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SAB Science Integration for Decision Making Fact Finding Interviews
EPA Office of Research and Development National Homeland Security Research Center (NHSRC) and National Risk Management Laboratory (NRML), Cincinnati Ohio
November 30, 2009

Schedule for November 30, 2009
SAB Science Integration for Decision Making Fact Finding Meetings

10:30 a.m. - 12:30 p.m.	Meeting with Director and Staff, ORD Homeland Security Research Center
1:15 p.m. - 2:15 p.m.	Meeting with Director and Management Team, ORD National Risk Management Laboratory
2:15 p.m. - 2:45	Meeting with Scientist, ORD National Risk Management Laboratory
2:45 p.m. - 3:15	Meeting with Scientist, ORD National Risk Management Laboratory

Logistics for Visit

SAB Members meet at 9:15 a.m. in the Coffee Shop of the Kingsgate Marriott Conference Hotel (151 Goodman Avenue) for a brief coordination meeting and then proceed to the Andrew W. Breidenbach Environmental Research Center go through security screening. We will then contact the NHRSRC receptionist Loretta Ward (513-569-7104) to escort us to the NHSRC Conference Room NG 31.

A parking space has been reserved for Dr. Sayler in the Research Center lot. Building security will provide a pass for parking for the day.

After the morning meetings, we will have a quick lunch in the cafeteria and proceed to the NRML conference room, 235

SAB Science Integration for Decision Making Fact-Finding Meeting
Meeting with the Acting Director and Staff, Office of Research and Development National Homeland Security Research Center (NHSRC)
Andrew W. Breidenbach Environmental Research Center. Cincinnati, Ohio, Room NG31
Call-in Number for SAB subgroup: 866-299-3188, access code 343-9981 and press the # sign.
November 30, 2009, 10:30 a.m. - 12:30 p.m. a.m.

Draft Agenda

Purpose of Interview: to help SAB Committee members learn about the National Homeland Security Research Center 's current and recent experience with science integration supporting EPA decision making so that the SAB can develop advice to support and/or strengthen Agency science integration efforts.

1. Introductions facilitated by the SAB Staff Office
2. Discussion facilitated by SAB Members
   - Practices for integrating science to support decision making
   - Consideration of public, stakeholder, external scientific, and other input in science assessment
   - Drivers and impediments to implementing past recommendations for science integration
   - Ways program receives feedback on how science is used in decision-making
   - Workforce to support science integration for decision making
3. Identification of any follow-up actions

Planned participants

EPA Office of Research and Development, National Homeland Security Research Center
Dr. Cynthia Sonich-Mullin, Acting Center Director
Mr. Jonathan Hermann, Center Director (on Special Assignment)
Dr. Gregory Sayles, Acting Deputy Director for Management
Ms. Kim Fox, Division Director, Water Infrastructure Management Division
Dr. Tonya Nichols, Acting Division Director, Threat and Consequence Assessment Division
Dr. Hiba Ernst, Acting Division Director, Decontamination & Consequence Mangement Division
Dr. Shawn Ryan, Associate Division Director, Decontamination & Consequence Mangement Division
Ms. Kathy nickel, GPRA Coordinator, Immediate Office, NRSRC
Dr. Kevin Garrahan, acting National Program Director, Threat and Consequence Assessment Division

SAB Committee on Science Integration Committee Members
Dr. Gary Sayler, University of Tennessee
Dr. Thomas Theis, University of Illinois at Chicago
Dr. Jill Lipoti , New Jersey Department of Environmental Protection(by telephone)
Dr. Thomas Burke, Johns Hopkins University (by telephone)
Dr. John Giesy, University of Saskatchewan (by telephone)

SAB Staff Office
Dr. Anthony Maciorowski, Deputy Director
Dr. Angela Nugent, Designated Federal Officer

Available Biosketches for NHSRC Interviewees

Names of Participants for SAB Meeting
National Homeland Security Research Center
November 30, 2009

Cynthia Sonich-Mullin	Acting Center Director
Jonathan Herrmann	Center Director (on Special Assignment)
Gregory Sayles	Acting Deputy Director for Management
Kim Fox	Division Director, Water Infrastructure Management Division
Tonya Nichols	Acting Division Director, Threat and Consequence Assessment Division
Hiba Ernst	Acting Division Director, Decontamination & Consequence Management Division
Shawn Ryan	Associate Division Director, Decontamination & Consequence Management Division
Kathy Nickel	GPRA Coordinator, Immediate Office, NHSRC
Kevin Garrahan	Acting NPD, TCAD, NHSRC

Jonathan G. Herrmann, P.E., BCEE
Director
National Homeland Security Research Center
U. S. Environmental Protection Agency
Cincinnati, OH 45268

Biographical Summary

Jonathan Herrmann has been with the U. S. Environmental Protection Agency (EPA) since 1975. He began his career working in the Agency's Region VIII Office in Denver, Colorado. He joined the EPA's Office of Research and Development (ORD) in 1978 and except for a brief time in the private sector in the early 1980's, Mr. Herrmann has been with ORD in Cincinnati, OH. Jon holds a Bachelor's Degree in Civil Engineering and a Master's Degree in Business Administration. He is a Registered Professional in Engineering in the State of Ohio and is a member of the American Society of Civil Engineers, the American Academy of Environmental Engineers, and the American Water Works Association.

Mr. Herrmann's career has spanned many areas of research and development. He has worked in mined land reclamation, Superfund site remediation, land disposal of hazardous and household wastes, pollution prevention, and environmental technology testing and evaluation. In the mid- to late-1990's, Jon was a strategic planner for the National Risk Management Research Laboratory and lead the development of ORD's Pollution Prevention Research Strategy and Mercury Research Strategy.

Jon joined the National Homeland Security Research Center (NHSRC) in September 2002 as the Water Security Team Leader. He and a group of scientists and engineers developed the Water Security Research and Technical Support Action Plan. The Plan involves close collaboration with the Agency's Office of Water (OW). Most recently, Jon served as the Acting Deputy Director for Management in NHSRC. As such, he was responsible for overseeing day-to-day research program execution including quality assurance and peer review, information security, funding and human capital, and product clearance.

Cynthia Sonich-Mullin, M. En.
Acting Director
National Homeland Security Research Center
Office of Research and Development
U.S. Environmental Protection Agency

Cynthia Sonich-Mullin is the **Acting Director** of the National Homeland Security Research Center, U.S. Environmental Protection Agency. She has served in a number of senior leadership positions within the Center including **Assistant Center Director for Research Coordination** and the **Acting Deputy Director for Management**. Her position of record is the Director, Threat and Consequence Assessment Division. Her research focuses on the application of risk assessment approaches to enable rapid decisions following the accidental or intentional release of CBRN contaminants into the environment.

As the **Acting Director**, NHSRC, Ms Sonich-Mullin leads the organization to ensure that ORD's research and development program fulfills the Agency's homeland security mission. The Center conducts research for the protection of water infrastructure, decontamination and disposal of contaminated materials, risk assessment and analytical methods development for contaminants of concern and technology testing and evaluation. This research is conducted in close cooperation with internal Agency partners and stakeholders in other federal organizations and the private sector. As the **Assistant Center Director for Research Coordination**, Cindy has been responsible for ensuring that the research conducted by the Center is responsive to the needs of NHSRC's primary partners and customers (Office of Solid Waste and Emergency Response, Office of Water, Office of Homeland Security). In this regard, Cindy is working closely with the senior leadership of the Agency's program and regional offices to ensure that the research conducted is coordinated, effectively and efficiently utilizes funds, and that communication of results and outcomes are timely and effective.

Cindy began her career at EPA working as an environmental health scientist conducting epidemiological studies related to water contamination and has published in this area.
She worked (and published) for many years in the ORD risk assessment research program to develop the Agency's risk assessment methodologies as well as the development of a number of chemical-specific assessments and criteria in support of Agency standards and decision-making activities. In 1993, Cindy was seconded to the International Programme on Chemical Safety (IPCS), World Health Organization, to globally harmonize approaches to the assessment of risk from exposure to chemicals. In the late-1990's she was a strategic planner for the National Center for Environmental Assessment and lead the development of ORD's Human Health Research Strategy.

Cindy joined the National Homeland Security Research Center (NHSRC) in March 2003 as the Rapid Risk Assessment Team Leader and with a group of scientists and engineers developed the Threat and Risk Assessment Program in support of the Agency's homeland security needs.

Ms Sonich-Mullin holds a Master of Environmental Sciences degree specializing in Applied Biology/Zoology, from the Institute of Environmental Sciences, Miami University, Oxford, Ohio. She has also completed doctoral course work in Epidemiology and Biostatistics at the University of Cincinnati College of Medicine, Cincinnati, Ohio.

GREGORY D. SAYLES
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National Homeland Security Research Center
Cincinnati, OH 45268
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EDUCATION

1990	Ph.D.	North Carolina State University	Chemical Engineering
1986	M.S.	University of California, Davis	Chemical Engineering
1983	B.S.	California Institute of Technology	Chemical Engineering

EXPERIENCE

2009-Present	*Deputy Center Director for Management (Acting)* U.S. EPA National Homeland Security Research Center, Cincinnati OH
2007-Present	*Associate Director* U.S. EPA National Homeland Security Research Center, Cincinnati OH
2005-2007	*National Program Director, Drinking Water (Acting)* U.S. EPA Office f Research and Development, Washington, DC
2002-2007	*Assistant Laboratory Director* U.S. EPA National Risk Management Research Laboratory, Cincinnati OH
1990-2002	*Research Chemical Engineer* U.S. EPA National Risk Management Research Laboratory, Cincinnati OH
1995-2002	*Associate and Assistant Adjunct Professor* University of Cincinnati, Dept. of Civil and Environmental Engineering
1989-1990	*Postdoctoral Research Associate* Duke University, Center for Biochemical Engineering, Durham, NC

RESEARCH PROGRAM LEADERSHIP HIGHLIGHTS

Associate Director, National Homeland Security Research Program

- Led successful review of the Homeland Security Research Program by the BOSC
- Led the development of the first Multi-Year Plan for Homeland Security research
- Wrote research budget justifications for EPA and OMB.
- Supported development of innovative measures of performance
- Presented strategic research directions to the ORD Executive and Science Councils, SAB, BOSC and ORD Regional Science Liaisons

Acting National Program Director, Drinking Water Research

- Successfully led 2005 Performance Assessment Rating Tool (PART) process including effectively negotiating with OMB on long term goals and annual measures
- Effectively led preparation, presentation and response the 2005 BOSC Program Review
- Presented briefings to the Assistant Administrator for ORD, SAB, BOSC, ORD Executive Council, and ORD Science Council.
- Began process to improve communications with our clients including starting the ORD-OW seminar series, initiating a client satisfaction survey, and beginning to develop a client-oriented web page.

Assistant Laboratory Director for Drinking Water and Pesticides/Toxics

- Co-authored Endocrine Disrupting Chemicals (EDCs), Safe Communities, and Safe Food MYPs
- Helped prepare and participated in the 2004 PART and BOSC Program Review for the EDCs Research Program
- Co-authored ORD's Research Plan for Endocrine Disruptors
- Designed the risk management portion of the EDCs research program

Co-Chair, Remediation Technologies Development Forum Bioremediation Consortium

- Helped develop a CRADA between EPA, Air Force, DOE, and six industrial partners to facilitate the development of in-situ bioremediation technologies
- Co-chaired the executive committee that planned and implemented a 5-yr, $10 million research program

AWARDS

U.S. EPA Bronze Medals

- 2007. For outstanding leadership in collaborating with other agencies and experts to develop and implement innovative new performance and efficiency measurement models and approaches (ORD Performance Rating Tool Development and Implementation Team)
- 2005. For participation on the organizing committee of the scientific program for the endocrine disruptors research program review.
- 1996. For leadership in constructing the Government/Industry research partnership, the Remediation Technology Development Forum Bioremediation Consortium.

U.S. EPA Scientific and Technological Achievement Awards

- **2000 Level III Award** for the paper, "Land Treatment of PAH-Contaminated Soil: Performance Measured by Chemical and Toxicity Assays," *Environ. Sci. Technol.*, **33**, 4310-4317, 1999, by **G.D. Sayles**, C.M. Acheson, M.J. Kupferle, Y. Shan, Q. Zhou, L. Chang and J.R. Meier.
- **1998 Honorary Mention** for the paper, "DDT, DDD, and DDE Dechlorination by Zero-Valent Iron." *Environ. Sci. Technol.*, **31**, 3448-3454 (1997), by **G.D. Sayles**, G. You, M. Wang, M.J. Kupferle.

Vice President's National Performance Review "Hammer" Award. For contributions to the Western Governors Association Interstate Technology and Regulatory Cooperation (ITRC) Workgroup, 1997.

American Chemical Society's Certificate of Merit for "Outstanding Material Content and Manner of Presentation". For the presentation, "A Simple, Effective and Low-Cost Extraction Methods for Environmental Soil Analysis," ACS 212th National Meeting, Orlando, FL, Aug. 1996.

MOST RECENT JOURNAL PUBLICATIONS (total >30)

Qi, S., C. Alonso, M.T. Suidan and **G.D. Sayles** (2006) "PCB Volatilization from Sediments," *J. Enviorn. Engin.*, **132(1)**, 102-111.

Pfiffner, S.M, Palumbo, A.V., **Sayles, G.D.**, Gannon, D., (2004) "Microbial Population and Degradation Activity Changes Monitored During a Chlorinated Solvent Biovent Demonstration," *Ground Water Monitoring and Remediation*; 24(3), 102-110.

Esperanza, M., M.T. Suidan, F. Nishimura, Z-M Wang, G.A. Sorial, A. Zaffiro, P. McCauley, R. Brenner and **G. Sayles** (2004) "Determination of Sex Hormones and Nonylphenol Ethoxylates in the Aqueous Matrixes of Two Pilot-Scale Municipal Wastewater Treatment Plants" *Environ. Sci. Technol.*, **38**(11), 3028-3035.

Acheson, C.M., Q. Zhou, Y. Shan, **G.D. Sayles**, and M.. Kupferle (2004) "Comparing the Solid Phase and Saline Extract Microtox© Assays for Two Polycyclic Aromatic Hydrocarbon-Contaminated Soils." *Environ. Toxicol. Chem.*, **23**(2), 245-251.

Sayles, G.D. (2002) "Environmental Engineering and Endocrine Disrupting Chemicals," *Journal of Environmental Engineering*, **128**, 1-2

Mihopoulos, P.G , M.T. Suidan, **G.D. Sayles**, S. Kaskassian (2002) "Numerical modeling of oxygen exclusion experiments of anaerobic bioventing," *J. Contam. Hydrology*, **58**(3-4), 209-220.

Shah J.K., **G.D. Sayles**, M.T. Suidan, P. Mihopoulos, S. Kaskassian (2001) "Anaerobic bioventing of unsaturated zone contaminated with DDT and DNT," *Water Sci. Technol.*, **43**(2) 35-42.

Mihopoulos P.G., M.T. Suidan, **G.D. Sayles** (2001) "Complete remediation of PCE contaminated unsaturated soils by sequential anaerobic-aerobic bioventing," *Water Sci. Technol.*, **43**(5) 365-372.

Steed, V. S., M.T. Suidan, G. Munish, T. Miyahara, C.M. Acheson, **G.D. Sayles** (2000), "Development of a sulfate-reducing biological process to remove heavy metals from acid mine drainage," *Water Environ. Res.* , **72** (5) , 530-535.

Mihopoulos, P.G., **G.D. Sayles**, M.T. Suidan, Jindal Shah, and D.F. Bishop (2000) "Vapor Phase Treatment of PCE in a Soil Column by Anaerobic Bioventing," *Water Res.*, **34**(12), 3230-3237.

Tonya Nichols
Microbiologist
U.S. EPA, National Homeland Security Research Center

Education

PhD in microbiology from the University of Louisville
Masters in Biology from Baylor University
Bachelors in Biology from University of West Alabama

Professional Experience

Throughout a 20-year science career, Dr. Nichols has worked in a variety of positions to include academia, industrial, clinical, and government that included teaching, laboratory analysis, and research (basic and applied). Currently, she is the Acting Associate Division Director for the Threat and Consequence Assessment Division (TCAD) within the EPA's National Homeland Security Research Center. She also serves as the technical lead for the incident-based microbial risk assessment research program housed in her division. Her research includes quantitative and qualitative risk assessment methodologies, indoor exposure assessment of aerosolized bioagent and derivation of risk-based clean-up goals for biothreat agents.

Accomplishments

Tonya Nichols is regarded as an Agency expert in the area of microbial risk assessment especially in the area of bioterrorism. This is evidenced through intragency collaborations within ORD, OEM, and OW, interagency collaborations, and international collaborations. As the lead for Microbial Risk Assessment, she has developed and implemented a successful research program to address the EPA's Homeland Security mission. To date, she has successfully managed approximately $10M in extramural funding for NHSRC, with an approximate $2.5 M annual budget. In addition, she has provided support to EPA program offices and been integral to collaborations with US Federal partners in areas of microbial risk assessment.

Shawn P. Ryan
Associate Division Director, Decontamination & Consequence Management Division
NHSRC/ORD, Research Triangle Park, NC

Education:

Ph. D., Chemical Engineering, Dec. 2001, Rensselaer Polytechnic Institute, Troy, NY
M.S., Chemical Engineering, Dec. 2000, Rensselaer Polytechnic Institute, Troy, NY
B.S., Environmental Engineering, May 1995, Rensselaer Polytechnic Institute, Troy, NY

Work Experience:

U.S. Environmental Protection Agency, Research Triangle Park, NC
ORD/National Homeland Security Research Center
Associate Division Director, March 2008 - Present

U.S. Environmental Protection Agency, Research Triangle Park, NC
ORD/National Homeland Security Research Center
General Engineer, September 2004 – March 2008

U.S. Environmental Protection Agency, Research Triangle Park, NC
ORD/NRMRL/Air Pollution Prevention and Control Division
Environmental Scientist, March 2001 – September 2004

Research Interests and Skills:

- Decontamination Research Area Lead
  - Coordination of decontamination related research within the chemical, biological, and radiological (CBR) program areas pertaining to indoor and wide areas
  - Determination of research priorities in the CBR decontamination area
- Principle investigator for chemical and biological decontamination investigations and decontamination engineering studies
  - Persistence (natural attenuation) of chemical and biological agents in the environment
  - Systematic (parametric) decontamination technology studies for use against chemical and biological agents
  - Studies on the interaction of decontamination agents with materials (e.g., determination of generation capacity requirements)
  - Studies on the impact of decontamination processes on materials and equipment (e.g., development of decontamination strategies of sensitive and high value items)

Selected Honors/Major Awards:

- U.S. EPA Science and Technological Achievement Award, Honorable Mention, 2005
- U.S. EPA-NRMRL Investigator Initiative Grant Award 2003 ($64,900)
- U.S. EPA-APPCD Exploratory Research Program Grant Award 2001 ($11,000)
- MASS-A&WMA Air Pollution Education Research Grant 1999 ($25,000)
- Eastern NY Section of the A&WMA Scholarship 1998 ($1,000)
- NSF Dissertation Enhancement Fellowship 1998 (travel plus 12 weeks stay at FZK, Germany)
- Chris Sgambati Award 1998-99 for involvement with local youth basketball
- Caird Prize in Environmental Engineering 1995 (most outstanding senior student)
- Tau Beta Pi Engineering Honor Society & Chi Epsilon Civil & Environmental Engineering Honor Society
- Clough, Harbour & Associates Scholarship 1993 & 1994

Shawn P. Ryan (cont'd)

Selected Major Published Outputs:

1. Impact of Temperature and Humidity on the Persistence of Vaccinia Virus and Ricin Toxin on Indoor Surfaces, EPA Report, Publication Pending
2. Persistence of Toxic Industrial Chemicals and Chemical Warfare Agents on Building Materials under Conventional Environmental Conditions, EPA Report, Publication Pending
3. Decontamination of Toxic Industrial Chemicals and Chemical Warfare Agents on Building Materials Using Chlorine Dioxide Fumigant and Liquid Oxidant Technologies, EPA Report, Publication Pending
4. Effects of Vaporized Decontamination Systems on Selected Building Interior Materials: Chlorine Dioxide, EPA Report, Publication Pending
5. Effects of Vaporized Decontamination Systems on Selected Building Interior Materials: Vaporized Hydrogen Peroxide, EPA Report, Publication Pending
6. Material Demand Studies: Interaction of Chlorine Dioxide Gas with Building Materials, EPA Report, Publication Pending
7. Material Demand Studies: Interaction of Vaporized Hydrogen Peroxide with Building Materials, EPA Report, Publication Pending
8. C. Briois, S. Ryan, D. Tabor, A. Touati, and B.K. Gullett. Formation of Polychlorinated Dibenzo-p-dioxins and Dibenzofurans from a Mixture of Chlorophenols over Fly Ash: Influence of Water Vapor, *Environ. Sci. Technol.*, Vol. 41 (2007), 850.
9. J.E. Oh, B. Gullett, S. Ryan, and A. Touati, A. Mechanistic Relationships among PCDDs/Fs, PCNs, PAHs, ClPhs, and ClBzs in Municipal Waste Incineration, *Environ. Sci. Technol.*, Vol. 41 (2007), 4705.
10. X.-d. Li, J. Zhang, J.-h. Yan, K.-f. Cen, S.P. Ryan, B.K. Gullett and C.W. Lee. Experimental and modeling study of de novo formation of PCDD/PCDF on MSW fly ash. *J. Environmental Sciences*, Vol. 19 (2007), 117.
11. S.P. Ryan, X.-d. Li, B.K. Gullett, C.W. Lee, M. Clayton and A. Touati. Experimental Study on the Effect of SO2 on PCDD/F Emissions: Determination of the Importance of Gas-Phase versus Solid-Phase Reactions in PCDD/F Formation, *Environ. Sci. Technol.*, Vol. 40 (2006), 7040.
12. B.K. Gullett, A. Touati, L. Oudejans and S.P. Ryan. Real-time emission characterization of organic air toxic pollutants during steady state and transient operation of a medium duty diesel engine, *Atm. Env.*, Vol. 40 (2006), 4037.
13. S.P. Ryan, B.K. Gullett, D. Tabor, L. Oudejans and A. Touati. Determination of the vapor pressures of select polychlorinated dibenzo-p-dioxins and dibenzofurans at 75–275 °C. *Chemical Engineering Science*, Vol. 60 (2005), 787.
14. S. Ryan and E. Altwicker. Understanding the Role of Iron Chlorides in the *de novo* Synthesis of Polychlorinated Dibenzo-p-dioxin/ Dibenzofurans, *Environ. Sci. Technol.*, Vol. 38 (2004), 1708
15. E. Wikström, S. Ryan, A. Touati and B. Gullett. In Situ Formed Soot Deposits as a Carbon Source for Polychlorinated Dibenzo-p-dioxins and Dibenzofurans, *Environ. Sci. Technol.*, Vol. 38 (2004), 2097.
16. E. Wikström, S. Ryan, A. Touati, D. Tabor and B. Gullett. Origin of Carbon in Polychlorinated Dioxins and Furans Formed during Sooting Combustion, *Environ. Sci. Technol.*, Vol. 38 (2004), 3778.
17. E. Wikström, S. Ryan, A. Touati and B. Gullett. Key Parameters for de Novo Formation of Polychlorinated Dibenzo-p-dioxins and Dibenzofurans, *Environ. Sci. Technol.*, Vol. 37 (2003), 1962.
18. E. Wikström, S. Ryan, A. Touati, M. Telfer, D. Tabor and B. Gullett. Importance of Chlorine Speciation on de Novo Formation of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans, *Environ. Sci. Technol.*, Vol. 37 (2003), 1108.
19. S. Ryan and E. Altwicker. The Formation of Polychlorinated Dibenzo-p-dioxins/ Dibenzofurans from Carbon Model Mixtures Containing Ferrous Chloride, *Chemosphere*, Vol. 40 (2000), 1009.

HIBA S. ERNST, Ph.D.
Acting Division Director, Decontamination and Consequence Management Division
(513) 569-7943
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Education

Ph.D. University of Cincinnati, Civil & Environmental Engineering Department, Environmental Science
M.S. American University of Beirut, Organic Chemistry
B.S. American University of Beirut, Chemistry

Work Experience

US Environmental Protection Agency, Cincinnati, Ohio
2007 – Present National Homeland Security Research Center, Office of Research & Development (ORD)
1997 – 2007 Technical Support Center, Office of Ground Water & Drinking Water (OGWDW)
01/2002 – 12/2002 (Detail) Assistant Director, Water Protection Task Force (previous name for the Water Security Division), OGWDW
1995 – 1997 Research Fellow at the National Risk Management Research Laboratory, ORD

University of Cincinnati, Civil & Environmental Engineering Dept., Cincinnati, Ohio
1995 - 1999 Adjunct Assistant Professor
1992 – 1994 Research Associate

Research Interests and Skills

- Research experience in chemical disinfection for drinking water treatment with emphasis on the formation and control of disinfection byproducts
- Office of Water lead on the collaboration effort with NHSRC to develop the "*Water Security Research and Technical Support Action Plan*" (Action Plan)
- Water security issues related to the use of chlorine disinfection
- Technical support for the development of the Stage 1 and Stage 2 Microbial Disinfection By Product Rules
- Analysis of data from 500 water treatment plants from the Information Collection Rule
- Strategic planning for research to support the development and implementation of drinking water regulations and emerging contaminants

Selected Honors & Awards

- *U.S. EPA Silver Medal for Commendable Service* "Microbial and Disinfection Byproducts (M-DBP) 2 Rules" April 2006
- *U.S. EPA Bronze Medal for Commendable Service* "For developing an OGWDW research strategy" June 2003
- *U.S. EPA Gold Medal for Commendable Service* "Water Protection Task Force" 2002
- *U.S. EPA Bronze Medal for Commendable Service* "EPA's Stage 2 Microbial and Disinfection Byproducts (M-DBP) technical support team." July 2001
- *U.S. EPA Bronze Medal for Commendable Service* "For publication of the Disinfection By Product Stage 1 Federal Register Notices of Data" July 1998
- *U.S. EPA Bronze Medal for Commendable Service* "For outstanding contributions and exceptional service in providing technical assistance to the Republic of South Korea." 1998.
- *AWWA Academic Achievement Award*, Ph.D. Dissertation, honorable mention, 1995.

Select Peer-Reviewed Publications

Kim, D., Hasan, S., Tang, G., Marinas, B. J., Couillard, L., Shukairy, H. M., and Kim, J. (2007). "Simultaneous Simulation of Pathogen Inactivation and Bromate Formation in Full-Scale ozone Contactors by Computer Software," *J. AWWA*. 99:8:77.

Kim, J. Elovitz, M. S., von Gunten, U., Shukairy, H. M., and Marinas, B. J. (2007). "Modeling *Cryptosporidium parvum* Oocyst Inactivation and Bromate Formation in a Flow-Through Ozone Contactor Treating Natural Water," *Water Research,* 41 (2). 467.

Obolensky, A., Singer, P. C., and Shukairy, H. M. (2007). "Information Collection Rule Data Evaluation and Analysis to Support Impacts on Disinfection By-Product Formation," *Journal of Environmental Engineering*, Vol 133 (1), 53.

Tang, G., Adu-Sardukie, K., Kim, D., Kim, J., Teefy, S., Shukairy, H.M., and Marinas, B. J. (2005). "Modeling *Cryptosporidium* Oocyst Inactivation and Bromate Formation in a Full-Scale Ozone Contactor," *Environ. Sci. Technol.*, 39, 9343.

Shukairy, H. M., Blank, V., and McLain, J. L. (2002). "TOX in Finished Waters and Distribution Systems, and Relationships with Other DBPs, " Chapter for *Information Collection Rule Data Analysis Report* (McGuire, M. J., McLain, J.L. and Obolensky, A., Eds.), pp. 251-275.

Shukairy, H. M., and Gusses, A. M. (2000). "An Illustration of the Use of Scientific Information to Support DBP Rule Development," in *Natural Organic Matter and Disinfection By-Products*, (Amy, G., Krasner, S. and Barrett, S., Eds.), ACS Symposium Series 761, p. 28, ACS, Washington, DC.

Owens, J.H., Miltner, R.J., Johnson, C.H., Dahling, D. R., Schaefer III, F.W. and Shukairy, H. M. (2000). "Pilot-Scale Inactivation of *Cryptosporidium* and Other Microorganisms in Natural Water," *Ozone Science & Engineering*, 22(5), 501.

Shukairy, H. M. (1998) "Ozonation in Drinking Water Treatment," in *The Encyclopedia of Environmental Analysis and Remediation*, (R. A. Meyers, Ed.) John Wiley and Sons, Inc., NY.

Shukairy, H. M., Miltner, R. J. and Summers, R. S. (1995). "Bromide's Effect on DBP Formation, Speciation and Control: Part 2, Biotreatment," *J. Amer. Water Works Assoc.,* 87(10),

Kim R. Fox
Director, Water Infrastructure Protection Division, NHSRC
513-569-7820
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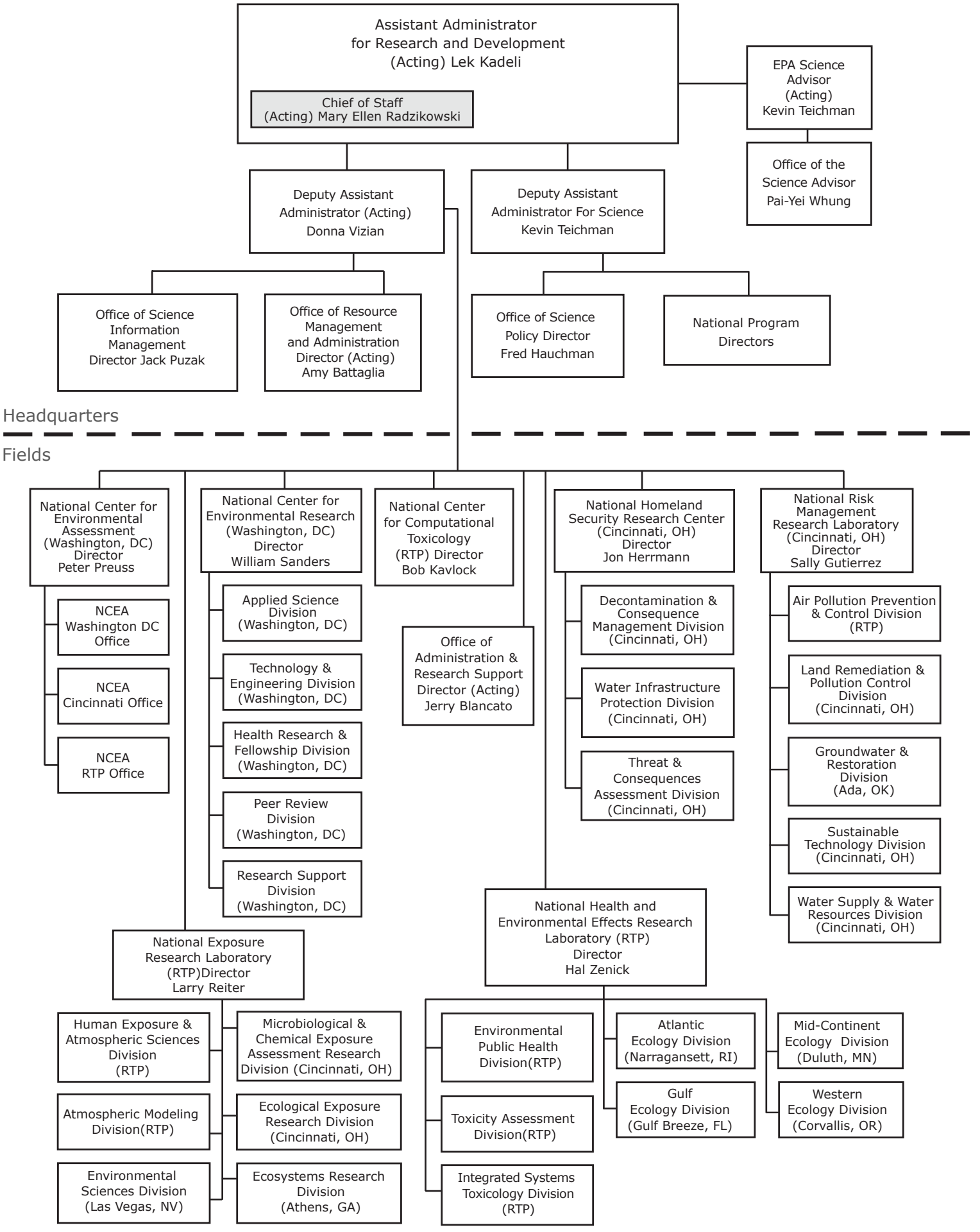
Education:
B.S. Civil Engineering, University of Cincinnati, Ohio (1977)
M.S. Environmental Engineering, University of Cincinnati, Ohio (1978)
Registered Professional Engineer - Ohio
Diplomate of the American Academy of Environmental Engineers

Employment:
Currently employed as the Director of the Water Infrastructure Protection Division of the National Homeland Security Research Center for the U.S. EPA. Primarily responsible for directing research on the detection, removal and decontamination of chemical, biological and radiological contaminants that could be used in an intentional contamination of a drinking water system. Previously, I was responsible for conducting research on removing inorganic chemicals and particulates from drinking water. The main areas I was involved with include arsenic removal, filtration processes, radon removal, small systems and point-of-use/point-of-entry treatment processes and waterborne disease outbreaks. Have conducted waterborne disease outbreak investigations in Cabool, Missouri (E. Coli), Peru (Cholera), Milwaukee, Wisconsin (Cryptosporidium), and in other locations. Assisted with Washington D.C. boil water order (1993). I have conducted particulate removal studies on Giardia, Cholerae, Cryptosporidium, and other significant organisms. Conducted research on slow sand filtration for treating drinking water. Help to renew interest in slow sand filters. Also I have provided technical assistance on filtration to various cities trying to meet requirements under the Surface Water Treatment Rule.

Selected Awards:
EPA's Bronze Medal: "Low Flow Drinking Water Pilot Plant Team" May 2001.
EPA's Bronze Medal: "Aerobic Spore Research Team", May 1999.
EPA's Gold Medal: "District of Columbia Drinking Water Team", February 1997.
EPA's Gold Medal: "Milwaukee Outbreak Investigation Team", May 1994.
Scientific and Technological Achievements Award (STAA) for Publication, July/August 1994.
Scientific and Technological Achievements Award (STAA) for Publication, October 1993.
Scientific and Technological Achievements Rewards (STAR) for International Journal of Environmental Health Research 1993 Publication, October 1995.
Scientific and Technological Achievements Award (STAA) for Publication, October 1993.
Scientific and Technological Achievements Rewards (STAR) Publication, October 1993.
Scientific and Technological Achievements Rewards (STAR) for Publication, October 1991.

Selected Publications:
Chapter 9 "Engineering Considerations in the Investigations of Waterborne Outbreaks" in Drinking Water and Infectious Disease - Establishing the Links CRC Press IWA Publishing 2002.
"A Waterborne Outbreak of Escherichia coli O157:H7 Infections and Hemolytic Uremic Syndrome: Implications for a Rural Water Systems" with Sonja J. Olsen et al. Emerging Infectious Diseases, Vol 8, No. 4, April 2002.
Dugan, N. R., Fox, K. R., et al. "Controlling *Cryptosporidium* Oocysts using Conventional Treatment". JAWWA, vol 93, No. 12, pp 64-76, December 2001.
Thompson, B. Fox, K. R., et al. "Arsenic Removal by Point-Of-Use Treatment Systems At San Ysidro". American Water Works Association Annual Conference and Exposition Proceedings, Denver, CO, June 2000.
Fox, K. R. and Reasoner, D. "Water Quality Monitoring, Sampling and Testing" in Waterborne Pathogens Manual. Published December, 1999, AWWA.
Lytle, D. A., Fox, K. R., et al. "Electrophoretic Mobility of Escherichia coli O157:H7 and wild-type Escherichia coli Strains, Applied and Environmental Microbiology, Vol 65, No. 7, July, 1999.
Dugan, N., Fox, K. R., et al. "Control of Cryptosporidium Oocysts by Steady-State Conventional Treatment", AWWA ACE Chicago, Illinois, 1999.
Fox, K. R., Dugan, N., et al "Comparative Removals of *Cryptosporidium* Surrogates in a Low Flow Pilot Plant System", AWWA WQTC 1998.
Lytle, D.A., Fox, K. R., et al. "The Design of a "Mini-Scale" Conventional Filtration Water Treatment Plant for Cryptosporidium Research", AWWA ACE 1998.
Blair, K., Fox, K. R., et al. "Issuing and Rescinding a Boil Water Advisory" in Cryptosporidium and Water: A Public Health Workbook. Centers for Disease Control and Prevention, Atlanta, Georgia, 1997.
Fox, K. R. and Lytle, D. A. "Milwaukee's Crypto Outbreak: Investigation and Recommendations". JAWWA, vol. 88, No. 9, pp 87-94, September 1996.

Office of Research and Development



SAB Science Integration for Decision Making Fact-Finding Meeting
Meeting with the Director and Management Team,
National Risk Management Laboratory (NRML)
Andrew W. Breidenbach Environmental Research Center. Cincinnati, Ohio, Room 235
Call-in Number for SAB subgroup: 866-299-3188, access code 343-9981 and press the # sign.
November 30, 2009, 1:15 p.m. - 2:15 p.m.

Draft Agenda

Purpose of Interview: to help SAB Committee members learn about the National Risk Management Laboratory 's current and recent experience with science integration supporting EPA decision making so that the SAB can develop advice to support and/or strengthen Agency science integration efforts.

1. Introductions facilitated by the SAB Staff Office

2. Discussion facilitated by SAB Members
   - Practices for integrating science to support decision making
   - Consideration of public, stakeholder, external scientific, and other input in science assessment
   - Drivers and impediments to implementing past recommendations for science integration
   - Ways program receives feedback on how science is used in decision-making
   - Workforce to support science integration for decision making

3. Identification of any follow-up actions

Planned participants

EPA Office of Research and Development, National Risk Management Laboratory
- Dr. Sally Gutierrez, Director
- Dr. Andy Gillespie, Deputy Director for Management
- Dr. Herb Fredrickson, Associate Director for Ecology & EDC
- Dr. Subhas Sikdar, Associate Director for Science

SAB Committee on Science Integration Committee Members
- Dr. Gary Sayler, University of Tennessee
- Dr. Thomas Theis, University of Illinois at Chicago
- Dr. Deborah Cory-Slechta, University of Rochester (by telephone)
- Dr. Taylor Eighmy, Texas Tech University (by telephone)
- Dr. Catherine Kling, Iowa State University (by telephone)
- Dr. John Giesy, University of Saskatchewan (by telephone)

SAB Staff Office
- Dr. Anthony Maciorowski, Deputy Director
- Dr. Angela Nugent, Designated Federal Officer

SAB Science Integration for Decision Making Fact-Finding Meeting
Meeting with Scientist, National Risk Management Laboratory (NRML)
Andrew W. Breidenbach Environmental Research Center. Cincinnati, Ohio, Room 235
Call-in Number for SAB subgroup: 866-299-3188, access code 343-9981 and press the # sign.
November 30, 2009, 2:15 p.m. - 2:45 p.m.

Draft Agenda

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3. Identification of any follow-up actions

Planned participants

EPA Office of Research and Development, National Risk Management Laboratory
Dr. William Schuster

SAB Committee on Science Integration Committee Members
Dr. Gary Sayler, University of Tennessee
Dr. Thomas Theis, University of Illinois at Chicago
Dr. Deborah Cory-Slechta, University of Rochester (by telephone)
Dr. Taylor Eighmy, Texas Tech University (by telephone)
Dr. Catherine Kling, Iowa State University (by telephone)
Dr. John Giesy, University of Saskatchewan (by telephone)

SAB Staff Office
Dr. Anthony Maciorowski, Deputy Director
Dr. Angela Nugent, Designated Federal Officer

SAB Science Integration for Decision Making Fact-Finding Meeting
Meeting with the Scientist National Risk Management Laboratory (NRML)
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Planned participants

EPA Office of Research and Development, National Risk Management Laboratory
Dr. Marc Mills

SAB Committee on Science Integration Committee Members
Dr. Gary Sayler, University of Tennessee
Dr. Thomas Theis, University of Illinois at Chicago
Dr. Deborah Cory-Slechta, University of Rochester (by telephone)
Dr. Taylor Eighmy, Texas Tech University (by telephone)
Dr. Catherine Kling, Iowa State University (by telephone)
Dr. John Giesy, University of Saskatchewan (by telephone)

SAB Staff Office
Dr. Anthony Maciorowski, Deputy Director
Dr. Angela Nugent, Designated Federal Officer

Available Biosketches for NRML Interviewees

Bill Shuster, Ph.D.
B.S. Physics, 1987, University of Michigan – Ann Arbor
Ph. D. Environmental Science, 2000, The Ohio State University

As a research hydrologist with the United States Environmental Protection Agency - National Risk Management Research Laboratory, Sustainable Environments Branch in Cincinnati OH, Dr. Shuster conducts interdisciplinary work to develop watershed management protocols that integrate elements of hydrology and soil science with ecology, economics, and law. The ultimate goal of current work is to design and test approaches to urban storm water management that possesses attributes of sustainability that span the triple-bottom line of social, economic, and environmental management objectives. Dr. Shuster has published widely in the areas of hydrology, soil science, biogeochemistry, landscape ecology, and sustainability science.

Curriculum Vitae: William D. Shuster, Ph.D.

United States Environmental Protection Agency (USEPA)
ML498, 26 W. Martin Luther King Drive
Cincinnati OH 45268
Tel: 513-569-7244 (desk)
Fax: 513-487-2511
Email: shuster.william@epa.gov (w), billhappyjack@aol.com
Citizenship: USA
Languages: English (native), college-level training in Spanish

Education:

Ph.D. 2000. The Ohio State University, Columbus.
Major: Environmental science (interdisciplinary program; training in soil science, hydrology, ecology, statistics). Dissertation: *Influence of earthworm community dynamics on soil structure, carbon distribution, solute transport, and leachate production in Ohio agroecosystems*

B.S. 1987. University of Michigan, Ann Arbor.
Major: Physics

Research and Work Experience:

Branch Chief, USEPA, National Risk Management Research Laboratory, Sustainable Environments Branch, April 2009 – August 2009.

Oversee day-to-day science administration for a group composed of 13 Ph.D. level research staff, and 6 support staff. Write multi-year plan goals, annual performance measures for sustainability metrics and develop sustainable watershed management programmatic areas. Learn about sustainability metrics and indicators and work with team leads to develop and expedite their research work. Develop cross-division approach to pursuing water resources management through linkages with climate change, land revitalization/Brownfields-Superfund, and ageing water infrastructure programs at USEPA, regional, state, county, and city-level stakeholders.

Research Hydrologist, USEPA, National Risk Management Research Laboratory, Sustainable Environments Branch, February 2003 – Present.

Principal investigator on multidisciplinary research effort to study alternative stormwater management strategies for urban and suburban ecosystems. Developed recommendations on sustainable approaches to stormwater management that resolve conflicts among hydroecological, economic, and legal interests. Develop and implement field research program to test hydrologic and ecological effectiveness of economic incentives applied to encourage placement of retrofit stormwater best management practices into residential parcels in a small urban watershed. Conduct research on: relationships between land use, hydrologic conditions, and stream biological communities; implementation issues and functional attributes of infiltration BMPs in urban settings; interpretation of soil survey data for hydrologic studies. Develop collaborative research to integrate geophysical characterization techniques to inform watershed restoration and management. Contact: Dr. Heriberto Cabezas, Branch Chief, USEPA-NRMRL-SEB, 513-569-7350

Postdoctoral Researcher, USEPA, National Risk Management Research Laboratory, Sustainable Environments Branch, May 2001 – February 2003.
Collaborated with USEPA economists and lawyers to develop a tradable credit tool based on hydrologic curve-numbers to abate excess stormwater runoff in urban watersheds; monitored stream stage and rainfall in nine tributaries of the Little Miami River (OH) watershed to better understand transient behavior of storm flows, and initiated a study on the effects of simulated urbanization on site hydrology at the USDA-ARS North Appalachian Experimental Watershed; Coshocton OH. Contact: Dr. Heriberto Cabezas, Branch Chief, USEPA-NRMRL-SEB, 513-569-7350

Environmental Specialist 2, Ohio Environmental Protection Agency, Division of Emergency and Remedial Response, Voluntary Action Program, August 2000- May 2001.
Worked as risk assessor in state-level brownfield program. Gave training and presentations to the regulated community and Ohio EPA staff on nonparametric and geospatial methods of data analysis. Represented Ohio EPA on the Great Lakes Commission on Strategic Land Use Initiatives task force. Manager: Amy Yersavich, OEPA Central Office, DERR-VAP

Postdoctoral Researcher, Horticulture and Crop Sciences, The Ohio State University, April 2000-August 2000.
Developed and carried out experimental approach to compare watershed level field surveys to track populations of an invasive weed species (*Alliaria petiolata*; garlic mustard). Modeled soil and landscape features to quantitatively describe and test for their potential influence on crop (G*lycine max*)-weed (*Abutilon theophrasti*) relationships. Supervisor: John Cardina, PhD, cardina.2@osu.edu

Graduate Research Associate, School of Natural Resources, The Ohio State University, September 1995-March 2000.
Conducted research that addressed the role of earthworm communities in regulating preferential flow, soil structure, carbon distribution, and water quality in Ohio agroecosystems. Applied mixed-model, repeated measures ANOVA; multivariate techniques, and spatial statistics to research data. Built and used custom radiometry instrumentation to monitor drought stress in turfgrass cropping systems. Characterized baseline soil physical properties for organic agroecosystems research project. Advisor: E.L. McCoy, PhD; SNR, Williams Hall, Ohio Agricultural Research and Development Center, Wooster, OH 44691, mccoy.13@osu.edu, 330-263-3884.

Research Assistant 2, Department of Entomology, The Ohio State University
March-September 1995.
Designed, tested, and applied apparatus to determine water stability of aggregated soil material and earthworm casts. Developed protocols and trained postdoctoral researchers and graduate students in soil physics research methods. Sampled earthworm communities, soil, and leachate in contrasting agroecosystems. Adviser: Scott Subler, PhD, scott.subler@pacific-garden.com

Agricultural Consultant – Snake Hill Farm, Chagrin Falls, OH
March-September 1995.
Worked with owner-operators to assess objectives, infrastructure and natural resources, then developed a farm management plan. Advised on: transition to organic vegetable cropping systems, flax culture, and selection of appropriate implements and inputs.

Farm Manager, Farm Operations, Department of Entomology, The Ohio State University, November 1992-January 1995.
Managed 50 ha. experimental farm to study sustainable agroecosystems management. Designed and maintained cropping systems to study productivity and economics of conventional, integrated, and certified organic agroecosystems. Managed teams of up to twelve seasonal student interns and state employees. Trained field scouts to aid in the monitoring of pest populations. Marketed produce through farmers markets, retail, wholesale, and institutional channels. Served on board of local farm market group. Summarized seasonal results in technical reports. Successfully competed for grant funds to support staff and on-farm research efforts. Supervisor: Clive Edwards, PhD, The Ohio State University, Department of Entomology, soilecol@osu.edu
William D. Shuster

Research Assistant 2, Department of Entomology, The Ohio State University, December 1990-November 1992.
Worked with farm manager and research team to design and build experimental farm infrastructure. Applied appropriate pest management techniques to each of conventional, integrated lower-input, and organic agroecosystems. Assessed water needs of five, 6-ha. agrocecosystems, and implemented drip irrigation system. Developed database for labor and material input data, and set up protocols for periodic sampling and analysis of soil and plant tissue. Created basic agroecology curriculum; coordinated farm visits and tours. Licensed pesticide applicator with certifications in: research and demonstration; fruit, vegetable, and field crops. Supervisor: Clive Edwards, PhD, The Ohio State University, Department of Entomology, soilecol@osu.edu

Research Assistant 1, Department of Agronomy, Soil Physics, The Ohio State University, December 1988-November 1990.
Set up and equipped soil physics laboratory. Responsible for determining proper testing protocols, conducting analyses, and maintaining records and databases pertaining to up to twelve field projects at any given time. Applied tillage and compaction treatments to field plots; conducted studies on agroecosystem impacts on soil physical and hydrologic processes, crop yield. Supervisor: Rattan Lal, PhD, lal.1@osu.edu

Teaching Experience

Adjunct Associate Professor, University of Cincinnati, Department of Civil and Environmental Engineering, 2004 – present

Seminar in sustainability science. Spring quarter 2008. University of Cincinnati, Department of Civil and Environmental Engineering, CEE676-907, 1-2 credit hours. Co-taught with Dr. Heriberto Cabezas. Coordinate seminar series on the topic of sustainability, deliver first lecture, facilitate discussions, and grade abstracts handed in by students after each lecture period.

Thomas More College, Summer Lecture Series, 2007. Organized a series of lectures by myself and other EPA staff aimed to educate upper-division undergraduates, faculty, and individuals from non-governmental and local government organizations on the nature of multidisciplinary work at USEPA.

Teaching Experience, continued

Watersheds: Theory and Management. Autumn quarter 2005, University of Cincinnati Department of Civil and Environmental Engineering, CEE696, 3 credit hours. Co-taught with Dr. Allison Roy. Develop curriculum and lectures, stream assessment exercise; administer assignments, readings and examinations

Environmental soil physics and unsaturated zone hydrology. Winter quarter 2004, University of Cincinnati Department of Civil and Environmental Engineering, Special Topics in Environmental Engineering, CEE899, 3 credit hours. Developed demonstrations and course materials with emphasis on unsaturated zone processes and phenomena, lectured, administered homework and examinations.

Introductory soil science laboratory. The Ohio State University, Agricultural Technical Institute, Wooster, OH. Winter quarter 1999. Taught up to 2 sections of 20 students each.

Advisory and Mentoring Experience

Graduate studies committees:
Maya Abi-Aad, MSE committee 2009, Sustainable Urban Engineering program, U. Cincinnati College of Engineering.

Diana Mitsova-Benova, dissertation 2008, Cellular automata – Markov chain model to project future patterns of urbanization in the Greater Cincinnati area, incorporating principles of "green infrastructure", School of Planning, U. Cincinnati

Chandrima Pal, Master of Community Planning, 2005, Improving conventional subdivision design by incorporating runoff impacts into land development decisions, School of Planning, U. Cincinnati

Samantha Hoffa, Master of Community Planning, 2004, Stormwater build-out analysis: Amberley Village, 2004, School of Planning, U. Cincinnati

Funding agencies:
Advisory board member for Water Environment Research Foundation (WERF) project 04-SW-1 entitled: *Successful Integration of Stormwater BMPs into the Urban Landscape*, grant awarded 4/2005, project completed 7/2007.

Mentoring:
Postdoctoral researchers: Dr. Yu Zhang, hydrologist (now at NOAA); Dr. Allison Roy, stream ecologist (Kutztown University); Dr. J. Beaulieu, biogeochemist (USEPA). Undergraduate research aides: Daniel Kowalski, Karsten Head (both 2005)

Professional Affiliations
American Geophysical Union, Ecological Society of America, American Society of Agronomy, American Water Resources Association, Sigma Xi

William D. Shuster

Science, Public Community Service

Associate Editor - Subsurface Hydrology, Journal of the American Water Resources Association. January 2007-January 2010.

Manuscript reviews: *Journal of the Soil Science Society of America, Journal of Environmental Quality, Environmental Science and Technology, Hydrologic Processes, Soil Biology and Biochemistry, Journal of the American Water Resources Association, Applied Soil Ecology, American Society of Civil Engineers, Bioresources Technology, Proc. National Conference on Urban Stormwater (USEPA)*. Grant proposal review: (US) National Science Foundation, Water Environment Research Foundation, USEPA-Natl. Center for Env. Research (STAR, Sustainability grant programs)

Peer-reviewed publications

1. Near-surface soil nitrogen dynamics in contrasting Midwest US agroecosystems were affected by earthworm manipulations - implications for water quality. WD Shuster*, CM McKeegan, M Carroll, and S Subler, in preparation.

2. A laboratory simulation of urban runoff and the potential for hydrograph prediction with curve numbers. WD Shuster and E. Pappas. Submitted October 2009 to ASCE J. Irrigation and Drainage Eng.

3. Modeling techniques of best management practices: rain barrels and rain gardens using EPA SWMM-5. Abi Aad MP, Suidan MT, Shuster WD. Accepted September 2009, J. Hydrologic Engineering.

4. Unraveling urban drainages for watershed management: applications of impervious surface connectivity data. 2009. AH Roy* and WD Shuster. J. Am. Water Resources. Assoc., Volume 45 Issue 1, Pages 198 – 209.

5. Front-loading urban stormwater management for success – a perspective incorporating studies of retrofit low-impact development. 2008. WD Shuster*, MA Morrison, R Webb. Invited paper, Cities and the Environment (online) 1(2), article 8 (15 pages).

6. Impediments and solutions to sustainable, watershed-scale urban stormwater management: lessons from Australia and the United States. 2008. A Roy*, S Wenger, T Fletcher, C Walsh, A Ladson, W Shuster, H Thurston, R Brown. Environmental Management 42, 344-356.

7. A laboratory-scale simulation of runoff response from pervious-impervious systems. 2008. WD Shuster*, E Warnemuende, and Y Zhang. J. Hydrologic Engineering, Volume 13, Issue 9, 886-893.

8. Characterizing storm hydrograph rise and fall dynamics in alluvial streams (Ohio, USA). WD Shuster*, Y Zhang, AH Roy, FB Daniel, and M Troyer. J. Am.Water Resources Assoc. 44, 1431-1440.

9. Impervious surface impacts to runoff and sediment discharge under laboratory rainfall simulation, 2008. EA Warnemuende*, C Huang, DR Smith, WD Shuster, JV Bonta. Catena 72, 146-152.

Peer-reviewed publications, cont'd.

10. Prospects for enhanced groundwater recharge via infiltration of urban stormwater runoff – a case study. 2007. WD Shuster*, R Gehring, and J Gerken. J. Soil Water Conservation 62, 129-137.

11. Applied hydrology of impervious surfaces – a review. 2005. WD Shuster*, H Thurston, B Warnemuende, D Smith, J Bonta. Urban Water, 2(4), 263-276.

12. Application of market mechanisms and incentives to reduce stormwater runoff: an integrated hydrologic, economic, and legal approach. 2005. P Parikh, M Taylor, T Hoagland, H Thurston, and WD Shuster*. Environmental Science and Policy, 8, 133-144.

13. Comparison of survey methods for an invasive plant at the subwatershed level. 2005. WD Shuster, CP Herms, MN Frey, DJ Doohan, and J Cardina*. Biological Invasions, 7(3), 393-403.

14. Earthworm communities affected leachate production and altered water quality in Ohio agroecosystems. 2003. WD Shuster*, MJ Shipitalo, S Subler, EL McCoy, S Aref, and C McKeegan. Journal of Environmental Quality, 32, 2132-2139.

15. Population dynamics of ambient and altered earthworm communities in row-crop agroecosystems in the midwestern U.S. 2003. WD Shuster*, MJ Shipitalo, PJ Bohlen, S Subler, and CA Edwards. Special Proc. of the 7th Intl. Symposium on Earthworm Ecology, Pedobiologia, 47, 825-829.

16. The influence of earthworm community structure on the distribution and movement of solutes in a chisel-tilled soil. 2002. WD Shuster*, S Subler, EL McCoy. Applied Soil Ecol., 21, 159-167.

17. Nitrogen source and earthworm abundance affected runoff volume and nutrient loss in a tilled-corn agroecosystem. 2002. WD Shuster*, LP McDonald, DA McCartney, RW Parmelee, B Stinner. Biology and Fertility of Soils, 35, 320-327.

18. Deep-burrowing earthworm additions changed the distribution of soil organic carbon in a chisel–tilled soil. 2001. WD Shuster*, S Subler, EL McCoy. Soil Biology and Biochemistry, 33, 983-996.

19. Water stability of earthworm casts in manure and inorganic-based agroecosystems were influenced by age and depth of deposition. 2001. F Ge*, WD Shuster, CA Edwards, RW Parmelee, S Subler. Pedobiologia (45)1, 12-26.

20. Foraging by deep-burrowing earthworms degrade surface soil structure of a Fluventic Hapludoll in Ohio (USA). 2000. WD Shuster*, S Subler, EL McCoy. Soil & Tillage Research, (54)3-4, 179-189.

21. Effects of vermicomposts and composts on plant growth in horticultural container media and soil. 2000. RM Atiyeh*, S Subler, CA Edwards, G Bachman, JD Metzger, WD Shuster, Pedobiologia (44)5, 579-590.

William D. Shuster

Peer-reviewed conference proceedings

1. Seasonal and situational impacts on the effectiveness of a decentralized stormwater management program in the reduction of runoff volume (Cincinnati OH; USA). Submitted to NOVAtech for review, June 2010; Lyon, France.

2. Decentralization of storm runoff via engagement of social and cultural capitals – implications for the management of flood risk at the municipal scale. Shuster WD*, Thurston HW, Garmestani AS. Proceedings of UNESCO "Road towards Flood Resilient City" Conference, Paris France, November 26-27, 2009.

3. A streamlined monitoring framework for sustainable and low-impact development stormwater management practices. Morrison MA*, Shuster WD, Webb R. Proceeedings of the 11th International Conference on Urban Drainage. Edinburgh, Scotland, Aug. 31-Sept. 5 2008.

4. Implementation of retrofit best management practices in a suburban watershed (Cincinnati OH) via economic incentives. Shuster WD*, AH Roy, HW Thurston, M Morrison, M. Taylor, and M Clagett. Proceeedings of the 11th International Conference on Urban Drainage. Edinburgh, Scotland, Aug. 31-Sept. 5 2008.

5. Simulated rain garden effectiveness and performance in response to synthetic and natural rainfall patterns. 2006. WD Shuster*, HW Thurston, Y Zhang, Proceedings IDM-WSUD, Melbourne Australia, April 2006. Volume 2, 285-292.

6. Evaluation of economic incentives for decentralized stormwater runoff management: the Shepherd Creek watershed pilot project. 2006. HW Thurston*, WD Shuster, MA Taylor, S Stewart, Proceedings IDM-WSUD, Melbourne Australia, April 2006. Volume 2, 567-574.

7. A multidisciplinary approach to stormwater management at the catchment scale. 2005. AH Roy, AL Mayer, WD Shuster, HW Thurston, T Hoagland, MP Clagett, PK Parikh, and MA Taylor, 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005

Non-peer reviewed papers and conference proceedings

1. Applying a Reverse Auction to Reduce Stormwater Runoff. Thurston, HW, MA Taylor, A Roy, M Morrison, WD Shuster, J Templeton, M Clagett and H Cabezas. Ambio, Vol. 37(4), pg. 326.

2. Retrofit stormwater management: Navigating multidisciplinary hurdles at the watershed scale. 2006. Roy AH, H Cabezas, MP Clagett, NT Hoagland, AL Mayer, MA Morrison, WD Shuster, JJ Templeton, HW Thurston.. Stormwater Magazine, May-June 2006.

3. Comprehensive research and management of impervious surfaces and impacts on watershed hydrology. 2004. WD Shuster,Y Zhang, J Bonta, E Warnemuende, and H Thurston, CIGR International Conference, Beijing, P.R.China, paper 10-077A.

Non-peer reviewed papers and conference proceedings, cont'd

4. Rainfall simulation methods to investigate hydrologic impervious surface effects. E Warnemuende, WD Shuster, J Bonta, D Smith. 2003. American Society of Agricultural Engineers Intl. Meeting, 27-30 July, Paper # 032297

5. Quantification of Urbanization in Experimental Watersheds. 2003. J Bonta, WD Shuster, E Warnemuende, H Thurston, D Smith, M Goss, H Cabezas. First Interagency Conference on Research in the Watersheds. Oct 28-30 2003, Benson AZ

6. Methodology for Determining Effects of Extent and Geometry of Impervious Surface on Hydrologic Balance. 2003. E Warnemuende, WD Shuster, D Smith, J Bonta. First Interagency Conference on Research in the Watersheds. Oct 28-30 2003, Benson AZ

Book Chapters, Guidance

1. Guidelines for utilizing rain gardens as a stormwater management tool in the Metropolitan Sewer District of Greater Cincinnati (MSDGC) – Steps to getting off of the stormwater grid. D Dyke, WD Shuster, S Foltz, et al.

2. Thurston H., A Roy, WD Shuster, H Cabezas, MA Morrison, and MA Taylor. Using Economic Incentives to Manage Stormwater Runoff in the Shepherd Creek Watershed, Part I. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/129, 2008.

3. Data Requirements for Integrated Urban Water Management, UNESCO publishing, Urban water series, UNESCO International Hydrological Programme. Co-author on overall publication, principal author on chapter 3.5 (stormwater). Taylor and Francis Group, London.

4. Trading Allowances for Stormwater Control: Hydrology and Opportunity Costs, HW Thurston, MA Taylor and WD Shuster. In: *Critical Transitions in Water and Environmental Resources Management, World Water and Environmental Resources Congress 2004*, G Sehlke, DF Hayes, DK Stevens, eds., ASCE, 138, 50.

5. Interactions between tillage and earthworms in agroecosystems. WD Shuster and CA Edwards. In: *The Role of Tillage in Agroecosystems*, Ed. A. El-Titi, 2003, CRC Books, Boca Raton

Book Reviews

1. Flood Risk Simulation, F.C.B. Mascarenhas (co-authors: Toda, M.G. Miguez, and K. Inoue), 2005 WIT Press Boston MA. 2005. J. Am. Water Resour. Assoc. 41, 1243-44.
2. Handbook of Ecological Restoration, Volume 2: Restoration in practice, Editors: Martin R. Perrow and Anthony J. Davy, Cambridge University Press. 2004. J. Environmental Quality 33, 2389.
3. Tillage for Sustainable Cropping, Gajri, Arora, Prihar, Food Products Press. 2003. J. Environmental Quality 32, 1574.
4. Groundwater Use in the West, Jeffrey S. Ashley and Zachary A. Smith, University of Nebraska Press. 2002. J. Environmental Quality, 31, 364.
5. Uphill Against Water-The Great Dakota Water War, Peter Carrels, University of Nebraska Press. 2000. J. Environmental Quality 29, 1021.

William D. Shuster

Awards, Grants, and project management

Interagency agreements with USGS (project officer, $500K); USDA (technical lead, $375K); USDA-NRCS (technical lead, $20K); STREAMS (streamlined USEPA contracting procedure); project officer or co-project officer, $20-500K.

2004, 2005, 2006, 2007, 2008, 2009: USEPA Superior Accomplishment Recognition Award.

McCloy Fellowship in Environmental Affairs, Amer. Council on Germany – support for travel and expenses associated with one-month of study in Germany, March-April 2009.

National Council of Architectural Registration Boards (NCARB) Grant Program, 2008, $2500. Course development grant. The proposed course endeavors to give undergraduate and early-phase graduate students a background in environmental issues pertinent to their experience, and present these issues from a multidisciplinary perspective with some degree of depth that is unavailable from other course offerings in either UC DAAP or other university divisions.

Recent abstracts and presentations

1. Presentation and poster – A multidisciplinary approach to sustainable management of watershed resources, Shuster WD*, Heberling M, Thurston HW. Ground Water Protection Council annual meetings, Cincinnati OH, Sept 21-24 2008.

2. Presentations – Implementation of retrofit best management practices in a suburban watershed (Cincinnati OH) via economic incentives Shuster WD*, Roy AH, Morrison M, Thurston HW, and; A streamlined monitoring framework for sustainable and low-impact development stormwater management practices. Morrison MA*, Shuster WD, Webb R. Proceeedings of the 11th International Conference on Urban Drainage. Edinburgh, Scotland, Aug. 31-Sept. 5 2008.

3. Invited presentations – Implementation of retrofit BMPs in a suburban watershed via economic incentives; and Are there prospects for enhanced groundwater recharge via infiltration of urban stormwater runoff? Northeast Ohio Stormwater Conference, Cleveland OH, May 21-22 2008.

4. Invited presentation – Stormwater, participatory environmental management, and sustainability – what are the connections? Conference on Urban Landscape Ecology, Oct 29 2007, Cleveland OH.

5. Invited presentation – Stormwater, participatory environmental management, and sustainability – what are the connections? Thomas More College, River Research Station. June 13 2007, Fort Thomas KY.

6. Invited presentation – Storm water best management practices: capacities, capabilities, and some limitations. NPDES Phase II Implementation Workshop. June 6 2007, New Richmond OH.

7. Invited presentation – Rain garden effectiveness for control of water quantity and quality. Rain Garden Alliance organizational meeting, Dec. 5 2006, Cincinnati OH.

Abstracts and presentations, cont'd.

8. Invited presentation - Stormwater management and the interplay between hydrology and socioeconomics. Department of Geophysics, Stanford University, May 16 2006, Palo Alto CA.

9. Invited presentation - Going underground: managing sources of and sinks for stormwater runoff. May 12 2006; IIHR- College of Engineering, University of Iowa, Iowa City IA.

10. Poster - Linking stormwater hydrology with biota. 2005. Session: Biogeochemistry and Hydrology of Suburbia. W Shuster, A Roy. Y Zhang, M Morrison, American Geophysical Union (AGU) Winter Conference, San Francisco CA.

11. Presentation - A multidisciplinary approach to stormwater management at the watershed scale. 2005. A Mayer, AH Roy, WD Shuster, HW Thurston, NT Hoagland, MP Clagett, PK Parikh, and MA Taylor. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August.

12. Poster - The influence of catchment land use on hydrograph dynamics and implications for stream biological assemblages. 2005. W Shuster, Y Zhang, A Roy, AGU Spring Conference, Baltimore MD.

13. Presentation - Management of Impervious Surface Impacts on Watershed Hydrology: Allowance Trading and Opportunity Costs. 2004. H Thurston and W Shuster, Illinois Water 2004, October 14, 2004.

14. Presentation - RestorationPlus: A Collaborative Environmental Protection Agency Research Program to Develop and Evaluate Ecosystem Restoration and Management Options to Achieve Ecologically and Economically Sustainable Solutions. 2004. E Striz, J Williams, H Thurston, W Shuster, J Newland, and R Brooks. USEPA Science Forum 2004, Washington DC.

15. Invited lecture - Multidisciplinary management of stormwater runoff: the Shepherd Creek (OH) Pilot Project. March 2005. Invited Lecture, CEE676 Graduate Seminar, University of Cincinnati.

16. Presentation - Detailed soil surveys and distributed BMPs for stormwater quantity control – making the connection. WD Shuster, R Gehring, J Gerken. Agronomy Society of America 2004 meetings, Seattle WA.

17. Presentation - Modeling Runoff Processes in Small Catchments. Y Zhang WD Shuster, J Bonta. 12th Nonpoint Source Monitoring Conference, Oct 2004; Ocean City MD.

18. Presentation - Comprehensive environmental management systems for excess storm water runoff, WD Shuster. 12th Nonpoint Source Monitoring Conference, Oct 2004; Ocean City MD.

19. Presentation - Comprehensive research and management of impervious surfaces impacts on watershed hydrology, invited presentation. Ohio Agricultural Research and Development Center, Urban Landscape Ecology Program quarterly seminar, Aug. 2004; Wooster OH.

Abstracts and presentations, cont'd.

20. Presentation - Comprehensive research and management of impervious surfaces impacts on watershed hydrology, invited presentation, Shuster, W; Zhang, Y.; Bonta, J.; Warnemuende, B.; Thurston, H., and Mayer, A; USEPA Regional/ORD Science Topic Workshop on Environmental Indicators. May 17-21, 2004, Kansas City, MO.

21. Presentation - Multi-Disciplinary Approach to Stormwater Management in Urban Areas: Shepherd Creek watershed pilot project (W. Shuster and H. Thurston) and poster presentation: "A multidisciplinary approach to managing stormwater runoff in an urban watershed," by A. Mayer et. al. at the *Workshop on the Effectiveness and Uses of Best Management Practices (BMPs),* in Arlington, VA, April 13-15, 2004.

22. Poster - □ SEQ CHAPTER \h \r 1□Impacts of impervious surface on landscape hydrology Shuster, W.; Bonta, J., Thurston, H.; Warnemuende, B.; and Smith, D.; □ SEQ CHAPTER \h \r 1□19th Annual Symposium of the United States Regional Association of the International Association for Landscape Ecology: Transdisciplinary Challenges in Landscape Ecology March 30 - April 2, 2004 Las Vegas NV.

23. Poster - Estimation of Entrapped Air and Pore Tortuosity for Soils Approaching Water Saturation. EL McCoy, AV Granovsky, and WD Shuster, 2002 Agronomy Meetings, Indianapolis IN.

24. Poster - Population dynamics of ambient and altered earthworm communities in row-crop agroecosystems in the midwestern U.S., 7th International Syposium on Earthworm Ecology, Cardiff ,Wales; September 2002.

25. Lecture - Patterning of resource distributions and hydrologic properties in agroecosystems: implications for soil erosion management. April 2002, National Soil Erosion Research Laboratory, USDA-ARS, West Lafayette IN.

26. Poster - Deep burrowing earthworm influenced leachate production and quality in typical Ohio agroecosystems, 2001 American Society of Agronomy Meetings, Charlotte NC.

27. Presentation - Comparison of sampling protocols for a watershed scale survey of an invasive plant species *Alliaria petiolata* (Garlic mustard), 2001 Midwest Ecology and Evolution Conference, Oxford, OH

28. Presentation - Issues in non-parametric data analysis, 2000 Certified Professional Workshop, Ohio EPA Central Office

Training

40-hour training in Ohio EPA Biocriteria program, 2001; 40-hour USEPA Hazardous Materials Operations, 2001; 40-hour training for BASINS 3.0; stream restoration, 2002; 40-hour USGS training in sediment sampling, 2004; USEPA contracts management 2003, 2006.

Committee Service

Gulf Hypoxia Task Force, 2006. Water Quality Research Leadership Team, writer and reviewer, 2005; Katrina Assistance and Response Team – ecosystem restoration subgroup, 2005; Region III Stormwater Action Team, 2004-2007.

Marc A. Mills , Ph.D. **USEPA**

Environmental Engineer

EDUCATION

Ph.D.	Texas A&M University (Civil/Environmental Engineering)
M.S.	Texas A&M University (Civil/Environmental Engineering)
B.S.	Texas A&M University (Civil Engineering)

PROFESSIONAL HISTORY

Environmental Engineer, USEPA Office of Research and Development
National Risk Management Research Laboratory, Cincinnati, OH

USEPA Federal Post Doctoral Researcher, USEPA Office of Research and Development
National Risk Management Research Laboratory, Cincinnati, OH

Oak Ridge Institute for Science and Education Fellow, Cincinnati, OH

Research Associate, Texas A&M University, Dept. of Civil Engineering, College Station, TX

QUALIFICATIONS

Dr. Mills' has a background in the fate and transport of organic contaminants, such as petroleum hydrocarbon, PCBs, and EDCs, in aquatic, sediment, and wetland environments. He is currently the principal investigator and project leader of several U.S. EPA funded projects in the areas of contaminated sediments, stable isotopic techniques for monitoring environmental processes, and the biodegradation and fate of legacy and emerging contaminants in sediments, surface waters and WWTPs. Current collaborations exist within EPA's Office of Research and Development, USGS, USACE, SPAWAR, University of Cincinnati, Texas A&M University, and Battelle Memorial Institute.

FUNDED RESEARCH AWARDS

Integrated forensics approach to fingerprint PCB sources using Rapid Screening Characterization (RSC) and Advanced Chemical Fingerprinting (ACF).(ESTCP: ER-0826) (Co-PI)

Development of DoD Guidance for Monitored Natural Recovery at Contaminated Sediment Sites (ESTCP Project: ER-0622) (Co-PI)

Characterization of Contaminant Migration Potential Through In-Place Sediment Caps (SERDP Project: ER-1370) (Co-PI)

Lake Hartwell Monitored Natural Recovery Research Project (internally funded EPA project) (PI)

Ashtabula River Dredging Characterization Project (internally funded EPA project) (co-PI)

Remedy effectiveness measures for dredging the Ottawa River (internally/GLNPO funded) (PI)

PROFESSIONAL ACTIVITIES

2009	Program Technical Steering Committee Member for the *Fifth International Conference on Remediation of Contaminated Sediments* Jacksonville, FL.
2008	Participant in the 4R's workshop, Vicksburg, MS.
2007- present	Representative for EPA ORD on Federal Contaminated Sediment (Fed Sed MOU) workgroup

2007	Co-instructor on short course "Monitored Natural Recovery of Contaminated Sediments" at *Fourth International Conference on Remediation of Contaminated Sediments* Savannah, GA
2006 - present	Representative for ORD on the EPA Contaminated Sediments Regional Research Advisory Group and the National Sediment Forum.
2005 – present	Representative for EPA ORD on Remediation Technology Discussion Forum (RTDF),
2004	Participant in the SERDP and ESTCP Expert Panel Workshop on Research and Development Needs for the In Situ Management of Contaminated Sediments. Department of Defense Strategic Environmental Research and Development Program and Environmental Security Technology Certification Program. Final Report. October 2004
To present	Reviewer for Environmental Science and Technology, Science of the Total Environment, Marine Pollution Bulletin, Journal of Environmental Quality, Environmental Technology, Chemosphere, etc.

SELECTED AWARDS AND HONORS:

- Federal Bronze Medal, Region 5/ORD Pharmaceutical Research Team, USEPA, 2008
- Federal Bronze Medal, Lake Hartwell Research Team, USEPA/ORD, 2006
- Federal Bronze Medal, EDCs Research Planning, USEPA, ORD, 2005
- Oakridge Institute for Science and Education (ORISE) Fellowship for Post-Doctoral Study, USEPA and USDOE, 1997-2000

INVITED LECTURES/SYMPOSIA:

Mills, MA, "Managing Endocrine Disrupting Chemicals (EDCs) in the Environment" Kunming University of Science and Technology, Kunming, China, 2009.

Mills, MA, "Managing Endocrine Disrupting Chemicals (EDCs) in the Environment" Solid Waste Summit, Tampa, FL, 2007.

Mills, MA, "Endocrine Disrupting Chemicals and other Emerging Contaminants in Wastewater and Drinking Water treatment technologies" NEIWPCC, Portland, ME, 2007.

Mills, MA, "Emerging contaminants of concern in wastewater", West Virginia Water Resources Institute Conference, Roanoake, WV, 2006.

Mills, MA, "Managing Emerging Contaminants of Concern in Wastewater and Animal Wastes", Endocrine Disruptors – What We Know & What We Don't", Cheasapeake Research Consortium, Frederick, MD, 2006.

ASSISTANCE/LEADERSHIP PROVIDED TO THE SCIENTIFIC COMMUNITY

- 2001 to Present, Adjunct Professorship - University of Cincinnati, Department of Civil and Environmental Engineering, Cincinnati, OH 45220
- FACA EDCs, workgroup member from USEPA.
- SETAC Conference, Session Organizer/Chair
- International Contaminated Sediments Conference 2009, Organizing Committee Member
- Peer Reviewer for Small Business Innovative Research Program at EPA
- Technical workgroup member for American Water Works Association Research Foundation for development of Emerging Contaminant Research Strategic Plan.

- Technical workgroup member for Water Environment Research Foundation for the development of Research "Prioritization of TOrCs for focused work based on potential exposure ad biological effects"

ASSISTANCE/LEADERSHIP PROVIDED TO THE AGENCY

- Contributor to the Federal Agency Research White Paper on Pharmaceuticals in the Environment
- Participant in the Universal Waste Rule and Pharmaceuticals workgroup for OSWER
- Workgroup participant for OSWER's nonylphenol ethoxylates on Subpart J of the National Contingency Plan
- Served as member of the CENR Subcommittee on EDCs
- Great Lakes National Program Office -Part of research team investigating PPCPs in the Great Lakes
- Office of International Activities - Sponsor for Fulbright Visiting Scientist from Spain's Ministry of the Environment conducting research on the fate of emerging contaminants in wastewater
- Member, Regional Pharmaceutical and Personal Care Products Working Group

SELECTED PUBLICATIONS

Suidan, M., **Mills, M.A**., Brenner, R. and Kreissel, J., *In press.* "Homeland Security and Wastewater Treatment", *Wiley Handbook Of Science & Technology For Homeland Security*, edited by John G. Voeller.

P. M. Nagarnaik, **M. A. Mills**, and B. Boulanger, *Accepted*. "Concentrations and Mass Loadings of Hormones, Alkylphenols, and Alkylphenol Ethoxylates in Healthcare Facility Wastewaters", *Chemosphere*.

Raikow, D.F., Walters, D.M., Fritz, K.M., and **Mills, M.A**. *In Review*. The spatial extent of aquatic subsidy and contamination in lake riparian food webs, *Ecological Applications*.

Walters, D.M., **M.A. Mills**, K.M. Fritz, and D.F. Raikow. *In revision*. Spider-mediated flux of PCBs from contaminated sediments to terrestrial ecosystems and potential risks to arachnivorous birds. *Environmental Science and Technology*

Merritt, K.A., Fimmen, R., Sass, B., Foote, E., **Mills, M.A.**, Leather, J., and Magar, V., *In review*, "Preliminary characterization of contaminant migration potential in the vicinity of an in-place sand cap", *Journal of Soils and Sediments*.

Marfil-Vega, R., Suidan, M.T., Mills, M.A., *In review*. "Interaction Of Estrogens With Wastewater Solids: Insights for An Improved Understanding Of Their Fate", *Chemosphere*.

Sowers, A.D., Gaworecki, .K.M., **Mills, M.A**., Roberts, A.P., Klaine, S.J. (2009) "Developmental effects of a municipal wastewater effluent on two generations of the fathead minnow, *Pimephales promelas*", Aquatic Toxicology, Volume 95, Issue 3, November 2009, 173-181.

Magar, V., Chadwick, D.B., Bridges, T.S., Fuchsman, P.C., Conder, J.M., Dekker, T.J., Steevens, J.A., Gustavson K.E., Mills, M.A. (2009)"Technical Guide: Monitored Natural Recovery at Contaminated Sediments Sites, ESTCP, May 2009.

Sowers, Anthony D., Mills, M.A., Klaine, S.J. (2009), "The developmental effects of a municipal wastewater effluent on the northern leopard frog, *Rana pipiens*", Aquatic Toxicology, Volume 94, Issue 2, August 2009, 145-152.

Mills, M.A., Bonner, J.S., Page, C.A., Autenrieth, R.L. (2004), "Evaluation of bioremediation strategies of a controlled oil release in a wetland " Marine Pollution Bulletin 49 (5-6), pp. 425-435 4

Mills, M.A., Bonner, J.S., McDonald, T.J., Page, C.A., Autenrieth, R.L. (2003) "Intrinsic bioremediation of a petroleum-impacted wetland", Marine Pollution Bulletin 46 (7), pp. 887-899

Mills, M.A., J.S. Bonner, R.L. Autenrieth (2002). "Intrinsic Bioremediation of Petroleum in a Wetland." *Marine Pollution Bulletin*, December, 2002.

Townsend, R.T., Bonner, J.S., Autenrieth, R.L., **Mills, M.A.**, and McDonald, (2000) "Microbial Dynamics during Bioremediation of a Crude Oil-Contaminated Coastal Wetland", *Bioremediation Journal* 4(3) 203-18.

Mills, M.A., J.S. Bonner, T.J. McDonald, M.A, Simon, R.L. Autenrieth (1999). "Method for Quantifying the Fate of Petroleum in the Environment." *Chemosphere*, Vol. 39(14): 2563-2582.

Page, C., Bonner, J., Kanga, S., **Mills, M.A.**, Autenrieth, R., (1999) "Biosurfactant solubilization of PAHs", *Environ. Eng. Science* 16(6) 465-474.

Kanga, S, J. Bonner, C. Page. **M.A. Mills**, R. Autenrieth (1996). "Solubilization of Naphthalene and Methyl-Substituted Naphthalenes from Crude Oil Using Biosurfactants." *Environmental Science and Technology* 30(2) 556-51.

Aldrett, S., J.S. Bonner, **M.A. Mills**, R.L. Autenrieth, F.L. Stephens, (1996). "Microbial Degradation of Crude Oil in Marine Environments Tested in a Flask Experiment." *Water Research* 31(11) 2840-2848.

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