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Inquiry into Nanotechnology in New South Wales

Supplementary Notes for Committee

These notes cover both; (a) information that was provided for the Committee at the hearing on 10 June 2008, and also (b) additional information that was not presented at the hearing.

INTRODUCTION

My name is Howard Morris and I represent the Australian Government Department of Education, Employment and Workplace Relations, Office of the Australian Safety & Compensation Council.

As such, the views I express are not provided with the intention of representing the views of the Australian Safety & Compensation Council (ASCC), which is made up of government, employer and employee representatives (including WorkCover NSW). However, we do work closely with ASCC member organisations.

The Office of the ASCC supports the activities of the ASCC, and provides advice on:
- OHS and workers compensation matters, and
- standards review, development and implementation.

The Office of the ASCC also coordinates the department's inter-governmental role in OHS and workers compensation through inter-governmental agencies such as the Organisation for Economic Co-operation and Development (OECD).

In support of the National Nanotechnology Strategy, the Office of the ASCC is implementing a Nanotechnology OHS Research & Development Program. This Program has Australian Government funding up until the end of the 2008/9 financial year, to examine and address nanotechnology occupational health and safety (OHS) issues. I'm the Manager of this program, and I submit a copy of the program for examination by the committee.

Control of emissions containing nanoparticles in occupational settings is not a new subject. For example, there are well-established methods to prevent exposure to welding fume. The objective of the R&D program is to help ensure the effective control of exposures:
- to an expanding range of engineered nanomaterials
- in an increasing number of research laboratories and workplaces

Finally, I would like to thank the Committee for the invitation to provide evidence to assist with the inquiry.

1. The Committee understands that you recently attended an International Standards Organisation meeting on nanotechnology. Can you advise the Committee on the outcomes and any implications arising from this meeting?

Yes. I attended the meeting of the International Organisation for Standardisation (ISO) Nanotechnology Technical Committee (TC229), from May 26-30. My colleague Dr John Miles from the National Measurement Institute (who previously gave evidence to this committee) also attended. There are four working groups (WGs)[1], covering:

- Nomenclature & terminology
- Characterisation & measurement
- Health, safety & the environment (HSE)
- Materials specification (new WG)

The Working Groups will develop Standards, Technical Specifications & Technical Reports. These are now being developed across all WGs, and a number of new Work Items were proposed at the recent meeting. There are currently 5 HSE projects.

In regard to HSE, which is my focus, the major outcome from the meeting was the completion of the Technical Report on *Health & safety practices in occupational settings relevant to nanotechnologies*. ISO member bodies have voted to approve publication, and I understand the report will be published in around two to three months. It has been a significant international collaboration, over a period of two years, led by a representative of the National Institute for Occupational Safety & Health (NIOSH) in the US, Dr Vladimir Murashov. Through the Standards Australia nanotechnology committee (NT-001) Australia has contributed significantly.

My role has been to coordinate Australian input, work on the project steering group and help draft the report. There's been with strong support and input from the Standards Australia Nanotechnology HSEWG, with members from the Australian Council of Trade Unions (ACTU), Consumers Federation of Australia, Plastics and Chemicals Industries Association (PACIA), National Industrial Chemicals Notification and Assessment Scheme (NICNAS), Flinders University and the Council of Textile and Fashion Industries of Australia. The work has also been supported by colleagues in the Office of the ASCC, and other Australian stakeholders. This Technical Report will assist nanotechnology organizations (both companies and research laboratories) in Australia and overseas to control OHS. Also, and importantly, the process of development has helped us become participants in this area of work, and thus promotes Australian involvement in other activities.

A second work item was completed, led by the British Standards (BSI) in the UK, on terminology for nanomaterials.

Implications, or rather opportunities for Australia lie in the opportunity for us to propose new work items and then lead the development of the standards. Thus, I would encourage NSW nanotechnology stakeholders who may wish to be involved in

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[1] There are 30 Participating and 10 Observer members of TC229 (Australia is a Participating member). I do not know the precise number of countries represented across all the working groups, but there is active participation from a significant number.

the Standards Development process to do so. Involvement in the process is voluntary, but it would enable international development and support in areas specifically of interest to Australia, to individual stakeholders or to organisations.

An important initiative currently underway lies in the development of a standard list of parameters (eg length, width, chemical composition, solubility and surface area) that should be measured to characterise the physico-chemical properties of engineered nanomaterials prior to toxicity testing. This needs to occur so we can fully understand the nature of the material being tested.

The UK BSI has proposed that its guide for Safe Handling and Disposal of Nanomaterials (which is currently publicly available) be converted into an ISO document. This would be of benefit to Australia, and the development process would examine and address any issues in the guidance. Effectively, it would be an international peer review of the BSI guide, and would make it internationally targeted rather than UK specific. I anticipate that the Office of the ASCC will support Standards Australia in providing input to the proposed document, should ISO agree to the project.

The ISO members present at the meeting also discussed important topical issues such as recent research findings into the health effects of multi-walled carbon nanotubes (MWCNTs).

2. The Committee has been advised that the ASCC is working on developing a national position paper on regulating nanomaterials in Australian workplaces, and that NSW WorkCover has been working with you on that. The position paper is to be finalised sometime this month. Can you advise the Committee on the development of this paper, and what will occur following that?

DEEWR's Office of the ASCC has been examining critically, and in detail, the issues relating to regulation of engineered nanomaterials, but we have not yet been involved in developing a national position paper on this topic.

We have been working with other Australian government agencies on a paper outlining the Australian Government's nanotechnology objectives, and approach to the responsible management of nanotechnology, which will soon be finalized and released. I anticipate that the Australian Office of Nanotechnology (AON) will coordinate publication, media release and other information about this paper when it is published.

We intend working very closely with the Nanotechnology OHS Reference Group (which includes WorkCover NSW) to develop a national position relating to the regulation of engineered nanomaterials.

The Office of the ASCC has been in regular contact with officers from WorkCover NSW on a number of topics relating to nanotechnology OHS, and I am fully aware of the interest and focus that WorkCover has in this area, and that WorkCover is looking to work closely with the Office on projects within the Nanotechnology OHS R&D program. I very much welcome WorkCover's input across all the work.

3. WorkCover NSW advised in evidence that it joined the newly established ASCC nanotechnology working group. Can you advise the Committee what this working group will be doing and what are its objectives?

WorkCover NSW has joined the newly established DEEWR Nanotechnology OHS Reference Group. Its membership includes representatives from ASCC members (OHS regulators, the Australian Council of Trade Unions (ACTU) and the Australian Chamber of Commerce and Industry (ACCI)) who have relevant OHS experience and expertise. This group also includes representatives from NICNAS and the Australian Office of Nanotechnology. This group was convened by DEEWR, not the ASCC.

I submit the Draft Terms of Reference for the Committee's examination. Given they are a draft, we would ask that they are not publicly released. Broadly speaking, the reference group will support the implementation of the Nanotechnology OHS R&D program, and provide support for a coordinated national approach to the management of nanotechnology OHS. The reference group will:

- Provide a forum to develop national positions in regard to nanotechnology OHS, which may be proposed to the ASCC for endorsement.
- Promote engagement and input from nanotechnology stakeholders in the process.
- Facilitate a coherent, consistent approach to the topic across Australian stakeholders, e.g. across states & territories
- Support the work of members' organisations in managing nanotechnology OHS
- Prevent duplication, e.g. of research & other programs
- Examine key issues e.g. the regulatory framework and OHS regulations in relation to nanotechnology
- Promote the effective sharing of information on nanotechnology OHS management amongst regulators, industry, the unions, researchers and relevant practitioners
- Provide advice and prioritization for projects and research focus in the R&D program
- Identify new projects for consideration

We're planning to hold the first meeting of this group on the 17 July 2008.

Members are invited to participate in or lead projects in the Nanotechnology OHS R&D program, and I can inform the committee that workplace Health & Safety, Queensland (WHSQ) will chair the Nanotechnology OHS Measurement Reference Group. This has been established to bring together experts and help develop Australian capability in measurement of exposure to nanoparticles in the workplace. I also submit the Draft Terms of Reference of the Measurement Group for the committee's examination (again as it's a draft, we would ask that it's not publicly released).

4. The Committee understands from the Australian Government submission that the Office of the ASCC, along with other relevant agencies, is reviewing the existing regulatory frameworks to ensure they appropriately address the impacts of nanotechnology. Can you advise the Committee on the progress of your review and any indicative outcomes to date?

The Australian Office of Nanotechnology (AON) commissioned a review of the Australian EHS regulatory frameworks by Prof Graeme Hodge and his team from the Centre for Regulatory Studies at Monash University. Using information from this review, and other sources, the Office of the ASCC has undertaken a detailed analysis of the implications for the regulatory framework from OHS. Our findings to date suggest:

- Nanomaterials are regulated in the workplace as a subset of workplace chemicals. The obligations that exist for other chemicals also apply to nanomaterials. These cover hazardous substances, dangerous goods and explosives.
- In general, the OHS regulatory framework is sufficiently robust and flexible to be able cover potential implications from engineered nanomaterials.
- But, there are regulatory issues associated with nanotechnology OHS.

<u>Identified Potential Regulatory Issues</u>
A number of issues are associated with our currently limited knowledge of the potential hazardous nature of engineered nanomaterials. Knowledge about this is rapidly developing as research findings become available. A clear issue is that we need to understand the hazards to be able to classify the materials accurately, and subsequently to provide appropriate information for users on labels, and in safety data sheets (or MSDS). Identifying the chemicals present and the hazards they pose also determines the need for other regulatory requirements, such as the to notify relevant authorities when certain materials are being used, handled or stored, or the need for routine health surveillance of workers.

A further major issue is our current capability of undertaking reproducible workplace exposure measurement of engineered nanomaterials. This is an issue for all countries with nanotechnologies. Measurement capability is also needed to measure exposures against workplace exposure standards, and determining appropriate exposure standards for engineered nanomaterials is a further issue.

Then, we also have a restricted picture of how effective conventional controls are in preventing exposure to engineered nanomaterials. However, recent research is indicating that conventional aerosol controls will be effective in preventing exposures to engineered nanomaterials in a number of situations.

Additionally, a further issue is the relationship between "reasonably practicable" and "precautionary approach" in the context of OHS legislation and nanotechnology, and this needs to be examined.

I'll go on to describe work we are doing to address issues when we cover progress of the Nanotechnology OHS R&D program (Question 5).

Where to from here with the examination of nanotechnology and the OHS regulatory framework? The Office of the ASCC has examined the overall national framework. We'll be presenting a paper to the first Nanotechnology OHS Reference Group meeting on this matter, and then we suggest the next step might be for regulators to use the information to examine where there may be implications for their regulations and codes of practice.

5. Can you advise the Committee on the progress of the various programs under the Nanotechnology OHS Research and Development Program to support the National Nanotechnology Strategy?

Yes, I can. I submit a copy of the R&D program for the committee's examination. There are four areas of work:

- Reviewing the Australian OHS regulatory framework in relation to nanotechnology
- Support for Australian nanotechnology businesses and research laboratories
- Evaluation and development of workplace controls for preventing (or minimising) exposures to engineered nanomaterials in the workplace.
- Undertaking, commissioning & coordinating Australian nanotechnology OHS research

I have already described the work being done to examine the regulatory framework. I will cover the other three areas by showing how the program work, and focus of research undertaken addresses the key regulatory issues identified.

<u>Achieving Accurate Classification</u>
Our strategy in this area is twofold:

- Firstly, to keep up-to-date with the growing body of research being undertaken overseas on the toxicology of engineered nanomaterials. Research into the toxicology of nanomaterials is an international effort, with many countries contributing. Thus, we have commissioned work to undertake an up-to-date review evaluation of the toxicology of engineered nanomaterials. This will update information in the previous review the Office of the ASCC, published in 2006 (on The Potential OHS Implications from Nanotechnology), which is presented on the ASCC website. I anticipate the new review report will be completed by the end of August, and we intend publishing the work subsequently on the ASCC website. This will include a critical examination of the similarity of the properties of carbon nanotubes and asbestos.
- Secondly, to commission or support toxicology research in Australia on topics of specific interest to Australia, which will also add to global knowhow and enable us to become involved in and contribute to the essential international collaborative work, and derive the benefits from these programs, e.g. through the OECD's Working Party on Manufactured Nanomaterials program.

<u>Measurement</u>
As previously reported, we have established the Nanotechnology OHS Measurement Reference Group, to bring together regulators, researchers and hygienists with expertise in measurement of nanoparticles in the workplace. WorkCover NSW is

also represented on this group, which will develop Australian capability in this critical area.

Control of exposures in the workplace

In order to provide OHS support to Australian nanotechnology organisations, the Office of the ASCC has commenced work on a number of initiatives:

Examining effectiveness of controls

We have commissioned a review of the evidence for the effectiveness of workplace controls for preventing exposures. I anticipate this review will also be completed by the end of August, and the review report will also be published subsequently.

Regarding Guidance Material

As described previously, the Office coordinated Australian contributions to the ISO Technical Report on *Health & Safety Practices in Occupational Settings Relevant to Nanotechnologies*. The report has been approved for publication by ISO member bodies.

Evaluation of control guidance material for suitability in Australia is underway. The Office has examined the British Standards BSI Guide on Safe Handling & Disposal of Nanomaterials. On initial examination, there appears to be useful guidance in this document, and further opinion on the guide, with particular focus on consideration of the proposed benchmark exposure levels, will be sought.

In terms of actively disseminating relevant OHS information, new nanotechnology OHS webpages were published on the ASCC website in March 2008. We will be regularly updating these webpages.

Risk Management

The Office is also examining new information relating to OHS risks arising from the use of nanotechnology or from nanoparticles

Laser printer emissions is a topic of interest in the community, and an Australian paper was published on this topic in July 2008 by Professor Lidia Morawska and co-workers from Queensland University of Technology. This research identified the emission of nanoparticles from some laser printers. Prof Morawska is currently leading a project (with participation from Workplace Health & Safety, Queensland) to further characterise laser printer particulate emissions – i.e. the number, size distribution and chemistry of particles emitted by laser printers, and to identify contributing factors to high emissions. The Office intends to provide funding for a third stage of the project which aims to characterise workplace exposures, examine the effect of ventilation on exposures, and develop guidance materials. The target completion date for this third stage of the project will be June 2009.

Some concerns have been expressed about the adequacy of information that is being supplied by manufacturers (in MSDS and labels), and the Office of the ASCC is considering this issue.

Field support for organisations

We're planning to establish or support field studies work, by an expert team (or teams) to provide advice for organizations. Pre-work for the fieldwork is currently focussing on (or will focus on):

- Measurement capability development
- Understanding the effectiveness of controls.
- Engagement of organizations,
- A survey of controls which are being used in nanotechnology organisations in Australia to prevent and control exposures to engineered nanomaterials, and what issues organizations have in nanotechnology OHS

I understand that the OECD project on exposure assessment & exposure mitigation for nanomaterials will be examining nanotechnology OHS audit/field study tools, and through involvement in the OECD's Working Party for Manufactured Nanomaterials (WPMN) program we will have access to these tools to assist work in Australia.

What committees and other forums does the Office of the ASCC operate in?

The Office of the ASCC is participating in collaborative research, guidance development and policy development to help optimise nanotechnology OHS management, both in Australia and internationally.

- The Office works closely with other Australian Government agencies, and is a member of the Australian Government's health, safety and environment working group.
- The Office is represented on the Standards Australia Nanotechnology Committee and ISO Nanotechnology Technical Committee (TC229) Working Group 3, focussing on nanotechnology environment, health and safety standards development
- The Office is represented on the National Health and Medical Research Council (NHMRC) Advisory Committee on Health and Nanotechnology
- The Office will also be supporting the Australian contribution, coordinated by NICNAS, to the OECD program on Safety Testing of Manufactured Nanomaterials.
- The Office also intends to participate in the OECD WPMN program on Exposure Measurement and Exposure Mitigation.
- The Office is also represented on two World Health Organisation Collaborative Centre nanotechnology projects.
- We are maintaining and developing relationships with overseas agencies e.g. National Institute for Occupational Safety & Health (NIOSH) in the United States and the Health and Safety Executive (HSE) in Great Britain.

The Office of the ASCC has been actively progressing work on this program, and this will now be built on and accelerated with engagement of stakeholders, in particular through the Nanotechnology OHS Reference Group.

6). Dr Morris you have been involved in a number of the community forums on nanotechnology held under the public engagement and awareness program. While acknowledging these forums are but one part of the program, do you think they have been successful in increasing awareness and understanding among the general public about nanotechnology?

I have participated in one Australian Office of Nanotechnology public forum as a speaker, and been in the audience at two forums. I also participated in the regulatory forum at the International Conference On Nanoscience and Nanotechnology (ICONN) 2008. Thus, perhaps I have somewhat limited experience on which to base my answer.

My experience is that the forums are a valuable exercise in community engagement. The audience is presented with a balanced range of views, over the spectrum of nanotechnology e.g. covering applications, potential health and safety issues, and ethical issues.

However, the information exchange is very much two-way, and my experience was that I took away valuable insights from the questions and comments of the audience. For example at ICONN, the issue of Material Safety Data Sheets (MSDS) was raised. It was reported that an MSDS for graphite was supplied for use with carbon nanotubes.

Thus, I think the forums do help in raising awareness and understanding, but need to be complimented by other work to reach a wider audience (e.g. university researchers).

7). The ASCC website provides useful information and links on nanotechnology. The Committee understands that the Australian Office of Nanotechnology is developing its website and fact sheets on nano-related issues. Will there be coordination between this website and the information provided by ASCC on its website?

Following feedback received on how we can support stakeholders, the Office of the ASCC developed nanotechnology OHS webpages for the ASCC website earlier this year, to provide information. We will aim to regularly update these pages, e.g. as new research papers are published. Amongst others, we provide a link to WorkCover NSW's 2007 publication on Nanotechnology: Occupational Health & Safety overview. It's good to hear that the ASCC website provides useful information.

We regularly consult with the Australian Office of Nanotechnology (AON) in regard to communications, including website content, and advise the AON on this matter through participation on the nanotechnology communications committee and through other forums. Regarding fact sheets, we are currently developing the nanotechnology OHS fact sheet for the AON.

Our website links into the National Nanotechnology Strategy and the AON is planning to develop webpages which will link (amongst others) into the Office of the ASCC's webpages.

Therefore, I think there is close coordination for website information between AON and Office of the ASCC.

Closing acknowledgement

I look forward to continuing to work closely with WorkCover NSW on nanotechnology OHS issues, and to work together on projects in the Nanotechnology R&D Program. Thank you again for the opportunity to assist the inquiry.