President’s Message – October 2008

Dear SRA-NE Members:

Our first seminar of the year is coming up next month. The date of the seminar has been changed to Wednesday, November 19, 2008 at 3:30. The abstracts for the talks, along with the room number and directions, are provided in the following pages. As mentioned previously, the seminar will be on the topic of nanomaterials, nanotoxicology, and risk assessment, with three excellent speakers - Jo Anne Shatkin of CLF Ventures, Christopher Long of Gradient Corporation, and Joe Brain of Harvard School of Public Health.

We have not yet nailed down the date for the second seminar of the year, on the topic of the National Research Council report on improving risk analysis methods at the US EPA, but we will provide that information shortly. For those who really like to plan ahead, we are currently planning four seminars this year, along with a few other events. We hope to be able to announce the topics and speakers for all four seminars by next month.

Sticking with the nanotechnology theme, as mentioned last month, SRA-NE will be co-sponsoring a one-day short course with the North Atlantic Chapter of Society of Environmental Toxicology & Chemistry (SETAC). This will be held in Leominster, MA, on January 27, 2009. Registration is now open at www.nacsetac.org, and more detailed information is available in last month’s newsletter as well as on the website.

Yet another nanotechnology announcement – there will be a half-day educational workshop on the first day of the SRA Annual Meeting in Boston (December 7), titled “Introduction to Environmental and Health Aspects of Nanotechnology”. More information is available in the attached announcement. By the end of January, SRA-NE members should be well-versed on issues of nanotechnology!

Finally, the recurring announcements - the SRA Annual Meeting in Boston is rapidly approaching (December 7-10, 2008), and the early registration deadline is November 7. Also, if you haven’t done so already, please renew your membership to SRA-NE (at www.sra-ne.org).

Jon Levy
November 19, 2008
NOTE CHANGE OF DATE
Refreshments: 3:30 pm - 3:45 pm
Presentations: 3:45 pm – 6:30 pm

NANOMATERIALS, NANOTOXICOLOGY, AND RISK ASSESSMENT

Presentations

ADVANCING RISK ANALYSIS FOR NANOMATERIALS AND NANOTECHNOLOGIES
Jo Anne Shatkin, Ph.D., CLF Ventures

THE STATE OF THE SCIENCE ON EXPOSURE ASSESSMENT OF ENGINEERED NANOPARTICLES: CHALLENGES, PROGRESS, OPPORTUNITIES
Christopher Long, Sc.D., Gradient Corporation

RESPONSES OF THE LUNGS TO NANOMATERIALS DEPENDS ON EXPOSURE, CLEARANCE, AND MATERIAL CHARACTERISTICS
Joseph D. Brain, Sc.D., Harvard School of Public Health

Location
Harvard School of Public Health
677 Huntington Ave.
Building I, Room 1302
NOTE CHANGE OF BUILDING AND ROOM NUMBER

Please RSVP by Monday, November 10th to Jonathan Levy (jilevy@hsph.harvard.edu), so we can know the number of attendees to order refreshments and can give your information to the guard’s desk.
ABSTRACTS OF PRESENTATIONS

Jo Anne Shatkin. Advancing Risk Analysis for Nanomaterials and Nanotechnologies

The rapidly expanding development and use of materials in the nanoscale range has generated new challenges to the application of current risk analysis methods for environmental, health, and safety concerns. The unique properties of these materials potentially have significant implications for current approaches to the hazard identification, exposure assessment and dose-response components of the traditional risk assessment paradigm that informs risk management decisions, and may confound the accurate assessment of potential risks as well as require changes to the way such risks are communicated to stakeholders and managed by policymakers. This talk will identify and address several of these issues, and will discuss the findings of a recent workshop, organized by Shatkin and colleagues on behalf of the Emerging Materials and Nanomaterials Specialty group (EMNMS) of the Society for Risk Analysis: NanoRisk Analysis: Advancing the Science for Nanoscale Material Risk Management, held in September, 2008, in Washington, DC. Participants in the workshop discussed five topical white papers, each co-authored by a combination of nanotechnology and risk experts on topics of: hazard identification and uncertainty; toxicology; exposure assessment; risk characterization; and risk communication. These papers were vetted in plenary and facilitated deliberative discussion session and will be published, along with other ideas generated during the workshop, as a series of reference papers advancing the science of risk analysis for nanomaterials and nanotechnology. A panel discussion on data gaps and needs for sound decision making vetted views of representatives from international governmental authorities, industry, and non-governmental organizations.

Christopher Long. The State of the Science on Exposure Assessment of Engineered Nanoparticles: Challenges, Progress, Opportunities

With over 800 nanotechnology-based consumer products currently on the market and estimates that over 2 million workers worldwide will be employed in the nanotechnology field by the year 2015, it is well-recognized that data are urgently needed to assess potential worker and consumer exposures to engineered nanoparticles (NP). Despite this widespread recognition, there remain relatively few published exposure studies of engineered nanoparticles, a data gap that is even more glaring given the multitude of toxicity studies that have been published in recent years. I will review what we now know regarding potential exposures to nanoparticles, highlighting some of the challenges posed by nanoparticle monitoring and by key research gaps. Given that engineered nanoparticles can come in many different sizes, shapes, and chemistries, one of the major challenges involves determining the toxicologically relevant exposure metric(s) for engineered nanoparticles- i.e., should we be measuring mass, surface area, size, number, and/or something else? Although few in number and limited to certain exposure metrics and exposure conditions, available exposure studies provide some valuable insights on nanoparticle exposure potential, and my talk will also highlight some of the key study findings to date. In particular, measurements performed in both carbon nanotube and fullerene manufacturing environments show evidence of extensive agglomeration and the dominant presence of respirable-sized particles rather than nanosized particles. We can also turn to studies of other more familiar nano-sized particles, such as ambient ultrafines, for insights on NP exposure potential. Some recent progress has certainly been made towards understanding nanoparticle exposures, but there remain numerous research needs and thus tremendous opportunities for exposure assessors, toxicologists, and aerosol scientists.

How do we balance the hazards from new and inadequately characterized materials with the potential of nanotechnology? There has been a dramatic expansion in the discovery of nanomaterials and a parallel increase in the applications of these novel creations. Private companies, universities, and governments are supporting this rapid growth. How do we evaluate risk and benefit?

There are reasons for concern about nanomaterials. Most are new and untested. Concerns include:
1. Nanomaterials appear in unexpected locations in the body.
2. Nanoparticles may enter cells and organelles by nonendocytic pathways, e.g. non-membrane bound.
3. Nanomaterials may have unexpected biological consequences.
4. Nanoparticles have:
   - More particles per unit weight.
   - More surface area per unit weight.
   - A toxicity which is usually better correlated with particle number or surface area than mass.

We need to recognize different kinds of nanomaterials. I choose to broadly divide them into three classes:
1. Stable emulsions: colloidal gold, colloidal carbon (India ink).
2. Smallest particles of familiar materials: welding fume, smokes, and diesel particles. All have fractions less than 100 nm.
3. Highly engineered nanoparticles with unusual properties: fullerenes, quantum dots, drugs, carbon nanotubes.

Nanotechnology is a powerful scientific and economic force, and will bring many benefits. But, in parallel fashion, we need to evaluate the toxicity of nanomaterials and technologies. What are the rules of nanotoxicology? A promising approach will be to examine families of engineered and rigorously characterized particles and study the role of (1) size, (2) shape, and (3) surface coatings. For example, we should study the same material as we systemically vary length and diameter. Like asbestos, we anticipate that long, narrow fibers will be more toxic than short fibers of the same diameter. We can also examine families of spherical particles whose diameters vary by orders of magnitude. Finally, one could examine spherical particles with identical dimensions, but with a range of surface properties. With the explosion of nanotechnology, the field of nanotoxicology will be a fruitful one for decades to come.
**Biographical Sketches of Presenters**

**Dr. Jo Anne Shatkin** is Managing Director of CLF Ventures, a non-profit affiliate of the Conservation Law Foundation, a regional environmental advocacy organization. Dr. Shatkin is a recognized expert in strategic environmental initiatives, human health risk assessment, technical communications, and environmental aspects of nanotechnology. She leads and provides technical and strategic expertise on projects and manages the day to day operations of CLF Ventures. Her work focuses on approaches for evaluating new and emerging contaminants in the environment, particularly on assessments of chemical and microbial concerns that inform policy development. She recently developed NANO LCRA, an adaptive life cycle framework for identifying and managing the risks of nanomaterials, described in her book, *Nanotechnology Health and Environmental Risks*, published in 2008 (CRC Press). Dr Shatkin recently founded the Emerging Nanoscale Materials Specialty Group of the Society for Risk Analysis, with 130 international members from public and private organizations. A Research Fellow at the George Perkins Marsh Institute at Clark University, she received her Ph.D. in Environmental Health Science and Policy in 1994 and her MA in Risk Management and Technology Assessment, both from Clark University, Worcester, Massachusetts and possesses a Bachelor of Science degree from Worcester Polytechnic University in molecular biology.

**Dr. Christopher Long** is a Principal Scientist in Environmental Health & Air Quality with Gradient Corporation. His central interests are indoor and outdoor air quality and health risk assessment, and he has particular expertise in exposure assessment, air pollution epidemiology and toxicology, air sampling and measurement, and airborne particulate matter (PM). He has investigated exposures and health risks associated with a number of airborne PM types, such as ambient PM, diesel exhaust particulates, carbon black, asbestos, and engineered nanoparticles, as well as a variety of gaseous criteria and hazardous air pollutants. Dr. Long’s practice area includes evaluating product safety, with specific interests in airborne exposures and engineered nanoparticles. He is co-director of Gradient's Nanotechnology Risk practice and is a technical editor of Gradient’s nanotechnology newsletter “EH&S Nano News.” Dr. Long has a Sc.D. in Environmental Health from the Harvard School of Public Health and a M.S. in Environmental Engineering from MIT, and he has prepared about 30 peer-reviewed articles and presentations in the general areas of indoor and outdoor air pollution and exposure assessment.

**Dr. Joseph D. Brain** is the Cecil K. and Philip Drinker Professor of Environmental Physiology at the Harvard School of Public Health. He has two masters degrees from Harvard and received his doctoral degree there in 1966. He has been a faculty member at Harvard since 1969. Dr. Brain has published more than 200 journal articles and book chapters. He has just begun a 3 year appointment on the EPA’s Clear Air Scientific Advisory Committee (CASAC). Professor Brain’s research emphasizes the body’s responses to inhaled gases, particulates, and microbes. His studies extend from the deposition of inhaled particles to their clearance and health effects. One context of these studies is the pathogenesis and prevention of environmental and occupational lung disease. Of particular interest is characterizing the potential bioavailability and toxicity of new and complex materials such as nanoparticles and nanofibers.
GETTING TO THE EVENT


- **From the MBTA Subway (on foot)** – The school is directly across from the Brigham Circle Green Line (E) stop

- **Driving directions**
  
  *From North or South of Boston:* Take I-93 North/South to Exit 26 (Storrow Drive). Follow Storrow Drive approximately 2.5 miles to Kenmore Square/Fenway exit (on left). The exit ramp forks, stay to your right. Take right at first light into Kenmore Square. Take leftmost fork at second light onto Brookline Avenue. Follow Brookline Avenue approximately 1 mile and through a major intersection (Beth Israel Hospital will be on the left). Watch for blue and white Longwood Medical area signs. Take left on Longwood Avenue and a right onto Huntington Avenue.

  *From West of Boston:* Take I-90 to exit 18. Follow Storrow Drive eastbound to Kenmore Square/Fenway exit. Follow directions above.

- **Once you arrive at HSPH**

  *Parking:* There are a limited number of metered parking spaces available on Huntington Avenue in front of the HSPH, as well as on adjacent streets. There is also limited visitor parking, and/or parking lots.

  *Room location:* Enter through the main entrance to the Kresge Building at 677 Huntington Ave., near the Brigham Circle Green Line stop. After going past the guard’s desk, go directly down the hall in front of you to enter Building I. Turn right at the end, and take the elevator to the 13th floor. Room 1302 will be directly in front of you as you exit the elevator.
ANNOUNCEMENT

Introduction to Environmental and Health Aspects of Nanotechnology

A half day educational workshop presented by the Society for Risk Analysis.

Instructors: Jo Anne Shatkin, CLF Ventures and Bernadene Magnuson, Cantox Health Sciences International

December 7, 2008 Boston, MA, 1:30 pm – 5:30 pm.

This half day course is intended for individuals interested in an introduction to potential environmental risk concerns raised by introducing nanotechnology into society and the economy.

This course will provide participants with an overview of the emerging concerns regarding nanotechnology and nanomaterials and impacts for occupational and public health and the environment. The course introduces the topics of nanotechnology, nanotoxicology, environmental aspects of nanotechnology, and addresses ethical, legal, societal and regulatory perspectives. Through lectures and interactive sessions, participants will obtain a knowledge base for understanding the exposure, human health, and safety issues for nanomaterials and nanotechnologies and the potential impacts for workers, consumers, stakeholders, and the environment.

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. Nanotechnology is emerging in all economic sectors, including: energy, medicine, food technology, imaging, manufacturing, electronics and air and water purification. Some of the current and potential future materials and technologies have the potential for significant impacts on health and the environment. This course introduces participants to the technological basis of nanoscale phenomena, the current and potential future uses of nanotechnology, explores the breadth of issues raised for health and the environment, and implications of current research and gaps on regulatory policy and societal impacts.

At the conclusion of this course, the participants will have gained insights into (1) Key concerns regarding nanotechnology risks for employees, the public, and the environment; (2) Characteristics and properties of nanomaterials and nanotechnologies; (3) Nanotoxicology: state-of-the-science regarding the toxicity of nanomaterials and nanotechnologies; (4) Environmental aspects of nanotechnology; and (5) Risk assessment and risk management issues for nanomaterials and nanotechnologies.

Instructors

Jo Anne Shatkin, Ph.D. Managing Director, CLF Ventures, Inc. Jo Anne Shatkin is a recognized expert in environmental aspects of nanotechnology, human health risk assessment and technical communications. She recently founded and currently chairs the Emerging Nanoscale Materials Specialty (EMNMS) Group of the Society for Risk Analysis (SRA). This international network of risk professionals affords direct access to governmental, non-governmental, industrial and academic colleagues working on nanotechnology risk issues in the U.S., E.U., and Japan. Dr. Shatkin is a member of the Canadian Council of Academies expert committee on nanotechnology. Her forthcoming book, Nanotechnology: Health and Environmental Risks, will be published in 2008.
Dr. Bernadene Magnuson is a senior scientist with Cantox Health Sciences International. She has degrees in Food Science, Nutrition and Toxicology. Her research is focused on food toxicology and the role of food in cancer development. She has published over 35 peer-reviewed articles, several book chapters and numerous professional news articles. She works in collaboration with the food and supplement industries, to conduct safety evaluations of dietary supplements and food additives. Dr. Magnuson teaches courses in food science, food toxicology and cancer prevention. Dr. Magnuson is on the Editorial Board of the Journal of Food Protection, and an Associate Editor of a new journal, Food Analytical Methods. She is actively involved in nanotechnology and food safety specialty groups of both the Institute of Food Technology and the Society of Toxicology.

For more information, contact Jo Anne Shatkin (jashatkin@elf.org)

To register, sign up for Workshop WK12-PM at http://www.sra.org/events_2008_meeting.php