

Nanotechnology – why unions are concerned

Nanotechnology is known as the science of the small. A nano particle is 1 billionth of a metre, or 100,000 times smaller than the width of a human hair. Size is not the only characteristic that gives nano particles their edge. Once materials are scaled down in size they begin to exhibit new properties, for example optical properties or magnetic properties.

Nanotechnology research and development is moving at a rapid pace and is already contained in over 800 everyday items such as sunscreens and cosmetics, food and building materials. Products developed with nano materials can be found in areas as diverse as aviation, automotive industries, food, computing to diagnostics and therapeutics.

Why is there concern over nano particles?

Nano particles can be hazardous because of their size, surface area and toxicity.

They can be inhaled or absorbed through skin. Research published in *Nature Nanotechnology* by researchers from the University of Edinburgh/MRC Center for Inflammation Research (CIR) in Scotland, has shown that multi walled carbon nano tubes share some of the same needle-thin characteristics as asbestos fibres and when mice were exposed to nano tubes, they had the same physical reaction as an asbestos fibre in the mesothelium.¹

Other research reports that when nano materials are deposited in the gut or lung, they can enter the blood stream and travel to the liver and brain.²

In advice to staff handling nano materials the Massachusetts Institute of Technology in the US says, "Once in the body, some types of nanoparticles may have the ability to translocate and be distributed to other organs, including the central nervous system".³

Australian and International regulation developments

Unions agree that nano technology has important potential, but argue that regulation is needed. Despite the growing evidence to show that nanomaterials present unique health and safety hazards, no country has introduced nano-specific regulations. Regulators, including Australia, rely on regulations that weren't designed to protect workers against nano sized materials.

¹ <http://www.sciam.com/article.cfm?id=carbon-nanotube-danger>

² *Biochem Soc Trans.* 2007 Jun;35(Pt 3):527-31.

³ Potential Risks of Nanomaterials and How to Safely Handle Materials of Uncertain Toxicity
<http://web.mit.edu/environment/ehs/topic/nanomaterial.html#3a>

In a report just released The European Agency for Health and Safety at Work has put nano particles at the top of the list of risks for workers.⁴

The French government have set a timetable to regulate nano materials.

Safe Work Australia has also initiated a nanotechnology occupational health and safety research program, and acknowledged that research is required to assess the OHS risks of nanotechnology. ⁵

The NSW Department of State and Regional Development's recent inquiry into nanotechnology recommended that a national mandatory labelling scheme be put in place for all engineered nanomaterials used in the workplace.

Members of the European Parliament (MEPs) have recently set stringent new rules for the safety assessment of foods produced using nanotechnology ('nanofoods').⁶

ANU Academic Thomas Faunce argues that the OECD is investigating nano particle toxicity, but the outcome of this will not be known for sometime. In the meantime the Australian Government must introduce safety standards for cosmetics and foods. ⁷ A presentation outlining Professor Faunce's views can be downloaded at

www.actu.asn.au/Images/Dynamic/attachments/6365/Regulatory%20Aspects%20for%20Nanoscience%20-%20Tom%20Faunce.pdf

Workplace activities involving nano materials

The following workplace tasks may increase the risk of exposure to nanoparticles:

- working with nanomaterials in liquid media without adequate protection (e.g., gloves) will increase the risk of skin exposure.
- working with nanomaterials in liquid during pouring or mixing operations, or where a high degree of agitation is involved, will lead to an increase likelihood of inhalable and respirable droplets being formed.
- generating nanoparticles in the gas phase in non-enclosed systems will increase the chances of aerosol release to the workplace.
- handling nanostructured powders will lead to the possibility of aerosolization.

⁴ Expert Forecast on Emerging Chemical Risks http://osha.europa.eu/en/press/press-releases/european_workers_face_new_increasing_health_risks_hazardous_substances_01.11032009

⁵ Dr Howard Morris, ASCC Nanotechnology OHS Program Manager, Presentation to Commonwealth Safety Management Forum, 14 November, 2008.

⁶ European Parliament, press release. http://www.europarl.europa.eu/news/expert/infopress_page/067-52498-082-03-13-911-20090324IPR52497-23-03-2009-2009-false/default_en.htm

⁷ Thomas Faunce, *Safety of nanofoods goes under the microscope*, Australian Financial Review, 31 March, 2009.



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- maintenance on equipment and processes used to produce or fabricate nanomaterials or the clean-up of spills or waste material will pose a potential for exposure to workers performing these tasks.
- cleaning of dust collection systems used to capture nanoparticles can pose a potential for both skin and inhalation exposure.
- machining, sanding, drilling, or other mechanical disruptions of materials containing nanoparticles can potentially lead to aerosolization of nanomaterials.
- depending on their composition and structure, some nanomaterials may initiate catalytic reactions and increase their fire and explosion potential that would not otherwise be anticipated from their chemical composition alone.

Union recommendations

- Nanoscale chemicals must be classified as new chemicals under the National Industrial Chemicals and Notification and Assessment Scheme (NICNAS)
- Government agencies should develop new standards for the handling of nanotechnology
- A mandatory requirement that all commercial products containing nanomaterials be labeled
- That a federal registry be established of all companies and organizations manufacturing, importing and supplying products containing nanomaterials.
- A tripartite body to be established to oversee the implementation of this regulatory framework
- Adoption of the "Precautionary Principle" when dealing with nanomaterials
- Development and improvement of hazard identification, assessment and control mechanisms for nanomaterials
- Enforcement of new exposure standards using an active inspectorate
- Monitoring of the health impacts on Australian workers involved in nanotechnology and investment in related medical research.

Further information and papers from a February 2009 ACTU seminar on nano technology can be viewed and downloaded at

www.actu.asn.au/HealthSafety/Campaigns/ACTUSeminarNanotechnologyTheNextAsbestos.aspx