

**STANDING COMMITTEE ON
ENVIRONMENT AND PUBLIC AFFAIRS**

**INQUIRY INTO THE IMPLICATIONS FOR WESTERN AUSTRALIA OF
HYDRAULIC FRACTURING FOR UNCONVENTIONAL GAS**

**TRANSCRIPT OF EVIDENCE
TAKEN AT PERTH
MONDAY, 17 FEBRUARY 2014**

SESSION TWO

Members

**Hon Simon O'Brien (Chairman)
Hon Stephen Dawson (Deputy Chairman)
Hon Brian Ellis
Hon Paul Brown
Hon Samantha Rowe**

Hearing commenced at 11.38 am

Mr RICHARD SELLERS

Director General, Department of Mines and Petroleum, sworn and examined:

Dr PHIL GOREY

Executive Director Environment, Department of Mines and Petroleum, sworn and examined:

Mr JEFFREY HAWORTH

Executive Director Petroleum, Department of Mines and Petroleum, sworn and examined:

The CHAIRMAN: On behalf of the committee, I would like to welcome you again to a hearing. Before we begin, I must ask our witnesses to take either the oath or affirmation.

[Witnesses took the oath or affirmation.]

The CHAIRMAN: Gentlemen, you would have signed a document entitled “Information for Witnesses”. Have you all read and understood this document?

The Witnesses: Yes.

The CHAIRMAN: These proceedings are being recorded by Hansard. A transcript of your evidence will be provided to you. To assist the committee and Hansard, please quote the full title of any document that you refer to during the course of this hearing for the record. I 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. Please note that until such time as the transcript of your public evidence is finalised, it should not be made public. I advise you that publication or disclosure of the uncorrected transcript of evidence may constitute a contempt of Parliament and may mean that the material published or disclosed is not subject to parliamentary privilege.

Mr Sellers, did you want to make an opening statement?

Mr Sellers: Thank you, Chair, I do. Good morning, Chair, and committee members. Thank you for the opportunity to address this parliamentary inquiry into the implications of hydraulic fracturing for shale and tight gas for Western Australia. The Department of Mines and Petroleum, which I will refer to as DMP, welcomes this inquiry as it provides an opportunity for a public policy discussion on this emerging industry.

DMP and its predecessors have been regulating Western Australia’s oil and gas sector for more than 50 years. Consequently, Western Australia has a comprehensive regulatory framework in place for exploration and production in the petroleum industry. In the past two decades technological advancements in drilling and hydraulic fracturing processes—also known as fracking—have enabled the development of significant natural gas resources in other jurisdictions that were previously considered unviable. Western Australia’s shale and tight gas industry is currently in the early exploration and evaluation stages, with seven wells hydraulically fractured in the past 10 years. DMP understands there is heightened community interest about the development of its new gas industry for the state. Environmental issues have been raised in other jurisdictions and, understandably, questions are being asked in WA about potential impacts on communities and our environment. In recognising these concerns, Western Australia’s regulatory framework has been reviewed and strengthened to ensure it reflects technological and scientific advancements, and to address change in community values and expectations. Western Australia’s regulation on hydraulic

fracturing is coordinated, transparent and risk based to ensure best practices are implemented to mitigate potential risks. DMP is part of an integrated multi-agency regulatory framework designed to protect public health, the environment, water resources and access to land. Other state government agencies and authorities contributing to the safe and responsible development of the shale and tight gas industry in Western Australia include the Departments of Environment Regulation, Health, Parks and Wildlife, Water and the Office of the Environmental Protection Authority.

In 2011, DMP commissioned an independent review of the regulation of the shale and tight gas industry. Recommendations from the Tina Hunter review endorsed DMP's reform initiatives that are being progressively implemented. Other review recommendations include the need for increased transparency and enforceability within the state's regulations.

New petroleum safety regulations came into effect in 2010, followed by new petroleum environment regulations in August 2012. These regulations strengthen the obligations on industry in relation to water use management and chemical disclosure. As a result, Western Australia now has the strongest chemical disclosure requirement of any Australian jurisdiction and possibly the world. In addition, DMP released new draft petroleum resource management regulations for public comment earlier this month. These draft regulations address issues such as well integrity and water baseline monitoring. In 2011 DMP established an interagency shale and tight gas working group that is focused on the state's regulatory framework. The group is developing a regulatory framework document that will provide a detailed outline of state's regulatory approach to shale and tight gas regulation. The document will set out key actions and outcomes for government, industry and the community and will address the technical issues around regulation of shale and tight gas. The document itself could be considered a practitioner's manual.

DMP is also developing formal administrative agreements with the Departments of Water and Health that include referral procedures for shale and tight gas activities proposed in proximity to a populated area or a known water resource. These agreements will reinforce existing regulatory processes, including international standards, well design and baseline and ongoing water monitoring. All hydraulic fracturing proposals are subject to the state's full environmental assessment processes.

DMP has a memorandum of understanding with the Environmental Protection Authority that requires referral for proposals within 500 metres of an environmentally sensitive area or two kilometres of a town site. DMP is working with the Environmental Protection Authority to ensure this MOU is adequate.

Mr Chair and members, I would like to take this opportunity to explain in a little bit more detail the life of a well and how regulatory issues are being addressed. At the surface of shale or tight gas activity there are several key considerations the state government is addressing through the industry's regulatory framework. Included is the size of the footprint of an activity, private land access arrangements, water management, potential impacts to the environment and the protection of workers and the public. Given advancements in horizontal drilling techniques, it is estimated a typical shale or tight gas well site will require about two hectares of land. If a project actually advances to production, current predictions are that one well site may be required every 225 hectares or spaced out around every 4.5 kilometres within the discovered gas field. Balancing land use to ensure coexistence with other uses will be a priority for the state government and will involve other departments responsible for land-use planning. Approvals under the state petroleum act require that the land access agreements must be made with private landowners prior to a petroleum company receiving project approval from DMP. DMP is pleased to see industry and agricultural bodies working together to review land access agreement processes to ensure they are conducted in a fair and equitable manner.

Environmental impacts and occupational health and safety considerations must be addressed through environmental plans and safety management systems. These are submitted to DMP for assessment and approval. Every petroleum activity is subject to the state's regulatory approval process and where applicable the DMP refers these proposals to agencies such as the Department of Water. Additionally, any proposal which potentially has a significant impact on the environment must be referred to the Environmental Protection Authority for an independent assessment.

Moving on from surface issues, there are several key considerations below the surface that the state government is addressing through its regulatory framework. These include protection of underground water resources, well integrity, hydraulic fracturing and well decommissioning. The new draft regulations released by DMP for public comment this month reflect these considerations. Petroleum operators will be required to adopt a whole-of-life approach to the construction, use and decommissioning of wells. These regulations include the requirement for international standards, well design, several layers of cement and steel casing when wells pass through aquifers, and the whole-of-life approach ensures that the actual wells are built to manage high pressure processes such as hydraulic fracturing. As previously mentioned, all fluids used down wells, including chemicals used during hydraulic fracturing, must be rigorously assessed and approved by my agency and then publicly disclosed. To ensure fluids and natural gas within a well do not leak into the outside rock formations or aquifers, operators must monitor well pressures to detect any potential loss. This monitoring is reviewed by DMP through a daily drilling report and other reporting mechanisms that we stipulate in our regulations. If a well is in close proximity to a water resource, baseline and ongoing water monitoring are also undertaken.

[11.50 am]

The allocation and management of the state's water resource is managed by the Department of Water. During the hydraulic fracturing process, operators must monitor fracture trajectory to ensure the fracture is controlled and remains within the targeted gas-bearing rock formation. This monitoring is conducted using fluid pressure sensors and microseismic technology, and the operator is required to shut down operations immediately if any predetermined safe limit is exceeded. Once a well is producing natural gas or oil, operators are required to maintain the integrity of the well. We monitor this maintenance and also conduct routine inspections. At the end of production operators are required to decommission wells and return the site to its former condition as much as reasonably practicable. As part of this process wells must be decommissioned according to international standards. This includes cement plugs to block any potential migration pathways through for fluid or gas in the well.

Natural gas is an important and significant energy resource that will continue to underpin our state's economy and energy security, ensuring Western Australia continues to have adequate, affordable and reliable energy will require the development of new natural gas fields onshore as well as offshore. Estimates suggest that WA's onshore shale and tight gas resources are significant, potentially twice what is already known offshore in the gas industry. This industry is still in its early stages of exploration and evaluation in Western Australia, so we are in a very strong position to build upon the significant research and experience of other national and international jurisdictions that already have significant shale and gas industries contributing to their economies. The responsible development of WA's shale and tight gas resource will bring both economic and social benefits, such as energy security, a cleaner energy mix, increased employment, regional growth and royalties. Consultation across the state has made it clear that many Western Australians are seeking more information about this industry in order to develop an informed opinion about the development of the shale and tight gas industry. A report released last year into shale gas development in Australia by the Australian Council of Learned Academies—ACOLA—states that to earn a social licence to operate, the shale gas industry must have transparent, adaptive and effective regulatory systems in place, backed by best practice monitoring and baseline surveys. That is certainly what we are working to achieve.

In closing, I would like to reiterate that the DMP sees this inquiry as an important part of the public discussion to ensure that community concerns are addressed and that Western Australian resources are developed appropriately and responsibly.

Mr Chairman, DMP has prepared some additional information to assist the inquiry. I seek your advice on whether you want us to table this now or refer to it as we go through. For your information, there is a copy of my statement and various other information sheets, one titled “Natural gas from shale and tight rocks: an overview of WA’s regulatory framework”; fact sheets on natural gas in shale and tight rocks; shale and tight gas activity maps overlaid with WA’s public drinking and water resource areas; petroleum approval process flowcharts; shale and tight gas stakeholder engagement activities for 2013; shale and tight gas interagency working group terms of reference; our petroleum chemical disclosure guidelines; environmental risk assessment of chemicals used in WA petroleum activities guidelines; and draft guidelines for the petroleum and energy resource regulations 2014. Thank you very much.

The CHAIRMAN: We will consider that package of information tabled. I notice that you have sufficient copies for all members. If you want to refer to any of those documents during this hearing, it might be best if members had them. I will ask our clerk to take a tabled copy and provide the others to members. If you have a copy of your statement in there, Hansard would appreciate a copy of that.

Given that DMP is the lead agency with responsibility in this matter, obviously there will be a lot of questions that we want to ask. No doubt we will have other occasions to communicate in future, if not in a forum like this then some other way. Thank you for providing that information. We already know from our preliminary inquiries late last year that this is an evolving issue. I will ask, firstly, from the department’s point of view, you have been regulating mining and petroleum activities in this state for many years, what is the difference with fracking? What are the challenges there? Is it just a different form of technology and you apply the existing approach that you have done for decades? What is it about fracking?

Mr Sellers: It is probably best to make two introductory comments and then to answer the question, if I may. In the gas industry around the world, the two technological advances involved in the process that released the gas from shale and tight rocks in America were horizontal drilling and fracturing. Both were technologies that had been in the industry for some time and had been used for a range of other purposes. Fracking has been used in Western Australia for a long period of time—in a moment I will defer to my colleague Jeff Haworth to give some absolute detail if required—however, my recollection is that there have been around 750 oil-related fracking jobs on Barrow Island over the last 40 years or so, because it is a formation where some of the oil came out easily but there was still a lot of oil in there and they were using it. Fracking has been used in Western Australia and around the world in oil fields as a stimulation method for a long time. Horizontal drilling and the way that technology advanced—I remind members that probably the most illustrated process of that in recent times is where the industry used it to drill and hit a well casing in the Timor Sea when there had been a blow-out on the Montara rig, and they did it from one and a half kilometres away and hit the 15 centimetre well casing; so they have got very good at directional horizontal drilling.

Although some shales can be quite thin and others quite thick, there are sweet spots in them, so if you are going to access the condensate, or the gas, out of it, the ability to drill to that area and maintain your presence in that productive part of the shale rock is very important. In some horizontal wells were enough to get gas to flow; they increased the surface area to the point where the gas would come out. That would not work in all fields and so the technology of fracking was used by innovative people in the American fields, and they started to produce large quantities of gas. That created an interest in a lot of other parts of the world where shale gas was known about for a long time—certainly in Western Australia since drilling in the late 1960s and 1970s when

people drilling the Canning basin at the time hit some shale beds and recorded the gas and petroleum in their well logs, but it was not flowing. It was that technology that actually unlocked it. In answer to the question, what is different about it now, one of the main things is that there is an increased interest in everything we do both in mining and petroleum. Fracking uses a significant quantity of water—we can clarify that after future questions if required—so if you have a multiple fracking operation that is going to reuse water through that process, then that water has to be dealt with. It has chemicals in it, and when there is no transparency about what those chemicals are, people, rightly, have concerns. Those are the things we have been addressing over the past 18 months in our community engagement and increasingly the transparency around regulation.

[12 noon]

Mr Sellers: To come down to a succinct answer, I think the first part is no; these technologies were well understood and used in various parts of industry. The fact that they have come together and they have generated a lot of public interest highlighted our need for transparency and highlighted our need to be able to explain the safety and risk-based approach that we have around these activities. Where it turned up in other parts of the world, other jurisdictions, prior to coming to Western Australia, where traditionally there has not been an oil and gas industry, it created a lot of community consultation and a lot of unease. We have also learnt from that and that is why we have been going out and engaging the community on it as soon as we could. I think it is that understanding that there is an activity that you need to know something about and for us to provide the factual information where we can.

The CHAIRMAN: We have a series of questions that we would like to ask; so we had better get down to it. I will try to set the example by being brief so that we can get through as many as we can. I notice in your document “Natural Gas from Shale and Tight Rocks: An overview of Western Australia’s regulatory framework” dated February 2014, that there is a discussion about the question of access to land on page 7. This discusses in general terms the requirements for landowners and petroleum operators to reach an agreement about questions of access, which I am sure is easier said than done. That leaves hanging the question about crown land which of course may be occupied by other people such as pastoralists. How is the state going to deal with that issue? We know from past experience that there are often problems with questions of access versus the rights of the leaseholder.

Mr Sellers: Thank you; there are also some fact sheets on how this operates. Given that Jeff Haworth is dealing with this every day I will defer to Jeff and his technical expertise to lead us through this one.

Mr Haworth: As you are probably aware, the current Petroleum and Geothermal Energy Resources Act 1967 has sections in it regarding land access agreements, compensation and a general framework around how negotiations are done. Taking your point, Mr Chairman, regarding pastoral leases versus freehold versus native title, they are all different. We still require that an operator has an access agreement to the land prior to doing any activities. How they do that, that commercial arrangement, is their business. All we need to know is that an agreement has been made. The native title issue, of course, has its own separate process. What we have done recently is talk to the Pastoralists and Graziers Association and the WA Farmers Federation as well as APPEA—the Australian Petroleum Production and Exploration Association—to come up with templates and guidelines around these sorts of access agreements because we see an impost on the landowner regarding these. The more assistance that can be given by those peak bodies the better. We also see that there will probably be three different templates: one for pastoralists, one for freehold and one for native title. That process is currently underway. The first meeting was on 16 October and that was chaired by Hendy Cowan. It was very positive. It seemed that everyone was on the same page as far as progressing this and acknowledging the impost that this would have on landowners. We

are looking forward to seeing how that voluntary process pans out so that we can look at the regulations to see if they need any more adaptation for that.

The CHAIRMAN: Can I ask you to detail what action the department has been taking, or is going to take, to consult with landowners and with the community in general in relation to concerns surrounding the fracking industry?

Mr Haworth: Okay; I will continue on that. We have a two-pronged approach to this. First of all there is our community consultation process where we are currently going out and talking to various bodies in the areas that we see have the potential for this industry to grow—mainly in the midwest and in the Kimberley. We have been doing that for just over a year with very good results. We talk to the communities but mainly we listen to them; we listen to what they have to say and we hear what their concerns are. That enables us to come back and review whether the legislation is right and whether we are getting the information out there. That is why a lot of these fact sheets have been produced; to get that information out. There is a thirst for information around that. That is our general approach and that will continue on through the Kimberley and the Pilbara. The second approach is actually the one-on-one negotiation that we have especially with native title. We are part of the native title negotiation process that is a tripartite agreement. When the native title bodies or communities ask for advice we will go out there, specifically to talk about that particular area and those particular projects. There is a general information dissemination program and there is also the continuing program of individuals being able to contact this department and find out about individual projects.

Mr Sellers: It might interest the committee to know that we have also sent some of our people to look at more mature jurisdictions that have this sort of activity going on to learn what sort of things they have done well and what they have not done well so that we can integrate those into our activities and regulations. In more recent times, what has been happening is that we have had some mature gas and oil provinces approaching us to talk about our disclosure regulations and how we deal with transparency. It is an open communication process both with the community and other regulators around the world to make sure that we get the best practice together.

Hon STEPHEN DAWSON: Just on that issue of community engagement, I do not want to take up too much time today but I would be very interested to hear what engagement has happened in Broome and the rest of the Kimberley—in particular with Aboriginal groups who may not be involved in the native title process at the moment. Could you provide that by way of supplementary information?

Mr Sellers: Certainly; Phil, do you have a comment about that?

Dr Gorey: Just in answer to that, as an example, in the last month or so we have had a number of people from the department—quite senior people including myself—going up and meeting with the local Indigenous community groups. This is something that we have had kicked off for almost a year. As a complete answer we would have to take that on notice.

Hon STEPHEN DAWSON: In earlier evidence and in fact in your statement and in your submission you refer to the inter-agency working group that you have convened to develop policies and frameworks governing fracking. In earlier evidence—it is public evidence so I am not telling any stories—the Water Corp expressed a concern that it is not involved in any of those inter-agency meetings. It seems to me that given that it is responsible for 95 per cent of the state's drinking water that it would be a perfect or an appropriate agency to involve in these inter-agency gatherings. Have you considered involving it? If you have and then decided not to, why have you decided not to include it?

Mr Sellers: Thank you for the question. The Water Corporation and the Department of Water have been working together to feed input into that inter-agency working group with the Department of Water being the policy arm and the Water Corporation being the provider. Certainly, we read its

initial written input that said there were some issues but since that time we have worked very closely with both the corporation and the Department of Water to make sure that they are comfortable with our approach. While there may not be complete comfort, there is certainly a level of understanding of them feeding into it. There are four specific issues. There is certainly no problem with them coming along but the policy development component of it has been worked through with the Department of Water which has another sub-group that works with the Water Corp. There are a lot of other agencies that could easily tag on but you would end up with a committee of hundreds.

[12:10 pm]

The Water Corp, in our one-on-one discussions, recognises that there is a policy link there and are working with it. In my discussions with the DG of the Water Corp, it has been very clear that their interest has certainly been around making sure that, you know, the water is of a quality that we all want to use here in Western Australia and they want to make sure that they have enough input to achieve that. So if it does reach a point where they need to be on it, we will put them on. At the moment they have agreed they do not need to be.

Hon STEPHEN DAWSON: Does the DMP have a policy on whether fracking, or indeed unconventional gas exploration, can take place in public drinking water source areas?

Mr Sellers: This leads to several sort of technical comments, the first of which is that, you know, drilling the well and the well casings that go through down to the shale and other tight rocks potential resource are in fact engineered so that they do not have any foreseeable risk of leaking and they are monitored and when they are over, they are plugged. So whether it is potable water or another aquifer that it is going through, the integrity design of the casing is there, so that there is—like in everything we do—risk, but that risk is mitigated through the engineering of the pipe. So the fracking actually happens down in the rock base, which is in these cases somewhere between three and five kilometres below the earth's surface and several kilometres of competent rock away from the subsurface water aquifers that are being used. Whether it is for the shale gas or for petroleum wells or for a gas well, the engineering is the same when it goes through an aquifer. As was mentioned in my lead-in statement, if it is near a priority area or it is near a town, it goes through its full assessment and it is part of that assessment that we would be looking to lead us to whether a gas or oil approach is warranted in that area. So, the simple answer is that the engineering in the well casing, whether it is for fracking, for oil, conventional oil, conventional gas, is the barrier as you go down through rocks and soil and aquifers to stop any interaction in that pipe.

Hon STEPHEN DAWSON: At this stage people can frack in the drinking water source areas and the department is fine with that because the technology is —

Mr Sellers: No, sorry, I am not trying to mislead you. They are not fracking in the public water source.

Hon STEPHEN DAWSON: But through them?

Mr Sellers: No. The fracking is in the shale bed, which is kilometres down under the ground.

Hon STEPHEN DAWSON: Sure. So, can a well then go through a public drinking water source area? That is maybe the proper question.

Mr Sellers: Wells can be drilled through aquifers, yes.

Hon STEPHEN DAWSON: Thank you.

The CHAIRMAN: Just on that, we have heard in this inquiry from the Department of Water and indeed from the Water Corporation, which both have an active interest in providing potable water, as you recognised, and that they see drilling for oil or gas in a public drinking water source area as an incompatible activity. I think we have been told that there is no situation where a public drinking

water source area has been drilled for oil. If that is not the case, I would be interested to know—that is the first question. Are you aware of any?

Mr Sellers: There are priority areas and catchments, so if you are looking at a water catchment area, you know, the catchment of the Swan River or the catchment of a dam area down south, say in Whicher Range, for example, there has been some drilling in water catchments and once it has gone through environmental protection processes, you are talking about the actual aquifer. I will ask my colleagues to comment.

Mr Haworth: If we are talking about public drinking areas, there is a requirement under our act to refer to the Department of Water, which is normally the owner of the reserve. At the moment the government policy is that they are compatible—I know there are moves in the pipeline at the moment regarding that—but the Department of Water has the right to comment on the drilling and we expect through that process that they would talk to Water Corp regarding areas. So we look on it very carefully and up the ante as far as the well integrity goes in those areas, and usually we would prefer companies to actually drill away from them. But as long as they meet the requirements of the Department of Water, it can be done. But as far as I am aware there is none in an actual public drinking water supply area.

The CHAIRMAN: We might clarify that through other means; in fact, we will. You might want to contemplate the questions that are raised separately, and perhaps determine if there have been any cases of conflict where the water authorities have not been happy about giving the tick to a petroleum operation which has gone ahead in one of their water protection areas. It might have happened historically but —

Mr Sellers: Certainly I am not aware of any that have happened in conflict; no.

Hon PAUL BROWN: If I could just follow on from that one, through the public water aquifers do you require a higher degree of engineering? Do you subject the drilling to a higher standard for anything that goes through the public water aquifers, or is that an across-the-board high standard?

Mr Haworth: It is basically across the board. Wells are interesting things in that, like houses and everything else, they are designed from the bottom up but, unlike everything else, they are constructed from the top down. So the way a well is designed is a design to deal with what is happening at the bottom of the hole—the pressures and temperatures and conditions down there—and during the drilling of the well they will be required to run certain set standard casings of a certain tensile strength and also cement it. The standard way of drilling is that in the first 50 metres what is called a conductor pipe is put in, which is steel and fully cemented to surface. After that, they are required to put in what is called a surface casing, which is normally around 800 metres down, which is below the potable water. That again has to be set with steel and cemented to surface. So in the very shallow surface aquifers you already have three barriers or four if you include the two cements and the two steels. They then have to drill down to whatever their target is. If that target is a successful target, they will be required to run what is known as production casing, and that is normally cemented in as well. It may not be right up to surface but it is certainly up to the casing shoe of the surface casing, if possible. Okay, you are giving me samples of it.

Hon PAUL BROWN: Show and tell.

Mr Haworth: Yes, this is a part of the show. Its cement is particularly manufactured and designed to bond to both the casing and to the rock, and they are required to run logs to prove that that has actually bonded properly. They have to pressure test each casing run to ensure there are no leaks. And in the cases of if they were going to do high-pressure fracturing, first their production casing has to be of the correct standard and they have to high-pressure test it, and we require them to run this cement bond log to prove that there are no avenues for any materials to escape up through the side of the casing or on the outside of the cement adjacent to the rock. There will be at least five barriers between any aquifer, be it potable or otherwise, and the actual well. That is stock standard.

There are requirements when drilling the well—drilling through the aquifer—that you use muds and greases and other tools and materials that are compatible with water drilling. It is the same standard of equipment that they would use for water, as far as the drilling muds are concerned.

[12.20 pm]

Hon PAUL BROWN: So the upshot is that you are fairly confident that no extra engineering or extra standard is required for going through a public aquifer?

Mr Haworth: The extra engineering will be required depending on the purpose of the well down at its target. If it is a high-pressure well, they will need to run high-pressure casings and specific types of cements to ensure that that pressure is maintained within the well and cannot disseminate out of the well.

The CHAIRMAN: Can you give us an indication of the scale of the central part of the well in each of these concentric barriers? I am trying to get a handle on what sort of mass we are talking about.

Mr Haworth: I hope the inquiry accepts my inability to talk in millimetres. I am an old guy, so I will talk inches. I am afraid that is what I am used to.

The CHAIRMAN: Most of us are of a suitable vintage.

Mr Haworth: The surface conductor is normally around a 17 and a half-inch diameter casing. If I pass this sample around—it is obviously not the 17 and a half—the thickness of the wall of that casing is normally around three-quarters of an inch. That is the one that goes down 45 to 50 metres.

The CHAIRMAN: That is the central —

Mr Haworth: That is the first outside casing. The next casing they will put in place is normally a 13 and three-eighth casing in diameter. That is the one that is cemented to the surface. Sometimes, depending on the target depth, they may drop that down to 13 and three-eighth and then nine and five-eighth and then seven inch. When drilling down to the final target, they will normally put in a five-inch diameter casing, or in this case a four-inch diameter casing. That is cemented into place as well. That will be down at 3 000 metres. One issue you have with holes is that they tend to fall in, and that is why you put casings in—to maintain the stability of the hole. You may have to put an intermediate casing in at maybe 2 000 metres, depending on the competency of the rocks around that hole. If that is the case, you have another bigger barrier. When that all goes in, normally, if they are going to do hydraulic fracturing, they will do that with the four-inch or five-inch production casing. That is where they perforate down at the shale and then they will start pumping fluids in at high pressure. That initiates the fracture of the rocks. Then they put in proppant and that keeps the cracks open. The proppant is normally sand. Once they have done that and once the well is producing and they are satisfied that it is producing enough, they run what is known as a two and a three-eighth production line—tubing. That tubing runs down to above where they are producing from. It is held in place by a hanger. The main reason for that is that it is far more efficient to produce gas through a much smaller diameter pipe than it is to try to pump it up with a five-inch casing that would be about four and a bit inches in diameter. That is hooked up to the Christmas tree on the surface. I will give the smallest examples. You have 13 and three-eighth, nine and five-eighth, four-inch casings and then a two and three-eighth inch tubing. If you like, I can get you the metrics for that if you want it in millimetres.

The CHAIRMAN: Is there something in this package of information that illustrates what we are after? I am trying to get an idea of the scale. I do not suppose you have a scale model on display in the foyer at your headquarters in Plain Street that we could go and have a look at.

Mr Haworth: There is a poster. We have an example on the “Natural Gas from Shale and Tight Rocks” fact sheet—a hydraulic fracture simulation. There is a diagram that shows it. We also have a poster at work that has a scale showing the belltower—you really need a microscope to see it—against what the well looks like.

Mr Sellers: We could give you a copy of those if you like. While members are looking, Jeff, you might want to tell the committee how they pressure test the well before they do the activity.

Mr Haworth: It has always been a requirement under both our schedules and what is coming in the new regulations that certain tests must be conducted on the well prior to proceeding. That is at every casing point. Once they have cemented the casing in place, there will be cement up inside the casing. Before they drill that out, they have to do an integrity test on the casing to ensure it meets the standards and the burst pressures that are required. When they drill out, they do a test on the formation to make sure that is competent for when they drill a head. That is required at every stage. Once they are fracturing, which is what Richard is talking about, they have to do continuous real-time monitoring of that hydraulic fracturing process, which means they sit there. This stuff pumps up. Normally in shale gas, it is around 10 000 psi. I cannot put that in bars or kPa. That has to be monitored. This goes up and there is what is called a fracture initiation point. That is where the rock will start fracturing. Then it will drop down and stay constant from that point. We do expect a small drop. This is a couple of hundred psi drop. If for any reason that pressure drops any more than that or it drops down during the process of fracturing, they immediately shut down. They have to immediately shut down. It could be caused by a couple of things. They could have hit a fault or they may have some issue with the integrity of the well. As far as we are aware, there have been no examples of that except one time in the UK at Blackpool. The royal society of engineers established that an unknown fault caused that. Therefore, certain traffic light systems were put in place for that. In WA, we insist that companies understand the geology well. Faults are no good for anybody. They are no good for the company because you cannot produce properly out of them. As I said, in WA so far, in hydraulic fracturing, no instances of that occurring have been reported to us.

Hon BRIAN ELLIS: You mentioned the new draft regulations. Can you explain to us how these new draft regulations provide stronger regulation of the hydraulic fracturing industry as opposed to the conventional regulations you had before?

Mr Haworth: If you do not mind, I will explain how these things developed. The whole point of moving towards objective-based regulation was caused by an event on 6 July 1988 called the *Piper Alpha*. I know that date very well because I lost two friends on that rig. The Cullen inquiry determined that the whole prescriptive system of safety management would not capture any systemic issues that certainly occurred on the *Piper Alpha*. There were both design issues and procedural issues. At that point they came up with the safety case regime for safety, which is objective based, risk managed safety management. That was rolled out in the UK. In Australia, it was agreed at the AMSA committee in 1994 to adopt this for all our regulations—safety, environment and resource management.

[12.30 pm]

The whole idea of it is that it is transparent, it is risk based, it talks about as low as reasonably practical as far as risk bases go, but it insists that risks are identified with their likelihood, their consequences, how you mitigate them, how you monitor them and how you remediate them should there be any errors or mistakes. How they are stronger is what we have done is separate from the schedule, which says, “You’ve got to do it this way; you’ve got to do it that way”, which gives you no real latitude for trying out new, innovative and probably better ways of doing things. But, specifically, we have put in the resource management regs specific penalties for specific things that have been done wrong, whereas the schedules did not really have that pinpointed penalty system. The other thing is the transparency of it all. We feel that the best way to get the message out both to the public and to the industry is to have open, transparent and consistent legislation around the board. These environment regs and the way we release data through the resource management regulations ensures that that transparency is available.

Hon BRIAN ELLIS: You did mention penalties. I would just like you to explain, then, how you arrived at your maximum penalty of \$10 000 for any offences under these regulations when you

take into account the amount of capital involved in this industry. Can you explain how you came up with that maximum?

Mr Sellers: It is a very good question. That is the maximum we can apply under current rules and legislation. Also, at the same time, we have another consultative process about our penalties overall and, in there, there are suggestions to take them up to the more appropriate corporate level. Once that has been settled, we see ourselves going back and adjusting those penalties up to a more appropriate base, but we have to consult and get the approval to do that prior to setting them on the existing. So, the existing was compelled by the legislation that is in place at the moment.

Hon BRIAN ELLIS: I suppose the overriding penalty is that you could close that well down.

Mr Sellers: Any time.

Hon BRIAN ELLIS: I have just got a couple of questions on the new draft regulations. Draft regulation 64 refers to the notice given to the minister of a significant event and defines five events which are significant events, including only one example of an activity which adversely affects the environment, and even that is causing effects outside of the licence area. Why do the draft regulations not include a reference to inside the licence area, and why is there no further reference to environmental impacts being significant?

Mr Sellers: It is a very good question.

Dr Gorey: I do not have the draft regs in front of me, so I might just preface what I am saying with that and offer that we might provide a more complete answer. In addition to the resource management regs that are out there for consultation are the specific environmental regulations which are already in place, which are intended to substantially deal with environmental management of petroleum activities, and there are also, which came in a number of years ago—a year and a half or two years ago—safety regulations that actually sit under those different acts as well. The resource management regulations are really the third tranche of regulations to look at the whole industry. I would have to just clarify how they interact with the environment regs, so I am happy to take that on notice.

The CHAIRMAN: Dr Gorey, if you could take that on notice. We have got a copy of the draft resource management regs available, but, as you say, it is how they interact with the previous draft environment regs that are out there. So if you could give us a supplementary response to that question, we look forward to receiving that.

Hon BRIAN ELLIS: You might need to take this on notice as well. The other draft regulation 85 that I wanted to query refers to permanently confidential information. I was just wondering whether you can elaborate on the purpose of that regulation and the types of situations that this type of information would apply to.

Dr Gorey: It is certainly not intended to relate to environmental data, but, with your consent, I might ask Jeff to provide a response to that one.

Mr Haworth: The response to that is: what they call permanent and confidential data usually is around trade secrets or personal information on, say, one of the directors when you get a CV as part of the application, or anything financial about the company that is not related to the permit in question. Those are the normal classifications of it that are used. Each one is assessed on its merit at the time and it falls back to what is still section 112 of the act, but that will be changed once these regulations are enacted. The primary aim of certainly this department is open data—get the data out; make it available. It is good not only for the public interest, but it is also good for the industry to see how wells were drilled and what happened on those wells.

Hon STEPHEN DAWSON: Following on from Brian's question, could this draft regulation 85 be used by companies who do not want to disclose what chemicals are in their fracking fluids?

Mr Sellers: No.

Dr Gorey: Certainly, that is not the intent. With the draft regulations going out, very clearly what we want to do is maintain the disclosure integrity of the environmental regulations, which have full chemical disclosure.

Hon STEPHEN DAWSON: So it is not the intent, but it could potentially happen. Before you answer, I also wanted to know who makes the final decision on what is confidential information.

Mr Sellers: I might answer that one first. Who is the decision maker, Jeff?

Mr Haworth: The decision maker is DMP.

Hon STEPHEN DAWSON: The agency?

Mr Haworth: The agency.

Hon STEPHEN DAWSON: So, a delegation. Do the regs delegate it to somebody? Is it the DG's responsibility? Do you delegate it down or can anyone in the agency decide?

Mr Haworth: With the delegation system at the moment, my position would make that decision.

Mr Sellers: On the first part of the question, they will put a case, we would look at it and we would say, on transparency, because of our other regs, clearly no.

The CHAIRMAN: Draft regulation 84 of course is related to 85 and talks about excluded information which is also permanently confidential information, as I understand it. I appreciate we are only reading the regulations in isolation. What I am asking is: where is it stated that these classes of information may or may not be released, because all this regulation does is define what it is?

Mr Haworth: I am going to have to probably get back to you, but there are some tables at the back that show how this data is released. I will take that question on notice and get back to you.

The CHAIRMAN: The principal act might use these terms and define them and say that more information is to be prescribed by regulation. Perhaps that is why we do not have the complete thing. Mr Haworth, if I can ask you to take that on notice just to clarify what it is all about. I am pretty sure that the Joint Standing Committee on Delegated Legislation will ask you the same question, so we will be doing you a favour if we get you to work that out in advance.

Mr Haworth: Thank you.

Hon SAMANTHA ROWE: The committee has heard previous testimony that contractors are responsible for different stages in the fracking process, whether it be maintenance or flow-back disposal. How does DMP monitor and regulate the different players in the process to ensure that all parties meet their obligations under the licence, and who is ultimately responsible for enforcing them?

Mr Sellers: It is a good question. The operator is ultimately responsible, but Jeff might lead us through the process.

[12.40 pm]

Mr Haworth: Sure. This is another one of those strengths that have come out of the new resource management regulations. Previously, it has been the operator or the titleholder who is responsible for anything that occurs on that site. One of the changes we have made with the resource management regs, and I think it is in the environment regs as well, is to make contractors and subcontractors accountable as well. Some of this has always been thought about, but I guess the Macondo situation with Halliburton really drove it home that contractors and subcontractors have to take responsibility. It is a requirement under our regulations that reports have to be submitted by the titleholder or the operator of the well, which includes all contractor and subcontractor reports. So mud reports, cementing reports, casing reports, the mud loggers, the wireline people, all have to submit these reports. Currently, that is required under the schedules and that will be required under

resource management regulations, as far as daily reports are concerned. If they do not do it, they get a penalty from us under the new resource management —

Hon SAMANTHA ROWE: So the new penalties are still to be drawn up; is that right?

Mr Sellers: The regs have penalties in them, but we expect them to increase with the other penalty review outcomes that are due for further consultation.

Dr Gorey: It is a number of months away. We put it out for a reasonable amount of time because we are looking at the penalty regime across all our regulatory operations, not just hydraulic fracturing.

Hon PAUL BROWN: Who gets the penalty? Is it the licence holder or the subcontractor who gets the penalty?

Mr Sellers: It could be both.

Hon STEPHEN DAWSON: I have a question in relation to well integrity. We heard earlier advice about concern in Western Australia and around the world about well integrity and well failures. Have we seen examples previously in Western Australia of wells that have failed; and, if so, where and when? If a well fails, can you explain to us what the process is—who tells who and how it is remedied?

Mr Haworth: I would like to start off with a comment about well integrity. The meaning of well integrity versus barrier failure. Engineers being engineers look at a well from top to bottom. They will say the tubing, the casing, the valves on the surface, the flow lines are all part of well integrity. In answer to your question, there have been two cases that I can think of with issues of small leaks. The first well was a well called Corybas-1 up in the midwest. It had a leaky valve—a very slow leak. All that required was, basically, a grease gun because you pack it back up again and that stops the leak.

The CHAIRMAN: Can you just clarify where that valve was?

Mr Haworth: Yes; I am sorry. It is up on the surface. It is part of the Christmas tree structure, which is a series of valves on the surface. It certainly was not a subsurface issue.

Mr Sellers: If there is any failure with the Christmas tree structure, it has a series of valves and it can shut down the well. So, it starts with just a simple clamp and ends up with a complete sheer, so the well protection blowout is referred to as a Christmas tree.

The CHAIRMAN: On that specific question, was that described as a well failure?

Mr Haworth: That is regarded as a well integrity failure, not a barrier failure.

The CHAIRMAN: What was the consequences or potential consequences to the environment or people around if that had not been dealt with?

Mr Haworth: The leak was so small they could not pick it up with detectors. The only way they detected it was when the cellar filled up with water and they saw a small bubble coming up. The actual amount of methane or gas coming out was minute.

The CHAIRMAN: What was the other one?

Mr Haworth: The other one was what we call a flange. I refer you to the land use and access factsheet, which has a picture on the bottom there of the Christmas tree. You can essentially see the valves and the flanges. Now, one of those flanges was damaged, which caused, again, a small leak. That was repaired by retightening the bolts on that flange to fix that up. Again, that was in the midwest. I think the well was Redback South. Those are the only two instances we have had of those sorts of leaks. The other one that I should mention that has occurred in conventionals, especially in the offshore, is that production tubing I was telling you about that runs down. That is built almost like a tyre on a car, so when you get sand going up, it will abrade and slowly thin this

thing out. Once that happens they can detect that through the pressures. They will shut the well in. They will pull that tubing out and they will replace it, just like you will replace a car tyre once the tread has gone. They are the only ones that have occurred in Western Australia. There has certainly not been barrier failures where you have had a whole series of cementings fail.

Hon STEPHEN DAWSON: The other part of the question related to what happens when there is a failure. What are the reporting mechanisms? Does a contractor or a proponent or whomever have to tell you and what process does it go through?

Mr Haworth: As soon as they have something like that, the first thing they do is they shut the well in. They have to report to DMP; it is a requirement. They will give us a report actually outlining what occurred and the remedial process they are going to take. If we feel it is necessary, we will send an inspector out—certainly for Corybas and Redback we did that—to actually inspect what is going on and the remedial process that goes on. So there is a requirement for them to report any incidents that occur and also under the environment regulations they are required to submit any information about spills or whatever.

Hon BRIAN ELLIS: Just on the same thing, how long does the monitoring go on for—how many years?

Mr Haworth: For the monitoring of a well?

Hon BRIAN ELLIS: The two that you have spoken of, where someone found a leak; there could be another leak.

Mr Haworth: They are required under legislation to inspect those wells. If it is an active well, they normally inspect them on a daily basis or at least a weekly basis. Naturally, a company does not want leaks because that is money going up into the atmosphere rather than going down the tube and into the pipeline. They are required to tell us about those inspections. We have a monthly reporting system on production. In that report, not only do they give us the production figures, but also any incidents or any work done on the wells.

The CHAIRMAN: I am going to have to draw this hearing to a close because we are well over time, but I have one question you might want to take on notice to research and to respond. In the course of this inquiry, we have received a number of representations, submissions and others that the experience in other jurisdictions, such as the United States, is that fracked wells fail or have a well integrity incident in about six to seven per cent of cases. Now, if you have got many, many wells, as they do in the states, that would be a large number of incidents. Have you heard those sorts of claims?

Mr Sellers: Yes.

The CHAIRMAN: Again, you might want to research this, because this seems germane and is an article of public concern that is held widely out there. The inference is that some, if not all, of these failures of well integrity are catastrophic. My question is: Is the six or seven per cent right? How many of those failures are minor and easily rectified like the one that Mr Haworth referred to? How many are more serious? How many are catastrophic? I think that is something the public would be interested to know.

Mr Sellers: That is something that we have done quite a lot of research on. I will ask Mr Haworth in a moment to give you a brief rundown of what we have found today and we will give you a more fulsome written answer, if you like.

Mr Haworth: Certainly. We have obviously read a lot of these reports. I know the report to which this has been referred to and we have read other reports. My main concern is looking at scientifically proven or empirical observation that has been made. There are several papers out that would suggest that six to seven per cent is not quite valid. I would refer to the ACOLA report. If you want me to give you the full title, I can. There are also a couple of other reports that have been

put out by the Ground Water Protection Council in the US, the US EPA and others, which suggest that the vast majority of these well integrity issues are around the tubing or valves or regulators. I mean valve pipe regulators, not “us” regulators!

But certainly there has been no evidence of any hydraulic fracturing causing a well integrity failure, and that is certainly available in the ACOLA report. But we will give you a more fulsome response, with a set of references for you to have a look at.

The CHAIRMAN: We will look forward to receiving that, together with some other information that was identified during the course of this hearing. On behalf of the committee, we have already noted, in the several dealings we have had with your department, that this a project in evolution as well, so we will no doubt have some continuing contact in relation to this inquiry on other occasions. But for today I thank you for your attendance, assistance and cooperation, and sorry we have run quite a bit over time—we will probably do that next time as well.

Hearing concluded at 12.50 pm
