

**STANDING COMMITTEE ON  
ENVIRONMENT AND PUBLIC AFFAIRS**

**TRANSCRIPT OF EVIDENCE  
TAKEN AT PERTH  
ON WEDNESDAY, 17 APRIL 2002**

**Members**

**Hon Christine Sharp (Chairman)  
Hon Kate Doust (Deputy Chairman)  
Hon J.A. Scott  
Hon Louise Pratt  
Hon Frank Hough  
Hon Robyn McSweeney  
Hon Bruce Donaldson**

**Committee met at 2.00 pm**

**CARBON, MR BARRY,**  
**Private citizen,**

**The CHAIRMAN:** On behalf of the committee, I welcome you here this afternoon Barry. You will have sighted a document titled "Information for Witnesses". Have you read and understood that document?

**Mr Carbon:** Yes, I have.

**The CHAIRMAN:** You would be aware that the proceedings are being recorded by Hansard and a transcript of your evidence will be provided to you. To assist the committee and Hansard, if you quote any document please state the full title of the document for the record. Also, try to be aware of the microphones and talk clearly and ensure that you do not cover them with papers. I need to remind you that your transcript will become a matter for the public record. If, for some reason, you wish to make a confidential statement during today's proceedings, you should request that the evidence be taken in closed session. If the committee grants your request, any public and media in attendance will be excluded from the hearing. Also, until such time as the transcript of your public evidence is finalised, it should not be made public; and premature publication or disclosure of public evidence may constitute a contempt of Parliament. That will mean that the material published or disclosed is not subject to parliamentary privilege.

**Mr Carbon:** It is possible that one or two of the issues that I will raise could be contentious and criticised. Does that mean that if I raise those issues today and I am publicly criticised that I am unable to respond to that criticism until after things are published?

**The CHAIRMAN:** Yes. You would be unable to respond to the criticism and be protected by parliamentary privilege.

**Mr Carbon:** Sure, that is fine.

**The CHAIRMAN:** Once the evidence you give today is finalised, it will be protected. However, anything said subsequent to that and outside of this hearing will not be protected. The committee is aware of your report to Alcoa and its relationship to this inquiry into the Alcoa Wagerup refinery. Before discussing that report, would you like to make an opening statement to the committee?

**Mr Carbon:** Yes. Some of the things that I wish to discuss today go beyond the scope of what I was commissioned by Alcoa to report on. I would like to give a brief summary of the matters that are covered in my public report to Alcoa and also to cover other issues if I may. I trust that the notes from my meeting have been handed around in advance.

**The CHAIRMAN:** We have just received them.

**Mr Carbon:** The first page is about who I am, and I will assume committee members have read that. I now will move to the basis of my statement. Members will know almost all of this information, however, I need to go through some of it quickly in order to provide the background to my evidence.

**The CHAIRMAN:** We have until 3.00 pm. Members also have questions that they will want to put to you.

**Mr Carbon:** This may take five to ten minutes. Before this current issue arose, Alcoa's Wagerup refinery had been there for about 20 years. It has had neighbours close to it - indeed, too close in proper planning terms. However, in recent times neighbours have moved closer. The environment

in which the refinery is located is, in retrospect, pretty lousy. It is close to the Darling Range and on a flat plain. It has been well established over the last 20 to 25 years that a coastal plain is a bad environment for the mixing of air. When the Swan coastal plain is close to the scarp, as it is in this location, it becomes an exceptionally poor mixing zone. If a location had to be chosen that would cater for fumigation conditions - that is, when the chimney smoke comes down and lands on people - the Wagerup refinery is that location. I was involved with the submissions on the review of the refinery when it was first built, and that matter was not even thought about then. One of things that is important about the refinery's location is that given the certain weather conditions - and we are about to enter into that time of year - the material that comes out of chimneys holds together in a plume, rather than spreads out. Throughout this introduction I will refer to chimneystacks and exhaust pipes from cars as being virtually the same thing. About 40 000 cars go past the house in which I am living, and that is not an environmental issue. However, if the exhaust from one of those cars were put directly into the room in which I was sitting, I would get sick pretty quickly. Dissipation is an important issue.

The process of bauxite mining and refining is incredibly simple. Soil is dug out of the ground, crushed and cooked with caustic soda. It is stirred around a few times and then cooked to even hotter temperatures to remove the white crystals. One-third of that end product is alumina and the other two-thirds is waste material. The latter comprises soil from the Darling Range with some caustic soda in it. That is what is put out there. The process is no more complicated than that. In the cooking process the soil and the organic matter in it, most of which is historic tree roots, is cooked up. The organic matter is then broken down and does two things. Firstly, it stinks - as any cooking process would. However, this process particularly stinks because it involves a lot of material. Secondly, that organic matter is dissolved in the caustic soda.

I want to stress the changes that occurred about four and a half years ago amounted to more than just the installation of a liquor burner.

[2.10 pm]

First, there was the expansion, and with the expansion came the requirement for more hardware. The biggest and most obvious of the hardware was the calciner. This is where we take the cooked material or liquid, belt it up to a high temperature, drive the liquid off as steam and we are left with the white crystals. There is a big new calciner there. Secondly, the liquor burner went on. Thirdly, a gas power station was put in. Neither a liquor burner nor a gas power station had been there before. There are perfectly good reasons for both the liquor burner and the gas power station. Historically, the dissolving of the organic matter has been managed in such a way that - this applies to most of the world's alumina refineries - when the caustic soda gets a bit too much dirt in it, it is chucked away. Historically, it has been thrown away on the coastal plain and in big ponds. This measure has two negatives. First, it is a significant waste of resources because caustic soda has been rich in electricity, because that electricity was required in order to make it in the first place. Therefore, it is a loss of a natural resource. Secondly, it poses a long-term management problem - we have to decide what to do with large amounts of caustic soda on the Swan coastal plain. Perhaps that will not worry our generation, but it might worry the next. Finding better ways of recycling caustic soda is a sensible and environmentally responsible thing to do. However, it was a rather new experiment. Hardly any liquor burners had been associated with the alumina industry, although there had been a little one at Kwinana. The liquor burner was approved for Wagerup. Also approved was a gas power station. This made a lot of environmental sense. The ordinary power station has 40 per cent energy efficiency. If the power station was in a location from which it could harness heat and put it into a chemistry set like the bauxite alumina refinery, the heat could be used and the 40 per cent efficiency rate would almost double. It was really smart to put the gas power station near the alumina refinery. These two significant changes occurred during the same two-year time slot in which the expansion was taking place.

Up to this stage, Alcoa and the state approval agencies had done everything we could expect responsible companies and agencies to do. The proper approval processes had been sought, the right information was put forward, the assessments were carried out and the conditions were set. In retrospect, it is difficult to lay blame with the people involved. I stress that. Everything was done according to the law, the processes and the involvement of the public. Nevertheless, problems occurred. The historic problem associated with the bauxite industry is that it stinks. The people who work at alumina refineries around the world do not seem to notice the pungent, wet cement smell. They quickly become saturated by the smell, and do not notice that they stink. The bigger the refineries get, the more they stink. This has happened historically, and it is an issue. However, the problem was much more acute than that. When the liquor burner started - I was not there and no measurements were taken to confirm this, but I have spoken to enough people to be confident of the situation - the plume from the liquor burner fell onto an area in which there were people. That is bad management. One of the telltale signs in any industry is that we do not allow the plume or the stuff that comes out of the chimney to land on people until it has been through a process of dissipation. This did not happen. It was not foreseen. A criticism I have of the system - I have a couple - is that it responded too slowly. There was a period of between eight and 10 months in which the liquor burning was being turned on and off, and the plume was landing on the workers and neighbours in an undissipated way. It is a bit like putting your nose at the end of an exhaust pipe. It went on for far too long. I will not comment on who is to blame. There is a high probability that this impacted upon some people. I am certain that some of the people who felt sick - but not all - did so as a consequence of this process. I am talking about what took place four years ago. Most of the complaints came from people who worked there because they were closer. However, some nearby neighbours started complaining about similar symptoms. I do not know why people became sick. However, if I had to proffer an opinion, the most common cause of nausea and dizziness in industrial areas is that the gas from the large exhaust pipes lands on people, and there is not enough oxygen. There is carbon dioxide and likely also carbon monoxide existed because of the incomplete burning process. This is not uncommon in industries. However, the severity at which it occurred in this instance was uncommon. Certainly, there are reasons that people were impacted upon, and that it would have been better if the process had been turned off more quickly.

I think that the company should have been required to install cool temperature burners at the power station. I will not go into that any further, because it is all in my report. The monitoring that is carried out now - I have been privy to all the monitoring that has been carried out by state agencies and Alcoa - is as good as any that I have seen. It is of a high quality and is very detailed. As a consequence of the workshop that was held recently, and with interaction with state agencies, there will be a more comprehensive monitoring of what comes out of the refinery. It will easily be the most comprehensive monitoring of any alumina refinery anywhere in the world.

This is my first punchline - no emissions from the refinery reach the ambient air levels that are designed to protect the environment and people. I stress that. None of the air emissions that have been comprehensively and honestly measured - either on their own or combined - exceeds any of the ambient standards that exist anywhere in the world - I have enough experience to make this statement - would explain the symptoms that people have. I stress that I am not suggesting that people are not experiencing these symptoms. I am not suggesting that people are making them up. I am suggesting that, at this stage, if we look at the normal regulatory mechanisms for control, this is not an explainable phenomenon, nor is it explainable in terms of chemistry. I will come back to that later.

One of the criticisms I have of the regulatory authorities is that they have tried too hard. The regulatory authorities have tried inordinately hard to solve an issue that is mysterious, and, on the face of it, it should be subject to scientific endeavour. Such are the efforts of the agencies, that they are now involved in monitoring. They are trying to solve a problem that is blatantly and clearly

Alcoa's. Several people in the community have been critical of the regulatory authorities' measurements. We must have a situation in which the regulatory authorities stand back and do not propose solutions. They should be the honest experts who stand back and give the community the confidence that things are being done properly. That is my philosophical view. I am strongly of the view that when state agencies start to propose solutions, society loses its capacity to have a body that provides impartial environmental ticks.

The impact that is still being felt by workers and the community is almost completely associated with intact plume contact - remember that there is unusual geography - and it may well be that the tall stack that is now being constructed will remove the issue. As it stands now, the issues are not the same as they were four years ago. Indeed, I do not believe that the problem causing the odour can be assumed to be the cause of peoples' symptoms. In fact, there is no evidence whatsoever, even if we go through all the monitoring results. The level of complaint by people in the community is the same whether the burners are on or off.

[2.20 pm]

In almost 50 per cent of the reported cases whereby people have complained about the symptoms, there has been no odour. Conversely, often they smell odours when they have no symptoms. I am very confident that volatile organics within the products of cooking are causing the odours. I do not know what causes the symptoms.

I will deal with two matters that are hard for me to talk about. The liquor burner works better with a catalyst and the monitoring there is excellent. However, there is a logical train of thought through which one must go when one considers a subject different from that which one normally considers. I will deal first with what is being emitted from the refinery. This matter has been and still is being studied to death. I do not believe that it is necessary or profitable to go any further than the studies that the State has ordered to be done. Nothing is coming out of the refinery that should impact on people. The second matter deals with what comes out of the chimneys. Is something happening between the time the material leaves the chimney and when it impacts on people? My previous report has asked that question. I think it is highly unlikely that it is. However, if it is, it is being investigated.

A third matter, which has been dodged in the public debate, is whether anything has changed in the receiving environment. In this case, people are the receiving environment. I think something has changed. I think people have been frightened, with some justification. I am not being critical of the people. As this committee is involved with not only the environment but also public affairs, I hope that I can challenge it to face up to an issue that is extremely difficult but important for our society to face. People who worked and lived close to this refinery were impacted by things. A scientific explanation could be provided if they were affected by carbon monoxide or carbon dioxide. Although currently nothing can explain it on a scientific basis, I believe the impacts are real; people are not making this up. The community is sensitive of the issue and it is important that we face up to it. I do not think that we should be frightened of words like psychosomatic. I go swimming every day. When I was swimming off the ocean two weeks ago, I found myself in the middle of a school of herring. My arms went stiff, I could not breathe properly and I was scared witless about sharks that I could not see. Although I could not see them, it did not mean that it was not having an impact on me.

People who live in the area or whose families or workmates live in the area have seen people get ill or have been informed about people getting ill. They can legitimately and properly ask questions about what is making people who live in the area become sick. It is a very real issue. If we get frightened of words like psychosomatic or if we are frightened of concerns about perception and actuality, we will walk away from a real problem. Not many people today suffer from repetitive strain injury. People's perception of it has changed. That does not mean that the RSI problem was

not real. Friends of mine have suffered from it. I think this is a real issue of people being psychosomatic. This is probably the clearest example in Western Australia right now.

The long-established mechanisms of how the community finds out about issues have changed. I am of the opinion that the dominant newspaper in this State no longer chooses to run issues on an impartial basis; that is its business. However, that means that the newspaper does not impartially communicate to people about environmental issues. I do not say that lightly. An example I will give arose from this parliamentary committee. There have been articles about secret reports on benzene. However, there are no secret reports on benzene. Anyone can go to the Environment Australia web site and look at the national pollutant inventory, which anyone with any interest in the environment does, and get all the outputs of all gasses from not only all the alumina refineries but also all industries in Australia. People have been able to do that for four years; there are no secrets. One hundred people went on strike over the issue of benzene causing carcinogenic effects until they then had their own monitoring done and found out that the benzene concentrations were one-hundredth of acceptable standards. Any benzene in the environment is undesirable. However, benzene comes from motor cars.

People living anywhere within 10 kilometres of a refinery have heard stories about cancer. There is no evidence that any emissions from alumina refineries anywhere cause cancer. All soil in the Darling Range is radioactive and includes thorium and uranium. If it is cooked with caustic soda and a third of it is taken out for alumina, it marginally increases the radioactivity. If that is mixed with sandy soils, as the Department of Agriculture was doing, it is still significantly lower in radioactivity than any of the loamy soils on the coastal plain.

I am not defending Alcoa; indeed, I am the only person in Australia who has carried a successful prosecution of this topic. Recently, the company was accused of leaking alumina dust into the environment. Alumina dust was described as a suspected carcinogen that affects the human immune and central nervous systems. I have carried a successful prosecution of this matter and I am also aware of the extensive research done by the United States Environmental Protection Authority. Alumina dust is classified as inert. I believe this type of thing is a problem for not only this committee but also the community. I am aware that many members of the community who live close to that area want to get out because they are frightened. They want to be able to raise their children in an environment that they are sure will not harm them. That is very difficult in the environment we have today because of the flow of information.

**Hon BRUCE DONALDSON:** You mentioned the neighbours. Why would Alcoa bother to lease properties in buffer zone A to people while it is facing inherent problems and accusations are being made against it? We are dealing with petty cash. Would it not have been better for the company to have cleared out all those people and to have kept it as a buffer zone?

**Mr Carbon:** In my view, I would not let people live in those houses. If there is to be a buffer zone, it is incumbent on the system, including the State Government, to say that nobody should live in buffer zone A. The people of the district desperately want to maintain their schools, hospitals and the Police Force. They are concerned that, regardless of how many people put their hands on their hearts and say that people will be allowed to stay there, down the track some teachers will leave or somebody will close down the garage or whatever. There are competing interests between maintaining a population in the area and whether it is safe to do so. I repeat that if it were my decision, I would not let anybody live in the houses that have been vacated. On the other hand, some people have lived there for a long time and have said that they are not affected by any of the symptoms and they still want to live there. Those people should be allowed to stay.

**Hon FRANK HOUGH:** During evidence, I do not remember who it was, but someone said that paint and glass on the motor vehicles in the car park were being affected.

[2.30 pm

**Mr Carbon:** Yes.

**Hon FRANK HOUGH:** You say that there are no problems with the emissions. However, they are removing paint and glass. If the plume or the smokestacks are not emitting anything that is dangerous, the emissions are certainly removing glass and paint.

**Mr Carbon:** Yes, and thank you, because there is obviously a flaw in what I have said to you. Within the area of an alumina refinery, on an historic basis one would expect there to be three sorts of emissions. There is carbon monoxide, which makes people sick. In the olden days, it used to be quite common. There is dust, which is often associated with the handling of the fine material, and there is caustic soda or caustic carbonate. That is either sodium hydroxide or sodium carbonate. Sodium hydroxide will certainly take paint off cars and put etchings on glass, and that has happened historically to the vehicles of workers. In my mind, there is no doubt that that is an established cause and effect. What is of surprise to me, and I suppose to everybody else, is that the monitoring in the near environment - that is, beyond the refinery - has not been able to find any caustic soda at all - none. There have been high-volume` samples, and fine particles have been looked for. Indeed, in my report I suggested that one thing to do would be to look for ultra-fine particles - that is, less than about one micron - to see whether any caustic is stuck on them. It does not matter which way we look at it: the air has been bubbled through water and collected. If any form of caustic was getting out, it would effectively change the acidity and alkalinity of that. The answer is that there is none of that.

Certainly, within the refinery - this is a matter of housekeeping - in a place that is badly housekept, one would expect quite a bit of caustic to come out; in a place that is well housekept, one would expect virtually none of it. I am aware that at Wagerup about three or four years ago, the workers said that too much caustic was going into the atmosphere, and there was quite a major issue about it. Equipment has been fitted to try to reduce it, but it still happens. Caustic will form, but its particles drop very close to where it is.

**Hon FRANK HOUGH:** Around the circumference of the plant, one can just about group people who live and work in the area, because they are complaining of sicknesses. There is no question about their symptoms - they have blood noses and God knows what. Past that perceived area, there are no complaints. I do not know whether something is being emitted from the plant or whether it is in the ground, but there must be something - unless these people have phantom sicknesses. However, they have symptoms. Nevertheless, in a circumference around the plant, people are definitely suffering. Past a certain area, that ceases, and people who are further away do not seem to have any inhalation problems at all.

**Mr Carbon:** Some people as far away as the township have concerns, because they get the intense smell associated with the emissions, and they are concerned that there might be something in it. I think those concerns are legitimate. I would be concerned if my brother was working in the refinery and he was getting sick, or if I was living there. I think that there is a distance thing associated with the presence and perception of the smell that is real. However, the basic point you made is that in proximity to the refinery, it is inappropriate for people to have direct physical symptoms associated with something that can be measured and stopped.

**Hon J.A. SCOTT:** I refer to the emission levels. Since the committee has been examining this matter, I have searched the Internet extensively and looked at the levels of different volatile organic compounds and other emissions that might be found at the refinery and their impacts on human health. I have particularly researched the United States data. One thing that came across to me very clearly is that many compounds have never been tested for their levels of carcinogenic or mutagenic effect etc. Because many of these substances have not been tested, how can you competently assert that nothing would cause any harm to people?

**Mr Carbon:** There are two ways to answer that. First, the bit about which I am most confident is that none of the measurements show any excesses of any of the standards that have been set, either

in Australia or overseas. That is the first part of the answer. I take that very seriously, because all over the world people put a huge effort into trying to define these, particularly in the United States, which has had issues associated with cities that are much more polluted than ours. Therefore, in the United States much more work has been done on air toxins. However, as you are aware, work is now being done towards a national environment protection measure on air toxins. However, that again is unlikely to deal with the myriad micro organic compounds that exist. None of the measurements at the refinery exceeds the standards. The second part is that I, and certainly the state people and Alcoa, have gone to the trouble of asking the experts who have experience in that area, and their answer is the same: they know of nothing. Thirdly, the point that you made is totally valid. It is impossible to say that every single micron of material has been measured. However, the basic chemical structure of these things is known, and there is a close relationship between carcinogenic and mutagenic toxic impacts associated with basic structure.

It is fairly easy to define the basic structure of the products of breakdown of organic matter in its interaction with sodium hydroxide. None of those families has been implicated in being of concern for carcinogenic materials in the concentrations about which we are talking. As you well know, with some of the materials - even benzene and carbon monoxide - one would be concerned about whether the concentrations were high enough for long enough. However, we are not a half or a tenth below the levels of concern about which people talk; we are a hundredth or a thousandth below those levels.

**Hon J.A. SCOTT:** That is interesting, because when I looked at the US standards on benzene, its weakest ones were four times lower than our standards. In fact, some documents that have come through the committee process show that, at times, some benzene levels exceeded the limits. I also looked at the data on the effects of benzene on health. It was interesting that the strongest standard in the US was 0.1 parts per million over an eight-hour work shift, and there was a 15-minute level too, which was much lower than our eight-hour level.

**Mr Carbon:** But they always are in short -

**Hon J.A. SCOTT:** It was said that any level of a carcinogen is unsafe.

**Mr Carbon:** Yes.

**Hon J.A. SCOTT:** There is no safe level for a carcinogen. Therefore, it appears that our standards are based on a level of risk, rather than being safe, and that people could get sick from a carcinogen at any level, according to the health advice.

**Mr Carbon:** There are three parts to that answer. First, the standards, as such, for benzene and benzene derivatives in Australia are quite poor. It will not be until the national environment protection measures come out that we will have anything like a uniform scientific standard system across Australia. People have tended to focus on areas of concern and work on those, rather than work on standards. I do not think we will have the first professional set of standards. People have tended to be guided by EPA Victoria or the US Environmental Protection Agency. The member was talking about a fourfold difference. I am talking about a more than one-hundredfold difference in ambience, which gives the safety margin here. I have spent quite a bit of my career looking at reducing benzene in the atmosphere, in areas in which people are exposed to it. The major issue associated with benzene is motor vehicles. In fact, a major part of the formulation of Australian motor fuel has been based on minimising benzene. Indeed, it is expected in the next year or so that there will be further steps towards reducing it. Therefore, if there is an issue about benzene, I indicate that the benzene in our environment that people smell comes from motor vehicles, not from industry. Yes, there is some from industry, but it is much less than that from motor vehicles.

[2.40 pm]

Thirdly, you are exactly right. The ideal concentration of anything that causes cancer is zero. It is not possible to say that something is an exact safe level, whether it is for radioactivity or any of the

cyclic toxins. Around the world people have set levels, and when readings are below this level they do not express concern. The levels we are talking about are significantly below those.

**The CHAIRMAN:** Today's hearing will conclude at 3.00 pm I ask that questions and answers be succinct.

**Hon J.A. SCOTT:** My next question is about the small particles detected in the mud. I am told that material goes into the mud lakes, and when the lakes dry out they contain very small dust particles of between 2.5 and five parts per million. In the British inquiry into Gulf War syndrome there was concern that even though there were low levels of radioactivity when people were exposed to depleted uranium weaponry, very fine particles lodged in people's lungs, particularly the lining. Is it possible that the caustic materials and radiation could have a similar intake? Emissions and dust particles are easily blown around.

**Mr Carbon:** The member is concerned about respirable dust, which does not stay in a person's nose but goes further into the respiratory system. It is normally less than 2.5 microns and I do not think material from the mud lakes is in that category. I am not certain and I can check that. However, the question of ultra-fine material that is half a micron is something that I recommended to the State and to Alcoa should be measured because of the example the member talked about. People around the world are starting to ask that question. If it did happen it would explain how caustic materials can be spread over a larger area and still be inhaled. People can ask those questions because the technology is available to measure it. I do not think the technology has been available in Western Australia. I recommended to Alcoa and the State that they use the people at the Queensland University of Technology, which has that measuring equipment. They will be able to provide real-time measurements of ultra-fine particles. I hope that it will be available in the next three to six months. Even with the best of endeavour, the equipment used in the State's monitoring process was not up to measuring ultra-fine material.

**Hon LOUISE PRATT:** Mr Carbon referred to people "feeling sick". Is there is a distinction between symptoms - for example, irritation to the mucous membrane? That was something I experienced when I visited the site. There are obviously more serious health impacts. What is included in the definition of "feeling sick"?

**Mr Carbon:** The question takes me to the edge of where I feel competent to speak. I will comment on things I feel comfortable talking about. I feel comfortable talking about the immediate impacts of environmental pollutants on people. I have buckets of experience on that. I am talking about carbon dioxide, carbon monoxide and caustic sprays. It is when people feel exposure to a substance when they are close to it and feel nothing when they walk away from it. The second part is when people are exposed to something and their symptom is an itch that sometimes can last longer than their direct exposure to it. People explain it to me by saying that they walked into a plume and felt something during and after the event. That is the sort of thing I feel comfortable talking about. It reaches the limit of my expertise when I talk about things like multiple chemical sensitivities. I am comfortable talking about the generality in which environmental agencies are asked to consider standards and activities as a prelude to those things.

**Hon LOUISE PRATT:** Notwithstanding that, you can still quantify an impact on the community.

**Mr Carbon:** Remember that I stressed something that is not faced up to in the public debate. There is evidence from other activities that when people are exposed to something that makes them feel sick subsequent symptoms can be triggered by levels that are orders of magnitude less than prescribed by the standards. I am confident that my expertise goes that far. How the symptoms are managed is beyond my expertise.

**Hon LOUISE PRATT:** There was an acknowledgement that emissions in 1996-97 were much greater than now.

**Mr Carbon:** If the member is talking about volatile organics, the rate was 50 times greater than now. We do not have evidence that the rate of 50 times higher was causing the symptoms. In my mind, there is no doubt that people were feeling sick and that the airstream was more contaminated. In this sense, contaminated means it held cooked organics. We do not have evidence that that caused people to become sick. If I had to take a punt, it would be on carbon monoxide as a cause of the problem for the people who worked there. I have seen those symptoms before in industries in Geraldton, Townsville and other places. The symptoms were accompanied by an offensive odour that people referred to as the smell of burnt biscuits.

**The CHAIRMAN:** Will the witness indicate formally for the record what document he brought to the committee today and whether he will table it formally?

**Mr Carbon:** I brought with me seven pages of my own notes, which were the basis of my introductory statement. The copy the committee has is different from my copy.

**The CHAIRMAN:** I want the witness to note formally that he has tabled the version given to the committee. I have a copy of the witness's report to Alcoa on the issues. I need to clarify that the document I have, which runs to 13 pages, is the witness's full report. Is it a summary or a full report?

**Mr Carbon:** It is probably the full report. Is it in a dot point form?

**The CHAIRMAN:** It is in two sections. One section is a summary report. Does the committee have a copy of the full report to Alcoa? Is this it?

**Mr Carbon:** Yes. It is the full report. It is written in dot point form.  
[2.50 pm]

My arrangement with Alcoa was that when I presented material I would use dot points and give an oral presentation to the company, to the interested public and to the state people, which I have done. I have also taken some of the information from the Wagerup Alumina Refinery meeting of experts which was held immediately prior to Christmas to examine what extra measurements there should be. That document is available if anyone wishes to look at it. It would be a major job to copy all of it into *Hansard*.

**The CHAIRMAN:** If you are happy to do so, I would like you to table that document.

**Mr Carbon:** I table a document entitled "Wagerup Alumina Refinery - Emissions Management Meeting of Experts, Murdoch University, 20 December 2001."

**The CHAIRMAN:** I now move to your report to Alcoa. I noted with great interest the description about the plume and the characteristics of the plume. You write that the plume may stay quite intact as it travels across the landscape and may be less than 100 metres wide at northern Yarloop, which is quite extraordinary.

**Mr Carbon:** It is extraordinary.

**The CHAIRMAN:** How do you know that?

**Mr Carbon:** From hearsay and talking to a lot of people who live and work there. They can identify when they walk into the plume and when they walk out of it; they say that the sides of it are very narrow. Some people claim that there are conditions when they believe it has only been 30 metres wide. They refer to it as "it", which confuses me a little. I suspect, though it is not known, that there are multiple plumes from this refinery which coalesce, hence we would have plumes from the power station - which is several hundred metres away because that would take it in the right direction - that would pick up the others. That is why I was interested in the question: could there be a reaction occurring within the plume? Anyway we look at it, we are looking at a very unusual circumstance, where people who are exposed to that plume are exposed to something that has not undertaken the normal mixing one would expect from a motor vehicle exhaust pipe or a chimney somewhere else.

**The CHAIRMAN:** Would the chemical characteristics of that plume be similar to the chemical characteristics of the emissions at the stack itself?

**Mr Carbon:** They would be closer to the chemical characteristics at the stack than what you would normally expect. Normally you would expect a much greater mixing effect than occurs.

**The CHAIRMAN:** Is regular monitoring done at the stack itself?

**Mr Carbon:** There is point-source monitoring. There is discontinuous monitoring of most of the things that we are interested in.

**The CHAIRMAN:** Is that monitoring done at the source?

**Mr Carbon:** At the refinery. There are also monitoring locations near the dam as you drive in, about 200 metres from the refinery; there are monitoring locations perhaps 400 or 500 metres away. There is a network of monitoring locations.

**The CHAIRMAN:** Is there a monitoring location at the liquor burner stack itself?

**Mr Carbon:** No. There is intermittent monitoring of what comes out of the liquor burner.

**The CHAIRMAN:** But there is no actual monitoring?

**Mr Carbon:** I cannot answer that question. That may have occurred in the last several months.

**The CHAIRMAN:** Who is responsible for the network monitoring you have just described?

**Mr Carbon:** There are two parts. Most of it is the company's monitoring, and some monitoring is run by a combination of the State Chemistry Centre, the Department of Environmental Protection and the Department of Health.

**The CHAIRMAN:** Who has done the monitoring for the group of regulators?

**Mr Carbon:** They have done quite a bit of that themselves.

**The CHAIRMAN:** If we wanted to see the results of the DEP/Health/Chem Centre monitoring we can get that from them?

**Mr Carbon:** Yes. Public reports have been put out by the various committees. I have investigated them with very close scrutiny. They contain nothing that would give suggestion to any of the impacts or symptoms, which is the big surprise. One of the things that nags away at me is this: if the impacts we are talking about are impacts associated with contact with a discrete plume we can have less confidence than normal about ambient monitoring. We might be sitting 50 metres away from something and not be able to smell anything, yet somebody could say they are quite uncomfortable.

**The CHAIRMAN:** You make that point in your report. Given that general ambient monitoring may not intersect this type of plume, and given the practical difficulties that you mention in your report of being exactly in the right place at exactly the right time, are you aware of any monitoring solution for intercepting this plume and determining its actual characteristics?

**Mr Carbon:** It is possible to put tracers in the plume and get exactly where the plume goes and then take samples, but the problem really has gone a bit further than that. Now, with the detailed monitoring of the emissions from the stacks, it is unbelievably complex; the question you have to ask is what do you have to monitor, even if you find the plume. None of the values even as the plume comes out of the chimney explain what is happening. I have sympathy for the people who are saying we would like the system to reduce the emissions overall: but the emissions of what?

**The CHAIRMAN:** Did you not just say that the stack of the liquor burner itself is not monitored?

**Mr Carbon:** No. I said that I do not know if there is continuous monitoring of the emissions from the liquor burner.

**The CHAIRMAN:** Do you know if there is intermittent monitoring?

**Mr Carbon:** Yes, there is. This report contains some comprehensive analyses of what comes out of the liquor burner and the calciner stacks, and I have read mountains of monitoring results about those emissions. So a comprehensive set of monitoring is done. I do not know if it is now continuous. Indeed, the most recent licence condition set down by the Department of Environmental Protection contains a long list of organic chemicals which have been added to the monthly monitoring list. The same question arises: what do you do when you measure those things? These things exist in infinitesimally small numbers so that there is no information to tell you anything about these things anyway.

**Hon BRUCE DONALDSON:** You referred to the dispersion factor. It is interesting to look at the figures for 2000 and 2001, both completely different winters, which refer to the official complaints lodged with Alcoa. From the beginning of June to the end of August 2000 there were 401 complaints. That was more of a typical winter pattern, with more winds. In 2001 we had a crazy year weather-wise, with very little wind, and in the same three months the complaints went up to 527, but more importantly because of that factor it really lasted from the beginning of April to the end of September when we received 950 complaints. During that period last year there was little wind and a number of cold fronts did not come through, which we would normally associate with the south west. It showed up clearly during that period. Up until March of both years there were only 60 or 70 complaints in that three month period of summer.

**Mr Carbon:** That is right; it is winter through to the early spring period.

**Hon BRUCE DONALDSON:** You mentioned that the dispersion and the plume gathering together were highlighted in that year. Would you agree?

**Mr Carbon:** Yes, I would totally agree.

**Hon J.A. SCOTT:** The other issue was to do with the discontinuous monitoring. Would the emissions from the calciner stacks be constantly the same all the time through the production cycle, or would they vary at different times?

**Mr Carbon:** It varies. Indeed, one of the approaches I took in presenting the report for Alcoa was to ask the people who worked there for a long time what they thought it was. They could identify ways of managing the emissions that caused something to measure more than something else. The measure that they always used was odour. They said that if they do this it makes it smell more; if they do this it makes it smell less. As I indicated, I am not sure that the symptoms are caused by the odour. The odour legitimately triggers a concern in people.

**Hon J.A. SCOTT:** Would it be possible to add anything to the process by putting a colour in the plume?

**Mr Carbon:** Yes, it is possible to do that and to trace it that way. A unit at the Adelaide University does this as part of its activities. One of the large industries in South Australia tried that. It is certainly possible to do that.

**The CHAIRMAN:** Thank you for your attendance.

**Committee adjourned at 3.02 pm**