



NICNAS Information Sheet

Nanomaterials

November 2010

Summary of 2008 call for information on the use of nanomaterials

Background

Nanomaterials are materials designed at the molecular (nanometre) level to take advantage of their small size and/or novel properties which are generally not seen in their conventional bulk form. Nanomaterials which are considered to be industrial chemicals fall within the scope of the National Industrial Notification and Assessment Scheme (NICNAS).

Observations internationally suggests increasing research, development and use of nanomaterials around the world. In light of this view, NICNAS needs to ensure that the regulatory regime for industrial chemicals is appropriate for assessing and managing any risks posed by nanomaterials in order to protect human health and the environment. To do so, it is necessary to understand both the hazards of the nanomaterials and potential exposures that are likely to occur in Australia.

While NICNAS has in place a technical strategy to understand the potential hazards of nanomaterials, information relating to exposure is also needed. In 2006 NICNAS issued a voluntary call for information directed to all persons who manufactured or imported nanomaterials or products (mixtures) containing nanomaterials for industrial uses during 2005 and 2006. Companies were asked to provide information on the types of nanomaterials introduced, their volumes and uses. The result of the 2006 call¹ was published on the NICNAS website in January 2007.

Purpose and scope of the 2008 call for information

The purpose of this second call for information was to identify any change in the types and volumes of nanomaterials introduced into Australia. It was intended that NICNAS use the results from the 2006 call for information as a baseline and determine trends in introduction of these substances, where possible. A secondary purpose of this call was to ascertain the extent of health and environmental data held for these nanomaterials.

The call for information was again voluntary and directed to all persons who manufactured or imported nanomaterials or products (mixtures) containing nanomaterials for commercial development purposes in the calendar year 2008 in volumes greater than 100g of any individual nanomaterial. Unlike the information collated in 2006, information from the research and development (R&D) sector was requested in 2008 to determine the extent of use of nanomaterials in R&D during the same period.

¹ http://www.nicnas.gov.au/Publications/Information_Sheets/General_Information_Sheets/NIS_Nanomaterials_PDF.pdf

To gain an understanding of the extent of human health and environmental data holdings for materials in commerce and in R&D, NICNAS sought confirmation of data held relating to toxicological and physico-chemical characteristics, purity of the material, waste stream and lifecycle information. Respondents were not required to provide study reports to NICNAS, or to generate new data.

Process of the 2008 call for information

A notice of the second voluntary call for information was published in the Chemical Gazette in October 2008 with reminder notices in the Gazettes of November and December 2008 and January 2009.

To enhance the response rate, NICNAS also undertook a targeted communication strategy by e-mail to over 200 stakeholders covering industry, research and government areas, including respondents to the 2006 voluntary call, and again with monthly follow-up using e-mail and telephone until the closing date for the survey in January 2009.

The response to the 2008 voluntary call was limited by the closing date so all non-responding stakeholders were contacted by telephone and a further month allowed for completion of the survey.

Results of the call for information

NICNAS recognised that the 2008 call was more onerous on respondents because more information was sought than in 2006. Additionally it extended to the R&D sector. However based on anecdotal evidence of increasing use of nanomaterials and the inclusion of the R&D sector, NICNAS anticipated a larger response than in 2006.

A total of seven respondents provided information on their introduction and/or use of nanomaterials. To ensure confidentiality of commercial information, the data have been aggregated and presented in ranges (see Table 1). A further nineteen respondents reported that the survey did not apply to their business/research organisation.

Of the seven companies that reported introducing nanomaterials, three companies reported manufacturing nanomaterials and five companies reported importing nanomaterials. Note that one company reported manufacture and importation of nanomaterial. Two of the companies that reported using nanomaterials for research and development. Results indicated that five metal oxides and one polymer form of nanomaterials were introduced in the 2008 calendar year, significantly less than reported in 2006 (see below).

All six of the reported nanomaterials that were used in commercial applications or research are nanomaterials that have a bulk conventional form. The largest use by volume of nanomaterial was acrylic latex used in surface coatings in the range 1,000 – 10,000 tonnes. Zinc oxide followed next in volume of up to 5 tonnes/year in surface coatings and a similar volume in exterior timber coatings. All other reported nanomaterials were used in volumes of less than 1 tonne/year.

The response to the request for information on toxicological and physico-chemical data suggests that though some data are held, the extent is minimal. Six respondents reported holding some data on physico-chemical properties and animal or human toxicity and 4 reported holding data on environmental fate and ecotoxicity.

The response to the 2008 NICNAS call for information was limited, similar to responses to the voluntary calls for information undertaken in the US and the UK.

Comparison with the 2006 call for information

In 2006, 22 companies reported introducing approximately twenty one types of nanomaterials, significantly more than those reported in 2008 (see Table 1). Nanomaterials in 2006 were introduced for similar uses to those reported in 2008, and as in the 2008 survey, the largest use by volume of nanomaterial in 2006 was for surface coatings.

Overall, reported volumes for nanomaterials were greater in 2006 than those reported in 2008. For example, the previous call in 2006 showed acrylic latex being used for surface coatings in volumes of 10,000 - 50,000 tonnes/year, compared to the of range 1,000 – 10,000 tonnes reported in 2008 (see Table 1).

Chemical name and application	Reported Volume 2006 (tonnes per annum)	Reported Volume 2008 (tonnes per annum)
Acrylic latex - Surface Coatings	10000-50000	1000-10000
Aluminium oxide - Printing	0.05-0.1	
Aluminium oxide - Fuel catalysts and coatings		<0.01
Aluminosilicates - Water treatment	10 - 50	
Carbon black pigments - Surface coatings	10 - 50	
Cerium oxide - Catalysts	1-5	
Cerium oxide - Fuel catalysts and coatings		<0.01
Pearl powder - Cosmetics	0.01-0.05	
Pthalocyanine - Surface coatings	10-50	
Polyurethane resin - Surface coatings	<0.01	
Silica dimethyl silicate - Cosmetics	<0.01	
Silicon dioxide - Surface coatings	10 - 50	
Silicon dioxide - Water treatment	0.05-0.1	
Sodium silicates - Water treatment	0.1 - 0.5	
Surface treated silicon dioxide - Printing	1-5	
Surface treated aluminium dioxide - Printing	0.1 - 0.5	
Surface treated titanium dioxide - Printing	0.5-1	
Titanium dioxide - Water treatment	5-10	
Titanium dioxide - Domestic products	1-5	
Titanium dioxide - Cosmetics	1-5	
Titanium dioxide - Surface coatings		<0.01
Titanium dioxide - Secondary sunscreens		0.01-1
Zinc oxide - Surface coatings	5-10	1-5
Zinc oxide - Cosmetics	1-5	
Zinc oxide - Exterior timber coatings		1-5
Zinc oxide - Fuel catalysts and coatings		0.01 -1
Zirconium oxide - Fuel catalysts and coatings		0.01-1

Table 1: Reported usage of nanomaterials in the commercial sector in Australia, 1 January 2006 to 31 December 2006 & 1 January 2008 to 31 December 2008.

Comparison of results with market information

NICNAS is aware that the results received for the 2008 call for Information may not represent the full extent of nanomaterials present in Australia in the marketplace, as well as nanomaterials in advanced stages of research and development.

Anecdotal market information gathered through internet searches, as well as through direct contact between NICNAS and some companies, suggests nanomaterials may be utilised in applications in addition to those reported to NICNAS. This observation, based on marketing claims, is supported in surveys of products containing nanomaterials that have been conducted in Australia and overseas. One such survey is the *Nanotechnology Consumer Products Inventory* published by the Project on Emerging Nanotechnologies at the Woodrow Wilson International Centre for Scholars in the United States that lists "1000+ manufacturer-identified nanotechnology-based consumer products currently on the market." (See <http://www.nanotechproject.org/inventories/consumer/>). Another database has been compiled by BEUC, the European Consumer's Organisation and ANEC, the European Consumer Voice in Standardisation. This database holds information on 151 products found in Europe that claim to use nanomaterials in categories such as: appliances, electronics, automotive, cosmetic, food and beverage, health and fitness products and goods for children. (See <http://www.anec.eu/attachments/ANEC-PT-2009-Nano-015.xls>)

NICNAS's informal market research has identified that there is an inconsistency between market information and the results of the voluntary calls for information, observing that:

- 1) There are more suppliers in Australia, than those that responded to the voluntary calls for information, that are marketing substances that may fall under the definition of 'industrial nanomaterial', and:
- 2) The Australian market is populated with consumers products in similar categories to those reported in overseas consumer product inventories that utilise (or claim to utilise) nanotechnology.

These observations also imply that there may be greater use of nanomaterials in R&D than that reported in the 2008 call for information.

Use of information

The results of the 2008 call for information gives NICNAS some, but incomplete, information on the presence of industrial nanomaterials in Australia. This limited information does however assist in identifying nanomaterials of interest for further scientific assessment by NICNAS.

NICNAS monitors market developments and approaches companies in Australia that may be introducing nanomaterials where there may be concern over compliance with the *Industrial Chemicals (Notification and Assessment) Act 1989*. Stakeholders have been advised² to consult with NICNAS prior to introducing nanomaterials into Australia.

Proposal for Regulatory Reform of Industrial Nanomaterials

NICNAS released its [Proposal for Regulatory Reform of Industrial Nanomaterials](#) in November 2009 and has reviewed submissions received during the public comment period for this paper. Potential introducers or organisations involved in R&D of industrial nanomaterials should be aware that NICNAS is progressing a regulatory strategy for nanomaterials that is expected to be progressed in a staged manner and includes administrative and legislative amendments to the regulation of these substances.

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² Advised by NICNAS via the December 2008 NICNAS Matters and through the Chemical Gazette in February 2009.