Final Nanotechnology White Paper

Prepared for the U.S. Environmental Protection Agency by members of the Nanotechnology Workgroup, a group of EPA's Science Policy Council

Science Policy Council
U.S. Environmental Protection Agency
Washington, DC 20460

Nanotechnology White Paper, October 25, 2006 (PDF, xKB, x pages, About PDF)

EPA's Science Policy Council has issued the Nanotechnology White Paper (EPA/100/B-06/001, October 2006). The purpose of the White Paper is to inform EPA management of the science issues and needs associated with nanotechnology, to support related EPA program office needs, and to communicate these nanotechnology science issues to stakeholders and the public.

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modeling and manipulating matter at this scale. At the nanoscale, the physical, chemical and biological properties of materials may differ in fundamental and valuable ways from the properties of individual atoms and molecules or bulk matter. Nanotechnology presents new opportunities to improve how we measure, monitor, manage and minimize contaminants in the environment. New generations of nanomaterials will evolve and with them new and possibly unforeseen environmental issues.

The Nanotechnology White Paper provides:

- A basic description of nanotechnology,
- Information on why EPA is interested in nanotechnology,
- Potential environmental benefits of nanotechnology,
- Risk management and the EPA's statutory mandates,
- Risk assessment issues specific to nanotechnology,
- An extensive review of research needs for both environmental applications and implications of nanotechnology,
- Recommendations for addressing science issues and research needs, and includes prioritized research needs within most risk assessment topic areas (e.g., human health effects research, fate and transport research), and
- An appendix that contains a description of EPA's framework for nanotechnology research, which outlines how EPA will strategically focus its own research program to provide key information on potential environmental impacts from human or ecological exposure to nanomaterials in a manner that complements other federal, academic, and private-sector research activities.

- Collaboration with other researchers is a major focus of the paper.

The Agency is engaging in knowledge gathering through several efforts:

- Support of in-house and extramural research,
- Support of innovative technologies for detection and measurement of nanoparticles in the environment,
- Organizing scientific workshops, symposia and conferences,
- Coordinating with a variety of stakeholders—including industry, academia, NGOs, other federal agencies, and international organizations—to obtain additional information and enhance coordination and collaboration, and
- Coordinating within EPA to ensure that we ask the right questions and gather the right data to address our various statutory mandates for environmental protection.

BACKGROUND INFORMATION: In December 2004, EPA's Science Policy Council created a cross-Agency workgroup charged with describing key science issues EPA should consider to ensure that society accrues the important benefits to environmental protection that nanotechnology may offer, as well as to better understand any potential risks from exposure to nanomaterials in the environment. This paper is the product of that workgroup.

EPA released an external peer review draft in December 2005, and a Federal Register Notice (70 FR 75812) announced its availability and the opening of a docket for public comments.

External Review Draft Document, December 2, 2005
(PDF, 738KB, 134 pages, About PDF)

Independent peer reviewers commented on the document during an April 2006 expert peer review meeting (71 FR 14205), that an EPA contractor convened, organized and conducted. The external peer review meeting was publicly held, all public comments received in the docket were shared with the peer reviewers, and members of the public were also invited to give oral or provide written comments at the workshop regarding the draft document under review.

Peer Review Report for Nanotechnology External Review Draft, December 2, 2006
(PDF, 974 KB, 150 pages, About PDF)

EPA revised the draft following the peer review meeting, and all peer review and public comments were taken into consideration in finalizing the document.