SENATE COMMITTEE AFFAIRS REFERENCE COMMITTEE

INQUIRY INTO WORKPLACE EXPOSURE TO TOXIC DUST

Minerals Council of Australia

12 AUGUST 2005

OVERVIEW OF MCA'S POSITION ON KEY ISSUES

> Health impacts of exposure to toxic dusts are well known

> Development of national regulatory framework has been adequate and timely, although uptake by states could be improved

> There is limited exposure data held electronically and little or no correlation between health information and exposure data either at Government or company level.

> The impact of nanoparticles associated with the emergence of nanotechnology is unclear, but is a major focus of current research.

MINERALS COUNCIL OF AUSTRALIA

The Minerals Council of Australia (MCA) represents Australia's exploration, mining and minerals processing industry, nationally and internationally, in its contribution to sustainable development and society.
MCA member companies produce more than 85% of Australia's annual mineral output.

The MCA has three strategic roles in assisting the minerals sector maintain its social licence to operate:

> leadership in pre-competitive public policy advocacy, nationally and internationally

> facilitating and promoting leading operational practice and capacity building across industry and communities

> engaging opinion leaders and other stakeholders to build public presence and industry reputation based on its economic, social and environmental performance.

The MCA's strategic framework integrates the industry's sustainable development objectives with public policy, company operations and their triple bottom line. The industry's key policy and operational objectives are:

> an industry free of fatalities, injuries and diseases

> unfettered access to competitive capital and commodity markets

> an economic and business environment conducive to improved productivity and capital efficiency

> access to natural resources and competitive markets in minerals, water and energy

> a skilled and competitive workforce — providing the necessary scientific, engineering, technical and social disciplines and operational capabilities

> research, innovation and technological advancement

> mutually beneficial social outcomes through engagement and capacity building with Indigenous and local communities

> improved environmental performance.

The MCA welcomes the opportunity to comment on the Senate Enquiry into Workplace Exposure to Toxic Dust.

The MCA is not in a position to comment on all aspects of the terms of reference and has, therefore, focused on areas of direct relevance to the Australian minerals industry.

THE HEALTH IMPACTS OF WORKPLACE EXPOSURE TO TOXIC DUST INCLUDING EXPOSURE TO SILICA IN SANDBLASTING AND OTHER OCCUPATIONS

The Australian Minerals industry is aware of the risks associated with the exposure of its workforce to toxic dust. It has continually supported the adoption of exposure standards, across a wide range of substances, based on sound scientific data, and continues to ensure the protection of workers from illness.

The health impacts of these substances, are in general, well known throughout the Australian Minerals industry. For example:

> There is abundant information on respirable crystalline silica from a range of NOHSC reports, which the MCA has contributed to.

> The NOHSC Hazardous Substances Information System (http://www.nohsc.gov.au/applications/hsis/) provides access to data on many toxic substances, as do many other websites including:

  http://www.osha.gov/SLTC/healthguidelines/index.html
  http://www.cdc.gov/niosh/hhe/
  http://www.hse.gov.uk/coshh/

> NIOSH has done, and continues to research health effects of abrasive blasting agents (http://www.cdc.gov/niosh/homepage.html)

> The NSW Minerals Council has recently produced a report entitled "Particulate Matter and Mining" and other mining institutes have produced similar reports on toxic dusts. (http://www.nswmin.com.au)

The MCA recommends that continued promotion of these and other resources be a priority for NOHSC.

THE ADEQUACY AND TIMELINESS OF REGULATION GOVERNING WORKPLACE EXPOSURE, SAFETY PRECAUTIONS AND THE EFFECTIVENESS OF TECHNIQUES USED TO ASSESS AIRBORNE DUST CONCENTRATIONS AND TOXICITY

There has been adequate and timely regulation governing workplace exposure, with NOHSC producing National Standards and Codes of Practice, much of which has been taken up in State based legislation, although this process has been slow.

In the transfer of responsibilities from NOHSC to the Australian Safety and Compensation Council (ASCC), the MCA emphasizes the importance of developing adequate and timely regulation governing workplace exposure and is concerned this role may not be given priority by the ASCC.

There is no shortage of documentation on effective techniques to assess airborne dust concentrations and toxicity. Publicly available information on appropriate methodologies is provided by:

> Standards Australia (AS2985:2004: Workplace Atmospheres – Method for sampling and gravimetric determination of respirable dust - http://www.standards.com.au/) ; and

> other expert organizations, such as the Australian Institute of Occupational Hygienists (http://www.aioh.org.au/).

International methods are also readily available (http://www.cdc.gov/niosh/nmam/).

THE AVAILABILITY FO ACCURATE RECORDS ON THE NATURE AND EXTENT OF ILLNESS, DISABILITY AND DEATH, DIAGNOSIS, MORBIDITY AND TREATMENT

The MCA recently commissioned research to identify and analyse the important sources of health data for workers in the minerals industry including pre-employment and health monitoring and surveillance schemes.

Stakeholders nationally and in each state were identified and contacted with a request for information. These stakeholders included all Government agencies and companies associated with mining.

In all states, there are requirements for health monitoring of workers exposed to occupational hazards either under specific mining legislation or general workplace health and safety legislation. The extent of the requirements varies from state to state.

In New South Wales and Queensland, there is provision for a centralised health surveillance program only for the coal mining industry. In Western Australia, surveillance applies to the whole mining industry. Current Government held datasets mean coverage of the coal industry is more complete than the metalliferous industry. The focus for these centralised schemes is occupational health information. There are differences in the philosophies behind the schemes and the data collected. Other States do not collect health monitoring data for the mining industry in a central registry.

The data on occupational injuries and diseases contained in the National Workers' Compensation Statistics database (NDS) have been compiled by NOHSC from information supplied by Commonwealth, State and Territory workers' compensation authorities. The NDS can be interrogated for compensable injury or disease, however, there are limitations including lack of detail collected and the dataset only reports on claims resulting in a absence from work of 5 working days or more. The results from the NDS show hearing loss and musculoskeletal disease are the most common reported occupational illnesses for mining. These are also relatively easy to identify and well known problems in the mining industry. The reported frequency rates for other occupational diseases are consistent with the general industry level.

There are also other datasets that collect information on the general population that may be used to compare the occupational disease and illness levels in the mining industry. Limited information is also available from research.

Mining companies provided information through a questionnaire or interview. Companies generally considered legislative requirements to be the minimum and most companies completed additional health assessment. The industry has identified a need for a central data scheme so that data can be analysed to establish trends and allow following of individuals.

Current medicals completed under Government or company schemes are unlikely to identify the physiological changes that occur at the early stages of an occupational disease due to latency of onset and limited diagnostic criteria.

There is limited exposure data held electronically and little or no correlation between health information and exposure data either at the Government or company level. The limited exposure data that is currently collected in an electronic dataset makes it difficult to establish a relationship between occupational exposure and disease particularly when there may be lifestyle factors that also affect the likelihood of disease. The data currently held in electronic data sets limits both the following of individuals and the identification of trends. If electronic data capture is to be widely established, consideration needs to be given to privacy concerns, costs and resources and the potential use of information for litigation.

The surveillance of occupational disease and illness is an important factor in the overall management of occupational health. A range of work and lifestyle factors contribute to a healthy workforce and need consideration for the management of both occupational disease and occupational health.

THE POTENTIAL OF EMERGING TECHNOLOGIES, INCLUDING NANOPARTICLES TO RESULT IN WORKPLACE RELATED HARM

The emergence of nanotechnology and the potential impact of associated nanoparticles is well recognised. Nanotechnologies are poised to revolutionise medicine, manufacturing, energy production and other fundamental features of everyday life in the 21st Century. But they also pose important questions that stem from the unique nature of materials and processes at the nanometer scale. Nanoparticles or ultrafine particles are defined as having aerodynamic diameters < 100 nm (< 0.1 micron). Nanoparticles can comprise a range of different morphologies including nanotubes, nanowires, nanofibres, nanodots and a range of spherical or aggregated dendritic forms. These materials have seen application in a wide range of industries including electronics, pharmaceuticals, chemical-mechanical polishing and catalysis. Some of these applications are end uses for some products of the minerals industry.

Certain industrial by-products can be considered to contain nanoparticles - eg. from combustion engines (eg. diesel particulate material), furnaces and welding. There are bulk synthetic nanoparticulates - eg. titanium dioxide (TiO_2 - used in cosmetics); carbon blacks (used in pigments, tires, toner); amorphous silica (used in paints & fillers); and iron oxides. The minerals industry is already working to address these industrial exposures. There are also natural nanoparticles, associated with sand storms and forest fires.

The ubiquitous occurrence of airborne ultra fine particles results in significant human exposures under environmental and certain occupational conditions. Several epidemiological studies have found associations between exposure to ambient ultra fine particles and adverse respiratory and cardiovascular effects, an impetus for the Air Toxics NEPM work on $PM_{2.5}$ particulates, which the MCA has contributed to. Significant research has identified that inflammation is a primary health effect and oxidative stress can be identified as a dominant mechanism in the production of this inflammation. Studies have indicated that low solubility ultrafine particles are more toxic than larger particles on a mass for mass basis. There are strong indications that particle surface area and surface chemistry are primarily responsible for observed responses in cell cultures and animals.

In the realm of occupational health, much is unknown about the ways in which people may be exposed to nanomaterials through their manufacture and use in the workplace, and the potential health implications of such exposure. There are indications that ultrafine particles can penetrate through the skin, or translocate from the respiratory system to other organs. The likely adverse effects of ultra fine particles will depend on their chemical composition, their bioavailability, and their toxic effects on mucosal and neuronal cells as well as other tissue sites they enter from the general circulation. The likely health impact of ultra fine particles may include alveolar inflammation, the blood coagulation pathway and cardiovascular function. Modifying factors for these effects may include age, preexisting disease susceptibility and other co-pollutants. Research is continuing to understand how these unique modes of biological interaction may lead to specific health effects.

Three preliminary studies have been funded by the UK HSE as part of its horizon scanning activities to look at the potential hazards and risk of nanotechnology. These 'snapshot' reviews considered:

- Fire and explosion;
- Occupational hygiene; and
- Toxicological hazard.

These all reported on the limited data available, and the difficulty of drawing conclusions from existing data, and the necessity for further careful study of hazards associated with nanoparticles and fibres compared to bulk materials.

The reports of these UK studies also indicated that the areas of initial occupational health concern should be:

- potential for enhanced toxicity;
- potential to cross the skin barrier;
- the unproven nature of existing control measures; and
- possible persistence in the workplace.

These reports are available from the HSE website (http://www.hse.gov.uk/horizons/nanotech/).

The First International Symposium on Nanotechnology and Occupational Health was held in October 2004 in the British town of Buxton. It brought researchers, decision makers, occupational health professionals and other stakeholders together to discuss what is known and what we still need to discover about the occupational impact of nanotechnology. Workshops at the end of the symposium considered how best to address the key information gaps that exist in order to protect workers. An informal summary from the symposium is available at http://www.cdc.gov/niosh/topics/nanotech/confsumm-04.html.

A new initiative based in the United Kingdom, the Safety of Nanomaterials Interdisciplinary Collaboration (SnIRC), has recently commenced. The goals of the collaboration are to raise awareness about issues of nanotechnology, health and the environment; generate new research; and integrate UK research with corresponding studies in other European countries and the US. A web site describing the goals, composition and activities of the collaboration is posted at http://www.snirc.org/index.html.

This new collaboration responds to a recommendation in the 2004 report of the Royal Society and Royal Academy of Engineering, "Nanoscience and Nanotechnologies: opportunities and uncertainties" (http://www.nanotec.org.uk/finalReport.htm). Much of this information can be accessed at http://www.cdc.gov/niosh/topics/nanotech/.

The US National Toxicity Program (NTP) is planning to focus its studies on the potential toxicity of nanomaterials, beginning with titanium dioxide and a limited number of manufactured nanomaterials. The first studies will be of the distribution and uptake by the skin. The US EPA is funding research at universities to examine the toxicity of manufactured nanomaterials and titanium dioxide. The agency is also providing information on the effects of nanoparticles on human health through its current and past work in ultrafine particulates.

The issue of nanoparticles in aluminium smelting fume is beginning to be addressed by the work of the Norwegians, in particular Yngvar Thomassen and also by work being done in New Zealand at Auckland University by Dr Margaret Hyland.`