



The Nano Flyer

Keeping the ESOH Acquisition Community Informed on Nanotechnology Developments

Small is Big: Building Capacity to Anticipate Environmental Health Concerns from Engineered Nanomaterials

Engineered nanomaterials (ENMs) hold tremendous promise for use in a range of military, medical, environmental clean-up and other technologies. Potentially adverse environmental and health impacts from these innovative materials must be identified at appropriate times during the research and development (R&D), testing and evaluation of their usage to enable appropriate risk management. This is no less true for the Department of Defense’s (DoD) unique uses of ENMs. Given DoD’s track record of supporting innovative R&D efforts to advance war fighter and battle systems technologies, ENMs are likely to play increasingly larger roles in these technologies. In short, small is big, and getting bigger.

The benefits of ENMs may not be fully realized if the public perceives that environment, safety and occupational health (ESOH) issues are not being adequately identified and addressed. Where DoD develops nanomaterials or finds unique applications of nanomaterials, it is important that DoD demonstrate to its own staff, the public, and responsible agencies what, if any, risks they pose and that such risks can be effectively managed by the Department.

To begin this management process, ENMs were placed on the Office of the Deputy Under Secretary of Defense for Installation and Environment (ODUSD/I&E), ‘Watch List’ of emerging contaminants (ECs) in 2006. ECs are defined by DoD as chemicals or materials lacking regulatory, peer-reviewed human health standards or those as having regulatory standards that are evolving as a result of new science, detection capabilities, or pathways. ODUSD/I&E’s Chemical and Material Risk Management Directorate (CMRMD) tracks ECs to identify possible ESOH issues, in addition to potential im-

pacts on other key DoD functional areas including: training and readiness; acquisition, research, development, testing, and evaluation; and, production, operations, maintenance, and disposal. Acting earlier to identify and manage EC risks is not only environmentally sustainable, it makes good long-term business sense for the DoD. Clearly this is the case for ENMs.

Normally a detailed ‘Phase I’ Impact Assessment is prepared for a Watch List EC to assess the probability and severity of adverse impacts to DoD’s key functional areas. Unlike individual ECs on the Watch List, however, ENMs are a category of substances and materials and do not lend themselves to the existing chemical-specific impact assessment framework. But they do warrant a proactive integrated approach to risk management. Yet, data gaps inherent to this relatively new technology intensify the challenges of identifying and evaluating life cycle environmental and occupational health risks. Following the November 2007 Memorandum, [“Principles for Nanotechnology Environmental, Health, and Safety Oversight”](#) issued by the Executive Office of the President’s Council on Environmental Quality and the Office of Science and Technology Policy to the Heads of Executive Departments and Agencies, the Under Secretary of





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Defense (Acquisition, Technology, and Logistics) issued a [memorandum](#) on May 13, 2008, “Environment, Safety, and Occupational Health Risks from Engineered Nanomaterials,” encouraging DoD risk assessors and the ESOH community to stay abreast of the evolving science, regulatory and security requirements. It reminds science and technology managers, acquisition program managers, and ESOH professionals of their responsibilities to identify and address data gaps on ESOH issues for ENMs. The memo recognizes that DoD requires evaluation of life cycle costs and risks of proposed acquisition programs including implementing occupational and environmental health controls. Program managers funding development and use of nanomaterials will need to invest in research to assess human health and environmental risks for DoD applications where such are unknown. As hazardous materials need to have their risks managed as part of an Occupational and Environmental Health Program, the memo also establishes ENMs as hazardous materials per the DoD Hazard Communication Program which requires hazard determination, labeling, training and tracking. (To be clear, recording the existence of ENMs in the workplace does not mean reporting the presence of consumer products containing ENM!)

In an effort to ascertain whether additional policy, guidance, or procedures are necessary, the CMRMD is seeking input about the May 13, 2008, policy memo’s impact across DoD. Feedback is being coordinated through the DoD Nanomaterials ESOH Working Group (WG). Each of the Services as well as relevant DoD offices participate in this WG.

The CMRMD encourages risk assessors, and the ESOH, acquisition, and research communities to apply the principles and processes embodied in, **Nano Risk Framework** (www.nanoriskframework.com) jointly developed DuPont and the Environmental Defense Fund in June 2007.

CMRMD posts information pertinent to ESOH issues and nanomaterials risk assessment on the Defense Environmental and Information Exchange (www.denix.osd.mil). Any DoD work-

force member can access this information and post new information regarding risk science and policy issues under the MERIT working group link.

As nanotechnology continues to grow and mature, establishing both scientific knowledge and policy/guidance apparatus to address unique ESOH concerns is crucial to capturing the benefits of ENMs while protecting the environment, the public, and DoD personnel. Collectively, these steps demonstrate the Department’s stewardship of ENMs by taking potential ESOH concerns into account concurrent with development. CMRMD’s activities complement broader Federal efforts to promote information sharing on ENMs specifically through the multi-agency National Nanotechnology Initiative (www.nano.gov).

An emphasis on a balanced portfolio of basic research, applications development, ESOH investigations, and specialized studies is necessary. Understanding how ENMs impact the laboratory scientist, the war fighter, and the public may be an optimal way to advance nanotechnology as its tremendous promise is explored and realized. For more information on ENM ESOH issues please refer to:

Department of Energy

[www.sc.doe.gov/bes/DOE NSRC Approach to Nanomaterial ESH.pdf](http://www.sc.doe.gov/bes/DOE_NSRC_Approach_to_Nanomaterial_ESH.pdf)

Environmental Protection Agency

<http://es.epa.gov/ncer/nano/>

National Institute of Occupational Safety and Health

<http://www.cdc.gov/niosh/topics.nanotech/default.html>

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Upcoming ESOH Nanomaterials Workshop

The 77th AESW, ESOH Risk Management Branch (ASC/ENVV) is part of a multi-disciplinary team which formed a collaborative nanoparticle occupational health research program. In 2008, the Aeronautical System Center (ASC) and the Air Force Research Laboratory (AFRL) worked together to conduct a nanotoxicology and occupational health workshop at Wright-Patterson AFB. A total of 25 nationally recognized speakers from government agencies, industry, and academia shed light on the current issues facing us concerning the rapid development in nanoscience. Participants at the event included toxicologists, program managers, system engineers, bioenvironmental engineers, and students from the Air Force Institute of Technology and the University of Dayton. This event was sponsored by the Air Force Office of Scientific Research, USAF Aeronautical System Center, HQ Air Force Material Command Surgeon General (HQ AFMC/SG), and the Air Force Research Laboratory.

of nanomaterials which may enhance or improve the performance of various weapons systems.

Objectives for the Upcoming ESOH Nanomaterial Workshop

- Discuss nano-enabled technology being used in acquisition and the potential impacts to systems engineering processes.
- Identify how nanotoxicology is used to address the types of nanomaterials that are toxic, the mechanistic route resulting in the toxicity and the reasoning behind certain types of nanomaterials being classified as hazardous while others are considered safe.
- Address strategies on the environmental safety and occupational health (ESOH) implications of engineered nanomaterials throughout the life-cycle of the weapon system.
- Present the risks and benefits used in developing nano-enabled devices throughout the life-cycle of the weapon system.
- Discuss how risk assessment should be approached or addressed in the DoD community.



Poster presenters at the First USAF Workshop on Biological Interaction of Engineered Nanomaterials: Environmental, Safety and Health Issues of Military Concern held at Hope Hotel, WPAFB, Dayton, OH in 2008.

The 77th AESW ESOH Risk Management Branch (ASC/ENVV) and the 711th Human Performance Wing, Applied Biotechnology Branch (711 HPW/RHPB) are sponsoring the Upcoming ESOH Nanomaterial Workshop. The workshop will be held in Dayton, Ohio in the fall of 2009 and we anticipate approximately 100 to 150 attendees and 25 speakers. The workshop will prepare Air Force Industrial Hygienists, environmental representatives in weapon system program offices, as well as, original equipment manufacturers at the Air Force Plants for near or long-term consequences associated with the rapid development

Participants at this educational workshop will obtain training credits from either the American Board of Industrial Hygiene (ABIH) continuing maintenance points for Certified Industrial Hygienist (CIH) or Continuing Learning Points (CLP) for Acquisition Professionals Development Program (APDP). Speakers at the event may consist of subject matter experts from various government and regulatory agencies such as the U.S. Environmental Protection Agency, the U.S. Food and Drug Administration, the National Nanotechnology Initiative, and the National Institute for Occupational Health. Other speakers will include subject matter experts in acquisition, ESOH, geochemistry, toxicology, nanomaterial characterization, synthesis of nanomaterials, biological interactions among nanomaterials, and specialists in predictive modeling.

If you are interested in attending or presenting at the upcoming ESOH Nanomaterial Workshop please contact Mr. Scott A. Murphy, SAIC at Scott.Murphy@wpafb.af.mil or 937-255-3417



NIOSH Offers Medical Screening Guidance

In February 2009, the National Institute for Occupational Safety and Health (NIOSH) released “Current Intelligence Bulletin 60: Interim Guidance for Medical Screening and Hazard Surveillance for Workers Potentially Exposed to Engineered Nanoparticles.” The report was released based on the potential health risks workers may encounter when exposed to engineered nanoparticles. This report was established to provide employers with guidance on whether asymptomatic workers should obtain medical screenings and the specific medical tests. However, further research is needed to comprehend how engineered nanoparticles may impact a worker’s health; employers may take a proactive stance by requiring medical screenings. Other recommendations regarding protecting workers health and safety include controlling exposures to engineered nanoparticles, conducting hazard surveillances, and establishing medical surveillance approaches. For further information regarding guidance for worker medical screenings please visit NIOSH’s website at <http://www.cdc.gov/niosh/docs/2009-116/>

OECD Nanomaterial Safety Database

On 1 April 2009, the Organization for Economic Cooperation and Development (OECD) announced the launch of a global database focusing on Research into the Safety of Manufactured Nanomaterials. The project will address environmental, human health and safety issues associated with manufactured nanomaterials. Other goals in developing the database was determining major research gaps and forming international collaborations to address human health and environmental safety issues. Next, the website was designed to form a central database with completed research projects and planned research projects. The database will also house an inventory of all research programs related to the environmental, health and safety issues attributed to the manufacturing of nanomaterials.

For more information on the database please visit OECD’s website:

http://www.oecd.org/document/26/0,3343,en_2649_37015404_42464730_1_1_1_1,00.html

Database on Research into Safety of Manufactured Nanomaterials:

<http://webnet.oecd.org/NanoMaterials/Pagelet/Front/Default.aspx?>

OECD Working Party on Nanotechnology:

http://www.oecd.org/site/0,3407,en_21571361_41212117_1_1_1_1,00.html

Nano Websites:

Defense Nanotechnology Research and Development Program
<http://www.nano.gov/html/res/pdf/DefenseNano2007.pdf>.

The Virtual Journal of Nanotechnology Environment, Health and Safety
<http://icon.rice.edu/virtualjournal.cfm>

Upcoming Conferences:

4 June 2009

Nanotechnology in the Marketplace Webinar
<http://www.khlaw.com/showevent.aspx?Show=2599>

8-9 June 2009

NHSF Nanotechnology Health and Safety Forum
Seattle, Washington
<http://www.nhsf2009.org/>

14-21 August 2009

12th Annual Force Health Protection Conference
Albuquerque Convention Center
Albuquerque, New Mexico
http://www.pdhealth.mil/education/FHP_presentations.asp

Call for Articles and Information:

Submit articles or suggested topics for inclusion in future bimonthly editions to Megan Hawk, SAIC at Megan.Hawk@wpafb.af.mil or 937-255-3373.

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