ENGINEERED NANOMATERIALS IN THE WORK ENVIRONMENT

- summary of the danish Work Environment Council's overall recommendations to the Minister for Employment

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Engineered nanomaterials in the work environment

Companies are increasingly using nanomaterials, both internationally and in Denmark. There is great potential development and growth of new products based on special properties of engineered nanomaterials. This also increases the occurrence of nanomaterials in Danish workplaces, which requires intensified focus on occupational health and safety. This is because that compared to larger particles, the special properties of nanomaterials not only provide the basis for development and growth, but may also be associated with negative health effects.

Research in the field of nanosafety in recent years has provided evidence that occupational exposure to nanomaterials can have a negative health effects, especially inhalation of nanomaterials. This is mainly because nanomaterials are deposited deep in the lungs when inhaled and are only removed very slowly, which results in long-lasting exposure of the lungs.

The Danish Work Environment Council agrees that the main challenge for workplaces in relation to the ability to assess and manage nanomaterials in the work environment is that they do not receive adequate information about the individual nanomaterials, their physicochemical properties and information about safe use. This may create uncertainty in the workplace concerning occupational safety and health issues. At the same time, this can become a barrier preventing Danish companies from utilizing the potential benefits of nanomaterials. The Work Environment Council believes that high levels of nanosafety will increase Danish companies' use of nanomaterials and thus create new growth opportunities.

EU chemicals legislation does not yet include adequate requirements for the registration and disclosure of information on nanomaterials. Until adjustments to existing EU legislation in this area have been adopted and have been enforced, the Work Environment Council wishes to help to ensure a high level of protection in the manufacture and use of technically manufactured nanomaterials in the Danish work environment.

In accordance with the terms of reference of the working group under the Work Environment Council, which has prepared these recommendations, the recommendations concern *engineered nanomaterials in work environments*. This also applies to the places where the term *nanomaterial is* used for the sake of easy reading.

Recommendations of the Work Environment Council

The Work Environment Council would like to see a comprehensive approach to ensure that engineered nanomaterials are used in Danish workplaces on a fully responsible basis. This requires that the organisation and implementation of the overall occupational health and safety activities in Denmark are at the forefront of developments.

The Work Environment Council recommends a number of occupational health and safety policy initiatives which should be implemented by various occupational health and safety operators in order to translate knowledge and experience into practical and directly business-related action. The individual initiatives should be

coordinated in cooperation between relevant operators, so that the initiatives complement each other in the best possible way.

The need for increased focus on nanomaterials in the work environment
Inhalation of nanomaterials is more hazardous than the inhalation of larger particles with the same chemical composition by mass, and research within nanosafety in recent years has shown that occupational inhalation exposure to nanomaterials may constitute a health risk. Knowledge of the overall scale and use of nanomaterials in Denmark is inadequate, but according to the Danish National Research Centre for the Working Environment (NRCWE), there is currently reason to assume that the use of nanomaterials in Denmark is increasing.

This entails a need to support the continued Danish focus on occupational health and safety in relation to nanomaterials. In addition, information regarding the prevalence of nanomaterials in work environment should be made available for use in the overall Danish occupational health and safety activities. The Work Environment Council recommends that:

- *Overall Danish occupational health and safety activities take nanomaterials into consideration where adverse health effects have been documented or if there is suspicion or uncertainty about possible adverse health effects;*

- *The prevalence of nanomaterials in the work environment should be identified, including where they may potentially be found;*

- *The product register should be "nano-safeguarded' so that manufacturers, suppliers and importers will be able to indicate with a simple tick whether products subject to compulsory registration contain nanomaterials,*

- *The Danish Working Environment Authority should benefit as much as possible from the Danish Environmental Protection Agency's nano product register in relation to professional users and the work environment, including that the Danish Working Environment Authority receives documentation concerning nanomaterials in the work environment in order to strengthen its inspection activities; and that*

- *the Danish Working Environment Authority should present an overview of the knowledge available concerning the prevalence of nanomaterials in the work environment in Denmark to the Work Environment Council at least every 3 years. Based on this, the Work Environment Council will implement its preventive initiatives in relation to nanomaterials in the work environment.*

Sufficient information to workplaces
Businesses and employees require sufficient information to ensure a high level of protection in the production and use of engineered nanomaterials in the Danish work environment. The information that accompanies hazardous substances is an essential starting point for compliance with statutory requirements and to ensure safe handling. EU regulation plays an important role in the Danish regulation of chemicals and consequently for nanosafety. EU chemicals legislation does not yet

include adequate requirements for the registration and disclosure of information on nanomaterials, to identify risks or safe use. This means that the *flow of information* between suppliers of nanomaterials and the workplaces is at risk of being disrupted.

There is a need to support the information flow to workplaces that use and handle nanomaterials. It must be ensured that the workplaces receive sufficient information from manufacturers and suppliers concerning the properties of nanomaterials, the hazardous potential of nanomaterials, and instructions for safe handling. This means that:

- *The Work Environment Council supports that the Danish Government continues to work actively to ensure that EU regulation takes the special properties of nanomaterials into account;*

- *Until the adjustments to the existing EU legislation have been adopted and enforced, the Work Environment Council will launch an information campaign in Denmark to ensure that safety data sheets contain information about whether the substance or material contains nanomaterials, and to ensure that the safety data sheets are continuously updated. Workplaces are also encouraged to that knowledge of nanomaterials is included in the suppliers' safety data sheets; and*

- *Where there is a risk of exposure to nanomaterials in the work environment, the Danish Working Environment Authority should also have focus on whether the safety data sheets contain sufficient information about nanomaterials. If the information about nanomaterials proves to be inadequate, the Danish Working Environment Authority's market surveillance will take over the case in relation to the supplier, in accordance with current practice.*

The need to support workplaces' assessment and handling of nanomaterials

In cases where the information flow is disrupted, it is up to the workplaces themselves to request information on hazardous substances. Disruption of the information flow puts undue pressure on employers in their work on chemical workplace assessments and workplace instructions, making it more difficult to comply with occupational health and safety legislation.

In practice, information for use in preventive occupational health and safety initiatives is sought from different sources, and often on an unsystematic and ad hoc basis. There is thus a need to support workplaces in their assessment and handling of nanomaterials in the work environment. The Work Environment Council recommends that:

- *A coordinated campaign be implemented between the Work Environment Council and the Danish Working Environment Authority towards workplaces that manufacture, use and handle nanomaterials, with focus on the importance of including nanomaterials in the chemical workplace assessments;*

- *The Danish NanoSafety Centre initiates a mapping of the challenges presented in workplaces' occupational health and safety activities to ensure the safe handling of nanomaterials in the work environment. The mapping should be organised and performed with the involvement of the relevant Sector Work Environment Councils;*

- *The Danish NanoSafety Centre updates existing knowledge about effective prevention measures and provides an overview and assessment of the need to update existing information concerning nanomaterials and occupational health and safety targeted at Danish companies;*

- *Relevant Sector Work Environment Councils prepare updated guidelines for chemical workplace assessments and good practice for the handling of nanomaterials;*

- *The Work Environment Council and the Danish Working Environment Authority encourage and guide companies in requesting knowledge of nanomaterials from their suppliers, e.g. safety data sheets and any technical data sheets for use in the workplaces' occupational health and safety activities;*

- *Mandatory orders be included in the response options available to the Working Environment Authority in the event of inadequate chemical workplace assessments/workplace instructions; and in case, the rules for work with hazardous substances and materials, e.g. nanomaterials, are violated.*

- *Relevant Sector Work Environment Councils implement initiatives to increase the dissemination and application of risk assessment tools such as NanoSafer;*

- *The Danish NanoSafety Centre further develops NanoSafer to include the entire life cycle of nanomaterials and for use in situations with little specific knowledge of the substance and work situation;*

- *The Work Environment Council in cooperation with Sector Work Environment Councils ensures the establishment of training programmes for the health and safety organisations, with the most recent knowledge and tools for the safe handling of nanomaterials;*

- *People working with free carbon nanotubes and where there is a risk of exposure to free carbon nanotubes in the work process must have received specialised occupational health and safety training before starting the work;*

- *The use of free carbon nanotubes and working processes where exposure to these may occur must be notified to the Danish Working Environment Authority prior to the commencement of work; and*

- *The Danish NanoSafety Centre develops concepts for occupational exposure measurements of nanomaterials in the workplace.*

Evaluation of the documentation basis for the determination of limit values
In the Work Environment Council's work on nanomaterials and occupational health and safety, the National Research Centre for the Working Environment (NRCWE) has concluded there is sufficient scientific evidence that nanomaterials constitute a potential health risk in the work environment. In this context, NRCWE has identified a total of three specific nanomaterials, for which there is sufficient evidence of a health risk from occupational exposure. In addition, there are a number of other nanomaterials for which, according to NRCWE, there is uncertainty concerning the biological mechanisms underlying the adverse effects and consequently concerns about the health impacts.

Based on this, the Work Environment Council recommends the following with regard to the ongoing process for the assessment of documentation to determine limit values for specific nanomaterials:

- *That the Danish Working Environment Authority in cooperation with relevant scientific experts assesses whether adequate scientific documentation can be provided to use the scientific quality committee for an assessment of the scientific evidence to determine limit values for specific nanomaterials in the work environment.*

Use of knowledge for the benefit of the work environment and companies' competitiveness
It is essential that current scientific knowledge is used. There is a need to further develop and make use of the research in the field of nanomaterials and occupational health and safety. This includes making the research even more application-oriented, in order to promote safe use. This applies both in relation to Danish companies and to regulation of the area, for which it is vital to have a solid knowledge base. But it is also important to further develop the cooperation that exists between research institutions, workplaces and the operators involved in organising and implementing Danish occupational health and safety initiatives, such as the Sector Work Environment Councils.

The Work Environment Council therefore supports the continuation of the Danish NanoSafety Centre. This can build on the results achieved, and the centre's knowledge can be utilised to support the occupational health and safety initiatives, for the benefit of the work environment and companies' competitiveness.

Based on this, the Work Environment Council recommends that:

- *In the future, the Danish NanoSafety Centre supplements its primary toxicological focus with an increased focus on applied research, research concerning instruments, and national and international regulatory aspects of nano safety; and*

- *In connection with the continuation of the Centre, a unit should be created that can perform work place measurements of nanomaterials. Workplaces*

must be able to request measurements that can be used in occupational health and safety work. The results of the measurements must also be used in the Centre's research and provide an empirical basis that can be used in the general information and guidance for companies.

A concerted effort which requires close interaction

The use of nanomaterials is increasing rapidly and the implementation of the aforementioned initiatives will contribute to occupational health and safety initiatives staying at the forefront. In order to continuously monitor the development, at least every three years the Work Environment Council will conduct a discussion in principle concerning nanomaterials and occupational health and safety.

The Work Environment Council assesses that overall these initiatives address the current challenges faced by Danish workplaces with regard to nanomaterials. This applies not only to the question of safeguarding the work environment for people who are in contact with nanomaterials in the course of their daily work. The initiatives should also help to support companies' optimum utilization of nanomaterials' potential, thereby contributing to continued development and growth in Denmark.

For this overall effort to succeed, there is a need for close interaction between the Minister of Employment, the Danish Working Environment Authority and NRCWE on the one hand, and the labor-market parties in the Work Environment Council and the Sector Work Environment Councils on the other. As the competent authority concerning REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) the Danish Environmental Protection Agency also plays a central role in relation to EU regulation. The Work Environment Council hopes that all operators will contribute actively to the work, so that companies have the best possible basis for the safe handling of nanomaterials.

This document is a summary and translation of: *Teknisk fremstillede nanomaterialer i arbejdsmiljøet – Arbejdsmiljørådets samlede anbefalinger til beskæftigelsesministeren,* may 2015.