

**STANDING COMMITTEE ON
ENVIRONMENT AND PUBLIC AFFAIRS**

**TRANSCRIPT OF EVIDENCE
TAKEN AT PERTH
ON MONDAY, 18 FEBRUARY 2002**

SESSION 6

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**

CULLEN, DR MARK,
Professor of Medicine,
Yale University,
New Haven, Connecticut, USA, examined:

Dr Cullen: I have a longstanding relationship with the corporate entity, which is the parent Alcoa. I have had a long professional interest, as a researcher and practitioner of occupational medicine, in the effects of environmental exposures and some of the issues that have been raised by this inquiry. I was asked by Alcoa Australia to assist it in managing some of these issues.

The CHAIRMAN: Have you signed a document entitled Information for Witnesses? Have you read and understood that document?

Dr Cullen: I have.

The CHAIRMAN: This is being recorded by Hansard and a transcript will be provided to you for finalisation. After that, your evidence will go on the public record, but until then, you should not disclose your evidence because it will not be protected by parliamentary privilege and could be in contempt of Parliament .

Dr Cullen: I understand.

The CHAIRMAN: Would you like to make any general comments to the committee? We have questions for you, but we hope that you have a general summary that you might present to us.

Dr Cullen: I did not prepare comments for this purpose, and I apologise for that; it may have simplified both your effort and mine. I will describe my professional background and relationship with the organisation for the clarification of members of the committee, because I think it will assist in understanding how to focus some aspects of your questions. Among the many things that I have written over the years, I have brought a recent chapter which summarises what is known and what I know about the particular subject of interest to your inquiry. It is not yet published. It will be published as part of the second edition of my textbook of occupational and environmental medicine. It is relatively straightforward and readable and I am happy to submit it to you for consideration.

I will step back and describe my professional background. I went to medical school and trained in both internal medicine and epidemiology in the 1970s at Yale University. All my professional training was at Yale. I joined the full-time faculty of the institution in 1980 and I have been there as a full-time member of that faculty ever since. I became professor in 1993. My entire professional career has been devoted to some combination of research, teaching and practice. Probably somewhere in the range of half to two-thirds of that has been in the research domain. That is what academic careers in medicine are like nowadays. In that component of my career, as well as in the practice aspect of my work at Yale over the years, I have had a reasonable interest in the issue of multiple chemical sensitivities and responses to low-level environmental chemical exposures. I have published in this area. I think it would be disingenuous not to tell the committee that the name "multiple chemical sensitivities" was coined by me in a monograph published in 1987. I will be happy to describe the background of that. I have done some small amounts of research in this particular area, but it is only one of a larger number of areas in which I have been active, including somewhat easier subjects to study such as lead, beryllium, a variety of solvents and other carcinogens and so forth.

Starting in about 1993, I developed a relationship with the corporate entity Alcoa. At that time it was Pittsburgh based. It was a consulting relationship. The then medical director was a close personal friend and used me largely to help supervise and review epidemiologic studies. At that

time I began to develop some interest in both research issues and some practice issues at Alcoa. I continued in a consulting relationship with the company through 1996, at which time I was approached by the now retired chief executive officer and secretary of the Treasury in the United States, Paul O'Neill, asking me whether I was interested in undertaking what I think is a one-of-a-kind relationship between a large multinational such as Alcoa and an academic organisation such as Yale; that is, rather than its seeking a new full-time medical director, he asked me whether my department would be interested in taking on that responsibility collectively. It was a combined research and service activity involving an exchange of funds between Alcoa and my employer in return for a certain portion of time; in my case, it was 25 per cent. Five other individuals are actively involved in that contractual relationship. My employer remains as it has always been - the university. This arrangement provided Alcoa with a certain amount of expertise that it might not otherwise have been able to compete for and at the same time a certain amount of independence. In addition to my relationship academically, we have developed an occupational and environmental health advisory committee. Three individuals who have nothing directly to do with Alcoa's service on a day-to-day basis review a wide range of research, as well as perform other activities.

The service that I provide in my relationship with the corporate entity is in a variety of areas, none of which has to do with the direct management of individual clinical cases. That is quite intentional. Those are all handled at the location or business level; that is where the responsibility lies. My responsibility is in the setting and development of policy and worldwide health protocols, and the supervision of the data sets in which we collect information. I do a lot of research for Alcoa so that it understands better the contribution its activities may have in relation to health and safety. My relationship in this particular instance is as an adviser to this local business unit as we would see it, although the corporation has a large interest in the outcome of the issues here.

The CHAIRMAN: Is this the first time you have visited Alcoa's operations in Western Australia ?

Dr Cullen: Not at all. This is the second time I have been to WA. I have been to Australia largely in relation to the very large Healthwise research project, which I think you have heard about. I have made probably six or seven trips, previously, most of which have been to Melbourne and the Victorian operations. I previously visited Western Australia in 1998 and at that time had the privilege of visiting each of the major facilities, including Wagerup. I toured the facilities and met the management team in place then, some of whom are still in place. Yes, I am familiar with the operations here.

The CHAIRMAN: Have you come specifically to investigate the public health problems at the Wagerup refinery?

Dr Cullen: Yes. This was certainly the major agenda of my visit. I spent yesterday in Melbourne meeting with the Healthwise investigators and with our environmental health and safety manager in Victoria to talk about a different range of issues. The major purpose of my visit was to come here.

The CHAIRMAN: You have just arrived.

Dr Cullen: I took the eight o'clock flight from Melbourne this morning. Yes, I have just arrived.

The CHAIRMAN: I apologise for making it such a late afternoon. How long are you staying in the State?

Dr Cullen: I will be here until Friday morning.

The CHAIRMAN: Having established what you do and why you are here, do you want to make some general comments to the committee on what is contained in your chapter?

Dr Cullen: Yes. I will speak very briefly about that, partly because of the hour and partly because I think the chapter speaks better for itself. It will be more lucid than anything I could tell you at the moment. I will describe where I stand in some of the discussion that I heard in the previous testimony, none of which I disagree with, but to which I perhaps would provide a slightly different

slant. That is only to say that early in the 1980s as part of our practice at Yale, we began observing a variety of clinical problems in individuals who reacted to levels of chemicals and in situations that did not fit easily into the traditional occupational disease categories that were available. As part of that study, a group of us undertook to put together a monograph describing all the existing views in the mid 1980s of that condition. In addition to introducing the name “multiple chemical sensitivities”, the monograph introduced a range of ideas, some of which have subsequently been strengthened and validated by subsequent research, and many of which have proved foolish with the benefit of hindsight, like all good speculation. That is how I got started in this area. At that time I laid out a set of criteria for labelling individuals as either meeting or not meeting a definition, not because I thought this made it a well-defined disease entity, but largely for the purpose of fostering intelligent research and discussion so that we all felt we were talking about the same thing. Subsequent to that time, needless to say, I found myself in a fray that I did not necessarily invite. However, as I mentioned earlier, I have been involved in a few small research activities in one way or another. A small pharmacological trial back in the early 1990s, which I believe is described in the summary chapter, is a study of our clinical population to try to better define who was or was not falling into the category of clinical disturbance and so forth.

My larger role has turned out to be not as primary investigator but, oddly enough, as a kind of medium through which many other investigations have passed. I review, for whatever reason, almost everything people do - the protocols, papers, publications and so forth - so I am in this loop even though my research interests are largely elsewhere. I offer my paper and am happy to take questions.

The CHAIRMAN: You heard me ask Marc Bell about whether this notion of multiple chemical sensitivity has been accepted as a medical entity by any medical authority outside of your department.

Dr Cullen: I think he answered the question accurately. I tend to view the issue somewhat obliquely in the following sense: that it is surely correct that multiple chemical sensitivity is yet to be understood well enough to classify as a distinct disease entity and has not yet been endowed with a diagnostic code in the international classification of diseases, which is the only thing that would matter in terms of its existing or not existing as a disease entity. Many organisations have referred at different times to the appropriate use of this diagnostic label. It has been an interesting and often very heated debate. The reality is that in many countries of the world, certainly in North America and increasingly in Europe, the label, including the name that for better or worse I applied to it, is used in practice. I venture to say it is used pretty widely in practice. That is not to say there is broad agreement on any area or that it meaningfully qualifies as a disease entity, because both those views would be false. It is certainly a designation you could use in a conversation comfortably in many parts of the world and people would know what was being talked about.

The CHAIRMAN: Notwithstanding the diagnostic and the toxicological limitations, do you accept it as a disease entity?

Dr Cullen: I am not sure what you mean by a disease entity. We do not talk to people about it like that. We talk about it in essence as a label to describe a spectrum of symptoms, and it is neither less nor more than that. It is not less in that I feel comfortable saying to a patient I have evaluated fully that, although I do not understand the problem, whatever it is, it fits into this area that has this name. I think that is pretty wide practice. I certainly use the designation. If you came to my clinic you would see that entity used as the diagnostic name on my chart.

The CHAIRMAN: When there are multiple recorded cases, as is the case in Wagerup, would that give some status to that information that in fact there is something of a physical nature taking place in terms of the relationship between those individuals and the environment in which they live?

Dr Cullen: That is a good question. I want to be careful in a couple of ways. Although I have spoken to several individuals who have been affected, some of whom I know have appeared before

you and some who are sitting here, I have not been directly involved in reviewing medical records so I do not feel appropriately qualified to comment on whether the premise of your question is quite right; that is, whether the label - whatever one thinks of it - has been appropriately applied in this way. Having said that and not yet done what I came here to do - that is, to further explore what might be going on - there have been other “outbreaks” of multiple cases of MCS to which diagnostic labels have been applied in a variety of diverse settings such as large manufacturing settings, office settings and hospital settings. Unfortunately the study of those so-called outbreaks or clusters has not illuminated our understanding very much. In fact, I would go so far as to say in some situations we have learnt a little less than we have learnt from studying individuals. That may sound ironic from someone who calls himself an epidemiologist, as I do. Part of it is that when multiple cases have occurred, the scientific study has been often confounded by the complexity of the social issues, as I believe would probably be true here, from the little I know. This would not be my ideal, dream place to study MCS, whatever the chart may say.

The CHAIRMAN: Does the chapter you are kindly providing mention some of the history of the other outbreaks?

Dr Cullen: Yes, it does briefly. I do not dwell on them because I am not sure yet what to make of them other than their occurrence tells us perhaps something about the complex interchange between biological, sociological and psychological issues that are at play.

The CHAIRMAN: What I am trying to get at is that we, along with Alcoa and all the other stakeholders in this situation, are faced with the conundrum that on the one hand we do not have a definite scientific explanation but on the other hand there are multiple case histories recording similar symptoms. It seems to a lay person like me that to have such a large record of cases suggests something is happening of a physical nature that in itself gives some kind of scientific result based on the quantity of cases recorded. That is an assumption one must make in the same way as in theoretical sciences one also makes assumptions. Do you think that is a reasonable assumption?

Dr Cullen: You may find it ironic, given the name I use, which I discuss at some length in the chapter I provided, that the only small exception I make with your otherwise quite good lay interpretation of the situation is that we should not overemphasise the word “physical”. This is not to say that chemical odours and irritants do not have a role in triggering symptoms, which is the clear perception. In fact, the basis for the label is the individual who walks in the door and says, “Every time I smell X the following symptoms occur.” That is what it is all about. That is why the name “Chemical” appears in the designation. Nonetheless, we know considerably less about what prompts all this to occur in the first place in terms of its true pathogenesis. We do not know why it occurs even singly let alone in a group theoretically, because I said that I do not quite know in this case what is the true medical status. That is an area in which some of the most intense debate and research is going on, as you will see quickly when you review the chapter. Many of my colleagues, with some credible evidence on their side, believe that the role of chemicals is entirely symbolic. I want to make sure you understand that that is a credible view in the world. It does not mean they have no role but that the role is best viewed behaviourally in the way our dog behaves when it smells or hears something that makes it jump up, scratch and so forth. What happens after some experience with chemical odours is a behavioural response. It is a view that is in the community and one that cannot be completely dispelled. Many other colleagues take a much more biological view of the illness. At least from what I know of the situation at Wagerup, apropos my previous comment, we will not learn the answer there from this.

The CHAIRMAN: My questions so far have been of a general nature and have not sought your comment on Wagerup. We have been told that more than 300 VOCs are being emitted at the Wagerup refinery. Is it possible scientifically to track the different secondary chemical reactions that can happen from that quantity of elements? Is it theoretically possible? If so, will it be done?

Dr Cullen: One of the things we know best about multiple chemical sensitivity is that among the many hundreds of cases that have now been very well described in the scientific literature - the individual or group of chemicals that have been associated with the beginning of the process - the first manifestation of symptoms and those that trigger ongoing or additional symptoms after that first episode are diverse and numerous. The effort that was very intense early on in the research community of trying to find the cause - as in this case a toxic property of this chemical but not these other groups of chemicals and not single chemicals - appears almost certainly to be a wrong-headed approach. Many cases have occurred in association with leaks, spills or accidental exposure to one single chemical. I can list 100 that have played that inglamorous role. After the first symptom in that situation individuals may respond to literally hundreds of kinds of products and agents that have no chemical similarity. The role of the mixture at Wagerup is really more of a toxicological question, which is to say it is not whether there is some unique possibility that this mixture may do something in terms of multiple chemical sensitivity that any one of the entities themselves could not possibly trigger, but whether the mixture potentially confers on the work force there or the community any risk that would not have been predicted from our knowledge of the levels of the individual chemicals alone. That is always a legitimate concern people have, because in a world where there are 40 000 or 50 000 toxic chemicals in wide use, we occasionally have the opportunity to study any pair of them together and, needless to say, we do not have simple paradigms for studying any group of 300 together.

The CHAIRMAN: Are you saying that it is fruitless to try to track all those secondary chemical reactions?

Dr Cullen: We cannot answer it from results of an experiment. No-one has done this experiment and we will not be able to do it here. Many different things are involved. We must think about this in a more generic way. What do we know about the way chemicals interact from the opportunities we have had to study pairs and triplets of chemicals together? We know quite a lot about that generically. To make a complex subject simple: unless the chemicals actually interact in the environment to cause a new entity - that typically occurs in a very unusual chemical reactive situation where highly reactive chemicals, for example in a chemical plant, may produce some unknown new species - we think of large groups of chemicals as acting separately if their effects are different, or add them up dosewise if their effects are common. When someone is exposed to six organic solvents that have caused central nervous system punchiness intoxication, we tend to think of the six together as the sum of each of the six. If someone is exposed to an airway irritant and intoxicant at the same time, we view them as two separate exposures. I think there have been almost no good counter examples in which that way of thinking has not been adequate to the task.

The CHAIRMAN: Thank you. I have a couple of specific questions about Wagerup. You may or may not be in a position to answer them at this stage. It was pointed out by a couple of the consultants, and you may have already read the literature, that fine particulates below two microns may be one of the possible causes. Do you have any comments on that as a possibility, given that Alcoa has so far not been able to get enough sophisticated monitoring gear to check that out?

Dr Cullen: I prefer not to comment, but only because I have not seen the most recent data on it. It is a plausible concern. The world has been very concerned about fine particulates and it is worth looking at.

The CHAIRMAN: When you finish this visit and you have digested all the information that you will receive, will you produce a report and will that report be publicly available?

Dr Cullen: I cannot speak about how the company may choose to use it. We will develop some form of communication that will hopefully be made available, most importantly to the people who are most directly impacted. My view is that it is important that whatever perception issue may exist between what knowledge the company has and what knowledge is available to the community, it

needs to be as narrow as it possibly can be. I do not know whether there will be a formal, more detailed report. We have not yet discussed that.

The CHAIRMAN: It was suggested in evidence received earlier in the day that aluminium oxide is a particularly potent chemical. It is used in various experiments to increase chemical reactions. Given that this is a key component of this process, would you care to comment about whether that could have a significant role?

Dr Cullen: Let me answer that question by taking one quick step back. One of the protections that I feel is in place in the Western Australian environment is something that in many ways is the reason I got more seriously involved with Alcoa in the first place, which was the origins of the Healthwise study. The study has three components, one of which is the cross-sectional study of all current workers which was largely done in 1995 and 1996 and which is completed. We learned many things, one of which was that the individuals most heavily exposed to alumina - the workers in the various parts of the three refineries in the State - have patterns of symptoms which are virtually identical to patterns of symptoms seen in office workers in the same facilities and in non-refining facilities elsewhere in Australia, with the exception of some upper respiratory complaints. However, they are not well-associated with alumina; they are primarily associated with caustic exposures. Likewise, the lung function tests that were done on our highest alumina exposed workers show no evidence whatever of significant lower respiratory tract effects. Another component of this study, which has not been fully analysed, is called an inception cohort. That studies people who are newly hired into these job categories and actually has the best chance of showing subtle nuances of the relationship between exposure and effect. Frankly, with current data, I think that it is not true. I think alumina is fairly benign stuff. This was clearly the premise of the Healthwise study, because no-one had actually studied aluminum refineries in this way prior to Healthwise. However, it has certainly not panned out and if indeed the work force is showing little evidence of it, it seems unlikely that it would be a bigger problem outside the work force. It is an interesting hypothesis. So far, the evidence is pretty negative.

Hon J.A. SCOTT: Do you have any preconceived methodology with which you are going to approach this situation in Wagerup or are you going to have a look and work out a methodology afterwards?

Dr Cullen: I am not intending to do a formal study in any sense. The situation has evolved over time, as I am sure you now know, so in that sense it is not a formal process. In relation to both my work with Alcoa and the rest of my professional life, I am frequently called when there is trouble. That is the nature of what I do. I have a general approach, which I am happy to outline for you. That involves the following elements. Most importantly, I will try to have serious communication with all the relevant parties. I feel pretty strongly about that. I have already initiated that from several points of view. That includes medical practitioners, government agencies and members of the community. I will speak with individuals who are affected, not for the purpose of being their doctor or diagnosing them but to hear their perception and story from them, rather than through an intermediary. Likewise, I will speak with plant management at all its levels as it appears here. To the extent that it is available to me, I will review all current environmental data, both for the community and the work force. I have seen some of it in the past. I will look at it again. My hope is to be able to use my visit to define a pathway that spends less energy looking at how we got there from here, which is always fascinating but useless, and spend more energy on figuring out how we move forward, so that individuals who have been adversely affected can be effectively rehabilitated and so that the community's issues can be effectively addressed by remediation and other steps. My hope is that we can also put in place the kinds of management systems that will prevent these things from occurring in the future, to the extent that they possibly can. That is all I can tell you. That is a game plan. We are not there yet.

Hon J.A. SCOTT: Within that framework, one of the criticisms earlier participants have voiced in this inquiry is that they felt the monitoring equipment was not properly picking up the emissions on a regular basis, because there was only one and it was not in the best possible position. Secondly, there was no placement of monitoring equipment to look at secondary effects, like the formation of ozone and so on. As you are relying on data sets and so on to get your information, will you also look at the collection of that data as well as a possible way to find new information?

Dr Cullen: You bet. I want to provide a caution in that the area of ambient air pollution is a highly specialised and complex business, as I think some of your comments suggest you well understand. I feel that colleagues and others can better assist me in answering the question of whether we have really profiled what I would call the worst case situation, which is of course the answer that you, I and the management wants. We all want to know what the worst thing that might be happening is, because that is the standard against which we need to consider the control project. I cannot speak about whether we have adequate data. I will look at that critically when I am doing it.

Hon BRUCE DONALDSON: There has been a recent trend to give any form of suffering a causal label. I use the Gulf War and sick building syndromes as examples. We recognise that you are the author of the multiple chemical sensitivity label. However, debate rages within the medical profession about whether it is a sensitivity. Even though advocates say exposure to chemicals creates a physiological change, is it the right label to give it, especially when one could conclude that it may not be a sensitivity in that sense?

Dr Cullen: It is a long and unfortunately not entirely humorous discussion when you find yourself having embarrassingly named something. You are given quite a lot of opportunities to have second thoughts about the name you chose. I chose it because it described in the English language what the experience was of the people who suffered from it, which is that when they are exposed to lots of different kinds of chemicals they say, "God, I am sensitive to that." Probably rightly, the immunology community jumped all over it and said that it had coopted that term to mean something that has nothing to do with the English language use of the term. It uses the term to describe specific mechanisms in our gene immunology, particular antibodies, lymphocyte reaction and so forth. I will readily admit that it has not been proven that multiple chemical sensitivity is something like that, but also that it has been quite well proven that it is not. Of all the things that we can say biologically, one is that these are not classic allergies. We have known that largely from the word go. The use of the term was intended to be something quite different. The only part of the term that has not been seriously challenged is the use of the word multiple, which I guess made no-one unhappy. The choice of the word chemical made the chemical industry and others unhappy because it suggests that we know something about the pathogenesis and that chemicals are the cause, as opposed to its intent which was that when you ask someone who correctly carries this label what their experience of life is, they say, "I get around chemicals and I feel bad." That is what that label was intended to do. Unfortunately, all the attempts that have been made to change the label have another extraordinarily negative effect, which is to distract attention from the real issue - to better understand it. It is much easier to understand it if everyone uses the same name and criteria than if they spend a lot of time debating whether it exists, what form it exists in, what name it should have and so forth. It is complicated. Your point is well taken, but at least you will now understand why it is used.

Hon BRUCE DONALDSON: We all know that some women are allergic to different perfumes. They can cause headaches etc. Some men and women have allergic reactions to some deodorants - it affects the skin etc. That can be identified by some of the ingredients. Would that cause it? Take two women with a perfume like Opium. It affects one person but does not affect the other.

Dr Cullen: It will shock you when I tell you that some of the individuals you are describing probably have multiple chemical sensitivity. There have been fairly good epidemiologic studies of large populations. Whatever the hell it is, it is quite prevalent. A study was done to better

understand, since you raised it, the Persian Gulf War syndrome. That syndrome looks an awful lot like multiple chemical sensitivity. A study of military personnel, funded by the Centers for Disease Control and Prevention in Atlanta, was conducted in the State of Iowa. I am sure members of the committee know enough of my dear country to know that I am talking not about northern California but about military personnel in Iowa. The background rate of responses to this quite well-designed survey of people who would probably meet criteria for multiple chemical sensitivity was slightly above two per cent. That was of military personnel who did not go to the Persian Gulf. Of those who went to the Persian Gulf, the rate is closer to five per cent. That is probably what the so-called Persian Gulf War syndrome is in part about. When you describe women who feel violently ill and get headaches and so forth around certain perfumes, it is not a classic allergy. This is what MCS is about. Fortunately, the vast majority of these people do not bother doctors with it. They figure out for themselves what they can and cannot tolerate and they get on with their lives. What we ended up seeing clinically is unfortunately the tip of an iceberg.

The CHAIRMAN: Surely some people can have it worse than others, can they not?

Dr Cullen: They can, although we understand that as poorly as we understand why people get it in the first place. Since we have no physiological way of measuring this, we tend to rate severity on the basis of function. Although we have developed various ways of rating people's symptoms and so forth, what actually matters is how vaguely similar the life people lead is to the life they led before the symptoms started. That is how we think about them and the severity of symptoms. Thankfully, as I have said, the evidence is pretty strong that those who seek medical attention for it are a small minority of the people who are affected by chemicals.

The CHAIRMAN: You are not inferring that they are just the whingers, are you?

Dr Cullen: No I am not. I am being careful in my use of language, because "severe" in other diseases means something different; for example, how likely it is that people will progress to something else and die. If you read the paper, you will see that is not in the spectrum of this disease. This is not a progressive disease. It is not a curable disease, unfortunately, but it is not progressive. Therefore, we cannot use "severe" in the way that we might with other conditions.

Hon LOUISE PRATT: You mentioned the social phenomenon as opposed to the medical one. This is not specific to Wagerup but applies to other projects: a variety of people would naturally react to caustic odour without having multiple chemical sensitivity. This would create a certain mix of issues when distinguishing all the different possible threads, would it not?

Dr Cullen: If we had to rank chemicals by their irritancy, caustic would rank relatively high on the list. It is pretty irritating. If we were to spread a little caustic in this room, most of you would feel it. I have been through a dozen or more refineries, and depending on where I find myself standing and what part of the process is going on in the refinery, I find it more irritating than alumina or bauxite or the other common elements in an alumina refinery. However, it is worth noting that just by virtue of circumstances we had the HealthWise surveys of the symptoms and functions of the work force at all refineries done from a time which appears to predate the recognition of symptoms and concerns. It is true that the rates were not extraordinary; in fact, they were relatively indistinguishable between the hourly workers who were directly exposed and those who were not in direct contact on a daily basis, with the exception of intermittent upper respiratory symptoms and nose and eye irritation, especially nose. It would be the kind of thing that would lead one to enhance control, but it would not be the kind of thing that would lead one to take extreme precautionary measures. We have fair amount of information about the caustic issues. It is irritating. For those of you who have never been exposed to it, you should probably treat yourselves to it, just so that you will understand the kind of thing we are talking about.

Hon FRANK HOUGH: You would probably have the international figures on the effect of MCS. In Iowa, for example, it affected two per cent of the local people and five per cent of those who went away. The statistics for agent orange and many others are probably available. Would it not be

a opportunity for Alcoa to put this issue to bed by conducting a survey of all the people in the area and their symptoms? The two or five per cent are international figures. If the Alcoa site comes out with similar figures, obviously we are on the ball. If it comes out at 20 or 30 per cent or three to six times as much, we would have to go one step further and say that MCS can be triggered but there is an abnormal functional feature in the refinery.

Dr Cullen: Certainly in principle you are thinking in the way I always think about these kinds of issues, which is to try to step back from the observations of individuals, which are often very complex. An epidemiologist takes patterns of things relating to time and environmental measurable levels and things he can measure in response, whether that be questions, a blood test, a spiograph, or whatever. The problem unfortunately at this stage - I think I alluded to this in an earlier answer - is that life gets complex and the ante rises. People are too aware of what is going on around them, so the population responds. This has nothing to do with people being disingenuous, lying or cheating on either side of the ball. It has to do with the relative impossibility of studying a issue when respondents fully understand the ramifications of anything they write down. That is why we do not let scientists who are testing a new drug know who is getting the placebo and who is getting the new drug, because although they are lovely guys and are wonderful, honest and pure scientists, if they were not blinded they would get it wrong. The standard for doing research on a new drug is that a doctor who is testing his or her hypothesis cannot know who is getting that new drug. Unfortunately, we cannot do any blinding here, because people know where their property is and they know where they are. There is too much of what we call overlay to study in that way. I am very sympathetic to the idea. I just do not think it could be done in an unbiased fashion which will answer the question. There might have been a moment in time when one could have done it. Probably like everyone in this room, I have a feeling that had I been more perceptive in my last visit here, I might have been more useful. I regret that, but I recognised there is an issue. I thought it was being appropriately controlled. I was stunned to find out that more concerns had arisen over time. As I have said, I do not think that study could be done, unfortunately.

Hon FRANK HOUGH: I could be the bucket of water that is needed on the fire. It will only get worse.

Dr Cullen: Certainly we are all looking for a way to do the things I described earlier, which are to find a way out of this fire. Unfortunately, attractive as it is, I do not think it is the right solution, at least not by itself.

The CHAIRMAN: Thank you very much for making yourself available. If you come up with any written report at the end of this, I assure you it will be a best seller in the south west of Western Australia. In response to a query that was raised with me at lunchtime, I point out to people who have been sitting here for some hours that this is an open inquiry. If there is something that they think this committee should be aware of in pursuing this inquiry, I invite them to put in a submission to the committee office, and it will be circulated to members so that we will be aware of other views.

Committee adjourned at 5.40 pm