ABOUT NWRI

A 501c3 nonprofit organization, the National Water Research Institute (NWRI) was founded in 1991 by a group of California water agencies in partnership with the Joan Irvine Smith and Athalie R. Clarke Foundation to promote the protection, maintenance, and restoration of water supplies and to protect public health and improve the environment. NWRI’s member agencies include Inland Empire Utilities Agency, Irvine Ranch Water District, Los Angeles Department of Water and Power, Orange County Sanitation District, Orange County Water District, and West Basin Municipal Water District.

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   Michael A. Anderson, Ph.D.  
   Richard J. Bull, Ph.D.  
   Professor Dr.-Ing. Jörg Drewes  
   Charles N. Haas, Ph.D.  
   Walter Jakubowski  
   Perry L. McCarty, Sc.D.  
   Adam W. Olivieri, Dr.PH, P.E.  
   David L. Seldak, Ph.D.  
   Timothy J. Wade, Ph.D.
1. INTRODUCTION

The National Water Research Institute (NWRI), a 501c3 nonprofit research and education organization, proposes to form an independent, third-party Expert Panel to provide expert peer advice to the State of California on the following:

- Development of Water Recycling Criteria for indirect potable reuse (IPR) through surface water augmentation; and
- Feasibility of developing criteria for direct potable reuse (DPR), including a review of current DPR research efforts.

The Expert Panel will be held on behalf of the California Department of Public Health (CDPH) and administered by NWRI.

This proposal presents and summarizes NWRI’s efforts to identify and recruit a 10-member Expert Panel to assist the State of California.
2. DESCRIPTION OF THE PANEL

Brief descriptions of the role, activities, and end-products of the NWRI Expert Panel process are provided in this section.

2.1 Panel Role

The purpose of the Expert Panel is to provide an independent review, identify knowledge gaps, and make recommendations based on the current state-of-the-science for the following:

- **Development of Water Recycling Criteria for IPR through surface water augmentation.**

  Specifically, the Panel’s role involves the evaluation of proposed California criteria and making a finding, based on their expert opinion, whether the proposed criteria would adequately protect public health. Water Code Section 13564 provides a list of items CDPH must consider when developing the criteria. The items comprising that list should be considered by the Panel.

- **Feasibility of developing criteria for DPR, including a review of current DPR research efforts.**

  Specifically, the Panel’s role involves investigating the feasibility of developing California Water Recycling Criteria for DPR. Water Code Section 13566 provides a list of items CDPH must consider when investigating the feasibility of developing uniform water recycling criteria for DPR. The items comprising that list should be considered by the Panel. In addition, the Panel will have the opportunity to review the DPR research plans of water organizations early in their deliberations.

2.2 Panel Activities

As detailed below, NWRI proposes organizing a Panel of 10 independent, third-party experts in the field who would meet five times in person, as follows:

**Meeting 1:** Review with the Panel CDPH’s views on the Panel’s charge and goals for the process. Investigate the research needs necessary to draft DPR regulations that are adequately protective of public health.

**Meeting 2:** Complete investigation of research needs necessary to draft DPR regulations that are adequately protective of public health. Complete draft of a report that details what those research needs are and recommendations for how they can be accomplished.

**Meeting 3:** Begin the review and discussion of the initial draft of CDPH’s criteria for IPR through surface water augmentation. Provide feedback to CDPH on changes
necessary for the Panel to determine that the criteria are adequately protective of public health.

**Meeting 4:** Review and discuss the revised draft of CDPH’s criteria for IPR through surface water augmentation. Provide feedback to CDPH on changes necessary for the Panel to find the criteria are adequately protective of public health.

**Meeting 5:** Review and discuss the final draft of CDPH’s criteria for IPR through surface water augmentation. Make a determination as to whether the criteria are adequately protective of public health. Produce a report documenting the Panel’s determination.

### 2.3 Final Products of the Panel Review

The final products of the Expert Panel review process will be reports that address the following:

- An assessment of what, if any, additional areas of research are needed to be able to establish uniform regulatory criteria for DPR and a recommended approach for accomplishing any additional needed research regarding uniform criteria for DPR in a timely manner.

- A finding regarding the adequacy of proposed criteria for IPR through surface water augmentation to protect public health.
3. DESCRIPTION OF THE PANEL MEMBER SELECTION PROCESS

NWRI has a well-established Expert Panel process, which includes the selection of Panel members. A brief description of the Panel member selection process is included in this section.

3.1 Panel Member Characteristics

The goal of the selection process is to determine the most qualified experts to serve on the Panel. These experts include academics, utility staff members, retired regulators, current or retired federal agency staff, and independent consultants with professional knowledge, experience, and standing in areas relevant to surface water augmentation and potable reuse.

3.2 Objectives of the Selection Process

Because the selection of experts to serve as Panel members is critical to the success of the Panel review, the selection process has to achieve the following objectives:

- Panel members must be viewed as experts in their field.
- The expertise of Panel members must cover the appropriate areas of review.
- Panel members must be viewed as credible and independent, without the appearance of conflicts of interest.
- The Panel must be able to work together to carry out its assigned tasks and develop consensus findings and recommendations.

3.3 Role of the Panel Chair

The Expert Panel will be led by a Panel Chair, who is selected based on a number of factors, including: expertise, leadership capabilities, and ability to assist NWRI in managing the Panel.

The Chair is typically involved with Panel activities related to:

- Developing Panel meeting materials.
- Facilitating Panel meetings.
- Facilitating the preparation of Panel reports.
- QA/QC of Panel reports and other deliverables.
- Engaging in additional project activities or meetings, such as public meetings or dialogue with CDPH staff.
3.4 Process to Identify and Select Panel Members

The process used by NWRI to identify and select Expert Panel members involves the following steps:

- NWRI ensures its understanding of the CDPH Panel effort by reviewing overall goals and objectives with CDPH.

- Based on Panel needs, a list of disciplines required for Panel membership is reviewed with CDPH.

- Based on identified disciplines, potential candidates for the Panel are assembled using suggestions from CDPH, NWRI staff experience, a review of available publications, and recommendations based on interviews with known experts. Three to five candidates are typically identified for each Panel discipline.

- NWRI contacts each potential candidate via telephone to determine if the candidate has the appropriate background for the Panel. If so, NWRI assesses the interest, availability, and potential conflicts for each candidate.

- NWRI develops a summary matrix of potential candidates, including name, affiliation, position, a brief background summary, and any potential conflicts of interest.

- NWRI identifies preferred candidates based on their background and other information. In addition, NWRI assembles their vitas, biographies, or resumes.

- NWRI reviews the matrix of potential candidates with CDPH. Note that CDPH will convene an advisory committee that will be consulted on the proposed Panel members.

- NWRI selects Panel members based on input from CDPH.

- NWRI formally invites the selected individuals to serve on the Panel. NWRI also collects written statements regarding conflicts of interests from Panel members, if necessary, for review by CDPH.

Altogether, the selection effort is designed to be an open and collaborative process between NWRI and CDPH.
4. **DESCRIPTION OF PROPOSED PANEL MEMBERS**

Included in this section is a list of 10 proposed Expert Panel members for this effort and their areas of expertise.

4.1 **Panel Requirements**

Specific to this effort, the California Water Code (Section 13565) requires that the “expert panel shall be comprised, at a minimum, of a toxicologist, an engineer licensed in the state with at least three years’ experience in wastewater treatment, an engineer licensed in the state with at least three years’ experience in treatment of drinking water supplies and knowledge of drinking water standards, an epidemiologist, a limnologist, a microbiologist, and a chemist.”

4.2 **List of Proposed Panel Members**

A list of proposed Panel members and their areas of expertise is included in Table 1. For more information, please refer to candidate’s resume or CV, which can be found in the Appendix.

<table>
<thead>
<tr>
<th>Candidate</th>
<th>Area</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Rhodes Trussell, Ph.D., P.E., BCEE, Chairman &amp; CEO, Trussell Technologies (Pasadena, CA)</td>
<td>Panel Chair</td>
<td>• Ph.D. in Sanitary Engineering, UC Berkeley</td>
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<tr>
<td></td>
<td></td>
<td>• Experienced in methods and criteria for water quality and in the development of advanced processes for treating water or wastewater</td>
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<tr>
<td>Charles N. Haas, Ph.D. Dept. Head &amp; L.D. Betz Prof., Env. Eng., Drexel Univ. (Philadelphia, PA)</td>
<td>Microbial Risk Assessment</td>
<td>• Ph.D. in Environmental Engineering, University of Illinois at Urbana-Champaign</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Specializes in water treatment, risk assessment, environmental modeling and statistics, microbiology, and environmental health</td>
</tr>
<tr>
<td>Michael A. Anderson, Ph.D. Chair &amp; Prof., Applied Limnology &amp; Env. Chem., UC Riverside (Riverside, CA)</td>
<td>Limnology</td>
<td>• Ph.D. in Environmental Chemistry, Virginia Tech</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Research includes water and soil sciences, with particular emphasis in applied limnology and lake/reservoir management; surface water quality and modeling; fate of contaminants in waters, soils, and sediments; and environmental chemistry</td>
</tr>
<tr>
<td>David L. Sedlak, Ph.D. Prof., Civil &amp; Env. Eng., UC Berkeley (Berkeley, CA)</td>
<td>Chemistry</td>
<td>• Ph.D. in Water Chemistry, University of Wisconsin</td>
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<tr>
<td></td>
<td></td>
<td>• Research focus is on the fate of chemical contaminants, with the long-term goal of developing cost-effective, safe, and sustainable systems to manage water resources</td>
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<tr>
<td>Walter Jakubowski Consultant, U.S. EPA (retired) (Spokane, WA)</td>
<td>Microbiology</td>
<td>• M.S. in Microbiology, Oregon State University</td>
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<td></td>
<td></td>
<td>• More than 48 years of experience on public health significance and effects of waterborne pathogens in drinking water, wastewater, and municipal sewage sludge</td>
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<tr>
<td>Candidate</td>
<td>Area</td>
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<td><strong>Professor Dr.-Ing. Jörg Drewes</strong>&lt;br&gt;Chair &amp; Prof., Urban Water Systems Eng., Technische Universität München (Germany)</td>
<td>Water Treatment Engineering</td>
<td>• Dr. Ing. (Ph.D.) in Environmental Engineering, Technical University of Berlin, Germany&lt;br&gt;• Research includes treatment technologies leading to IPR and the fate and transport of persistent organic compounds in these systems</td>
</tr>
<tr>
<td><strong>Perry L. McCarty, Sc.D.</strong>&lt;br&gt;Silas H. Palmer Prof. of Civil &amp; Env. Eng. Emeritus, Stanford University (Stanford, CA)</td>
<td>Wastewater Treatment Engineering</td>
<td>• M.S. and Sc.D., Massachusetts Institute of Technology&lt;br&gt;• Recognized for his research on understanding contaminant behavior in groundwater aquifers and sediments</td>
</tr>
<tr>
<td><strong>Richard J. Bull, Ph.D.</strong>&lt;br&gt;Consultant, U.S. EPA (retired) (Richland, WA)</td>
<td>Toxicology</td>
<td>• Ph.D., Pharmacology, UC San Francisco&lt;br&gt;• Research interests include central nervous system effects of heavy metals, the carcinogenic and toxicological effects of disinfectants and disinfection by-products, halogenated solvents, acrylamide, and other contaminants of drinking water</td>
</tr>
<tr>
<td><strong>Adam W. Olivieri, Dr.PH, P.E.</strong>&lt;br&gt;Vice President, EOA, Inc. (Oakland, CA)</td>
<td>Multi-Barrier System Reliability</td>
<td>• M.P.H. and Dr. P.H. in Environmental Health Sciences, UC Berkeley&lt;br&gt;• Experience in the technical and regulatory aspects of water recycling, groundwater contamination by hazardous materials, water quality and public health risk assessments, water quality planning, wastewater facility planning, urban runoff management, and on-site waste treatment systems</td>
</tr>
<tr>
<td><strong>Timothy J. Wade, Ph.D.</strong>&lt;br&gt;Branch Chief, Epidemiology Branch, U.S. EPA (Chapel Hill, NC)</td>
<td>Epidemiology</td>
<td>• M.P.H., Epidemiology/Biostatistics and Ph.D., Epidemiology, UC Berkeley&lt;br&gt;• Research activities focus on waterborne disease and epidemiologic studies to evaluate the health effects of arsenic exposure in well water</td>
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</table>
APPENDIX: Curricula Vitae (CVs) of Panel Members

The curricula vitae (CVs) for the proposed Expert Panel members are provided in the following pages. Proposed Expert Panel members include:

- R. Rhodes Trussell, Ph.D., P.E., BCEE (Panel Chair)
- Michael A. Anderson, Ph.D.
- Richard J. Bull, Ph.D.
- Professor Dr.-Ing. Jörg Drewes
- Charles N. Haas, Ph.D.
- Walter Jakubowski
- Perry L. McCarty, Sc.D.
- Adam W. Olivieri, Dr.PH, P.E.
- David L. Sedlak, Ph.D.
- Timothy J. Wade, Ph.D.
CV for Proposed Expert Panel Member:

- R. Rhodes Trussell, Ph.D., P.E., BCEE (Panel Chair)
R. Rhodes Trussell, Ph.D., P.E., BCEE

EDUCATION:
Ph.D., Sanitary Engineering, University of California, Berkeley
M.S., Sanitary Engineering, University of California, Berkeley
B.S., Civil Engineering, University of California, Berkeley
Graduate, Stanford Executive Program

REGISTRATION:
Civil Engineer, State of California - No. 25107
Corrosion Engineer, State of California - No. 745

CERTIFICATION:
Board Certified Environmental Engineer, American Academy of Environmental Engineers

HONORS
1995 National Academy of Engineering
2001 AAMWA Boyd Award
2005 AEESP/AAEE Pohland Medal
2010 AWWA Black Award
2012 IWA's Global Water Award

SUMMARY:
Dr. Trussell is recognized, worldwide, as an authority in methods and criteria for water quality and in the development of advanced processes for treating water and wastewater to achieve the highest standards. He is often called upon to help utilities effectively manage critical projects involving regulatory authorities and public health. Dr. Trussell has also for more than 40 years maintained an active practice in the corrosion of materials in water systems, having conducted more than a dozen pipe-loop tests. He is sought nation wide as a consultant on water problems having advised the Cities of San Diego, Los Angeles, San Francisco, Oakland (EBMUD), Concord (CCWD), Portland, OR; Tacoma and Seattle, WA, Boston, MA; New York; and Washington DC and many others. Recent projects include: Advice on post treatment to the Monterey Regional Desalination Project; Development of water quality and treatment documents for the Woodland Davis Water Supply Project; Expert Testimony on contamination/corrosion of a liquid chlorine system at a major water treatment plant (Archer Western Contractors, Ltd. v. The City of Austin); Consulting with the Korean Water Corporation on the design of ozonation and GAC facilities for their Sungnam water treatment plant (207 mgd); Review of the design of a 30 mgd membrane filtration ozonation facility for the Clark County Reclamation District; Lead and Copper treatment for the Camp Pendleton Marine Corps Base; Participation in the DEC Review for USBR’s proposed facilities for the San Luis Drain ($2.3 billion); Report on Compliance with the Lead and Copper Rule for the San Francisco Public Utilities Department (300 mgd); evaluating Desalting for the City of Carlsbad, CA.; assisting the San Diego County Water Authority in a Design/Build/Operate effort for a 100 mgd membrane/ozonation/GAC plant; and reviewing the lead problem in Washington, D.C. for USEPA Office of Water. Dr. Trussell is available to review and advise on any complex water quality problem. He has special interest in reuse, desalting, membrane filtration, disinfection and corrosion.
Dr. Trussell served as Member and Chair of the Water Science and Technology Board for the National Academies from 1988 to 2007 and as a member of the EPA Science Advisory Board from 1998 through 2005. He was also the Vice Chair of the NRC Committees on Indicators of Pathogens and Drinking Water Contaminant Candidates. For the International Water Association, Dr. Trussell serves as a member of the Scientific and Technical Council, and was also a member of the Program Committees for the Convocations in Berlin 2001, Melbourne 2002, Marrakech 2004, Beijing 2006, and World Congress in Vienna, 2008. Dr. Trussell is a Board Certified Environmental Engineer in the American Academy of Environmental Engineers and is a member of the Academy’s Committee for Certification by Eminence. Dr. Trussell served as the Chair of the Research Advisory Committee and is now a member of the Board of Directors for the WaterReuse Foundation. He also serves on the Board of Directors of the Water Environment Research Foundation. Dr. Trussell was elected to the National Academy of Engineering in 1995, served as a member of the Academy’s Peer Committee for Civil Engineers for 2001-2003, served on the selection committee for the Academy’s “$1 million” Grainger Prize for 2006-2007, on the presently on the Academy’s Membership Committee (2006-2009) and on the Membership Policy Committee (2010-2012).

EMPLOYMENT HISTORY

TRUSSELL TECHNOLOGIES, INC. PASADENA, CA (2003-Present)
Chairman, CEO and founder of the company. Technology in the water world is rapidly changing. Many in the industry see choosing among the many technical opportunities as fraught with risk. Change takes place so quickly and there are so many things going on that it’s difficult to make good choices. Yet new technologies and new regulations are forcing change. Trussell Technologies seeks to be the trusted advisor that understands new technologies; how to test them, how to understand and predict their behavior, and how to reduce the risks associated with embarking on a new way of doing things.

UNIVERSITY OF CALIFORNIA, IRVINE (2003-Present)
Adjunct Professor of Environmental Health, Science, and Policy, School of Social Ecology, University of California, Irvine


MONTGOMERY WATSON, INC. PASADENA, CA (1992-2001)
Senior Vice President, Director of Corporate Development, Board Member and Member of the firm’s Executive Committee from when the firm was created in 1992 until merger with Harza in 2001. Participated in 13 mergers/acquisitions during that time.

JAMES M. MONTGOMERY CONSULTING ENGINEERS, INC. PASADENA, CA (1972-1992)
Entered as Senior engineer in Pasadena Water Department, became Vice President Head of Environmental Sciences Department, became head of Specialized Resources Group, founded both the company’s laboratory and research group, became Corporate Director of Water, became Senior Vice President and Director of Applied Technology for the firm, 1972-1991. Director of Corporate Development, charged with strategic planning and mergers

UNIVERSITY OF CALIFORNIA (1966-1972)
Ph.D. Research: Dr. Trussell developed a methodology for making predictions in water chemistry. The method is in use in the Environmental Engineering field.

CONSULTING WHILE AT U.C. (1966-1972)
While in school, Dr. Trussell worked as a consultant with Dr. Jerome F. Thomas, the firm of Pomeroy, Johnston and Bailey, and James M. Montgomery, Consulting Engineers, Inc. Studies included internal and external corrosion of private, municipal, and industrial iron, copper and stainless steel piping; corrosion of buried iron and steel piping and other equipment; industrial water treatment; design, operation, and maintenance of cooling towers; proper operation of boilers and associated condensate return systems; the preliminary design of chlorination facilities for a large municipality; solid waste management; design of individual home waste disposal systems; demineralization; and advanced wastewater treatment.

PROJECT EXPERIENCE (Selected projects):
Santa Margarita Water District
Title: Copper Tubing Corrosion
Year: 2011-2012
Homeowners in the SMWD service area have reported copper pitting of consumer plumbing as a problem occurring in new construction built in the early 2000s. Trussell Tech was retained to write a Technical Memorandum to provide a brief background on the copper pitting issue; briefly summarize the claims made and the technical reports filed; look at the existing water quality of the treated water from Metropolitan Water District of Southern California’s (MWD) Diemer Water Treatment Plant (WTP) that feeds the SMWD’s water distribution system; provide a visual evaluation of existing pipe materials through photographic evidence including discussion of evaluation techniques planned for pipe materials sent to EPA’s lab in Cincinnati, Ohio; and provide recommendations, schedule, and budget of next steps including a twelve-month test with a pipe loop setup at SMWD’s pump station to evaluate treatment alternatives including phosphate addition and disinfection.
Role: Technical Director

Monterey Regional Water Pollution Control Agency (MRWPCA)
Title: Groundwater Replenishment Project
Year: 2012-present
MRWPCA is planning to develop and implement a Groundwater Replenishment Project in the Seaside Groundwater Basin. It is planned to percolate into the basin either advanced treated water from the Salinas Valley Water Reclamation Plant and/or agricultural drainage from Blanco Drain. The estimated amount of water that could be provided by the project is approximately 2,800 acre-feet per year (AFY), which will supplement the natural recharge to the basin by approximately a factor of two. Trussell Tech was retained to assist with source water characterization, to evaluate Membrane Bioreactor (MBR) technology as an alternative secondary treatment approach to the existing trickling filters, and to evaluate post treatment stabilization and dual purpose pipeline considerations.
Role: Technical Advisor

Water Reuse Research Foundation (WRRF)
Title: Equivalency of Advanced Treatment Trains for Potable Reuse
Year: 2012-present
Trussell Technologies is lead firm on WRRF 11-02 potable reuse project in partnership with Carollo, University of Arizona, and numerous utilities. This important project serves to bridge the gap from indirect potable reuse projects in place today to future direct potable reuse projects that reduce the role of the environmental buffer. The project involves three overarching tasks: (1) background research and criteria development including literature review with focus on health
criteria and regulations, process models, and alternative treatment trains; review of available public health criteria including international, federal, state, and local regulations and guidance; development of criteria for direct potable reuse that are protective of public health through an Independent Advisory Panel and workshop; development of additional criteria to compare unit processes and treatment trains; and culminating in a State-of-the-Science report;

(2) Toolbox for integrated treatment trains, a computer model that provides information on integrated water reuse treatment trains for DPR; and

(3) Treatment Train Development and Validation, involving validation of the relevant treatment trains at the pilot-, near-full-scale, and full-scale including testing with reclaimed water from the LACSD’s San Jose Creek WRP with advanced treatment processes including ozonation and biological filtration, among other technologies.

**Role:** Principal Investigator (PI)

**Upper San Gabriel Valley Municipal Water District**

**Title:** Groundwater Recharge project  
**Year:** 2012-present

Trussell Technologies is serving as Technical Advisor for Upper District's Indirect Reuse Action Plan (IRAP). This involves identifying and assisting the District in tasks required to permit, construct, operate, and pay for advanced treatment facilities to produce highly treated recycled water for groundwater recharge in the Main San Gabriel Basin. This involves interactions with CDPH and the RWQCB on regulatory considerations including the CDPH’s draft groundwater recharge reuse requirements. It also involves identification and piloting of advanced treatment technologies including ozone/biological filtration.

**Role:** Technical Advisor

**PACE Engineers, Inc. (for SMWD)**

**Title:** Treatment for Corrosion Control  
**Year:** 2012

Working as a sub for PACE, Trussell Tech developed a TM for SMWD for evaluation of treatment technologies for corrosion control treatment to resolve excessive copper concentrations in consumer plumbing exposed to groundwater serving Nichols Institute in SMWD's service area. Treatment evaluated included air stripping, caustic addition and/or orthophosphate addition. Orthophosphate ended up being the best choice based on previous experience at nearby Camp Pendleton.

**Role:** Technical Director

**Santa Ana Watershed Project Authority**

**Title:** Inland Empire Brine Line Solids Control  
**Date:** 2011 – Present

The Santa Ana Watershed Project Authority (SAWPA) operates the Inland Empire Brine Line, a brine line used to convey wastes (desalter discharge, domestic and industrial wastewater) to Orange County for treatment, prior to discharge. Trussell Technologies has been retained by SAWPA to investigate the formation and composition of solids within the brine line, as well as sampling procedures and potential mitigation strategies, given that Orange County uses solids loading as a parameter for billing SAWPA. Dr. Trussell has overseen these efforts in the capacity of Technical Advisor, providing critical insight into the characterization of the solids and the implications of non-representative sampling on the solids loading.

**Role:** Technical Advisor

**Santa Margarita Water District**

**Title:** Copper Tubing Corrosion  
**Year:** 2011-2012

Homeowners in the SMWD service area have reported copper pitting of consumer plumbing as a problem occurring in new construction built in the early 2000s. Trussell Tech was retained to write a Technical Memorandum to provide a brief background on the copper pitting issue; briefly summarize the claims made and the technical reports filed; look at the existing water quality of the treated water from Metropolitan Water District of Southern California’s (MWD) Diemer Water Treatment Plant (WTP) that feeds the SMWD’s water distribution system; provide a visual evaluation of existing pipe materials through photographic evidence including discussion of evaluation techniques planned for pipe materials sent to EPA’s lab in Cincinnati, Ohio; and
R. Rhodes Trussell, Ph.D., P.E., BCEE Resume

provide recommendations, schedule, and budget of next steps including a twelve-month test with a pipe loop setup at SMWD’s pump station to evaluate treatment alternatives including phosphate addition and disinfection.

**Role**: Technical Director

**Rancho California Water District District/RMC Water and Environment**

**Title**: Indirect Potable Reuse Conceptual Design Study

**Year**: 2011 to present

The Rancho California Water District (District) is evaluating alternatives and the viability of indirect potable reuse for augmenting their water supply. Indirect potable reuse alternatives cover a wide-range of possibilities from reservoir augmentation to surface spreading. The project aims to maximize the District’s beneficial use of recycled water while meeting salt and nutrient plan objectives for the groundwater basin. Trussell Technologies, Inc. evaluated the various recycled water source water alternatives, developed treatment alternatives to minimize brine, and assisted with the evaluation of advanced water treatment process alternatives.

**Role**: Technical Advisor

**Search Dog Foundation**

**Title**: National Training Center Water Treatment Design

**Year**: 2010 to present

Search Dog Foundation (SDF) is currently planning and constructing their National Training Center (NTC) in the foothills of Santa Paula, CA to consolidate its canine kennels, search training sites, and offices. The NTC is located in a quiet, rural area, and their projected water demand of 4000 gallons per day must be met with an onsite groundwater well. Testing has shown this water quality to be challenging, containing elevated levels of total dissolved solids, sulfates, boron, iron, manganese, and potentially hydrogen sulfide. Also challenging is the client’s request to have minimal trucking associated with water treatment and an impacted watershed (i.e., no conventional place to discharge the waste stream produced by water treatment). Trussell Technologies has evaluated multiple whole-system treatment technologies for the NTC, including solar distillation, thermal distillation, and reverse osmosis (RO) with pretreatment for producing drinking water; and thermal distillation and evaporative beds for brine minimization and treatment. Upon Trussell Technologies’ recommendation, SDF has selected RO with pretreatment and evaporative brine beds for their overall water treatment system, and retained Trussell Technologies for the process design. To ensure successful RO performance, pretreatment involves tray aeration to oxidize iron, manganese, and hydrogen sulfide and greensand filtration. Post-treatment of the RO
permeate will involve boron ion exchange, calcite filtration for stabilization, and disinfection. RO brine and filter backwash water will be sent to the evaporative beds, where only solids will be retained, making this overall system essentially zero-liquid discharge. Trussell Technologies will continue to participate in final process design, as well as start-up testing and evaluation of the new water treatment system, enabling the NTC to have a safe and reliable drinking water supply. **Role:** Technical Advisor

Trussell Technology assisted WBMWD in the design and now the operation of their full-scale seawater desalination facility in Redondo Beach, CA. Operational assistance includes management of the system for manufacturing preformed chloramines, monitoring and control of water quality in the seawater, the product water, and the seawater discharge. The firm also manages the quality control on the bench-sale unit for post treatment. **Role:** Technical Advisor

**MWH / City of Tacoma Dept. of Public Utilities**

**West Yost Associates**

**Role:** Technical Advisor

**MWH Americas, Inc. (MWH)** provided design the development of the Davis-Woodland Water consultant services to the City of Tacoma, Supply Project, a 52 mgd project which will take Department of Public Utilities, Water Division water from the Sacramento River, treat it and (Tacoma Water) for design and construction of a supply it to these two Central Valley new filtration facility for the Green River supply to Communities. The project is utilizing a design-meet the requirements of the Long Term 2 Enhanced build-operate method of delivery and Trussell Surface Water Treatment Rule (LT2ESWTR). supervised extensive water quality monitoring, Successful implementation of this project will provide coordinated with the California Department of significant benefits to Tacoma Water, its Regional Health, prepared white papers on key water Water Supply System Partners (Partners) and other quality issues, conducted bench testing on wholesale customers.

**Role:** Technical Director

The Green River Filtration Facility (GRFF) will be benchmark process train, including process flow constructed on the site of the existing Green River sheet, design criteria, hydraulic profile, and site Headworks Facilities. It will treat water supplied from layout, equipment selection. The firm has also the Green River downstream of Howard Hanson prepared major portions of the RP and draft Dam and from the North Fork Well Field (NFW). The service contract.

initial maximum filtration capacity of the new facilities will be 150 mgd with an ultimate filtration capacity of 168 mgd. Planned capacity will be 90 mgd when operating in conventional mode (with pretreatment preceding the filters). Currently, maximum and annual average treatment flows are approximately 110 mgd and 60 mgd, respectively, but are anticipated to increase after construction of the GRFF. Trussell Tech provided engineering analysis, oversight and technical review services as a subconsultant to MWH. **Role:** Technical Director

**West Basin Municipal Water District**

**Title:** SWRO Demonstration

**Year:** 2008-present

**RMC Environment/ Marina Coast Water District**

**Title:** Marina Coast Regional Desalination Project

**Year:** 2009-2012

The Marina Coast Water District was working with Cal Am and Monterey County to develop a 10 mgd regional desalination project. Trussell Technologies did the preliminary process design including flow sheet, design criteria, process modeling, water quality goals, and equipment selection and interaction with the California Department of Health. The effort included extensive evaluation of GWUIDI criteria, alternatives for disinfection and an extensive
examination of alternatives for corrosion control, including a preliminary design.

**Role:** Technical Director

**Private Client**
**Title:** Water Filtration Development  
**Year:** 2009  
Developing advanced water filtration technology for a private client via market and regulatory investigation, experimentation, design and collaboration with academic and manufacturing partners, including comparisons of various attributes with multicriteria decision making tools (e.g., Target Plot/-Spider Diagram) and development of a technology roadmap.

**Role:** Technical Director

**RMC Environment/ Marina Coast Water District**
**Title:** Marina Coast Salinas River Surface Water Treatment Plant Conceptual Design and Permitting  
**Year:** 2009  
The Marina Coast Water District is developing new water supply options including a surface water treatment plant on the Salinas River in Monterey County. The project consists of seasonal diversion of excess Salinas River surface water and treating it at a surface water treatment plant to provide a potable water supply directly to urban users. Trussell Technologies, Inc was hired by RMC Environment to prepare a conceptual design of the plant, assist with the process selection, and the Department of Public Health permitting, including the preparation of the sampling plan. The primary treatment processes proposed for this facility are high rate sedimentation (Actiflo) followed by microfiltration (MF) membranes. These processes were selected for their ability to meet water quality goals, large turndown requirements, and in the case of Actiflo, ability to handle rapid changes in turbidity.

**Role:** Project Advisor

**Sunnyslope County Water District**
**Title:** Treatment of Groundwater Using Precipitation Softening  
**Year:** 2008-2009  
The District faces increasingly stricter regulations on its wastewater discharge, which limits the concentrations of sodium, chloride, and total dissolved solids that are allowed. Unfortunately, the groundwater available to the District is hard and self-regenerating water softeners (SRWS) are in common use throughout the service area, which increases all three constituents of concern. RMC retained the services of Trussell Technologies to evaluate treatment alternatives that could reduce the water hardness and the total dissolved solids concentration without using complex or expensive treatment processes. Trussell Technologies evaluated softening treatment alternatives using a ‘Softie Model’ to compare a pellet reactor, to a high rate solids contactor with lime, along with a high rate solids contactor with lime and potassium soda ash. In addition to evaluating lime softening of the groundwater, Trussell Tech was tasked with modeling softening processes to treat the brine from a primary reverse osmosis operating on the

In order to diversify its potable water supply portfolio, the City of San Diego is conducting a 12 month San Pasqual Brackish Groundwater Desalination Demonstration Project. In addition to investigating the efficacy of various wells to extract sustained production volumes from the shallow aquifer, the Demonstration Project is aimed at determining the operational parameters that will be necessary for sustained operation of a reverse osmosis plant. This project will investigate precipitative softening processes using two of the most promising technologies (i.e. tubular membrane filtered lime slurry reactor and a pellet reactor) and a biological reducing process to eliminate oxyanions (i.e. sulfate, nitrate). The overall treatment train objectives are to minimize the total brine volume and the mass of salt contained in this brine without using any cost-prohibitive thermal processes currently incorporated in treatment schemes that approach the recoveries described here (i.e. zero liquid discharge (ZLD) at 97%).

**Role:** Project Advisor

**City of San Diego**
**Title:** Innovative Brine Minimization Treatment Train  
**Year:** 2009
R. Rhodes Trussell, Ph.D., P.E., BCEE Resume

groundwater. Modeling the operation of a secondary RO system treating the softened RO brine is also part of this project. Trussell Tech will participate in an evaluation of additional brine minimization alternatives such as: evaporation ponds, VSEP and thermal processes.

**Role:** Technical Director

**West Basin Municipal Water District**

**Pilot Operation Of Novel High-Rate Granular Media Filtration As Pre-Strainer To Microfiltration On Open-Intake Seawater Source**

**Year:** 2009

West Basin MWD’s El Segundo, CA pilot test site, have successfully employed a 100-micron disc filter for this application. The District has now investigated an alternate approach to pre-straining, using a high-rate granular media filter (GMF) in place of the disc filter. The goal is a more robust pretreatment process that can accomplish the straining requirements at a reduced total water cost.

To evaluate the GMF concept, two pilot trains were operated with identical microfiltration (MF) systems operating downstream of the pre-straining processes. The high rate GMF and disc filter processes were operated in parallel on the raw ocean water that was pre-screened with a 1.6 mm basket strainer. This enabled the performance of the GMF / MF combination to be compared to the disc filter / MF combination. Data was generated for typical seawater conditions as well as impaired seawater conditions that occurred as a result of algal blooms and storm events. West Basin MWD plans to continue to evaluate the process benefits and the economics of these two pre-strainer technologies to determine the most cost-effective and robust pretreatment system (pre-strainer + MF).

**Role:** Expert Witness

**MWH/West Basin Municipal Water District**

**Title:** West Basin Red Tide Project

**Year:** 2007 – 2008

Working with MWH, Trussell Tech has been retained along with the University of Southern California to develop and conduct a comprehensive monitoring program for stormwater impacts on the SWRO treatment process and resulting permeate water quality, and marine phytoplankton and biotoxin production impacts on the SWRO process and resulting permeate water quality. The monitoring program will develop real-time monitoring surrogates and utilize state-of-the-art technologies to demonstrate the public health and operational significance of these events. The algal toxin information generate by the project is novel both in the context of seawater desalination, as well as in the context of fundamental research in marine biology and oceanography. Trussell Tech has developed the stormwater monitoring program and is coordinating the RO testing related to the algal toxins identified for study by USC.

**Role:** Project Manager

**City of Austin, Texas**

**Title:** Chlorine contamination

**Date:** 2008-2009

The City of Austin substantially expanded the city’s water treatment plant and, as part of the process, it constructed facilities to receive, store, evaporate and deliver liquid chlorine. Storage facilities are sufficient for 48 tons of liquid chlorine. During the start-up of the facilities, contamination began to appear in the chlorine and a dispute has arisen between the City and the contractor as to the cause of the contamination. The City has retained Dr. Trussell to serve as an expert witness on its behalf.

**Role:** Expert Witness

**West Yost/ Davis-Woodland JPA**

**Project Title:** Davis-Woodland’s Sacramento River Surface Water Treatment Plant Conceptual Design and Permitting

**Year:** 2009-Present

The Cities of Davis (Davis) and Woodland (Woodland) and the University of California at Davis (UC Davis) are working in partnership to develop a regional water supply. The Davis-Woodland Water Supply Project (DWWSP) is intended to divert and treat Sacramento River water and convey the resulting potable water to the project partners. Trussell Technologies, Inc was hired by West Yost to assist with the Department of Public Health permitting, including
the preparation of the sampling plan. In subsequent phases of the work Trussell Technologies, Inc will be involved in the following tasks: preparation of water quality performance specification, process selection, conceptual design, and bid package preparation. **Role:** Technical Advisor

Camarillo Water Division/CDM

**Pilot Plant Design and Operation of Camarillo’s Groundwater Treatment Facility**

Working with CDM, Trussell Technologies was retained by the City of Camarillo on a project to expand the groundwater supply for the City to reduce its dependence on imported water, while improving the quality of water ultimately discharged to the Calleguas Creek watershed. They are developing a groundwater treatment system that is capable of addressing current water quality concerns and also flexible enough to adjust to potential future water quality changes as they occur in the aquifer. Trussell Technologies evaluated emerging contaminants for the project including but not limited to hexavalent chromium and the issues considered for the City of Camarillo’s wells are directly applicable to water quality issues that need to be evaluated for the SFB wells. The purpose of the pilot study is to demonstrate and select the most cost-effective treatment approach, providing specific information on operating performance, water quality, and projected treatment costs for the proposed treatment processes. Trussell Technologies is also involved in optimization of the desalination process and is evaluating a wide range of “new-era” low energy NF/RO membranes for the treatment of contaminated groundwater. **Role:** Technical Advisor

Boyle/City of Huntington Beach

**Title: Huntington Beach Desalter**

**Date:** 2008

Working with Boyle, Trussell Technologies was retained by the City of Huntington Beach to provide expert technical advice on the implications for water quality and disinfection of introducing a seawater desalination source into its distribution system alongside its existing sources. Dr. Rhodes Trussell and Dr. Hokanson advised the City on the matter. **Role:** Technical Advisor

Boyle Engineering

**Title:** Water Quality Facilities for the Upper Chiquita Reservoir

**Date:** 2008

Boyle was retained by the Santa Margarita as the lead for a team to design the Upper Chiquita reservoir, a new, 2,700 Ac-ft treated water reservoir to provide emergency storage for agencies in South Orange County. Trussell Tech. was included as part of the team, responsible for portions of the design addressing water quality. The work included developing projections of chloramine decay over long periods of time, examination of DPB formation, including the potential formation of NDMA, examination of alternatives for maintaining a residual and/or controlling the presence of ammonia oxidizing bacteria (AOBs) in the reservoir effluent. The ultimate design makes provision for dissipation of the residual in the reservoir, rechloramination and UV disinfection to ensure the removal of AOBs that would proliferate therein. Trussell Tech analyzed the problem, examined alternatives, and developed P&IDs, design criteria, preliminary layouts and equipment selection. **Role:** Project Manager.

Sydney Water Corporation

**Title:** Taste and Odour Management: Project report

**Date:** 2008

In February 2003, a serious taste and odor incident (MIB & Geosmin) occurred in the Prospect Reservoir, the location of Sydney’s largest water treatment plant. Using high rate direct filtration (10 gpm/sf) and chlorination/chloramination, the plant has only limited taste and odor removal capability, particularly where MIB & geosmin are concerned. Three years later in January 2006 Sydney experienced another troublesome T&O incident in their Cascade System. Again MIB & Geosmin were implicated. In April of that same year, another serious T&O incident occurred in the Prospect system, this one more widespread than
MWH-Australia was contracted by the Sydney Water Corporation to conduct a comprehensive review of taste and odor management in the Sydney water catchments. Dr. Trussell was retained to do an independent peer review of the draft report.

**Role:** Peer Reviewer

### U.S. Department of Justice

**Title:** Expert Witness on BNR in the U.S. v. Eastern MWD et al  
**Date:** 2007 - 2008  
DOJ is representing Camp Pendleton MCB in lawsuit with Eastern MWD and Rancho California WD in connection with a 1990 Agreement between the Four Parties. Dr. Trussell prepared an expert witness report on the definition of best available treatment for nitrogen and phosphorous, on the cost of treatment to meet BAT and on the reasonableness of the cost of said treatment.

**Role:** Expert Witness

### Beverage Company

**Title:** Assessment of the Risks of Recovery RO Systems Implemented to Improve Water Use Ratio in the Production of Beverage Products  
**Date:** 2007-2008  
Trussell Technologies was retained by a major beverage company to assess the risks to water quality of implementing a secondary stage of RO to increase recovery in the production of its products. Trussell Tech also developed strategies and guidelines for to provide to bottlers to minimize the risk of introducing secondary RO into the treatment train.

**Role:** Project Manager

### Downey Brand Attorneys, LLP

**Title:** Expert Witness on BNR in the U.S. v. Eastern MWD et al  
**Date:** 2007 - 2008  
Downey Brand is representing Fallbrook PUD in lawsuit with Eastern MWD and Rancho California WD in connection with a 1990 Agreement between the Four Parties. Dr. Trussell prepared an expert witness report on the definition of best available treatment for nitrogen and phosphorous, on the cost of treatment to meet BAT and on the reasonableness of the cost of said treatment.

**Role:** Expert Witness

### Carollo Engineers

**Title:** Workshop on Silica removal  
**Date:** 2007  
Carollo has several projects where silica is the limiting constituent in concentrating the brine from RO facilities. Trussell Tech organized a workshop to discuss possible solutions to the issue.

**Role:** Organizer, Expert

### CDM/Los Angeles Department of Water and Power (LADWP)

**Title:** Scattergood Generating Station Seawater Desalination Pilot Project  
**Date:** 2007 - 2009  
Trussell Technologies, Inc. is part of CDM’s team for the Scattergood Desalination pilot project. This project is the next step for LADWP in their evaluation of the feasibility of seawater desalination to augment their available drinking water supply. Trussell Technologies, Inc. is tasked with developing the technical memorandum to identify the process trains that will be pilot tested in the upcoming years along with water quality goals for each treatment.
process and a final treated water quality goal for distribution. This TM included the selection of an appropriate desalination process, pretreatment and coarse screening process. Trussell Technologies, Inc. is also tasked to perform an analysis on how LT2 SWTR would be applied to the selected treatment train.

**Role:** Project Manager

**Boyle/City of Poway**

**Title:** Bergland Water Treatment Plant Upgrade  
**Date:** 2007-present

Working with Boyle, Trussell Technologies, Inc. was retained by the City of Poway to evaluate key water quality and treatment issues related to its Bergland Water Treatment Plant upgrade. Issues examined included investigating the levels of DBPs in the water, costing and ozonation alternative and determining whether it is needed based on the DBP levels in the water, and evaluating ancillary issues like the presence of quagga mussels in the source water.

**Role:** Project Manager

**MWH/West Basin Municipal Water District**

**Title:** Critical Raw Water Quality Issues  
**Unique to Seawater: Marine Phytoplankton Blooms, their Associated Biotoxins, and Transient Urban Stormwater Inputs**  
**Date:** 2007-present

Working with MWH, Trussell Tech has been retained along with the University of Southern California to develop and conduct a comprehensive monitoring program for stormwater impacts on the SWRO treatment process and resulting permeate water quality, and marine phytoplankton and biotoxin production impacts on the SWRO process and resulting permeate water quality. The monitoring program will develop real-time monitoring surrogates and utilize state-of-the-art technologies to demonstrate the public health and operational significance of these events. The algal toxin information generate by the project is novel both in the context of seawater desalination, as well as in the context of fundamental research in marine biology and oceanography. Trussell Tech is developing the stormwater monitoring program and coordinating the RO testing related to the algal toxins identified for study by USC.

**Role:** Project Reviewer

**Provost & Pritchard**

**Title:** Peer Review of Impacts of Delta Water on Friant Kern Users  
**Date:** 2007

Users of the Friant-Kern canal have been approached by the MWD of SC to consider an arrangement where MWD would use Friant-Kern Canal water during certain periods in return for providing State Project water during periods when Friant-Kern water is not so readily available. Provost & Pritchard was retained to review the impacts of the exchange on Friant-Kern users and Trussell Tech was retained to conduct a peer review of that study.

**Role:** Peer Reviewer

**Los Angeles County Sanitation Districts**

**Title:** Santa Clarita Valley Chloride Study  
**Date:** 2007

The Los Angeles Regional Water Quality Control Board has issued a TMDL for chloride the Santa Clara River and, as a result, is considering limitations on the chloride on the wastewater discharged from the Saugus and Valencia water reclamation plants, operated by the Los Angeles County Sanitation Districts. The Districts retained Trussell Tech to determine the appropriate desalination technology, the amount of flow to be treated at each facility and to do a preliminary design of the required facilities.

**Role:** Project Manager

**ECO Resources, Inc.**

**Title:** San Juan Capistrano Water Recovery Facility  
**Date:** 2007

ECO Resources, Inc., a division of Southern Water, Inc., operates a 4 mgd groundwater desalination facility in San Juan Capistrano, CA. Since its inception the facility has had difficulties meeting its production goals and its membranes have required excessive cleanings. Trussell Tech was retained to review the problem and examine possible remedies.

**Role:** Technical Director
West Basin Municipal District- Separation Processes, Inc.
Title: General Consulting on Desalination
Date: 2007
Trussell Technologies was part of the SPI team selected to provide consulting services to WBWD. Project involved review and comment on water quality data. Advice on use of pre-formed chloramines. Advice on the use of high rate coarse media filtration.
Role: Project Advisor

Clark County Water Reclamation District
Title: The Addition of Membrane Filtration and Ozonation to CCSD’s advanced wastewater Treatment Plant
Date: 2007
Clark County Water Reclamation District retained the services of Trussell Technologies to prepare review and advise on the preparation of contract documents for constructing a 30 mgd tertiary facility using membrane filtration and ozonation at their Advanced Wastewater Treatment Plant. The review included an assessment of the necessary ozone dose as well as extensive discussions on the best approach for getting useful bids from competing membrane manufacturers.
Role: Project Advisor

Beverage Company
Title: Technical Advisory Committee
Date: 2007
A major beverage company established a technical advisory panel of five national experts and met with the panel to review their water treatment standards and practices and suggest possible weaknesses or changes.
Role: Advisory Committee Member

Southwest Water Company Optimization of the San Juan Capistrano Groundwater Recovery Plant
Date: 2006-2008
The Southwest Water Company (SWC) owns and operates a desalting facility to treat up to 5 mgd of highly mineralized groundwater for the City of San Juan Capistrano. The groundwater is also contaminated with iron and manganese. Trussell Technologies, Inc. assisted the SWC in a project to rehabilitate the desalter. Trussell Tech diagnosed the cause of membrane fouling, identified changes in chemical feed methods to prevent clogging of pipelines with calcium carbonate, recommended changes in pretreatment to prevent future fouling, selected new membranes to replace old membranes which had ceased to meet requirements, met with CDPH and Southwest Water to discuss CDPH requirements and provided support to Southwest during implementation.
Role: Technical Director

Coachella WD - MWH
Title: Ion Exchange to Remove Arsenic
Date: 2006
MWH had designed ion exchange facilities to remove arsenic from drinking water. The specification included limitations on the Langelier Index of the water produced in order to ensure that old, arsenic-containing, pipe scales in the distribution system would not be compromised. Some of the IX facilities were having difficulty meeting this requirement. Trussell Technologies was asked to analyze the cause of the problem.
Role: Technical Advisor

West Basin Municipal District-MWH
Title: Scoping Study for the Design of a 0.5 mgd Ocean Desalination Demonstration Facility
Date: 2006
Trussell Technologies was part of the MWH team selected to do a comprehensive scoping study for the design of a 0.5 mgd ocean desalination demonstration facility. Trussell Tech did the Water Assessment, looking at all water quality questions, both for the permeate and for environmental discharges. Trussell Tech also did assessments of pretreatment alternatives as well as reviewing the remainder of the preliminary design.
Role: Project Advisor

Hankuk Engineering Company
Title: Sungnam Water Treatment Plant
Date: 2006-2007
Hankuk Engineering Company (HEC) had been retained by the KOWACO, the largest water utility in So. Korea to upgrade KOWACO’s largest water treatment plant. Trussell
Technologies traveled to Korea to review the project and provided advice on the design of systems for ozonation and granular activated carbon for removing the unusually high levels of 2-methyl iso borneol and geosmin in the raw water supply.  
**Role:** Project Manager  

**Hankuk Engineering Company**  
**Title:** Seoul Water Treatment Plant  
**Date:** 2006  
Hankuk Engineering Company (HEC) had been retained by the City of Seoul, So. Korea to design a new, large water treatment plant. Trussell Technologies provided advice to HEC regarding the design of deep bed granular media filters.  
**Role:** Project Manager  

**MWD- Geopentech**  
**Title:** Review of Perchlorate Treatment near Las Vegas Wash  
**Date:** 2006-2007  
Geopentech was conducting a study for MWDSC on the contamination of Lake Mead with perchlorate being discharged by former rocket fuel manufacturers whose wastes are tributary to the Las Vegas Wash. Trussell Tech was retained, together with Black and Veatch to review treatment processes being used or proposed by those industries to remove perchlorate and to advise MWDSC s to their efficacy.  
**Role:** Project Manager  

**Sydney Water Corporation – SKM - Reiss Env.**  
**Title:** Sydney Water Reuse Program  
**Date:** 2006  
Trussell Technologies was a member of the team examining reuse alternatives for Sydney Water. The work includes an extensive review of existing use of advanced treatment for reuse.  
**Role:** Project Manager  

**Castaic MWD - Carollo Engineers**  
**Title:** AwwaRF Project 3182 – An Electrochemical Reactor to Minimize Brominated DBPs: Impact on Coagulation and Ozonation  
**Date:** 2006  
Along with Castaic MWD, Carollo Engineers is conducting bench and pilot studies examining a new innovative electrochemical reactor to minimize the formation of brominated DBPs during disinfection.  
**Role:** Technical Adviser  

**MWH-ARD**  
**Title:** WERF Pharmaceuticals Study  
**Date:** 2006  
Under the auspices of an unsolicited proposal to WERF, the MWH Applied Research Department conducted a study examining the effectiveness of alternative biological process on the removal of pharmaceuticals and personal care products. Among other things the study demonstrated that an SRT of over 10 days ensures much greater removal. Dr. Trussell is an adviser on the project  
**Role:** Technical Adviser  

**LACSD- Kennedy-Jenks Engineers**  
**Title:** WERF Disinfection Study  
**Date:** 2006  
Working in conjunction with the Los Angeles County Sanitation Districts, Kennedy-Jenks Engineers is conducting a WERF on alternatives for the disinfection of wastewater. The study includes an extensive survey of existing practice. Dr. Trussell is an adviser on the project  
**Role:** Technical Adviser  

**Tucson Water- Malcolm Pirnie**  
**Title:** Tucson Water, Water Quality and Implementation Program  
**Date:** 2006 - 2007  
MPI was retained by Tucson Water to conduct an extensive study of alternatives for augmenting the City’s water supply. Part of the program includes review by a panel of six independent outside experts. Dr. Trussell was a member of that panel  
**Role:** Panel Member  

**Clark County Water Reclamation District**  
**Title:** Cost Estimate for the Addition of Membrane Filtration to CCSD’s advanced wastewater Treatment Plant  
**Date:** 2006  
Clark County Water Reclamation District retained the services of Trussell Technologies to prepare an independent estimate of the cost of constructing a 30 mgd tertiary membrane facility
at their Advanced Wastewater Treatment Plant. The estimate included the cost of several alternatives, including two alternative Greenfield facilities, as well as a possible retrofit to existing alum flocculation basins.

Role: Technical Advisor

**Water Replenishment District of Southern California**
Facility Evaluation and Resolving Membrane Fouling at the Leo Vander Lans Water Treatment Facility
Year: 2008
Trussell Technologies, Inc. has been retained by the District as a membrane and process consultant to optimize the performance of a 3 MGD MF/RO reclamation plant. Trussell Tech is tasked with analyzing the performance and condition of the MF and RO membranes, probing the causes of membrane fouling, and identifying the key foulants causing the sub-optimal plant performance. The task also includes development of a cleaning protocol so that foulants from the full-scale RO trains can be removed. In addition, Trussell Tech will provide recommendations on how best to operate the LVL Facility to minimize future membrane fouling rates.

Role: Technical Advisor

**Separation Processes, Inc.**
Title: Treatment Alternatives for Removing Barium from CAP Water
Date: 2006
SPI was doing a study on the alternatives for desalinating CAP water and the precipitation of barium sulfate had been identified as limiting water recovery. Trussell Technologies explored treatment alternatives, including lime softening and ion exchange. The outcome of the project was a unique ion exchange strategy that cuts costs by taking advantage of the higher preference of most cation resins for barium ion.

Role: Technical Director

**Metropolitan Water District and Participating Water Agencies**
Title: Cost Alternatives for Reducing Contaminants of Concern from the Discharge of the Sacramento Regional Wastewater Treatment Plant
Date: 2006
MWD So. Cal., on behalf of a group of fifteen water agencies using water drawn from the Sacramento-San Joaquin Delta, retained Trussell Technologies, Inc. to develop an estimate of the cost of meeting five alternative levels of four contaminants of concern (orthophosphate, total inorganic nitrogen, total organic carbon and C. parvum) from the discharge of the Sacramento Regional Wastewater Treatment Plant. The estimate included the cost of converting all, or portions of the existing HPOAS facility, to more modern nutrient removal processes ranging from the Modified Ludzack-Ettinger process to a modified Bardenpho process.

Role: Principal-in-Charge

**Rick Brady & Associates – Camp Pendleton Marine Corps Base (MCBCP)**
Title: Investigation of Copper Mitigation Measures for the North System
Date: 2006 - present
Through Rick Brady & Associates, MCBCP retained the services of Trussell Technologies to provide assistance in troubleshooting and resolving the recent copper problems in the groundwater supply of the Northern system on the base.

Role: Project Manager

**Los Angeles Superior Court**
Title: Appraiser, LASC Case No. BC 315186 City of Santa Monica v. Baron & Budd P.C. et al.
Date: 2005 - 2007
Dr. Trussell was appointed by Superior Court Judge David Minning as the Appraiser in a suit between Santa Monica and a group of attorneys that had represented the City in an earlier suit. The Appraiser’s assignment was to determine the value of the Settlement in that earlier suit. The Appraisal involved estimating the cost to design, permit, build and operate a water treatment plant to remove methyl tertiary butyl ether and tertiary butyl alcohol from groundwater until the groundwater was no longer contaminated. The project involved the 10% design of a $60M UV/H₂O₂ advanced oxidation facility followed by GAC adsorption. Dr. Trussell...
organized an extensive team of outside consultants to accomplish the effort.

**Role:** The Appraiser

**Rick Brady & Associates – Camp Pendleton Marine Corps Base (MCBCP)**

**Title:** Investigation of Copper Mitigation Measures for the North System  
**Date:** 2006-2007

Rick Brady & Associates retained the services of Trussell Technologies to provide assistance in troubleshooting and resolving the operational problems experienced with the new iron and manganese removal facility in the Southern water system at Camp Pendleton.

**Role:** Project Manager

**Bureau of Reclamation**

**Title:** Review of Bureau Plans for a System to Treat Agricultural Runoff  
**Date:** 2005 - 2006

When the Bureau of Reclamation committed to build aqueducts to serve farms in the San Joaquin Valley, it also committed to construct a drain to remove salt-laden agricultural runoff. The so called “San Joaquin Drain” ran into serious environmental opposition and was never completed. Nevertheless, the courts maintained that the USBR continued to have the responsibility to provide for disposal of the agricultural drainage. To resolve the issue, the Bureau has undertaken an extensive program of treatment research. Trussell Technologies has been retained to review the output from that program.

**Role:** Project Manager

**Rick Brady & Associates – Camp Pendleton Marine Corps Base (MCBCP)**

**Title:** Investigation of Lead Mitigation Measures for the South System  
**Date:** 2005 - 2006

Through Rick Brady and Associates, MCBCP retained the services of Trussell Technologies to provide assistance in troubleshooting and resolving the recent lead problems in the groundwater supply of the Southern system on the base.

**Role:** Project Manager

**MWH – San Francisco Public Utilities Department**

**Title:** Comprehensive Report on Lead and Copper Rule Compliance  
**Date:** 2005 - 2006

Working with MWH, Trussell Technologies was retained to prepare a comprehensive report on the implementation of the lead and copper rule in the San Francisco Water System, and in the Regional Water Systems also served by SFPUC. The study addressed past and current practice, compared it to the practices of several other U.S. cities treating similar water supplies and recommended pH adjustment as corrosion control treatment. The study also included an extensive assessment of the impact of this strategy on the protection of cement-based assets in the system and made recommendations to maximize their protection. Finally the study examined the rational for water quality parameters in the system to address copper and lead rule requirements. In the end all the recommendations of the study were approved by CDHS. At the present time SFPUC is conducting monitoring of consumer plumbing to confirm the success of the program.

**Role:** Project Manager

**Desalination and Water Reuse Task Force**

**Title:** State-of-the-Science Report on Membranes  
**Date:** 2005

Trussell Technologies has been retained by the D&WRTF to develop a state of the science report on membranes in desalination and reuse. This report is one of three reports to be used by the group to identify information gaps to be supported by its research monies.

**Role:** Project Manager

**City of Carlsbad, CA**

**Title:** Assessing Boron and Chloride in Desalted Seawater  
**Date:** 2005

The City of Carlsbad, CA., is evaluating a proposal where Poseidon Resources, Inc. would provide desalted water to the City. Trussell Technologies has been retained to assist the City in understanding alternatives for improving the removal of boron and chloride, and in conducting investigations to understand the impact of future
硼和氯化物对植物生命的影响。
**Role:** Project Manager

**Metropolitan Water District of Southern California**
**Title:** Review Panel on Recreation in Lake Perris
**Date:** 2005
MWD retained a panel of specialists to review a study conducted examining the impact of recreation on the microbiological quality of the water in Lake Perris, and the alternatives for reducing its impact. Dr. Trussell was a member of that panel.
**Role:** Consultant

**City of Carlsbad, CA**
**Title:** Assessing Corrosiveness of Desalted Seawater
**Date:** 2005
The City of Carlsbad is evaluating a proposal where Poseidon Resources, Inc. would provide desalted water to the City. Trussell Technologies was retained to assist the City in understanding and reviewing the plans for conduct of studies to assess the corrosiveness of the desalted water.
**Role:** Project Manager

**MWDA-Geopentech**
**Title:** Perchlorate and the Colorado Aqueduct
**Date:** 2005
Geopentech has been retained by the Metropolitan Water District of Southern California to examine several issues related to gaining a better understanding of the history and fate of perchlorate in the Colorado River Aqueduct. Dr. Trussell serves as a project consultant on questions of treatment and water chemistry.
**Role:** Consultant

**EPA Office of Water**
**Title:** Estimate of National Occurrence of Waterborne Disease Associated with Community Water System Drinking Water
**Date:** 2005
In September 2005, the EPA prepared a paper entitled, "Estimating the National Occurrence of Waterborne Disease Associated with Community Water System Drinking Water." The report was a preliminary estimate of GI illness attributable to drinking water. Dr. Trussell was retained by the U.S. EPA as an independent reviewer to comment on the analysis in the paper and on its conclusions.
**Role:** Independent Reviewer

**MWH Constructors**
**Title:** Northeast Water Purification Plant
**Date:** 2004
MWH Constructors built a 40 mgd water purification plant to treat water from Lake Houston and serve portions of the City of Houston. Dr. Trussell was retained to provide consulting services on the treatment process during startup.
**Role:** Project Consultant

**MWRA**
**Title:** Lead and Copper Rule/Corrosion Strategy for the Greater Boston Area
**Date:** 2004
For more than 20 years, MWRA has been struggling to find the water treatment necessary to control the corrosion of lead to levels that will allow it to comfortably meet the EPA Lead and Copper Rule. In the Fall of 2004, the utility faced a particularly important milestone where it must meet the lead action level. MWRA staff organized a five-member Panel of nationally recognized experts to review their past actions and to provide advice on future actions that might be taken. Dr. Trussell was a member of that panel.
**Role:** Panelist

**San Diego Water Authority**
**Title:** Twin Oaks Valley DBO
**Date:** 2004
Dr. Trussell was a member of a five-member Board of Senior Consultants retained by the San Diego Water Authority to act as an independent expert body to support the Water Authority during its effort to proceed with a design-build-operate procurement for a 50 to 100 mgd water treatment plant in northern San Diego County.
**Role:** Board Member

**Carollo Engineering**
**Title:** Water Treatment Consulting
Date: 2004-present
The firm of Carollo Engineering established a general contract for the services of Dr. Trussell to assist the firm in its water treatment efforts.

**Role:** Consultant

**McGuire and Associates**
**Title:** Reservoir Augmentation in San Diego, CA  
**Date:** 2004
Teamed with PBS&J, McGuire and Associates was retained to review alternatives for recycling in the City, specifically reservoir augmentation. Dr. Trussell was part of the technical team that will provide technical analysis of treatment alternatives and assessment of potential contaminants.

**Role:** Consultant

**EPA-Environomics**
**Title:** Review of Washington D.C. Lead Problem  
**Date:** 2004
In July 2002, and in two subsequent samplings, the lead levels in Washington, D.C. tap water have suddenly increased. On behalf of the EPA Office of Water, the firm of Environomics retained Dr. Trussell and three additional national experts to review the efforts being made to address the problem.

**Role:** Consultant

**City of Carlsbad, CA**
**Title:** Poseidon Agreement  
**Date:** 2004
The City of Carlsbad is evaluating a proposal where Poseidon Resources, Inc. would provide desalted water to the City. Trussell Technologies, Inc. was retained by the City to provide advice on the technical aspects of the agreement between Poseidon and the City.

**Role:** Consultant

**City of Carlsbad, CA**
**Title:** Impact of Desalting on Cost of Water  
**Date:** 2003-2004
The City of Carlsbad evaluated a proposal where Poseidon Resources, Inc. would provide desalted water to the City. Trussell conducted an analysis which compared the cost of desalted water to the cost of imported water over a 20-year horizon.

**Role:** Consultant

**Portland Water Bureau - Murray, Smith and Associates, Inc.**
**Title:** Portland, OR. Blending and Operations Study  
**Date:** 2003-2004
The Portland Water Bureau is considering augmenting the Bull Run Water Supply with local water near the Bull Run Headworks. Through MWH and Murray, Smith and Associates, Dr. Trussell was retained to provide technical review on the effort.

**Role:** Consultant

**Brown and Caldwell**
**Title:** Water Treatment Consulting  
**Date:** 2003-2004
The firm of Brown and Caldwell established a general contract for the services of Dr. Trussell to assist the firm in its water treatment efforts.

**Role:** Consultant

**Chino Basin Watermaster - Black and Veatch**
**Title:** Removal of Perchlorate, Nitrate, Arsenic and Synthetic Organics in Chino Basin Groundwater  
**Date:** 2003-2004
The firm of Black and Veatch retained Dr. Trussell to assist the firm in a review of approaches to the removal of nitrate, perchlorate, arsenic, and selected synthetic organics from groundwater in the Chino Basin.

**Role:** Consultant

**Denver Water Board - MWH**
**Title:** Denver Water Moffat Water Supply Project Indirect Potable Recycling White Paper  
**Date:** 2003-2004
The City of Denver is experiencing extreme water shortages and has retained the Denver office of MWH, Inc. to assist them in developing an indirect potable reuse project for the water supply for the Moffat water treatment plant. Dr. Trussell was retained as a member of an Advisory Panel to review a white paper for the project.

**Role:** Consultant

**Arapahoe County Water and Wastewater Authority - Richard P. Arber and Associates**
Title: TAC, Water Purification Project for Arapahoe County Water and Wastewater Authority
Date: 2003
The Arapahoe County Water and Wastewater Authority (ACWWA) and the Cottonwood Water Sanitation District (CWSD) are located in a part of Colorado near Denver that is experiencing extreme water shortages. The two utilities have retained Richard Arber and Associates to assist them in developing an indirect potable reuse project using the alluvium adjacent to Cherry Creek. Dr. Trussell was retained as a member of an Advisory Panel for the project.
Role: Consultant

MHW, Inc. Applied Research Department
Title: USBR MBR Pilot Study
Date: 2003
MWH’s ARD group has been conducting a long-term pilot-scale study of four Commercial MBR technologies for possible application for water reclamation at the Point Loma WWTP for the City of San Diego. Dr. Trussell was retained as a member of an Advisory Panel for the project.
Role: Consultant

City of Torrance
Title: Remediation of the Madronna Marsh
Date: 2003
The City of Torrance maintains the Madronna Marsh as one of the last remaining examples of the vernal marshes that once dotted the Pacific Flyway. The Marsh had been subjected to significant pollution and had been substantially impacted. Dr. Trussell was retained to review the situation and advise on possible remediation alternatives.
Role: Consultant

MWH, Inc. Las Vegas
Title: Application of Membrane Filtration and MBR to phosphate reduction
Date: 2003
MWH retained Dr. Trussell to assist in the review of alternatives using membrane filtration and MBR for phosphate reduction at the Clark County Sanitation District. The review included detailed discussions with four manufacturers about the cost of MBR.
Role: Technical Advisor

Role: Consultant

Metropolitan Water District of Southern California
Title: Chlorine/Chlorine Dioxide Alternatives Study
Date: 2002-2003
At the request of several of its member agencies, the Metropolitan Water District of Southern California conducted bench, pilot and full-scale studies examining alternatives to ozonation as a treatment strategy for the three plants it operates which blend Colorado Water and State Project Water. The District assembled a panel of experts to review the progress of that study.
Role: Panel Member

Portland Water Bureau/US EPA
Title: Panel to Review Methods Copper Lead Rule Compliance
Date: 2002
Portland, Oregon has been having difficulties meeting the lead rule; in spite of changes made in chemical treatment. With the U.S. EPA, the Water Bureau convened a blue ribbon panel of experts to review recent treatment practices and recent lead sampling data and to help the Bureau consider alternatives for addressing the issue.
Role: Panel Member

AWWARF/EPA/MWH
Title: Treatability of Perchlorate in Groundwater Using MfBR Technology—Phase III
Date: 2002-2003
The pilot-scale design from the earlier study was revised and improved. They continued to remove perchlorate and showed considerably more promise for scale-up. Nevertheless, significant scale-up issues remain. The process was also shown to be capable of removing perchlorate and nitrate from ion exchange brine.
Role: Technical Advisor

City of San Diego
Title: Membrane Bioreactor Study
Date: 2001-2003
In a U.S.B.R funded study, the City examined four different alternative OEMs for MBR that might be applied at the City’s Point Loma WWTP. The evaluation included application of these...
technologies, both before and after enhanced primary treatment. Costs were also prepared for a 1, 5, and 10 mgd reclamation facility using the technology.

**Role:** Technical Advisor

**AWWARF/EPA/MWH**

**Title:** Treatability of Perchlorate in Groundwater Using MfBR Technology--Phase II  
**Date:** 2002-2003  
The pilot scale design for a membrane fiber biological reactor (MfBR) to remove both nitrate and perchlorate from groundwater was built and operated at a La Puente well site. The study established the feasibility of the process, but raised some significant scale-up issues.

**Role:** Chair of Technical Advisory Group

**City of San Diego**

**Title:** Upgrading the Otay Water Treatment Plant  
**Date:** 2002  
The City was considering several alternatives for remodeling their Otay Water Treatment Plant, so that is could comply with upcoming regulations. The City’s budget had been severely cut and a special study was conducted to examine alternatives. Issues included meeting the requirements of the interim enhanced surface water treatment rule and upcoming requirement on disinfection byproducts.

**Role:** Peer Reviewer

**IONICS, INC.-MWH**

**Title:** Pretreatment for 36 mgd desalter at Point Lisas, Trinidad  
**Date:** 2001-2002  
Ionics, Inc. prepared the successful bid for the desalter to provide drinking-quality water for the Trinidad and Tobago Water and Sewage Authority. The desalter was constructed with an ultimate capacity of 30 mgd. MWH Inc. was charged with design of the system to pretreat the water for the seawater reverse osmosis (SWRO) as well as certain other support facilities. Based on Ionics’s experience with projects at other locations, the bid was prepared to include coagulation, sedimentation, and two-stage, dual-media filtration. After the Ionics team was selected, Dr. Trussell led a more detailed evaluation of pretreatment options, recommending coagulation and sedimentation followed by a single-stage, deep-bed, dual media filter. Pilot tests conducted in parallel with construction demonstrated the validity of the improved filter design, allowing for the elimination of the second stage of filtration.

**Role:** Technical Consultant

**AWWARF/EPA/MWH**

**Title:** Treatability of Perchlorate in Groundwater Using MfBR Technology--Phase I  
**Date:** 2001-2002  
Northwestern University had developed and patented a biological process for the removal of perchlorate and nitrate using only hydrogen gas. This study was to further develop the process at bench scale and to design the reactor for a further pilot-scale study.

**Role:** Technical Advisor

**East Bay Municipal Utilities District**

**Title:** Treatment alternatives to meet emerging regulations  
**Date:** 2002  
The Districts asked Dr. Trussell to review an alternatives analysis that District Staff had prepared with the assistance of consultants, to address emerging contaminants.

**Role:** Technical Advisor

**AWWARF/EPA/MWH**

**Title:** Treatability of Perchlorate in Groundwater by Ion Exchange Technology—Phase I  
**Date:** 2000-2002  
Evaluated, through proof-of-concept laboratory studies, the feasibility of an optimized ion exchange process for treating low concentration perchlorate contamination of groundwater.

**Role:** Technical Advisor

**AWWARF/University of Houston/MW**

**Title:** Treatability of Perchlorate in Groundwater by Ion Exchange Technology—Phase I  
**Date:** 2000-2002  
Evaluated, through proof-of-concept laboratory studies, the feasibility of an optimized ion exchange process for treating low concentration perchlorate contamination of groundwater. Further research will be conducted in project.

**Role:** Technical Advisor
Aerojet General
Title: GET/E/F Treatment Study on Perchlorate Removal
Date: 2001-2002
Aerojet ran a three-year study developing and testing a biological process for Perchlorate Removal at pilot and full-scale. Dr. Trussell served as a member of a Blue Ribbon Panel that reviewed the progress of the study.
Role: Panel Member

Los Angeles Department of Water and Power
Title: Conversion to Chloramines for Residual Maintenance
Date: 2000-2002
In seeking to meet upcoming changes in the regulation of disinfection byproducts, Department staff had written a white paper recommending converting the system to chloramines for residual maintenance. Implementing the decision is complicated by the sheer size of the system and by the number of large open, finished water reservoirs. MW was retained to do a comprehensive study examining the feasibility of conversion to chloramines and identifying the key projects that would be required to make implementation possible.
Role: Technical Advisor

Northwestern University/Montgomery Watson
Title: Application of Bioreactor Systems to Low-Concentration Perchlorate-Contaminated Water
Date: 1999-2001
Evaluated the efficiency of a biological process to reduce perchlorate concentrations of up to 1,000 micrograms per liter to levels of 4 - 18 micrograms per liter. Evaluated the impact of co-contaminants on process performance, characterize process effluents, and define post treatment requirements. Included pilot-scale testing. Process received a U.S. Patent.
Role: Technical Advisor

Portland Water Bureau
Title: Conduct of Bench Studies with Medium and LowPressure UV
Date: 1999-2001
The Portland Water Bureau, as a conduit for a group of several of the largest unfiltered water agencies has asked MW to conduct bench studies to confirm the inactivation of Cryptosporidium with medium pressure UV, to establish if infectivity studies will show that same inactivation with low pressure UV, and to determine if these technologies will also cost effectively address Giardia and viruses.
Role: Technical Director

Los Angeles Department of Water and Power
Title: Conduct of Bench and Pilot Studies with Medium Pressure UV
Date: 1999-2001
The Los Angeles Department of Water and Power is under the process of applying for a permit to avoid filtration at the Encino and Stone Canyon Reservoirs. A critical part of the City's long-term plan is the use of medium pressure UV for control of Cryptosporidium. In order to get a permit under the SWTR, the technology must be approved by the State and EPA for its effectiveness in removing Giardia and enteric viruses as well. The project will include bench studies to develop survival curves for Cryptosporidium, Giardia and enteric viruses; the development of a public-domain model to calculate the UV dose for a given full-scale reactor; pilot studies to confirm the model and bench-scale results and the development of a technique to confirm the RTD in the reactor meets standards.
Role: Technical Director

Los Angeles Department of Water and Power
Title: Filtration Avoidance Criteria
Date: 1998-2001
The Los Angeles Department of Water and Power is under direct order from the California Department of Health Services to filter the water at Stone Canyon Reservoir. Local citizens hired an outside consultant that recommended that medium pressure UV be used in place of filtration. MW was retained to review the consultant's recommendation and later, to help the Department pursue an application for avoiding the filtration requirement.
Role: Technical Director

City of San Diego
Title: Repurification
Date: 1998-1999
The repurification project was proposed implementation of indirect potable reuse and involved extensive study. Managing operations, coordinating sampling, organizing/ordering lab supplies, performing seeding experiments, data collection and data analysis were routine tasks performed during this project.  
**Role:** Technical Director

### Australian Water Services

**Title:** Cryptosporidium Crisis  
**Date:** 1998  
Early in the 1990’s MW was part of a four-firm consortium that designed the Prospect Water Filtration plant, a 3,800 mL/day water treatment plant that is the largest of three plants serving the Metropolitan Area of Greater Sydney. In July 1998, a local laboratory reported levels of Cryptosporidium in the distribution system as being unusually high. Recognizing that its client may be at risk, MW appointed Dr. Trussell to follow up. Dr. Trussell followed the issue through the crisis and, in consultation with the client, sent two specialists to Sydney; one, a nationally recognized expert in treatment for cryptosporidium removal worked in the client’s offices for three months, helping them deal with the crisis. The other, MW’s principle engineer with the most recent experience in designing a large scale ozone system, went to Sydney and worked with the local office to produce a predesign and cost estimate for this important treatment alternative. By assisting the client to stay ahead of the problem, MW was able to help them stay out of trouble during the crisis.  
**Role:** Appointed MW Representative

### The San Benito County Water District

**Title:** Membrane Feasibility Studies  
**Date:** 1998  
The San Benito County Water District is interested in examining aquifer storage and recovery as a means for augmenting their water supply in areas where recharge through surface spreading is not possible. Studies will examine the feasibility of membrane filtration as a pretreatment for the injection process.  
**Role:** Technical Director

### The North Holland Water Authority (PWN) Amsterdam, Netherlands

**Title:** The PWN Hermskeerk WTP,  
**Date:** 1993-1995  
Dutch water utilities are facing increasingly strict standards for the drinking water. Meanwhile, the quality of the River Rhine, their principle supply, continues to decline due to municipal, industrial and agricultural discharges from countries upstream, particular France and Germany. PWN, a drinking water utility that serves a part of Amsterdam, draws an increasing portion of its supply indirectly from the Rhine and faces increased mineralization, more organics, and more microbiological contaminants. Meanwhile new Dutch drinking water standards have been established. Dr. Trussell served the technical reviewer for a scoping study MW and it's Dutch partner, Witeeven + Bos, recently completed. Two basic alternatives were chosen for further study, conventional treatment followed by reverse osmosis, post ozonation, and GAC and conventional treatment followed by ultrafiltration and reverse osmosis. As a result of that effort, the MW/W+B team is now embarked on a predesign study for a 75 mgd plant that includes choosing among these processes. Dr. Trussell assembled a unique team from MW's operations in the U.S., Australia, Holland, and England to complete the project.  
**Role:** Technical Advisor

### Portland Water Bureau, Portland, OR

**Title:** Corrosion Study  
**Date:** 1993/95  
The Portland Water Bureau retained MW to conduct an evaluation of treatment and non-treatment alternatives for optimizing the reduction of lead and copper corrosion byproducts in consumer plumbing. The study involved pilot studies of elevating the pH, elevating the pH and the alkalinity, adding orthophosphate, and adding silicates as well as an extensive evaluation of non-chemical options.  
**Role:** Technical Advisor

### East Bay Municipal Utilities District, Oakland, CA

**Title:** Blue Water Project  
**Date:** 1991-1993
Black Hawk, CA: A mysterious corrosion problem developed in the copper plumbing of approximately one thousand homes in some of the most expensive developments in the EBMUD service area. The problem manifested itself when water with a deep blue color sporadically emanated from taps in these homes. It took three years and substantial resources to solve the problem in a cooperative effort between, EBMUD, the developers, the plumbers, the manufacturers of building materials, various City and County building authorities, and the Alameda County Department of Health Services. A large number of corrosion specialists were involved and a number of public meetings, press conferences and TV interviews were also held. At one point a local talk show host came on site and made it his mission to solve the problem. As the lead technical advisor to EBMUD, Dr. Trussell provided guidance for the technical investigation and helped the District represent itself to citizens, to other outside experts, to the developers, and to the Health Department.

**Role:** Technical Director

**The Rotterdam Water Authority, Rotterdam, Netherlands – Witeven+Bos**

**Title:** The Berenplaat Expansion

**Date:** 1993/95

The Berenplaat, the largest water treatment plant in Holland (155 mgd) and the place where the THMs were originally discovered, takes water from the River Rhine, treats it, and serves it to the City of Rotterdam. The water is currently treated with conventional lime softening, filtration and chlorine disinfection. Dutch citizens are very concerned about the unpleasant chlorine taste in their water and about the potential health risk associated with the by-products of chlorination. As a result, Rotterdam has set a goal of treating River Rhine water so thoroughly that no chlorine residual is necessary in the distribution system. Dr. Trussell was a key technical reviewer on a MW/W+B team from three countries that worked with staff at the Berenplaat as well as KIWA, the Dutch Water Research Center, to develop the process for the plant. The proposed process, which includes ozonation, biologically active carbon, aeration, a second stage of physiochemical carbon adsorption, and disinfection with ultraviolet light has been verified with large scale pilot studies.

**Role:** Technical Advisor

**Melbourne Water Board, Melbourne, Australia**

**Title:** Workshop on Nutrient removal in Municipal Wastewater Treatment

**Date:** 1994

The Melbourne Water Board was having problems with stimulation of algal growths in the waterways for which it had jurisdiction and nutrients being discharged from municipal wastewater treatment plants had bee implicated. The Water Board retained Montgomery Watson to convene a workshop with technical experts on the subject and to produce a state of the art report on technologies for nitrogen and phosphorus removal from municipal effluents. As lead technologist for the project, Dr. Trussell served as convener for the workshop and editor of the report.

**Role:** Convener/Editor

**Sydney Water Board, Sydney Australia**

**Title:** Sydney Water Board Drinking Water Program

**Date:** 1990-1994

At the present time virtually all the water supplying the City of Sydney, Australia receives chloramination as its only treatment. As a result of more restrictive regulations as well as rising consumer standards, a decision was made to treat the water supply. Ultimately Sydney plans on building four new water plants ranging from 60 to 950 mgd in capacity. The Sydney Water Board is self-regulating and Dr. Trussell, as part of The Prospect Group, a venture involving MW, CDM and two Australian engineering firms, worked with the Board to help resolve certain key elements of their water quality standards and to conduct pilot, prototype studies and a predesign work for two of the four plants - including the 950 mgd Prospect Plant. Eventually it became clear that Sydney would privatize the construction and operation of these plants. Dr. Trussell was instrumental in bringing together members of Australian Water Services (AWS), the company that won the contract for the largest of the four plants. At the present time the Prospect Group is
working for AWS, completing the design of the plant

Role: Technical Advisor

Portland Water Bureau, Portland, OR
Title: Filtration Study
Date: 1989-1992
Following the passage of the EPA Surface Water Treatment Rule, the Portland Water Bureau retained MW to do pilot and predesign studies of the Bureau's Bull Run Supply. Extensive pilot and predesign studies were conducted, including extensive work establishing the effectiveness of free chlorine, combined chlorine and ozone on the disinfection of *Giardia lamblia*. Dr. Trussell was a regular technical advisor on this effort which involved interaction with two blue ribbon panels composed of technical experts from around North America (one on water treatment and one on disinfection of *Giardia lamblia*). Both of the technical panels had representatives from the Oregon State Department of Health Services and the EPA. Public input was also important and included workshops and focus groups with stakeholders as well as ordinary citizens.

Role: Technical Advisor

Palm Beach County Utilities District: MW was retained by PBCUD to operate as the District's engineer for two five year periods. During that period Dr. Trussell served as a key technical advisor in an evaluation of methods for enabling the system to meet the new coliform rule, in pilot studies evaluating ozonation as an alternative for color removal, in the design of full scale ozonation facilities, and in the conduct of pilot studies to deal with biodegradable carbon resulting from the ozonation process.

Coalition of West Coast Suppliers: The EPA Lead Rule: During the period when the EPA was developing the Lead and Copper Rule, Dr. Trussell worked with an informal consortium of water suppliers (Portland, OR, Seattle and Tacoma, WA, San Francisco, CA, East Bay Municipal Utilities District, Oakland, CA, American Water Works Service Co., Paramus, NJ, and New York City, NY) to ensure that the EPA had the best possible data for making decisions on the lead rule. The effort included helping to organize the utilities, several meetings with the group and with the EPA, collecting, compiling and organizing data for EPA's consideration and informal meetings with EPA to help ascertain the meaning of the data. These efforts helped the EPA to balance some practical considerations as well as the concerns of Congress in their decision making.

Contra Costa Water District - Randall-Bold WTP - The Contra Costa Water District was searching for a way to reduce the cost and increase the appeal of a project involving a water plant that would serve the Eastern zone of their District. Working with staff, Dr. Trussell developed a new process that reduced capital cost while also improving the flavor of the water, providing a barrier against pesticide spills from Delta agriculture, and eliminating the byproducts of chlorination almost entirely. Because the process was new, extensive pilot and prototype studies were required, both to verify the technical performance of the process and to allow the Health Department to review evaluate it. Today Contra Costa has one of the most advanced water treatment plants in the country, producing unusually low turbidities, THMs below 10 g/L, and a water of excellent taste.

Portland Water Bureau - Corrosion Study: In the early 1980's the Portland Water Bureau was challenged by the Citizens for a Lead-Free Environment who asserted that the Portland water supply resulted in excessive lead levels in consumer plumbing. After extensive interviews, the Water Bureau retained MW with Dr. Trussell in charge to conduct a study to examine the question. The progress of the effort, that included extensive sampling in consumer's homes, was reviewed by a Panel of local Citizens convened for that purpose. As a result of the study, 50/50 lead solder was banned in the State of Oregon. MW is still working with the Water Bureau on the corrosion issues today.

Coalition of U.S. Unfiltered Supplies, During the period when the EPA was developing the Surface Water Treatment Rule, Dr. Trussell worked with the City of Portland in assembling a consortium of unfiltered water supplies (Portland,
OR, Seattle and Tacoma, WA, San Francisco, CA, Casitas, CA, and New York City, NY) and in ensuring that the EPA had the best possible understanding of the practices and circumstances that made these water supplies safe. As a result of these efforts, the EPA visited the watersheds of most of these utilities and incorporated provisions in the final rule that allowed them to maximum potential to continue operation.

**East Bay Municipal Utilities District / Contra Cost Water District - Water Supply Quality Study:** MW was retained by the East Bay MUD and the Contra Costa WD to organize and evaluate a comprehensive water program to assess water quality in the current sources of supply for these utilities as well as alternate sources of water that both were considering throughout the Sacramento/San Joaquin River System. This survey included extensive sampling and analysis of raw waters throughout the northern California area and preparation of a report that addressed treatment of these supplies under a variety of conditions and mixes. Dr. Trussell was Project Manager.

**Beaver Creek Water District:** MW was retained to do a master plan, conduct pilot studies and for the design and construction supervision of a new water treatment plant for the District. Dr. Trussell served as a key technical advisor for the project.

**Valley County Water District/EPA - Air Stripper:** The VCWD retained MW to conduct extensive pilot studies for determining design criteria for removing organic solvents from their groundwater supply. These studies were then used in the design of an air stripper on one of the most heavily contaminated wells in the San Gabriel Valley. Dr. Trussell was Project Manager.

**Portland Water Bureau - pH Adjustment Study:** MW was retained by the Portland Water Bureau to conduct a pilot study of alternatives for adjusting the pH of Portland water. A number of options were considered and a pilot plant was constructed and operated to observe the stability of the water quality that resulted. Dr. Trussell was the principle investigator for this project.

**Kaiser Steel – Groundwater Plume Characterization:** MW was retained by the Kaiser to drill monitoring wells and produce a groundwater model describing the scope of the plume of contaminated water due to several decades of discharge of pickle liquor on the steel-mill site. The study resulted in one of the first models of the travel of contaminant plume in Southern California Groundwater. Dr. Trussell was Principle-in-Charge

**Kaiser Steel – Hazardous Waste Evaluation:** MW was retained by the Kaiser to conduct a survey of the Fontana Site to determine the actions required to comply with new Federal Law. The survey identified a number of issues, in particular the potential for a large plume of contaminated water drifting off-site. Dr. Trussell was the principle investigator for this project.

**La Habra - Air Stripper:** MW was retained by the City of La Habra to examine the means for removing organic solvents from the water in a new well the City had recently developed. Pilot studies demonstrated that air stripping would do the job and the first full-scale airstripper in So. California was designed and commissioned as a result. Dr. Trussell was Project Manager.

**Pembroke Pines, FL - Air Stripping Study:** The effluent from the Pembroke Pines WTP had THM levels approaching 1.0 mg/L, 10 times the proposed EPA MCL. Pilot studies demonstrated that air stripping could be effectively employed to remove these THM's after they were formed without removing a chloramine residual. Studies also demonstrated that the remaining TOX was unaffected. Dr. Trussell was principle investigator.

**Contra Costa WD - Air Stripping Study:** MW was retained by the Contra Costa Water District to conduct a pilot study of air stripping as a means for removing THM's from the treated water in the Bollman WTP. These were the first pilot studies that successfully demonstrated effective removal of bromoform from drinking water via air stripping. Dr. Trussell was principle investigator.
**Four Agency Delta Study:** Four major agencies using Delta water retained MW to develop a comprehensive assessment of Delta water using information gathered in the Contra Costa Study as well as additional information gathered by the California Department of Water Resources and the U.S. Bureau of Reclamation. This study compiled the most comprehensive assessment of Delta water quality assembled up to that time. Dr. Trussell was project manager.

**Portland Water Bureau - Corrosion Study:** MW was retained by the Portland Water Bureau to conduct a study of the corrosiveness of the Bull Run Water Supply. The study included a review of that statistics of consumer complaints, collection and analysis of standing and running water samples in consumer plumbing, examination of piping material from the Distribution system, pilot testing simulating consumer plumbing (copper and galvanized), certain pilot scale testing by the Water Bureau on lead release from lead pigtails and frequent interaction with a panel of citizens. One of the principle outcomes was that Oregon was one of the first states to outlaw the use of 50/50 solder for copper tubing in residences. Dr. Trussell was project manager.

**Potomac Estuary Experimental Prototype:** The Baltimore District of the U.S. Army Corps of Engineers is responsible for providing the water supply for the City of Washington, D.C. In the early 1980's, the COE proposed to consider taking water from the lower Potomac Estuary. As most of the water in the estuary would be wastewater during low flow periods, the District was required to conduct a full-scale investigation on the treatment of reclaimed wastewater for potable reuse. A full-scale, 1 mgd treatment facility was constructed and MW was retained to operate the facility and study the quality over a 30 month period. Dr. Trussell was heavily involved in the technical direction of the project, which involved the most extensive chemical analysis and health-effects testing that had ever been done up to that time. Along with the rest of the project team, Dr. Trussell helped present the results of the study to a special Committee of the National Academy of Sciences which had been assembled to review the conduct of the study and its results. The Committee spoke positively about the MW effort.

**Contra Costa Water Quality Study:** MW was retained by the Contra Costa Water District to do a comprehensive assessment of the quality of the water in the Contra Costa Canal as well as other sources of supply in the Delta of interest to the District. This was the first comprehensive assessment of waters in the Delta and included extensive organics assays, virus assays, microbiological assays, asbestos, heavy metals and corrosivity. Dr. Trussell was the Project Manager.

**MWD/EPA Study of Copper-Induced Pitting of Galvanized Pipe:** MW was retained by the Metropolitan Water District of Southern California to conduct a large scale, EPA supported, pilot study on the pitting of galvanized pipe as a result of copper in the water supply. The study not only addressed the copper-induced pitting problem, but also addressed the problem of pipe quality as well. Dr. Trussell was Project Manager for the study.

**The Contra Costa Water District - THMs:** While the THM regulations were under development, Dr. Trussell worked extensively with the Contra Costa Water District to develop alternatives to meet the new regulations. These studies, which included examination of chloramination, ozonation, enhanced coagulation, GAC adsorption, and air stripping, were among the first to demonstrate the cost-effectiveness of chloramination in controlling THM formation. Working with the California Department of Health Services, an agreement was reached to allow the District to use chloramines for residual maintenance provided certain standards of treatment were met and that a short time of disinfection with free chlorine was also provided. This agreement served as a model that Cal DHS followed with numerous other utilities throughout California and which was eventually duplicated in nearly one third of the water supplies in the nation.

**Pitting of Galvanized Pipe in Agoura:** MW was retained to examine the cause of failure of
new galvanized pipe in several hundred homes in a development in the Agoura area. The cause was determined to be copper-induced pitting of the new galvanized pipe. Dr. Trussell was the project Manager.

**EPA Selenium Analysis Study:** EPA retained MW to evaluate alternative methods for differentiating between the principle forms of selenium found in drinking waters. Fluorometric and ion chromatographic methods were evaluated. Dr. Trussell was technical advisor.

**Ramona Water District/EPA - Selenium Removal Study:** MW was retained by the Ramona Water District to conduct a study on methods for removal of selenium from drinking water. Bench and pilot studies demonstrated that activated alumina would be effective but that the oxidation state of the selenium was also important. Dr. Trussell was principle investigator.

**Aguadora de Nicaragua:** The principle water supply for the City of Managua was Lake Asosoca, a collapsed volcanic feature between the City and Lake Managua. A large industrial complex had been constructed between the two lakes and the City was concerned about the potential for contamination being transported in the groundwater from the industries to the City's supply. Dr. Trussell did extensive surveys of the industries as well as chemical testing that demonstrated that small amounts of the organic chemicals being discharged by the industries were already showing up in the drinking water supply.

**Water Factory 21:** Once the Water Factory's R.O. plant was built and began groundwater injection, the California Department of Health Services required that the Orange County Water District, conduct extensive studies demonstrating that the process effectively removed viruses. Dr. Trussell worked with staff at the Water Factory, the California Department of Health Services, the Health Services research laboratory, Montgomery Laboratories, and the University of California Department of Health to develop and manage a five year program that confirmed the high quality of the Water Factory’s product where viruses are concerned.

**Sinotech Pingtung Industrial Waste Design:** Sinotech was retained to design systems to collect and treat the wastes for a large industrial complex being built in Ping Tung. Dr. Trussell served as a technical expert advising Sinotech on the concept of the design, in negotiations with the Taiwan EPA, and in reviewing the detailed design of the facilities.

**C & H Sugar Refinery Heat Dissipation Study:** MW was retained by the C&H refinery in Crockett, California to evaluate the refinery's hot water discharges to the Sacramento River, and to develop alternative means for controlling the problems. The principle source of heat was the barometric condensers. Remedies considered included cooling towers and an outfall that dissipated the hot water in during periods of high tidal flux. Dr. Trussell served as technical director on the Project.

**Dominquez Water Company:** The Dominguez Water Co. retained MW to examine the cause of pitting-type failure of galvanized pipe in some 60 to 80 homes in a development in their water system. Though the cause could not be absolutely determined, copper-induced pitting was the principle suspected cause. Dr. Trussell was the principle investigator.

**California Office of Water Recycling - Reuse in Cooling Towers:** MW did a study of reuse of municipal effluents in cooling towers throughout the United States and as a result of the study, developed criteria for wastewater reuse in cooling towers in California.

**Kenniwick WTP:** The City of Kennewick wished to construct a new WTP drawing water from the Columbia River. MW conducted extensive pilot studies for the City that resulted the design of the first direct filtration plant with pre-ozonation in the United States. Dr. Trussell was the Project Manager.

**Casitas Municipal Water District:** The Casitas Municipal Water District was considering the installation of a 20 mgd water treatment plant for Lake Casitas. Dr. Trussell managed a pilot study which demonstrated that direct filtration would be suitable treatment. The study also addressed the
potential impact of unscheduled shutdowns and sudden demand changes on water quality.

**The Los Angeles Aqueduct Plant:** Dr. Trussell was the technical director for the predesign pilot studies for the Los Angeles Aqueduct Plant. These extensive pilot and full-scale studies were conducted by MW staff as well as the staff of LADWP and resulted in the development of the advanced high-rate, deep-bed filtration process with ozonation which the plant uses today. Because of the importance of the Owens River supply and because of the innovative nature of the process, satisfying the concerns of the California Department of Health Services was a key element in the effort.

**Water Factory 21:** After the Water Factory was built and it became clear that the sea water desalination portion of the project would not be cost effective, MW was retained to help the District explore design alternatives that involved the desalination of the tertiary effluent produced by the Water Factory. The firm developed bid documents for the desalination process (a 5 mgd reverse osmosis plant) and designed the support facilities for the same. Dr. Trussell was involved in evaluating desalination process and assisted in the preparation of bid documents.

**The City of San Diego - Alvarado/Miramar WTP Study:** Once it became clear that the City would be receiving State Project water, MW was retained to do a comprehensive evaluation of both the Alvarado and Miramar WTPs. Dr. Trussell was did much of the process work for both projects. During the effort Trussell demonstrated an inexpensive interim modification of the filter control systems that allowed the plant to successfully operate at a capacity increase of 20%.

**Chino Basin Municipal Water District, Plant No. 2:** Trussell organized and executed a pilot and prototype scale program for evaluating ozonation/direct filtration as a technology for ensuring virus removal from the CBMWD secondary effluent. The process was demonstrated to produce more than 5 logs of reduction of Polio virus and an effluent that was free of native viruses as well.

**The Contra Costa Water Reuse Project:** Dr. Trussell was technical director and project manager for the Contra Costa Industrial Reuse Project. The project included full-scale testing of reclaimed water in industrial cooling towers, an extensive industrial user cost study, a two year pilot scale study of softened water in cooling towers and the design of a 15 mgd system to further polish the effluent and serve it to several Contra Costa industries. The project required coordination with six major industries; the California Department of Health Services, the Central Contra Costa Sanitary District, the Contra Costa Water District, and the San Francisco Regional Water Quality Control Board.

**Contra Costa Water District**

**Title:** Design of 10 mgd Ion Exchange Softening Plant  
**Date:** 1978  
Dr. Trussell designed a 10 mgd ion exchange plant to soften reclaimed water produced by the Central Contra Costa Sanitation District to be used for cooling towers operated by the Shell and Phillips Petroleum Refineries and by PG&E. The plant used a counter-flow ion exchange process and achieved regeneration efficiencies of less than 1.15.

**The San Diego Water Authority:** The Water Authority was considering the construction of a water treatment plant to treat water imported from Northern California. Dr. Trussell conducted an evaluation of technologies appropriate for treating that supply.

**Reedy Creek Improvement District:** Dr. Trussell was retained by the Reedy Creek Improvement District, over a period of several years, to advise its operational staff on the operation of the District's activated sludge treatment plant. Trussell used innovative computer technology to communicate with the treatment plant operators and assist them in managing the plants operating conditions.
Circus World Waste Study - MW was retained by Circus World Inc., to do a comprehensive study of all the solid and liquid waste treatment systems to emanate from the new amusement park in Orlando, FL. The project involved extensive characterization of a variety of animal wastes as well as designing a treatment system that addressed all the appropriate special quarantines and other regulations that apply to animal collections. Mr. Trussell was the project engineer.

The Seaworld Ozonation Study: Seaworld had a number of installations where recirculated water was used for the habitat for sea-going mammals such as killer whales and porpoises. Practice had been to disinfect these systems with chlorine, occasionally using breakpoint chlorination as a means for controlling the eye-irritation that stems from extensive exposure to chlorine. Dr. Trussell was hired to evaluate alternatives and, using field and pilot data developed the design criteria that are now used for ozonation in such recirculated seawater system throughout the industry.

Hollywood Presbyterian Hospital Waste Study - MW was retained by the Hollywood Presbyterian Hospital to review the problems in disposing of wastes from their new expansion. The timing of the expansion was unfortunate because, at the time, State Law required that all hospital wastes be incinerated, but the Southern California Air Quality Management District had recently set air quality limits that no such incinerator could meet. Mr. Trussell organized the bulk of the study and the issue was only resolved when members of all the relevant regulatory agencies were brought into one room so a compromise could be struck.

Rancho California On-Site Treatment Study - MW was retained by Rancho California, Inc. to conduct a study of on-site wastewater treatment for large rural lots in the development in an area with shallow soil and poor percolation rates. A manual was developed for use in site-by-site design of an evapotranspiration system to serve development in the area.

Power Plant in Needles, CA - A private utility was considering construction of a large power plant near Needles, CA. and was considering discharge of the waste brine to a deep aquifer via deep-well injection. Dr. Trussell conducted an evaluation of the interaction of the injection water and the deep aquifer water, demonstrating that significant scaling could be expected.

Rancho California Vail Lake Masterplan - MW was retained by Rancho California, Inc. to develop a water and sewer masterplan for the Vail Lake area. The effort included studies of land use, population estimates, and preliminary layouts of both sewers and water mains. Mr. Trussell conducted much of the work.

Corona Corrosion Study - MW was retained by Home Savings and Loan to find the cause, and recommend action, for the pitting failure of copper tubing in a number of homes in the vicinity of Corona, California. The homes, which were served by groundwater exhibited Type I pitting in the coldwater plumbing. Chemical treatment was recommended. Dr. Trussell conducted the investigation.

Crummer Ranch Study - Home Savings and Loan, owner of Crummer Ranch retained MW to basis for sizing the new sewer system being installed by the Triunfo Sanitation District in a service area that included the Crummer Ranch. New population estimates were developed and the size and cost of the sewer system was reviewed. Mr. Trussell did the larger share of the technical work.

ORGANIZATIONS:
- American Association of Environmental Engineering Professors (Associate)
- American Chemical Society
- American Society of Civil Engineers
- American Institute of Chemical Engineers
- American Water Works Association (Life Member)
- California Water Pollution Control Association
- International Water Association
- National Association of Corrosion Engineers
Sigma Xi - The Scientific Research Society of North America
Water Environment Federation

PROFESSIONAL ACTIVITIES:

AAEE
Nominated to AAEE by AWWA
Cover person in Environmental Engineer, January 1997
Kappe Lecturer for Fall of 1999
Member, Certification by Eminence Committee, 2005-2007
Frederick G. Pohland Medal, For outstanding contributions to bridging environmental engineering research, education, and practice, 2005 (jointly awarded by AAEE & AAEESP)

AAEESP
Invited Speaker to AAEESP forum at AWWA, 1989.
Invited member of Asilomar Panel on the New Frontiers in Environmental Engineering and Science, 1997p
Frederick George Pholent Medal, 2005, (jointly awarded by AAEE & AAEESP)

AWWA
Vice Chair Water Treatment Committee, California Section 1977-1980.
Co-chair National Research Committee on Particulates, 1978-1982
AWWA Representative to the Editorial Advisory Board of Standard Methods for Examination of Water and Wastewater, 1982-1989.
AWWA Representative to International Water Supply Association’s Standing Committee on Water Quality and Treatment, 1990-1994
Member of AWWA International Committee 1990-present
Best Paper Award, Distribution Division, 2000
Best Paper Award, Distribution & Operations Division, 2001
Best Paper Award, Water Resources Division, 2001

AP Black Award, 2010

AWWARF
AWWARF - US/Holland Committee on Volatile Organic Compounds in Ground Water, 1982-1983
AWWARF - US/German Committee on Corrosion, 1983-1985
AWWARF - US/USSR Committee on Drinking Water Research, 1985-1987
AWWARF – US/French Committee on Mixing in Water Treatment 1988-1990

ASCE
Civil Engineering Research Foundation, CERF
Executive Committee, 1994.

ACS
Member Editorial Board of Environmental Science and Technology, 1978-1983
Member of magazine Editorial Board of Environmental Science and Technology, 2000-2005.

IWA
Member of Standing Committee on Water Quality and Treatment, 1990-1994
Member of Scientific and Technical Council, 1994-present
Chair, Committee on Disinfection, 1994-2002
Member, Programme Committee, 2000-2008

National Academy of Engineering
Peer Committee 2001-2003
Membership Committee 2005-2007
Grainger Prize Committee 2006-2007

National Research Council - Division on Earth and Life Studies Water Science and Technology Board
Chair 2002-2008

National Water Research Institute
Member of Clarke Prize Selection Committee
2006-2012
Member of Davis Water Supply Panel
Member of OCWD GWRS Panel

WaterReuse Association
Chairman of Research Advisory Committee, 2005-2007

Water Environment Research Foundation
Member, Board of Directors, 2007-2010

EPA ADVISORY ACTIVITIES

Science Advisory Board
Consultant to Sub Committee on Drinking Water, 1988-1990
Member Committee on Drinking Water, 1990-1992
Consultant to Committee on Drinking Water, 1992-1994
Member, Committee on Drinking Water, 1994-2005
Chair, Committee on Drinking Water, 2000-2004
Member, Executive Committee and Board, 2000-2005

EPA Board of Scientific Counselors
Member of Committee on Arsenic in Water, 1997

Other EPA Activities
Invited Speaker EPA Seminar Series on Treatment Technology for Meeting the NIPDWR 1976
Invited Speaker EPA Seminar Series on Operation of Activated Sludge, 1977
Invited Speaker EPA Seminar on Defluoridation of Drinking Water, Dallas, Texas, 1978
Invited Speaker EPA Seminar/Workshop on Corrosion in Consumer Plumbing, Cincinnati, Ohio, 1979
Invited Speaker EPA Seminar Series on Treatment Technology for Removing Organics in Drinking Water, San Francisco and Dallas, 1979
Member EPA Arlie Conference on Potable Reuse Criteria, Washington, D.C., 1980
Member EPA Panel on Re-evaluation of National Water Quality Criteria; The Johns Hopkins University, 1983
Member of Consulting Panel to EPA to Write Report to Congress on the Relative Risks of Disinfection and Disinfection By-products, 1987-88
Member of Panel appointed to review office of pesticide program regulations, 2000.

NATIONAL RESEARCH COUNCIL
Member National Academy of Sciences Committee on Drinking Water Chemicals CODEX, 1980-1982
Member National Academy of Sciences Committee on 3rd Party Certification of Drinking Water Chemicals, 1983-1984
Member National Academy of Sciences Committee on Irrigation Induced Water Quality Problems, 1985-1989
Elected to National Academy of Engineering, Class of 1995
Member of National Academy of Sciences Committee on Viability of Potable Reuse, 1996-1998.
Vice-Chair of National Academy of Sciences Committee on Setting Priorities for Drinking Water Contaminants, 1998-1999
Member of Water Science and Technology Board, 1999-2007, Incoming Chair 2004-2007
Vice-Chair of National Academy of Sciences Committee on Identifying Future Drinking Water Contaminants, 1999
Vice-Chair of National Academy of Sciences Committee on Categorizing Drinking Water Contaminants for Purposes of Regulation, 2000-2001.
Vice-Chair of National Academy of Sciences Committee on Microbial Indicators in Water
Member of Peer Committee for Section 4, Civil Engineering, 2001-2004

OTHER ADVISORY PANELS
Member, Scholars Committee on Perchlorate, Urban Water Research Center, Irvine, CA 2003-2004

HONORS:
1985 Who’s Who in the West
1987 Who’s Who in America
1989 Who’s Who in Engineering
1990 American Academy of Environmental Engineering (nominated by AWWA)
1995 National Academy of Engineering
1997 American Academy of Environmental Engineering, Featured Cover Story
1998-1999 American Water Works Association, Distribution & Plant Operations Division, Best Paper Award
1999 American Academy of Environmental Engineering: Kappe Lecturer
2000 American Water Works Association, Distribution Division, Best Paper Award;
2001 Water Resources Division, Best Paper Award
2001 American Water Works Association, Distribution & Operations Division, Best Paper Award;
2001 American Association of Municipal Water Agencies Donald R. Boyd Award for leadership and contributions to the drinking water community
2003 American Water Works Association, Life Member
2003 American Chemical Society, Life Member
2005 Association of Environmental Engineering and Science Professors/American Academy of Environmental Engineering – Frederick G. Pohland Medal for outstanding contributions to bridging environmental engineering research, education and practice
2010 American Water Works Association, A.P. Black Award
2012 International Water Association, Global Water Award

PUBLICATIONS IN REVIEWED BOOKS AND JOURNALS


5. EPA Process Control Manual for Aerobic Biological Treatment Facilities. Dr. Trussell was one of three principal authors (March 1977).


23. NAS, Water Chemicals Codex, [member of Committee] National Research Council, W.D.C., 1982


56. NAS, Setting Priorities for Drinking Water Contaminants, Report on NAS Committee of which Dr. Trussell was a Vice Chair, National Academy Press, Washington D.C., 1999.


59. NAS, Identifying Future Drinking Water Contaminants, Report on NAS Committee of which Dr. Trussell was a Vice Chair, National Academy Press, Washington D.C., Pre-Released on June 7, 1999.


64. Chang, M., R. Trussell, R., Guzman, V., Martinez, J., and Delaney, C., “Laboratory Studies on the Cleanbed Headloss of Filter


72. NAS, *Classifying Drinking Water Contaminants For Regulatory Consideration*, Third report of the NRC Committee on Drinking Water Contaminants. [Dr. Trussell was Vice Chair of the Committee] National Academy Press, 9 March 01


78. NAS, (2004) *Indicators for Waterborne Pathogens*, National Research Council, Washington, D.C. (Dr. Trussell was Vice Chair of the Committee)


UNREVIEWED PUBLICATIONS AND CONFERENCE PROCEEDINGS


15. Tate, C. and Trussell, R. R., "Optimization of Turbidity Removal by Use of Particle


44. Tate, C., & Trussell, R., “Pilot Plant Justification”, *Proceedings of 24th Annual Public Water Supply Engineer’s Conference*, University of Illinois, Champaign, IL, pp87-92, April 1982.


69. Trussell, R., "The Role of Ozonation in Water Treatment in the 1990's", Presented at the Meeting of the American Association of Water Agencies, Nov. 24, 1990, Salt Lake City, UT.


79. Adham, S.S; Rohe, D.L.; Jacangelo, J.G.; & Trussell, R.R. Application of Microfiltration and Ultrafiltration Membrane Processes for Water and Wastewater Treatment. presented
at the Specialty Conference on “PUTTING A PRICE ON WATER: Alternative Strategies for water in the Middle East”, Bahrain (Jan., 1995).


Conversion – Problems and Solutions” Proceedings of AWWA Conference, Denver, CO, June 2001


136. Trussell, R. Rhodes 2008 Water Reuse is a Key Element in Responsible and Sustainable Development, Water Practice, V2(3) Editorial

processes (AOPs).” The Croucher Foundation Advanced Study Institute (ASI), June 23-27, 2008, Hong Kong, China.


CV for Proposed Expert Panel Member:

- Michael A. Anderson, Ph.D.
MICHAEL A. ANDERSON, Ph.D.

ADDRESS

Department of Environmental Sciences
University of California, Riverside, CA 92521
(951) 827-3757
e-mail: michael.anderson@ucr.edu

EMPLOYMENT HISTORY

- Chair, Environmental Sciences, University of California, Riverside. 2010 – present.
- Professor, Environmental Sciences, University of California, Riverside. 2009 – present.
- Associate Professor, Environmental Sciences, University of California, Riverside. 1996 – 2009.
- Assistant Professor, Environmental Sciences, University of California, Riverside. 1990 - 1996.

EDUCATIONAL BACKGROUND


RESEARCH INTERESTS AND AREAS OF SPECIALIZATION

- Applied limnology and lake/reservoir management
- Surface water quality and modeling
- Fate of contaminants in waters, soils and sediments

RECENT RESEARCH PROJECTS

- Environmental, Biological and Technical Support for Development of Species Conservation Habitat at the Salton Sea. Funding Agency: California Dept. of Water Resources. 2010-2012.

RECENT PROFESSIONAL ACTIVITIES

- Vice-Chair, IWA Lake and Reservoir Management Specialist Group (2013-2014)
- Guest Professor, Huazhong Agricultural University, Wuhan, China (2011-14)
- Associate Editor, Lake and Reservoir Management (2007 – present)
- Member, Integrated Watershed Management, Environmental Protection Admin., Taiwan (2009)
- Member, San Diego Indirect Potable Reuse/Reservoir Augmentation Panel, NWRI (2009-12)
- Member, Water Science Management Board, California Bay Delta Authority CALFED (2005)
- Member, UC Water Resources Center Technical Advisory Committee (2001-05)


**Peer-Reviewed Book Chapters**


SELECTED TECHNICAL REPORTS (OUT OF 36 TOTAL)


UNIVERSITY TEACHING

ENSC 101: Water Resources (2012 - present)
ENSC 140: Limnology (1994 - 2012)
ENSC 176: Acquisition and Analysis of Environmental Data (1998 - 2006)
ENSC 204: Environmental Organic Chemistry (1997 - 2006)
ENSC 207: Surface Water Quality Modeling (2009 - present)
SWSC 203: Surface Chemistry of Soils (1992 - present)
CV for Proposed Expert Panel Member:

- Richard J. Bull, Ph.D.
CURRICULUM VITAE

Richard J. Bull, Ph.D.

December, 2008

PERSONAL DATA:

Current Title: Consulting Toxicologist
MoBull Consulting
1928 Meadows Drive North
Richland, WA  99352

Tel.  509-628-0818
Fax:  509-628-1398
Cell:  509531-7991
rjbull@earthlink.net

Professor Emeritus,
Pharmacology and Toxicology
Washington State University
Pullman, WA

Place of Birth: Stillwater, Oklahoma

EDUCATION:

Graduate: Department of Pharmacology
University of California
San Francisco Medical Center
San Francisco, California

Major: Pharmacology
Degree: Ph.D.
Year: 1971

Undergraduate: College of Pharmacy
University of Washington
Seattle, Washington

Major: Pharmacy
Degree: B.S.
Year: 1964

EXPERIENCE:

1964-65 U.S. Public Health Service, Division of Hospitals, Baltimore, Maryland
Duties: Resident in Hospital Pharmacy

1965-67 U.S. Public Health Service, Northeast Marine Health Science Lab., Narragansett, Rhode Island
Duties: Chemist, Isolated and purified paralytic shellfish poison (saxitoxin) from the siphons of the Alaskan Butter Clam.

1967-70 Department of Pharmacology, University of California, San Francisco Medical Center, San Francisco, California
Duties: Graduate student in pharmacology
Title of doctoral dissertation: "Saxitoxin, tetrodotoxin and excitation in cerebral cortex slices."

1970-77 Health Effects Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio
Duties: Research Pharmacologist/Toxicologist. Principle area of research in the area of central nervous system and cardiovascular toxicology of heavy metals and their derivatives.

1977-81 Chief, Toxicological Assessment Branch, HERL, U.S. Environmental Protection Agency, Cincinnati, Ohio
Duties: Direction of research designed to define the hazards associated with chemicals found in water. Position involved the direction of 28 permanent in-house professionals and technical staff and a sizable extramural program working in carcinogenesis, mutagenesis, development and target organ toxicology.

1981-84 Director, Toxicology and Microbiology Division, Health Effects Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio.
Duties: Administrative and technical direction of a multidisciplinary research program. Principle program areas involved the definition of chemical and microbiological hazards associated with water. Research interests include determining mechanisms involved in chemically-induced disease and the importance of mechanisms in risk assessment. Size of the program was 90 FTE and 12 million dollars including extramural projects.

1984-94 Professor/Scientist of Pharmacology/Toxicology, College of Pharmacy, Washington State University, Pullman, Washington
Duties: Teaching of Pharmacology/Toxicology to professional students and graduate students. Research interests include mechanisms involved in the induction of hepatic tumors by halogenated hydrocarbons and haloacetic acids.

1990-92 Chair, Pharmacology/Toxicology Graduate Program, Washington State University.

1994-2000 Senior Staff Scientist, Battelle Pacific Northwest Laboratory, Richland, WA
Duties: Develop and manage a research program in health risk assessment in support of Department of Energy’s problems with hazardous waste sites and other public concerns over chemical hazards. Direct research interests in the toxicology of drinking water disinfectant by-products in humans and experimental animals and halogenated solvents and their metabolites.

2000-present Consulting Toxicologist, MoBull Consulting, Kennewick, WA.
Duties: Conduct studies of chemical problems encountered in water for water utilities domestic and internationally, federal, state and local governments. Special emphasis on chemicals found in drinking water. Also provide expert advice on regulation of chemicals in water and provide direction to research programs being developed by utilities to address their long-term plans for development and treatment of waters from varying sources. A particular interest is in potable reuse of municipal wastewater.

2000-2002 Adjunct Professor Department of Environmental Science and Regional Planning, Washington State U. Tri-Cities Campus
Duties: Conduct research on risk assessment at low doses of environmental contaminants. Particular interests include low-LET radiation, by-products of the disinfection of drinking water, and halogenated solvents.
1994- present  Adjunct Professor of Pharmacology and Toxicology at College of Pharmacy at Washington State University, Pullman, WA.

MEMBERSHIP IN SCIENTIFIC, PROFESSIONAL, AND SCHOLARLY SOCIETIES:

American Association for the Advancement of Science    1967 to 2004
Sigma Xi                                      1969 to 1994
American Society for Pharmacology and Experimental Therapeutics  1976 to 2002
Society of Toxicology                              1978 to present
Pacific Northwest Association of Toxicologists    1985 to present
American Water Works Association                  1990 to present
International Society for the Study of Xenobiotics  1992 to present

PROFESSIONAL RECOGNITION:

Awards:

1979 EPA Scientific Achievement Award for research efforts directed at detecting delays in brain development produced by perinatal Pb exposure.

1984 EPA Scientific Achievement Award for research documenting the formation of mutagenic chemicals from chlorination of humic acids.


Offices:

Councilor, Carcinogenesis Specialty Section of the Society of Toxicology (1995-7 and 2003-5)
Nominating Committee, Society of Toxicology (1996-7)
Membership Committee, Society of Toxicology (1997-1999)
Chair, Membership Committee, Society of Toxicology (2000-2001)

Invited Presentations:

"Toxicology Research: Its application to the setting of drinking water standards. 16th Water Quality Conference, University of Illinois.
"Is Drinking Water a Significant Source of Human Exposure to Chemical Carcinogens and Mutagens?" at Second Symposium on the Application of Short-Term Bioassays to the Fractionation and Analysis of Complex Environmental Mixtures. Williamsburg, VA. March 4-7, 1980.
"Toxicological effects of drinking water disinfectants that are alternatives to chlorine." Miami University, Department of Zoology. March 1980.
"Reactions of chlorine with humic acid to produce carcinogenic and mutagenic chemicals." Temple University, College of Medicine. Department of Pharmacology. October 1981.


"Carcinogenic and mutagenic chemicals produced by reaction of chlorine with organic chemicals present in drinking water." Purdue University, School of Pharmacy. February 4, 1983.

"In Vivo production of by-products of chlorine that possess carcinogenic and mutagenic properties." Washington State University, College of Veterinary Medicine. June 16, 1983.

"Toxicology of Natural and Man-Made Toxicants in Drinking Water" at 14th Conference on Environmental Toxicology, Dayton, OH. November 5-17, 1983.


"Dichloroacetate and trichloroacetate as examples of major drinking water contaminants that are carcinogenic but not mutagenic." RIVM/KIWA Workshop, Genotoxicity of drinking water: Significance and future approach, Bilthoven, The Netherlands, May 10 & 11, 1989.


"Toxicology of Disinfectants and Disinfectant By-Products" First International Conference on the Safety of Water Disinfection August 31 - Sept. 3, 1992 Sponsored by ILSI Health and Environmental Sciences Institute.

"Haloacetates and Bromate: By-Products that may Critically Affect Drinking Water Disinfection." Fifth National Conference on Drinking Water. Winnipeg, Manitoba Sept 15, 1992


"Toxicology of Drinking Water Disinfectant By-Products" Presented at the Water Research Center Symposium on Drinking Water Disinfection, Medmanham, U.K. February 2-3, 1993


"Toxicology of Disinfectants and Disinfectant By-Products" presented at ILSI Symposium on Current Issues on Drinking Water Quality, Seoul, Korea September 15, 1994.

"Toxicology of Water Contaminants” presented at conference on “Water Quality for the Food Technologist” Sidney, Australia, September 27, 1994. Sponsored by ILSI-Australasia and CSIRO.

"Water Chlorination: Essential Process or Cancer Hazard?” Symposium organized and conducted at the Annual Society of Toxicology Meeting, Baltimore, MD, 1995


"Future Directions in the Use of Mode of Action Information in Assessing Cancer Risks from Trichloroethylene (TCE). Workshop on Integration of Mechanistic, Toxicological, and Epidemiological Data into the EPA’s Trichloroethylene Cancer Assessment. 39th Annual Meeting of the Society of Toxicology, Philadelpidia, PA, March 23, 2000.
"NDMA: A New Ballgame with Disinfection By-Products?" Early Bird Session for the Annual Water Quality Technology Conference, Seattle, WA 11/12/02

Are There Significant Health Effects Associated with the Use of Chemical Disinfection of Drinking Water?" Workshop on research needs with disinfection by-products in Melbourne, Australia 10/29-31/01

"Chemicals of Concern for Water: The Status of Research Assessing the Risk of Current Disinfection Practice" Keynote Speaker at the AWA-IWA conference Sydney, Australia 6/4-5/03

“Are Organic Nitrogen-Containing Disinfection By-Products Potential Causes for Bladder Cancer and Reproductive Effects?" Annual Meeting of the American Water Works Association, Anaheim, CA, 6/18/03

“Monitoring Water Quality: Chemical Contaminants" CDC Water Reuse Workshop Atlanta, GA, 3/13 & 14/03

MEMBERSHIPS ON NATIONAL ADVISORY COMMITTEES AND BOARDS:

Advisor to NRC Committee on Lead in the Human Environment, 1977
Interregulatory Agency Task Force on Neurotoxicology, 1976
Drinking Water Research Committee (EPA), 1977-1984
Chemical Testing and Assessment Research Committee (EPA), 1977-1981
TSCA Section 4 Workgroup (EPA), 1977-1980
Primary Drinking Water Standards Workgroup (EPA), 1977-1984
Member of Advisory Group to Denver Water Board on Potable Reuse of Wastewater, 1982 to 1995
Interagency Collaborative Group on Environmental Carcinogenesis, 1977-1982
Workgroup on Health Effects of Space Station Wastewater Reuse and Atmosphere Recycling - National Aeronautics and Space Administration, 1985
Member National Research Council Subcommittee on Drinking Water Disinfectants (USEPA), 1986-1987
Member National Research Council Committee on Recycling, Reuse and Conservation of Water (U.S. Army), 1986
Co-Chair of Space Station Water Quality Conference sponsored by NASA, July 1-2, 1986
Member, National Research Council Committee on National Water Quality Assessment Program (USGS), 1987
Chair, National Sanitation Foundation Health Effects Task Group for Drinking Water Additives, 1985 - 1989
Member, National Research Council Subcommittee on Guidelines for Recommending Spacecraft Maximum Contaminant Levels, (Committee on Toxicology), 1989 – 1999.
University of Arizona Superfund Grant Advisory Committee. 1991-1992
Member, National Research Council Committee on the Viability of Augmenting Potable Water Supplies with Reclaimed Water., 1996-8
Member, Science Advisory Panel for the Santa Ana River Water and Health Study. Orange County CA. 1997- 2003
Chair, Drinking Water Committee of the U.S. Environmental Protection Agency’s Science Advisory Board, 1997-2001
Author and member of, International Program in Chemical Safety (WHO) consultation on Disinfection By-Products 1998-9
Member, EPA Subcommittee reviewing the proposed new Cancer Risk Assessment Guidelines of the Environmental Protection Agency 1999-2000
Chair, National Research Council Committee on Copper in Drinking Water. 1999-2000
Member and Coordinator, Science Advisory Panel for the National University of Singapore project on Potable Resuse of Wastewater.
Member, Joint Committee of EPA Science Advisory Board and Science Advisory Panel for review of Endocrine Disruptor Screening and Testing Advisory Committee Report to the Agency, 1998-9
Member of the Science Advisory Panel for the Medical University of South Carolina on the Environmental Management Science Program Project, 1999-2004.
Member, Research Strategies Advisory Committee of EPA Science Advisory Board 1999-2003
Member, Science Advisory Panel for the Orange County Groundwater Replenishment System Project under the auspices of the National Water Research Institute. 2003-present.
Member, Independent Advisory Panel for the San Diego Water Reuse Project under the auspices of the National Water Research Institute. 2004-present.
Member, Science Advisory Panel for the Monterey Water Reuse Project under the auspices of the National Water Research Institute. 2006-

CONFERENCE ORGANIZATION AND EDITING:

Roundtable Session: Should carcinogenesis data from transgenic animals be applied to safety assessment, if so, how? 36th Annual meeting of the Society of Toxicology, Cincinnati, OH, March 9-13, 1997
Bromate Health Research Strategy Workshop. AwwaRF sponsored workshop held at Miami University, Feb. 11-13, 2005. Co-chaired with Joseph A. Cotruvo (proceedings published in a special issue of Toxicology)

PEER REVIEW ACTIVITIES:

Toxicology (Editorial board 1994 - present)
Journal of Toxicology and Environmental Health (Editorial Board, 1994 - 2000)
Biochemical Pharmacology
Toxicology and Applied Pharmacology
Fundamental and Applied Toxicology (Editorial Board 1986-94)
Chemical Research in Toxicology
CRC Critical Reviews in Toxicology
Environmental Science & Technology (American Chemical Soc.)
Journal of American Waterworks Association (Editorial Board 1986-92)
Food and Chemical Toxicology
NeuroToxicology
Life Sciences
INTERNATIONAL ACTIVITIES:


Preparation of working paper for International Agency for Research on Cancer (IARC-WHO) workshop on "Approaches for evaluating human health hazards from drinking water" to be held in Lyon, France, December 11-14, 1984.


Water Research Center of the United Kingdom Seminar on the Health Effects of Disinfectant By-Products. Feb. 2-3, 1993


Technical Advisor on Health Canada Workshop Held to Identify Critical Endpoints for Assessment of Health Risks Related to Trihalomethanes (THMS) in Drinking Water. Ottawa, September 18-19, 2002


CRCWQT/AWWARF Disinfection Byproduct Collaborative Research Planning Workshop, Brisbane, Australia, 7/25-26/05

APPOINTMENTS

Adjunct Associate Professor, Ohio State University, College of Medicine, Department of Pharmacology, Columbus, Ohio

Adjunct Professor, Miami University, Department of Zoology, Oxford, Ohio

Adjunct Professor, Pharmacology/Toxicology, College of Pharmacy, Washington State University.

THESIS AND DISSERTATION COMMITTEES

Major Advisor to the following graduate students at Washington State University.


Melissa K. Lingohr Smith, Ph.D. (2000) Dichloroacetate Modulates Glycogen Metabolism and Insulin Signaling Proteins In Vivo and In Vitro.

**GRANT and CONTRACT FUNDING:**
(principal investigator, R. Bull unless otherwise noted)

<table>
<thead>
<tr>
<th>Title</th>
<th>Source</th>
<th>Budget Direct Costs</th>
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<td>Ethanol-Induced in Trichloroethylene Toxicity</td>
<td>U.S. Air Force (17%) AFOSR-86-0284</td>
<td>$227,024</td>
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<td>Importance of Hepatic Peroxisome Proliferation in Carcinogenic Responses to Environmental Chemicals and Complex Mixture</td>
<td>Battelle</td>
<td>$18,722</td>
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<td>Differential Pharmacokinetics and Toxicology of Iodine and Iodide</td>
<td>NASA (16%) NAG 9-226</td>
<td>$188,747</td>
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<td>Chlorinated Acetic Acid Hepatocarcinogenesis</td>
<td>NIEHS 1 RO1 ESO4648-01</td>
<td>$257,309</td>
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<td>Application of Pharmacokinetic Analyses and Dosimetry to Species Differences in Sensitivity to Toxic Substances</td>
<td>EPA CR-81216-01-0</td>
<td>$1,145,182</td>
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<td>Differential Effects of Iodine and Iodide on Thyroid Function on Thyroid Function</td>
<td>NASA NAG-9-545</td>
<td>$245,368</td>
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<td>Small mammals as dosimeter of toxic substances</td>
<td>EPA</td>
<td>$315,827</td>
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<td>Relationship of Dichloroacetate (DCA) and Trichloroacetate (TCA)-Induced Hepatic Tumors with Induction of Peroxisomes</td>
<td>AWWARF (701)</td>
<td>$255,000</td>
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<td>Utilization of Chemical and Cellular Kinetics to Improve the Accuracy of Risk Assessments. I. Physiologically Based Pharmacokinetic Modeling of Chlorinated Alkenes and their Metabolites.</td>
<td>EPA CR 819283</td>
<td>$155,000</td>
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<td>NIEHS (RO1-ES04648)</td>
<td>$448,983</td>
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<td>Utilization of Chemical and Cellular Kinetics to Improve the Accuracy Risk Assessment. II. Comparative metabolism of Chlorinated Solvents.</td>
<td>EPA CR 820614</td>
<td>$206,000</td>
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<td>PA CR 819562</td>
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<td>Department of Energy</td>
<td>$1,800,000</td>
<td>9/1/96</td>
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<td>Using Mode of Action to Assess Health Risks from Mixtures of Chemical and Physical Agents</td>
<td>SERDP CU-1073</td>
<td>$1,400,000</td>
<td>6/13/97</td>
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<td>Sensitivity to Radiation-Induced Cancer in Hemochromatosis.</td>
<td>Department of Energy</td>
<td>$414,000</td>
<td>9/99 – 9/01</td>
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<td>Low-Dose Program</td>
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<td>Optimizing the Scientific, Regulatory and Societal Impact of the DOE Low Dose Radiation Research Program supplement Antone Brooks, PI, R.J. Bull, Co-PI</td>
<td>Department of Energy</td>
<td>$1,300,000</td>
<td>9/00-5/03</td>
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<td>Low-Dose Program</td>
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<td>Projects awarded to MoBull</td>
<td>Awwa Research Foundation No. 2869</td>
<td>$350,000</td>
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<td>Risk Based Prioritization of Disinfection By-Products</td>
<td>R.J. Bull, PI, David Reckhow, Co.-P.I.</td>
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<td>Amount</td>
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<td>Bromate Health Research Strategy Workshop</td>
<td>Awwa Research Foundation No.</td>
<td>$75,000</td>
<td>6/04-12/05</td>
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<td>Low Dose Risks from Bromate: The Relationship between Drinking Water Foundation No. 4042</td>
<td>Awwa Research</td>
<td>$400,000</td>
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<td>Concentrations and the Actual Dose to Susceptible Organs in Rats and Humans</td>
<td>Ca. $40,000 to MoBull</td>
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<td>Identifying Health Effects Concerns of the Water Reuse Industry and Prioritizing Research Needs for Nomination of Chemicals for Research to Appropriate National and International Agencies</td>
<td>WaterReuse Foundation No. 06-004</td>
<td>175,000</td>
<td>6/07-5/09</td>
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<td>Methods Development for Disinfection By-Products Associated with Cancer Subcontract from University of Alberta</td>
<td>Awwa Research Foundation No. 4089</td>
<td>$400,000</td>
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<td>Ca $30,000 to MoBull</td>
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</tbody>
</table>

**PUBLICATIONS:**

Refereed:


Non-Refereed:


Bull, R.J. (1980) Is drinking water a significant medium of human exposure to chemical carcinogens and mutagens? In: *Short-Term Bioassays in the Analysis of Complex Environmental Mixtures* - Williamsburg, Virginia, II. (Waters, M.D.)


Reviews:


PAPERS, POSTERS, AND PRESENTATIONS:

Dr. Bull has been active in a number of professional societies and presented papers and abstracts at their annual meetings. If a record of such activity is required a listing of these activities can be provided.

c:/word/Bullcv.doc
CV for Proposed Expert Panel Member:

- Professor Dr.-Ing. Jörg Drewes
EDUCATION
Doctorate in Environmental Engineering (Ph.D.), Technical University of Berlin, Germany 1997
Dipl. Ing. Environmental Engineering (M.S.), Technical University of Berlin, Germany 1992

EXPERIENCE
8/2013-present: Research Professor, Civil and Environmental Engineering, Colorado School of Mines, Golden CO.
8/2011-7/2013: Director of Research. NSF Engineering Research Center on Reinventing the Nation's Urban Water Infrastructure (ReNUWIt), Stanford, UC-Berkeley, New Mexico State University and Colorado School of Mines.
3/2010-7/2013: Professor, Civil and Environmental Engineering, Colorado School of Mines, Golden CO.
Co-Director, Advanced Water Technology Center (AQWATEC).
8/2010-8/2013: Visiting Professor. Water Desalination and Reuse Center (WDRC), King Abdullah University of Science and Technology, Thuwal, Saudi-Arabia.
7/2007-present: Adjunct Professor, UNSW Water Research Centre, The University of New South Wales, Sydney, Australia.
8/2001-4/2006: Assistant Professor, Environmental Science and Engineering Division, Colorado School of Mines, Golden CO.
9/1999-7/2001: Associate Director, National Center for Sustainable Water Supply (NCSWS), Arizona State University, Tempe, AZ, USA
8/1997-8/1999: Visiting Professor, Arizona State University, Tempe, AZ, USA

RESEARCH INTEREST
Energy efficient water and wastewater treatment engineering; energy recovery from waste streams; distributed water reuse and remotely operated treatment; potable reuse; monitoring strategies and treatment performance assessments; novel design approaches for natural treatment systems (riverbank filtration, aquifer recharge and recovery); state-of-the-art characterization of natural and effluent organic matter and emerging trace organic chemicals (endocrine disrupting compounds, pharmaceutical residues, household chemicals) in natural and engineered systems.

AWARDS and HONORS
Chair, International Water Association (IWA) Water Reuse Specialist Group; Panel Member, National Research Council (NRC) on Gray Water Reuse 2013-2015; Panel Member, National Research Council (NRC) on Water Reuse 2008-2011; Member, Research Advisory Council WaterReuse Foundation (WRF); Chair, Science Advisory Committee on Compounds of Emerging Concern in Recycled Water, California State Water Resources Control Board; American Water Works Association Rocky Mountain Section Outstanding Research Award, 2007; Dr. Nevis Cook Graduate Teaching Award, Colorado School of Mines, 2003. Quentin Mees Research Award for outstanding water-related environmental research in the State of Arizona, 1999. Research Scholarship administered by the Deutsche Forschungsgemeinschaft (DFG), 1997 – 1999. Willy-Hager Award for outstanding research in the field of water and wastewater treatment, Germany, 1997.

PUBLICATIONS (Selection)
Papers in peer-reviewed journals


Guerra, K., Pellegrino, J., Drewes, J. E. (2012). Impact of operating conditions on permeate flux and process economics for cross flow.


Peer-Reviewed Books and Book Contributions


CV for Proposed Expert Panel Member:

- Charles N. Haas, Ph.D.
Charles N. Haas

Present Position: Betz Chair Professor of Environmental Engineering & Head, Department of Civil, Architectural and Environmental Engineering, Drexel University, Philadelphia, PA 19104; 215/895-2283; e-mail: haas@drexel.edu; URL: http://www.pages.drexel.edu/~haascn/

Date of Birth: December 27, 1951
Place of Birth: Bronx, New York
Citizenship: U.S.A.

Education:
- M.S. (Environmental Engineering), IIT, 1974.

Academic Appointments
- 2005--: Head, Department of Civil, Architectural and Environmental Engineering
- 2003--: Research Professor, Department of Emergency Medicine, Drexel University College of Medicine
- 2002–2005: Director of Environmental Engineering and member of Department Executive Committee
- 1991--: Betz Chair Professor of Environmental Engineering, Drexel University.
- 1989-1990: Acting Chairman, Pritzker Department of Environmental Engineering, Illinois Institute of Technology
- 1988-1989: Visiting Professor of Environmental Engineering, University of Illinois at Urbana-Champaign
- 1981-1990: Assistant Professor (1981-83), Associate Professor (1983-87), Professor (1987-90) Illinois Institute of Technology
- 1978-1981: Assistant Professor of Environmental Engineering in the Department of Chemical and Environmental Engineering, (1979-1981), Acting Director of Environmental Engineering Programs, Rensselaer Polytechnic Institute

Professional Memberships
- American Chemical Society; American Association for the Advancement of Sciences; American Society for Engineering Education; American Statistical Association; American Society for Microbiology; American Water Works Association (Life Member); American Society of Civil Engineers; Association of Environmental Engineering and Science Professors; International Water Association; Sigma Xi; Society for Risk Analysis; Water Environment Federation; American Academy of Environmental Engineers

Honors and Awards
- Recipient, 1984 AAAS-USEPA Summer Environmental Science and Engineering Fellowship.
- Octave Chanute Award (Outstanding Paper), Western Society of Engineers, 1984.
- Charles Ellet Award (Outstanding Young Engineer), Western Society of Engineers, 1985.
- Listed in American Men and Women of Science (1994)
- Professional Research Award, Pennsylvania Water Environment Association (1997)
- American Academy of Microbiology, Elected as Fellow (1997)
- Frontiers in Research Award, Association of Environmental Engineering and Science Professors (sponsored by...
American Association for the Advancement of Science, Elected as Fellow (2002)
Society for Risk Analysis, Elected as Fellow (2002)
University of Illinois at Urbana-Champaign, Department of Civil and Environmental Engineering, Distinguished Alumnus Award (2003)
American Water Works Association, advisor to 2nd Place Academic Achievement Award Winner (Christopher Crockett—PhD dissertation) (2005).
American Academy of Environmental Engineers, Board Certified Environmental Engineering Member (BCEEM), elected by eminence (2007)
American Society of Civil Engineers, elected Fellow (2010)
International Water Association, elected Fellow (2011)

Workshops & Continuing Education Attended

Funded Research Projects
Principal Investigator, "Trace Metal Speciation". U.S. Environmental Protection Agency--Industrial Waste Elimination Research Center (1980-1982 for $113,000).
Principal Investigator "Preparation of a Chapter on Chlorination-Dechlorination and Miscellaneous Halogens." U.S.Environmental Protection Agency via a subcontract from Oklahoma State University (1982-1985 for $82,000).
Principal Investigator, "Wastewater Treatability Study" -- Morton Thiokol, Morton Chemical Division ($25,000 1986-1987).


Principal Investigator, "Equilibria of Mixed Metal Precipitates", IWERC (USEPA) (1990, $55,000).


Co-Principal Investigator, "Microbial Risk Assessment", American Water Works Association Research Foundation (1993-1995, subcontract from University of South Florida, $90,000).

Principal Investigator, "Review of Factors Affecting Metal Fate and Transport in Saline Waters", Dupont Corporation (1992, $12,500).


Principal Investigator, "Review of Models for Chemical Fate and Transport", Betz Laboratories Inc. (1993-94, $39,000)


Principal Investigator, "Monitoring for Giardia and Cryptosporidium", Philadelphia Water Department (1994-95, $45,000).

Principal Investigator, "Models for Chemical Fate and Transport in Waste Treatment", Betz Laboratories Inc. (1995, $45,000).


Principal Investigator, "Risk Assessment from Sewage Discharges in Mamala Bay, HI", Subcontract from University of Arizona (Mamala Bay Commission), 1995, $35,000.

Principal Investigator, "Risk Assessment of Heterotrophic Organisms in Point of Use Devices", Subcontract from University of South Florida (Water Quality Association), 1995-1996, $15,000.

Principal Investigator, "Electroporation and Electroporation Aided Disinfection of Cryptosporidium and Giardia", National Science Foundation, 1995-1998, $190,000.


Principal Investigator, "Development of Integrated Program for Chemical Fate and Transport in Waste Treatment", Betz Laboratories Inc. (1996-1997, $45,000).

Co-Principal Investigator, "Literature Review on Cryptosporidium Removal in Water Treatment", Chlorine Chemistry Council, 1996, $16,000 (with Gordon Finch).

Co-Principal Investigator, "Extension of Quantitative Microbial Risk Assessment Methods to Foodborne Pathogens", International Life Sciences Institute, 1997-1998, $85,000 (with Joan Rose and Charles Gerba).

Principal Investigator, "Disinfection of Protozoa", Philadelphia Water Department, 1997-8, $50,000.

Co-Principal Investigator, Update The AWWARF Report On Experimental Methodologies For The Determination Of Disinfection Effectiveness To Include Cryptosporidium Disinfection Protocols", 1997-8 (with Gordon Finch), $25,000.


Co-Investigator, “Synergistic Inactivation of Cryptosporidium Oocysts in Natural Waters”, AWWA Research Foundation, 1999-2001 (with Gordon Finch, Mike Belosevic), $77,000 (Drexel share).

Principal Investigator, Peer Review of Class A Sludge Designation Petition, Metropolitan Water Reclamation District of Greater Chicago, 1999-2000, $20,000.

Principal Investigator, Assessment of EPA Pathogen Equivalency Committee, US EPA, 2000, $15,000.

Principal Investigator, "Use of Microbial Risk Modeling to Determine the Benefits of Topical Antimicrobial Products", Soap and Detergent Association, 2000-2002 (with Joan Rose and Charles Gerba), $163,000.

Principal Investigator, "Disinfection of Protozoa", Philadelphia Water Department, 2000-2001, $50,000

Principal Investigator, "Evaluation of the Analytical Capabilities, Today and Near Future, for the Monitoring of Drinking Water for Accidental or Intentional Contamination", Philadelphia Water Department, 2002-2003, $100,000.


Principal Investigator, “Workshop on Advancing the Quality of Water (AQWA)”, National Science Foundation, 2003-2004, $99,000.

Principal Investigator, “Delaware Valley Water Source Tracking Effort (DeVaWaSTE)”, Philadelphia Water Department, 2004-2011, $400,000.


Principal Investigator, “Assessment of Physical Scale Models for Development of Room Decontamination Design Criteria”, funded via National Bioterrorism Civilian Medical Response Center (CIMERC), 2004-5, $55,000.


Co-Principal Investigator, “CLEANER Project Office”, National Science Foundation, 2005-8, $250,000 (Drexel share), $3,000,000 total (lead institution: University of Illinois at Urbana-Champaign).

Co-Principal Investigator and Co-Director, “Center for Advancing Microbial Risk Assessment (CAMRA)”, US EPA and US Department of Homeland Security (Cooperative Center of Excellence), 2005-2010, $2,200,000 (Drexel share), $10,000,000 total funding (lead institution: Michigan State University).

Principal Investigator, “The Drexel University GAANN Fellowship Program: Educating Renaissance Engineers”, 2006-10 ($510,000).

Principal Investigator, “Risk Assessment from Wet Weather Flows”, Philadelphia Water Department, 2007-2012, $1,500,000.

Publications & Presentations

Books and Other Major Works


14) Effect of Initial Microbial Concentration on Disinfection Efficiency, AWWA Research Foundation, C.N. Haas and B. Kaymak, Denver CO (2002).

**Peer Reviewed Publications**

1) “Oxygen Uptake Rate as an Activated Sludge Control Parameter.” Journal of the Water Pollution Control Federation, 51, 938-943 (1979), Charles N. Haas.


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<tbody>
<tr>
<td>16</td>
<td>“Effect of Effluent Disinfection on Risks of Viral Disease Transmission via Recreational Exposure.” Journal of the Water Pollution Control Federation, 55, 1111-6 (1983), C.N. Haas.</td>
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</table>
48) “Assessing the Need for Wastewater Disinfection”, Journal of the Water Pollution Control Federation, 59, 856-64 (1987), C.N. Haas et al.
165) “Wastewater Disinfection by Peracetic Acid: Assessment of Models for Tracking Residual Measurements and Inactivation”, Santoro, Domenico; Gehr, Ronald; Bartrand, Timothy A; Liberti, Lorenzo; Notarnicola, Michele; Dell’Erba, Adele; Falsanisi, Dario; Haas, Charles N., Water Environment Research 79(7):775-87 (2007).
Presentations


2) “Physiological Alterations of Vegetative Microorganisms Resulting from Aqueous Chlorination,” presented at the Research Symposium during the 51st annual meeting of the Water Pollution Control Federation, Houston, October, 1978.

3) “Physiological Basis for Chlorination,” presented at a seminar of the Department of Civil Engineering, Syracuse University, November, 1978.


8) “A Quantitative Model of Post-Disinfection Microbial Dynamics.” Presented at the Research Symposium during the 52nd Annual Meeting of the Water Pollution Control Federation, Anaheim, October, 1979.


11) “Acid-Fast Bacteria and Yeast as Indicators of Disinfection Efficiency.” Invited Presentation before the Interstate Seafood Seminar, Ocean City, MD, October, 1980.


19) “Estimation of Recreational Disease Risk due to Disinfection: Illinois–A Case Study.” Presented at the 55th Annual Conference of the Water Pollution Control Federation, St. Louis, October, 1982.

20) Seminars presented during a visit to the Italian National Research Council, Water Research Institute, Bari, Italy, June, 1982:
   “Rational Analysis of Chlorination Kinetics.”
   “Use of Computer Equilibrium Models for Assessment of Industrial Waste Chemistry.”
   “Novel Precipitation processes for Metal Recovery from Semiconductor Wastes.”
   “Application of Ion Exchange to Recovery of Metals from Semiconductor Wastes.”
   “Solid Phase Differential Reactor Studies on Adsorption in Air and Water.”


53) “Maximum Likelihood Analysis of Disinfection Kinetics”, seminar to the Environmental Engineering Program, Department of Civil Engineering, University of Illinois at Urbana-Champaign, February 1989.

54) “Multicomponent Interactions In Environmental Engineering”, seminar to the Institute of Environmental Studies, Drexel University, April 1989.


58) “Occurrence of Pathogens and their Associated Risk”, invited paper, Regulating Drinking Water in the 1990’s, sponsored by the Northeast Regional Environmental Public Health Center, April, 1991, Amherst MA.


62) “Biological Sulfide Prestripping for Metal and COD Removal”, Annual Conference of the Water Pollution Control Federation, October 1991, Toronto, Canada.


64) “Nonideal Interactions in Metal Separations in Environmental Engineering”, seminar to the Department of Chemical Engineering, Drexel University, January 27, 1992.

65) “Risk Assessment of Infectious Disease from Waterborne Exposures”, seminar to the Department of Bioscience and Biotechnology, Drexel University, April 2, 1992.


72) “The Risk of Illness from Drinking Water”, seminar to the Department of Civil and Architectural Engineering and the Environmental Studies Institute, Drexel University, January 1993.

73) “Microbial Risk Assessment of Drinking Water”, seminar to the Department of Environmental and Occupational Health and the Department of Civil Engineering and Mechanics, University of South Florida, Tampa, March 1993.

75) “Nonideal Interactions in Metal Separation Processes”, seminar to the Department of Civil Engineering, University of Delaware, March 1993.
76) “The Effect of Free Chlorine, Preformed Monochloramine, Chlorine+ Preammoniation and Ozone on Giardia muris Cyst Viability”, presented at the Annual Conference of the Pennsylvania Section of AWWA, April 1993, with Joel Hornberger, Uma Anmangandla and Josh Joffe.
79) “What We Think We Know and What We Think We Don’t Know About Chlorination and Dechlorination”, presented at the Water Environment Federation Specialty Conference on Wastewater Disinfection, May 1993, Whippany NJ.
83) “Verification of a Mechanistic Kinetic Model for Chloroform Formation from a Model Precursor During Water Chlorination”, C.N. Haas and K. Topudurti, presented at the National Meeting of the American Chemical Society, Chicago IL, August 1993.
88) Invited presentations to faculty and administration at University of Texas-El Paso: “Environmental Science and Engineering at Drexel University” and “Future Trends in Environmental Protection”, November 1993.
93) “Can Chlorine be Eliminated from Water Treatment?”, invited seminar, MIT Program in Technology and Public Policy, May 1994.
97) “Application of Reaction Engineering Approaches to Disinfection Process Design”, seminar to the Department of Civil Engineering, University of Illinois at Urbana-Champaign, August 1994.
103) “Application of Reaction Engineering Approaches to Disinfection Process Design”, seminar to Texas A&M University, Department of Civil and Ocean Engineering, August 1995.
111) “Novel Quantitative Approaches for Chemical Mixtures”, seminar to Department of Environmental Systems Engineering, Clemson University, April 4, 1997.
112) “The Role of Risk Assessment in Setting US Drinking Water Standards”. Nishihara Invited Lecture delivered to:
   - Hokkaido University (Japan) – Environmental Engineering program
   - Tokyo University – Department of Urban and Environmental Engineering
   - Nishihara Sanitation Company
   - Nihon University – Department of Civil Engineering
   - Japan Ministry of Health – Membrane 21 Conference
113) “What we Think We Know and What We Think We Don’t Know about Chlorination-Dechlorination”, presented at the preconference workshop on Disinfection, Water Environment Federation Technical Conference, October 18, 1997, Chicago.
117) “Risk Based Criteria for Pathogens in Drinking Water: Has the Time Come?”, Seminar to the Department of Civil and Environmental Engineering, University of Delaware, March 27, 1998.
125) “Risk Based Criteria for Pathogens in Drinking Water: Has the Time Come?”, seminar to Department of Civil Engineering, San Diego State University, December 2, 1998, San Diego CA.
133) “Risk Based Criteria for Pathogens in Drinking Water: Has the Time Come?”, seminar to the Department of Civil and Environmental Engineering, Princeton University, October 20, 1999.
142) “Progress and Data Gaps in Quantitative Microbial Risk Assessment”, invited presentation to the Department of Urban and Environmental Engineering, University of Tokyo, Japan, September 18, 2001.
148) “Microbial Dose-Response Models”, presented at a short course on microbial risk assessment offered by the University of Ottawa to personnel from Food Canada and Health Canada, March 1, 2002, Ottawa, Canada.
149) “Chemical and Biological Terrorism and Higher Education”, presented at a workshop organized by the Association of Independent Colleges and Universities of Pennsylvania, Harrisburg PA, March 7, 2002.
161) “Quantitative microbial risk assessment+20: victories, challenges and a look forward”, seminar to the Harvard Center for Risk Analysis, October 31, 2003, Boston MA.
172) “Chemical Terrorism Against Food and Water Supplies”, Symposium on Toxic Industrial Chemicals and Toxic Industrial Materials, sponsored by ATSDR and American Society for Medical Toxicology, Drexel University, June 13, 2005.


176) ”Animal Dose Response Data for Predicting Risk of BT Events: Preliminary Thoughts on Validation Using the 2001 AMI Incident as a Case Study”, presented at the annual meeting of the Society for Risk Analysis, December 2006.


187) “Dose-Response Model of Rocky Mountain spotted fever for humans”, Presentation at Annual Conference of Society for Risk Analysis (by Sushil Tamrakar, PhD student), Salt Lake City, December 2010.


190) “Re-envisioning a more sustainable urban water cycle”, Invited presentation at Peking University in Senzhen, April 2011.

191) “Introduction to QMRA”, presentation at the biennial conference of the Association of Environmental Engineering and Science Professors, Tampa, July 2011.

Non-Reviewed Publications

1) “Chemical Basis for Interaction Between Aquatic Bacteria and Phytoplankton,” Final Report to the National Science Foundation, Student Originated Studies Program (1973).


7) Discussion on “Cyanophage Analysis as a Biological Pollution Indicator—Bacterial and Viral.” Journal of the Water Pollution Control Federation, 49, 1913 (1977).

Student Advising

Rensselaer Polytechnic Institute

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<tr>
<th>Year</th>
<th>Degree</th>
<th>Student</th>
<th>Title</th>
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<tr>
<td>1979</td>
<td>M.Eng.</td>
<td>P.A. Sajous</td>
<td>Oxygen Uptake Rate as a Control of Activated Sludge Process</td>
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Illinois Institute of Technology

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<th>Student</th>
<th>Title</th>
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<tbody>
<tr>
<td>1984</td>
<td>M.S.</td>
<td>K. Khater</td>
<td>Inactivation of Tetrahymena pyriformis By Monochloramine.</td>
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<td>1984</td>
<td>M.S.</td>
<td>A. Wojtas</td>
<td>Inactivation of Tetrahymena pyriformis By Free Chlorine.</td>
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<td>1984</td>
<td>M.S.</td>
<td>D.M. Brncich</td>
<td>The Determination of Stability Constants for Na, Li, and K Ion Pairs with OCl</td>
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<td>1984</td>
<td>M.S.</td>
<td>B. Kaplan</td>
<td>The Influence of Humic Acid on Solubility and Air-Water Partitioning of Toluene.</td>
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<td>1985</td>
<td>M.S.</td>
<td>J. Macak</td>
<td>The Use of Coal Ash Mixtures as a Final Cover in the Reclamation of Landfills.</td>
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<td>1985</td>
<td>M.S.</td>
<td>M. Karalius</td>
<td>Inactivation of Escherichia coli by Chlorine in the Presence of K+ and Li+ Ions.</td>
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<tr>
<td>1985</td>
<td>M.S.</td>
<td>John Sheerin</td>
<td>Magnitude and Decay of Fecal Coliforms in Chlorinated and Non Chlorinated Wastewater Discharges.</td>
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<td>1986</td>
<td>M.S.</td>
<td>Paul Bitter</td>
<td>Analysis of Five Nutrient Effects on the Growth of Microorganisms in the City of Chicago Drinking Water Supply.</td>
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<td>1986</td>
<td>M.S.</td>
<td>Bon Mui</td>
<td>Distribution of Coliforms in Lake Michigan.</td>
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<td>1986</td>
<td>M.S.</td>
<td>R. J. Vamos</td>
<td>Kinetics of Cadmium Complexation Reactions with Chloride and Hydroxide</td>
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<tr>
<td>Year</td>
<td>Degree</td>
<td>Student</td>
<td>Title</td>
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<tr>
<td>1986</td>
<td>M.S.</td>
<td>Angela Podesta</td>
<td>A Rapid Membrane Filter Technique For the Concentration of Plankton in Finished Drinking Water.</td>
</tr>
<tr>
<td>1988</td>
<td>Ph.D.</td>
<td>K.V. Topudurti</td>
<td>Transfer of Chlorine from Monochloramines and Organochloramines to a THM Precursor.</td>
</tr>
<tr>
<td>1988</td>
<td>M.S.</td>
<td>Marc Bonem</td>
<td>Plant Deposition of Nitrogen Dioxide (co advised).</td>
</tr>
<tr>
<td>1990</td>
<td>Ph.D.</td>
<td>Yao Kouome</td>
<td>CSTR Microbial Inactivation by Free and Combined Chlorine.</td>
</tr>
<tr>
<td>1990</td>
<td>Ph.D.</td>
<td>C. Polprasert</td>
<td>Biological Sulfide Production for Heavy Metal Removal.</td>
</tr>
<tr>
<td>1990</td>
<td>M.S.</td>
<td>Chi Lo</td>
<td>Assessment of Solid Waste Generation Patterns and Potential for Recycling on the IIT Campus.</td>
</tr>
<tr>
<td>1991</td>
<td>Ph.D.</td>
<td>J. VanNortwick</td>
<td>Mixed Metal Precipitation</td>
</tr>
<tr>
<td>1991</td>
<td>M.S.</td>
<td>B. Bush</td>
<td>Carcinogenic Risk Assessment: Calculating Confidence Limits on the Virtually Safe Dose</td>
</tr>
</tbody>
</table>

**Drexel University**

<table>
<thead>
<tr>
<th>Year</th>
<th>Degree</th>
<th>Student</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>M.S. (Env.)</td>
<td>Bruce Stirling</td>
<td>Biological Responses to Mixtures</td>
</tr>
<tr>
<td>1993</td>
<td>M.S. (Env. Eng.)</td>
<td>Joel Hornberger</td>
<td>Development of a Standard Method for the Determination of Disinfection Effectiveness Against Giardia Cysts</td>
</tr>
<tr>
<td>1993</td>
<td>M.S. (Env. Eng.)</td>
<td>Uma Anmangandla</td>
<td>Regression Analysis of Disinfection Kinetics</td>
</tr>
<tr>
<td>1994</td>
<td>M.S. (Env. Eng.)</td>
<td>Sean Kersten</td>
<td>Analysis Of Binary Toxic Mixtures Using A Model Of Independence</td>
</tr>
<tr>
<td>1995</td>
<td>M.S. (Env. Eng.)</td>
<td>Kaushik Cidambi</td>
<td>Analysis Of Binary Toxic Mixtures Using A Generalized Additivity Model</td>
</tr>
<tr>
<td>1995</td>
<td>M.S. (Env.Eng.)</td>
<td>Chris Crockett</td>
<td>Determination of Sources and Impacts of Giardia and Cryptosporidium in a Major Metropolitan Watershed</td>
</tr>
<tr>
<td>1996</td>
<td>PhD (Env Eng)</td>
<td>Jin Anotai</td>
<td>Effect of Calcium Ion on Chemistry and Disinfection Efficiency of Free Chlorine at pH 10</td>
</tr>
<tr>
<td>1996</td>
<td>M.S. (Env. Eng.)</td>
<td>Shubhangi Desai</td>
<td>Kinetics of Inactivation of G. muris by Monochloramine</td>
</tr>
<tr>
<td>1996</td>
<td>M.S. (Env. Eng.)</td>
<td>Aamir M Fazil</td>
<td>A Quantitative Risk Assessment Model for Salmonella</td>
</tr>
<tr>
<td>1996</td>
<td>M.S. (Env. Eng.)</td>
<td>R.B. Chitluru</td>
<td>Chlorination Kinetics for Water Main Associated Organisms</td>
</tr>
<tr>
<td>1996</td>
<td>M.S. (Env Sci)</td>
<td>J.L. Gambetese</td>
<td>Fate Modeling of Organic Compounds in Wastewater Treatment Plants: A Comprehensive Analysis of WATER7 and WATER8</td>
</tr>
<tr>
<td>1997</td>
<td>M.S. (Env Eng)</td>
<td>Joe Nattress</td>
<td>Benchmarking Giardia and Cryptosporidium Inactivation at the Philadelphia Water Department</td>
</tr>
<tr>
<td>1998</td>
<td>M.S. (Env Eng)</td>
<td>Dhumal Aturaliye</td>
<td>Electroporation Assisted Disinfection of Giardia and Cryptosporidium</td>
</tr>
<tr>
<td>1999</td>
<td>Ph.D. (Env. Eng)</td>
<td>Mukul Gupta</td>
<td>Epidemiological Modeling of Waterborne and Foodborne Outbreaks</td>
</tr>
<tr>
<td>Year</td>
<td>Degree</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>1999</td>
<td>MS (Env Eng)</td>
<td>Modeling Cryptosporidium Removal in Drinking Water by Physical Processes</td>
<td>Kathy French</td>
</tr>
<tr>
<td>1999</td>
<td>MS (Env Eng)</td>
<td>Water matrix effects on protozoan inactivation in chlorine-chloramine disinfection processes</td>
<td>Paul Batman</td>
</tr>
<tr>
<td>1999</td>
<td>MS (Env Eng)</td>
<td>Benchmarking and modeling the inactivation of Legionella pneumophila using chlorine and chloramines</td>
<td>Dora D’Andrea</td>
</tr>
<tr>
<td>1999</td>
<td>MS (Env Eng)</td>
<td>Ion exchange on a chelating resin: multicomponent equilibrium predictions using binary data</td>
<td>Joseph Dmochowski</td>
</tr>
<tr>
<td>2000</td>
<td>MS (Env Eng)</td>
<td>Use of Microbial Risk Modeling to Determine the Benefit of Topical Antimicrobial Products</td>
<td>Jason Sites</td>
</tr>
<tr>
<td>2001</td>
<td>PhD (Env Eng)</td>
<td>Numerical Simulation of Chlorine Disinfection Processes in Non-Ideal Reactors</td>
<td>Paula R. Klink</td>
</tr>
<tr>
<td>2004</td>
<td>PhD (Env Eng)</td>
<td>Development of Physiologically Based Pathogen Transport and Kinetics Model for Inhalation of Bacillus anthracis Spores</td>
<td>Lijie Li</td>
</tr>
<tr>
<td>2005</td>
<td>PhD (Env Eng)</td>
<td>A quantitative microbial risk assessment model for human inhalation exposure to Legionella</td>
<td>Thomas W. Armstrong</td>
</tr>
<tr>
<td>2006</td>
<td>PhD (EnvEng)</td>
<td>High-Resolution Experimental and Numerical Analysis of Fine Bubble Ozone Contactors (co advised with Baki Farouk)</td>
<td>Timothy A. Bartrand</td>
</tr>
<tr>
<td>2008</td>
<td>MS (Env Eng)</td>
<td>Tracking the Sources of Fecal Contamination in the Wissahickon Creek Watershed using Phenotypic and Genotypic Analytical Methods</td>
<td>Joanna M. Pope</td>
</tr>
<tr>
<td>2009</td>
<td>PhD (EnvEng)</td>
<td>Development of Computational Fluid Dynamics based Multiple Linear and Neural Network Metamodels for Bioaerosol Fate and Transport in Indoor Environments</td>
<td>Mark Weir</td>
</tr>
<tr>
<td>2010</td>
<td>PhD (EnvEng)</td>
<td>Sustainable Development: Which Policy Process - Autocratic or Democratic- Leads to More Durable Policy and Environmental Outcomes?</td>
<td>Shamia Hoque</td>
</tr>
<tr>
<td>2011</td>
<td>PhD (EnvEng)</td>
<td>Incorporating Time to Response into Dose-Response Models Used in Quantitative Microbial Risk Assessment</td>
<td>Paula Estornell</td>
</tr>
<tr>
<td>2011</td>
<td>MS (EnvEng)</td>
<td>Dose-Response Models of Rickettsiae and Other Biological Agents of Concern</td>
<td>Yin Huang</td>
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</tbody>
</table>
Student Research In Progress at Drexel University:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Student</th>
<th>Topic</th>
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<tbody>
<tr>
<td>PhD (Env Eng)</td>
<td>Russell Green (2002-)</td>
<td>Biologically Assisted Corrosion</td>
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<tr>
<td>PhD (EnvEng)</td>
<td>Michael Ryan (2008-)</td>
<td>Microbial Source Tracking</td>
</tr>
<tr>
<td>PhD (EnvEng)</td>
<td>Neha Sunger (2008-)</td>
<td>Recreational Water Risk Assessment</td>
</tr>
<tr>
<td>PhD (EnvEng)</td>
<td>Bidya Prasad (2011-)</td>
<td>Microbial Risk Assessment</td>
</tr>
<tr>
<td>PhD (EnvEng)</td>
<td>Kerry Hamilton (2011-)</td>
<td>Microbial Risk Assessment</td>
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Teaching Experience

Rensselaer Polytechnic Institute

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
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<tr>
<td>Unit Processes</td>
<td>Advanced Aquatic Chemistry</td>
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<tr>
<td>Thermodynamics</td>
<td>Biological Treatment</td>
</tr>
<tr>
<td>Environmental Engineering Laboratory</td>
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<tr>
<td>Chemistry for Environmental Engineers</td>
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Illinois Institute of Technology

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
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<tr>
<td>Water &amp; Wastewater Treatment</td>
<td>Environmental Chemistry</td>
</tr>
<tr>
<td>Introduction to Environmental Engineering</td>
<td>Biochemical Engineering</td>
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<td>Physical Treatment</td>
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<td></td>
<td>Sanitary Design</td>
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<td></td>
<td>Hazardous Waste Engineering</td>
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<td></td>
<td>Industrial Waste Treatment Criteria</td>
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<td></td>
<td>Groundwater Contamination</td>
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<td>Data Analysis</td>
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Drexel University (* - Undergraduate Course)

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
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</thead>
<tbody>
<tr>
<td>Environmental Engineering I</td>
<td>Unit Operations: Biological</td>
</tr>
<tr>
<td>Unit Operations Laboratory</td>
<td>Chemistry of the Environment</td>
</tr>
<tr>
<td>Reaction Kinetics &amp; Mass Transfer</td>
<td>Risk Assessment</td>
</tr>
<tr>
<td>Bioterrorism (Special Topics)</td>
<td>Advanced Environmental Chemistry</td>
</tr>
<tr>
<td>Professional Practice in Environ. Eng.</td>
<td>Unit Operations: Physical-Chemical</td>
</tr>
<tr>
<td>Environmental Engineering Laboratory I, II</td>
<td>Topics in Environmentrics</td>
</tr>
<tr>
<td>Introduction to Environmental Engineering</td>
<td>Hazardous Waste &amp; Groundwater Treatment</td>
</tr>
<tr>
<td>Water &amp; Wastewater Design III</td>
<td>Biostatistics</td>
</tr>
<tr>
<td></td>
<td>Environmental Impacts</td>
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<tr>
<td></td>
<td>Sanitary Microbiology</td>
</tr>
</tbody>
</table>

Service on External Graduate Student Committees

Alexa Oblensky, University of North Carolina at Chapel Hill, Department of Environmental Science and Engineering (advisor – Phil Singer), 2002-present.
Benjamin Tanner, University of Arizona, Department of Soil, Water and Environmental Sciences (advisor – Ian Pepper), 2003-2004.
Domenico Santoro, Polytechnic of Bari at Taranto (Italy), Faculty of Environmental Engineering (external examiner and collaborator; advisor – Lorenzo Liberti), 2004-2005.

**Post-Doctoral Scholars Advised**

Vinod Tare (PhD – IIT Kanpur) – 1985-87  
Timothy Bartrand (PhD – Drexel Univ.) – 2007-8  
Toru Watanabe (Japan Society for Promotion of Science sponsored; PhD Tohoku Univ.) – 2008-2009  
Sondra Teske (PhD – Univ. of Arizona) – 2009 --

**Professional Activities**

**Editorial Boards**

- Founding Editor in Chief - Quantitative Microbiology (Kluwer), 1998-2001  
- Applied and Environmental Microbiology (Editorial Board, 1988-1994)  
- Ozone Science & Engineering (Editorial Board, 1999 - 2001)  
- Journal of Medical Risk (Editorial Board, 2003-)  
- Risk Analysis (Associate Editor – Microbial Risk, 2006-)

**Panels and Seminars Chaired**

- Organized and Chaired a Seminar on "Mode of Action of Halogen Disinfectants Used in Water and Wastewater Treatment" at the Annual Meeting of the American Society for Microbiology, Dallas, March, 1981.  
- Organized and Chaired a Session on "Disinfection and Chemical Oxidation" at the Annual Meeting of the American Institute of Chemical Engineers, New Orleans, November, 1981.  
- Organized and Chaired a Session on "Potpourri: Industrial and Toxic Wastes" at the National Meeting of the American Institute of Chemical Engineers, Cleveland, August, 1982.  
- Organized and Co-Chaired a Session on "Recovery of Metal Values From Industrial Wastes" at the National Meeting of the American Institute of Chemical Engineers, Denver, August 1983.  
- Invited Chairman on "Disinfection of Wastewater Effluents" NSF State of the Art Conference on Disinfection of Wastewater Effluents and Sludges, Miami, May 1984.  
- Co-Organized and Co-Chaired a Preconference Seminar on "Practical Experience with Ozone for Organics Control and Disinfection", AWWA, Cincinnati, June 1990.  
Organized NSF supported expert workshop on Advancing the Quality of Water (AQWA), Chapel Hill NC, March 10–12, 2004.
Co-Organized WEF/AWWA/IWA Disinfection Specialty Conference, Pittsburgh PA, February 4-7, 2007

Professional Society Activities
American Society of Civil Engineers,
  Environmental Engineering Division.
  Member, Task Committee on Disinfection Risk Assessment 1981-1985.
  Water Supply and Resource Management Committee
  Chairman, Task Committee on Control of Microbes in Drinking Water, 1989-90
  Member, Executive Committee, Department Heads Council (2011-)
American Water Works Association
  Member, Research Division Committee on Disinfection, 1980-1992.
  Member, Water Quality Division Committee on Disinfection, 1982-present.; Chairman, 1989-1994
  Member, Water Quality Division Committee on Organisms in Water, 1983-1987.
  Member, Water Quality Division Committee on Status of Waterborne Diseases in the US and Canada, 1987-1995
  Member, Student Activities Committee, 1984-1990.
  Illinois Section Student Activities Committee, Member, 1981-1990; Chairman, 1983-1986.
American Water Works Association Research Foundation (AWWARF)
  member, various project advisory committees (1993-current)
Association of Environmental Engineering and Science Professors
  Chairman, Committee to revise recruitment brochure, 1981-1983.
  Member, Board of Directors, 2001-2004
  Treasurer and Member of the Executive Committee, 2002–2004
  Chairman, Conference Planning Committee, 2003-present
International Water Association
  USA National Committee
    Chairman 1994 - 2000
Water Environment Federation
  Director-at-Large, 2004-2006.
  Member, Research Committee, 1978-1982.
  Member, Research Committee Task Force on Toxic Substances, 1980-1982.
  Member, Committee on Disinfection, 1980-1988, 1991-present.
    Vice-Chairman, 1982-1985.
  Member, Research Symposium Subcommittee of the Program Committee, 1984-1986.
  Member, Illinois Association Student Activities Committee, 1981-1990.
  Co-Chairman, Third Specialty Conference on Disinfection (Baltimore, April 1998)
Water Environment Federation Research Foundation
  member, Project Subcommittee (UV Disinfection) - Sept 1996-1998
  member, Project Subcommittee (Water Reuse) - Oct. 1997-2001
  member, Board of Directors – 2006-
Standard Methods for the Examination of Water and Wastewater
  Member, Joint Task Group on Chlorine Demand, 1988-1994.
Society for Risk Analysis, Councilor (member, Board of Directors), 2000–2003
American Association for the Advancement of Science, Division Y (General Interest)
   Electorate Nominating Committee (2002-2005).
   Chair-Elect (2008-9)
   Chair (2009-2010)
American Society for Microbiology
   Public and Scientific Affairs Board, Committee on Environmental Microbiology, Member (2003-)

Continuing Education Programs
Seminar on Current Topics in Water Supply, New York State Section of the American Water Works Association,
Limiting Liability for Hazardous Wastes, a continuing education program for lawyers, sponsored by the
   Chicago-Kent College of Law, Chicago, November, 1981, was also a member of the program Steering
   Committee.
WPCF Preconference Workshop on Wastewater Disinfection Alternatives, Atlanta, October 1983, Co-organizer and
   participant.
WPCF Preconference Workshop on Disinfection Risk Assessment, New Orleans, September 1984, Co-organizer
   and participant.
University of Wisconsin-Milwaukee, Engineering Extension. Wastewater Pretreatment and Toxicity Control,
   March, 1986.
WPCF Preconference Workshop on Design and Operation of Alternative Disinfection Systems, Los Angeles,
   October, 1986, Organizer and participant.
WPCF Preconference Workshop on Emerging Issues in Effluent Disinfection. Philadelphia, October, 1987,
   Organizer and participant.
California Business Law Institute, Environmental Regulation in Illinois, participant, November 1989.
University of Wisconsin-Madison, Engineering Extension. Disinfection of Wastewater, October 1989, October
   1990.
International Association of Milk, Food and Environmental Sanitarians, Co-Organized Workshop on Microbial Risk
WEF Specialty Conference on Disinfection, Baltimore MD, April 1998, co-organized.
AWWA/IWSA Symposium on Disinfection Residuals, Philadelphia PA, April 1998, member - planning committee.

University Service

Rensselaer Polytechnic Institute
   RPI Department of Chemical and Environmental Engineering Committee on Graduate Students, Member,
   Planning Committee for the UPS Conference, RPI Fresh Water Institute, 1979.
   Member, RPI Biohazard Safety Committee, 1979-1981.

Illinois Institute of Technology
   Member, IIT Graduate Study Committee, 1981-90.
   Member, Armour College Committee on Promotion and Tenure, 1984-1986.
   Member, Institute Library Planning Committee, 1983-88.
   IIT Faculty Senate, Recording Secretary, 1984-1986.
      Corresponding Secretary, 1987-1988.
Member, New Business Committee, and IIT Projects Manager, Center for Hazardous Waste Management, 1987-89.
Member, Department Chairman Search Committee, 1988-9.
Member, IIT Faculty Council, 1989-90
Chairman, Academic Affairs Committee, 1989-90

Drexel University

University
Faculty Senate
Vice Chair, 1994-1995
Chair, 1995-1996
Member, University Appeals Committee, 1991-94
Member, Search Committee for Associate Director of Enrollment Management (Graduate/Part Time), 1992
Chairman, University Biosafety Committee, 1996-1998.
University Assessment Committee (preparation for Middle States visit), 1998-2001
Member
Co-chair, Research & Graduate Task Force
Chairman, Search Committee for a Director of SESEP, 2000-2002
Member, Law School Development Committee, 2004-5.
Co-Director, Drexel Engineering Cities Initiative (DECI), 2008-present
Member, Vice Provost for Research Search Committee, 2009-10
Member, Academic Excellence Award Committee, 2009-10

College/School
Chairman, Environmental Policy Faculty Search Committee, 1997.

Department
Chairman, Environmental Studies Institute Curriculum Committee, 1991-1994
Chairman, Civil and Architectural Engineering Department Graduate Committee, 1991-1992
Member, Civil and Architectural Engineering Department Committee on Laboratory Renovation, 1993-4.
Member, Search Committee, Environmental Engineering Faculty, 1996.
Member, Search Committee, Environmental Chemistry Faculty, 1993-1994, 1996
Chairman, SESEP Faculty Search Committee, 1997-1998.
Chairman, SESEP Curriculum Committee, 1999-2002
Chairman, ABET Preparation for Initial BS EnvE Accreditation, 1999-2002
Chair, Midterm Review Committees for Assistant Professors Lordgooei and Wartman, 2002.
Member, Departmental Promotion Committee for Associate Professor Welty, 2002.
Member, Department Head Search Committee, 2002-2003.
Member, CAEE Department Undergraduate Curriculum Committee, 2002-2005
Member CAEE Department Graduate Committee, 2003-2005
Chair, CAEE Department Faculty Search Committee, 2003-2004

Consulting Activities
Energy & Resource Recovery Corporation (Subsidiary of Alpha Portland Industries)--performed a regulatory analysis and preliminary feasibility study for the use of hazardous wastes and spent solvents as supplemental fuel in cement kilns, 1979.
New York State Department of Civil Service - served as a member of oral examination panels for the positions of Associate Sanitary Engineer and Associate Air Pollution Control Engineer, March through May, 1981.
Patterson Associates, Inc.
determination of hazardous waste production potential and management options for the forging industry, June through October, 1981.

analysis of a the waste management profile for a large, privately held, conglomerate, November, 1986.


Waste Management, Inc. --Prepared testimony on the need for additional hazardous waste disposal capacity in Will County, Illinois, October, 1982.

Katz, Friedman, Schur and Eagle/United Auto Workers-- evaluation of technical documents relating to environmental impact of cooling water discharge at Quad Cities/Cordova Generating Station, June 1983-ongoing.


East Bay Municipal Utility District (Oakland, CA) -- Serve as a technical advisor on the design of an innovative stormwater overflow disinfection system, August 1986-April 1987.

E & E Hauling, Inc. -- Advised on environmental impact of an asphalt hot melting facility, January 1987.


Metropolitan Waste Systems, Inc.

-- Preparation of testimony on need for solid waste disposal capacity in La Salle County, IL, March - May, 1988, January-May, 1989.

-- Assessment of need for a solid waste transfer station in Blue Island, IL. January 1989.


Land and Lakes Co. -- Assessment of need for additional solid waste disposal capacity in Will County, IL. December 1989 - November 1990.

Chlorine Institute -- preparation of review on chlorine fate in freshwater systems as part of FIFRA reregistration application, July-August, 1990.


City of Philadelphia - Department of Personnel -- Served on Oral Examination Panel for Water Treatment Engineer, March 1993.


Carollo Engineers - Microbial Criteria Development for a Water Treatment Plant, including consideration of recycle streams and Cryptosporidium, 1996-1997.


US Department of Justice - provide expert analysis on impact of sewage discharges on water quality (US vs. Penn Hills), 1998.

CDM, Inc. and Massachusetts Water Resources Authority - advise on novel integration approaches to evaluating disinfection "c_t" values, 1998.


Alston and Bird - Provide expert support in administrative proceeding on behalf of Gwinnett County GA regarding defense against petition to deny effluent discharge permit modifications. (Lake Lanier Association et al. v. Georgia Environmental Protection Division). 2001-2002.


Foley, Hoag and Eliot (counsel to Portland Water Bureau) – advise on regulatory issues relating to the Long Term 2 Enhanced Surface Water Treatment Rule, 2006.

Metropolitan Water Reclamation District of Greater Chicago (via CTE Engineers) – provide assistance with respect to regulatory proceedings on surface water quality and disinfection criteria, 2007-.

Hurvitz & Waldman – provide expert support in defense of litigation involving Legionella and drinking water, 2008-11.

US Department of Justice – provide expert analysis in criminal enforcement case under the Clean Water Act, 2011-

CDM, Inc. – Provide technical assistance regarding compliance with Cryptosporidium standards in Portland, OR, 2011-

**Membership in Advisory Bodies**


Chaired peer review panel to review the research program on "Microbial Degradation in Distribution Systems" for US EPA, June 1983.


Member, US EPA peer review panel to review work on microbial inactivation in drinking water disinfection, March 1986.

Member, US EPA peer review panel to review program on risk assessment from microorganisms in wastewater sludges, April 1986.


Member, peer review panel, Oklahoma Council on Science and Technology, 1989.

Member, study section, National Institute of Environmental Health Sciences, 1991, 1994.


Member, City of Philadelphia, Department of Health, Advisory Committee on Cryptosporidium, October 1995-1999.


Member, Oversight Steering Committee and Statistics Panel, EPA-George Washington University Cooperative Agreement on Risk Assessment, 1999-.

Member, Committee on Drinking Water Contaminants, National Research Council Water Science and Technology Board, 1999-2001.

Invited Participant, Consultation on "Harmonised Risk Assessment for Water-Related Microbiological Hazards".
Member, Committee on Toxicants and Pathogens in Biosolid Fertilizers, National Research Council, Board on Environmental Studies and Toxicology, 2001-2002.
Member, review team for the Environmental Pollution Control MS Program, Pennsylvania State University, March 2001.
Member, Committee on Indicators for Waterborne Pathogens, National Research Council, Board on Life Sciences, 2002-2003
Member, Water Science and Technology Board (WSTB), National Research Council, 2004-2010.
Member, US EPA Board of Scientific Counselors Executive Committee, 2007-current.
Member, National Research Council Committee on Assessment of Water Reuse as an Approach for Meeting Future Water Supply Needs, 2008-2011.
Chair, National Research Council Committee on Evaluation of the Health and Safety Risk Analyses for the Planned Expansion of USAMRIID's Biosafety Level 3 and 4 Laboratories at Fort Detrick, Maryland, 2009-2010.
Member, US EPA Science Advisory Board Augmented Committee on Ecosystem Services and Processes to Provide Advice on Ballast Water Management, 2010-1.
Chair, National Research Council Committee on Assistance to the U.S. Army Medical Research and Materiel Command with Preparation of a Risk Assessment for the Medical Countermeasures Test and Evaluation (MCMT&E) Facility at Fort Detrick, MD, 2011-

November 2, 2011
NWRI Expert Panel for the California Department of Public Health

CV for Proposed Expert Panel Member:

- Walter Jakubowski
NAME: Walter Jakubowski
PHONE: 509-448-3535
Email: waltjay@yahoo.com

ADDRESS: 4511 E. 42nd Avenue 
Spokane, WA 99223-1590 USA

EDUCATION:

Brooklyn College of Pharmacy, Long Island University, Brooklyn, N.Y. Attended from 9/57 to 6/61
B.S. cum laude in Pharmacy Awarded June 1961

Oregon State University, Corvallis, Oregon
Attended from 9/66 to 6/68
M.S. in Microbiology Awarded June 1969

University of Minnesota, Minneapolis, Minnesota
Attended Graduate Summer Session June and July, 1977
Completed coursework in Fundamentals of Epidemiology and Fundamentals of Biostatistics; Certificate awarded

University of Minnesota, Minneapolis, Minnesota
Attended Graduate Summer Session June and July, 1979
Completed coursework in Epidemiology of Infectious Diseases and in Clinical Trials; Certificate awarded

EXPERIENCE (Dates, employers, position title, and area of work, USPHS Commissioned Officer grade):

07/97 - Present  Owner, WaltJay Consulting, Spokane, WA USA.
Clients have included: U.S.E.P.A.; Science Applications International Corporation; GF Craun & Associates; Pfizer Ltd.; Versar, Inc.; Lovelace Clinic Foundation; Cadmus, Inc.; P&G; ICFI Consulting, et al.

02/94 – 07/97  U.S. EPA, AWBERC, NERL, Human Exposure Research Division, Cincinnati, Ohio 45268 - EPA Director; Technical Advisor. In a Division with about 50 staff members, provide expertise and
conduct research on microorganism methods, occurrence and significance in the environment.
Grade: CO-06

08/88 – 02/94 U.S. EPA, AWBERC, EMSL, Microbiology Research Division, Cincinnati, Ohio 45268 - Chief, Parasitology & Immunology Branch. Supervise 5-7 people in a research program on parasitic contaminants of water, wastewater and sludge, and on immunological methods for the detection and identification of environmental contaminants.
Grade: CO-06

10/81 - 08/88 U.S. EPA, AWBERC, HERL, Toxicology & Microbiology Division, Cincinnati, OH 45268-Chief, Parasitology & Immunology Section. Supervise research on health effects/microbial contaminants in water and wastewater; supervise 5-7 people in projects dealing with protozoa, helminths and immunology; project officer on extramural studies of health effects associated with water supplies and irrigation of wastewater.
Grade: CO-06

09/76 - 10/81 U.S. EPA, ERC, HERL, Cincinnati, Ohio 45268 Chief, Bacterial & Parasitic Diseases Group. Supervise a research program on health effects of microbial contaminants of water and wastewater; supervise 5-7 people in projects dealing with bacteria, viruses, and protozoa; project officer on extramural studies of health effects associated with water supplies and wastewater treatment and disposal.
Grade: CO-05

06/73 - 09/76 U.S. EPA, ERC, HERL, Cincinnati, Ohio 45268 Virologist. Improve and evaluate methods for concentrating and detecting human enteric viruses in drinking water.
Grade: CO-05

06/68 - 06/73 U.S. EPA, NWWSRL, Gig Harbor, Washington Virologist. Develop methodology for concentrating and detecting human enteroviruses in drinking and estuarine waters; maintain tissue culture laboratory.
Grade: CO-04

08/66 - 06/68 DHEW, USPHS, WSSR, NCUIH, Corvallis, Oregon - Microbiologist (Student). Complete requirements for obtaining a Master of Science degree in microbiology. Conduct thesis
research on adsorption of poliovirus by marine silt and clay in estuarine water.
Grade: CO-04

09/64 - 08/66 DHEW, USPHS, PNW Shellfish Sanitation Laboratory, Gig Harbor, Washington - Research Microbiologist. Conduct studies on accumulation and elimination of bacteria and bacterial viruses by oysters and clams.
Grade: CO-03

08/62 - 09/64 DHEW, USPHS Hospital, San Francisco, California - Staff Pharmacist. Manufacture, prepare, and dispense pharmaceutical preparations for hospital inpatients and outpatients.
Grade: CO-03

07/61 - 08/62 DHEW, USPHS Hospital, Norfolk, Virginia - Pharmacy Intern. Became familiar with all phases of PHS hospital pharmacy; manufacture, prepare, and dispense pharmaceuticals for hospital inpatients and outpatients.
Grade: CO-01

PROFESSIONAL MEMBERSHIPS:

American Society for Microbiology
American Water Works Association
International Water Association

COMMITTEES AND BOARDS:

APHA Water and Wastewater Committee, 1984
Chairman, Sec. 912 - Pathogenic Microorganisms Joint Task Group, APHA Standard Methods, 16th and 17th Edition
Chairman, Sec. 9711 - Pathogenic Protozoa Joint Task Group, APHA Standard Methods, 18th Edition, 1990-92
Member, Sec. 913 Viruses JTG, APHA Standard Methods, 15-17th Eds.
Pathogenic Suite Committee, USEPA, 1976-1986
WPCF Safety and Health Committee, 1985-1987
Pathogens Equivalency Committee, Office of Water, USEPA, 1986-1997
Chairman, ASTM Section on Pathogenic Protozoa, Committee D.19 on Water, 1987-1997
Chairman, ASTM Section on Helminths, Committee D.19 on Water, 1992-94
Member, Sec. 9060, Samples JTG, APHA Standard Methods, 18th Ed., 1990-92
Editorial Board, International Journal of Environmental Health
Research, 1990-present
Member, Organisms in Water Committee and Waterborne Disease Outbreaks Subcommittee, American Water Works Association, 1990-1994
Publications Board Member, American Public Health Association, 1992-1997
Chair, Sec. 9711-Pathogenic Protozoa JTG, APHA Standard Methods, 21st Edition, 1999-2005

HONORS AND AWARDS:

Rho Chi Honor Society, 1961
USPHS Clinical Society Pharmacy Award, 1963
Sigma Xi Society, 1968
Nominated for U.S. EPA Scientific Achievement Award, 1979 & 1984
USEPA Bronze Medal re Giardia, 1984
USEPS Commendation Medal, re Wastewater Sludge Program, 1991
USEPA Gold Medal re Milwaukee Cryptosporidium outbreak, 1994
USEPA Bronze Medal re Drinking Water Regulations, 1997

ADDITIONAL ACTIVITIES:

Pharmacy license in Virginia and New York.

Served as member of Microbiology Panel at the "Protocol Development: Criteria and Standards for Potable Reuse and Feasible Alternatives" Workshop, ODW, Airlie House, Virginia, July 1980.

Served as member and rapporteur to the World Health Organization Biological Aspects Task Group on Drinking Water Guidelines, 1980-81.

Served as consultant to the Pan-American Health Organization on environmental virus methods at CETESB, Sao Paolo, Brazil, Aug. 1980.


Served as presenter and co-rapporteur of Occupational Hazards Panel at the Commission of European Communities Workshop on "Epidemiological Studies of Risks Associated with the Agricultural Use of Sewage Sludge: Knowledge and Needs," Metz, France, May, 1985.
Member of the work group on development of the coliform and surface water filtration regulations, ODW, EPA, 1986-1989.


Member, OGWDW Work Group for development of ICR, ESWTR and D/DBP rules, 1993-1997.

Peer reviewer for the NYC Expert Panel on Water Supply, l992-l993.

Member, NYC Advisory Panel on Waterborne Disease Assessment, 1993.

Organizer and participant, Protozoa, Virus and Coliphage Monitoring Workshop, Office of Water, Cincinnati, OH, l993.

Participant, Microbial and Disinfection By-Product Research Needs Expert Workshop, AWWA Association Research Foundation, Miami, FL, l993.

Presenter/participant, Milwaukee Boil Water Workshop, June 1994.


Presenter and participant, AWWA workshop on government Cryptosporidium research, Beltsville, MD, September 6, 1995.

Developer, steering committee member, presenter and participant at EPA workshop on Development of Giardia/Cryptosporidium Protocols, Crystal City, VA, September 11-12, 1995.

Member, Work Group on Bacteria/Disinfection Requirements, ORSANCO, 3/96

Participant, FDA Workshop on Cyclospora Methods, Washington, DC, 8/96

Member, CDC Working Group on Waterborne Cryptosporidiosis and presenter at international teleconference on the Public Health Handbook, May, 1997

WERF Project Subcommittee Member for 98-HHE-2, "Fate and Persistence of Pathogens Subjected to Disinfection", 1997-

Invited participant, AOAC symposium on waterborne protozoa, Montreal, September 1998.


Invited presenter and co-chair of "Water Treatment" session at "Giardia in the Rockies" conference, Canmore, Alberta, Canada, October, 2000.

Faculty member, 2000 AWWA-WQTC Workshop "Measuring Disinfection of Cryptosporidium: Cell Culture and Other In-Vitro Methods", Salt Lake City, Utah, November, 2000.

WERF Health Advisory Committee Member for 98-REM-1A, "A Dynamic Model to Assess Microbial Health Risk Associated with Beneficial Uses of Biosolids--Phase 2", 2003-2006.


WateReuse Foundation Project Advisory Committee Member for M-04-01, “Application of Microbial Risk Assessment Techniques to Estimate Risk Due to Exposure to Reclaimed

WateReuse Foundation Project Advisory Committee Member for WRF-06-003, “Investigating the Occurrence of Infectious Cryptosporidium Oocysts in Recycled Water and Evaluating the Effectiveness of Various Disinfection Techniques”, 2006-2009.

Panel Member, EPA CCL Microbial Expert Focused Workshop: Phase II, Arlington, VA, June, 2006


Liaison to the NWRI Independent Advisory Panel on the Orange County Waste District’s Santa Ana River Monitoring Panel.

Member of the 2012 NWRI Independent Advisory Panel for WateReuse Foundation Project 11-02 on criteria for direct potable reuse.

SELECTED JOURNAL ARTICLES:


Walter Jakubowski
Consultant
WaltJay Consulting (Spokane, Washington)

Education includes an M.S. in Microbiology from Oregon State University after graduating cum laude in Pharmacy from Brooklyn College of Pharmacy, Long Island University. He has certificated graduate training in Epidemiology from the University of Minnesota. He has been a hospital pharmacist and has research publications in this field. He conducted research on microorganisms in oysters and clams under the federal Shellfish Sanitation Program; however, most of his career has revolved around determining the health effects and public health significance of pathogens, especially intestinal protozoa and viruses, in drinking water, waste water and municipal sewage sludge. He has authored or co-authored more than 40 peer-reviewed publications in this area. He has served as a consultant to the World Health Organization on pathogenic intestinal protozoa (for development of the International Drinking Water Guidelines), and to the Pan-American Health Organization on environmental virus methods. He helped the Centers for Disease Control conduct the first international symposium on *Legionella* and Legionnaire’s Disease.

With more than 49 years experience working with waterborne pathogens, he is a recognized international expert on *Giardia* and giardiasis and has given invited presentations on this organism at domestic and international conferences. In addition to developing and standardizing methods for the detection of intestinal protozoa and viruses in the environment, he initiated research designed to gather information on the occurrence and distribution of *Giardia* infection in wildlife. He developed the first practical method for detecting *Giardia* cysts in drinking waters and he was the first to recover cysts, using this method, from source waters and distribution system water from a public water supply involved in a waterborne outbreak. He has worked with a variety of international, national, state and local public health authorities on problems related to *Giardia* and other infectious organisms in water, wastewater and sludge.

He initiated landmark studies on the human infectious dose of *Cryptosporidium* oocysts. He chaired the Joint Task Group on Pathogenic Intestinal Protozoa for *Standard Methods for the Examination of Water and Waste Water* from 1978 to 2005. He was a charter member of USEPA’s Pathogen Equivalency Committee and served on that committee until his retirement from the U.S. Public Health Service/Environmental Protection Agency in 1997. In 2006, he participated in an expert panel on procedures for improving the EPA mechanism for selecting microorganisms for the Drinking Water Contaminant Candidate List. He served on the National Water Resources Institute (NWRI) Independent Advisory Panel (IAP) for the Orange County (California) Water District’s Groundwater Replenishment System from 2007 until 2013 and was also a liaison to the NWRI IAP on the Orange County Waste District’s Santa Ana River Monitoring Panel. He served as a microbiologist and public health expert on the 2012 NWRI IAP for WateReuse Foundation Project 11-02 on criteria for direct potable reuse. He participated in a recently completed multi-organization research project to develop a molecular method for detecting and enumerating viable/infectious *Giardia* cysts of public health importance in environmental samples. His current interests include microbiological risk assessment and issues concerning waterborne pathogens in drinking water, wastewaters and reclaimed wastewater. He recently served as an advisor to Washington State in developing microbiological standards for the use of reclaimed wastewater. He was an invited participant in the 2010 WateReUse Foundation expert panel on "Examination of Microbiological Methods for Use with Reclaimed Waters.” He is on the editorial board for the International Journal of Environmental Health Research.
CV for Proposed Expert Panel Member:

- Perry L. McCarty, Sc.D.
PERRY L. McCARTY

Perry L. McCarty, Silas H. Palmer Professor Emeritus, joined the Stanford University faculty in 1962 when he came to help develop the environmental engineering and science program. From 1980 to 1985 he was Chairman of Stanford's Department of Civil and Environmental Engineering, and from 1989 to 2002 served as Director of the Western Region Hazardous Substance Research Center. He has a B.S. Degree in civil engineering from Wayne State University (1953), and M.S. (1957) and Sc.D. (1959) degrees in sanitary engineering from M.I.T.

The focus of his research and teaching has been on water with primary interest in biological processes for the control of environmental contaminants. His early research was on anaerobic treatment processes, biological processes for nitrogen removal, and water reuse. Current interests are on aerobic and anaerobic biological processes for treatment of domestic wastewaters, and movement, fate, and control of groundwater contaminants.

He was elected to membership in the National Academy of Engineering in 1977 and the American Academy of Arts and Sciences in 1996. He received the John and Alice Tyler Prize for Environmental Achievement in 1992, the Athalie Richardson Irvine Clarke Prize for Outstanding Achievements in Water Science and Technology in 1997, and the Stockholm Water Prize in 2007.

Prof. McCarty has over 350 publications, and is coauthor of the textbooks, *Chemistry for Environmental Engineering and Science*, and *Environmental Biotechnology - Principles and Applications*. He has been active with several professional groups, especially the National Academies. Among his other awards are honorary Doctorates from the Colorado School of Mines and Nanyang Technological University in Singapore; Distinguished Member, American Society of Civil Engineers; Honorary Member in the American Water Works Association, the Water Environment Federation, and the American Academy of Environmental Engineers and Scientist; and Fellow with the American Association for the Advancement of Science and the American Academy of Microbiology. He was selected by the National Academies to be the 2001 Abel Wolman Distinguished Lecturer. Other honors include the Harrison P. Eddy Award for Noteworthy Research (1964 and 1977), the Thomas Camp Award for Unique Application of Engineering Research (1975), and the Gordon Maskew Fair Distinguished Engineering Educator Medal (2012) of the Water Environment Federation; the A. P. Black Research Award (1989) and Water Industry Hall of Fame Award (2009) of the American Water Works Association; the Walter L. Huber Research Prize (1964), the Simon W. Freese Environmental Engineering Lecture Award (1979), and J. James R. Croes Medal (1995) of the American Society of Civil Engineers; and the Joan Hodges Queneau Palladium Medal (2013) of the National Audubon Society.
BIOGRAPHICAL SKETCH

Name: Perry L. McCarty

Education: B. S. Civil Engineering, Wayne State University, 1953
S. M. Sanitary Engineering, Massachusetts Institute of Technology, 1957
Sc.D. Sanitary Engineering, Massachusetts Institute of Technology, 1959

Employment:

1962-date: Faculty Member, Stanford University
1999-date: Silas H. Palmer Professor of Civil Engineering Emeritus
1989-2003: Director, Western Region Hazardous Substance Research Center
1980-1985: Chairman, Department of Civil Engineering
1975-1999: Silas H. Palmer Professor of Civil Engineering
1967-1975: Professor of Civil Engineering
1962-1967: Associate Professor of Civil Engineering
2008-2013: World Class University Professor, Department of Environmental Engineering, Inha University, Incheon, Korea
2004-2007: Chair Professor, Department of Environmental Science and Engineering, Tsinghua University, Beijing, China
2003: Lecturer, Stanford Canada and Great Lakes College
1971: Visiting Professor, University of Cape Town, South Africa
1968-1969: Honorary Research Associate, Harvard University
1969: Visiting Lecturer, Summer Institute in Advanced Sanitary Chemistry, Harvard University
1968-1972: Faculty Member, Curso de Postgrado en Ingenieria Hidrologica, Ministerio de Obros Publicos, Venezuela
1959-1962: Assistant Professor of Sanitary Engineering, Massachusetts Institute of Technology
1958-1959: Instructor of Sanitary Engineering, Massachusetts Institute of Technology
1958-1961: Associate, Rolf Eliassen Associates, Research, development, and industrial waste treatment design
1957: Research Staff, Massachusetts Institute of Technology
1956: Engineer, Civil Engineers, Inc., Subdivision and water treatment plant design
1954-1956: U.S. Army
1954: Field Engineer, George Jerome and Company, Construction inspector
1953-1954: Instructor: Department of Civil Engineering, Wayne State University
1953: Field Engineer: Hubbell, Roth and Clark, Subdivision development
1952: Engineer: Pate and Hirn, Subdivision design
1951: Field Engineer: Edwin Orr. Subdivision development
Honors:

Tau Beta Pi Fellowship, 1956-57.
Harrison P. Eddy Award of the Water Environment Federation for Noteworthy Research (with Ross E. McKinney), 1962.
Walter L. Huber Research Prize of the American Society of Civil Engineers, 1964.
First prize for best paper presented at annual meeting of Society for Industrial Microbiology, 1965.
Inaugural Distinguished Faculty Award in Sanitary Engineering, the American Association of Professors in Sanitary Engineering, 1966.
NSF Science Faculty Fellowship, 1968-69.
Thomas Camp Award of the Water Environment Federation, for Unique Application of Engineering Research, 1975.
Member, National Academy of Engineering, 1977.
Simon W. Freese Environmental Engineering Lecture Award, American Society of Civil Engineers, 1979.
Engineering-Science Research Award, Association of Environmental Engineering Professors (with Bruce E. Rittmann), 1979.
Fellow, American Association for the Advancement of Science, 1980.
Honorary Member, American Water Works Association, 1981.
Thomas R. Camp Lecturer Award, Boston Society of Civil Engineers, 1983.
Engineering-Science Research Award, Association of Environmental Engineering Professors (with Edward J. Bouwer), 1983.
Distinguished Professor Lectureship, Association of Environmental Engineering Professors, 1984.
Outstanding Publication Award (with Alonzo Wm. Lawrence), Association of Environmental Engineering Professors, 1985.
Research Division Best Paper Award, American Water Works Association (with Marco Aieta) 1985.
Life Member, American Water Works Association, 1987.
Wayne State University Engineering Alumni Achievement Award, 1988.
Honorary Member, Water Environment Federation, 1989.
Inaugural Tsuan Hua Feng Distinguished Lecturer, University of Massachusetts, 1989.
CH2M HILL Research Award, Association of Environmental Engineering Professors (with Craig S. Criddle), 1990.
The John and Alice Tyler Prize for Environmental Achievement, 1992.
Founder's Award for sustained and outstanding contributions to environmental engineering education, Association of Environmental Engineering Professors, 1992.

Research Fellowship, Japan Society for the Promotion of Science, 1992.
Fellow, California Council on Science and Technology
Life Member, American Society of Civil Engineers, 1995.
Fellow, American Academy of Arts and Sciences, 1996.
The Athalie Richardson Irvine Clarke Prize for Outstanding Achievements in Water Science and Technology, 1997.
Certificate of Merit, Division of Environmental Chemistry, American Chemical Society, 1997.
CH2M HILL Research Award, Association of Environmental Engineering Professors (with James E. Anderson), 1997.
Dean's Award for Academic Excellence, Stanford University, 1997.
Outstanding Publication Award (with Edward J. Bouwer), Association of Environmental Engineering Professors, 1998.
Inaugural Walter J. Weber Distinguished Lecturer, University of Michigan, 2000.
Inaugural Distinguished Visiting Lecturer, Environmental Engineering and Science, University of Illinois, 2000.
The Barnett F. Dodge 2001 Distinguished Lecturer in Chemical Engineering, Yale University
Inaugural Association of Environmental Engineers and Scientists Distinguished Lecturer, Georgia Institute of Technology, 2002.
Outstanding Publication Award (with Kenneth Williamson), Association of Environmental Engineering and Science Professors, 2003.
Inaugural Ryckman Lecture, Environmental Engineering and Science Program, Washington University, 2003
Golden Drop Award, American Water Works Association, 2007
Stockholm Water Prize, 2007
Brown and Caldwell Lifetime Achievement Award, 2008
Lifetime Achievement Award, Groundwater Resources Association of California, 2008
Honorary Member, American Academy of Environmental Engineers, 2009
Water Industry Hall of Fame, American Water Works Association, 2009
Honorary Degree of Doctor of Engineering, Nanyang Technological University, Singapore, 2010
Honorary Professor, Harbin Institute of Technology, China, 2011
Association of Environmental Engineering and Science Professors Lecturer, WEFTEC, 2011
Honorary Professor, National Chiao Tung University, Taiwan, 2011
Honorary Fellow, the Chinese Institute of Environmental Engineering, Taiwan, 2011
Distinguished Member, American Society of Civil Engineers, 2012
Fellow, Water Environment Federation, 2012
Life Member, Association of Environmental Engineering and Science Professors, 2012
Joan Hodges Queneau Palladium Medal for engineering achievement in environmental conservation, National Audubon Society, 2013
Gordon Maskew Fair Award for exemplary professional conduct, recognized achievements, and significant contributions to the world’s environment, American Academy of Environmental Engineers and Scientists, 2014

**Organizations:**
American Society of Civil Engineers
Water Environment Federation
American Water Works Association
American Association for the Advancement of Science
Association of Environmental Engineering and Science Professors
Tau Beta Pi
Omicron Delta Kappa
Kappa Mu Epsilon
Sigma Xi

**Professional Activities:**
Member, Water Pollution Control Federation Program Planning Committee, 1964-1970.
Assistant Editor, American Society of Civil Engineers, Sanitary Engineering Division Newsletter, 1965-68.
Chairman, National Symposium on Estuarine Pollution, ASCE, August 1967.
Chairman, San Francisco Sanitary Engineering Section, American Society of Civil Engineers, 1967.
Board of Directors and Consultant, Biostimulation and Biotoxicity Study, 
Member, Committee on Wastewater Reclamation, American Water Works 
Member, Committee on Quality Control in Reservoirs, American Water 
Member, U.S. National Academy of Science – Indian National Science 
Academy Workshop on, "Water in Man's Life in India," September, 1971, 
New Delhi, India.
Consultant, Symbiotic Study on Agricultural Wastewaters, U.S. Bureau of 
Member, Sanitary Engineering Advisory Committee, California Department 
Member, George Westinghouse Environmental Student Award Committee, 
Member, Committee on Control of Nitrates, American Water Works 
Chairman, Gordon Research Conference, Environmental Sciences – Water 
1972.
Participant, Smithsonian Institution Study on the Effect of Rapid Urbanization 
Member, Water Quality Policy Committee, National Academy of Sciences - 
National Academy of Engineering, Advisory to the National Commission 
Member, Environmental Studies Board, National Research Council, National 
Member, Potomac Estuary Committee, National Research Council, National 
Chairman, Panel on Treatment Processes, National Research Council, 
Chairman, Research Committee, Technical and Professional Council, 
Member, Technical and Professional Council, American Water Works 
Vice Chairman, Environmental Studies Board, National Research Council, 
Member, Commission on Natural Resources, National Research Council, 
Chairman, Camp Medal Award Committee, Water Pollution Control Federation, 1977-1979.
Member, Wastewater Reclamation Health Effects Advisory Panel, California Department of Health Services, 1980-1985.
Member, National Science Foundation Advisory Subcommittee for Civil and Environmental Engineering, 1981-85.
Director, International Conference on Ground Water Quality, 1981.
Guest Lecturer, Chinese Academy of Sciences, Biogas Production, Guangzhou and Chengdu, China, 1982.
Member, Drinking Water Standards Committee, American Water Works Association, 1984-1986.
Member, Organizing Committee, Specialized Seminar on Degradation, Retention, and Dispersion of Pollutants in Groundwater, Copenhagen, 1984.
Member, Committee on Groundwater Protection, National Research Council, National Academies, 1984-1986.
Member, Visiting Committee, Princeton University, Dept. of Civil Engineering, 1985-1988.
Chairman, Visiting Committee, University of Minnesota, Dept. of Civil Engineering, 1985.
Member, Technical Advisory Committee, Clean Sites, Inc., 1985-94.
Member, Visiting Committee, California Institute of Technology, Division of Engineering and Applied Science, 1986-92.
Chairman, Visiting Committee, University of California, Berkeley, Department of Civil Engineering, 1987.
Member, Visiting Committee, University of Southern California, Department of Civil Engineering, 1987.
Member, National Institute of Environmental Health Sciences Panel for review of Superfund Phase II proposals, 1988.
Chairman, Environmental Protection Agency Panel, for review of Hazardous Substance Research Center proposals, 1988.
Member, SCOPE Panel on Groundwater Contamination, 1988-1995.
Member, Civil Engineering Visiting Committee, Massachusetts Institute of Technology, 1989-1993.
Member, Advisory Committee for Center for Environmental Health Sciences, Massachusetts Institute of Technology, 1989-92.
Member, Research Council, WEF Research Foundation, 1989-95.
Member, Evaluation Committee on Civil Engineering, University of California, Berkeley, 1990.
Member, Visiting Committee, Dept. of Environmental Engineering and Science, University of North Carolina, Chapel Hill, 1992.
Member, Visiting Committee, Environmental Engineering Program, University of Texas, San Antonio, 1992.
Member, Advisory Board, Marine Bioremediation Program, University of Washington, 1993-1996.
Member, Editorial Board, *Biodegradation*, 1993-
Alcoa - Environmental Technology Advisory Board, 1993-2005
Member, Work Group, President’s Council on Sustainable Development, 1994-1995.
Member, Commission on Geosciences, Environment, Resources; National Research Council, National Academies, 1994-1997.
Member, Visiting Committee, Dept. of Civil Engineering, Northwestern University, 1996.
Member, Visiting Committee, Dept. of Civil Engineering, Cornell University, 1996.
Member, Selection Committee, Blasker Award for Environmental Science and Engineering, 1996-2001
Member, Committee on Intrinsic Bioremediation, National Research Council, National Academies, 1997-2000.
Member, Chemical & Environmental Engineering Department Industrial Advisory Committee, University of Arizona, 1999-2002
Member, Committee on Assessment of Risks from Remediation of PCB-Contaminated Sediments, National Research Council, National Academies, 1999-2001
External Examiner, Environmental Engineering Program, Department of Chemical and Environmental Engineering, National University of Singapore, 1999-2001
Member, Expert Panel on Water Reuse, West Basin Municipal Utility District, 2001-2002
Member, Tritium Migration Independent Scientific Peer Review Panel, U.S. Department of Energy, 2001-2002
Member, Civil Engineering Peer Committee, National Academy of Engineering, 2001-2004
Member, Panel for Independent Review of DDT Contamination, Kenwood Avenue, Los Angeles, requested by Congresswoman Jane Harmon, 2001
Member, Committee on Water Quality Improvement for The Pittsburgh Region, National Research Council, The National Academies, 2002-2004
Member, Oversight Committee for Strengthening Science-Based Decision Making, Policy and Global Affairs Division, the National Academies, 2002-2007

Member, Research Advisory Board, National Water Research Institute, 2005-.


Member, The Athalie Richardson Irvine Clarke Prize Executive Committee, 2005-2007.

Member, External Advisory Committee, Water: Systems, Science, Society Program, Tufts University, 2006-

Member, Committee on Sediments Dredging at Superfund Megasites, The National Academies, 2006-2007.

Member, Steering Committee for Environmental & Water Technologies, National University of Singapore, 2006-2007

Member, Division of Environmental Science & Engineering Visiting Committee, National University of Singapore, 2006-2007

Member, Project Evaluation Panel, Environmental and Water Industry Development Council, Ministry of the Environment and Water Resources, Singapore, 2006-

Associate Editor-in-Chief, *Frontiers of Environmental Science & Engineering in China*, 2006-.

Member, Lee Kuan Yew Water Prize Nominating Committee, Singapore, 2008-

Member, Peer Review Team, Capital Regional Districts Core Area Wastewater Management Program, Victoria, British Columbia, 2009

Member, Environmental Science and Engineering Visiting Committee, Colorado School of Mines, 2009

Member, International Scientific Advisory Board, World City Forum, Incheon, Korea, 2009.

Chair, External Review Committee, Academic Program Review of Environment Science and Engineering, Tsinghua University, Beijing, China, 2010.

Member, IWA China AD Advisory Group, 2013-
Invited Guest
Lecturer at
Universities:

Arizona State University
Brigham Young University
California Institute of Technology
California State Polytechnical University San Luis Obispo
Central Public Health Engineering Research Institute, Nagpur, India
Chico State University
Clarkson University
Clemson University
College of Engineering, Guindy, Madras, India
Cornell University
Dalian University of Technology, China
Drexel University
Georgia Institute of Technology
Hanoi University of Technology, Vietnam
Hanyang University, Korea
Harvard University
Hong Kong University of Science & Technology, Hong Kong
Imperial College London, England
Inha University, Korea
Institute of Biology, Chinese Academy of Sciences, Chengdu, China
Institute of Energy Conversion, Chinese Academy of Sciences, Guangzhou, China
Iowa State University
Johns Hopkins University
Keimyung University, Korea
Korea University, Korea
Kyoto University, Japan
Manhattan College
Marquette University
Massachusetts Institute of Technology
Northeastern University
Pennsylvania State University
Princeton University
Renssleer Polytechnic Institute
Rice University
Rutgers University
San Jose State University
Seoul National University, Korea
Sungkyunkwan University, Korea
Swiss Federal Institute of Technology, Zürich, Switzerland
Technische Universität, Dresden, Germany
The Agricultural University Wageningen, The Netherlands
Tokyo University, Japan
Tsinghua University, Beijing, China
Tufts University
University of Alberta, Canada
University of Arizona
University of Birmingham, England
University of California Berkeley
University of California Davis
University of California Riverside
University of California San Diego
University of California San Francisco
University of Cape Town, South Africa
University of Central Florida
University of Colorado
University of Connecticut
University of Florida Gainsville
University of Houston
University of Illinois
University of Iowa
University of Karlsruhe, Germany
University of Maryland
University of Massachusetts
University of Michigan
University of Nevada, Reno
University of New Mexico
University of North Carolina
University of Notre Dame
University of Oklahoma
University of Texas Austin
University of Texas Dallas
University of Toronto
University of Washington
Vanderbilt University
Vietnam National University, Ho Chi Minh City
Vietnamese Academy of Science and Technology
Virginia Polytechnic Institute
Washington University
Wayne State University
Yale University
Yonsei University, Korea
Perry L. McCarty  
Silas H. Palmer Professor, Emeritus  
Stanford University  
Stanford, California

List of Publications


228. Hopkins, G. D., Munakata, J., Semprini, L., and McCarty, P. L., "Trichloroethylene Concentration Effects on Pilot Field Scale In-Situ Groundwater Bioremediation by


292. Yang, Y., and McCarty, P. L., "Response to Comment on ‘Comparison of Donor Substrates for Biologically Enhanced Tetrachloroethene (PCE) DNAPL Dissolution’,"


Books

Reports


**Patents**


NWRI Expert Panel for the California Department of Public Health

CV for Proposed Expert Panel Member:

- Adam W. Olivieri, Dr.PH, P.E.
BIOGRAPHICAL SKETCH

Adam W. Olivieri  
Vice President  
EOA, Inc.  
1410 Jackson Street  
Oakland, CA 94612  
Phone: (510) 832-2852  
Fax: (510) 832-2856

Education

Dr. P.H.  University of California, Berkeley  1982  Environmental Health Sciences  
M.P.H.  University of California, Berkeley  1978  Environmental Health Sciences  
M.S.  University of Connecticut, Storrs  1975  Civil and Sanitary Engineering  
B.S.E.  University of Connecticut, Storrs  1974  Civil Engineering

Professional Certificates

Registered Civil Engineer, State of California

Research and Professional Experience

1985 – Present, Principal Engineer, EOA, Inc.  
As vice president of EOA, Inc., shares responsibility for administrative and management activities. Project management responsibility for projects including NPDES permit compliance, pretreatment program development, wastewater reclamation, risk assessment, urban runoff, and regulatory program development and analysis.

1997 – 1999, Project Director/Investigator, Public Health Institute  
San Diego Wastewater Reclamation Study: AQUA 2000 Microbial Testing Program.

1985 – 1997, Project Manager, Western Consortium for Public Health  
$6.8 million San Diego Wastewater Reclamation Health Effects Study.

1983 – 1993, Staff Specialist IV (PostDoc), University of California, School of Public Health  
Management and technical responsibilities for several research projects related to groundwater resource evaluation and database system development for groundwater contamination data management. Project manager for the U.S. Army Water Quality (Infectious Agent) Risk Assessment Project.

1974 – 1985, Water Resources Control Engineer, San Francisco Regional Water Quality Control Board  
Senior Engineer in charge of the Basin Planning Section responsible for policy development, water quality, and basin planning projects. Manager of the Board's Toxic Task Force responsible for hazardous material site clean-up policy development, underground Tank Leak Detection Program, risk assessment study, assistance to local hazardous material ordinances, and supervision of site investigations at some 20 sites. Also, preparation of NPDES and WDR Permits, clean water grant facilities planning, plant inspections, and pretreatment program implementation.

HONORS AND AWARDS: Chi Epsilon, EPA Fellowship, EPA SAB (Consultant); Blending Testimony to U.S. House of Representative – Subcommittee on Water Resources and Environment – April 13, 2005

PUBLICATIONS: Principal and co-author of a number of technical publications and project reports.
Congressional Testimony and Independent Review Panels (recent)


7. NWRI – Monterey Peninsula Groundwater Recharge Independent Review Panel – George Tchobanoglous Chair, Feb. 28, March 1 and 2, 2007 (Environmental Engineering and Risk Assessment panel member)


9. WERF PSC member - Quantification of pathogens and sources of microbial indicators for QMRA in recreational waters (PATH2R08) 2009-2010.


16. SFEI and RMP

17. NWRI - Orange County Independent Review Panel – George Tchobanoglous Chair, Disinfection Optimization (Environmental Engineering and Risk Assessment panel member). 2014

18. NWRI – Expert Panel for CDPH on Development of Water Recycling Criteria for Indirect Potable Reuse through Surface Water Augmentation and the feasibility of Developing Criteria for Direct Potable Reuse, Dr. Rhodes Trussell (Chair), 2014 - ???


PUBLICATIONS

REGULATION OF GROUNDWATER CONTAMINATION SITES


**RISK ASSESSMENT**


59. Risk Based Review of California’s Water Recycling Criteria for Agricultural Irrigation, Olivieri, Adam W., Seto, Jean-François Edmund, Cooper, R.C., Cahn, Michael D., Colford, John, Crook, James, Debroux, Mandrell, Robert, Suslow, Trevor, Tchobanoglous, George, Hultquist, Robert, A., Spath, David, and Mosher, Jeffrey, J., ASCE (under review).

WATER QUALITY & ENVIRONMENTAL ENGINEERING


38. Microbial Risk Assessment of Human Health Impacts Associated with Water Contact Recreation during Wastewater Treatment Plant Blending, Konnan, J., Olivieri, A.W., Seto, E., prepared for EBMUD as part of WERF 03-CTS-12 project, 2009.


CV for Proposed Expert Panel Member:

- David L. Sedlak, Ph.D.
DAVID L. SEDLAK

EDUCATION

University of Wisconsin, Madison, Wisconsin Ph.D. June 1992
Water Chemistry Dissertation: Abiotic Oxidation of Polychlorinated Biphenyls (PCBs)

Cornell University, Ithaca, New York B.S. June 1986
Environmental Science

EXPERIENCE

October 1994-Present: Professor (2004-present), Associate Professor (2000-2004) and Assistant Professor (1994-2000), Department of Civil and Environmental Engineering, University of California, Berkeley, CA

January 2010-March 2010: Visiting Academic, Advanced Water Management Centre, University of Queensland, Brisbane, Australia

July 2003-June 2004: Visiting Associate Professor, School of Civil and Environmental Engineering, University of New South Wales, Sydney, Australia

April 1992-June 1994: Postdoctoral Fellow, Swiss Federal Institute for Environmental Science and Technology, Dübendorf, Switzerland

July 1986-June 1988: Staff Scientist, ENVIRON Corporation, Princeton, New Jersey

RESEARCH INTERESTS

Fate of wastewater-derived chemical contaminants in conventional and advanced wastewater treatment plants, fate of steroid hormones in the aquatic environment, chemical fate during groundwater recharge and in engineered treatment wetlands, metal speciation in soil and water.

AWARDS

US National Academy of Engineering Gilbreth Lecturer, 2010
Fulbright Alumni Initiative Award, 2010
Fulbright Senior Scholar Award for Australia, 2003
Paul L. Busch Award for Innovation in Applied Water Quality Research, 2003
National Science Foundation CAREER Development Award, 1998
Hellman Family Fund Faculty Award, 1995
Graduate Student Award, ACS Division of Environmental Chemistry, 1991
Graduate Student Paper Award, ACS Division of Environmental Chemistry, 1990
Carl Ladd Scholarship, Cornell University, 1985
New York State Regents Scholarship, Cornell University, 1982-1986

PROFESSIONAL AFFILIATIONS AND SERVICE

Associate Editor, Environmental Science & Technology
Associate Editor, Water Research
Chair, Gordon Research Conference Environmental Sciences Water, 2004 & 2012  
Member, US EPA Science Advisory Board, Drinking Water Committee, 2002-2009  
Member, US EPA Board of Scientific Counselors Drinking Water Subcommittee, 2005  
Member, US National Research Council Research Committee on Water Reuse, 2008-2011  
Member, American Chemical Society  
Member, Association of Environmental Engineering Professors  
Review Panel Member, USEPA Ecosystem Research Division Peer Review, 2007

UNIVERSITY SERVICE
Co-Director, Berkeley Water Center  
Deputy Director, NSF Center on Reinventing Urban Water Infrastructure  
Director, Berkeley Environmental Solutions Laboratory  
Executive Committee, UC Toxic Substances Teaching & Research Program, 2002-2009  
Group Leader, Environmental Engineering Program, 2003-2006  
Member, Committee on Undergraduate Prizes, 2003-2007  
Member, Committee on Undergraduate Scholarships and Honors, 2000-2003  
Organizing Committee, California Colloquium on Water, 2001-2009

PEER-REVIEWED PUBLICATIONS


**NON-REVIEWED PUBLICATIONS**


INVITED PRESENTATIONS (PARTIAL LIST)


“Agricultural Sources of Endocrine-Disrupting Compounds (EDCs) and the Fate of EDCs in Surface Waters and Wetlands” AQWATEC Distinguished Lecturer, Colorado School of Mines. Golden, CO. March 26, 2009.
“Oxidant Production from Iron Nanoparticles: Mechanisms and Environmental Implications” Department of Civil and Environmental Engineering, Stanford University, November 7, 2009.
“Thinking Beyond the Box About the Challenges Posed by Emerging Contaminants” AEESP/WEF Scientist’s Luncheon, WEFTEC 2008, Chicago, IL, October 20, 2009.
“Engineering Surface Waters to Minimize the Impacts of Steroid Hormones and Related Compounds” Department of Civil and Environmental Engineering, University of Texas, Austin, TX, October 9, 2008.
“Turning Rust Into Gold: Harnessing the Oxidation of Iron to Improve Water Quality” Distinguished Faculty Lecturer, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA. April 15, 2008 and Environmental Engineering Seminar Series, UCLA, May 20, 2008.
“Will The Toxics We Pour Down the Drain Come Back and Bite Us?” University of California Research and Teaching Program Annual Meeting, Riverside, CA. April 12, 2008.
“Treatment and Treatability of Pharmaceuticals in Water Treatment Plants” Society of Toxicology Annual Meeting, Seattle, WA. March 18, 2008.

“Steroid Hormones and Endocrine Disruption in Agricultural Watersheds” Department of Energy, Environmental and Chemical Engineering, Washington University, St. Louis, MO. March 2, 2007.

“Sources, Fate and Potential Impacts of Steroid Hormones in the Aquatic Environment” Department of Chemical & Environmental Engineering, UC Riverside. September 29, 2006.


“Quantifying Sources and Attenuation of Wastewater-Derived Contaminants” UC Davis Department of Civil and Environmental Engineering. May 22, 2006.


“Quantifying Sources and Attenuation of Wastewater-Derived Contaminants” Environmental Toxicology Program, UC Santa Cruz. April 25, 2006.


“Challenges and Opportunities Associated with Wastewater-derived contaminants” Department of Chemistry, University of Buffalo, NY. November 11, 2005.


“NDMA Fate and Transport” WateReuse Association Research Conference, Orlando, FL, May 24, 2005.


“The Fate of Wastewater-Derived Contaminants in Engineered Treatment Wetlands”, Departmental Seminar, Department of Oceanography, Stony Brook University, Stony Brook, NY, May 2, 2003.


"Endocrine Disrupters in Municipal Wastewater." Department of Environmental Engineering, National Autonomous University of Mexico (UNAM), Mexico City, Mexico. July 2001.


"Thermodynamic Data and the Prediction of Metal Speciation in Polluted Waters." National Institute of Standards and Technology (NIST), Gaithersberg, MD, August 1998.

“The Treatment and Environmental Fate of Strongly Complexed Metals.” Department of Civil and Environmental Engineering, UC Davis, November 1997 and Department of Civil Engineering, University of Nevada, Reno, February 1998.

“Superoxide radical (O$_2^-$) and the Photoredox Chemistry of Copper and Chromium.” 18th Annual Meeting of the Society of Environmental Toxicology and Chemistry, San Francisco, CA, November 1997.


“The Treatment and Environmental Fate of Strongly Complexed Metals”. Department of Civil and Environmental Engineering, UC Davis, November 1997.

NWRI Expert Panel for the California Department of Public Health

CV for Proposed Expert Panel Member:

- Timothy J. Wade, Ph.D.
Timothy J. Wade

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106 Tremont Circle
Chapel Hill, NC 27516

EDUCATION

Ph.D., Epidemiology 2002
University of California, Berkeley
Specific research activities focused on waterborne disease. Received Warren Winklestein Award for outstanding Epidemiology doctoral student

Master’s of Public Health 1998
University of California, Berkeley
Concentration: Epidemiology/Biostatistics

Bachelor of Arts 1989
Claremont McKenna College
Major: Psychobiology. Elected by faculty to Sigma Xi

California Polytechnic, Pomona 1990-1991
Graduate coursework in biological science

PROFESSIONAL EXPERIENCE

Branch Chief August 2010-present
Epidemiology Branch
United States Environmental Protection Agency
• Determined research priorities and directed staff of 12-15 scientists, post-doctoral students and support staff
• Managed annual budget of over $1 million dollars annually

Adjunct Assistant Professor of Epidemiology February 2006-present
University of North Carolina, Chapel Hill
School of Public Health
• Train and mentor pre-doctoral epidemiology students, assist in course instruction
Epidemiologist May 2005-August 2010
United States Environmental Protection Agency
• Principal investigator on a multi-year recreational water study (NEEAR study) conducted by the EPA.
• Principal investigator on a series of epidemiologic studies to evaluate the health effects of arsenic exposure in well water in Inner Mongolia (ongoing).

Epidemiologist/Post doctoral position April 2003-May 2005
United States Environmental Protection Agency
Mentor: Rebecca Calderon, Ph.D

Project Director Oct. 1999-April 2003
Water Evaluation Trial (WET)
University of California Berkeley and the California Emerging Infections Program
• Project director of a $3.2 million dollar, federally (Centers for Disease Control, Environmental Protection Agency) funded randomized controlled trial of in home drinking water treatment.

Post-doctoral researcher May 2002-April 2003
School of Public Health, University of California, Berkeley
Mentor: John M. Colford, Jr., M.D. Ph.D
• Recreational water quality and health

Assistant Project Manager May 1998-May 1999
University of California, Berkeley
• Assistant project manager for a randomized controlled trial and cross-sectional survey of drinking water in HIV infected persons.

Assistant Project Director, Data Manager, Data Analyst Jan. 1998-May 2000
University of California Berkeley and the California Emerging Infections Program
• Data manager for the pilot randomized controlled trial of in home drinking water treatment. Managed day to day activities of the trial, designed and maintained databases, and conducted data analysis.

Data Manager/Statistician June 1997-Jan. 1998
California Environmental Protection Agency, Berkeley

University of California, Berkeley

Graduate Student Instructor (Biology) Aug. 1996-June 1997
University of California, Berkeley

Biology Instructor 1995-1996
Montwood High School, El Paso Texas
Timothy J. Wade

- Taught biology, chemistry, general science and mathematics at a rural high school in Lesotho, Africa.

Lilburn Corporation and URS Corporation, San Bernardino, California
- Conducted biological surveys; prepared Environmental Impact Reports, Environmental Impact Statements and Habitat Conservation Plans in compliance with state and federal environmental policies.

Biology Research Assistant May 1988-Sept. 1989
Rocky Mountain Biological Laboratory, Gothic, Colorado

Biology Laboratory Instructor 1988-1989
Joint Science Department, Claremont, California

PUBLICATIONS

Peer Reviewed Journals


Timothy J. Wade, Yajuan Xia, Barbara Jane George, Chris X. Le, Dong Runhe, He Lingling, Wayne Cascio, Gene Sanders, Judy Mumford. Well-water and body burden arsenic are associated with glycated hemoglobin (HbA1c) marker of diabetes risk. Submitted to American Journal of Epidemiology.

Benjamin F. Arnold, Kenneth C. Schiff, John F. Griffith, Joshua S. Gruber, Vincent Yau, Catherine C. Wright, Timothy J. Wade, Susan Burns, Jacqueline M. Hayes, Charles McGee, Mark Gold, Yiping Cao, Stephen B. Weisberg John M. Colford, Jr. Evaluation of widely used exposure and length of follow-up assumptions in recreational water studies: A prospective cohort at Malibu beach. Epidemiology. Accepted for Publication


Mo J, Xia Y, Ning Z, **Wade T.J.**, Mumford JL. Elevated ERCC1 gene expression in blood cells associated with exposure to arsenic from drinking water in Inner Mongolia.


**Book Chapters**


**Reports**

INVITED SEMINARS AND APPOINTMENTS

Editorial Board: Frontiers in Epidemiology (2013-present)


Advisory Panel, Water ReUse Foundation. Advisory panel for epidemiological studies. 2011


Invited Speaker, AIDIS (Inter-American society for Environmental and Sanitary Engineering). “Water quality and illness symptoms at Boquerón Beach, Puerto Rico”. Punta Cana, Dominican Republic, November 7-10, 2010


Session Chair, EPA National Beaches Conference. Epidemiology Section (2009 & 2011)

Peer Reviewer, Water Environment Research Foundation (WERF). Peer reviewer for WERF-sponsored epidemiology studies of illness resulting from contact with secondary treated, but unchlorinated sewage discharge in the Chicago-area waterway system, 2006-2011.


Workgroup Member, US EPA Office of Research and Development. Participating member in developing the “Critical Path Science Plan for the development of new or revised recreational water quality criteria”. August 2007.


Invited Contributor, US EPA Region 5. Provided critical support to region by reviewing microbial risk assessment of the effects of sewage discharge to recreators in the Chicago Area Waterways. 2007.


CONFERENCE PRESENTATIONS AND POSTERS


S Hatcher, C Heaney, T Wade, E Prevette, J Stewart. Multidrug-Resistant Staphylococcus sp. Isolated from Sand at a Tropical Beach and a Beach Impacted by Non-Point Source Pollution. 112th General Meeting of the American Society of Microbiology. Accepted poster presentation. June 16-19, 2012. San Francisco, CA


Christopher Heaney, **Timothy J. Wade.** Microbial Exposure Assessment of Beach Sand and Exposure-Response Analysis with Symptoms of Enteric Illness. 21st Annual International Society for Exposure Science Conference. October 23-27, 2011. Baltimore, MD


Judy Mumford, Tim Wade, Gene Sanders, Yajuan Xia, Jinyao Mo. Cardiovascular and other health effects associated with arsenic exposure in Inner Mongolia, China. Annual Meeting of the Society of Toxicology, Seattle Washington, March 16-17, 2008.


Jinyao Mo, Yajuan Xia, Zhixiong Ning, Tim Wade and Judy Mumford. 2005 Increased OGG1 expression in peripheral blood cells of individuals exposed to arsenic-contaminated drinking water. Annual Meeting of American Association for Cancer Research, held in Anaheim, CA, April 16-20, 2005.


Rees JR, **Wade TJ, Mills DS, Levy DA, Colford JM Jr.** Approaches to the analysis of the health effects of HPC bacteria: Results from a randomized, controlled trial of home drinking water treatment. International Conference on HPC bacteria in drinking water, Geneva, Switzerland, April 2002

**AD HOC JOURNAL REVIEWS**

- American Journal of Epidemiology
- American Journal of Public Health
- Bulletin of the World Health Organization
- Canadian Journal of Public Health
- Emerging Infectious Diseases
- Environmental Science and Technology
- Environmental Health
- Environmental Health Insights
- Environmental Health Perspectives
- Epidemiology and Infection
- Journal of Environmental Management
- Journal of Infection and Public Health
- Journal of Ocean Technology
- Journal of Toxicology and Environmental Health
- PLoS One
- Scientific World Journal
- Toxicology and Applied Pharmacology

AWARDS
EPA Office of Water Bronze Medal, 2011: Exceptional service to Office of Water in development of recreational water quality criteria
EPA Office of Research and Development Honor Award, 2010. Exceptional/Outstanding ORD Technical Assistance to the Regions or Program Offices. Beaches Field Team.
EPA Office of Research and Development Bronze Medal, 2007: For work with the Office of Water on developing the “Critical Path Science Plan for the development of new or revised recreational water quality criteria”.
Office of Research and Development Honor Award, 2006. Exceptional/Outstanding ORD Technical Assistance to the Regions or Program Offices. Individual award for superior technical support to the Office of Water and EPA Regions to improve recreational water quality and protect human health.
Level I EPA STAA (Science to Achieve Results) award recipient, 2006: Protecting Swimmers’ health with faster ways of measuring water quality.
Warren Winklestein Award, Outstanding Epidemiology Doctoral Student, 2002: Selected by Epidemiology faculty at UC Berkeley as the outstanding doctoral student of 2002.
Outstanding Graduate Student Instructor, 1999: Selected by students and faculty as an Outstanding Graduate Student Instructor, for teaching of Public Health 250B, Advanced Epidemiological Methods.
Universitywide Aids Research Program Scholarship recipient, 1998: Competitive scholarship, selected by UARP committee. Awarded financial assistance to travel and attend the UARP yearly conference and disseminate information to colleagues at UC Berkeley.

TEACHING AND MENTORING
Lecturer-Environmental Epidemiology. Gillings School of Public Health, University of North Carolina, Chapel Hill. Yearly guest lecturer and contributor for waterborne disease material. 2003-present.
Graduate Student Instructor (Biology). University of California, Berkeley. 1996-June 1997
Dissertation Committee, University of North Carolina, Chapel Hill. Department of Epidemiology. Department of Environmental Sciences and Engineering, Yvonne Yuen. Studies on approaches to measure coliphage in the environment. 2011-Present


PROFESSIONAL AFFILIATIONS

International Society of Environmental Epidemiology (member)
Society for Epidemiological Research (member)
REFERENCES

John M. Colford, Jr.
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