UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD

July 22, 2005

MEMORANDUM

SUBJECT: Formation of SAB Arsenic Review Panel

FROM: Thomas O. Miller ***/Signed/***
Designated Federal Officer, Arsenic Review Panel
EPA Science Advisory Board Staff Office (1400F)

TO: Vanessa T. Vu, Ph.D.
Director
EPA Science Advisory Board Staff Office (1400F)

THRU: Daniel Fort ***/Signed/***
Ethics and FACA Policy Officer
EPA Science Advisory Board (SAB) Staff Office (1400F)

This memorandum documents the process and steps taken in regard to the request of EPA's Office of Research and Development (ORD) to the SAB to provide independent scientific and technical advice to the EPA on the Agency's assessment of potential carcinogenic effects of inorganic and organic arsenic. This memorandum provides background information on the subject SAB activity and addresses:

1) The Charge developed for the Panel;
2) The type of panel that will be used to conduct the review, the name of the Panel, and identification of the Panel Chair, and the types of expertise needed to address the charge;
3) How individuals were identified as "Short List" candidates for the Panel;
4) Conflict of Interest and Appearance of Impartiality Considerations; and
5) How individuals were selected for the Panel.

A. Background

EPA's Office of Water (OW) has developed an assessment entitled *Toxicological Review of Inorganic Arsenic*, and EPA's Office of Pesticide Programs (OPP) has prepared a paper entitled *Science Issue Paper: Cancer Mode of Action of Cacodylic Acid (Dimethylarsinic Acid, DMA^V) and Recommendations for Dose-Response Extrapolation*. EPA's Office of Research and Development requested that the SAB consider and advise the Agency on several issues about the mode of carcinogenic action of various arsenic species and the implications of these issues on EPA's assessment of cancer

hazard and risk. More details on the EPA charge and background on this issue can be found in the Charge questions.

B. Determinations:

1) Charge to the Panel: The SAB Arsenic Review Panel is being asked to comment on several key science issues concerning the i) toxicity/metabolic profile/bioavailability for different arsenic species, ii) the Agency's understanding of the mode of action of arsenic carcinogenesis and implications of that on dose response extrapolation for DMA^V and inorganic arsenic, and iii) the implications of newer epidemiology and the 2001 National Research Council recommendations on modeling the human cancer slope factor for inorganic arsenic. The charge to the SAB is on the EPA SAB Website at http://www.epa.gov/sab/panels/arsenic_review_panel.htm.

2) Type of Panel that will be used to conduct the review, the name of the panel, and identification of the panel chair, and the types of expertise needed to address the charge: This activity will be conducted by a Science Advisory Board *Ad Hoc* Review Panel composed of members of the chartered SAB and its committees, members of the FIRRA Scientific Advisory Panel, and invited outside experts. The Panel is to be referred to as the SAB Arsenic Review Panel. Dr. Genevieve Matanoski, a member of the chartered SAB, will chair this review panel. A *Federal Register* notice was published on February 23, 2005 (widecast) requesting nominations of individuals with the following expertise, especially with respect to arsenic and arsenic compounds: human physiology and exposure, epidemiology, toxicology (including mechanisms of toxicity for cancer), metabolism, pharmacokinetics/modeling, dose-response assessment, analytical chemistry as applied to living organisms/environmental media, risk assessment, and biostatistics (see Attachment A).

3) How individuals were selected for the "Short List" posted on the SAB website as candidates for the committee: Over sixty individuals were nominated to serve on the Arsenic Review Panel. On the basis of the candidates' relevant expertise, interest in being considered for membership on the panel, and their availability the SAB Staff Office identified twenty-seven (27) nominees for the "short list" of candidates.

On June 1, 2005, the SAB Staff Office posted a notice on the SAB Website inviting public comments on the "short list" of 27 prospective candidates to serve on the Panel (see Attachment B). In particular, the notice on the Web site stated that the Staff Office would welcome any information, analysis or documentation that the SAB Staff Office should consider in evaluating the candidates on the "Short List." The notice also asked that comments be provided to the SAB Staff Office no later than June 22, 2005. *The SAB Staff Office received three submissions of public comments.* See Attachment C for the list of public commenters.

4) Identification of parties who are potentially interested in or who may be affected by the activities of the SAB Arsenic Review Panel: Parties interested in the activities of the SAB Arsenic Review Panel include all U.S. residents as they may all be potentially affected by exposure to inorganic and/or organic arsenic. Specific groups with an interest in the activities of the Arsenic Review Panel may include, but are not limited to: EPA and other Federal government agencies; state and local governments; tribal governments; municipal water systems; rural water systems; and producers and users of pesticides containing arsenic, dimethyl arsenic acid (DMA^V), or methyl arsonoic acid (MMA^V).

5) Conflict of Interest and Appearance of Impartiality Considerations

a) Conflict of Interest Issues: Whether the charge involves a Particular Matter and how Conflict of Interest regulations apply to members of the panel is considered relative to specific Federal ethics regulations and principles. For Conflict of Interest, 18 U.S.C. 208 provision states that:

> "An employee is prohibited from participating ***personally and substantially*** in an official capacity in any ***particular matter*** in which he, to his knowledge, or any person whose interests are imputed to him under this statue has a financial interest, if the particular matter will have a ***direct and predictable effect*** on that interest [emphasis added]."

For a conflict of interest to be present, all elements in the above provision must be present. If an element is missing, the issue does not involve a formal conflict of interest. However, the general provisions in the "appearance of a lack of impartiality guidelines" may still apply and need to be considered.

Personal and Substantial Participation: Participating personally means participating directly. Participating substantially refers to involvement that is of significance to the matter. [5C.F.R. 2640.103(a)(2)]. For this review, Panel members will be participating personally in the matter through attendance at meetings, teleconferences and other means.

Direct and Predictable Effect: A direct and effect on a participant's financial interest exists if. "... a close causal link exists between any decision or action to be taken in the matter and any expected effect of the matter on the financial interest...A particular matter does not have a direct effect...if the chain of causation is attenuated or is contingent upon the occurrence of events that are speculative or that are independent of, and unrelated to, the matter. A particular matter that has an effect on a financial interest only as a consequence of its effects on the general economy is not considered to have a direct effect." [5 C.F.R. 2640.103(a)(i)]. A predictable effect exists if, "...there is an actual, as opposed to a speculative, possibility that the matter will affect the financial interest." [5 C.F.R. 2640.103(a) (ii)].

Particular Matter: A "particular matter" refers to matters that "...will involve deliberation, decision, or action that is focused upon the interests of specific people, or a discrete and identifiable class of people." It does not refer to "...consideration or adoption of broad policy options directed to the interests of a large and diverse group of people." [5 C.F.R. 2640.103 (a)(1)].

For the most part, the Panel's activity qualifies as a *particular matter of general applicability* because the resulting advice will be part of a deliberation, and under certain circumstances the advice could involve the interests of a discrete and identifiable class of people but does not involve specific parties. That group of people constitutes those who are associated or involved with the potentially interested or affected parties, as identified above.

However, it should be noted that the effects of active ingredients of certain pesticides (e.g., DMA^V, and MMA^V) will be part of the Panel's work. A particular matter involving specific parties means any judicial or other proceeding, application, request for a ruling

or other determination, contract, claim, controversy, investigation, charge, accusation, arrest or other particular matter involving a specific party or parties in which the United States is a party or has a direct and substantial interest. [5 C.F.R. 2637.102(a)(7)] As such, with respect to the producers/users of the pesticides noted above, the Panel's activity qualifies as a *particular matter involving specific parties*.

b) <u>Appearance of a Lack of Impartiality Considerations</u>: The Code of Federal Regulations [5 C.F.R. 2635.502(a)] states that:

> "Where an employee knows that a ***particular matter*** involving specific parties is likely to have a ***direct and predictable effect*** on the financial interest of a member of his household, or knows that a person with whom he has a covered relationship is or represents a party to such matter, and where the person determines that the circumstances would cause a ***reasonable person*** with knowledge of the relevant facts to question his impartiality in the matter, the employee should not participate in the matter unless he has informed the agency designee of the appearance problem and received authorization from the agency designee."

Further, 5 C.F.R. 2635.502(a)(2) states that:

> "An employee who is concerned that circumstances other than those specifically described in this section would raise a question regarding his impartiality should use the process described in this section to determine whether he should or should not participate in a particular matter."

Prospective members of the Panel were evaluated against the 5 C.F.R. 2635(a)(2) general requirements for considering an appearance of a lack of impartiality. Information used in this evaluation has come from information provided by potential advisory panel members including, but not limited to, EPA Form 3110-48 confidential financial disclosure forms.

To further evaluate any potential appearance of a lack of impartiality, the following five (5) questions were posed to prospective panel members:

> - Have you had any previous involvement with EPA's human health risk assessment of inorganic arsenic and organic arsenic including authorship, collaboration with the authors, or previous peer review(or advisory role) functions? If so, please identify and describe that involvement.
>
> -- Have you served on any advisory/peer review panels or committees convened by EPA or other organizations that have addressed the topic under consideration? If so please identify those current or previous activities.
>
> - Have you made any public statements (written or oral) on related to potential human health risk on organic or inorganic arsenic form environmental exposure. If so, please identify those statements.

- Have you made any recent public statements on the above topic that would indicate to an observer that you have taken a position on the topic or issue under consideration? If so, please identify those statements.

- Is there a reason you might be unable to provide impartial advice on the matter to come before the Panel or any reason that your impartiality in the matter might be questioned?

As a result of a review of the submitted financial disclosure forms, the responses to the five questions above, public comments, and information gathered by SAB staff as well as additional information provided by prospective panel members, the Deputy Ethics Official of the Science Advisory Board, in consultation with the SAB Ethics and FACA Policy Officer, has determined that there are no conflicts of interest or appearance of a lack of impartiality issues for the members of this Panel.

c) <u>How individuals were selected for the final committee</u>: The SAB Staff Office Director, in consultation with the Panel Chair, makes the final decision about who serves on the Arsenic Review Panel during the "Panel Selection" phase. Members of the Panel were selected from the "short list" of candidates discussed above. Selection criteria included: scientific credentials and relevant expertise, willingness to serve on the panel and availability to meet during the proposed time period, absence of conflict of interest, absence of an appearance of a lack of impartiality, balance of needed expertise, and diversity of scientific viewpoints. Based on the criteria, candidates selected for membership on the SAB Arsenic Review Panel include the following experts:

1. Dr. Genevieve Matanoski, Chair, Johns Hopkins University
2. Dr. H. Vasken Aposhian, University of Arizona
3. Dr. Aaron Barchowsky, University of Pittsburgh
4. Dr. David Brusick, Covance, Retired
5. Dr. Kenneth Cantor, National Cancer Institute
6. Dr. Jack Colford, University of California, Berkeley
7. Dr. Yvonne Dragan, National Center for Toxicological Research
8. Dr. Sidney Green, Howard University
9. Dr. Sioban Harlow, University of Michigan
10. Dr. Steven Heeringa, University of Michigan
11. Dr. Claudia Hopenhayn, University of Kentucky
12. Dr. James Klaunig, Indiana University
13. Dr. X. Chris Le, University of Alberta
14. Dr. Michelle Medinsky, Consultant
15. Dr. Kenneth Portier, University of Florida
16. Dr. Barry Rosen, Wayne State University
17. Dr. Toby Rossman, New York University
18. Dr. Justin Teeguarden, Pacific Northwest National Laboratory
19. Dr. Miroslav Styblo, University of North Carolina
20. Dr. Michael Waalkes, National Cancer Institute
21. Dr. Janice Yager, Electric Power Research Institute

Concurred,

/Signed/

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Vanessa T. Vu, Ph.D.
Director
EPA Science Advisory Board Staff Office

July 22, 2005
Date

Attachments

Attachment A	Federal Register Notice-Request for Nominations (70 FR 8803)
Attachment B	Invitation for Comments on the "Short List" Candidates
Attachment C	List of Public Commenters in Response to the Notification of the Short List of Candidates for the Arsenic Review Panel

Attachment A

Federal Register / Vol. 70, No. 35 / Wednesday, February 23, 2005 / Notices

ENVIRONMENTAL PROTECTION AGENCY

[FRL–7876–3]

EPA Science Advisory Board Staff Office; Request for Nominations of Experts for the Arsenic Review Panel

AGENCY: Environmental Protection Agency (EPA).
ACTION: Notice.

SUMMARY: Requesting the nomination of experts for the Science Advisory Board (SAB) Arsenic Review Panel.
DATES: Nominations should be submitted by March 16, 2005, per instructions below.
FOR FURTHER INFORMATION CONTACT: Any member of the public wishing further information regarding this Request for Nominations may contact Ms. Vivian Turner, Designated Federal Officer (DFO), SAB Staff Office, by telephone/ voice mail at (202) 343–9697; by fax at (202) 233–0643; or via e-mail at *turner.vivian@epa.gov.* General information concerning the EPA Science Advisory Board can be found on the EPA SAB Web site at: *http:// www.epa.gov/sab.*
SUPPLEMENTARY INFORMATION:

Background: Inorganic arsenic is found naturally in the environment and it is typically present in soil and water at some determinate level. Sources of human exposure to inorganic arsenic include drinking water, diet, air and anthropogenic sources such as wood preservatives and industrial wastes. Additionally, humans are exposed to organic arsenicals when they are used as pesticides (*e.g.*, monomethylarsenic acid and dimethylarsenic acid or cacodylic acid). The EPA is currently completing its draft assessment of potential human health effects associated with arsenic compounds. EPA's Office of Research and Development (ORD) has requested the EPA Science Advisory Board (SAB) to conduct a review of this assessment.

The EPA Science Advisory Board (SAB) was established by 42 U.S.C. 4365 to provide independent scientific and technical advice, consultation, and recommendations to the EPA Administrator on the technical basis for Agency positions and regulations. The SAB and the Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel (FIFRA SAP) will establish a panel to conduct a review of the Agency's risk assessment for arsenic. The review panel will be formed from members of the Science Advisory Board, the EPA FIFRA SAP, and other experts as determined to be necessary. This panel will comply with the provisions of the Federal Advisory Committee Act (FACA) and all appropriate SAB procedural policies. Upon completion, the panel's report will be submitted to the SAB for final approval for transmittal to the EPA Administrator.

Availability of the Review Materials: The EPA draft assessment to be reviewed by the SAB Panel will be made available by the Office of Research and Development. For questions and information concerning the review materials, please contact Dr. Reeder Sams, at (919) 541–0661, or *sams.reeder@epa.gov.*

Request for Nominations: The SAB Staff Office is requesting nominations of recognized experts with one or more of the following areas of expertise, especially with respect to the potential human health effects of arsenic and arsenic compounds: human physiology and exposure; epidemiology; toxicology, including mechanisms of toxicity for cancer; metabolism; pharmacokinetics and modeling; dose-response assessment; analytical chemistry as applied to living organisms and environmental media; risk assessment; and biostatistics.

Process and Deadline for Submitting Nominations: Any interested person or organization may nominate individuals qualified in the areas of expertise described above to serve on the SAB Arsenic Review Panel. Nominations should be submitted in electronic format through the Form for Nominating Individuals to Panels of the EPA Science Advisory Board which can be accessed through a link on the blue navigational bar on the SAB

Web site at: *http://www.epa.gov/sab.* To be considered, all nominations must include the information requested on that form.

Anyone who is unable to submit nominations using this form and any questions concerning any aspects of the nomination process may contact the DFO, as indicated above in this notice. Nominations should be submitted in time to arrive no later than March 16, 2005. Any questions concerning either this process or any other aspects of this notice should be directed to the DFO. The process for forming a SAB panel is described in the Overview of the Panel Formation Process at the Environmental Protection Agency, Science Advisory Board (EPA-SAB-EC-COM-02-010), on the SAB Web site at: http://www.epa.gov/sab/pdf/ec02010.pdf.

From the nominees identified by respondents to this Federal Register notice (termed the ``Widecast''), the SAB Staff Office will develop a smaller subset (known as the ``Short List'') for more detailed consideration. The Short List will be posted on the SAB Web Site at: http://www.epa.gov/sab, and will include, for each candidate, the nominee's name and biosketch. Public comments on the Short List will be accepted for 21 calendar days. During this comment period, the public will be requested to provide information, analysis or other documentation on nominees that the SAB Staff Office should consider in evaluating candidates for the Panel.

For the SAB, a balanced panel (i.e., committee, subcommittee, or panel) is characterized by inclusion of candidates who possess the necessary domains of knowledge, the relevant scientific perspectives (which, among other factors, can be influenced by work history and affiliation), and the collective breadth of expertise and experience to adequately address the charge. Public responses to the Short List candidates will be considered in the selection of the panel, along with
information provided by candidates and information gathered by SAB Staff independently on the background of each candidate (e.g., financial disclosure information and computer searches to evaluate a nominee's prior involvement with the topic under review). Specific criteria to be used in evaluation of an individual Panel member include: (a) Scientific and/or technical expertise, knowledge, and experience (primary factors); (b) absence of financial conflicts of interest; (c) scientific credibility and impartiality; (d) availability and willingness to serve; and (e) ability to work constructively and effectively in committees.

Prospective candidates will be required to fill-out the ``Confidential Financial Disclosure Form for Special Government Employees Serving on Federal Advisory Committees at the U.S. Environmental Protection Agency'' (EPA Form 3110-48). This confidential form allows Government officials to determine whether there is a statutory conflict between that person's public responsibilities (which includes membership on an EPA Federal advisory committee) and private interests and activities, or the appearance of a lack of impartiality, as defined by Federal regulation. The form may be viewed and downloaded from the following URL address: http://www.epa.gov/sab/pdf/epaform3110-48.pdf.

Dated: February 14, 2005.
Vanessa T. Vu,
Director, EPA Science Advisory Board Staff Office.
[FR Doc. 05-3449 Filed 2-22-05; 8:45 am]
BILLING CODE 6560-50-P

Attachment B

Invitation for Comments on the "Short List" Candidates for the SAB Arsenic Review Panel

The EPA Science Advisory Board (SAB) Staff Office announced in a Federal Register Notice (Volume 70, Number 35; Pages 8803 - 8804) that it was establishing a SAB panel to conduct a review of EPA's assessment of inorganic and organic arsenic. The SAB review panel will be composed of members of the SAB, members of EPA's Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) and other outside experts. The SAB Staff Office sought public nominations of individuals with relevant expertise, especially with respect to human health effects of arsenic and arsenic compounds in the following areas: human physiology and exposure; epidemiology; toxicology, including mechanisms of toxicity for cancer; metabolism; pharmacokinetics and modeling; dose-response assessment; analytical chemistry as applied to living organisms and environmental media; risk assessment; and biostatistics. Background information concerning this review and details on the nomination process appeared in the cited notice. The notice is available on the SAB Website at www.epa.gov/sab/.

The SAB Staff Office has reviewed over 60 nominations ("wide cast" nominations) for the Arsenic Review Panel. Based on relevant qualifications, interest and availability of the nominees, the SAB Staff Office identified a "Short List" of 27 candidates. Brief biographical sketches of the experts on the "Short List" are provided below for comment. The SAB Staff Office plans to select candidates from this "Short List" to form the Arsenic Review Panel. We welcome information, analysis or documentation for the Staff Office to consider in evaluating the "Short List" candidates.

The SAB Staff Office Director, in consultation with SAB leadership, as appropriate, makes the final decision about who will serve on the panel in the "Panel Selection" phase of this process. In that phase, the SAB Staff completes its review of information regarding conflict of interest, appearance of a lack of impartiality, and appropriate balance and breadth of expertise needed to address the charge. The SAB Staff Office will review all available information gathered independently by staff, information provided by the candidates, and any information provided by the public.

Please provide any comments you may have with respect to the "Short List" candidates, no later than June 22, 2005. Written comments should be addressed to the attention of Ms. Vivian Turner at turner.vivian@epa.gov

Arsenic Review Panel

H. Vasken Aposhian

Dr. H. Vasken Aposhian received a Sc. B. in Chemistry from Brown University and an M.S. and Ph.D. from the University of Rochester. He has been a faculty member of the Department of Pharmacology, Vanderbilt University College of Medicine; Department of Microbiology, Tufts University College of Medicine, and Department of Pharmacology, University of Maryland College of Medicine. Since 1975, he has been Professor of Molecular and Cellular Biology and Professor of Pharmacology at the University of Arizona. He has extensive research experience and publications dealing with the toxicology of heavy metals, in particular arsenic and mercury. This has included enzymology of arsenic biotranformation; the study of human populations in Chile, Inner Mongolia, Romania, Mexico and rural Southwest China as to their body burden of arsenic or mercury; the human metabolism of chelating agents; and the biochemical genetics in particular gene transfer in mammalian cells. His laboratory, at present, is searching for biomarkers for autism using the latest proteomic techniques and trying to decipher the polymorphisms in the human gene for human glutathione-S-transferase-omega a crucial enzyme that reduces arsenic species.

His teaching responsibilities involve teaching human toxicology to a small class of seniors. Dr. Aposhian is a member of the Society of Toxicology; The American Society Of Biological Chemistry And Molecular Biology; and the AAAS. He has recently given invited seminars at the EPA, the Health Realties Institute, WHO/NIEHS meeting on Environmental Health of Children in Central Asia held in Amity, Kazakhstan, Grand Rounds of the Tucson Medical Center and the Canadian Chemistry Conference.

Dr. Aposhian is on the Editorial Board of the American Chemical society journal *Chemical Research in Toxicology*. He participated in the writing of the NAS/NRC monographs on *"Arsenic in Drinking Water"* and *"Toxicology Of Methyl Mercury".* He has serves on numerous NIH, EPA and FDA committees and panels. The Wallace Research Foundation (NIEHS) and the Autism Research Foundation support his research.

Aaron Barchowsky

Dr. Aaron Barchowsky is an Associate Professor in the Department of Environmental and Occupational Health in the University of Pittsburgh Graduate School Of Public Health, as well as an Associate Professor of Pharmacology in the School of Medicine. He received his B.S. in Zoology from North Carolina State University (1978) and Ph.D. in Pharmacology from Duke University (1985). After completing a toxicology fellowship at Duke University, he joined the faculty in Clinical Pharmacology at Thomas Jefferson University (1988-1991) and then the Department of Pharmacology and Toxicology at Dartmouth Medical School (1991-2003). At Dartmouth, he was Project Leader for research on the cardiovascular effects of arsenic in the Dartmouth NIEHS funded Superfund Basic Research Program on Toxic Metals (1995-2005). He is currently the Director of the University of Pittsburgh Center for the Environmental Basis of Human Disease and the Pittsburgh Environmental Health Sciences Program. Dr. Barchowsky has served on numerous national review committees, including special emphasis panels for SCORs in lung fibrosis, the Alcohol and Toxicology I study section (1999-2003), and is a standing member of the Vascular Cell and Molecular Biology study section (2003-2007). He served on the National Academy of Science Committee on the Framework for Evaluating the Safety of Dietary Supplements; Chromium Picolinate I Working Group, (2002-2003). He is an external advisor for the University of Montana Center for Environmental Health Sciences (2003-2007).

He is an active member of the Society of Toxicology, the Society for Free Radical Biology and Medicine, the American Physiological Society, and the American Society for Investigative Pathology. He is an associate editor of *Cardiovascular Toxicology* and the *Journal of Cellular Physiology*. Dr. Barchowsky has maintained an active NIH-funded research program investigating the cellular and molecular effects of oxidants or metals in the regulation of genes involved in injury and repair in the cardiovascular and pulmonary systems. Current research focuses on the mechanisms for environmental arsenic-induced blood vessel remodeling to explain the etiology of arsenic-induced vascular diseases (NIEHS SBRP). Dr. Barchowsky is the Principal Investigator on an NIEHS-funded grant (2001-2006) entitled "Regulation of transcriptional competence by chromium" and is the Principal Investigator on a pending NIEHS SBRP application to fund the Pittsburgh Environmental Health Sciences Program. He has over 60 publications related to pharmacology and toxicology and was recently awarded the "Best Paper of the Year (2004) in *Toxicological Sciences"* by the Society of Toxicology for *in vivo* studies of the angiogenic and tumorigenic effects of arsenic.

David Brusick

Dr. David Brusick was the Director for Global Toxicology at Covance Corporation through 2002. He is currently Vice President for Resource Management at Covance. During his tenure at Covance, Dr. Brusick established and managed the Genetic Toxicology business unit before moving into regulatory toxicology. Dr. Brusick was an Assistant Professor on the staff of Howard University Medical School and has been an adjunct staff member at George Washington University in Washington, D.C. since 1980. Dr. Brusick was a member of several National Academy of Science Toxicology Subcommittees. He was the Chairman of a subcommittee on DNA Adducts and served on toxicology committees investigating the carcinogenicity and mutagenicity of diesel exhaust. Dr. Brusick was a member of the NIH Toxicology Study Section from 1993-1996. He has also served as a consultant to many private companies in the area of genetic toxicology. Dr. Brusick has more than 100 publications in peer-reviewed scientific journals, a number of book chapters covering various areas of genetic toxicology, edited a book on Genetic Risk Assessment sponsored by UNEP and has published a book “Principles of Genetic Toxicology”. Dr. Brusick received a Ph.D. in Microbial Genetics from Illinois State University in 1970. He held a NAS/NRC postdoctoral fellowship from 1971-1972. He served as President of the Environmental Mutagen Society from 1978-1979 and was Chairman of the International Commission for Protection against Environmental Mutagens and Carcinogens (ICPEMC) from 1990 – 1994. He served on the Board of Directors of the Academy of Toxicological Sciences from 1990 – 2000.

Kenneth Cantor

Dr. Kenneth Cantor is a Senior Investigator in the Occupational and Environmental Epidemiology Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute (NCI). He holds a Ph.D. in Biophysics (U.Calif., Berkeley, 1969) and an M.P.H. (Harvard School of Public Health, 1973). Since 1981, Dr. Cantor has conducted a program at NCI of research into the relation between exposure to occupational and environmental factors and risk of cancer. He has published several papers on the relation between pesticide exposure and risk of cancer, especially hematopoietic malignancies. In recent years, his primary research focus has been carcinogens in drinking water, in particular, disinfection byproducts, arsenic, and nitrate. He has published over 150 original research and review articles on these and related topics.

Dr. Cantor has served on numerous scientific advisory and oversight committees related to evaluation of contaminants in drinking water and has been active with many professional organizations and journals involved with environmental and occupational epidemiology. He has been a contributing member of several National Research Council Committees and Subcommittees concerned with water-related health issues. Among these Committees are: Water Supply Review Committee (1978-1981); Complex Mixtures Committee (1985-1987); Subcommittee on Arsenic in Drinking Water (1997-1999); Subcommittee to Update the NRC Report on Arsenic in Drinking Water (2001); Committee on Research Priorities for Earth Science and Public Health (2004-present). He has consulted for international organizations, including the Pan American Health Organization, Health Canada, and the International Agency for Research on Cancer (IARC). Among the Federal advisory boards on which he as served are: Fluoride Risk Work Group, Public Health Service (1990-1991); Subcommittee on Drinking Water & Health, Public Health Service (1995-1997), and the Camp Lejeune Expert Panel, ATSDR/CDC (2005). He was a member of the Science Advisory Board for the Santa Ana River Water Quality and Health Scientific Advisory Board from 1996 to 2004, and has served on advisory groups of other local water and health authorities. Dr. Cantor has held elective office on the Boards of the Society for Occupational and Environmental Health (1988-1990) and the International Society for Environmental Epidemiology 1998-2000. He is an Associate Editor for the *American Journal of Epidemiology* and frequently serves as a peer reviewer for this and numerous other scientific journals.

Dr. Cantor's current research is directed toward improving our understanding of the effects of chronic exposure to drinking water contaminants, and the influence of genetic factors in modulating those effects. Dr. Cantor was one of the first to develop methods to estimate historical exposure to disinfection byproducts in drinking water for use in epidemiologic studies. Currently, he directs the environmental exposure group for a large case-control study of bladder cancer in northern New England, where relatively low-level exposures to arsenic and disinfection byproducts in drinking water are of special interest. In collaboration with CDC, he recently conducted a clinical study of the effects of showering on levels of trihalomethanes in blood, with special focus on genetic and metabolic factors that may modulate internal exposures to these compounds. Dr. Cantor's research activities are supported through intramural funding at the National Cancer Institute.

John Colford

Dr. Jack Colford is an Associate Professor of Epidemiology at the University of California, Berkeley, School of Public Health. He is a graduate of the Johns Hopkins School of Medicine (MD 1985) and the UC Berkeley School of Public Health (Ph.D., Epidemiology, 1996). He completed a residency in Internal Medicine and a fellowship in Infectious Diseases at the University of California, San Francisco. He was Chief Medical Resident at Stanford University Hospital. He is board-certified in both Internal Medicine and Infectious Diseases and is also an Attending Physician at the San Francisco Veterans Administration Medical Center Infectious Disease Clinic. Dr. Colford is the sole instructor in semester-long courses in advanced epidemiologic methods, intervention trial design, and meta-analysis and has received several teaching awards. He has taught for many years as a visiting professor each summer at the University of Michigan (meta-analysis) and the University of Zurich, Switzerland (epidemiologic methods).

Dr. Colford authored more than 40 peer-reviewed scientific publications, including numerous peer-reviewed articles on the health effects of waterborne diseases. He is the Principal Investigator of four triple-blinded, randomized controlled trials of drinking water and health effects funded by the National Institutes of Health, the Centers for Disease Control, and the Environmental Protection Agency, and the University of California. These have included large trials in the United States as well as a drinking water study in 22 villages now underway in Bolivia. He was the Principal Investigator of the Mission Bay Epidemiology study of the health effects of recreational water exposure, funded by the California Regional Water Quality Control Board. He was asked by an NRC committee to review all health evidence of associations between recreational water indicators and health outcomes.

Dr. Colford recently returned to UC Berkeley after a one year sabbatical at the World Health Organization (Water, Sanitation, and Health Division) in Geneva, Switzerland where he collaborated with the World Bank in a published monograph and peer-reviewed manuscript evaluating the effectiveness of drinking water treatments throughout the world.

Kenny Crump

Dr. Kenny Crump, a principal at Environ International Corporation, is a mathematician who specializes in the assessment of human risk from exposure to toxic chemicals. Dr. Crump received a B.S. degree in Electrical Engineering from Louisiana Tech University, an M.A. in mathematics from the University of Denver, and a Ph.D. in mathematics from Montana State University. Dr. Crump has specialized in development of quantitative methodology for risk assessment, including the "linearized multistage model" used in cancer risk assessment and "benchmark method" for use with non-cancer outcomes. He has applied these and other methods to many different types of chemical exposures. He is an author of over 100 research articles on these and other subjects that have appeared in the scientific peer-reviewed literature.

Dr. Crump is a Fellow of the American Statistical Association and of the Society for Risk Analysis. Among his awards are the Distinguished Achievement Medal, Section on Statistics and the Environment, American Statistical Association, and the Society for Risk Analysis Distinguished Achievement Award. He has served on the science advisory boards of the U.S. Environmental Protection Agency, the Mickey Leland National Urban Air Toxics Research Center, the National Center for Toxicological Research, and the National Institute of Environmental Health Sciences. He has also served on committees of the National Academies of Science, on advisory panels of the Royal Society of Canada, the Province of Ontario and the State of California, and as an advisor to the Food and Agriculture Organization of the United Nations/World Health Organization (FAO/WHO) Joint Expert Committee on Food Additives (JECFA).

Dr. Crump is presently participating in a project involving dose-response modeling of arsenic funded by the Electric Power Research Institute in cooperation with the U.S. Environmental Protection Agency. He is also involved in dose-response modeling of methylene chloride, which is funded by the U.S. Environmental Protection Agency.

William Cullen

Dr. William Cullen is an Emeritus Professor of Chemistry at the University of British Columbia, Vancouver BC, Canada, and an Adjunct Professor of Chemistry and Chemical Engineering at the Royal Military College of Canada, Kingston ON, Canada. Dr. Cullen received his BSc and MSc (First Class Honors in physical chemistry) from the University of New Zealand, and his PhD in inorganic chemistry from Cambridge University, UK. He has been appointed visiting professor at a number of institutions including the Universities of Bristol and Sussex, UK; UK; the Universities of Adelaide and Western Australia; the Australian National University, and the University of Otago, NZ.

Dr. Cullen has been actively involved in research for fifty years and has published about 400 peer reviewed papers most of which have been concerned with various aspects of the chemistry of arsenic. He is internationally recognized as an expert on the chemistry, biochemistry, and microbiology of this element. Some recent studies include: arsenic species and their bioavailability in environmental samples from the marine and terrestrial environment; the possible connection between arsenic compounds and sudden infant death syndrome; the genotoxicity of methylarsenic species; arsenic species in the urine of arsenic-exposed populations; the quantitative measurement of the ArsC gene in environmental samples as a measure of arsenic mobility; the uptake of the pesticide MSMA by woodpeckers and other birds. His research is currently funded by two Canadian Networks of Centers of Excellence: Metals in the Human Environment, and the Canadian Water Network. Dr. Cullen is a Fellow of the Royal Society of Canada. He was awarded a Rockefeller Foundation Residency in Bellagio, Italy in 2002; a Killam research Prize (UBC) in 1994, and a Killam Senior Fellowship (UBC) in 1989.

Dr. Cullen is a Member of the American Chemical Society and is currently Vice-Chair of the Environment Division of the Chemical Society of Canada. He was an Associate Editor of the Journal of Applied Organometallic Chemistry for many years. He was a member of the US NRC Committee on Arsenic in Drinking Water whose deliberations are summarized in “Arsenic in Drinking Water” NRC, National Academy Press 1999. Dr. Cullen is a consultant to the Canadian International Development Agency on the provision of “arsenic-free” water to the people of Bangladesh (this has so far involved three visits to Bangladesh). He is an advisor the Canadian Department of Indian and Northern Affairs on cleaning up the abandoned gold mine sites in Yellowknife and the safe disposal of the 260,000 tons of arsenic trioxide stored underground. Other agencies who have consulted Dr. Cullen on arsenic related issues include: the Canadian Department of National Defense; the Canadian Department of the Environment, the Ontario Ministry of the Environment; US NIEHS; US EPA; NATO; and many private companies in Canada and the USA.

Yvonne Dragan

Dr. Yvonne P. Dragan is currently Director of the Division of Systems Toxicology (DST) and Chief of the Center for Hepatotoxicology at the Food and Drug Administration's (FDA) National Center for Toxicological Research (NCTR) located on the campus of the Jefferson Laboratories of the FDA in
Jefferson, Arkansas. The DST was established in September 2004 to provide an integrated and iterative assessment of the toxicity of agents based on the holistic analysis of OMICs (genomics, transcriptomic, proteomic and metabolomic) analyses and classic toxicology endpoints. The Division is currently applying an integrated, state-of-the-art OMICs platform (consisting of microarray, nuclear magnetic resonance (NMR)- and mass spectrometry (MS)-based metabolomic and proteomic signatures) in order to perform analyses of compounds-of-interest to the FDA and to provide the
technical expertise to the Agency in genomic, proteomic and metabolomic interpretation and guidance. Dr. Dragan is recipient of the 2005 FDA Leveraging/Collaboration Award for developing collaborative relationships within the FDA and beyond to industry to harness the potential of technology in advancing the understanding and assessment of genomic data submissions.
In addition, Dr. Dragan serves an Adjunct Associate Professor for the University of Arkansas for Medical Sciences' Interdisciplinary Toxicology (INTOX) Program.

Dr. Dragan received her B.A. in Biology from Smith College in Northhampton, Massachusetts (1981) and her Ph.D. in Pharmacology and Toxicology from the Medical College of Virginia, Richmond, Virginia (1988). Prior to establishing a liver toxicology laboratory at NCTR (2001), Dr. Dragan was on the faculty at the Ohio State University, College of Medicine and Public Health, School of Public Health (1998-2001); and a research scientist at the McArdle Laboratory for Cancer Research, University of Wisconsin (1991-1998). From 1988-1991, she held a Postdoctoral Fellowship in Chemical Carcinogenesis at the McArdle Laboratory for Cancer Research, University of Wisconsin. Dr. Dragan is a member of the Society of Toxicology (SOT), American Association for Cancer Research, Society of Toxicologic Pathology, American Society for Pharmacology and Experimental Therapeutics and the American Association for the

Study of Liver Disease. She is an elected member of the SOT Council (2004-2005) and has served as President, Vice-President, Vice-President Elect and Secretary-Treasurer for the SOT Carcinogenesis Specialty Section (1994-2001). Dr. Dragan has served on numerous committees to include FDA's Interdisciplinary Pharmacogenomic Review Group and the Environmental Protection Agency's (EPA) Environmental Carcinogenesis Division Site-Visit Team (1998; 2004), Draft Cancer Risk Guidelines, Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel (2003) and the Scientific Advisory Board on Drinking Water (1998-2001); the International Life Sciences Institute (ILSI) Panels on Chloroform (1996-1997), Fumonisin (1999-2000), and Workshop on Mode of Action in Rodent Liver Tumors for Human Cancer Risk Assessment (2004); and the National Toxicology Program Board of Scientific Counselors (2000-2001). Dr. Dragan has published more than 65 manuscripts and 12 book chapters.

Floyd Frost

Dr. Floyd Frost is a senior scientist with the Lovelace Respiratory Research Institute in Albuquerque, New Mexico. He obtained both a Ph.D. in epidemiology and a M.S. in biostatistics from the University of Washington. Has worked as an epidemiologist with the Washington State Department of Health for 13 years and recently been instrumental in establishing a consortium of western state health departments to conduct environmental exposure assessment and outcomes studies.

He has several major research interests. One focus is microbial contamination of drinking water and immune responses to low levels of pathogens in drinking water. The studies suggest that non-waterborne modes of *Cryptosporidium* transmission are more important than commonly believed. However, waterborne transmission appears to be responsible to immunizing the exposed population. Therefore, complete elimination of waterborne exposure to low-doses of oocysts may increase the risk of diarrheal and gastrointestinal illnesses from non-waterborne routes of transmission. He recently published a paper that found similar protective effects of prior exposure for immuno-suppressed individuals suffering from HIV infection. A second focus is assessing the health effects of low-dose arsenic exposures and evaluating the risks and benefits of various intervention programs to reduce waterborne arsenic exposure. As with many large environmental engineering interventions that change the characteristics of our food and water, inadequate attention has been given to unintended consequences of eliminating all or most arsenic exposure. Studies are needed to accurately estimate the benefits of the intervention as well as identify and characterize unintended health consequences. In the case of arsenic these unintended outcomes include injuries and deaths from transporting treatment water treatment chemicals, the added cardiovascular disease risks from eliminating minerals in drinking water and the economic trade-offs needed for the poor to pay for the mandated treatment changes. A third area of focus is evaluating the cost and safety of commonly used pharmaceuticals. Dr. Frost is currently designing studies to evaluate the safety of medications used to treat attention deficit disorder. A prior study of epilepsy demonstrated that the actual costs of health care for a chronic disease are higher than prior studies estimated. This occurs because a disease such as epilepsy changes the delivery of health care for a wide range of conditions unrelated to epilepsy. Other studies he conducted found similar finding for chronic obstructive pulmonary disease. His previous research has been funded by: the Washington State Department of Health, the Environment Protection Agency, the Centers for Disease Control and Prevention, the National Institutes of Health, the American Water Works Association Research Foundation and a number of U.S. and foreign drinking water utilities. He has also conducted studies for industry to assess the safety and/or efficacy of their products. He has served on advisory committees for the U.S. Environmental Protection Agency, state public health agencies, the American Water Works Association Research Foundation and industry groups.

Herman Gibb

Dr. Herman Gibb is Vice President and Senior Epidemiologist at Sciences International, Inc., a health risk consulting company in Alexandria, Va. He is an Adjunct Professor in Environmental and Occupational Health at the George Washington University School of Public Health in Washington, DC. Dr. Gibb received a BS from the Pennsylvania State University in 1970. He received an MPH in Environmental Health from the University of Pittsburgh Graduate School of Public Health in 1974 and a PhD in Epidemiology from the Johns Hopkins University School of Hygiene and Public Health in 1989. Since joining Sciences International in January 2004, Dr. Gibb has served as an expert consultant to several major projects including an assessment of the health effects of mining waste in the Philippines, development of a Framework for Metals Health Risk Assessment for EPA, mercury exposure and potential health effects in Ukraine, and expert witness for OSHA on the proposed Permissible Exposure Limit for chromium. Prior to joining Sciences, Dr. Gibb held positions at the U.S. EPA's National Center for Environmental Assessment (NCEA) as Assistant Center Director, Acting Associate Director for Health, and Senior Science Advisor. He is well known for his work on the risk assessment of metals, in particular arsenic, nickel, and chromium, and is lead author of a significant epidemiologic study on chromium. He was the Agency's lead author on its Mercury Research Plan. Dr. Gibb chaired a PAHO advisory group to a study conducted in Santiago, Chile, on health effects from acute exposure to copper. He was a member of White House Interagency Groups on various risk assessment topics, World Health Organization and International Program on Chemical Safety working groups, and risk assessment working groups at the International Life Sciences Institute. He has been an invited speaker at many international scientific meetings including keynote speaker at international meetings on arsenic. He is the author of numerous EPA risk assessment documents, journal articles, and book chapters including numerous articles on arsenic. Dr. Gibb is a co-author of recent publications on the assessment of inhalation exposures and potential health risks from the collapse of the World Trade Center Towers and on a quantitative assessment of the carcinogenic risk of hexavalent chromium. He is a recipient of EPA's Gold Medal for his risk assessment work on arsenic and of EPA's Scientific and Technological Achievement Award for his epidemiology study of chromium production workers.

Dr. Gibb currently serves on the U.S. Presidential Advisory Board to the Ana G. Mendez University System, San Juan, Puerto Rico, where he is Chairman of the Research Subcommittee, the International Scientific Committee of the International Symposium on Metal Ions in Biology and Medicine, and the International Tissue and Tumor Repository for Chronic Arseniasis Steering Committee at the Armed Forces Institute of Pathology, Washington, D.C. He is a member of the International Society for Environmental Epidemiology and the Society for Risk Analysis. Dr. Gibb's recent sources of contract support are OSHA; EPA; Merck Research Laboratories; NIEHS; the Engine Manufacturers Association; the Alliance of Automobile Manufacturers; LeClair Ryan; McGuire Woods LLP; Government of the Philippines; Paul Hastings, Janofsky, and Walker; the International Program on Chemical Safety; Sidley Austin Brown and Wood; and the Civilian Research and Development Foundation.

Sidney Green

Dr. Sidney Green is an Associate Professor of Pharmacology at the Howard University College of Medicine in Washington, D.C. He received his Ph.D. from Howard University in Pharmacology in 1972. He has held previous positions at Covance Laboratories, Inc, Vienna, VA as Director of Toxicology, the Food and Drug Administration as Director Division of Toxicological Research, Associate Director for Laboratory Investigations, Chief Whole Animal Toxicology Branch, and Chief Genetic Toxicology Branch. He has also served as Chief of the Toxic Effects Branch in the former Office of Toxic Substances at the EPA. He has over seventy publications primarily in genetic toxicology, short-term test methodology and policy issues associated with alternatives to toxicological animal tests. He also has expertise in systemic toxicology related to food additives and contaminants. He has received the FDA Commissioner's Special Citation, two Group Recognition Awards and twice received the FDA Award of Merit once as a group award and singularly. It is the highest honor the agency can bestow on employees. He has served on numerous National Academy of Sciences review committees and currently is a member of the Committee on Toxicology. He is a past President of the American College of Toxicology, a Fellow of the Academy of Toxicological Sciences and a member of its Board of Directors, a member of the Society of Toxicology, Environmental Mutagen Society, Society for In Vitro Biology, Organization of Black Scientists and the Association of Government Toxicologists. He is a past Chairman of the Membership Committee and of the Council of the Society of Toxicology. He is on the editorial boards of the Journal of Applied Toxicology, Human and Ecological Risk Assessment, Human and Experimental Toxicology and the Journal of Toxicology-Cutaneous & Ocular Toxicology. He is currently a member of EPA's Science Advisory Board.

Sioban Harlow

Dr. Sioban Harlow, B.A., (Health Arts and Sciences), University of California, Berkeley; Ph.D., (Epidemiology), Johns Hopkins School of Hygiene and Public Health, is Professor of Epidemiology, Department of Epidemiology, School of Public Health, University of Michigan, Associate Director of the International Institute, and Director of the Advanced Studies Center at the University of Michigan. She is a member of the Scientific and Technical Advisory Group of the Reproductive and Health Research Division of the World Health Organization. Previously she served on the Committee on the Use of Third Party Toxicity Research for Human Research Participants for the Science, Technology and Law Program of the National Academy of Sciences. She has served on numerous grant review panels for NIEHS, NIOSH, NICHD, NSF and the Workplace Safety and Insurance Board of Ontario. Her research focuses on reproductive, perinatal and occupational epidemiology in developing countries. In collaboration with El Colegio de Sonora, she co-founded the Programa de Formación de Investigadores en Salud Reproductiva to foster the development of human resources in reproductive health research in the US-border region of Mexico with support from the Fogarty International Center, under whose auspices she recently hosted the International Workshop on Environmental Health in Latin America: Developing a Gender Perspective. Dr. Harlow's professional memberships include Phi Beta Kappa, Delta Omega, North American Menopause Society and the Society for Epidemiologic Research.

Steve Heeringa

Dr. Steven G. Heeringa is a Research Scientist and the Director of the Statistical Design Group at the University of Michigan Institute for Social Research (ISR) where he oversees statistical design and for population-based studies in the social sciences, education, demography, public health and medicine. Dr. Heeringa has a Ph.D. in Biostatistics from the University of Michigan and is a specialist in statistical design and analysis for studies of human and animal populations. He has over twenty-five years of statistical sampling experience directing the development of the ISR National Sample design as well as sample designs for ISR's major longitudinal and cross-sectional survey programs. During this period he has been actively involved in research and publication on statistical methods and procedures such as weighting, variance estimation and the imputation of missing data that are required in the analysis of sample survey data. He is an advisor to panels of the National Institutes of Health (NIH) and the World Health Organization (WHO). Since 2000, he has served as an ad hoc member of more than 10 EPA FIFRA Scientific Review panels and is currently a member of the EPA's FIFRA SAP. He has been a teacher of survey sampling methods to U.S. and international students and has served as a sample design consultant to a wide variety of international research programs based in countries such as: Russia, the Ukraine, Uzbekistan, Kazakhstan, India, Nepal, China, Iran, Chile and Egypt.

Claudia Hopenhayn

Dr. Claudia Hopenhayn is an associate professor in the Department of Epidemiology, College of Public Health, at the University of Kentucky. She holds a degree in Spanish-English Translation from the Universidad del Salvador, Buenos Aires, Argentina (1979), and from the University of California, Berkeley she obtained a B.A. in Physical Education (1986), an MPH in epidemiology/biostatistics (1989) and a PhD in Epidemiology (1996). Her general areas of expertise include environmental/occupational epidemiology, particularly cancer and reproductive outcomes, and cancer surveillance and control epidemiology. From a more specific and relevant viewpoint, Dr. Hopenhayn's research work on arsenic-related health studies has spanned over 15 years, ranging from studies of cancer to reproductive outcomes to methylation studies, including both descriptive and analytic investigations, across various populations in several countries. As a result, Dr. Hopenhayn has authored and co-authored numerous arsenic publications as well as being invited as a guest speaker to many national and international presentations, and served as peer reviewer for many submitted articles on arsenic work.

Dr. Hopenhayn served as consultant in a short term appointment for the World Health Organization to evaluate an arsenic project in Inner Mongolia, China (2000) and as member of an advisory task group on Arsenic and Arsenic Compounds for the International Program on Chemical Safety, WHO (1999-2000), which resulted in an Arsenic Environmental Health Criteria Document (2001). She also served as expert consultant for the National Academy of Sciences for their 2001 Review of Arsenic in Drinking Water. In addition, Dr. Hopenhayn has served in two EPA/SAB FIFRA panels, one on the evaluation of certain arsenic compounds used primarily on treated wood (CCA) (2001), and another one on atrazine (2003). She currently serves as a member of the external review committee to the University of Arizona's Superfund research program, and as a member of the Institute of Medicine's Committee on Veterans and Agent Orange. Dr. Hopenhayn most recent funding sources include the EPA, CDC and ACS.

James Klaunig

Dr. James E. Klaunig is Professor of Toxicology and Director of Toxicology in the Department of Pharmacology and Toxicology at Indiana University School of Medicine. He also serves as the Program Director of the Molecular Carcinogenesis Program for the Indiana University Cancer center. He received his BS degree from Ursinus College in Collegeville, Pa. and his PhD from the University of Maryland in Baltimore, Md. He is a Fellow of the Academy of Toxicological Sciences and serves on its Board of Directors. He has received numerous awards including the Otis R. Bowen, Distinguished Leadership Award, Indiana University School of Medicine, the Indiana University Trustee Teaching Excellence Award, the Kenneth P. DuBois Award from the Midwest Society of Toxicology and the Sagamore of the Wabash from the Governor of Indiana for service to the State. He has served as an Associate Editor of Toxicological Sciences and is currently the Editor in Chief of Toxicologic Pathology.

He has served as a member of the NIH/NIEHS National Toxicology Program Board of Scientific Counselors and is currently a member USEPA Science Advisory Board. He also has served as President of the Carcinogenesis Specialty Section, President of the Ohio Valley Society of Toxicology (SOT), member and Chair of the SOT Education Committee, a Member of the Finance and Program Committees of the Society of Toxicology and was recently the Treasurer and a member of the Executive Council of the Society of Toxicology. He also served the State of Indiana as the Director of Toxicology and the State Toxicologist from 1991 to 2003 as well as service on the Indiana Pesticide Review Board, the Governor's Council on Impaired and dangerous driving and on the Indiana Controlled Substances Advisory Board. He has trained over 50 graduate students and postdoctoral fellows. He has over 170 peer reviewed manuscripts in toxicology, carcinogenesis and risk assessment. His research interests are dedicated to understanding the mechanisms of chemically induced carcinogenesis specifically the mode of action of nongenotoxic carcinogens, role of oxidative stress in carcinogenesis and cell injury, and understanding of the multistage nature of the cancer process.

Michael Kosnett

Dr. Michael Kosnett is a medical toxicologist with a clinical and research interest in the toxicology of arsenic and other heavy metals. Dr. Kosnett received his B.S. degree in Molecular Biophysics & Biochemistry from Yale University in 1979, his M.D. degree from the University of California, San Francisco in 1983, and his M.P.H. degree in Environmental Health Sciences from the University of California, Berkeley, in 1988. Dr. Kosnett is a Diplomate of the American Board of Internal Medicine, the American Board of Medical Toxicology, and the American Board of Preventive Medicine (Occupational Medicine). He is an Associate Clinical Professor in the Division of Clinical Pharmacology and Toxicology at the University of Colorado Health Sciences Center, and an Attending Physician at the Rocky Mountain Poison and Drug Center. Dr. Kosnett is the immediate Past-President of the American College of Medical Toxicology, the national organization of physicians specializing in the field of medical toxicology. He has served on the Subcommittee on Arsenic in Drinking Water of the National Research Council (1999 and 2001 reports), and has been a Temporary Advisor to the World Health Organization regarding human arsenic exposure from drinking water in India and SE Asia. He has participated in clinical research in Chile investigating the health effects of chronic arsenic consumption in drinking water. He is a past member of the Committee on Toxicology of the National Research Council, and of the US EPA FIFRA Scientific Advisory Panel on Copper-Chromated-Arsenic Treated Wood. He has served as an advisor to the State of Michigan regarding the health risks of arsenic in drinking water, and serves as technical advisor to a community group regarding a Superfund site impacted by arsenic and lead in residential soil.

Joseph Landolph

Dr. Joseph R. Landolph, Jr., Ph. D., is currently Associate Professor of Molecular Microbiology and Immunology and Pathology, and a Member of the USC/Norris Comprehensive Cancer Center, in the Keck School of Medicine, and Associate Professor of Molecular Pharmacology and Toxicology, in the School of Pharmacy, with tenure, at the University of Southern California (USC) in Los Angeles, California. Dr. Landolph received a B. S. degree in Chemistry from Drexel University in 1971, and a Ph. D. in Chemistry from the University of California at Berkeley in 1976 under the guidance of the late Professor Melvin Calvin. At UC Berkeley, he studied the metabolism of the chemical carcinogen, benzo(a)pyrene, and the molecular mechanisms of its ability to induce cytotoxicity to cultured mouse liver epithelial cells and morphological transformation in Balb/c3T3 mouse fibroblasts for his Ph. D. thesis. Dr. Landolph received training in Nuclear, Chemical, and Biological Warfare Protection at Ft. Sam Houston, San Antonio, Texas, in the U. S. Army in 1976 as a First Lieutenant in the U. S. Army Reserve. Dr. Landolph performed postdoctoral study in chemically induced morphological and neoplastic cell transformation and mutagenesis at the USC/Norris Comprehensive Cancer Center at the University of Southern California under Professor Charles Heidleberger, from 1977-1980. Dr. Landolph was appointed Assistant Professor of Pathology in l980, and Associate Professor of Microbiology, Pathology, and Toxicology at USC in 1987. Dr. Landolph has served as a grant reviewer for the US EPA Health Effects Research Panel, for special RFAs for the NIEHS, and as an ad hoc member of the Chemical Pathology Study Section and the Al-Tox-4 Study Section of the NIH. Dr. Landolph is also a member of the Carcinogen Identification Committee reporting to the Scientific Advisory Committee of the Office of Environmental Health Hazard Assessment of the California Environmental Protection Agency from l994-Present, and a member of the Scientific Review Panel for Toxic Air Contaminants of the California Environmental Protection Agency. He is the recipient of numerous awards, including the Merck Award in Chemistry from Drexel University in 1971, a competitive American Cancer Society Postdoctoral Fellowship from 1977-1979, the Edmundson Teaching Award in the Dept. of Pathology at USC in 1985, and a Traveling Lectureship Award from the U. S. Society of Toxicology in 1990.

Dr. Landolph's research interests and activities include studies of the genetic toxicology and molecular mechanisms of the cell transformation-inducing ability of carcinogenic insoluble, nickel compounds, carcinogenic chromium compounds, carcinogenic arsenic compounds, and carcinogenic polycyclic aromatic hydrocarbons. His laboratory now studies the ability of these carcinogens to induce morphological and neoplastic transformation of C3H/10T1/2 mouse embryo cells and the cell and molecular biology of the transformation process. His laboratory is currently studying the ability of carcinogenic nickel compounds to induce activation of expression of oncogenes and inactivation of expression of tumor suppressor genes in cells transformed by insoluble carcinogenic nickel compounds, such as nickel subsulfide, crystalline nickel monosulfide, and green (high temperature) and black (low temperature) nickel oxides. His laboratory is also studying the molecular biology of hexavalent chromium ion-induced morphological and neoplastic cell transformation. Dr. Landolph is an expert in chemically induced morphological and neoplastic transformation and chemically induced mutation in murine and human fibroblasts. He is author/co-author of of 52 scientific publications, is a co-editor of a textbook on Molecular Carcinogenesis (in Press), and has held peer-reviewed grant support from the U.S. EPA, the U. S. National Cancer Institute, the U. S. National Institute of Environmental Health Sciences, and the Nickel Producers Environmental Research Association. He currently holds a contract from the Nickel Producers Environmental Research Association from 8/01/04 – 6/31/06.

X. Chris Le

Dr. Chris Le is Professor and Canada Research Chair in Environmental Health Sciences and Bio-Analytical Technology. He is also Adjunct Professor of Chemistry and Adjunct Professor of Laboratory Medicine and Pathology, University of Alberta. He received his Ph.D. in Environmental/Analytical Chemistry from the University of British Columbia (Canada) in 1993 and carried out postdoctoral research at the University of Alberta (Canada) in 1994. He was recruited to the Department of Public Health Sciences in the Faculty of Medicine in 1995, and was promoted through the ranks to Full Professor in 2002.

Dr. Le has served on the joint Environmental Protection Agency (EPA) and American Water Works Association Research Foundation (AWWARF) Technical Representatives Committee on arsenic in drinking water (2000) and an EPA panel on Early Indicators of Environmental Diseases (2005). He was invited to contribute to a National Research Council report on "Arsenic in Drinking Water" (1999). He has served on the Science Advisory Committee on Ambient Air Quality (Alberta Environment), the Science Advisory Committee on Alberta Fish Advisory Program (Alberta Health and Wellness), and the Arsenic Research Group (Alberta Health and Wellness, Government of Alberta, Canada). Dr. Le has served as an overseas expert on the grant review panel of the National Natural Sciences Foundation of China for four years (2001-2005). He has also reviewed grants as a panel member or an external reviewer for 15 national and international funding agencies. He serves on the editorial board of four journals.

Dr. Le has received several research awards, including the E.W.R. Steacie Fellowship from the Natural Sciences and Engineering Research Council of Canada, the Martha Cook Piper Research Prize from the University of Alberta, an elected Fellowship in the Chemical Institute of Canada, and the W.A.E. McBryde Medal from the Canadian Society for Chemistry. He is also honored to be Guest Professor at Beijing University and the Chinese Academy of Sciences.

Dr. Le's research on arsenic covers a wide range of topics, including analytical techniques for arsenic speciation analysis, assessment of human exposure to arsenic species, biomarkers, metabolism of arsenic species, and arsenic health effects. His team has developed several analytical techniques for the speciation analysis of trace levels of arsenic compounds in water, food, urine, blood, and cell samples. These techniques have enabled researchers to study arsenic metabolism, toxicity, and health effects. He collaborates with researchers at EPA and National Cancer Institute on several epidemiological studies conducted in the United States and in Inner Mongolia. He also collaborates with several toxicologists and biochemists in the US to study arsenic toxicity. One of his current research projects investigates the mechanisms of arsenic carcinogenesis. A main focus is to study the effects of arsenic species on the repair of DNA damage induced by other environmental carcinogens.

Dr. Le's research program has been supported by grants from American Water Works Association Research Foundation, Canada Research Chairs Program, US EPA, NCI (USA), National Cancer Institute of Canada, National Institutes of Health, and Natural Sciences and Engineering Research Council of Canada. Two national research networks, the Canadian Water Network of Centers of Excellence and the Metals in the Human Environment Research Network also support his research on arsenic.

Genevieve Matanoski, Chair

Dr. Genevieve Matanoski is a professor of epidemiology at the Johns Hopkins University Bloomberg School of Public Health in Baltimore, Maryland. For a time after medical school she pursued a career in pediatrics and general preventive medicine. After earning a doctor of public health degree, she was appointed to the faculty of Johns Hopkins University and has been a professor since 1976. In addition to teaching and research, Dr. Matanoski has held appointments in a number of teaching and training programs in the United States and abroad and is a frequent advisor to legislative and policy making groups. She is a member of several scientific advisory bodies both for governmental agencies and for industry. She is a member of the EPA Science Advisory Board (SAB) and has served as past Chair of the SAB. During her tenure on the EPA SAB, Dr. Matanoski was involved in the writing of several documents produced by the SAB to provide advice to EPA including the Beyond the Horizon: Using Foresight to Protect the Environmental Future and Toward Integrated Environmental Decision-making.

She is the author or co-author of more than 80 publications. Dr. Matanoski's work has focused on the epidemiology of cancer, including bladder, lung, skin and uterine cancers, and leukemia. Her research studies have examined the risks associated with occupational and environmental exposures to such agents as radiation, electromagnetic fields, and chemical substances such as styrene, butadiene, arsenic and environmental tobacco smoke. Recent research has emphasized reproductive effects and congenital malformations from environmental exposures. Her early work involved infectious diseases and illnesses in infants and children. Dr. Matanoski received a B.A. degree in chemistry at Radcliffe College and an M.D. at the Johns Hopkins School of Medicine and a doctor of public health degree from the Johns Hopkins University School of Hygiene and Public Health.

Michelle Medinsky

Dr. Michele A. Medinsky is currently a toxicological consultant to clients in the private and public sectors. She received a Ph.D. degree in biology from the University of New Mexico in 1980. Her dissertation research on the "Metabolic Fate of Inhaled Selenious Acid and Elemental Selenium Aerosols" was conducted at the Inhalation Toxicology Research Institute (ITRI) in Albuquerque, NM. Following a 2-year postdoctoral fellowship at the Chemical Industry Institute of Toxicology (CIIT) in Research Triangle Park, NC, she was employed from 1982 to 1989 as a toxicologist at ITRI. Her research involved assessment of the toxicity of inhaled gases and vapors, investigation of biochemical mechanisms of toxicity of inhaled materials, disposition of xenobiotics after various routes of administration including inhalation, and the development of physiologically based pharmacokinetic models. From 1989 to 1998 she was a scientist in the Chemical Carcinogenesis Program at CIIT. Her research at CIIT continued to focus on the toxicity of inhaled materials and the application of physiological dosimetry models toward understanding the mechanisms of action of volatile organic chemicals. She is the author or co-author of 90 peer-reviewed publications and 38 book chapters and proceedings.

Dr. Medinsky has been a Diplomate of the American Board of Toxicology since 1983, and was most recently recertified in 2004. She is a member of the Society of Toxicology (SOT), where she was elected to the Education Committee, appointed to the Public Communications Committee and Tox90's Education Task Force and elected President of the Inhalation Specialty Section. She has served on the editorial boards of a number of toxicology journals including Toxicology, Fundamental and Applied Toxicology, Journal of Toxicology and Environmental Health, Environmental Health Perspectives, Toxicology and Applied Pharmacology, and Research Communications in Toxicology. She has served on several advisory boards, including Toxicology Study Section of the National Institutes of Health, the Committee on Toxicology of the National Research Council, the U.S. Environmental Protection Agency (EPA), Science Advisory Board, the National Toxicology Program Board of Scientific Counselors Subcommittee on the Report on Carcinogens and the Subcommittee on Technical Reports, the North Carolina Association for Biomedical Research, and as an ad hoc member of the FIFRA Science Advisory Panel of the EPA.

Kenneth Portier

Dr. Kenneth M. Portier is Associate Professor of Statistics and Agricultural Experiment Station Statistician in the Institute of Food and Agricultural Sciences at the University of Florida (UF). A native of south Louisiana, Dr. Portier received a B.S. in mathematics (1973) from Nicholls State University (Thibodaux, La), then moved to the University of North Carolina where he earned a M.S. in Statistics (1975) and a Ph.D. in Biostatistics (1979). Since early 1979, he has worked at UF, primarily as a statistical consultant to researchers in agriculture, natural resources and the environment and as a teacher of statistical methods to graduate students in associated disciplines.

Widely sought after for graduate committees, Dr. Portier has coauthored publications in many of the premier journals in agriculture, natural resources and environmental sciences. He has twice participated in USDA HEP funded teaching grants, one related to the development of web-based materials for teaching natural resources sampling and more recently for the development of a senior undergraduate course in forested watersheds. In collaboration with other researchers at UF, Dr. Portier is Co-Principal Investigator on research grants from NSF, USDA, NOAA and DOI. He collaborates with UF's Center for Environmental and Human Toxicology primarily answering statistical question that arise in environmental sampling and risk assessments. In recent years, he has been a regular member of US EPA and National Toxicology Program science advisory panels reviewing human and ecological risks from agriculture-related chemicals and practices. His research interests are in applied statistics, biostatistics, statistical computing and the teaching of statistics.

Barry Rosen

Dr. Barry P. Rosen is Professor and Chairman of the Department of Biochemistry and Molecular Biology at Wayne State University School of Medicine. He has been chair for 18 years, before which he was Professor in the Department of Biological Chemistry at the University of Maryland School of Medicine for 15 years. He received his B.S. degree (1965) from Trinity College, Hartford, CT, M.S. (1968) and Ph.D. (1969) from the University of Connecticut. He was an NIH fellow at Cornell University from 1969-1971.

Dr. Rosen's honors include Basil O'Connor Awardee, March of Dimes, 1974-1976; Maryland Distinguished Young Scientist Award, 1979; Josiah Macy, Jr. Faculty Scholar, 1980-1981; Honorary Professor, 1991, Academia Sinica, Institute of Zoology, Beijing, China; Distinguished Faculty Fellow, Wayne State University, 1997; Outstanding Graduate Mentor Award, Wayne State University; 1999; Wayne State University Academy of Scholars, 2000. Dr. Rosen is a member of the editorial boards of the Journal of Biological Chemistry, Biometals, Drug Resistance Updates. He was formerly on the editorial board of the Journal of Bacteriology and Microbiological Reviews. He has served as a member of grant advisory committees for NIH, NSF, American Heart Association, Canadian Foundation for Innovation, and the Veterans Administration. He has organized numerous international meetings, including chairing a 2004 Gordon Research Conference. He has authored 230 papers, reviews and chapters. Dr. Rosen is a sought-after speaker and, over the last two decades has given more than 200 presentations at universities, national and international symposia around the world.

Dr. Rosen's research accomplishments span four decades. His laboratory focuses on the mechanisms of gene regulation, transport and detoxification of toxic metals, including arsenic, antimony, copper, cadmium and lead. He has elucidated the pathways for arsenic detoxification in prokaryotes and eukaryotes, including the first identification of the pathway of arsenic uptake in human cells such as those in the blood-brain barrier. He identified the transporter that takes up the arsenical drug Trisenox that is used to treat leukemia. He has genetically engineered both plants and microorganisms for arsenic bioremediation of soil and water (patent pending). He has cloned, expressed and characterized many enzymes and proteins of arsenic metabolism, including arsenic reductases, methylases and transcription factors, and has determined the three-dimensional structure of several.

Dr. Rosen is currently funded by four active NIH grants, two from the National Institute of General Medical Sciences on arsenic biochemistry and transport, a third from the National Institute of Allergy and Infectious Diseases on heavy metal regulation of gene expression, and a fourth from the National Institute of Environmental Health Sciences on genetic/epigenetic susceptibility to superfund chemicals.

Toby Rossman

Dr. Toby G. Rossman holds the rank of tenured Professor of Environmental Medicine at New York University School of Medicine (NYUSOM) and Director of the Molecular Toxicology and Carcinogenesis Research Core of the NYU/NIEHS Center. Dr. Rossman did her undergraduate work (Biology major/Chemistry minor) at Washington Square College (NYU), started graduate studies in Biochemistry at Brandeis University and completed a Ph.D. degree in Microbiology (1968) from NYUSOM. Following a postdoctoral in Pathology at NYUSOM, and a position as Associate Research Scientist at the Nelson Institute of Environmental Medicine, she was appointed Assistant Professor of Environmental Medicine in 1974, and subsequently promoted to Associate Professor (1978) and Full Professor (1985). Dr. Rossman has received almost continuous funding for her research for 30 years, mainly from the NIH, but also from USEPA and small amounts from non-federal sources (e.g. March of Dimes).

She has published over 110 articles, mostly on metal carcinogenesis and toxicology, with an emphasis on arsenic. She was first to report on the comutagenicity of arsenic and later developed the only animal model of arsenic-induced skin cancer. Dr. Rossman has served on the Chemical Pathology Study Section (NIH), the National Toxicology Program (NTP) Study Section to review proposals for contracts, the American Cancer Society Study Section (Genetics), twice on the Environmental Health Sciences Review Committee (NIEHS), on NIH Small Business Grants (Genetics) study section, and on the Metabolic Pathology Study Section (NIH). She is on the editorial boards of *Environmental and Molecular Mutagenesis* and *Mutation Research*, and previously of *Molecular Toxicology* and *Teratogenesis, Carcinogenesis and Mutagenesis*, and is a reviewer for many other journals as well as Federal documents.

Dr. Rossman is an active member of the Environmental Mutagen Society (EMS), Society of Toxicology (SOT), and American Association for Cancer Research (AACR), and has served on many committees and as a councilor of the EMS and Metals Specialty Section of SOT. She participated in the Workshop “Environmental Restoration: Significant Basic Research Needs”, U.S. Department of Energy, 1990 and the International Agency for Research in Cancer (IARC) review of the carcinogenicity of metals, Lyon, France, 1993 and again in 2004. Dr. Rossman organized and chaired the session on mechanisms of carcinogenesis at the NIH/EPA meeting “Arsenic: Health Effects, Mechanisms of Action, and Research Issues,” Baltimore, Sept. 22-24, 1997. She was co-organizer (with Max Costa) of the First, Second, and Third International Meetings on Molecular Mechanisms of Metal Toxicity and Carcinogenicity. In 2003, Dr. Rossman edited a Special Issue of Mutation Research devoted to Metals and Carcinogenesis. She is currently on the Program committees for the 9th Symposium of Metals in Biology and Medicine to be held in Lisbon in 2006 (where she is organizing the session on Arsenic) and the 9th International Conference on Environmental Mutagens to be held in San Francisco in September, 2005, and is organizing a Symposium on metal transport for the 45th Annual SOT meeting to be held in San Diego in March, 2006.

Miroslav Styblo

Dr. Miroslav Stýblo is a Research Associate Professor in the Department of Nutrition, School of Public Health, University of North Carolina (UNC) at Chapel Hill. He received his Graduation Diploma in biochemistry from the Kharkov State University, Ukraine (USSR), in 1980 and his CSc. (an equivalent of Ph.D.) degree in biochemistry from the Czechoslovak Academy of Sciences in 1988. In addition to his primary appointment in the Department of Nutrition, Dr. Stýblo is also a Faculty member in the Curriculum in Toxicology, in the Center for Environmental Medicine, Asthma, and Lung Biology, and in the Center for Environmental Health and Susceptibility of UNC Chapel Hill.
Dr. Stýblo's professional background is in the area of metallobiochemistry, nutritional biochemistry, and molecular toxicology of metals and metalloids. In recent years, his work has focused primarily on metabolism of arsenic and on molecular mechanisms underlying toxicity and adverse health effects associted with environmnetal and occupational exposures to arsenic. He was a member of the US EPA Scientific Advisory Panel for the Federal Insecticide, Fungicide, and Rodenticide Act that evaluated health risks associated with exposure to chromated-copper-arsenate (CCA) treated wood in 2001 and 2003. He was also a member of several special emphasis and review panels for the National Institute of Environmental Health Sciences. Dr. Stýblo's other professional interests include metabolic interactions between micronutrients and environmental pollutants; the role of antioxidants in responses to the oxidative stress induced by exposure to environmental toxins, by viral infections or nutritional deficiencies, and the role of metabolism in modulation of therapeutic effects of metal-based anticancer drugs, especially arsenic trioxide. He has authored or co-authored 59 papers, 46 of which were published in peer-reviewed journals.

Dr. Stýblo's research has been funded by grants from the US EPA/STAR program and from the National Institutes of Health/NIEHS, and by a research contract from the European Commission. The general topics of these grants include: arsenic-induced oxidative stress and oxidative stress-sensitive transcription factors in human cells, molecular mechanisms of diabetogenic effects of chronic arsenic exposure, enzymology of arsenic methylation in human liver, and the role of genetic polymorphism in the inter-individual variation in arsenic metabolism in humans.

Justin Teeguarden

Dr. Justin Teeguarden is a Senior Research Scientist at the Pacific Northwest National Laboratory in Richland, WA., where his interest is in the fundamental biology underlying dose-response relationships by developing models of signaling networks involved in important human environmental diseases. He received his Ph.D. in 1999 from the University of Wisconsin, Madison in Toxicology where he studied multistage carcinogenesis. From 1999 -2004, he was Senior Associate/Toxicologist at K.S. Crump Group and Environ International where he developed physiologically based (PBPK) and compartmental pharmacokinetic models for a variety of compounds including the metal manganese. Most of these models were used to evaluate the relationship between external exposure, target tissue dose and response in support of risk assessment activities. His approach is that quantitative models of dose-response that characterize the underlying physiological and biochemical processes are more sound, more flexible platforms for conducting interspecies, dose and dose-route extrapolations.

Dr. Teeguarden has served as a vice president and president elect for the Dose Response Specialty Group (DRSG) of the Society of Risk Analysis, has received several poster and best manuscript awards from the Society of Toxicology and the Society of Risk Analysis for work advancing the risk sciences. He has also served as a member of the EPA's STAR grant review panel (Computational Toxicology). Dr. Teeguarden's current research involves developing an integrated systems biology directed research program in particulate matter on respiratory health, but continues to consult both for the U.S. EPA and private companies on developing and applying PBPK models and other dosimetry approaches supporting risk assessments.

Michael Waalkes

Dr. Michael P. Waalkes is a research toxicologist with the National Cancer Institute (NCI). Dr. Waalkes received his Ph.D. in 1981 in Pharmacology and Toxicology from West Virginia University. His thesis involved the study of the perinatal toxicology of cadmium. He was a Postdoctoral Fellow at University of Kansas School of Medicine, Department of Pharmacology, Toxicology and Therapeutics from 1981 to 1983 to where his studies focused on the cellular and molecular mechanisms of acquired tolerance to metal toxicity. In 1983 he joined the National Cancer Institute, where he is now Chief of the Inorganic Carcinogenesis Section which is part of the Laboratory of Comparative Carcinogenesis. From 1983 to 1996 he was located at the Frederick Cancer Research Center in Frederick, Maryland. In 1996 he and his section were detailed to Research Triangle Park to become NCI at the National Institute of Environmental Health Sciences (NIEHS) where he currently is stationed. His current research involves defining the mechanisms of action of the carcinogenic inorganics, including arsenic, lead and cadmium. Dr. Waalkes received the Society of Toxicology Achievement Award for Outstanding Contributions to the Science of Toxicology by an Individual 41 Years of Age or Younger in 1990.

In 2000, he received the National Institutes of Health Merit Award for exemplary service as a member of the NIEHS, National Toxicology Program (NTP) Committee for the Report on Carcinogens. From 1989 to 1996 he served as Professor of Toxicology, within the University of Maryland, Environmental Toxicology Program. He was part of the External Advisory Board of the Southwest Environmental Health Sciences Center, University of Arizona from 1992 to 2000. In 2000 he was appointed as Editor of *Toxicology and Applied Pharmacology*, a leading journal in mechanistic toxicology, and serves on the Editorial Boards of *Toxicology, Journal of Toxicology and Environmental Health*, and *Toxicology Mechanisms and Methods*. He has served on various review committees including those involving the International Agency for Research on Cancer, the National Science Foundation, various study sections, and the NTP Report on Carcinogens. He is an active member of the Society of Toxicology and has served on the Program Committee, the Board of Publications, the Committee on Public Communications, the Education Committee, as Metals Specialty Section President and as the North Carolina Regional Section President. He has chaired numerous symposia and continuing education courses involving metals toxicology as the SOT annual meetings. Dr. Waalkes is author or co-author of over 250 peer-reviewed publications and book chapters.

Janice Yager

Dr. Janice W. Yager is Research Program Manager, Occupational Health Research and Senior Research Manager, Air Quality and Health Research in the Environment Division of the Electric Power Research Institute (EPRI), a private non-profit research institute located in Palo Alto, California. She received a B.S. degree in Biomedical Sciences from the University of Wisconsin, Madison, and an M.P.H. and Ph.D. in Environmental Health Sciences from the University of California at Berkeley. Prior to joining EPRI in 1990, Dr. Yager served as Research Toxicologist in the Department of Environmental Health Sciences, School of Public Health, University of California, Berkeley where she conducted research on development and application of biomarkers for exposure assessment and early reversible effects in the human population focusing principally on novel cytogenetic methods.

Dr. Yager is certified by the American Society of Clinical Pathology in Clinical Laboratory Sciences and licensed in the state of California. She served as a Visiting Scientist *via* a competitive one-year award from the Fogarty International Center of NIH to the Academy of Finland. There she continued work in biomarker research at the Institute of Occupational Health in Helsinki, Finland. Her current research interests are in the areas of toxicology, exposure assessment, and risk assessment, with particular interest in arsenic. She has served as an invited member on state and national scientific advisory committees including those for US EPA, NIH, NIOSH, ATSDR, and ACGIH. Dr. Yager also served as a member of the External Program Peer Review committee for arsenic research: Carcinogenesis Section, U.S. Environmental Protection Agency – NHEERL, and is currently a member of the NRC-NAS Committee on Assessing Human Health Risks of TCE and the Biological Exposure Indices Committee of the American Conference of Governmental Industrial Hygienists. Currently, Dr. Yager develops, manages, and provides scientific oversight for research programs and projects. Results of research funded by EPRI including that on arsenic toxicology, pharmaco-kinetics, and mechanisms of action are regularly published in the peer-reviewed literature. She has served as president and member of the executive committee of the Genetic and Environmental Toxicology Association, and on the Board of Councilors of the Environmental Mutagen Society and is a member of a number of additional scientific societies. Dr. Yager is author or co-author of more than 50 publications in peer-reviewed journals, proceedings and book chapters.

Attachment C

List of Public Commenters in Response to the Notification of the Short List of Candidates for the Arsenic Review Panel

1. Lynn L. Bergeson, Bergeson & Campbell, P.C., Washington, DC for the MAA Research Task Force Three.

2. Jim Hale, Wood Preservative Science Council

3. Mike Keegan, National Rural Water Association