 6 and 7 to CASA, but I do not think I did to you. I will add paragraph 7 into yours.

**CHAIR**—My final question is, in terms of the recommendations made in your report on the Frank Colver Melbourne incident, you recall that there was some debate. Whether or not the debate was between you and CASA, it was certainly between CASA and us and you and us. There was some reluctance on the part of CASA to recognise what some people felt was the seriousness of that issue and there was some suggestion that they were not going to act on the recommendations you made. But what I thought I heard you say earlier was that you were now working much more closely with CASA and possibly those recommendations have now been picked up, either partially or completely. Are you happier with CASA's response in that regard?

**Mr Leyshon**—At this point in time we have accepted the recommendation. However, we have placed it on a monitor status. Any occurrence that involves fumes in a BAe146 or any other aircraft will immediately be notified. We will also notify CASA—and this extends to overseas. Our latest meeting with CASA was this afternoon to discuss the latest findings on the Sweden occurrence. So there is a very open channel of communication between the two organisations. When they took us through each of the modifications, step by step, along with changes from the aircraft manufacturer in operating procedures, crew procedures, emergency procedures, we were satisfied that the intent of that recommendation has been addressed.

**CHAIR**—That is reassuring to the committee. We thank you very much for your evidence and your attendance. No doubt we will have further conversations.

Committee adjourned at 10.04 p.m.