T R A N S C R I P T

STANDING COMMITTEE ON THE ENVIRONMENT AND PLANNING

Inquiry into unconventional gas in Victoria

Melbourne — 1 September 2015

Members

Mr David Davis — Chair
Ms Harriet Shing — Deputy Chair
Ms Melina Bath
Mr Richard Dalla-Riva
Ms Samantha Dunn
Mr Shaun Leane
Mr Adem Somyurek
Mr Daniel Young

Participating Members

Mr Jeff Bourman
Ms Colleen Hartland
Mr James Purcell
Mr Simon Ramsay

Staff

Secretary: Mr Keir Delaney

Research assistants: Ms Annemarie Burt and Ms Kim Martinow

Witness

Professor Michael Ackland (sworn), Acting Chief Health Officer, Department of Health and Human Services.

The CHAIR — I welcome Professor Michael Ackland to the hearing into unconventional gas in Victoria to talk about the public health considerations. I indicate at the start that what you say here is evidence under oath and will be protected by parliamentary privilege. If you repeat that outside, that may not be protected.

You are aware of our terms of reference, Professor Ackland, and I ask you to step through a submission in the first instance and then we will follow with questions.

Visual presentation.

Prof. Ackland — Thank you very much, Chair. I welcome the opportunity to appear before this inquiry. While I am the acting chief health officer, I want to emphasise that I am fully in the role as chief health officer for the state of Victoria and I take on all the responsibilities, formal and statutory, in relation to that role. Just a very quick outline: I am unashamedly going to speak to some of the broad principles of public health and health risk assessment and management, and address some of the key elements required to protect public health in relation to unconventional gas.

Just briefly, the role of the chief health officer, for those of you who do not know, is a statutory role appointed by the Secretary of the Department of Health and Human Services under section 20 of the Public Health and Wellbeing Act. The chief health officer, amongst other things, has the following functions and powers: to develop and implement strategies and promote and protect public health and wellbeing, which is the most fundamentally important part; provides advice to the Minister for Health and the departmental secretary on matters relating to public health and wellbeing; and exercises specific legislative roles. In the capacity of presenting today, I have an advisory role to this committee, and the chief health officer does have an advisory role regarding investigations and inquiries relating to potential impacts on public health, such as non-occupational or community level exposures. It is important to note that the chief health officer does not have a role in dealing with occupational exposures.

In terms of public health risk assessment and management, this might seem like public health 101 to some of you, but it is actually very, very important for me to emphasise that there are a well-recognised and agreed set of steps that must be used in a health risk assessment. The first of those is to identify hazards of concern, and hazards may be pollutants, chemicals, issues that can have an impact on people — they are things that can actually impact on people; to identify what doses of hazards are associated with what particular effects, and that can sometimes be referred to as a dose-response relationship; to define how people might be exposed to hazards, and there are many ways that that can happen; to characterise the potential for and the scale of adverse effects on health, and that is known as a risk-characterisation exercise; and then, of course, to determine measures to reduce risk of adverse health effects, which is about risk management.

I should just note that on the slides the bits in red are generally relevant to the gaps that we have in the context of this exercise.

The need for strong evidence in relation to health risk assessments is a fundamental tenet of how we do assessments in public health. In relation to unconventional gas, there are a number of really important hazards. So clearly you understand that there are chemical hazards. I emphasise that there can be mixtures of chemicals, and the effect of mixing chemicals together can be much more than the sum of the parts of the mixture, and it is about chemicals that can be used in gas extraction through hydraulic fracturing and then there are issues around chemicals that can be produced in gas extraction, which can be naturally occurring gases, chemicals and even radioactive materials liberated by the process. Of course dust particles, noise and various other emissions, which can have impacts on climate change from greenhouse gas emissions, are also important for consideration. And I do not think we should ignore the fact that there can be significant downstream effects that are not just about the physical exposure to a chemical for an individual.

I wanted to give you a sense as to the range of chemical hazards that I have been briefed on, and there are many different chemicals that may be used and produced due to unconventional gas operations. The available evidence indicates that these may include, as you can see, quite a list, and some of these are not very pleasant chemicals. If we go to the bottom of the list, we have the polycyclic aromatic hydrocarbons and the volatile organic compounds, such as benzene, xylene and ethylbenzene, which are well-established carcinogens. I do not intend to read through that list, but you can see that there is a broad range of chemicals.

I have already mentioned this, but the potential for health effects does depend on the particular hazard, how much of that hazard people are exposed to — so that is the dose — and the duration of exposure, so obviously there will be different effects from short-term and longer term exposures. In terms of potential health effects, if I go back to that list of chemicals that I have just shown you, these are the sorts of health effects that can occur as a result of exposure to those chemicals. And I want to repeat that it can be the combination of mixtures of chemicals that can lead to this, and it is actually important to appreciate that. The effects on the immune system, the nervous system, liver and kidney toxicity, reproductive issues, cancers, respiratory and cardiovascular illnesses and psychological effects are all very serious health issues.

How might people be exposed to such hazards in this context? Contaminated land, contaminated surface and ground water supplies, and pollutants in the air are the main routes of contamination — so the main routes of exposure. Contaminated land can occur from chemical spills and inappropriate disposals of wastes, including hydraulic fracturing fluids, and the impacts can be on land, including secondary contamination of primary produced products, such as food, crops and livestock. So there is actually a further downstream effect, as opposed to having the direct effect on people. There can be downstream effects relating to obviously the consumption of crops or the flesh of livestock.

Contaminated surface and ground water is something which is for me very conspicuous and very, very important indeed. Again, looking at chemical spills, injection of hydraulic fracturing fluids and inadequate treatment and disposal of wastewaters can lead to potential impacts on drinking water in regular water catchments, water used for irrigation, recreational use of waterways and stock and domestic use again — just remembering that potable water can be derived from groundwater, as does occur in the Geelong district. Then there can be pollutants in the air due to fugitive gas emissions, from dust from contaminated land and from the operation of machinery. There is quite a broad range of air pollutants that can be important.

In terms of risk characterisation I think one of the important things I wanted to attend to here was understanding a range of knowledge gaps. I think one of the first issues is that there is significant uncertainty regarding several aspects of public health risk related to unconventional gas activities, principally because many of the potential hazards are actually unknown. Knowledge is lacking regarding potential hazards and their physical and chemical properties, how they move in the environment, associated health effects and the dose-response relationships. In those points I am suggesting that while on the one hand we may not actually know what the chemicals are, even if we did know some of the names of those chemicals it may still be unknown as to what the actual effects those chemicals would have on people who are exposed to them, so that is a significant knowledge gap. Hence there are gaps in prevention or our ability to carry out a comprehensive health risk assessment, and clearly that is because there is a significant range of potential hazards, and it is only if we have a full understanding of the full range of hazards that we can actually get to that point. I have already expressed to you my concern about the health impacts from exposure to chemical mixtures.

Another thing that is important is that health guideline values are not available for all known hazards. When we are looking at assessing public health risks in relation to food and water, for example, we take for granted that there are processes and understandings of what is acceptable to be in our food and what is not acceptable to be in our food. With regard to water, for example, there are safe drinking water guidelines which stipulate reference levels for the levels of certain elements that may occur in water. In this area we have no such guideline values. Of course the guideline values, were they to exist, would be different for different exposure routes, emphasising that there can be oral intake, which is ingestion — for example, with the water guidelines; inhalation — and we are looking at air quality guidelines; and then there is topical exposures, to which guidelines relevant to skin contact relate. Again there is this sort of poverty of evidence that is available to us in relation to the long-term and short-term effects in relation to these exposures. Importantly there is also no evidence to rule out such health effects.

With hydraulic fracturing chemicals, when I was on my learning curve about this perhaps one of the most alarming things for myself was that there are many, many chemicals that are proprietary chemicals and are essentially commercial-in-confidence and are therefore not able to be disclosed. Looking at the experience from the United States Environmental Protection Agency, there are around 1076 chemicals that have been compiled by the US EPA, and in only 42 per cent could the physicochemical properties of those chemicals be obtained, and in relation to levels that people could safely consume over a lifetime without health effects that information was only available in 90, or only 8 per cent, of that large list of chemicals. If that is not a large knowledge gap, then I am not sure what it is.

In relation to risk management, I have made reference to what we take for granted in looking at things like food and water, and preventive risk management principles are absolutely what underpin our processes, strategies and policies in relation to food and water safety, and so it should apply in this context as well. There are a number of key elements in relation to risk management, which include mitigation measures and operational procedures and process control measures. Again referring to the US EPA there are published reports which have examined the level of effectiveness of various elements, such as risk mitigation measures. There have been, for example, 151 spills, documented in the US, of hydraulic fracturing chemicals, where fluids reached the surface water in 9 per cent of cases and the soil in 64 per cent of cases, and at least 3 per cent of surveyed wells did not have cement across the portion of casing which is aimed to prevent chemicals and gases from entering the groundwater or leaching out from the drill pipes. So while such events may be relatively low frequency or likelihood, the consequences for failures such as the above are indeed potentially very significant and can be potentially irreversible. It is a matter of getting it right in terms of the regulatory arrangements around unconventional gas mining.

The key elements required to protect public health are summarised nicely on this particular slide. There needs to be a comprehensive assessment and management of potential risks to human health, including a comprehensive understanding of the hazards and potential impacts, the likelihood and consequences of key hazardous events, stringent risk mitigation measures and an understanding of the effectiveness of risk mitigation measures. While there is some degree of mystery about proprietary chemicals and chemicals that cannot be disclosed for reasons of commercial-in-confidence, I think for proposed projects in Victoria there should be full disclosure of chemicals that are being used in the process of fracking. If we are injecting chemicals into the ground in a particular project, we should know what they are. There of course is uncertainty about the chemicals that come out of the ground; we may predict what they are, but we also have to be mindful of the fact that there may be chemicals that are unknown that come out of the ground, either on an expected basis or on an unexpected basis. There needs to be consideration of the potential health effects from exposure to chemical mixtures, as I have already pointed out twice. There needs to be a strong and effective regulatory oversight mechanism.

At the moment one of the things that I am also concerned about is the fact that the environment effects statements are at the discretion of the Minister for Planning. I think it is important that environmental effects statements for particular projects should be mandated — it makes no sense that they should not be — and that the Department of Health and Human Services should participate in the preparation of environmental effects statements. That is to ensure that there is an adequacy of the health risk assessment process in that mechanism.

The other thing that I point out — the last dot point here — is the engagement with national peak health bodies. It is my view that the National Health and Medical Research Council would ideally be approached to conduct a full, systematic literature review of the health effects of unconventional gas mining. I think that is something that we should be referring to peak organisations such as the NHMRC to get an independent and obviously highly competent evaluation.

In summary, there are a number of potential hazards associated with unconventional gas activities. The full range of hazards is currently unknown. For the known hazards scientific data that we have access to can be quite limited, so it is one thing to put a list of chemicals up on the board — and it could be as long as a piece of string — it is quite another thing to know about the health impacts of particular chemicals. We know what we know, but there is quite a bit that we do not know in relation to lists of chemicals.

There is a need for further research to fully assess the potential risks to public health, and a strong and effective regulatory oversight is a prerequisite for protecting public health. A precautionary approach is one that I adhere to in my business, and that should be taken where there is any scientific uncertainty at all. The Public Health and Wellbeing Act says:

> If a public health risk poses a serious threat, lack of full scientific certainty should not be used as a reason for postponing measures to prevent or control the public health risk.

What I have just put up on the board for your interest are several very important international scientific reviews. In addition I refer you to the National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia, as conducted by the National Industrial Chemicals Notification and Assessment Scheme — NICNAS — which is yet to be published; but it is probably the only significant report that I am aware of in Australia that does provide any focus on human health — —

The CHAIR — Is that available, or is it not yet available?

Prof. ACKLAND — It is not yet available because it has not been published. It is still a work in progress. That concludes my presentation, Chair.

The CHAIR — Professor Ackland, I thank you for your very helpful submission. It seems to me — and I am going to summarise some points here to see if you agree with my understanding of things — there are a number of process improvements that you recommend, including requirements for health input on environment effects statements being mandated, work with the NHMRC to collect evidence and those sorts of steps on the one hand, but the essence of your advice to us is that there is a range of chemicals that are used in fracturing of various types. There are varying states of knowledge about those particular chemicals and the dosages at which they are safe or otherwise, and some of them are proprietary chemicals. In those cases we do not know what those chemicals are. We might know a general classification, but we might not know the exact chemical. In those circumstances we cannot be certain that use of these chemicals is safe.

Prof. ACKLAND — Correct. I am happy with your summary of that. That is correct.

The CHAIR — All right, and to go a step further — and I just might ask if there is a chief health officer discussion that has occurred on this matter and whether any of that is available — I note that you have recommended that the NHMRC be commissioned to undertake a full review.

Prof. ACKLAND — There has not been a formal discussion of this matter with chief health officers. As you will know, Chair, chief health officers convene at the Australian Health Protection Principal Committee, and that has not been a formal agenda item recently that I have been part of. There have been some informal conversations between chief health officers but none of which are formal and have generated any consensus position that I could convey to you.

The CHAIR — I note the New York State Department of Health public health review of high volume hydraulic fracturing for shale gas and the EPA that you refer to and the environmental impacts — Werner et al. (2015). The closest that we would have here would be the New South Wales chief scientist's review. Does that touch closely enough on some of these health matters or not really?

Prof. ACKLAND — I am not actually able to answer that question, because I am not aware of the contents of the New South Wales chief health scientist's review, but I could take that on notice.

The CHAIR — The chief scientist; that would be fine, thank you.

Ms SHING — Thank you, Professor, for your very comprehensive presentation and for outlining the scope of your contribution to the terms of reference that the committee is dealing with. I would like to take you to the summary at page 7 of the slides that you prepared for us today, which indicates among other things at the last dot point that a precautionary approach should be taken where there is scientific uncertainty. That comes off the back of what you have indicated throughout the course of your presentation — and my apologies if I have got this wrong — that there is significant scientific uncertainty.

Prof. ACKLAND — Correct.

Ms SHING — And I note that you have set out a definition from the Public Health and Wellbeing Act 2008 around a 'lack of full scientific certainty should not be used as a reason for postponing measures to prevent or control the public health risk.'. I also note that the precautionary approach has been considered in public policy and by the courts in relation to the statement of common sense that it requires in terms of understanding risk and managing risk. The question that I have around how it is that the precautionary approach should be adopted relates to how the scientific uncertainty can be addressed without proceeding with an industry in order to better understand what the consequences are over time. On the one hand, there are lots of unknown knowns and unknown unknowns in this given proprietary chemicals and the way in which — —

The CHAIR — Yes, Donald.

Ms SHING — That is correct, and I do not shy away from quoting Donald Rumsfeld in this regard because it is directly relevant.

Prof. ACKLAND — We have done that a few times.

Ms SHING — There is an awful lot that we do not know about the longitudinal health effects and environmental impacts of the sorts of chemicals which occur either directly in the course of the process or which may arise in the context of blending or combining various chemical combinations. How, from a risk management perspective and in your view, can we best address a precautionary approach without actually going down the path of a suck-it-and-see trial, for want of a better term? I am testing this in the context of a lot of evidence that has said, 'If we go down this path and there are irreversible consequences, we cannot then come back from that precipice'.

Prof. ACKLAND — Thank you, Deputy Chair, there is a lot in your question.

Ms SHING — There is a lot in that. I apologise.

Prof. ACKLAND — But I think I need to distil this to some simple principles again: I am a bear of very simple brain. I think it is really, really important that we follow precautionary principles in addressing this, but I think there is also through this inquiry a very significant opportunity in Victoria for us to get some of the fundamental principles right in terms of how we address this. It is not about whether we go ahead or do not go ahead; it is more about making sure that when we are involved/engaging in projects that involve either testing or the conduct of unconventional gas mining we make sure that we have the knowledge that I believe is necessary for us to gain confidence as to what we are dealing with. There is a whole lot of knowledge that is out of scope for me to comment on — that is knowledge around the geomorphology of the places we are actually drilling into. I have been advised that there is a significant amount of variability in that space in both the Otway and Gippsland basins. I have seen the transcripts that have discussed that. That is terribly important in its own right.

Then, from the public health point of view, I really want to adhere to the comment I made in relation to the disclosure of chemicals in proposed projects. Whether they are pilot projects or major implementation projects, I think it is quite reasonable that we expect that there is disclosure of the chemicals that are used. One of the things I also want to emphasise is that one sometimes hears percentage figures that say, 'Look, in the actual injection of stuff into the ground, 90 per cent is water, X per cent is sand and only something like 1 per cent is chemicals' — or it is a very small proportion. The implication is: 'Sorry, guys, there's nothing to worry about'. That 1 per cent can actually translate into tens of thousands of litres of chemicals that, if they are unknown, present a problem.

I actually think that in terms of a regulatory framework it is quite reasonable to have an expectation that on a project-by-project basis we understand what has been put into the ground. I think it is also reasonable to expect that as a precaution we have regulatory measures that make quite clear what is expected of the processes in mining. Again, it is out of scope for me to comment on that, but it makes basic sense that we should have that. It also makes sense that there should be strong monitoring arrangements in place which are looking at the performance of any mines we are dealing with. That is a strict monitoring, again, of what is going into the ground and what is coming out of the ground. What is coming out of the ground can be problematic, of course, because it may actually go into groundwater below what is visible to us, so that needs careful consideration. I think that is actually doable, and it is quite within the scope of people with the relevant expertise to monitor that. Then, of course, there are other issues which I referred to in terms of hazards and how they can actually be generated.

I think the other thing which is really important is looking at the issue of decommissioning various mines. There are a number of decommissioned sites around the state, and I think we should be able to assume that there is a strong regulatory arrangement in place to actually manage the decommissioning of mines because it is quite possible that there can be leakage of fugitive gases from decommissioned mines after their effective life has ceased.

They are the sorts of things I think we need to go back to, in defending what I have said about the precautionary approach. If we do not do that, then we are not taking a precautionary approach and we are potentially exposing the community to risks.

Ms SHING — Just one final supplementary: if we are not doing those things and we are thus exposing the community to risk, is there by extension a manageable level of risk in relation to potential health impacts that might be able to be achieved where we do not know what the impact of these chemicals might be?

Prof. ACKLAND — One cannot make a general statement about that, and I think one needs to look at this on a case-by-case basis. That is why I made the point about looking at risks or issues relevant to what I have quoted on my slide as 'proposed projects'. I would be reluctant to make a general, sweeping statement about that, but you have mentioned the word 'community' and I think it is really important that in this whole process the community is engaged in this. In terms of risks, one of the things that occupies a lot of my time is actually providing support to the community, which has perceptions of risk. We need to manage perceptions and also manage the reality of risks to which the community is exposed. Simple processes of consultation can be very, very helpful, particularly if they are done in a timely manner.

Mr DALLA-RIVA — Professor, when you referred to the slide on chemical hazards, you said, and I wrote it down, 'I have been briefed on'. Who briefed you?

Prof. ACKLAND — I just need to refer to the slide that you are referring to.

Mr DALLA-RIVA — It is 'Chemical hazards', on page 3 of the printout. You said, 'I have been briefed on'. Who briefed you?

Prof. ACKLAND — It was an internal briefing from my environmental health team, some members of my team being in the room at the moment. We have a group of experts. I am a public health physician; I am not an environmental health expert. I depend on the expertise of my people to give me advice on the sorts of ranges of chemicals that we are dealing with, and that is what I was referring to.

Mr DALLA-RIVA — A question about the volatility of chemicals. I am just curious about your views on the location. Whilst you indicated the potential health effects, the potential health effects from exposure to certain chemicals would obviously be dependent on the location of the facility. I use the reference that if you were to undertake coal seam gas exploration in a rural town or city, it would clearly have a different effect from the effect if it was in, say, a very remote rural area. Do you have any comments about the effects from your perspective, the health perspective, in a dense area or a very remote area and how you make the determination on the risk to the chemical exposure in a remote, very limited area of human population, and how would that impact on your assessment of what you presented today?

Prof. ACKLAND — There will clearly be different risks and levels of risk dependent on the location of a mine. So if we were to drill a mine in the middle of the CBD here, there would be hundreds of thousands of people potentially exposed; if we were in a remote area, fewer people would be exposed. But I do want to remind the panel that the exposures on people can be both direct — so there can be direct physical exposure, such as contact with the skin — and there can be indirect exposures.

Even in very remote areas groundwater can be affected. For example, you could contemplate a remote farming station where groundwater is drawn and it could be hypothetically contaminated. It could affect stock, it could affect agricultural crops and it could affect the people who are actually working in that particular setting, so this is again why I have tried to emphasise the importance of looking at a case-by-case assessment of the locations of projects and the importance of looking at the risk assessment on a case-by-case basis.

I would not be comfortable making a general statement about the level of risk in terms of the likelihood of exposure and the consequences as a blanket statement; I cannot do that. One does need to look at the site-specific issues, and hence my statement about the importance of environmental effects statements that actually have a health risk assessment component to them on a case-by-case basis as something that should be a required part of the process rather than a discretionary part of the process. By so doing, it will take into account things like population density or agricultural use.

What is meant by remoteness? The word 'remote' actually does not give me any comfort because there can be many significant human activities that occur in remote settings and we need to take into account those things. That is exactly what happens through an environmental effects statement.

Mr DALLA-RIVA — In taking that one step further, if I may, Chair, in the assessment what you are looking at is not directly to a human being; it is what eventually may get to a human being through different processes.

Prof. ACKLAND — It may.

Mr DALLA-RIVA — The groundwater that you have given the example of that may be contaminated, that then flows on through whatever means through the crops or dairy product, which ultimately would end up being in the shop in a form that is consumed by a human — is that where you are at? Because I am not understanding where — —

Prof. ACKLAND — There is no one fixed exposure route. If we are looking at the general sort of scheme of this particular industry — this is not the right slide, I am sorry — there is clearly the potential for people to have direct exposure to the chemical so they can actually get a chemical on their skin. They could consume orally, in food, a chemical. They could breathe it in if there is dust and there is chemical in the air that we breathe, right? There can be radioactive exposure to chemicals, such as radon, that could be about an individual exposure.

Again, there is a bit of a danger in making sweeping, generalised statements about this. It is about looking at the specific exposures, effectively the dose response I was telling you about earlier, in terms of the amount; looking at the exposure to a particular known chemical; understanding the risks associated with the particular chemicals or other things that people are exposed to; understanding the duration of exposure; and having evidence, as best we can get it, in relation to our knowledge of the hazard, which is the chemical or the pollutant, and the effect it can have on people. We need to get that right, so that is the principle I have been trying to communicate to the panel about how we actually go about a health risk assessment. That is part of the environmental effects statement that needs to be done on a case-by-case basis.

Ms BATH — Thank you, Professor. At page 5 of the handout we have, you speak about health guidelines:

> Health guideline values are not available for all known hazards, including those relevant to different exposure routes …

We know some information about some of the chemicals. In order to produce health guidelines and looking at public health risk, what would you suggest would be the format and undertaking to get a full picture so that we can understand how much exposure people could be exposed to? Tell me more about the health guidelines that you would see and the scientific background on that.

Prof. ACKLAND — This is a significant body of work that needs to be done. When I was referring to peak agencies that can look into these sorts of issues, that is certainly the sort of thing that would be in the scope of the National Health and Medical Research Council to do, when I said in my presentation that it could:

> … conduct a full, systematic literature review of the health effects of unconventional gas mining.

Part of that is about trying to understand what health guideline values might be. For example, as some of you know, I have recently been publicly involved in the discussion around community exposure to mercury in fish in the Gippsland Lakes. Food Standards Australia New Zealand has very clear guideline values for the levels of mercury that are acceptable in the flesh of fish in tests that are done, which is exactly what we were doing. It is quite an empirical value. You can say you either exceed that value or you do not, and if you do not exceed that value, then you are dealing with something that is safe.

In this particular context, there are a number of chemicals where guidelines exist, but more often than not they do not. There is a body of work that is required to obtain that information. I do not think it is for me to suggest to the committee who should do that work, but it is certainly something that we should seek to do as part of the assessment of chemicals that would be used, as I said, on sites that may occur in Victoria on a case-by-case basis.

Ms BATH — I have two more. It seems to me that some of these chemicals would take quite a while in order to get the guidelines — as in, there would need to be a longitudinal study around that. Could you make commentary around the time that would be required?

Prof. ACKLAND — I cannot comment on the time that it would take. Obviously for some chemicals that are obscure chemicals it would take a significant body of work and there would need to be studies done. For some chemicals it would be different and it may be possible to get appropriate information quicker than that. But generally speaking this is a gap. I would urge that we consider the basis of my logic rather than the time that it takes to get the appropriate evidence to provide assurances that processes are safe for the community.

Ms BATH — With respect to the produced water — at the end of the fracking process we have produced water — have you had knowledge or experience around the testing of the treatment? So it has treated the

produced water, whoever the oil company is: do you have knowledge around that process or the result of the treatment?

Prof. ACKLAND — I do not have sufficient knowledge of the actual details of the process for that, but I understand there are requirements for water that is to be consumed by people which are underpinned by our state drinking water guidelines. In terms of the details of the processes I think you should speak to experts who are involved in the water industry to ascertain how those processes are conducted.

Ms DUNN — Thank you, Professor Ackland, for your presentation. I am still grappling with the range of knowledge gaps in this space, and your presentation highlights many of those knowledge gaps. It would seem that we need a better understanding of the health implications.

Prof. ACKLAND — I am sorry, I was not able to hear what you just said. I beg your pardon.

Ms DUNN — That is okay. Clearly one of the key issues is around the use of chemicals, and to that end we do not even know all of the chemicals. I am trying to understand how you reconcile a health assessment against a group of unknown chemicals. I assume that you will need to know what chemicals are being used before you can even begin to evaluate the health impacts of those chemicals.

In your view, in terms of moving ahead in getting a better understanding of all of these impacts and these knowledge gaps, what do you believe is the best next process to get a comprehensive understanding of the health impacts?

Prof. ACKLAND — I think there needs to be a detailed conversation with the experts who will be, for example, generating pilot test wells in the state. As I have indicated to you, the chemicals that we are talking about can be chemicals that are actually used — in other words, are pumped into the ground — as part of the process, and it is my understanding that these chemicals are used to effectively break up or assist in breaking up the biomass around gas under the ground. Then of course there are the chemicals that come out of the ground.

I think if there is to be progression of this matter in any testing arrangements that are put in place it should be firstly established exactly what chemicals are being used. We need to start at the beginning, so I do not think we can make assumptions. In fact my understanding is that it is not correct to assume that the same chemicals will be used in different places. If we took 50 different potential wells across Victoria, it is possible that there would be 50 different combinations of chemicals that could be pushed into the ground as part of the process.

I think what we need to do is to gather some evidence around what chemicals are used. I have no idea, because what those chemicals are and what variance there is in their use is outside my area of expertise. It may be that there can be more consistency in the use of chemicals than I am imagining, but I think we need to gather some data about that to form a view about what hazard those chemicals present to public health. We should also get expert advice around the nature of the chemicals that are actually derived from the process — that effectively come out of the ground. Obviously there are intended gases that come out of the ground, because that is why we are doing it, but there will be unintended gases that may be in fugitive gas settings which may be known or unknown.

Whenever one is confronted with this sort of dilemma I have always been taught to look at some sort of pilot process, and if one is doing some sort of pilot process there needs to be a thorough evaluation framework established before you embark on the pilot process. It is not quite good enough to go in and do a pilot exercise and then have a think afterwards and say, 'Oh, heck, we should have done an evaluation of that or thought about what we're going to evaluate after the fact of doing it'. I think having a proper evaluation structure or framework built around the pilot before it happens is the best way of dealing with this. Then you will give yourself the best opportunity to capture the sort of information that I am currently not able to access. Then we could have a different conversation, I suspect, about risks.

Ms DUNN — Do you see as part of that process the department having a key role in that process?

Prof. ACKLAND — Are you referring to the Department of Health and Human Services?

Ms DUNN — Yes.

Prof. ACKLAND — I think it is important, as I have indicated, that in the generation of environmental effects statements — which I believe as I have indicated should be mandatory and not discretionary — there should be engagement with the department as a matter of routine so that one is in the best position possible to comment on health risk assessments that would have been done as part of the EES to allow the chief health officer of the day, for example, to make a comment if needed or provide advice on health risks that could be generated. But that needs to be done as part of the package of the EES.

Ms DUNN — Thank you, Professor. I will ask another question, if I may, Chair. It relates to the department's capacity in relation to emergency management. Should the worst thing happen and some sort of disaster unfolds, I am interested in your views as to whether the department can effectively manage and is effectively equipped to handle disaster both in the short term and in the long term and any health risk impacts.

Prof. ACKLAND — Emergency Management Victoria has been configured for and a lot of thought has gone into having a cross-agency involvement in Emergency Management Victoria's strategies for dealing with emergencies that can impact on Victorians. This would be no different. The chief health officer and the emergency management commissioner are in a position to convene and to make a determination of the status of an emergency and what some of the requirements would be in response to that emergency, and this would be no different from any other emergency that might occur. It is just that the complexities here might be different, but all emergencies have complexities that are unravelled in an appropriate manner, thanks to the new arrangements in EMV, which I think are outstanding.

Ms DUNN — Lastly, do you see that the department would have an additional monitoring role in relation to the long-term health impacts, should there be any? Do you see that that monitoring role would be more substantial with unconventional gas?

Prof. ACKLAND — I think thought needs to be given to how monitoring is conducted. In terms of the actual environmental impacts, there is clearly a role for the Environment Protection Authority Victoria, EPA, in monitoring arrangements. It is appropriate that our department provides advice in relation to health issues that arise from monitoring. There are a whole range of agencies that ought to be involved in monitoring. As part of the regulatory framework for this industry — I alluded to this in my talk, I think — it is important that careful thought is given to monitoring arrangements and how agencies would engage with each other to ensure that the monitoring is appropriate and to understand the physical environmental issues and also the impacts on community and agriculture. Clearly it would be a matter for me and others — probably the Chief Veterinary Officer — to comment on issues relating to the monitoring of effects on livestock and so on and so forth. I think it has to be a fit-for-purpose monitoring plan.

Mr YOUNG — I want to draw you to the figures you have here for the 1076 chemicals compiled by the US EPA. Please correct me if I am wrong, but I dare say many of those chemicals would be used in a variety of industries in a variety of other ways, and for 92 per cent of those chemicals we do not know what levels can be safely consumed by a human over their lifetime. Why is it appropriate for those to be used in other industries, and what would make this industry any different to those, given that there would be regulatory frameworks around those, which is what we need to look at doing here?

Prof. ACKLAND — There are some assumptions in your question — —

Mr YOUNG — Please correct me if you think that is not accurate.

Prof. ACKLAND — I think there are some assumptions in your question about the knowledge about those chemicals and the environment in which chemicals are used in industries other than the industry we are talking about. You may be leading me to suggest that uncertainties about the physical environment of other industries would be similar to the physical environment of this proposed industry. I do not think that is a valid assumption, and I think it is really important that that is made clear. I have tried to stress that we need to gain an understanding that is based on fact and evidence rather than assumptions about what happens in other industries.

I would suggest to you that, in many other industries where there are chemicals used on a daily basis in large quantities that can be highly toxic to human beings, there are more often than not strong protection measures in place to protect people from exposure. We can look, for example, at the use of radioactive substances that are used in health care at the Peter MacCallum Cancer Institute. There are very strong measures put in place to make sure there is no accidental exposure of the community to those highly radioactive substances that are used

in health care, so fit and proper use of chemicals and radioactive substances is fine. The question we are faced with here is an environment that has uncertainties to it, and I would be repeating myself if I started to say again what those uncertainties are. I think it is a different scenario that we are looking at here.

Mr RAMSAY — I want to hone in on the disclosure issues, because I note that one of the recommendations of a similar committee to this one in New South Wales was also in relation to non-disclosure of chemicals, and I also think a Senate committee found companies wanting in relation to providing information on chemicals used. That was four years ago. In 2012 there was a national assessment of chemicals associated with coal seam gas extraction done by CSIRO, the Department of the Environment and Geoscience Australia, due to report in 2014. I am not familiar with that report. Are you familiar with the outcome of that report and how it might meet some of the recommendations you have identified here in the key elements required to protect public health? There has been some research work done and papers written in relation to public health and chemical use. In fact the previous government banned BTEX chemicals in relation to fracking here in the state of Victoria, so I can only assume some other work had been done as well.

Prof. ACKLAND — I do not think it is reasonable to assume we are starting from a zero base of knowledge here. There is work that has been done, but I believe there is more work that is required to get confidence about the understanding of what the chemicals are that are being used, particularly in a Victorian setting. One of the things I understand is that there is significant variance in the types of chemicals and combinations of chemicals that are used in this industry from place to place. Even in a jurisdiction like Victoria, across Victoria there could be different combinations and types of chemicals used. Looking at different jurisdictions, geomorphology is again quite different, so I want to emphasise that in Victoria we need to be focusing on gaining a strong knowledge base of the chemicals that are used. For some there will be knowledge and evidence; for others there will not.

The CHAIR — Professor Ackland, thank you. We have gone a little bit over time, but it has been very helpful. I have no doubt the secretariat will need to talk to you further on some of these matters, so I thank you for your submission.

Prof. ACKLAND — Thank you very much for giving me the opportunity.

Witness withdrew.