

REPORT OF PROCEEDINGS BEFORE

STANDING COMMITTEE ON STATE DEVELOPMENT

INQUIRY INTO NANOTECHNOLOGY IN NEW SOUTH WALES

Uncorrected Proof

At Sydney on Friday 6 June 2008

The Committee met at 9.30 a.m.

PRESENT

The Hon. A. Catanzariti (Chair)

The Hon. M. R. Mason-Cox

Reverend the Hon. F. J. Nile

The Hon. M. J. Pavvey

The Hon. M. S. Veitch

CHAIR: Good morning, Minister. Thank you for attending the inquiry. It is not necessary for you to be sworn as a witness because, as a Minister, you have already taken an oath. If you take questions on notice today, the Committee would appreciate it if the responses could be forwarded to the Committee Secretariat by Friday 27 June. Would you like to make an opening statement before we proceed to questions?

Ms VERITY FIRTH: Yes. Some of my opening statement may address some of your questions, but of course feel free to continue to ask. Thank you for the invitation and the opportunity to address the Standing Committee on State Development in relation to its inquiry into nanotechnology in New South Wales. I do not think I need to tell Committee members this, because I think you probably now know more about nanotechnology than any individuals in New South Wales. I thank you for your time and effort in this area, which is really interesting and exciting.

As you know, nanotechnology has the very real potential to revolutionise the world in which we live. It has the promise to change the way we detect and treat disease, monitor and protect the environment, produce and store energy, and the way in which certain industries manufacture. However, while these breakthroughs foreshadow great benefits for society, we nevertheless do not have a clear picture of the impact and effect that nanotechnology and nanomaterials will have on human, animal and environmental health. For example, an article published in the May scientific journal *Nature* details a study that reported that carbon nanotubes of a certain size caused "asbestos-like pathogenicity" in a pilot study on mice. So there is a reason to be both excited by the application of this technology as well as aware of the potential adverse effects.

I would like to provide the Committee with some contextual information regarding the administration of my portfolio responsibilities. I have seen some of the issues that have been arising and I thought this would give you an idea about how it is currently working, how these strategies are formed, and how it all operates in New South Wales. In my capacity as the Minister for Science and Medical Research I am committed to building science and medical research capacity in New South Wales—skills, infrastructure and policies that allow the full benefit of the knowledge that is created to generate environmental, social and economic benefits for our community.

I am involved in strong and ongoing dialogue with the university sector, medical research institutes, and the innovation sector through both the New South Wales Innovation Council and the Commonwealth Minister for Innovation, Industry, Science and Research, Minister Kim Carr. Through the Science and Medical Research portfolio, as well as priorities expressed under the New South Wales Government Statement on Innovation, the State Plan, and the broader activities of the New South Wales Government business and development agency, the Department of State and Regional Development, we are committed to supporting science and medical research, and innovation, as important contributors to a strong economy.

My specific responsibilities as the New South Wales Minister for Science and Medical Research are implemented through three divisions in the department: the Office for Science and Medical Research [OSMR], the Industry Division, and the Innovation Unit, which also supports the New South Wales Innovation Council. More explicitly, strategy and policy development, and the associated provision of grants to the New South Wales science and medical research sector, are carried out by the OSMR with priority to facilitate and increase research and education capacity; engage with the Commonwealth Government and international science funding programs; develop a statewide plan for medical research; encourage students to take up science, engineering, technology or mathematics-based careers; and ensure industry and small business access to research and development infrastructure.

The Industry Division within the Department of State and Regional Development works with businesses and industry bodies to achieve industry development. It also works within the commercialisation nexus between research and industry to assist research into product realisation. These include engaging science with businesses in target sectors by reducing the cost of access, and applying science to remove barriers and drive innovation; hosting industry sector roundtables for the New South Wales-based Centres of Excellence; promoting outcomes from research commercialisation; the success of the BioFirst incubator at the Australian Technology Park; through the administration of the BioBusiness Proof of Concept grants; promoting success through the Australian Technology Showcase; the promotion and facilitation of New South Wales companies at

the annual BIO Conference in the United States, and Medica in Germany; development of the ICT Cluster; and the annual BioFirst Commercialisation Awards, which this year are being held in June.

The Innovation Unit, which was established as a result of the New South Wales Innovation Statement that was released by the Premier in 2006, supports the New South Wales Innovation Council to develop policy and strategy responses that will improve productivity in industries best positioned to strengthen the broader New South Wales economy. It is important to note that as well as taking a sectoral approach, the Innovation Statement includes five policy goals. These policy goals are to improve human capital; upgrade knowledge and information infrastructure; reduce the cost to business of utilising science and technology; encourage capital allocation to invest in innovation; and reduce the regulatory barriers to innovative New South Wales companies.

Going forward, delivering on these goals will include stronger integration with the research sector—and universities in particular. The Department of State and Regional Development is also the main New South Wales Government interface with the Commonwealth's National Innovation Program, under which a number of proposals have been developed for Commonwealth-funded Enterprise Connect Centres. The New South Wales Government has also set up the Innovation Council, the Skills Council and the Manufacturing Council to secure high-level industry and academic advice.

In addition to the Department of State and Regional Development, a wide variety of other government portfolios carry out science and research. These include the departments of Environment and Climate Change, Primary Industries, Health, Lands, Commerce, and the New South Wales Food Authority. So we have the right elements in place, and we are taking action to boost and integrate these elements. It is in this context that I would also like to touch on some of the coordinating mechanisms I have put in place.

The fact is that our nation as a whole produces only 2 per cent of the world's new products and processes; 98 per cent is created elsewhere. This creates a two-fold challenge for New South Wales. On the one hand, we need to maintain our capacity to invent, create and commercialise new ideas, and on the other, we also need to draw upon those ideas that make up the remaining 98 per cent to quickly and effectively adapt initiatives from this larger pond. Making the most of the State's knowledge base will be critical to our ability to deliver skills, high-value jobs, create new knowledge, and adapt and absorb knowledge created in other jurisdictions, both nationally and abroad.

At my direction DSRD has established and chairs the science agencies group, which is a cross-government forum of New South Wales agencies carrying out science and research to achieve greater communication and coordination of common issues across New South Wales government, and, in particular, to develop whole-of-government science priorities, communicate New South Wales government and agency research activity excellence and contribution, and of course engage with Commonwealth funding programs. In addition, I have established stakeholder advisory groups involving universities and government and a medical research liaison group. These function not only as advisory mechanisms for my portfolio but also as sectoral coordinators.

I can also advise that I have directed the Office for Science and Medical Research to develop a proposal outlining the Chief Scientist position for New South Wales. I am advised that the initial scope of such a position would be to provide independent advice to government regarding the strategy and mechanisms for New South Wales; to develop best available scientific capability directed at the needs of the New South Wales economy, society and environment; guide the development of strategies to improve the translational capacity of the New South Wales research effort and the absorptive capabilities of business; work with the universities and the research sector more broadly to encourage greater alignment between their activities and State priorities; play a lead role in promoting science education and careers; and provide balanced and objective advice on matters of significance to the New South Wales community. We are now set to consult on these models with peak groups, such as the Australian Academy of Technological Services and Engineering. I thank the Committee for providing me with the opportunity to address all of these issues. I now look forward to your questions.

CHAIR: Thank you very much, Minister. You have probably touched on most of the questions we had for you, but we will ask you some questions just in case there is something on which you wish to elaborate.

Ms VERITY FIRTH: Yes.

CHAIR: It has been suggested to the Committee, particularly in the submission and evidence from the University of New South Wales, that, in terms of strategy and support research, science, innovation, technology and development do not fit well within the current structure of the New South Wales Government. Can you provide a response to that view and, in doing so, perhaps outline the current structure and administrative arrangements for supporting research, science, industry and innovation?

Ms VERITY FIRTH: Thank you for that question. As I outlined in my opening statement, I believe that research, science, innovation, technology and development are served well within the current structure of the New South Wales Government—as I outlined, under the Department of State and Regional Development and those three arms that deal with research, industry and innovation. But what I think is quite important about the current structure is that it parallels the structure of the current Australian Government, specifically the Department of Innovation, Industry, Science and Research. I believe this is a good and adequate structure that we currently have.

The Hon. MELINDA PAVEY: To that point, Queensland, through former Premier Beattie, started the Smart State about 10 years ago, and Queensland is leading the way in Australia in terms of a lot of biotech companies that are up there.

Ms VERITY FIRTH: Yes.

The Hon. MELINDA PAVEY: Victoria has had a strong focus on science and technology over the past five years.

Ms VERITY FIRTH: Yes.

The Hon. MELINDA PAVEY: Both those States have a Chief Scientist. It is pleasing to hear that New South Wales will follow.

The Hon. MATTHEW MASON-COX: May follow.

Ms VERITY FIRTH: Yes.

The Hon. MELINDA PAVEY: The evidence, certainly from the Deputy Vice-Chancellor of the University of New South Wales was fairly strongly against New South Wales leading the way. I note that your Ministry is subservient—perhaps you are not subservient necessarily to Ian Macdonald—but he is the lead Minister and your portfolio is under his. It is a confusing arrangement. How is it working with you having Climate Change and Environment as well as Science and Research and having to speak to Ian Macdonald as the Minister for State Development? Is it the perfect arrangement?

Ms VERITY FIRTH: I think the fit between Minister for Science and Medical Research and the Minister for Climate Change and the Environment is a very good fit because, as we all know, a lot of long-term solutions for climate change are technological solutions and innovation solutions, both in the way that we innovate in regard to our economy and market mechanisms and so forth, but also in the way that we innovate in terms of technologies for energy and so forth.

I will stick by my opening statement and say that I think it is a structure that works. I think what is good about having science and medical research within the Department of State and Regional Development is that it very closely links the idea of research and industry development. Therefore it gives a lot of emphasis on the translational capacity of our research into development of products and industry processes and so forth. What is good about that, of course—this is my strong view—is that we want to create an economy that is a knowledge-based economy, that has those high wage level, high skill sector jobs of the future that are really going to propel us into an economy in the twenty-first century that can be sustainable in the long term. I defend the structure: I think it works.

I will talk a little bit about the University of New South Wales evidence to you because we have had a lot of conversations with the university sector recently. That is a sector that I am incredibly passionate about supporting. I have set, as a primary priority, engaging more closely with the university sector in New South Wales. At my direction, the Office for Science and Medical Research has convened a university-government working group that will be chaired by OSMR with which there has already been consultation on things like the Chief Scientist and the New South Wales Medical Research Plan. It is of primary importance that the university sector and the New South Wales State Government policy are aligned where relevant in order to effectively contribute to the New South Wales innovation system and economy.

I recognise that universities in New South Wales have specific strengths in engineering, solar research, robotics, quantum computing and finance, and that these may be enhanced by strong engagement with the New South Wales Government. What I always say about the university sector in New South Wales is that it is absolutely amazing. Our universities in New South Wales are incredibly strong. I will give you some good statistics to always keep in our mind. New South Wales universities have the highest expenditure of any State on research and development, totalling \$1.18 billion. In 2006 they had combined revenues of \$4.4 billion, corresponding to just under 1.5 per cent of the gross State product. They are a primary exporter, generating an estimated \$2 billion in annual export income for the wider State economy. They bring in around 60,000 students annually to New South Wales and, in doing so, contribute to the brand of Sydney and New South Wales as a competitive knowledge-based economy. They employ nearly 26,000 people and they graduate over 70,000 people each year. I am putting it on the record to say that—

The Hon. MELINDA PAVEY: The tertiary sector is going very well?

Ms VERITY FIRTH: Yes. It is going very, very well. Strengthening the strategic alliance and the communication between the State Government and the university sector could only be a good thing, and that is what we are attempting to do.

The Hon. MELINDA PAVEY: Just in relation to the Chief Scientist and your announcement that you are going through a proposal to bring it together, as a Committee we had some discussions couple of weeks ago. As part of the work of our Committee—particularly with the Chair, the Hon. Tony Catanzariti, having a connection with the agricultural inquiry—we recently visited the agricultural research centre in Tamworth. We have been up to Narrabri where the research centre is something of which the State can be incredibly proud as well as with the work that happens in Orange. But just in our informal discussions, it was very strongly communicated that it is very important for our Chief Scientist not become another silo and separate; that through any innovation or work that is happening, such as with the Department of Health within our hospitals or through the department of agriculture, the position does not become another stumbling block or another piece of red tape in the process. It is preferable that the Chief Scientist maybe understands what is going on in New South Wales and supports it, but does not become another process to go through.

CHAIR: You are right.

The Hon. MELINDA PAVEY: That is a very strong opinion of the Committee—that we are doing excellent work in some of the departments and that the Chief Scientist has to fit into what is happening, rather than making it more difficult.

Ms VERITY FIRTH: Yes.

CHAIR: We had some concerns that we do not want all the good work that is being done to be stopped, for want of a better term, or for a lower level of approach to be taken to it. That is the part that we were concerned about.

Ms VERITY FIRTH: Yes.

CHAIR: We certainly applaud you for having a position of Chief Scientist in mind and for developing that, but we also have a concern that we do not want to destroy anything else.

Ms VERITY FIRTH: That would definitely not be our intention. So that is good feedback. Thank you for raising that.

The Hon. MELINDA PAVEY: From a personal point of view, I would love to see the Chief Scientist very strongly involved with the Department of Education, particularly encouraging country children to do science and mathematics, and to improve the quality of teaching in science and mathematics in regional and country areas and road shows. There are some really good things that have happened in Queensland and Victoria in terms of the Chief Scientist in an education capacity.

Ms VERITY FIRTH: I know that the Australian Chief Scientist was also very interested in the education role of a Chief Scientist as well. I am very aware of the need to promote science and mathematics in schools. It is interesting that when you talk to the university sector they are very aware of this. They say they often feel as if they need to spend the first year catching all the children up on mathematics. That is not about lack of curriculum opportunities in secondary school, but it is almost a societal thing; the importance that we place on science and mathematics and children being more allured to the things that they consider more trendier or hipper.

At the Office for Science and Medical Research [OSMR] we have a strong emphasis on trying to encourage those children in year 9 and year 10 to get excited by science, so as to pursue it in year 11 and year 12. We have a thing called Science EXPosed, which we hold annually at Parliament House and if any members of Parliament have not yet participated in it they should try and participate in it next year. We hold things like petitions between the members of Parliament and the students—not that I think that particularly excites them to pursue a career in science—but we also have an expo outlining science career opportunities, and the societal issues raised by science and technology development, at Hyde Park Barracks and The Mint.

We have held specific forums on nanotechnology because we always feel the really amazing aspects of science are what get the students in. Last year, for instance, we had a DNA testing kit and the police demonstrated how DNA is tested, and all that sort of thing, to excite their interest and point to the real sort of work you can do if you decide in years 11 and year 12 to pursue science as an option. We have the Science EXPOsé competition open to high school students as part of the Government's support for the New South Wales Scientist of the Year Awards and aimed at encouraging us to learn more about our great scientific minds. We have the Young Tall Poppy Science Awards, which is where we specifically recognise the achievements of Australia's young researchers and reward them.

We have also just recently announced a New South Wales Scientist of the Year, which offers a total \$85,000 in prize money for cutting-edge research. The awards are directed to highlight the work of our best scientists and also our best teachers. There is a specific part of that award for excellence in science teaching. Again that is something that is really important to promote. Everyone remembers at school it was incredibly fun when the teacher did all sorts of interesting experiments, which added a fun element to the learning of science.

In fact when Peter Agre came out, who was a Nobel Prize Winner in Chemistry, he said the real reason he got involved in chemistry was in year 9 in the States—before that he had not been interested at all—he was doing an experiment in class and when he tipped all the chemicals down the sink at the end of the day—which also does not sound very environmental—they blew up and caused an explosion in the classroom. That was when Peter decided to become a chemist. Not that I am suggesting that, but I am saying that there is incredible opportunities to excite children's imagination. They are the sorts of programs we really want to support. I have also just been passed a note saying we will make sure the Committee gets invited this year to the Science EXPOsé events, so the Committee can come and have a look. It is really a fun couple of weeks up at Hyde Park Barracks.

The Hon. MICHAEL VEITCH: Just so you know, my year 9 son says that nano is mega. That is his view about nanotechnology.

The Hon. MELINDA PAVEY: I think for the record it would not hurt to point out that your son miraculously is part of the gifted and talented program and has been to the University of New South Wales special program. It is a miracle.

The Hon. MICHAEL VEITCH: That is true.

CHAIR: What happens with the country children? Do they participate in all this, as well as the city children?

Ms VERITY FIRTH: I will take that on notice and I will get some figures for year. I do not know off the top of my head. It is definitely open to all children; it is not discriminatory. Whether or not we have much country school participation I do not know. I will get those figures and report back to the Committee. If we find that there are structural problems we will see what we can do to address them.

The Hon. MATTHEW MASON-COX: All that excitement aside for the moment, there was not a lot of excitement from a number of members of the science community and the people who put in submissions about the structure of the Government in dealing with this emerging world of nanotechnology. The Committee has had evidence from the department in relation to, perhaps, nanotechnology just being an industry like any other industry—that is fair enough—and we have processes in place to deal with industries. When one makes inquiries from an industry perspective it goes through the normal channels, if you like.

Given the opportunities in this field, and given the positions that Queensland and Victoria have taken, and the perception out there that New South Wales is not really on the game in this new area—it is following rather than taking the lead—do you think there is a case for looking at a Nanotechnology New South Wales or some sort of flatter structure dealing with this industry, so that we are seen to be more responsive?

Ms VERITY FIRTH: I think one of the reasons why we are having this inquiry, to be brutally honest with you, is to get an idea about what we should be doing in New South Wales. As you are probably aware from the submissions, at the moment there is a Nanotechnology State and Territory Committee [NSTC] coordinated at the Commonwealth level that we are very committed to because, like anything, a national approach is always best if you can get one. So the NSTC is an officer level committee, comprising representatives from the States and Territories, set up by the Australian Office of Nanotechnology for the promotion of Australian nanotechnology capability to the international community, information flow regarding Commonwealth and individual State nanotechnology initiatives and public engagement in education.

The Department of State and Regional Development is represented on that committee by officers from both the industry division and the Office for Science and Medical Research. I am advised that it has met so far once in February this year. Through the information gained from this national committee, New South Wales co-sponsored a nanotechnology public engagement forum, which was held by the Australian Office of Nanotechnology in the New South Wales Office for Science and Medical Research at the State Library in April 2008. On a side note, I would like to point out that part of the Commonwealth Government's national nanotechnology strategy funding for the NSTC, along with the other components of the national strategy, has been halved from \$21.5 million over four years to \$10.7 million over two years ending in 2009.

The Hon. MATTHEW MASON-COX: What is your gut feeling?

Ms VERITY FIRTH: What we are saying is that we believe in a strong national coordination in nanotechnology. I believe it is important. I honestly think that the reason we are having this inquiry is to help establish if there is anything specific that we need to do in New South Wales in relation to this.

The Hon. MATTHEW MASON-COX: Let me put it to you that there is a Victorian Office of Nanotechnology because they felt they needed a really focused State response in this emerging industry. They have a Victorian nanotechnology statement and they have really taken the lead in this area. What are your thoughts about what we should do? Should we adopt that type of model?

Ms VERITY FIRTH: I genuinely look forward to the recommendations of this Committee on that. Maybe we want to adopt that model, maybe not.

The Hon. MATTHEW MASON-COX: Do you have a gut feeling on that?

Ms VERITY FIRTH: I think it will depend on where our strengths lie. New South Wales does not have to be strong in everything. We need to be strategic about how we approach our science and medical research, where Government funding goes and so forth. We need to pitch to our strengths. We need to make sure that we have the human capital to be able to respond to those strengths.

The Hon. MATTHEW MASON-COX: It is those exact points that were put to us, if you like, very positively by the Australian Nuclear Science and Technology Organisation [ANSTO] when we visited the nuclear reactor. In that we have the premier research facility in that domain here in New South Wales, along with a number of other first-class research facilities at universities, but no focus in terms of bringing those things together in a much more coordinated and integrated way. That is what I am trying to get from you. We have a plethora of bureaucratic committees or offices but no focus, it appears, to bring these things together.

Ms VERITY FIRTH: There is obviously a strong case for better coordination, which again is one of the reasons why we are having this inquiry. The first step is the network, setting up the expert group about nanotechnology. I think NanoVictoria has done excellent work. I have been talking off line to the Minister in Victoria about it. He was very interested in this inquiry, our setting it up and any results we get from it. I am happy to keep consulting on this question. I am happy to hear what you have to say about it. I am happy to talk to industry and stakeholders about it. We obviously need a more coordinated response. We are committed to the national process, but we want to make sure that New South Wales is also aware of what it needs to do.

The Hon. MICHAEL VEITCH: Minister, many of the submissions to us have commented on the occupational health and safety aspects of nanotechnologies as an element of the research that is undertaken. There does not seem to be a great deal of research in occupational health and safety. In your opening address you spoke of the article in May this year about carbon nanotubes. Do you have a view about how we can target more research into the occupational health and safety aspects of the very broad field of nanotechnology?

Ms VERITY FIRTH: It is definitely one of the issues that prompted me to set up this inquiry. It was something that was coming up through people working in the industry who were genuinely concerned that they may be dealing with the next generation of asbestos. We need to make sure our workers are safe, and that includes our scientists in science laboratories. Perhaps there is an opportunity, and we should always be looking for opportunities, to lead the way. New South Wales has a strong medical research sector. We already comprise approximately 30 major research institutes and 8 medical research hubs. We already like to combine things in a sort of hub or network strategy and make sure that all our people working in the same field are talking to each other. Perhaps this is an area where we could set up some sort of toxicology network of expertise. We should definitely be thinking about that.

We do need to ensure a safe and enabling operating environment in New South Wales for our researchers and workers, underpinned by the best available information either generated in New South Wales or accessed from other jurisdictions and internationally. We need a system that recognises the obvious benefits that nanotechnology allows industry to quickly and actively ascertain the potential toxicity of any of its nanotechnology-related products and processes. Finally, we need to work within the international process that is currently being established by the OECD to coordinate international testing of nanoparticles and ensuring a two-way information flow from this process. We should definitely be looking into that.

The Hon. MELINDA PAVEY: You mention that you are hearing concerns from workers about working within the nanotechnology field. A representative from the Australian Manufacturing Workers Union made genuine statements and recommendations to the Committee that there be a moratorium placed on any further research into nanotechnology. This position was very similar to that of the Friends of the Earth. I had the opportunity to ask him how many representations or how many complaints by members who worked in the nanotechnology had been made to him. He said that he had not had any. It is a strong position that is taken by the Australian Manufacturing Workers Union. I am not saying it is not a genuine position, but by adopting the position of the Friends of the Earth it is

a fearful position. If a moratorium were placed on nanotechnology development in New South Wales, we would be behind the eight ball. I suppose it is a matter of communication. Are you concerned that major unions, such as the Australian Manufacturing Workers Union, are making that sort of recommendation? How should we deal with this issue?

Ms VERITY FIRTH: I am not concerned because the unions are representing their workers' interests. Naturally, union representatives would want to make sure that their workers are working in the safest possible environment. There are concerns about whether or not nanotechnology materials are safe to work with. I respect their right to defend their members' interest in this matter. Again, I suppose one of the reasons for these inquiries is to try to get to the bottom of this stuff. It is definitely not my view as Minister for Science and Medical Research that we should just stop all science research into this field. It could have huge potentials, and not just for medical devices. They have already talked about the ability to deliver cancer drugs right to the very location of the tumour through nanotechnology.

The Hon. MELINDA PAVEY: We have heard evidence on that.

Ms VERITY FIRTH: You do not need to hear it from me. It also has huge environmental benefits in terms of energy and how we can help save our planet from climate change. We need to be able to undertake this research and industry needs to be able to undertake safe development of products. It is like any new technology, we need to do that with all the possible information that we have in front of us to ensure that our workforce and our researchers are safe. That is why we establish inquiries such as this. That is why we participate in the national programs. That is why we make sure that we are up to date on the OECD research and so forth.

CHAIR: The Committee is looking closely at regulations for the industry—what should be included, how do we implement them. While nanotechnology is one word, it covers multiple areas. How do we regulate the nanotechnology industry? Should there be State-by-State, national or international regulations? The Committee is putting a great deal of thought into this issue and we are trying to get our heads around the recommendations that we make in that regard. We are concerned about food products and sunscreens and so on. Although you are asking us for information, do you have any views that could enlighten us?

Ms VERITY FIRTH: No, I have no magic wand that can solve all these issues. These are always difficult issues for government. I liken it to a certain extent to the type of arguments and regulations surrounding embryonic stem cell research. It is in a similar vein in the sense that there are new technologies and new science available that could have huge potential benefits for humanity. But in terms of stem cell research, how do you do it in a way that is ethical? In terms of this research, how do you do it in a way that is safe? How do you do it in a way that we do not end up endangering people working in the industry? They are incredibly complicated questions for government. Essentially, what we want to do is see all the amazing opportunities of this new technology and not have any of the downsides. That is a complicated regulatory process, but that is why inquiries such as these are so important. We want to be armed with as many facts as possible and look to as many other jurisdictions dealing with these same issues as possible.

CHAIR: We can assure you, Minister, we are doing our best.

The Hon. MICHAEL VEITCH: Minister, one of the issues that has been raised with us is that we can invest in infrastructure for research as much as we want, but there is an issue about attracting quality researchers to New South Wales and retaining them and training new researchers in New South Wales. What are we doing in this area? Do you have any suggestions as to how we can do better?

Ms VERITY FIRTH: Attracting the best and brightest to New South Wales is something we always have to do. It is also about retaining our people here as well, making sure that they do not just disappear. As one of our science researchers said to me, "We do not necessarily mind our bright young PhDs disappearing overseas for a couple of years. We just want them to come back." We do a lot to attract and retain our bright young things. The first way we do that is to make sure that we have good capital infrastructure and good research infrastructure to attract them. For example, investment

in capital infrastructure has happened since 2006 with over \$150 million in New South Wales government funding.

I am just going to read a few of the things we have done because I think, to a certain extent, there is often a perception problem about the very real and very great amount of public funding and capital expenditure that comes from the New South Wales Government for the research sector: over \$150 million since 2006 in the development of medical research facilities, including the Garvan Institute, the Victor Chan Cardiac Research Institute, the Woolcock Institute, the Children's Cancer Institute, North Sydney and the Hunter Medical Research Institute.

Of course, when you invest at a State level—we have put in \$150 million of capital investment—that, in turn, essentially leverages or attracts further Commonwealth or philanthropic support. This has attracted Commonwealth philanthropic and university funding of \$177 million so far. We have got major funding support for cancer research and treatment, and this specifically includes fellowship programs where we, again, I suppose, try to entice bright young researchers to rather than immediately entering into private practice stay in the research field, and we offer very generous fellowship scholarships for that.

We aim to facilitate cancer research so that it can be quickly translated into benefits for cancer patients, to recruit and support researchers in New South Wales to become more skilled and more internationally competitive, and to provide enabling infrastructure to improve international competitiveness and relevance. This year the Government is providing \$27.3 million through the Cancer Institute, which is an increase of 69 per cent over the past two years. We have seen some absolutely great results in cancer research in New South Wales because of this. We have a medical research support program where we have \$61 million allocated over three years for infrastructure support. We have a science leveraging fund, which has been very successful: it is \$40 million over four years.

We have provided nearly \$23.5 million in funding to New South Wales centres, and that has helped them leverage \$158 million in funding from the Commonwealth and \$320 million in cash in-kind from additional partners. Again, that fund is specifically about providing leverage for these institutes and organisations. We have invested, of course, into NICTA. We have our Spinal Cord Injury and Related Neurological Conditions Fund, which is about our spinal cord effort. We have New South Wales Life Sciences Research Awards, which provides grants to bring outstanding researchers to New South Wales, again providing a sort of intellectual environment where people want to work and so bringing some of the best international minds here. We have allocated \$5.8 million for that in the 2007-08 budget.

We have provided \$1 million for a clinical trials business development centre, and that is now going to be set up in combination with the Cancer Institute. That is about bringing in the clinical trial sector to New South Wales because, again, that produces, firstly, a reason for people to want to come and do work here but also it produces better clinical outcomes because we are wanting to get more of our patients, obviously, involved in clinical trials. Commercialisation of the New South Wales medical and biotechnology research is supported through a \$13 million package of bio business. We have proof-of-concept grants; a medical research commercialisation research fund, which we are co-funding with Victoria to, again, provide money for those start-up phases, and that has been leveraged by Westscheme and statewide superannuation—using some superannuation money for start-ups. And, of course, a whole range of programs to try and get kids at the younger levels, in high schools. So, yes, we are very aware of that and we are doing everything we can.

CHAIR: The Committee has also heard evidence that there is a need for New South Wales to develop a long-term strategy plan to both address critical research infrastructure and research priorities. What plans does the Government have that addresses these issues?

Ms VERITY FIRTH: I think the response I have just given to my last question covers a lot of that. Notwithstanding that, we are seeking advice on the function of a chief scientist. The New South Wales Government does have a strategic program of investment that is directed to a number of areas, namely, research infrastructure, coordination and critical mass capacity accessible by universities, institutes, industry and government, and education and promotion of the uptake of

science, mathematics and engineering careers at schools. That is what we are looking at, and a lot of what I just said was examples of where we are providing the dollars to help achieve these outcomes.

The Hon. MELINDA PAVEY: During your opening address you mentioned that there are regulatory barriers facing science innovation in New South Wales, and red tape. What sort of barriers are they?

Ms VERITY FIRTH: I will take that question on notice. When we talk about barriers it is specifically what we are doing in terms of the innovation council. I will take the question on notice and get a response from our innovation unit. But we are essentially talking about the sorts of business barriers that may prevent the uptake of new ideas to the commercialisation phase. Sometimes it is not even a barrier but more about the availability of venture capital. Something that we run into a lot with medical research, not just in New South Wales but in Australia, is there is a lot less of a sense of a philanthropic support base than in other countries. We really do not have a lot of philanthropy in Australia. So there are all sorts of barriers to prevent sometimes the take-up or the translation to commercialisation stage of good ideas. But I can give you some more information on that out of our innovation unit.

The Hon. MELINDA PAVEY: You particularly mentioned regulatory barriers. I just wanted to get some more information about the science agency group. That is something that you have started?

Ms VERITY FIRTH: Yes.

The Hon. MELINDA PAVEY: How often does it meet, and are you part of that process?

Ms VERITY FIRTH: No, it is at agency level. We eventually get together all the different government agencies that have some sort of science capacity within government—I think I read out a list of them before: Environment and Climate Change, Primary Industries, Health. It is to provide, firstly, a better coordination of the government science that is actually happening and making sure that everyone is aware of the science that each other is doing, because there are real opportunities for collaboration and, therefore, inefficiencies within government. The Department of Environment and Conservation could be doing some program about solar or something—you know what I mean: there are real opportunities for collaboration and better communication. Also, to make sure that our science agencies are delivering on our science priorities in government, to get a bit of an idea about that.

I have just been told that it meets quarterly and that I am addressing it at an end of June meeting. But the idea behind that is to make sure that government agencies are participating, because there is some great research going on. In fact, the Department of Primary Industries in particular—

The Hon. MELINDA PAVEY: What we saw in Tamworth in terms of the chemical technology that is being looked at.

Ms VERITY FIRTH: It is amazing. And there are some interesting partnerships happening with the Department of Primary Industries and our university sector. I visited the Armidale University—

The Hon. MELINDA PAVEY: The property research centre there.

Ms VERITY FIRTH: Yes, which is amazing stuff too. I suppose we just want to make sure that everyone knows what the science agencies are doing, and there are some good collaborations that can happen.

The Hon. MELINDA PAVEY: Who is the lead agency in organising that? Is that State Development or the Office for Science and Medical Research?

Ms VERITY FIRTH: We are coordinating it, so it would be through DSRD.

Reverend the Hon. FRED NILE: The New South Wales Government's submission on page 4 notes that there is a need and an opportunity to coordinate the toxicology research capacity within

New South Wales, possibly through a network, to create assessment capacity relevant to research and industry sectors in New South Wales. It has also been put to the Committee from representatives of the CSIRO that the capacity to develop and undertake toxicity tests of emerging nanomaterials could well be a booming industry just waiting to happen. Could you elaborate on the network idea, including what its aims might be and how it would operate?

Ms VERITY FIRTH: Yes, I can. I will be brief because we addressed this a little bit just before. Yes, a network idea we think is a very good one. We already have a sort of network process in New South Wales in terms of our science and medical research sector. So we have a number of clinical research networks facilitated and supported through the Office for Science and Medical Research, and this presents a framework that draws on the contribution of specific strengths from different research groups in order to contribute to a specific health issue such as cardiovascular disease, mental health or, in this case, toxicity of certain nano particles. It is definitely a model that we have used in other areas of expertise, so I cannot see why that could not be translated. We can look at that.

As I told the Committee before, there are a number of drivers for such a network. We obviously want to ensure a safe and enabling operating environment in New South Wales for our researchers and workers. This is one of the reasons why we are having an inquiry such as this. We want a system which recognises the economic benefits of nanotechnology but which is also able to deal with those environmental and health aspects. We also want to ensure that we are working with the international process currently being established by the OECD. That is definitely a good suggestion.

The Hon. MICHAEL VEITCH: The Hon. Melinda Pavey asked a question about the proposal for a moratorium coming from some sections of the community in New South Wales. In our deliberations it has also been highlighted that there appears to be a lack of information about the breadth of nanotechnology as a sector. It has also been suggested that perhaps a nanotechnology web portal or web page might be beneficial for the people of New South Wales to access information. Is that something the committee should continue to investigate?

Ms VERITY FIRTH: I am always in favour of more information rather than less information. In new areas like this, we really need to ensure that the public is well informed. Then they can make up their own minds and determine their opinion, but with all the facts available to them. It is very important that the public, as well as politicians, are informed about the potential benefits and risks involved in new technologies such as nanotechnology. This in turn will promote an informed and rational debate. As such, I strongly believe that the provision of high-quality information is one of the key instruments that we have at our disposal.

The Office of Science and Medical Research's website includes links to relevant nanotechnology information reports and bodies. However, it is also being significantly redesigned. In its new form it will provide an information resource for science and medical research-related nanotechnology issues. I totally agree, in any debate about new technologies and science, we should have more information rather than less and we should let the public have an informed and rational debate.

The Hon. MICHAEL VEITCH: [When will the revamped website will be open?](#)

Ms VERITY FIRTH: I will take that question on notice.

Reverend the Hon. FRED NILE: Are you also producing education materials for libraries and schools?

Ms VERITY FIRTH: That is a good idea. We were talking earlier about inspiring young kids to take up science as a career and to do science in years 11 and 12. These sorts of things could also inspire people to be interested in science. We have commenced the website process and now have information clearly articulated on the Office of Science and Medical Research site, which talks about what we do. That site will be updated regularly. I agree that not everybody consults websites, so we should look at other ways to disseminate information.

The Hon. MELINDA PAVEY: I would like to follow up on the question of our natural competitive advantage in New South Wales. The Hon. Matthew Mason-Cox mentioned the Australian Nuclear Science and Technology Organisation. The CSIRO's facilities in Sydney have also been mentioned during the committee's hearings. It has been suggested that New South Wales could become a world leader in nanotechnology and toxicology research using those facilities. The State Government's submission pointed out that we need to coordinate and realise that as an opportunity. **Has that been discussed with the Australian Government as part of the establishment of the nanotechnology State and Territory committee?**

Ms VERITY FIRTH: That is a good question. I will take that question notice. It is a good idea.

CHAIR: Minister, do you have anything to add?

Ms VERITY FIRTH: I am sure people have heard plenty from me. Thank you very much for having me and for the hard work the committee is doing. I hope members are finding it interesting.

CHAIR: Thank you very much for appearing.

(The witness withdrew)

(Short adjournment)

ELIZABETH ANN SZABO, Chief Scientist, New South Wales Food Authority, P.O. Box 6682, Silverwater, sworn and examined:

CHAIR: I should point out that if you consider at any stage that certain evidence you wish to give or any documents you may wish to tender should be heard or seen only by the Committee, please indicate that fact and the Committee will consider your request. If you take any questions on notice today, the Committee would appreciate it if the responses to those questions could be forwarded to the committee secretariat by Friday 27 June. Would you like to make an opening statement before questions or do you want to go straight into questions?

Dr SZABO: If I may just make an opening statement to provide a bit of background about the New South Wales Food Authority. It is a State government agency. It was established in April 2004. It is responsible for food safety across the entire food industry, that is from point of primary production right through to the point of sale in New South Wales—to the consumer. Its main functions are compliance and enforcement activities; science and policy development; the investigation of incidents associated with foodborne illness; standards development and implementation; and consumer and industry education. Our key legislative tool is the New South Wales Food Act 2003, and our approach to risk management under that Act is science and evidence based. As chief scientist, I am a member of the New South Wales Food Authority's executive team, providing advice to our director general on scientific matters of relevance to the authority's business.

The Hon. MELINDA PAVEY: The director general is?

Dr SZABO: Mr George Davey. My qualifications are a Bachelor of Science with first-class honours. That was in the area of microbiology from the University of Queensland, and I hold a Doctor of Philosophy, also in the field of microbiology, from that same university. I have provided for your a handout, which may assist with discussion, if we have one, on the regulatory process in Australia with regard to food.

CHAIR: For the purpose of the inquiry could you describe the current regulatory frameworks in operation with respect to nanomaterials in food and, in that context, explain how the New South Wales Food Authority operates in relation to Food Standards Australia New Zealand?

Dr SZABO: Food regulation in Australia is a joint activity between industry and government. The onus is clearly on industry to produce food that is safe and suitable. The role of government is to ensure that industry has the mechanisms in place to be producing safe and suitable food. Under the auspices of the Council of Australian Governments a nationally coordinated framework for food regulation was developed and adopted in November 2000. That is represented on the handout I provided. I will walk through the various elements of it. There are four: stakeholder import; policy development; standard setting; and implementation.

I will begin with the policy development area. You will note that in one of the boxes in white you have represented the Australia New Zealand Food Regulation Ministerial Council. I will just refer to that as the ministerial council. Its role is to develop domestic food regulation policy in the form of policy guidelines. It will comprise of all Ministers who have a responsibility for domestic food regulation from all the Australian States and Territories as well as representation from New Zealand. Each member of the council needs to bring a whole of government approach to policy decision-making. New South Wales is represented on that council by the Minister for Primary Industries, Minister Ian Macdonald. He is the lead Minister. He is also represented by the Minister for Health.

Also within the policy area another committee has been established. It is called the Food Regulation Standing Committee. It goes by the acronym of FRSC. That is responsible for coordinating the policy advice that goes to the ministerial council. The membership of FRSC reflects the ministerial membership on the council. In this respect, New South Wales is represented by three agencies: the New South Wales Food Authority, by its director-general, Mr George Davey; New South Wales Health; and the New South Wales Department of Primary Industries.

Reverend the Hon. FRED NILE: Does that have a New Zealand representative on it as well?

Dr SZABO: Yes, it will have a New Zealand representative on it as well. In the standards setting area we have Food Standards Australia New Zealand or FSANZ. That is the statutory authority responsible for developing all domestic food standards based on science and technology data. In the implementation phase again there is another committee. It is called the Implementation Subcommittee or ISC. Again, the role of the committee is to ensure there is a consistent approach to implementing and enforcing food regulations and standards nationally. New South Wales is represented on that committee by the New South Wales Food Authority. We have three representatives on it: our director general, Mr George Davey; Mr Craig Sahlin, who is the deputy director general of the authority and also the executive director of the science and policy branch; and Mr Peter Sutherland, the director of industry liaison and business planning.

Consultation forms an important role of the whole process, and consultation is open to anyone. It is open to a government agency, it is open to a food company and it is open to members of the public. At any point in that whole framework people can have a voice and can offer their opinions on standards that are being developed.

One of the key outputs of this whole regulatory process is the Australia New Zealand Food Standards Code, which I will refer to as the code. Each Australian State and Territory needs to embody that into its own legislation. In New South Wales we do that by the New South Wales Food Act 2003. The New South Wales Food Authority and local councils have the responsibility for enforcing and policing the code, and all food that is offered for sale in Australia—and offered for sale in New South Wales—whether that is made in Australia, whether it is made overseas, has to comply with the code.

There are various procedures outlined in the FSANZ Act as to how you could go about modifying the Australia New Zealand Food Standards Code. This begins first of all with an application to FSANZ, and if that application meets a certain minimum amount of material, FSANZ will begin the process of looking at that. Depending on the type of variation that might be proposed, it goes through one of three areas. If it is a minor variation, the amount of consultation will only be within government agencies. If it is a major or a new variation, it will be a much more widespread public consultation process.

The time consequences are that if it is a minor variation, an application could be processed within three months. If it is a more detailed, new or major variation, the time frame shifts to about nine to 12 months. If in assessing and going through that consultation process FSANZ deemed that a variation to the code is necessary, they put a recommendation to their own board. If their board accepts that, then the ministerial council is notified. The ministerial council then has one opportunity to ask for a review and, depending on that review, they can ask for an amendment to the code or they can reject.

CHAIR: How often does a review take place? Is there a time frame of say four or five years as the natural thing or is it just when something comes up?

Dr SZABO: Currently, we are running two systems: the previous system where the ministerial council has the opportunity to ask for two reviews and the new one, which I think came in July last year where we have only got the one opportunity for review. The review period is usually for a three-month duration. It cannot really go on for years. A decision at one point has to be made whether you accept the variation or whether that variation is rejected.

Reverend the Hon. FRED NILE: Thank you very much coming in. It is nice to meet a Chief Scientist. Is the issue of nanomaterials in food currently being monitored or investigated by the New South Wales Food Authority?

Dr SZABO: We do a degree of monitoring of the scientific literature that is available in the public domain. We are also very dependent on our jurisdictional linkages, our networks, to our regulatory agencies not only within Australia but abroad, as well as our scientific networks. What I have generally found in the scientific literature is that there is a great deal of information focusing on the benefits of nanotechnology—the benefits that might be delivered to the consumer, the benefits that might be offered for industry. These are in the areas of food ingredients, food additives and of

potential food contact materials and the expectation that this might deliver new flavours and new tastes. It might lead to a reduction of the fat content in food and might lead to a reduction in the use of some additives in some foods. It might offer a benefit to food security; it might help us trace food through the supply chain.

Some of these applications or potential applications I am starting to see come through in the scientific literature by way of research. Very subjectively I would have to say that that volume of research is increasing and that is being reflected in an escalation of interest in the area in the research community and no doubt that is also going to be driven, in part, by the interest of particular food companies. It is a very active area and where we are seeing more publications coming through. Scientific literature also focuses on safety. There is an approach that looks at the size of the nanoparticle itself. It is one also that looks at the properties of the nanoparticle, but really we are finding with regards to food, that there is some information available on how our body might respond to a nanoparticle when we inhale it. There is only a little bit of information out there about what happens to a nanoparticle when we ingest it. So it is an area that we do require more research to inform us as to whether the current way in which we assess the risks associated with not just a nanoparticle but traditional food processes, whether they are going to suffice for nanomaterials.

Via regulatory networks, we have become aware that in the United States a food company has applied for a patent to cover the use of titanium dioxide and silicon dioxide in chocolate in the nanoparticle form so that it gives it a nice shiny gloss, but we are not aware that any application has been made to FSANZ to seek use of that in foods produced in Australia. This is an example that highlights an area of challenge for us. Titanium dioxide is a permitted food colour in the Food Standards Code and silicon dioxide is a permitted food additive. Our code is silent when it comes to the size of the particle so the debate would have to be had: would these two chemicals that are currently permitted in our code be viewed the same as their traditional form or would they be viewed as novel?

The Hon. MICHAEL VEITCH: Is that because they behave differently, when they are broken down, to the nanoparticle size?

Dr SZABO: It is not completely my area of expertise but one of the benefits that people believe is important with regards to the nanoform is that they are readily digestible, that we can uptake them more readily and in this particular case it really is going to open the debate as to whether that nanoform is the same as our traditional form and does the code, as it currently exists, really invite someone to seek an amendment to it.

The Hon. MELINDA PAVEY: Is there research being done anywhere in the world on this particular issue in relation to those particular chemicals?

Dr SZABO: Not to my knowledge but I could try to have a look in the scientific literature, if that would be of assistance. I have not come across that specifically.

Reverend the Hon. FRED NILE: You do not have a unit in your area that could do those tests?

Dr SZABO: That is the second challenge with regard to this sort of example—the test methodology. We do have some analytical techniques that can measure materials at the nanoscale. Will they be appropriate for the measurement in food? Food is a very complex matrix and often when we take analytical techniques that have been developed in other areas and try to apply them to food, you can be faced with many challenges, such as the interference of food materials. The other aspect is that there are naturally occurring nanoparticles in food. Does the technology allow us to distinguish between something that was manufactured and something that naturally occurs? Again, that is an area of challenge.

The Hon. MICHAEL VEITCH: That leads on to consumer education and awareness around nanoform that currently exists and your example of titanium dioxide. What is the Food Authority's role in maintaining consumer awareness around nanoform in foods?

Dr SZABO: The New South Wales Food Authority does have a role in providing education to the consumer. You will be aware that there is a Commonwealth Government process going on looking at the adequacy of regulation with regard to nanotechnology. Food is an aspect of it, but it is looking at the breadth of applications, as I understand this Committee is as well. Part of that process, I understand, is a public communication process and a process of providing information to the public in a language that is non-technical and the public would be able to understand.

Our position at the New South Wales Food Authority would be to wait until that process has been completed so that we are being consistent with the messages that are going out to the public. My understanding from my discussions with FSANZ is that the intent would be for materials to be developed for the public, and then, of course, any jurisdiction could either link to them or modify them for their own needs. I think it is important that we get a consistent message coming out.

The Hon. MICHAEL VEITCH: Does the Food Authority have a role in the labelling of foods?

Dr SZABO: Yes, we do have a role in the labelling of foods. Labelling is something that comes under the Australia and New Zealand Food Standards Code. We have used it to provide information to consumers so that they could make more healthy food choices. An example would be the nutrition information panels that appear on the backs of food. We have used labelling to warn consumers, particularly susceptible consumers, that there may be something harmful in the food. An example would be that if a food contains a known allergen, it needs to be listed on the ingredients list.

We have also used labelling so that we can provide instructions to the consumer as to how a food can be safely stored. An example would be a date mark, such as "needs to be used by", "needs to be refrigerated", or "can be stored at room temperature". Labelling also helps us to trace a product if, by chance, it has to be recalled; the batch coding assists us.

Recently, where we have departed from information sharing with the consumer regarding the safety of the food product, we have been looking at GM labelling, whether the food contains genetically modified material. There are labelling requirements for irradiation. More recently there have also been labelling requirements with regard to country of origin. Each of these went through the rigours of seeking an amendment to the Food Standards Code. They went through an assessment, and that also would have involved a regulatory impact statement, that is, a statement of the costs and benefits.

Could we do that ourselves in isolation? That is possible in New South Wales. However, we would only be able to place that requirement on food that is produced in New South Wales, and that would only hold for 12 months. We would then be required to make some moves on the national front. It would not prevent a food made elsewhere from coming into New South Wales, because there are specific requirements that allow that free movement.

The Hon. MICHAEL VEITCH: So chocolate from the United States that looks nice and shiny—

Dr SZABO: Or food that is produced in any other State. We could ask our manufacturers to specifically label, but we could not ask the same of manufacturers in other States. So, if we move down the path of wondering whether New South Wales can just act alone in an area, yes it is possible, but there are restrictions and we would need to very carefully balance what are the overall health benefits that we are able to offer the public in doing that and what are the potential economic impacts on the New South Wales companies that alone would be affected by it. The national process would, of course, then be applied nationally. And then, if there were a change to the code, any food that is coming into Australia would need to abide by that.

The Hon. MICHAEL VEITCH: Are you aware of any nanoform currently added to foods that, in your view, should be labelled?

Dr SZABO: I am not aware of any nanoform that is present in a food. Having said that, we need to be mindful that there are naturally occurring nanoparticles in a food. So, yes, we would be getting exposed to nanoparticles. There are some traditional processing technologies we use—for

example, heating in the form of pasteurisation—where we can produce nanoforms of particles. There are certain forms of milling where we turn something that is dry and leafy into a powder. Again, they can sometimes result in a nanoform being produced. To my knowledge, in that whole milling area there have also been advancements to increase the proportion of nanoparticles that you might get from that kind of process. Again, it is very difficult to be able to determine whether particles that have come through those sorts of processes are being added to our food.

The Hon. MATTHEW MASON-COX: I apologise; I was a little late and I may have missed some of your opening statement so you may have covered this. I want to be clear about the New South Wales Food Authority's position in the hierarchy in terms of the document you have provided to us. Am I correct in assuming that the Food Authority is on the implementation side of that parallelogram?

Dr SZABO: If I could take you through each of the elements—

The Hon. MATTHEW MASON-COX: No, please do not do that. Could you tell the Committee where the Food Authority fits in this process?

Dr SZABO: We will have representation on the food regulation standing committee, in the policy development area; we will have representation in that implementation phase; and at any point in that process we can also have input as a stakeholder.

The Hon. MATTHEW MASON-COX: What is the scientific capacity of the Food Authority to investigate whether nanomaterials are a significant health risk or otherwise?

Dr SZABO: We have a small team of scientists at the New South Wales Food Authority and a lot of our activity is directed towards areas that currently exist in the Food Standards Code, or to looking at areas of concern where we perhaps need to place more effort. We also do a lot of activity to support the development of a standard. So, if we were to get policy guidance from the Ministerial Council in this framework that there was a need to look at nanotechnologies typically within the food regulatory framework for Australia, we would be able to offer some services there. Having said that, nanotechnology is something that the laboratory that we use would not necessarily currently have the capacity to be able to—

The Hon. MATTHEW MASON-COX: Has there been any direction from the Ministerial Council for investigation in relation to nanoscale materials in food?

Dr SZABO: Not as yet. The Commonwealth is in the midst of its process in assessing whether regulation across the board is appropriate to address nanotechnology and its use, and food is one of those aspects. The results of that assessment have not been known. I would anticipate that when they are known, and there is a commentary on it from the Commonwealth, if any regulatory gaps are identified they would be made known to that Ministerial Council.

The Hon. MATTHEW MASON-COX: Is the capacity for scientific investigation really only at the Commonwealth level, through the CSIRO?

Dr SZABO: For that scale, yes. The CSIRO would be very well set up, in terms of capacity, to look at the analytical side of things. Also, with regard to assessing the risk, again it would be FSANZ that we would use as our first port of call for the expertise to do that.

The Hon. MATTHEW MASON-COX: And they have that expertise?

Dr SZABO: FSANZ has given all jurisdictions contact with regard to nanotechnology, and it certainly is an area that it is looking in separately, and monitoring the literature and looking at some of the implications and the gaps that we might have in our current scientific knowledge.

The Hon. MATTHEW MASON-COX: In your view, is that sufficient? Is there any need for New South Wales to be involved in any scientific investigation, or should that be more properly left at the Commonwealth level?

Dr SZABO: My view is that nanotechnology is something that does not affect us all. It is something that I think should be addressed nationally. If we do have the expertise in New South Wales to contribute to that process, we should certainly be making that available and we should be putting ourselves around the table. My view is that it does need to be a national discussion.

The Hon. MATTHEW MASON-COX: I am interested in your thoughts on the existing code. I note that under the existing code there is no mention of the size of molecules at the nano level. Do you think there is a need to do that? I suppose without the science it is difficult to tell, but where do you think that should be going?

Dr SZABO: If you look at the existing code—and even if you look at the New South Wales Food Act 2003, which is our instrument for enforcing the code—nothing specific is said about nanotechnology. Overall it does provide us with a robust framework to do a safety assessment. That does not mean that we do not have any challenges. I mentioned previously that we have the challenge, first of all, of being able to detect nanoparticles in food effectively, and also the challenge of clearly understanding that the way we currently go about assessing risks applies equally as well to the nanoparticle.

The Hon. MATTHEW MASON-COX: So you think the current framework is appropriate, in that there are nanoparticles sliding around as we sit in this room, as there are in foods at the natural level, so why do we need to change anything. Is that pretty much where you are?

Dr SZABO: I do not think I can necessarily judge whether we do need to change.

The Hon. MATTHEW MASON-COX: Do you think the current code is sufficient to cover the risk?

Dr SZABO: I think the current framework and the elements of going through a very robust risk assessment are adequate. Whether we specifically need to look at alterations to the code I would anticipate would be an outcome of the Commonwealth process. One of its goals is to look at some of the regulatory gaps and where we might need to consider making changes.

The Hon. MATTHEW MASON-COX: What is your view on the regulatory gaps?

Dr SZABO: With regard to the regulatory gaps, potentially it is the example I provided before. Where we have a particular substance that is already listed in the code as permitted to be used, we do not make reference to its size in a nanoform. The challenge will be: Can we address its use through the novel standards that are available in the code? Would we view that as being the same as a traditional use, or would it stand the test of "novel"? Another potential gap is that the way we make reference to a number of elements in the code has to do with weight: a gram-for-gram basis or a gram-for-volume basis. Whether that is then equally applicable to the nanoparticle is something that we perhaps have to look at.

The Hon. MATTHEW MASON-COX: Are there any other regulatory gaps that you are aware of?

Dr SZABO: No, not to my knowledge. But when we do see the full report and the full commentary coming through from the Commonwealth on the areas of regulatory gaps, it is certainly something that we as a food authority would have a look at.

The Hon. MATTHEW MASON-COX: We are looking forward to the release of that report. There seems to be a common thread that the science is perhaps behind the game in terms of where this technology at a whole range of levels is going, but particularly in relation to food and the potential health risks which no-one knows about because no-one has done the science. So we do not know whether we should change anything because there is not the science. Do you have a general view on what we should be doing in that regard?

Dr SZABO: We, as in New South Wales?

The Hon. MATTHEW MASON-COX: The Commonwealth, Australia and New South Wales, which all have a role in that.

Dr SZABO: I think, in essence, we have to clearly follow the scientific literature. Often what we find is that companies approach us before they tackle something like nanotechnology, in terms of deliberately adding it to their food. They are aware that there are certain—

The Hon. MATTHEW MASON-COX: Are they required to?

Dr SZABO: If they were applying it in an area where they would have to amend the code, yes, there are pre-market requirements. But some of the areas of challenge are the examples I provided before—things that are there but are in the nanoform. But they might equally make the decision that that is a grey area and that they are best to engage with a regulator early in the process, rather than when the food is on the market. A lot of these technologies require a significant investment on behalf of the company. It has been our experience that companies come to us before they travel down a particular path.

The Hon. MATTHEW MASON-COX: I am sorry, I interrupted you. Getting back to the science, what do you think we should be doing as a State and as a country in relation to the science in this whole area?

Dr SZABO: In terms of the areas that relate to food, we really need to be gaining the confidence and certainty in the way we currently assess the risk, whether they are going to be applicable to the nanoparticle as well.

Reverend the Hon. FRED NILE: Do you envisage that in the future there would be a requirement to have on food products a label that says, "This food contains nanoparticles", to identify each nanoscientific description—we mentioned chocolate—or will that be unworkable?

Dr SZABO: Whether it is going to be workable depends on how it goes through that risk assessment process. If someone did want to add a nanoparticle to a food and it required a change to the code, part of that whole assessment process might be that there needs to be a labelling requirement. That is a very long, robust process that is open to consultation that is also subject to a regulatory impact statement. So labelling might be an outcome of a process but it is dependent on the application.

CHAIR: Dr Szabo, do you have anything further to add?

Dr SZABO: No, I do not.

CHAIR: If the Committee has further questions, they will be sent to you and we would appreciate your answers.

Dr SZABO: Certainly.

(The witness withdrew)

CRAIG JOHN LAMBERTON, Director, Specialised Regulation, Department of Environment and Climate Change, P.O. Box A190, Sydney South, and

THERESE MARIE MANNING, Ecological Risk Specialist, Department of Environment and Climate Change, P.O. Box A290, Sydney South, and

PHILIPPA JANE MALLEN-COOPER, Manager, Chemicals Policy, Department of Environment and Climate Change, 59 Goulburn Street, Sydney South, sworn and examined:

CHAIR: Welcome to the inquiry and thank you for your attendance this morning. If at any stage you should consider that certain evidence you wish to give or documents you wish to tender should be heard or seen only by the Committee, please indicate that fact and the Committee will consider your request. If you take any questions on notice today, the Committee would appreciate it if the responses to those questions could be forwarded to the Committee secretariat by Friday 27 June 2008. Do any of you want to make a brief opening statement?

Mr LAMBERTON: Our department welcomes the opportunity to address the Committee on what is a fairly contemporary issue for us and the community. Our agency, as you may know, has quite a broad role in nature conservation, biodiversity and management of the State's resources and also in trying to improve our response to climate change. The element that is most relevant for the Committee today is our regulation of environment protection, chemicals in particular. We regulate chemicals, radiation, dangerous goods, a range of things where chemical-related products interact with the environment. We recognise that nanoparticles and nanotechnology have significant potential benefits for the environment, cleaning up wastewater, improving recycling, greater energy efficiency and a number of quite positive technologies in being able to monitor these things in the environment. We are also mindful that there are potential risks that are not properly quantified yet. We have discovered a new technology, as mankind has on a number of occasions. Whilst we have seen some benefits, often the risks or hazards do not become clear until later on. We should learn from the history of mankind that sometimes we do not know what we do not know.

Nanotechnology is one of those areas where, notwithstanding the potential significant benefits, we do not really know the potential interactions of a lot of the nanoparticles in the environment or, in fact, for other media as well. We do not necessarily know what we should be looking for. As you would be aware, a lot of the regulatory regimes talk about chemicals and describes the chemical by its name. But in the form of carbon, carbon could be diamonds or graphite. They are very different materials and they have very different properties, yet they are still all carbon. So a lot of the regulatory regimes are about the name of the substance, not its physiochemical properties. That is where nanoparticles are a new dimension for us to regulate. We certainly do not know all the issues we should be considering. There may be different issues in different environments.

New South Wales has very comprehensive and strong legislation for the regulation of chemicals. We can regulate radiation, chemicals, asbestos. All of our legislation is about addressing the hazard to the environment. "Hazard" is broadly defined, so it could include nanoparticles. We regulate the cleanup of contaminated science in the theory it could be a nanoparticle that needed to be cleaned up, although we have no experience of that yet. We regulate emissions from industry, be it air or water, and regulation of waste. We have regulations to control the life cycle of chemicals and standard producer responsibility. The producer has a responsibility beyond just selling its product to the public, particularly for its ultimate disposal. We have regulations that cover pesticide use and environmental hazardous chemicals where, again, we can regulate the entire life cycle of a chemical product to control its risks to the environment.

All our regulatory regimes are quite effective. We have the tools we need, but we work within a national framework. That, of course, makes sense. Every government I have known, State or federal, has been very supportive of national uniformity improvements in cross-border trade efficiency and avoidance of duplicative processes in different States. It means that we have a common national approach. All of the regimes we work in, most of the standards and the broad regulatory frameworks are set nationally, and we contribute to that. But we rely upon, if you like, the initial assessment of the chemical, the food, the pesticide, whatever it might be, to be done at the national level. The broad risk

assessments—the issues, the risks, the controls that might be required—are determined at a national level. Then we in the States implement those recommendations through our Acts and regulations.

Our department contributes quite a bit. We have professional and organisational relationships with the federal authorities. For example, at the moment we are working on a national chemicals environmental management [NCEM] framework. Our Minister and all the other environment Ministers are strongly supportive of that. That is currently reviewing how environmental issues are regulated nationally. I guess we are a little bit behind some of the other regimes. Occupational health some years ago developed a national framework and a series of standards. That is less clear in the environment area, but that is being addressed currently in the NCEM framework. We also participate in a number of forums. We provide input on some of the priorities for research in New South Wales. We have the Environmental Trust Scheme. There is a lot of competition, as there always is for grants schemes, but that scheme allows New South Wales applicants to be sought for research and supports nanoparticle-type applications federally. So we have some influence there, although it is very competitive.

We believe in New South Wales we have the right frameworks to regulate nanochemicals, but we do not have the information to know exactly what needs to be regulated. We are somewhat strongly supportive of a national assessment of these substances before they find their way into products that will be in the environment and, for that matter, foodstuffs and others, so that as regulators we know what we should be looking for in each of these individual products. Some of them will be quite benign and I am sure they will provide only benefits to our society. Some of them potentially could have significant downsides. They should be assessed before they are let loose and we discover them in 5 or 10 years' time—at which stage, of course, it is quite difficult to undo the damage. The approach we are taking is to support the Commonwealth and to encourage and develop assessment schemes early when they are introduced into Australia, not down the track. We believe changes can be made to adopt that approach nationally.

CHAIR: We will now proceed to questions.

The Hon. MELINDA PAVEY: In terms of nanotechnology and nanoparticles, is the department investigating the issue? Specifically, have you had discussions with the CSIRO about land sustainability? We met with the CSIRO two or three weeks ago. It is doing some interesting work. Is there collaboration between the department and the CSIRO?

Ms MANNING: We have a long-term relationship with the CSIRO Centre for Environmental Contaminants Research, which is part of the group that is working on the CSIRO project on nanotechnology. Their team leader came and talked to us about three months ago to bring us up to date on where they are. We have an ongoing relationship with them. The other part of what we are doing, I am involved in organising a conference in August for the Society for Environmental Toxicology and Chemistry [SETAC], and so is that team. One of the focus areas for the international congress that will be at Darling Harbour in August is nanotechnology. One of our keynote speakers will speak on that and there will be a whole day of research papers on that topic. We are keeping in touch with what the CSIRO is doing and keeping on board with where they are up to. But we are also working with them in trying to hear more about what the on-the-ground researchers are doing. Recently one of our staff members went to the United Kingdom on a United Kingdom-Australian governments interaction. That was mostly to do with endocrine disrupting chemicals, but the United Kingdom government wants to extend it so that we have an ongoing relationship on a research and regulatory basis to talk about nanoparticles as well.

Reverend the Hon. FRED NILE: Just to clarify that conference: you said "we". Is that organised by the Department of Environment and Conservation?

Ms MANNING: I am involved in the organising committee, so when I say "we" I mean me. But I am doing that as part of my job and the department is one of the major sponsors of the conference.

Reverend the Hon. FRED NILE: The department is sponsoring it?

Ms MANNING: Yes. It is the society's conference—the Society of Environmental Toxicology and Chemistry [SETAC], but the department is deeply involved.

The Hon. MATTHEW MASON-COX: Craig, in your opening statement you said that you supported the Commonwealth taking the lead in relation to the assessment of risk in chemicals and nanoparticle levels, et cetera, et cetera, and that you supported changes being made so that we move to a national framework. Can you just outline what changes would need to be made in order for that to happen?

Mr LAMBERTON: Jane might assist me as well. I guess one of the fundamental changes is to recognise that the current Federal legislation again defines things by the chemical nature—the carbon example—not necessarily its physiochemical form. We believe that needs to be either clarified with the existing legislation if it can do that, and if not, change it. But either way the policy should be that chemicals should be assessed in the form in which they are going to be used not just their pure chemical nature. It may be that carbon has already been assessed, but carbon in a new form, such as a nanoparticle, should be assessed at that entry stage into Australia, the National Industrial Chemicals Notification Assessment Scheme.

The Hon. MATTHEW MASON-COX: NICNAS.

Ms MANNING: NICNAS, yes. It is yet to be clear internationally what is the characteristic that is most applicable to put into legislation to control that, but that is where we are headed.

The Hon. MATTHEW MASON-COX: Given the life of nanoparticles, and disposal is an issue that we have had some evidence on, I just wanted to get your thoughts in relation to the challenges presented by chemicals at the nanoscale or other products at the nanoscale in terms of the actual disposal of the waste of those.

Mr LAMBERTON: We regulate landfills, and in my time in the Environment Protection Authority and now the Department of Environment and Conservation, landfill technology has come an awful long way in the last decade. Now, all modern landfills are lime, leachate collected, properly capped and also they are not built on in the future as they have been in the past. In terms of priorities, we do not see the disposal path as being the one where the most risk is because landfills are designed for the secure containment into the longer term of these materials—and anything else as well: potentially other chemical products; anything that goes into those red-top bins. So, it is more the uncontrolled release into the environment that we will be more concerned about where there are not the controls in place to contain them, where their interactions cannot be controlled. Waste does not come off on the radar for us at the moment as being its most significant form of risk.

Ms MALLEEN-COOPER: Can I just add something to that? At this stage there is so much that we do not know about how the technology is being used—the manufacturing facilities here and how they are doing it and what is being imported. We can look at that further down the track but I think we need to go back a step as well, and what we would like to see is more information about use and the types of nanoparticles, because, having read your submissions and the hearings, there is a huge range of material, some of which will cause environmental concerns and some of which will not. It depends on how they are being released into the environment or whether they are in products that they stick in with and do not come out of further down the track.

I do not think we probably know enough yet to know what the downstream impacts are going to be. We certainly do not have tools available as yet for monitoring those or picking them up. What we need to do is go back a step, which is where we are all at the learning phase I think, and work out what types of materials are they, what sort of structures are they, are they likely to aggregate in the environment or are they likely to stay in their stable nanoform? There are a lot of questions we need to think about before we know how we can apply the tools that we have. I support what Craig has said, that we have good tools but we do need to know what we are dealing with. As yet I do not think we have got that clearly. We need more information.

The Hon. MATTHEW MASON-COX: How would you recommend we go about finding out that information?

Ms MALLEEN-COOPER: I think there needs to be good connections amongst industry and government and the broader community and I think there needs to be good transparency in the information and the uses and the risks, and falling out of those processes will be better information that we can all work with to address the concerns and benefits that might come from nanotechnology.

Reverend the Hon. FRED NILE: You mentioned the problem could be it is in the environment or it is in the product. Do you see any parallels with the asbestos situation as to how that developed? Are there any parallels with the nanotechnology? Getting into people's lungs and the body and so on?

Ms MANNING: Some of the nanoparticles have been shown to have the same sort of effects as asbestos, but whether they are going to be released to the air, except in occupational circumstances, I am not sure. I have not gone into their uses as much as really understanding that. But a lot of those, if they are in use in optical fibres and a whole lot of computing stuff they are less likely to get into the environment like the carbon nanotubes and stuff like that. They are less likely to get into the air so that people can inhale them, so that will be less of an issue. But it is an issue in occupational circumstances when they are manufacturing them because they can get into the air in those sorts of circumstances. But for the community my understanding of their current uses is that that would not be an equivalent exposure pathway.

Reverend the Hon. FRED NILE: There may be a need for strict requirements in the manufacturing area, that those units or factories are sealed in some way: you go through a lock to enter the premises, et cetera?

Ms MANNING: Yes. My understanding is a lot of them have to be manufactured in clean rooms and they would have that requirement. A clean room has to be sealed so that the dirt cannot come in, as well as the stuff that is inside the clean room cannot go out. To be accredited as a clean room you have to go through all of those tests.

The Hon. MICHAEL VEITCH: Does the department have a process for identifying emerging issues in the context of nanotechnology but in a broader sense?

Ms MALLEEN-COOPER: Our department has been leading a national group under the Environmental Protection and Heritage Council, which has developed this framework for national chemicals environmental management in that we work with our Commonwealth environment counterparts and all our State and Territory colleagues from environment agencies. That framework covers quite a range of activities from better environmental input into assessments, appropriate management and regulation, better feedback loops to the national assessment and national regulators, and strategic policy setting and prioritisation.

The framework was signed off by all environment Ministers in June last year and we are working our way through emerging issues and the priorities that we would need to follow, and certainly nanotechnology is an emerging issue that environment agencies need to work on together cooperatively. The good thing about working in those national processes is that we have formed very strong linkages with the national regulators such as the National Industrial Chemicals Notification and Assessment Scheme and the Australian Pesticides and Veterinary Medicines Authority. We are very closely involved in their processes and in working to get a better system together. So, we have lots of opportunities to work together on priority issues and to see what we need in terms of environmental gaps or regulatory gaps or where we need to engage better with the community.

The Hon. MICHAEL VEITCH: Has the department initiated, partnered or commissioned any research about that?

Ms MANNING: No, we have not at this stage. A lot of the work that seems to be needed is being done overseas. It would seem not such a great idea to repeat that work. As I said, we are encouraging the CSIRO to keep going with its project and keeping up with that. But we have not initiated any additional research. We are keeping a watching brief on the international literature and talking to our colleagues, doing conference stuff and working with the United Kingdom. We are developing linkages and keeping up with literature, but not doing on-the-ground research.

The Hon. MELINDA PAVEY: Are you generally happy with the way communication is happening within the Australian scientific community with nanotechnology? We have the National Nanotechnology Strategy, through which federal agencies are currently advising the regulatory regime. Do you think things are working well?

Ms MANNING: Only a limited number of people are working on scientific research. We are keeping in touch with them. They are excellent at communicating what they are doing and stuff like that.

The Hon. MELINDA PAVEY: Are you happy with the communication within the country about nanotechnology, or do you think it could be better?

Ms MALLEEN-COOPER: There is a lot happening. Certainly, everyone's awareness nanotechnology is increasing all the time among agencies. There are good linkages. We work closely with our commonwealth counterparts, who are more involved in the international movements. The Commonwealth Department of Environment, Water, Heritage and the Arts is involved in OECD work, for example, through the joint chemicals committee and the National Industrial Chemicals Notification and Assessment Scheme is involved on the nanotechnology subcommittee of that scheme. That information feeds back to us because we have strong linkages with other agencies through the National Chemicals Environmental Management Framework Working Group under the Environment Ministers' council.

The Hon. MELINDA PAVEY: We have also been advised that the United States nanoscale iron has been identified and used as an effective tool for the remediation of polluted waste sites. Is the department conducting any research or doing any work in this area?

Mr LAMBERTON: No, but we are primarily a regulator. However, we are aware that some work has been done at the University of New South Wales in relation to the Botany contaminated groundwater. They have had some initial success, but that pollution has a number of components and it works on only one of those components. From my regional days in the Illawarra I know of a cut-off wall was installed to stop the migration of pollution. Whilst it was not built as a nanotechnology, it is using that kind of high surface area—which provides many surfaces for lots of interactions—with nanoparticles that stop pollution from moving out of an old containment site.

Ms MANNING: Zero valent iron has been a remediation technology for some time.

The Hon. MELINDA PAVEY: What is that?

Ms MANNING: It is iron that has no charge on it. It is the metallic form of iron. It is made into a very fine powder, but not nano scale; it is still the normal size. They make it into a fine powder and it can be put in a drum that water passes through or in a cut-off wall in the ground so that the groundwater passes through it. Zero valent iron is a known technology for remediation where the contaminant chemicals need to be oxidised in some fashion. Nanoscale zero valent iron is another step in the process of increasing the surface area so that the reaction happens more quickly. We have not had many people proposing to use it or any of that sort of stuff. Some of the trials at Orica at Botany have not worked very well because the reaction is specific to only one of the contaminants.

Ms MALLEEN-COOPER: My understanding is that trials are still very much at the pilot stage. Our contaminated site specialists keep in touch with regulators, for example, with the United States Environmental Protection Authority.

Ms MANNING: It was decided that Orica needed to pump and treat the groundwater contamination. There was no alternative process it could use.

Reverend the Hon. FRED NILE: You all know about nanotechnology. Is one of you responsible for it within the department? Do you have a unit monitoring it?

Mr LAMBERTON: I am responsible for the specialised regulation branch. Chemicals policy monitors the national regimes in terms of policy and regulatory tools. Ms Manning's area—the

science branch—monitors the technology side of the business. It is not the only thing we have to do. That is why we have Dr Mallen-Cooper and Ms Manning here today.

Reverend the Hon. FRED NILE: It is a team approach?

Mr LAMBERTON: Yes.

The Hon. MICHAEL VEITCH: What is the most exciting nanoscale technology at this moment available to remediate polluted sites other than iron? Is anything else being touted or used?

Ms MANNING: Not that I am aware of. Most of the nanoscale stuff I am aware of relates to improving products, whether they be food, sunscreen, drugs or delivery. One of the things I have read talked about using nanoscale technologies to make a better membrane for water-treatment processes. That is possible, but I do not think they have got very far with that process; that is, to commercialisation. Anything that improves our ability to treat water at a lower cost is a good thing. Extensive treatment requires enormous amounts of electricity. If we go to reverse osmosis and make those membranes easier to use using less energy that will be a significant improvement.

Reverend the Hon. FRED NILE: We mentioned the Federal role. It seems that the national role is the prime role. Do you have any views on how effective it is at the moment? Are you confident that it is dealing with priorities and that it has appropriate financial resources?

Ms MALLEEN-COOPER: The Productivity Commission is conducting a review of the regulation of chemicals and plastics in Australia. That involves some recommendations that we think would be useful in improving the situation. The Commonwealth is currently doing its own review of nanotechnology, which we have not been party to yet. We are quite interested to see what comes from that. We hope they will take on board the recommendations we have discussed here this morning in terms of earlier assessment.

Reverend the Hon. FRED NILE: Did you say that you have not been party to it?

Ms MALLEEN-COOPER: No.

Reverend the Hon. FRED NILE: Surely they should consult with the States?

Ms MALLEEN-COOPER: The Commonwealth has the lead on the national nanotechnology strategy, which I am sure the committee has heard about. We were consulted in the report process leading up to that strategy. They are currently doing a study of regulatory adequacy in Australia for managing nanoparticles. That is broad in scope. I think they are still developing that. When the Commonwealth has developed a whole-of-government position on that, it will then consult with its State and Territory counterparts across agencies.

Because of the processes happening in the chemicals and plastics review, the Productivity Commission, the Council of Australian Governments, the Environment Ministers task force everyone is seeing the value of national, cooperative action. Everyone has a role to play and those roles are different across levels of government. Many good processes are in place. It is good that an issue like nanotechnology is emerging when all these structures, communications and so on are being considered. We are in a really good position to have processes that will deal with them.

Reverend the Hon. FRED NILE: What was going through my mind with that question was that from the evidence we have been hearing obviously New South Wales, and particularly Victoria, are very advanced in the area of nanotechnology and the commercial development, which would not be the case with the Commonwealth. There would need to be that consultation with the States, where one could say the action is. It is not happening in Canberra.

Ms MALLEEN-COOPER: Yes, and I think it probably needs to be. Coming from that study will be the need for information sharing and transparency. We would strongly support that. A lot of the focus has been on the technology, which can do amazing things, and there are really still only a handful of published research papers on environmental impacts, but people are starting to think. There are concerns in some areas and not in others. So, we need to address this cooperatively and we need to

start thinking about, in the development phase, what are the health and safety and environmental risks we are dealing with and the social aspects of that, bringing the community with us and making sure there is good communication, not only within government and between industry and government, but with the broader community.

CHAIR: Would you like to make any further comments or is there anything you would like to say before we close?

Ms MALLEN-COOPER: We have some references and things like that that we can provide, if they are of interest.

Reverend the Hon. FRED NILE: That conference you are holding, that is not until August?

Ms MANNING: Yes, it is in August.

Reverend the Hon. FRED NILE: It would helpful if we got some of that information.

Ms MALLEN-COOPER: Yes. We would like to thank you for the work you are doing. I found it really interesting. Gathering all that information in the one place is really helpful for a regulatory agency like ours, to know who to talk to in all the different sectors and to know all the things they are doing.

CHAIR: If you could give us anything that you have that you want to pass on to us, it would be appreciated.

Ms MALLEN-COOPER: Yes, okay.

(The witnesses withdrew)

(The Committee adjourned at 12.12 p.m.)