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INFORMATION GATHERING SCHEMES ON NANOMATERIALS: LESSONS LEARNED AND REPORTED INFORMATION

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Environment Directorate
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
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No. 1, *Report of the OECD Workshop on the Safety of Manufactured Nanomaterials: Building Co-operation, Co-ordination and Communication (2006)*

No. 2, *Current Developments/ Activities on the Safety of Manufactured Nanomaterials: Tour de table at the 1st Meeting of the Working Party on Manufactured Nanomaterials (2006)*

No. 3, *Current Developments/ Activities on the Safety of Manufactured Nanomaterials: Tour de table at the 2nd Meeting of the Working Party on Manufactured Nanomaterials (2007)*

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No. 29, *Current Development/ Activities on the Safety of Manufactured Nanomaterials: Tour de table at the 8th Meeting of the Working Party on Manufactured Nanomaterials (2011)*

No. 30, *Regulated Nanomaterials: 2006-2009 (2011)*

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The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation in which representatives of 34 industrialised countries in North and South America, Europe and the Asia and Pacific region, as well as the European Commission, meet to co-ordinate and harmonise policies, discuss issues of mutual concern, and work together to respond to international problems. Most of the OECD's work is carried out by more than 200 specialised committees and working groups composed of member country delegates. Observers from several countries with special status at the OECD, and from interested international organisations, attend many of the OECD's workshops and other meetings. Committees and working groups are served by the OECD Secretariat, located in Paris, France, which is organised into directorates and divisions.

The Environment, Health and Safety Division publishes free-of-charge documents in ten different series: **Testing and Assessment**; **Good Laboratory Practice and Compliance Monitoring**; **Pesticides and Biocides**; **Risk Management**; **Harmonisation of Regulatory Oversight in Biotechnology**; **Safety of Novel Foods and Feeds; Chemical Accidents; Pollutant Release and Transfer Registers; Emission Scenario Documents;** and **Safety of Manufactured Nanomaterials.** More information about the Environment, Health and Safety Programme and EHS publications is available on the OECD's World Wide Web site (www.oecd.org/ehs/).

This publication was developed in the IOMC context. The contents do not necessarily reflect the views or stated policies of individual IOMC Participating Organizations.

The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The Participating Organisations are FAO, ILO, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD. UNDP is an observer. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organisations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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FOREWORD

The OECD Joint Meeting of the Chemicals Committee and Working Party on Chemicals, Pesticides and Biotechnology (the Joint Meeting) held a Special Session on the Potential Implications of Manufactured Nanomaterials for Human Health and Environmental Safety (June 2005). This was the first opportunity for OECD member countries, together with observers and invited experts, to begin to identify human health and environmental safety related aspects of manufactured nanomaterials. The scope of this session was intended to address the chemicals sector.

As a follow-up, the Joint Meeting decided to hold a Workshop on the Safety of Manufactured Nanomaterials in December 2005, in Washington, D.C. The main objective was to determine the "state of the art" for the safety assessment of manufactured nanomaterials with a particular focus on identifying future needs for risk assessment within a regulatory context.

Based on the conclusions and recommendations of the Workshop [ENV/JM/MONO(2006)19] it was recognised as essential to ensure the efficient assessment of manufactured nanomaterials so as to avoid adverse effects from the use of these materials in the short, medium and longer term. With this in mind, the OECD Council established the OECD Working Party on Manufactured Nanomaterials (WPMN) as a subsidiary body of the OECD Chemicals Committee in September 2006. This programme concentrates on human health and environmental safety implications of manufactured nanomaterials (limited mainly to the chemicals sector), and aims to ensure that the approach to hazard, exposure and risk assessment is of a high, science-based, and internationally harmonised standard. This programme promotes international co-operation on the human health and environmental safety of manufactured nanomaterials, and involves the safety testing and risk assessment of manufactured nanomaterials.

This document is published under the responsibility of the Chemicals Committee of the OECD. It is intended to provide information on the outcomes and developments of the OECD programme on the safety of manufactured nanomaterials.

TABLE OF CONTENTS

TABLES

OECD'S PROGRAMME ON THE SAFETY OF MANUFACTURED NANOMATERIALS

The OECD's Programme on the Safety of Manufactured Nanomaterials[1] was established in 2006 to help member countries efficiently and effectively address the safety challenges of nanomaterials. OECD has a wealth of experience in developing methods for the safety testing and assessment of chemical products.

The Programme brings together more than 100 experts from governments and other stakeholders from: a) OECD Countries; b) non-member economies such as China, the Russian Federation, Singapore, South Africa, and Thailand; and c) observers and invited experts from UNITAR, FAO, WHO, ISO, BIAC[2], TUAC[3], and environmental NGOs.

Although OECD member countries appreciate the many potential benefits from the use of nanomaterials, they wished to engage, at an early stage, in addressing the possible safety implications at the same time as research on new applications are being undertaken.

The Programme of Work is being implemented through specific projects to further develop appropriate methods and strategies to help ensure human health and environmental safety:

- OECD Database on Manufactured Nanomaterials to Inform and Analyse EHS Research Activities;
- Safety Testing of a Representative Set of Manufactured Nanomaterials;
- Manufactured Nanomaterials and Test Guidelines;
- Co-operation on Voluntary Schemes and Regulatory Programmes;
- Co-operation on Risk Assessment;
- The role of Alternative Methods in Nanotoxicology;
- Exposure Measurement and Exposure Mitigation; and
- Environmentally Sustainable Use of Manufactured Nanomaterials

Each project is being managed by a steering group, which comprises members of the OECD Working Party on Manufactured Nanomaterials (WPMN), with support from the Secretariat. Each steering group implements its respective "operational plans", each with their specific objectives and timelines. The outputs of each project are then evaluated and endorsed by the WPMN, and subsequently by the OECD Chemicals Committee.

This document was prepared by the WPMN steering group five leading the project on Co-operation on Voluntary Schemes and Regulatory Programmes and was endorsed at the 8th meeting of the WPMN in March 2011.

More information about the work of the OECD's Programme on the Safety of Manufactured Nanomaterials, as well as OECD's publications regarding safety issues of nanomaterials, is available at www.oecd.org/env/nanosafety.

[1] Updated information on the OECD's Programme on the Safety of Manufactured Nanomaterials is available at: www.oecd.org/env/nanosafety

[2] The Business and Industry Advisory Committee to the OECD

[3] Trade Union Advisory Committee to OECD

EXECUTIVE SUMMARY

1. One of the objectives of the OECD Project on Co-operation on Voluntary Schemes and Regulatory Programmes on Nanomaterials is to gather information on the lessons learned from countries that have completed information gathering initiatives, and summarise non-confidential business information and statistics on nanomaterials reported, to provide insight on global market activity. To meet this objective, two q*uestionnaires: Information Gathering Schemes* were implemented. The first questionnaire (2008) focused on which information gathering initiatives were implemented, as well as a review of the information included, which allowed an analysis on how these schemes are developed[1]. The second questionnaire (2010), aimed at analysing lessons learned from the Information gathering initiatives; and to collect information on reported nanomaterials. This document presents the results of the second questionnaire. It was distributed amongst those countries that have already completed an information gathering survey in order to gather their data and experience in implementing these schemes.

2. This report summarises the results obtained from the second questionnaire on: i) the lessons learned (Part A); and ii) the non-confidential business information and statistics on nanomaterials (Part B) reported by jurisdictions. It complements the published report on "Analysis of Information Gathering Initiatives", which lists suggestions for countries to consider when developing an information gathering initiative for manufactured nanomaterials.

3. It is important to note that the information presented in this report represents only a portion of the activity and information available within OECD countries. Not all OECD countries have conducted an information gathering scheme. Furthermore, they have targeted different industries and thus collected different kinds of information. It should be noted that despite the low or very low response rates in some cases (see Part A of the Questionnaire) or confidentiality issues that prevented the reporting, some interesting observations could be made from the information obtained.

4. Responses to Part A of the *Questionnaire: Information Gathering Schemes* were received from eight (8) countries for a total of nine (9) surveys (including two surveys from Japan). Information was requested on the timeframe for the survey, developmental approach, purpose for developing the survey, nanomaterials targeted, activities targeted, information requested, survey response rates and general recommendations. Even though the nanomaterials targeted and information gathered differed between countries, a number of important considerations were identified for those intending to develop an information gathering survey as follows:

a) Response Time: The length of time individuals have to respond to the survey need not be lengthy. A number of countries reported that 2-4 months was more than adequate, however, if a country was to consider a survey period of this length, care needs to be taken to avoid issuing the survey during peak holiday seasons (ex. summer holidays when companies are short staffed);

b) Stakeholder Consultation: The majority of countries strongly recommended stakeholder consultation throughout the survey's development period to ensure robustness of the scheme and likelihood of participation;

[1] See *Analysis of Information Gathering Initiative on Manufactured Nanomaterials (2009)* at www.oecd.org/env/nanosafety

c) Identification of Respondents: Diligent efforts are needed to identify survey respondents and promote responses to the survey;

d) Survey Format: In order to encourage participation and adequacy of the information obtained, the survey needs to be well designed so that it is simple to fill out;

e) Support to Respondents: A programme should be in place to enable respondents to get training, assistance and/or questions answered; and

f) Obligation to Respond: Response rates for voluntary surveys tended to be lower than anticipated with expectations for the survey not met. However, most countries that issued voluntary surveys indicated that valuable information was still obtained, and that it was a good first step, with further actions necessary to fill in the information gaps.

5. Eight (8) countries (including 2 programmes from Japan) reported information under Part B of the Questionnaire on the types, volumes and uses of nanomaterials in their country. Fifteen (15) different categories of nanomaterials were reported by three (3) or more countries, twelve (12) of which have been identified in the Sponsorship Programme, including: aluminum oxide, cerium oxide, fullerenes, iron, iron oxide, multi-walled carbon nanotubes, nanoclay, silica/silicon dioxide, silver nanoparticles, single-walled carbon nanotubes, titanium dioxide, and zinc oxide. Carbon black, silicates and pharmaceutical actives were also reported by three (3) or more countries, while a number of other nanomaterials including dendrimers, which are included in the Sponsorship Programme and polystyrene were reported by less than three (3) countries.

6. Of the fifteen (15) most commonly reported nanomaterials, titanium dioxide was reported by the most number of countries (7 countries) and by the most number of companies/institutions (43 companies/institutions). Zinc oxide, silver and silicon dioxide were also reported by a number of different countries and companies/institutions. Most companies worked with nanomaterials in volumes of less than 10 kg/yr (106 companies), and the next most common volume reported was over 1000 kg/yr (28 companies). The nanomaterials used at these volumes included; titanium dioxide (9 companies), carbon black (5 companies), silicon dioxide (5 companies), aluminum oxide (3 companies), zinc oxide (3 companies), iron oxide (2 companies) and cerium oxide (1 company).

7. It would appear that most companies/institutions from countries that collected and reported additional information, such as the availability of information on fate and exposure, physical chemical properties, human toxicity/ecotoxicity data, and risk management, had some data available and did have risk management measures in place. The information most likely to be available for the fifteen (15) most commonly reported nanomaterials was on physical chemical properties (reported by 51 companies/institutions) with the least amount of information available for ecotoxicity (reported by 33 companies/institutions). Titanium dioxide and zinc oxide were the two nanomaterials reported to have the most amount of information available overall.

8. Most countries agreed that their information gathering survey helped them learn, in part, the identity of the nanomaterials, extent of use and sectors involved in nanotechnology in their countries, and indicated that the information most useful to collect was the name/identity of the nanomaterial, along with use patterns and volumes. Others recommended requesting all available data to identify research gaps. A few countries concluded that some data exists but that it is not comprehensive, and a few countries also reported that risk management measures are being employed, but questioned whether or not they were adequate or based on any data.

9. The majority of countries reported having drafted or are drafting a summary report of the information obtained through their information gathering survey, and an equal number of countries reported some form of follow-up action to obtain additional information or validate results. A few countries acknowledged that there was a need for a strengthened regulatory framework or Environment Health and Safety (EHS) policies/programs to be developed, and are moving forward with regulatory/policy and/or guidance development.

10. The individual responses and summary of results for each section in Part A as well as Part B of the *Questionnaire: Information Gathering Schemes* are detailed below.

SECTION I: SUMMARY OF LESSONS LEARNED (Part A of the Questionnaire)

Section 1: Timeframe for Survey Response

11. The timeframe for collecting information varied between one (1) month and two (2) years (Annex I, Table 1). Three (3) countries that collected information for a time period in excess of three (3) months indicated that the length for responding to their survey could have been shorter without impacting the quantity of responses received. Three (3) of the countries that collected information for a time period of four (4) months or less, warned that the time of year for issuing the survey was very important, and to avoid the summer vacation period when companies are not well staffed.

Section 2: Development Approach

12. Most countries indicated that various stakeholders were involved in the development of the survey either through contact with selected companies, industry organizations or public consultation/meetings (Annex I, Table 2). Most countries agreed that by doing so, it increased the likelihood of participation and robustness of the scheme. One (1) country that did not engage stakeholders during survey development recommended that stakeholders be consulted in the development of future surveys. One (1) country completely outsourced their survey to a third party, and one (1) country involved a 3rd party to help develop their survey, and would recommend a consultant with good knowledge of the sector and its major players.

13. Apart from the general consensus that stakeholder participation during the development of the survey is desirable, other recommendations received included the importance of keeping the survey form simple and providing guidance and training to respondents.

Section 3: Purpose for Developing an Information Gathering Survey

14. The most common reason for conducting an information gathering survey was to obtain an overview of the nanotech industry (seven surveys) (Annex I, Table 3). Five (5) countries indicated that the purpose for the survey included to obtain available data and/or for risk assessment or risk management purposes, two (2) countries conducted the survey to either guide research programs, support program development and/or support regulatory development or amendment, and one (1) country indicated that a purpose for the survey was to assess effectiveness of current legislation/regulation. Other reasons for conducting the survey included developing an overview of workplaces using nanomaterials, determining guidance needed to reduce risk, obtaining information on worker protection and identifying uses and risk management measures in place. With the exception of using the data collected for this OECD WPMN Questionnaire, the data collected by each country has not been used for any other purpose than originally

intended. One (1) country indicated that the low response rate for their voluntary survey has become a major consideration for developing a regulatory reform proposal.

Section 4: Nanomaterials Targeted

15. Generally, the nanomaterials targeted by these information gathering schemes were engineered to have at least 1 or 2 dimensions less than either 100 or 200 nm. Some countries that targeted nanomaterials in the workplace only targeted engineered nanoparticles produced as a powder (Annex I, Table 4a). Nanomaterials excluded included those used in research and development, those contained in manufactured products, nanostructured surfaces, nanofilms and nanoporous structures, fumes and those items that fall outside of a jurisdictions purview. Recommendations received on the types of nanomaterials that should be targeted in an information gathering survey varied and included those covered by the OECD WPMN Testing Programme, those within an agency's purview, and those with consumer exposure.

16. Clearly the nanomaterials targeted will vary depending on the purpose each country has for conducting their survey. It is generally recognized however, that for those trying to obtain an overview of the industry, the survey be broad to capture as much information as possible.

17. The majority of countries targeted nanomaterials that were manufactured for commercial use (all 9 surveys) (Annex I, Table 4b). Nanomaterials manufactured for processing were targeted by eight (8) surveys, and those on sale for commercial use were targeted by seven (7) surveys. Nanomaterials manufactured for R&D were targeted by six (6) surveys; nanomaterials imported for commercial use, or imported for processing were each targeted by five (5) surveys; nanomaterials imported for Research and Development (R&D) or for sale as a raw material were targeted by three (3) surveys, and nanomaterials for sale in a formulated product were targeted by two (2) surveys (Annex I, Table 4b).

18. In all but two jurisdictions, companies were asked to respond to the survey regardless of the volume imported, manufactured, used or released. One (1) country used a trigger volume of >10 kg/yr, and indicated that a smaller trigger volume is necessary to receive responses from companies working with small volumes (Annex I, Table 4b and 6). For the most part, end use application was not relevant, with most countries indicating that either none were specified or all applications were targeted. Four (4) surveys targeted a limited number of end use applications, possibly due to legislative scope.

Section 5: Information Requested by the Survey

19. Information requested by the various countries relating to the company/institution, nanomaterial identification and use can be seen in Annex I, Table 5a. Six (6) surveys requested the company name, four (4) requested information on the company size, and three (3) requested information on company location. Other information requested included the name and position of the respondent, type of products and sectors covered and number of individuals handling nanomaterials. Eight (8) surveys requested information on the material name, five (5) on the material type/class, five (5) requested the Chemical Abstracts Service number, four (4) requested chemical formula and three (3) the trade name for the nanomaterial. Other information collected included particle size, methods, source and impurities. All nine (9) surveys requested information on use pattern, and all but one requested information on volume of use. Other information requested included whether the nanomaterial was manufactured versus imported and the concentration of the nanomaterial and other constituents in the final product (Annex I, Table 5a).

20. The most common information requested by countries was physico-chemical data, human toxicity data, fate and exposure, ecotoxicity and risk management information (6 surveys each). Waste disposal, personal protective equipment, and measurement and detection methods were each requested by four (4) surveys, while benefits and production methods were each requested by three (3) surveys and

biodegradation and bioaccumulation data were requested in only one (1) survey. Other items requested included degree of purity, lifecycle data, concentration, information available to the customer, opinions on guidance or regulation needed, information on health effects during production/use, Material Safety Data Sheet (MSDS), exposure mitigation practices, crystal structure, aggregation, dispersibility, particle size distribution, configuration, density, surface area, and charge (Annex I, Table 5b).

Section 6: Response Rate

21. Six (6) countries indicated that the response rate was either low (less than 40%) or very low (less than 20%) (Annex I, Table 6). One (1) country indicated a moderate response rate (40-60%) and two (2) indicated a response rate of very high (>80%). For those countries that had low or very low response rates, the following contributing factors were identified: poor timing for release of the survey, voluntary response rather than mandatory, too much data requested, complications with companies not wanting to provide Confidential Business Information (CBI), and form complexity. For those indicating a moderate or very high response rate, contributing factors were identified as mandatory requirement to respond, collection of information by public health authority, good consultant and strong consultation with stakeholders when drafting the survey (Annex I, Table 6).

22. Promotion efforts to encourage completion of the survey were similar between all countries and included publication of notices, website updates, mass distribution by mail or e-mail, co-operation with industry organizations, research councils, government/industry networks, conferences and regional meetings (Annex I, Table 6). One (1) country used staff from a relevant jurisdiction to collect the information. The following recommendations were made by various countries to promote a good response rate: a) design the survey to be simple; b) ensure there is a mechanism for individuals to get assistance and have questions answered c) have good communication with stakeholders during survey development, and d) follow-up with stakeholders during the timeframe for response. Other recommendations received included education/training, financial bonuses to those gathering the data, lowering trigger volumes for responding to the survey, clear instructions, clear purpose and clear incentives, consider working through trade organizations and make efforts to reach small companies not affiliated with trade organizations (Annex I, Table 6).

Section 7: General Observations

23. Interestingly, five (5) of the six (6) countries that indicated the response rate was either low or very low indicated that although their original expectations were not met, valuable information was obtained by completing the survey (Annex I, Table 7). Even those with higher response rates indicated that the data received was not as detailed as originally hoped, or was incomplete. Most countries indicated that they were either moving forward with another survey or considering the use of another survey to gather additional information. One (1) country is moving forward with regulatory reform to require reporting.

24. General advice from countries suggested that voluntary schemes may be a good first step, as well as keeping the survey clear, concise and simple to complete. Some countries recommended collecting less detailed information to encourage higher response levels, and then following up with the individual respondents for more detailed information. Careful planning, use of a good consultant, strong effort to identify relevant companies using a variety of sources, providing assistance to answer questions, assurances of confidentiality and explaining benefits for completing the survey or offering incentives were also mentioned (Annex I, Table 7).

Conclusions

25. Part A of the *Questionnaire: Information Gathering Schemes* gathered valuable experience from those countries that have conducted an information gathering survey. Regardless of the type of nanomaterial or sector targeted, countries had similar advice including a) avoiding the issuance of surveys during summer holidays; b) encouraging stakeholder participation during the survey development; c) encouraging diligent efforts to identify potential respondents and encourage participation; d) keeping the survey form clear, concise and simple to complete; and e) providing a support network to respond to questions. Countries that issued voluntary surveys generally had low or very low response rates, however, most of these countries indicated that valuable information was obtained and it proved to be a good first step in gathering information.

SECTION II: SUMMARY OF NON-CBI DATA (Part B of the Questionnaire)

Section 1a: Summary of Data Collected

26. Apart from collecting data on the nanomaterials reported under the various information gathering schemes, Section 1 of the Questionnaire attempted to gain an understanding of the number of companies or institutions that responded to the information gathering initiatives and what activity/activities they were involved in. The number of companies or institutions reporting activities with nanomaterials ranged from 8 to 90 with all but one (1) country reporting numbers of 45 or less (Annex II, Table 8). These numbers emphasize the low or very low response rates reported by a number of countries in Part A of the questionnaire.

27. No pattern emerged relating to the activities companies or institutions were involved in (Annex II, Table 8). This is likely due to a number of factors including the differences in target audience for the survey between jurisdictions and low response rates. Only one (1) jurisdiction indicated that some nanomaterials for which they received information on, were not reported in this OECD Questionnaire for reasons of confidentiality.

Section 1b: Information on Individual Nanomaterials

28. Individual jurisdictions provided information on the nanomaterials reported under their information gathering survey through the use of an excel table. Although the exact names of the nanomaterials were not provided due to reasons of confidentiality, information obtained from the various jurisdictions has been grouped together by category. The information obtained through this OECD questionnaire is presented in the tables below by category, for each category that was reported by 3 or more jurisdictions. All other nanomaterial categories reported (by only 1 or 2 jurisdictions) can be found in Annex II, Table 25. Readers are reminded that this information represents only a portion of nanomaterial activity within OECD countries. Not every OECD country has conducted an information gathering survey, some surveys targeted only certain sectors, and many reported low or very low response rates (see report on Section A of the Questionnaire).

29. Fifteen (15) nanomaterial categories were reported by three or more jurisdictions, including aluminum oxide, carbon black, cerium oxide, fullerenes, iron, iron oxide, multi-walled carbon nanotubes, nanoclay, pharmaceutical actives, silicates, silica/silicon dioxide, silver nanoparticles, single-walled carbon nanotubes, titanium dioxide and zinc oxide (Annex II, Tables 9-23).

30. Twelve (12) of the fifteen (15) most commonly reported nanomaterial categories across OECD jurisdictions are consistent with those identified by the OECD Sponsorship Programme for the Testing of Manufactured Nanomaterials (SP), with only carbon black, silicates and pharmaceutical actives not part of the SP. Two (2) jurisdictions reported activity with dendrimers, which are part of the Sponsorship Programme, and one (1) jurisdiction reported activity with polystyrene (Annex II, Table 25).

Aluminum Oxide (Annex II Table 9a/b)

31. Aluminum oxide was reported by five (5) countries, with the number of companies or institutions reporting use ranging from 1-11 per country. Seven (7) companies/institutions reported working with aluminum oxide in volumes of less than 10 kg/yr for a range of uses including research and development, industrial, consumer and cosmetics. Two (2) companies reported use between 10-100 kg/yr and three (3) reported use of > 1 000 kg/yr. The use codes were the same for all volumes with the exception of research and development not indicated by the companies using aluminum oxide in volumes greater than 1 000 kg/yr. Two companies/institutions reported information available on physical chemical properties, and eleven (11) companies/institutions reported risk management in place.

Carbon Black (Annex II Table 10a/b)

32. Carbon black was reported by five (5) countries (including two programs from Japan) with the number of companies/institutions reporting use with carbon black ranging from 1 to 6 per country. Two (2) companies/institutions reported working with carbon black in volumes of less than 10 kg/yr for research and development or industrial purposes. Five (5) companies/institutions reported use of carbon black in quantities greater than 1 000 kg/yr for industrial or consumer uses. Six (6) companies/institutions reported information available on fate and exposure, physical chemical properties, and human toxicity data, one (1) company/institution reported information available on ecotoxicity and nine (9) companies/institutions reported risk management in place.

Cerium Oxide (Annex II Table 11)

33. Cerium oxide was reported by four (4) countries with the number of companies/institutions working with cerium oxide ranging from 1-2 per country. One (1) company reported use of cerium oxide in volumes of less than 10 kg/yr for consumer uses, and one company reported use of cerium oxide in volumes of greater than 1 000 kg/yr, also for consumer use. Other use codes were identified by other countries including research and development and industrial.

34. One (1) company/institution reported information on fate and exposure and ecotoxicity data, two (2) companies reported information available on physical chemical properties and human toxicity data, and one (1) company/institution reported risk management in place.

Fullerenes (Annex II Table 12a/b)

35. Fullerenes were reported by four (4) countries (including 2 programs from Japan) with the number of companies reporting uses of fullerenes ranging from 1-6 per country. Six (6) companies reported uses of fullerenes in volumes of less than 10 kg/yr for research and development or industrial purposes. Other use codes reported by countries included consumer, cosmetics and other.

36. Six (6) companies/institutions reported information available on fate and exposure, human toxicity data and ecotoxicity data, seven (7) companies/institutions reported information available on physical chemical properties and eleven (11) companies/institutions reported risk management measures in place.

Iron (Annex II Table 13)

37. Iron nanoparticles were reported by three (3) countries with the number of companies/institutions reporting activities with iron nanoparticles ranging between 1 and 6 per country. Five (5) companies reported working with iron nanoparticles below 10 kg/yr and one (1) company reported working with 10-100 kg/yr, all for research and development purposes only. Other use codes identified by other countries include industrial and consumer. The Czech Republic reported six (6) companies/institutions with risk management procedures in place (information not shown).

Iron Oxide (Annex II Table 14)

38. Iron oxide was reported by four (4) countries with the number of companies/institutions working with iron oxide ranging from 1-10 per country. Nine (9) companies/institutions reported working with less than 10 kg/yr for research and development purposes, one (1) company/institution reported working with iron oxide in volumes between 10-100 kg/yr for industrial use, and two (2) companies/institutions reported working with a volume greater than 1 000 kg/yr for industrial and consumer uses. Iron oxide was also reported for cosmetic use. The Czech Republic reported that the ten (10) companies working with iron oxide had risk management measures in place (information not shown).

Multi-Walled Carbon Nanotubes (Annex II Table 15a/b)

39. Multi-walled carbon nanotubes (MWCNT) were reported by three (3) countries (including 2 programs from Japan) with the number of companies/institutions working with MWCNT ranging from 3-11 per country. Six (6) companies/institutions reported using MWCNT's in quantities less than 10 kg/yr for research and development purposes. Other use codes indicated were industrial and "other". Three (3) companies/institutions reported information on fate and exposure, physical chemical properties, and human toxicity data, two (2) companies/institutions reported information available on ecotoxicity data and nine (9) companies/institutions reported risk management measures in place.

Nanoclay (Annex II Table 16a/b)

40. Nanoclay was reported by four (4) countries with the number of companies/institutions working with nanoclay ranging from 1-3 per country. Four (4) companies reported use volumes of less than 10 kg/yr for either research and development or food and drug purposes. Other use codes reported for nanoclay included industrial, consumer, cosmetics and agricultural. One (1) company/ institutions reported information available on physical chemical properties and human toxicity data and three (3) companies reported risk management measures in place.

Pharmaceutical Actives (Annex II Table 17a/b)

41. Pharmaceutical actives were reported by three (3) countries with the number of companies/institutions working with pharmaceutical actives ranging from 1-5 per country. Six (6) companies reported use volumes of less than 10 kg/yr for research and development purposes. One (1) company/institution reported information available on human toxicity data and ecotoxicity data, while five (5) companies/institutions reported risk management measures in place.

Silicates (Annex II Table 18a/b)

42. Silicates were reported by three (3) countries with the number of companies/institutions working with silicates ranging from 1-8 per country. Six (6) companies reported working with silicates in volumes less than 10 kg/yr for research and development purposes, one company reported working with silicates in volumes between 10-100 kg/yr for research and development purposes, and one (1) company reported

working with silicates in volumes between 100-1000 kg/yr for industrial purposes. Other use codes reported for silicates include food and drug.

43. One (1) company/institution reported information available on chemical properties, human toxicity data and ecotoxicity data, and seven (7) companies/institutions reported having risk management in place.

Silica/Silicon Dioxide (Annex II Table 19a/b)

44. Silica/Silicon dioxide was reported by five (5) countries (including 2 programs from Japan) with the number of companies/institutions working with silica/silicon dioxide ranging from 2-13. Ten (10) companies reported working with silica/silicon dioxide in volumes of less than 10 kg/yr for uses including research and development, industrial and food and drug purposes. One (1) company reported working with silica/silicon dioxide in volumes between 10-100 kg/yr for research and development purposes and one (1) company reported working with silica/silicon dioxide in volumes between 100-1000 kg/yr for industrial purposes. Five (5) companies reported working with silica/silicon dioxide in volumes greater than 1, 000 kg/yr for industrial and consumer uses. Other use codes reported for silica/silicon dioxide include cosmetics, pesticides, agricultural and other.

45. Two (2) companies/institutions reported information available on fate and exposure, two (2) companies/institutions reported information available on ecotoxicity, three (3) companies/institutions reported information available on human toxicity, four (4) companies/institutions reported information available on physical chemical properties and fourteen (14) companies/institutions reported risk management in place .

Silver Nanoparticles (Annex II Table 20)

46. Silver was reported by five (5) countries with the number of companies/institutions working with silver ranging from 1-19. Eighteen (18) companies reported working with silver in volumes of less than 10 kg/yr for research and development, industrial and consumer uses. Two (2) companies reported working with silver in volumes between 10-100 kg/yr for industrial purposes and one (1) company reported working with silver in volumes between 100-1000 kg/yr for industrial purposes. The Czech Republic reported fourteen (14) companies/institutions with risk management in place (information not shown).

Single-Walled Carbon Nanotubes (Annex II Table 21a/b)

47. Single-walled carbon nanotubes (SWCNT) were reported by three (3) countries (including 2 programmes from Japan) with the number of companies/institutions reporting activity with SWCNT ranged from 2-3 per country (Annex I, Table 14). Three companies reported using SWCNT in volumes of < 10 kg/yr for research and development purposes only. Other reported use codes included industrial.

48. Two (2) companies/institutions reported information available on fate and exposure and physical chemical properties, one (1) company/institution reported information available on human toxicity and five (5) companies/institutions reported risk management in place.

Titanium Dioxide (Annex II Table 22a/b)

49. Titanium dioxide was reported by seven (7) countries (including 2 programmes from Japan) with the number of companies/institutions working with titanium dioxide ranging from 2-18 per country. Sixteen (16) companies/institutions reported working with titanium dioxide in volumes of less than 10 kg/yr for research and development and consumer uses, two (2) companies/institutions reported working with titanium dioxide in volumes between 100-1000 kg/yr for industrial and consumer uses, and at least

nine (9) companies/institutions reported working with titanium dioxide in volumes greater than 1000 kg/yr for industrial, consumer and cosmetics purposes. One (1) jurisdiction reported "other" for a use code.

50. Twelve (12) companies/institutions reported having information on fate and exposure, thirteen (13) companies/institutions reported information on physical chemical properties, thirteen (13) reported information on human toxicity data, twelve (12) reported having information on ecotoxicity data and twenty-two (22) companies/institutions reported risk management in place.

Zinc Oxide (Annex II Table 23)

51. Zinc oxide was reported by six (6) countries (including 2 programs from Japan) with the number of companies/institutions working with zinc oxide ranging from 1-6 per country. Seven (7) companies/institutions reported working with zinc oxide in volumes of less than 10 kg/yr for research and development and cosmetic purposes, one (1) company reported working with zinc oxide in volumes between 10-100 kg/yr for research and development and industrial purposes, one (1) company reported working with zinc oxide in volumes between 100-1000 kg/yr for consumer purposes and three (3) companies reported working with zinc oxide in volumes greater than 1000 kg/yr for consumer and cosmetic purposes. Other use codes reported for zinc oxide included food and drug and other.

52. Seven (7) companies/institutions had information available on fate and exposure, ten (10) had information available on physical chemical properties, eight (8) had information available on human toxicity data, seven (7) had information available on ecotoxicity data, and ten (10) reported risk management in place.

Summary of the 15 Most Commonly Reported Nanomaterials (Annex II Table 24)

53. Titanium dioxide was reported by most countries (7) and by most companies/institutions (43). Zinc oxide was reported by six (6) countries and twenty (20) companies/ institutions; silver by five (5) countries and twenty-six (26) companies/institutions; silicon dioxide by five (5) countries and twenty-four (24) companies/institutions; and although multi-walled carbon nanotubes were reported by only three (3) countries, twenty (20) companies/institutions were reported to have activities with them.

54. Most companies worked with nanomaterials in volumes of less than 10 kg/yr (106 companies), the next most common volume reported was over 1000 kg/yr (28 companies). The nanomaterials used at these volumes included titanium dioxide (9 companies); carbon black (5 companies) silicon dioxide (5 companies), aluminum oxide (3 companies), zinc oxide (3 companies), iron oxide (2 companies) and cerium oxide (1 company).

55. As a general observation, for the countries that collected and reported additional information, such as the availability of information on fate and exposure, physical chemical properties, human toxicity/ecotoxicity data, and risk management, it would appear that most companies did have some data available and did have risk management measures in place. The most available data for the fifteen (15) most commonly reported nanomaterials was on physical chemical properties (reported by 51 companies/institutions in total for all fifteen nanomaterials combined) followed by human toxicity data (reported by 45 companies/institutions). Data was least likely to be available on fate and exposure (reported by 39 companies/institutions) and ecotoxicity data (reported by 33 companies/institutions). Titanium dioxide and zinc oxide were the two nanomaterials reported to have the most amount of

information available overall. Also for the fifteen (15) most commonly reported nanomaterials, 137 companies/institutions reported risk management measures in place[2]

Other Nanomaterials Reported (Annex II Table 25)

56. Table 25 (Annex II) lists the other nanomaterials that were reported, most by only one (1) country. It would appear that there are a wide range of nanomaterials currently in industrial, food and drug, consumer and cosmetic use at this time.

Section 2: Summary of Information Obtained

57. A number of countries recommended collecting information on the chemical name/identity, use patterns and volumes (Annex II, Table 26). This information was most useful in determining potential risks, exposure routes and trends in production. Requesting all available data also helped to identify gaps in toxicity and ecotoxicity testing. Most jurisdictions reported that they learned to some extent the identity of the nanomaterials, extent of use and sectors involved in nanotechnology in their countries. Two (2) countries cautioned that either a voluntary scheme may not be reliable or that a large segment of the industry is still unknown.

58. Three (3) countries reported that some environmental, health and safety (EHS) data was available but it was not comprehensive. The UK reported that enough information was obtained to conclude that cerium oxide does not pose an EHS threat, and data submitted on carbon nanotubes enabled a targeted risk management response. Two (2) countries reported that nanomaterials which exist as powders are being treated as "fine powders/dusts" with general measures for chemical powders being followed in the workplace. The adequacy of these measures however, may or may not be adequate. The US also reported that companies are developing risk management measures, but these actions are based on little or no data. Three (3) jurisdictions reported the need for either a strengthened regulatory framework, or EHS policies/programs to be developed.

Section 3 and 4: Actions Taken and Other Comments

59. Five (5) countries reported publishing a summary report on the information obtained from conducting their information gathering survey (Annex II, Table 27). Six (6) countries reported some form of follow-up action to obtain additional information from companies or to validate results, while three (3) countries reported either regulatory development or publishing of policy recommendations/guidance documents.

Conclusions

60. Information contained in this report represents a portion of the information available in OECD countries on nanomaterials and their extent of use. Despite the limitations of the data collected, Part B of the *Questionnaire: Information Gathering Schemes* identified fifteen (15) of the most common nanomaterials in use, twelve (12) of which have been identified by the SP. The Questionnaire also identified titanium dioxide and zinc oxide as the two most commonly used nanomaterials (based on the number of countries and companies/institutions reporting them) and identified titanium dioxide, carbon

[2] Readers are cautioned that this value is elevated above the other numbers reported in this paragraph due to one country having information available and reporting on risk management measures only.

black and silicon dioxide as the highest volume nanomaterials reported (based on the number of companies working with volumes in excess of 1000 kg/yr). Fewer countries collected and/or reported information on availability of data compared to identity, use and volumes, nonetheless, it would appear that many companies/institutions have some data, with data on physical chemical properties the most widely available and ecotox data the least widely available.

61. Many countries feel that conducting an information gathering scheme was beneficial despite the often low to very low response rates for the voluntary schemes, and are moving forward with follow-up actions to gather more information, validate information and/or develop regulations/policies and/or guidance.

ANNEX I: RESPONSES RECEIVED ON LESSONS LEARNED (Part A of the Questionnaire)

Table 1: Timeframe for Survey Response

Country	Survey Length	Months	Comments Provided on Length of Survey and Time of Year
Australia	108 days	Oct-Jan	Ending date in January (summer) and close to a holiday period may have resulted in lower response rate
Czech	2 months	Jul/Aug	Not a good time due to vacations (stage 1 only)
Denmark	28 days	Mar/Apr	None
Germany	3 months	May-July	3 months was a good time frame
Ireland	4 months	Jun-Sep	2-3 months would be best, recommend Feb/Mar or Sep/Oct to avoid vacations
Japan-METI	8 months	Jul-Mar	Adequate, could be shorter
Japan-MHLW	1 year	Apr-Mar	None, survey outsourced
UK	2 years	Sep-Sep	Adequate time frame
USA	2 years	Jan-Jan	1 year would have been adequate

Table 2: Development Approach

Country	Stakeholder Involvement	Type of stakeholder involvement	3rd party involvement in survey Development	Recommendations for Survey Development/Other Comments
Australia	Yes	In consultation with the NICNAS National advisory group which includes industry, researchers and community sectors	No	Keep surveys as simple as possible to encourage participation
Czech	Yes	Designed by national institutes of public health	No	Training to those completing survey (consultation and leaflet)
Denmark	Yes	Selected companies	Yes	Consultant has good knowledge of sector and knows major players
Germany	Yes	Industry organization and industry representatives	No	Industry organization received and anonymized the responses
Ireland	No	Not applicable	no	Recommend stakeholder participation in development of future surveys
Japan-METI	Yes	Formal and informal discussions with industry org. and companies	No	Difficulties encountered because of lack of measurement methods and toxicity testing
Japan-MHLW	No	Not Applicable	Yes	Whole survey was outsourced to 3rd party
UK	Yes	Input from all stakeholders received; held public consultation	No	Form simplicity and guidance in completing survey is important, benefits to industry need to be advertised
USA	Yes	Public input/public meeting and public comments welcomed	No	Public consultation/comment makes for robust scheme and good participation

Table 3: Purpose for Developing the Survey

Country	Overview of nanotech industry in your country	Obtain available data	Assess effectiveness of current legislation/regulation	Support regulatory development or amendment	Support program development	Guide research programs	Risk assessment or risk management	Other	Used for another purpose?
Australia	X		X	X					Low response rate became a major consideration for developing regulatory reform proposal
Czech							X	Overview of workplaces using nanomaterials	Yes, OECD/WPMN
Denmark	X	X					X	Determine guidance needed to reduce risk	No response
Germany	X	X					X	Information on worker protection, identify uses and risk management in place	No
Ireland	X								No but could be used as a first step to policy formation
Japan-METI	X	X			X		X		No
Japan-MHLW	X								No
UK		X				X	X		No
USA	X	X		X	X	X			No

Table 4a: Nanomaterials Targeted

Country	Description of Nanomaterial Targeted	Nanomaterials Excluded	Recommendations regarding Nanomaterials that should be Targeted in an Information Gathering Survey
Australia	Specifically engineered materials with at least one dimension < 100 nm	Nanomaterials outside the scope of NICNAS (ex. therapeutic goods, food and food additives, agricultural or veterinary chemicals	The nanomaterials that are requested in a survey produced by a regulatory agency should be limited to nanomaterials that are relevant to that agency's targeted audience.
Czech	All engineered nanomaterials potentially present in the workplace		Request information on use/handling
Denmark	Engineered nanoparticles, flakes and fibres with at least 1 dimension < 100 nm in Danish end products	Nanostructured surfaces, nanofilms and nanoporous structures	None
Germany	Engineered nanoparticles produced as a powder with at least 2 dimensions <100 nm	Fumes from soldering, metal or diesel fumes	
Ireland	Engineered nanoparticles produced as a powder with particle dimension <100nm	No response	Focus on the 14 NM from testing program
Japan-METI	CNT, fullerenes, carbon black, titanium dioxide, zinc oxide, silicon dioxide	Nothing specific, was not targeting R&D	None
Japan-MHLW	MWCNT, SWCNT, fullerenes, titanium dioxide etc.	Nothing specific	None
UK	Engineered materials with 2 or more dimensions up to 200 nm	Manufactured products (carbon nanotubes in sports racquets)	Target NM with consumer exposure; bound NM not a concern
USA	Materials engineered with 2 or more dimensions between 1-100 nm	Non TSCA items such as foods, drugs, pesticides, certain polymers, organic pigments, dyes, biological materials; heavy fuel oil, salts	Encourage submission of all available information

Table 4b: Activity Targeted, Trigger Volume for Survey, End Use Applications Targeted

Country	Activity Targeted										Trigger Volume				End Use Applications Targeted							
	Import for commercial use	Import for R&D	Import for processing	Commercial use	Sale of formulated product	Manufacture for commercial use	Manufacture for R&D	Manufacture for Processing	Sale of raw materials	Other	>0 kg/yr	>1 kg/yr	>10 kg/yr	Other	Occupational	Food and Drug	Personal Care	Industrial	Fertilizer	Pesticide	Consumer	Other
Australia	X	X	X			X	X	X						>100g/yr	X		X	X			X	
Czech	X	X	X	X	X	X	X	X	X		X											Not relevant
Denmark	X	X	X	X	X	X	X	X	X		X											None specified
Germany				X		X		X					X		X			X				
Ireland				X		X	X	X		Releases				None								None specified
Japan-METI						X								None	X	X	X	X	X	X	X	All
Japan-MHLW				X		X	X	X	X		X					X					X	
UK	X		X	X		X	X	X			X				X	X	X	X	X	X	X	
USA	X		X	X		X		X		Late stage R&D				None	X			X			X	

Table 5a: Information Requested by the Survey

Country	Information on the Company/Institution				Information on Nanomaterial Identification						Information on Use		
	Company name	Company location	Company size	Other	Material name	Formula	Material type/class	CAS number	Trade name	Other	Use pattern	Volume	Other
Australia	X	X			X	X		X	X		X	X	
Czech	X	X	X	Name/position/relation of respondent	X	X	X	X	X	Particle size	X	X	Production on site vs. imported
Denmark	X		X	Type of products and sector	X		X	X			X	X	
Germany			X	Number of individuals handling NM	X					Particle size	X	X	
Ireland			X				X			Size and methods	X	X	
Japan-METI	X				X	X					X	X	
Japan-MHLW				Info not available	X		X				X	X	
UK	X	X			X			X	X	Source	X		
USA	X				X	X	X	X		Impurities	X	X	Concentration and other constituents

Table 5b: Other Information Requested by the Survey and Recommendations

Country	Other Information Requested													Recommendations	Changes you'd make
	Fate and exposure	Physico-chemical	Human tox	Ecotox	Personal equipment	Risk management	Waste disposal	Benefits	Biodegradation	Measurement & detection	Bioaccumulation	Production methods	Other		
Australia	X	X	X	X			X						Degree of purity and life cycle data	Keep the format as simple as possible, even asking for data "if available" may be a disincentive to respond, survey format should be simple to fill in and send in; where to get support or have questions asked should be included and it should be clear that CBI will be kept confidential	Simplify information requested. Don't ask for 'other' information. Provide additional support to address questions including staff phone numbers and e-mail addresses.
Czech						X									No changes
Denmark	X	X	X	X	X	X	X						Concentration, info available to customer, guidance or regulation needed	None	None listed
Germany	X				X	X				X			Info on health effects during production/use		Change format of survey to be interactive and dynamic
Ireland		X	X	X									MSDS and exposure mitigation practices	Measurement and detection methods	Seek more info on industrial processes and industrial

Country	Other Information Requested													Recommendations	Changes you'd make
	Fate and exposure	Physico-chemical	Human tox	Ecotox	Personal equipment	Risk management	Waste disposal	Benefits	Biodegradation	Measurement & detection	Bioaccumulation	Production methods	Other		
														and production methods	hygiene practices
Japan-METI	X	X	X	X	X	X	X	X		X		X	Crystal structure, aggregation, dispersibility, particle size dist., configuration, density, surface area, charge etc.	None	None listed
Japan-MHLW														None	None listed
UK	X	X	X	X		X		X		X		X		Request HH data	Keep form simple, provide training, provide benefits for completion
USA	X	X	X	X	X	X	X	X	X	X	X	X		Request all data available	Make it mandatory to submit information

Table 6: Response Rate

Country	Response Rate	What contributed to response rate?	Promotion Efforts/efforts to Encourage Completion	Recommendations
Australia	Very low	Timing, voluntary, data requested	Publication of notices, monthly reminders through publications and website, mass distribution	Simplify design, stakeholder follow-up and mechanism to assist
Canada				
Czech	Very high	Mandatory to communicate with public health authorities	Involve parties with relevant jurisdiction	Education/training and financial bonuses to those gathering the data
Denmark	Moderate	Good consultant	Keep questions simple; allow to stop at certain points	None listed
Germany	Low	Voluntary and anonymized	Cooperation with industry organization; assistance by industry organization	Include NM in suspension; lower trigger volumes to capture small companies
Ireland	Low	Requesting ID and data that companies feel is CBI	E-mail	Reduce the "regulatory" look of the survey
Japan-METI	Very high	Consultation with stakeholders when drafting survey	Sending survey to individual companies, meetings	Lots of discussion with industry during development of survey
Japan-MHLW	Not available	No response	No response, survey outsourced	None listed
UK	Very low	CBI issues and complex form	On government website, relevant companies e-mailed, liaising with other organizations (research council, government/industry networks)	Simplify form; clear guidance/instructions; clear purpose, clear incentives for being open, advertise widely, consider working through trade organizations
USA	Very low	Voluntary	EPA participation in conferences, contact through industry organizations, regional meetings and e-mail to identified companies	Solicit stakeholder input when designing survey, conduct outreach, make efforts to identify small companies not linked with industry or regulatory organizations

Table 7: General Observations

Country	Effectiveness of Survey	Plans to Conduct Another Survey?	Final Words of Advice
Australia	Minimal, did not meet expectations or objectives	None planned at this stage	Keep it as simple as possible and easy to complete
Czech	Good response from identified companies, may have missed companies not on list, information received was incomplete or low value	Yes, stage II is underway and continuous	Plan carefully, combine info from various sources to ID relevant companies, appropriately trained personnel to gather information, gather everything
Denmark	Confident know extent of use; know lack of EHS data	None planned	Good consultant; explain aim of survey; explain how industry will benefit
Germany	Good results received for protective measures; rough results received for exposure	Yes planned for 2010/2011	
Ireland	Info gained was not as detailed as originally hoped but enough to justify initiating specific work programmes	Yes through site visits	Consider collecting less detailed information at first then follow-up individually for more details
Japan-METI	Not yet analyzed	Maybe	Consider an incentive to industry for completion
Japan-MHLW	Yes effective	Maybe	None listed
UK	Some useful data was obtained, but HH data was largely missing; some risk assessments could be conducted	Considering a mandatory survey	Clear and concise scheme; precise data request; not costly for companies to complete; publicize widely; structure to assist companies completing the form; assurance of confidentiality
USA	Received much new data, but data gaps still exist	Plans to conduct mandatory data gathering	Voluntary scheme is a good first step

ANNEX II: RESPONSES RECEIVED ON NON-CBI DATA (Part B of the Questionnaire)

Table 8: Summary of Data Collected

Country	Number Responding	Number Working with NM	# R&D	# Importing	# Manufacturing	# Using	# Processing	# NM not Included in Table	Any Other Data
Australia	26	9	2	4	3			0	6 respondents had phys-chem data; 4 had ecotox, but not comprehensive
Czech Republic	150 workplaces	128 workplaces in 90 companies or institutions	99	92	40	0	0		No
Denmark	75	24	8	0	1	2	14	No response	No
Germany	217	45			2	26		No response	An additional 13 use and manufacture
Ireland	No response								
Japan-METI	31	31	1	0	26	0	4	0	No
Japan-MHWL	Not available							No response	No
UK	8	8	4	6	5		8	0	No
USA	31	31	7	5	24	29	28	71	Public list of NM and companies and analysis of data

Table 9a: Aluminum Oxide

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Australia	1	4	1	4						
Czech Republic	11*	1,2	5*	1	2*	1,2			2*	2
Japan-MHLW		2,4,5**								
UK	1	2	1	2						
USA	4	1,2,4							1	2,4

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 9b: Aluminum Oxide

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Australia	0	1	0	0	N/A
Czech Republic					11*
UK		1			

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 10a: Carbon Black

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	4*	1,2	2*	1,2					2*	2
Denmark	2	2,4							2	2,4
Germany	1									
Japan-METI	6	2,8								
Japan-MHLW		2,4**								
USA	1	2,4							1	2,4

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 10b: Carbon Black

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					3*
Japan-METI	6	6	6	1	6

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 11a: Cerium Oxide

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Australia	1	4	1	4						
Japan-MHLW		2*								
UK	1	4							1	4
USA	2	1,2								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 11b: Cerium Oxide

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Australia	1	1	1	1	N/A
UK		1	1		1

Table 12a: Fullerenes

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	5*	1	5*	1						
Japan-METI	6	2,5,8								
Japan-MHLW		4**								
UK	1	1,2	1	2						
USA	1	2								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 12b: Fullerenes

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					5*
Japan-METI	6	6	6	6	6
UK		1			

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 13: Iron

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech	6*	1	5*	1	1*	1				
Japan-MHLW		2,4**								
USA	1	1								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 14: Iron Oxide

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	10*	1,2	9*	1	1*	2				
Denmark	2	2,4							2	2,4
Germany	3									
USA	1	2,3,4,5								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 15a: MWCNT

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	6*	1	6*	1						
Japan-METI	3	2,8								
Japan-MHLW		2**								
USA	11	1,2								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 15b: MWCNT

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					6*
Japan-METI	3	3	3	2	3

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 16a: Nanoclay

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	3*	1	3*	1						
Japan-MHLW		3,4,5,7**								
UK	1	3	1	3						
USA	2	2,3,4								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 16b: Nanoclay

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					3*
UK		1	1		

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 17a: Pharmaceutical Actives

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	5*	1	5*	1						
Germany	2									
UK	1	1	1	1						

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 17b: Pharmaceutical Actives

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					5*
UK			1	1	

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 18a: Silicates

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	8*	1,2	6*	1	1*	1	1*	2		
Germany	2									
UK	1	3								

Use codes: 1-R&D; 2-Industrual; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 18b: Silicates

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					7*
UK		1	1	1	

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 19a: Silica/Silicon Dioxide

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	13*	1,2	9*	1	1*	1	1*	2	2*	2
Denmark	3	2,4							2	2,4
Japan-METI	2	2.3.5.6.7.8.								
Japan-MHLW		2,3,4,5,6**								
UK	2	2,3	1	2,3						
USA	4	2,4,5							1	2,4

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 19b: Silica/Silicon Dioxide

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					12*
Japan-METI	2	2	2	1	2
UK		2	1	1	

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 20: Silver Nanoparticles

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech Republic	19*	1,2	16*	1	2*	2	1*	2		
Denmark	2	2,4	2	2,4						
Germany	1									
Japan-MHLW		2,4**								
USA	4	1,2,4								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 21a: SWCNT

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Czech	3*	1	3*	1						
Japan-METI	2	1								
Japan-MHLW		1**								
USA	3	1,2								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes between 10-100 kg/yr

Table 21b: SWCNT

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Czech Republic					3*
Japan-METI	2	2	1	0	2

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 22a: Titanium Dioxide

Country	No. Companies	Use Codes identified	No. of Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Australia	2	4	1	4			1	4		
Czech	18*	1,2	15*	1			1*	2	2*	2
Denmark	>4	2,4,5							3 or 4	2,4,5
Germany	4									
Japan-METI	8	2,5,8								
Japan-MHLW		2,4,5**								
UK	2	5							2	5
USA	5	1,2,4,5							2	2,4

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 22b: Titanium Dioxide

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Australia	2	3	3	2	N/A
Czech Republic					12*
Japan-METI	8	8	8	8	8
UK	2	2	2	2	2

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 23a: Zinc Oxide

Country	No. Companies	Use Codes identified	No. Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Australia	3	1,4					1	4	2	4
Czech	6*	1	6*	1						
Denmark	1 or 2	5								
Japan-METI	4	2,5,8								
Japan-MHLW		3,4,5**								
UK	3	1,2,3,5	1	5	1	1,2			1	5
USA	3	1,2,4,5								

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

Table 23b: Zinc Oxide

Country	# of Companies reporting info on Fate and Exposure	# of Companies reporting info on Phys-Chem Properties	# of Companies reporting Human Toxicity Data	# of Companies reporting Ecotox Data	# of Companies reporting Risk Management in Place
Australia	3	3	3	3	N/A
Czech Republic					6*
Japan-METI	4	4	4	3	4
UK		3	1	1	

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

Table 24: Summary of 15 Most Commonly Reported Nanomaterials

Nanomaterial	# Countries reporting	# Companies reporting	# Companies <10 kg/yr	# Companies 10-100 kg/yr	# Companies 100-1000 kg/yr	# Companies > 1000 kg/yr	# Companies with Fate/Exposure info	# Companies with Phys-Chem info	# Companies with Human Tox info	# Companies with Ecotox info	# Companies with Risk Management in Place
Aluminum oxide	5	17	7	2	0	3	0	2	0	0	11
Carbon black	5	14	2	0	0	5	6	6	6	1	9
Cerium oxide	4	4	1	0	0	1	1	2	2	1	1
Fullerenes	4	13	6	0	0	0	6	7	6	6	11
Iron	3	7	5	1	0	0	0	0	0	0	6
Iron oxide	4	16	9	1	0	2	0	0	0	0	10
MWCNT	3	20	6	0	0	0	3	3	3	2	9
Nanoclay	4	6	4	0	0	0	0	1	1	0	3
Pharmaceu-tical actives	3	8	6	0	0	0	0	0	1	1	5
Silicates	3	11	6	1	2	0	0	1	1	1	7
Silicon dioxide	5	24	10	1	1	5	2	4	3	2	14
Silver	5	26	18	2	1	0	0	0	0	0	14
SWCNT	3	8	3	0	0	0	2	2	1	0	5
Titanium dioxide	7	43	16	0	2	9	12	13	13	12	22
Zinc Oxide	6	20	7	1	1	3	7	10	8	7	10

Table 25: Other Nanomaterials Reported (reported in alphabetical order)

Nanomaterial ID and Country	No. Companies	Use Codes identified	No. Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Acrylic Minute Particles-Japan		2,4,5**								
Acrylic latex-Australia	1	4							1	4
Antimony Pentoxide-USA	1	2								
Carbon Nano Fiber-Japan MHLW		2**								
Carbon Nanoparticle-USA	1	2								
Cobalt-USA	1	1								
Copper-Denmark	1	2	1	2						
Copper Oxide-USA	1	1								
Dendrimers-Czech	1*	1	1*	1						
Dendrimers-Japan MHLW		2,5**								
Gold-USA	1	1								
Lithium Titanate-USA	1	2,4								
Manganese Oxide-USA	1	1,2							1	2
Magnesium Oxide-USA	1	1								
Metal powders-Germany	2									
Nanodiamonds-USA	1	4					1	4		

Nanomaterial ID and Country	No. Companies	Use Codes identified	No. Companies reporting < 10 kg/yr	Use Codes for < 10 kg/yr	No. of Companies reporting 10-100 kg/yr	Use Codes for 10-100 kg/yr	No. of Companies reporting 100-1000 kg/yr	Use Codes for 100-1000 kg/yr	No. of Companies reporting > 1000 kg/yr	Use Codes for >1000 kg/yr
Nickel-USA	1	1								
Nickel-Japan MHWL		2**								
Organic or inorganic fibres-Czech	6*	1,2	5*	1	1*	2				
Palladium-USA	1	1								
Pigment Minute Particles-Japan MHLW		2,4**								
Pigments-USA	1	2								
Platinum-USA	1	1								
Polymers(other than dendrimers)-USA	4	2,4								
Polystyrene Japan-MHLW		2,5**								
Quantum dots-Czech	3*	1	3*	1						
Quantum dots-Japan-MHLW		1****								
Rhodium-USA	1	1								
Silicic acids Germany	4									
Zirconium Oxide-Australia	1	4	1	4						
Several products-Germany	23									

Use codes: 1-R&D; 2-Industrial; 3-Food and Drug; 4-Consumer; 5-Cosmetics; 6-Pesticide; 7-Agricultural; 8-Other

*Czech Republic reported total number of workplaces (in some cases there may be more than one workplace per company/institution)

**Japan-MHLW reported total use in Japan at volumes >1000 kg/yr

***Japan-MHLW reported total use in Japan at volumes between 10-100 kg/yr

****Japan-MHLW reported total use in Japan at volumes <10 kg/yr

Table 26: Summary of Information Obtained

Country	Recommendations on Information Collected	What You Learned about the Industry	What You Learned about EHS	What You Learned about Reg. Triggers, Assessment Frameworks or RM	Other
Australia	Chemical name and application details were important to understand potential risks from various exposure routes	Voluntary scheme may not be reliable reflection of actual use	Some data is available but it is not comprehensive	All those submitted were nanoforms of existing chemicals thus reg framework reviewed and revised as appropriate	No response
Czech Republic	Designed well to cover HH aspects of using NM in workplace	Large no. of researchers working with small volumes, few large scale producers	Exposure and risk in workplace is low and no reported illnesses	No specific regulatory measures in place, workplaces reporting minimizing exposure to mitigate risk	
Denmark	No response	What NM are used, to what extent and for what purpose	None-dry form are treated as a "fine powder"	None identified	No response
Germany	Starting criterion for activities involving nanomaterials should be lowered to less than 10 kg/year and include activities involving suspensions	Useful and informative overview	High need for information on exposure and risk assessment in SME's	No response	No response
Ireland	No response	The different sectors interested in the technology	EHS policies/programs need to be developed	No response	No response
Japan-METI	Useful to have volumes and use information, status of measures for risk management to review voluntary measures	CNT and fullerene production is on the rise; carbon black, titanium dioxide, zinc oxide and silicon dioxide have been manufactured for several decades	Data on acute toxicity, skin irritation, carcinogenicity, mutagenicity etc. reported by some companies	Some NM exist as powders, general measures for chemical powders/dusts are being followed but these may or may not be adequate. MHLW is initiating approaches aimed at preventing workplace exposure	Many companies are following and distributing MSDS
Japan-MHWL	No response	Applications of NM, usage per year			
UK	Identifying NM and their use is important for understanding trends in production and exposure from product use. Helped to identify gaps in toxicity and ecotox	Partial knowledge gained in the range and use of NM	Cerium oxide does not pose an EHS threat	Data submitted enabled a targeted risk management response to carbon nanotubes entering UK	Voluntary survey is unlikely to fill all regulatory needs
USA	Ask what NM they are importing, manufacturing or using and all data. Most useful info was identity of co. ID of NM and production levels	Large segment of the industry still unknown	Limited EHS data available and is not generated by co.	Most co. develop RM but based on little, faulty or no data	No response

Table 27: Actions Taken and Other Comments

Country	Actions Taken as a Result of the Survey	Other Details or Explanations	Final Words of Advice
Australia	Attempted to validate results with nanotechnology advisory group; development of a regulatory proposal for NM; preparation of summary report	Voluntary information gathering achieved limited response, inconsistent with downstream market research	
Czech Republic	Summary report provided to public health authorities, results presented at local seminars and conferences, article being prepared for medical journal, follow-up with selected companies	Data presented in Part B is on total number of workplaces and not by institution	Plan your information gathering scheme carefully. Combine various sources of information to identify as many relevant companies/institutions as possible. Use qualified personnel with appropriate jurisdiction for gathering the data. Collect even data that may not appear to be relevant now.
Denmark	Followed up with some of the responding companies for more details	No response	None
Germany	Planning a follow-up for continuous monitoring	No response	Need consensus with industry on definition for NM, simple process/form is important, companies want to preserve anonymity
Ireland	Establishment of a tripartite WG; publish policy recommendations, nominated staff to European WG on nanotechnology; follow-up with specific companies; plans to publish guidance docs	No response	No response
Japan-METI	Report published, may carry out a follow-up survey	Information provided by companies should be reviewed based on current knowledge; information should be made available to the public	
Japan-MHWL	Published a summary report with CBI removed	No response	No response
UK	Phone survey near the end of the 2 year reporting timeframe to analyse the success of the voluntary reporting scheme. Recommend voluntary scheme asks for only basic information, recommend a phased in approach to reporting with different information required depending on whether activity is R&D, pre-commercial or commercial, consider facility licensing for pre-commercial activity and substance assessment for post-commercial activity	Different reg. approaches may be required for different stages for ex. R&D, commercial evaluation vs. commercial exploitation	Licensing scheme may be most appropriate for R&D phase
USA	Interim report produced, final report will be developed, regulations being developed to fill data gaps	Data skewed by 58 R&D NM submitted by one co. and submissions for carbon black and amorphous silica	No response