

## **BRUCE E. RITTMANN**

### **Regents' Professor and Director**

Biodesign Swette Center for Environmental Biotechnology  
Arizona State University  
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Websites at: <http://environmentalbiotechnology.org>, <http://www.biodesign.org>, and  
[https://en.wikipedia.org/wiki/Bruce\\_Rittmann](https://en.wikipedia.org/wiki/Bruce_Rittmann)

#### **Education:**

Ph.D. Environmental Engineering, Stanford University (1979)  
M.S. Environmental Engineering, Washington University (1974)  
B.S. Civil Engineering, Washington University (1974)

#### **Professional Appointments:**

- Director, Biodesign Swette Center for Environmental Biotechnology, Arizona State University (1/2005-present)
- Regents' Professor, School of Sustainable Engineering and the Built Environment, Arizona State University, with affiliate appointments as noted just below (2009-present)
- Institute for the Future of Innovation in Society Fellow, ASU (2017-present)
- PLuS Alliance Fellow, ASU (2016-2019)
- Barrett Honors College Faculty (2016-present)
- Distinguished Sustainability Scientist, Global Institute of Sustainability, Arizona State University (12/2010-present)
- Lincoln Scholar, Lincoln Center for Applied Ethics, Arizona State University (2012-present)
- Professor, Dept. of Civil, Environmental and Sustainable Engineering, Arizona State University (1/2005-2009)
- Affiliate appointments in the Dept. of Chemical Engineering, School of Life Sciences, School of Sustainability, Biological Design Ph.D. Program, Dept. of Chemistry and Biochemistry, Environmental Life Science Graduate Program (2005 – present)
- John Evans Professor of Environmental Engineering, Dept. of Civil and Environmental Engineering, Northwestern University (9/1992-12/2004)
- Professor of Environmental Engineering, University of Illinois at Urbana-Champaign (1988-1992)
- Associate Professor of Environmental Engineering, University of Illinois at Urbana-Champaign (1984-1988)
- Assistant Professor of Environmental Engineering, University of Illinois at Urbana-Champaign (1980-1984)
- Post-Doctoral Scholar and Lecturer, Stanford University (1979)

- Lecturer, San Jose State University, San Jose, CA (1979)
- Graduate Research Assistant, Stanford University (1975-1979)
- Environmental Engineer, Sverdrup & Parcel and Associates, Inc., St. Louis, MO (1974-1975)
- Pilot-plant operator, Metropolitan Sewer District, St. Louis, MO (1971).

### **Honors and Awards:**

- Stockholm Water Prize (2018)
- Telford Premium 2017 Award, Institution of Civil Engineers (UK) (2017)
- Fellow, Association of Environmental Engineering and Science Professors (AEESP) (2017)
- “Gold Medal” Award, Algae Industry Magazine 2017 International Readers’ Poll (2017)
- Daniel Jankowski Legacy Award, Ira A. Fulton Schools of Engineering, Arizona State University (2017)
- Fellow, National Academy of Inventors (2017)
- Perry L. McCarty/AEESP Founders’ Award, AEESP (2016)
- Gordon Maskew Fair Award, American Academy of Environmental Engineers and Scientists (2016)
- Alumni Achievement Award, Washington University in St. Louis (2015)
- Life Member, Association of Environmental Engineering and Science Professors (2015)
- Life Member, American Water Works Association (2015)
- Life Member, American Society of Civil Engineers (2015)
- Distinguished Professor, Tec de Monterrey, Monterrey, Mexico (2015)
- Environmental Engineering Excellence Award for Research, American Academy of Environmental Engineers and Scientist (2014); with CDM-Smith and APTwater
- ISME/IWA BioCluster Award (2014)
- Honorary Doctorate, University of Waterloo (Ontario) (2014)
- Joan Hodges Queneau Palladium Medal, American Association of Engineering Societies (AAES) (2014)
- Fellow, Water Environment Federation (2013)
- Honorary Member, American Academy of Environmental Engineers and Scientists (AAEES) (2013)
- Distinguished Member, American Society of Civil Engineers (ASCE) (2012)
- Lincoln Scholar, Lincoln Center for Applied Ethics, ASU (2012)
- Fellow, International Water Association (IWA) (2011)
- Environmental Engineering Excellence Award, American Academy of Environmental Engineers (2011)
- Top-Cited Author, Elsevier Publishers, for two papers in *Water Research* for the period of 2007 – 2011 (2011)
- Distinguished Sustainability Scientist, Global Institute of Sustainability, Arizona State University (2010)
- Research Excellence Award, Arizona BioIndustry Association (2009)
- Regents’ Professorship, Arizona State University (2009)
- Simon W. Freese Environmental Engineering Award and Lecture, American Society of Civil Engineers (2009)
- Faculty Achievement Award for Excellence in Defining Research, Natural Science and Math, Arizona State University (2008)
- Innovator of the Year, Arizona Technology Enterprises (2007)

- New Innovator of the Year, Arizona Technology Enterprises (2006)
- Honorary Professor, Harbin Institute of Technology, Harbin, P.R. of China (2006)
- Honorary Professor, Tongji University, Shanghai, P.R. of China (2005) (2013 – 2016)
- Honorary Professor, Shanghai Normal University, Shanghai, P.R. China (2005)
- Member, National Academy of Engineering (2004)
- Honorary Member, World Innovation Foundation (2004)
- Distinguished Lecturer, Association of Environmental Engineering and Science Professors (2004)
- Editor's Award, *J. Environmental Engineering*, American Society of Civil Engineers (2004)
- Visiting Professor, Hokkaido University, Sapporo, Japan (2004)
- Faculty of 1000, Microbiology Section (2003)
- ISI List of Most Highly Cited Researchers, Institute for Scientific Information (2002)
- Guest Professor, Nanchang Institute of Aeronautical Technology, Nanchang, P.R. of China (2002)
- Editor's Award, *J. Environmental Engineering*, American Society of Civil Engineers (2001)
- Visiting Professor, Institut für Abfallwirtschaft und Alasten, Technical University of Dresden, Germany (2001)
- Visiting Professor, Research Center for Environmental Quality Control, Kyoto University, Japan (1999)
- 1999 Award of Excellence in Research and Development, Ontario Ministry of the Environment; with R. K. Rowe and several colleagues at the U. Western Ontario (1999)
- Visiting Professor, Research Center for Environmental Quality Control, Kyoto University, Otsu City, Shiga, Japan (1999)
- Founders Award, USA National Committee, IAWQ; with H. Yu (1998)
- Travel Fellowship, Japan Society for the Promotion of Science (1997)
- Fellow, American Association for the Advancement of Sciences (1996)
- CH<sub>2</sub>M-Hill Award, Association of Environmental Engineering Professors; with Eric Seagren (1995)
- Montgomery-Watson Award, Association of Environmental Engineering Professors; with John Wooschlager (1995)
- A. R. I. Clarke Prize for Outstanding Achievement in Water Science and Technology, National Water Research Institute (1994)
- Engineering Science Award, Association of Environmental Engineering Professors; with Wookeun Bae (1993)
- J. M. Montgomery Award, Association of Environmental Engineering Professors; with Daniel Noguera (1992)
- Walter L. Huber Research Prize, American Society of Civil Engineers (1990)
- Academic Achievement Award, American Water Works Association; with Jacques Manem (1990)
- CH<sub>2</sub>M-Hill Award, Association of Environmental Engineering Professors; with Jacques Manem (1989)
- University Scholar, University of Illinois (1987)
- Best Paper Award, Illinois Water Pollution Control Association; with E. Namkung (1987)
- Xerox Faculty Research Award, College of Engineering, University of Illinois at Urbana-Champaign (1985)
- Presidential Young Investigator Award, National Science Foundation (1984)

- Chi Epsilon Honor Initiate, University of Illinois (1982)
- Engineering Science Award, Association of Environmental Engineering Professors; with Perry McCarty (1979)
- E. O. Sweetser Award, Department of Civil Engineering, Washington University (1973)
- Tau Beta Pi (1972)
- Bausch & Lomb Science Prize (1969)

### **Distinguished Professional Service:**

- Fellows Steering Committee, Association of Environmental Engineering and Science Professors (2018-2020)
- Guest Editor, Special Issue on Waste Biorefinery, Bioresource Technology (2015-2016)
- External PhD Examiner, University of Guelph (2015)
- External Review Committee for the Dept. of Civil and Environmental Engineering, University of Nevada, Reno (2014)
- External Review Committee for the Center for Biomolecular Science and Engineering, Office of Naval Research (2014)
- Food Security *Ad Hoc* Committee, National Science Foundation (2013-2014)
- Advisory Committee, IWA China Working Group on Anaerobic Digestion (2013)
- Program Committee, Sixth International Conference on Biofilm Reactors (2012-2013)
- Organizing Committee, National Academy Keck Frontiers Initiative (NAKFI) Symposium (2011-2013)
- Chairman, Investment Advisory Committee, AEESP Foundation (2012-2014)
- Biofilm Model-Calibration Working Group, International Water Association, (2011-2015)
- Program Committee, Leading-Edge Technology Conference, International Water Association (2010-present).
- President, Leading-Edge Technology Conference, International Water Association (2010)
- Board of Directors, AEESP Foundation (2010 – 2012)
- Editorial Board, *Frontiers of Environmental Science & Technology in China* (2007-present)
- Editorial Board, *The ISME Journal: Multidisciplinary Journal of Microbial Ecology* (2007-present)
- AZ Bio-Ag Platform Panel, Flinn Foundation (2006-2007)
- Editorial Board, *Microbial Ecology* (2006-2011)
- Chairman, Leading Edge Technology Conferences, International Water Association (2008-2009)
- Co-Chairman, Leading Edge Technology Conferences, International Water Association (2004-2007)
- Editorial Advisory Board, *Environmental Science & Technology* (2003-present)
- Faculty of 1000, Microbiology Section (2003-2007)
- Review Coordinator, National Research Council (2002)
- Environmental Engineering Committee, Science Advisory Board, Environmental Protection Agency (2001-2003)
- Sub-committee on Research on Monitored Natural Attenuation, Science Advisory Board, U.S. Environmental Protection Agency (2000)
- Chairman, Panel on Intrinsic Remediation, National Research Council, National Academy of Sciences (1997-2000)
- Editorial Board, *Environmental Microbiology* (1998 – 2011)
- Editorial Board, *Water Environment Research* (1998-2003)
- Chairman, IAWQ Specialists Conference on Microbial Ecology of Biofilms (1996-1998)
- Vice-Chairman, WERF-sponsored workshop on Biotechnology and Wastewater Treatment (1998)
- Editor-in-Chief, *Biodegradation*, Kluwer Academic Publishers (1996-2004)
- Program Committee, IAWQ Workshop on Biofilm Structure, Growth, and Dynamics, Amsterdam, The Netherlands (1995)
- Vice-Chairman, Water Science and Technology Board, National Research Council, National

- Academy of Science (1994-1997)
- Program Committee, IAWQ Specialty Conference on Biological Degradation of Organic Chemical Pollutants in Biofilm Systems, Copenhagen, Denmark (1994)
  - Management Group, IWA Specialists Group on Biofilm Systems (1993-2008)
  - Chairman, Panel on In Situ Bioremediation, National Research Council, National Academy of Sciences (1992-1993)
  - Water Science and Technology Board, National Research Council, National Academy of Sciences (1991-1997).
  - Managing Editor, *Biodegradation*, Kluwer Academic Publishers (1990-1996)
  - Panel on Simulation of Contaminant Transport in Groundwater, National Research Council, National Academy of Sciences (1987-1989)
  - Organizing Committee, Dahlem Conference on Biofilm Structure and Function (1989)
  - Board of Directors, Association of Environmental Engineering Professors (1988-1992); Vice-President (1989-1990); President (1990-1991), Past-President (1991-1992)
  - Advisory Committee for the Critical Engineering Systems Division, National Science Foundation, (1986-1990).

**Publications:**

Over 660 publications (listed below), including articles, book chapters, books, and reports in the areas of biofilm kinetics and processes, biodegradation of organic chemicals, bioremediation, biological stability of drinking water, microbial ecology, biogeochemistry, microbial bioenergy, and related topics.

**Patents Awarded:**

Molecular Biology Analysis

1. Means for Qualitative and Quantitative Analysis of Microbial Populations Present in a Sample, European Patent 98952692.6-2116 (April 4, 2000).
2. Means for Qualitative and Quantitative Analysis of Microbial Populations Present in a Sample, U.S.A. patent 6,808,879 (October 26, 2004).

Membrane Biofilm Reactor (MBfR)

3. Hollow-Fiber Membrane Biofilm Reactor for Autohydrogenotrophic Treatment of Water, U.S.A. patent 6,387,262 (May 14, 2002)
4. Perchlorate Reduction and Related Water Treatment Methods; U.S.A. patent no. 7,186,340 (March 6, 2007).
5. Apparatus for Water Treatment; U.S. patent no. 7,338,597 (March 4, 2008).
6. Methods and Systems for Total Nitrogen Removal; U.S.A. patent no. 7,491,331 (Feb. 17, 2009);
7. Methods and Systems for Total Nitrogen Removal; Mexican patent no. 268620 (July 23, 2009).
8. Apparatus and Methods for Water Treatment, U.S. patent no. 7,632,415 (Dec. 15, 2009).
9. Apparatus and Methods for Water Treatment, U.S. patent no. 7,910,001 (Mar. 22, 2011).
10. Method and System for Surface Water Treatment. US Patent no. 8,394,273 (March 15, 2013);
11. Methods and System for Surface Water Treatment. Chinese Patent no. ZL 200980107867.4 (November 6, 2013).

Intimately Coupled Photocatalysis and Biodegradation (ICPB)

12. Intimate Coupling of Photocatalysis and Biodegradation in a Photocatalytic Circulating Bed

Biofilm Reactor, U.S. patent 8,388,844 (March 5, 2013).

#### Microbial Electrochemical Cells (MxCs)

13. Micro-sized microbial fuel cell. US Patent no. 8,734,968 (May 27, 2014).
14. Bicarbonate and carbonate as hydroxide carriers in a biological fuel cell. US Patent no. 9,142,852 (September 22, 2015).
15. Microbial electrolysis cells and methods for the production of chemical products. US Patent no. 9,216,619 (December 22, 2015).

#### Human Intestinal Microbial Ecology

16. Reducing short-chain fatty acids and energy uptake in obese humans by managing their intestinal microbial communities. US Patent no. 9,549,955 (January 24, 2017).

#### **Professional Organizations:**

- Water Environment Federation (WEF) -- Fellow
- American Society of Civil Engineers (ASCE) – Distinguished Member and Life Member
- American Association for the Advancement of Sciences (AAAS) -- Fellow
- International Water Association (IWA, formerly IAWQ) -- Fellow
- Association of Environmental Engineering and Science Professors (AEESP) – Life Member
- American Water Works Association (AWWA) – Life Member
- American Society for Microbiology (ASM)
- American Chemical Society (ACS)
- International Society for Microbial Ecology (ISME)
- International Society for Microbial Electrochemistry and Technologies (ISMET)

#### **Other Professional Service**

##### Engineering Profession (not listed above)

- Research Symposia and Program Committee, Water Pollution Control Federation (1983-1985)
- Chairman, Student Activities Committee, Illinois Water Pollution Control Association (1983-1986)
- Awards Committee, Illinois Water Pollution Control Association (1984-1987); Chairman of Best Paper Award Committee (1984-1986)
- Academic Achievement Awards Committee, American Water Works Association (1985-1987)
- Research Division Organic Contaminants Committee, American Water Works Association (1986-1992)
- Advisory Board, Illinois Center for Solid Waste Management and Research (1987)
- Project Advisory Committees, American Water Works Association Research Foundation (1990-1995)
- Awards Committee, Association of Environmental Engineering Professors (1993-1996)
- Scientific Advisory Board, NSF Center on Biofilm Engineering, Montana State University (1993-01)
- Representation of AEEP to the United States of America Organizing Committee (USANC) of the IAWQ (1992-1994)

- Chairmen, AEEP Committee on Conferences, Workshops, and Receptions (1994-95)
- Program Committee, World Environment Congress (1994-95)
- Program Committee, IAWQ Biofilm Systems Conference, New York (1998-99)

#### University of Illinois at Urbana-Champaign

- *Ad Hoc* committee on hazardous waste management (1983-1984)
- Freshmen Chemistry Liaison Committee (1983-1990); Chairman (1988-1990)
- Ad Hoc Committee on Refuse Incineration (1985)
- College of Engineering Committee on Bioprocess Engineering (1985)
- College of Engineering Committee on the Program in Biological Engineering (1986-1987)
- College of Engineering Committee on Planning the Undergraduate Curriculum for the 1990s (1986-1988)
- Chairman, Bioprocess Engineering Laboratory Search Committee, College of Engineering (1986-1987)
- Advisory Committee, University of Illinois Biotechnology Center (1987-1991)
- College of Engineering Committee to evaluate a common curriculum for the first two years of the undergraduate program (1990-1991)
- College of Engineering Committee to evaluate transfers and the technical grade point average (1991-1992)
- Discover Session Leader, Honors Symposium (1989-1992)

#### Northwestern University

- Co-chairman, Steering committee for the Institute for Sustainable Technologies (2002-2003)
- Co-chairman, Environmental Sciences Task Force (2002)
- Area Coordinator, Environmental Engineering in Civil Engineering (1992-2002)
- Co-chairman, Environmental Council (1992-00)
- Chairman, Environmental Biotechnology and Bioremediation Initiative (1992-99)
- McCormick School Committee on Excellence (1992-94)
- McCormick School Committee to Review Junior Faculty Appointments (1993-97; chair, 1996-97)
- Executive Committee of the Civil Engineering Department (1993-95; 1996-98)
- McCormick Promotion and Tenure Committee (1994-96; 2000-01)
- Program Review Committee (1994-95)
- Alumni Education Speaker (1995)
- Advisory Board, Biotechnology Center (1995-00)
- Civil Engineering Self-Study Committee (1995-96)
- Policy Series Review Committee (1996-97)
- Civil Engineering Strategic-Planning Committee (1997-98)
- Search Committee for the Dean of McCormick (1998-99)

#### Arizona State University

- Chalk Talk Committee Chair (2017-2018)
- DECISIVE Domain Team Leader (2016-2017)
- Dean Search Committee, Ira A. Fulton Schools of Engineering (2015-2016)
- Chair, Awards Committee, School of Sustainable Engineering and the Built Environment



(2011-present)

- Search Committee for a Director, Center for Bioenergy and Photosynthesis (2014)
- Chair, Environmental Engineering Faculty Search Committee, SEBE (2013-2017)
- Chair, Techno-Economics Research Professor Search Committee, SEBE (2012-2013)
- LightWorks Steering Committee (2011-present); co-chair of the Sustainable Fuels and Materials section (2013-present)
- Search Committee, Synthetic Biology Faculty, SoLS (2012-2013)
- Search Committee for 3 SEMTE/SEBE faculty, IAFSE (2012-2013)
- Space Committee, Biodesign Institute (2011 – present)
- Chair, Sustainability Strategic Planning Team, Biodesign Institute (2011-2013)
- Faculty Excellence Awards Selection Committee (2010 and 2012 and 2014)
- Bioenergy Faculty-Hiring Planning Committee, School of Life Sciences (2011-2012)
- LightWorks Executive Committee (2011-2013)
- Barrett Honors Faculty (2011-2012)
- Obama Scholars Mentor (2010-2012)
- Bio-energy Planning Committee, School of Sustainability (2011-2012)
- Energy Meta-Plan Committee (2010-2011)
- Renewable Energy Faculty Search Committee, Fulton Schools of Engineering (2009-2010)
- Dean Search Committee, Fulton School of Engineering (2005-06)
- *Ad hoc* Committee to Create Procedures for Hiring and Promoting Research Professors, Biodesign Institute (2005)
- Chair Search Committee, Department of Civil and Environmental Engineering (2006-2007)
- Bioenergy-Cluster Faculty Search Committee, pan-ASU (2006-2007)
- Chair-Search Committee, Dept. of Bioengineering (2007- 2008)
- Executive Committee, Center for Bioenergy and Photosynthesis (2007-present)
- Graduate College Committee to administer SFAz fellowships (2007-present)
- Search Committee for Bioenergy Faculty, IAFSE (2008-2009)
- Personnel Committee, Dept. of Civil, Environmental, and Sustainable Engr., (2009)

### The Community

- Chairman, Vice-Chairman, and Secretary, Prairie Group of the Sierra Club (1980-1982)
- Principal member, Abbott Reconversion Study Group (1981-1985)
- Principal member, Responsible Waste Management (1982-1986)
- Board of Directors, Central States Education Center (1984-1992)
- Advisory Committee, Urbana Park District (1986-1987)
- Board of Directors, Spirit of the Senses (2015)

### Reviewer for Journals, Publishers, and Agencies

*Proceedings of the National Academy of Sciences*  
*Water Environment Research*  
*J. Environmental Engineering, ASCE*  
*Environmental Science & Technology*  
*Biotechnology and Bioengineering*  
*Water Research*

*Water Science and Technology*  
*Water21*  
*J. American Water Works Association*  
*Water Resources Research*  
*Water Pollution Research J. of Canada*  
*Activated Carbon Technology*  
*Environmental Technology Letters*  
*Environmental Technology*  
*J. Industrial Microbiology*  
*Canadian J. of Civil Engineering*  
*Biodegradation*  
*Applied and Environmental Microbiology*  
*Applied Microbiology and Biotechnology*  
*Environmental Microbiology*  
*Advances in Soil Science*  
*Limnology and Oceanography*  
*J. Environmental Quality*  
*Engineering Science, J. of King Saud University*  
*Revue des Sciences de l'Eau*  
*AQUA*  
*J. Hazardous Materials*  
*J. Air & Waste Management Association*  
*Environmental Engineering Science*  
*Industry and Engineering Chemistry Research*  
*Aquaculture Engineering*  
*Industrial and Engineering Chemistry Research*  
*J. Environmental Engineering and Science*  
*Environmental Technology*  
*Geomicrobiology Journal*  
*Journal of Chemical Technology and Biotechnology*  
*Biotechnology Progress*  
*Science of the Total Environment*  
*J. Environmental Management*  
*Critical Reviews in Environmental Science and Technology*  
*International Journal of Hydrogen Energy*  
*Industrial & Chemistry Engineering Research*  
*Electrochimica Acta*  
*PLoS ONE*  
*International Journal of Obesity*  
*J. of Hazardous Materials*  
*American Chemical Society*  
*Prentice-Hall Publishers*  
*Academic Press, Inc.*  
*John Wiley & Sons, Inc.*  
*McGraw-Hill Book Co.*  
*CRC/Lewis Publishers, Inc.*

American Chemical Society Books  
National Research Council  
National Science Foundation  
Environmental Protection Agency  
Department of Energy  
National Aeronautics and Space Administration  
National Institutes for Health  
U. S. Geological Survey  
Natural Science and Engineering Research Council of Canada  
United States-Israel Binational Science Foundation  
American Water Works Association Research Foundation  
New York State Center for Hazardous Waste Management  
Illinois Hazardous Waste Research and Information Center  
University Council on Water Resources  
Illinois Water Resources Center  
Virginia Water Resources Center  
Minnesota Water Resources Center  
Wisconsin Water Resources Institute  
University of Illinois Research Board  
Natural Environment Research Council, United Kingdom  
New Mexico Water Resources Institute  
Cornell University Theory Center  
St. Lawrence Centre, Montréal  
Illinois Groundwater Consortium  
Great Lakes and Mid-Atlantic Hazardous Substances Research Center  
Oak Ridge National Laboratory  
University of Wisconsin Sea Grants Center  
Illinois-Indiana Sea Grant Center  
U.S. Civilian Research and Development Foundation  
Science Foundation of Ireland  
South Carolina NASA/EPSCoR  
University of Guelph

## Major Consulting Activities

- Beatrice Foods, Champaign, IL (1980-1990). Carried out pilot studies to determine the feasibility and design criteria for anaerobic-filter treatment of dairy wastewater; established design criteria for full scale design; advised client on choice of system and on operations.
- Kankakee Water Co., Kankakee, IL (1983-1989). Analyzed operational and equipment problems at the Bourbonnais sewage treatment facility; proposed process and operations improvements; advised plant personnel on operations.
- U.S. Environmental Protection Agency (1983, 1984, 1988). Served on peer-review panels for E.P.A.-sponsored research.
- Village of Bourbonnais, IL (1983). Analyzed impact of wet-weather flows on the Village's sewage treatment facility; served as expert witness before the Illinois Pollution Control Board.
- Consumers Illinois, Park Forest South, IL (1984-1996). Analyzed operational and process problems at their sewage-treatment facility; analyzed impacts of increased industrial loadings and provided preliminary designs for pre-treatment and facility expansion.
- Lakeside Equipment Co., Bartlett, IL (1983-1986). Served as a general consultant on biological processes; directed research on nitrification-denitrification and phosphorus removal in oxidation ditches; directed development of design criteria.
- Staley Manufacturing Co., Decatur, IL (1984-1990). Analyzed proposed anaerobic-treatment system for their West Lafayette and Decatur facilities; advised client on design criteria; advised client on operations of existing facilities.
- Illinois Department of Energy and Natural Resources, Springfield, IL (1985-1986). Performed a study to determine the emissions of volatile organic compounds from publically owned treatment works in Chicago.
- Environmental Improvement Division, State of New Mexico, Sante Fe, NM (1984). Planned, developed, and carried out a two-day workshop on transport and fate of organic pollutants in groundwater.
- Borden Chemical and Plastics Co., Illiopolis, IL (1984-2001). Analyzed operation of existing treatment system; proposed and monitored improvements to the operation of the existing facility; evaluated the technical and economic feasibility of plant expansion, including anaerobic pretreatment.
- Uriah Environmental Services, Modesto, CA (1985-1988). Designed and applied a novel biological treatment system for groundwater cleanup.
- Kapsner & Kapsner, Bismark, ND (1985). Expert witness on civil suit involving sludge management practices at the Bismark sewage treatment facility.
- Rudy Bonzi Landfill, Modesto, CA (1985-1986). Analyzed groundwater contamination problems; developed a site cleanup plan using anaerobic and aerobic biological treatment; helped develop a site monitoring effort; represented landfill at proceedings with the State Regional Water Quality Control Board.
- Anderson-Clayton Foods, Jacksonville, IL (1985-1986). Investigated problems of sulfide production in the sanitary sewers receiving discharge from Anderson Clayton; issued a report on the causes of sulfide generation and their impacts on the municipal sewage treatment facility.
- City of Jacksonville, IL (1985-1986). Issued recommendations for controlling operational problems at their sewage-treatment facility.
- University of Alberta, Edmonton, Alberta, Canada (1986-1989). Consultant on research project for the biodegradation of algal products.

- Ciba-Geigy, Inc., Toms River, NJ (1987). Member of blue-ribbon panel of experts to develop a research and demonstration plan for a superfund site cleanup; consultant for biological treatment plant.
- Radian Corp., Milwaukee, WI (1987). Expert review panel for establishing and EPA database on the fate of hazardous organic compounds in treatment processes.
- ERT, Houston, TX (1987). Expert review panel on an *in situ* biological cleanup demonstration at the French Limited Superfund site.
- National Starch and Chemical Corp., Meredosia, IL (1989-1990; 1996). Analysis of wastewater treatment system; consultant on operations improvements.
- Enviromega, Inc., Burlington, Ontario, Canada (1989-1997). Expert consultant for research program on modeling the fate of hazardous chemicals in sewage treatment plants.
- City of Niagara Falls, NY (1990-1993). Expert advisory panel for research leading to revision of the wastewater treatment facility.
- Southland Corp., Houston, TX (1990). Expert witness on litigation concerning fate of hazardous chemicals at a Superfund site.
- Allied-Signal, Inc., Chicago, IL (1990-1992). Expert consultant on biofilm-process research and development.
- Monsanto Corp., St. Louis, MO (1990-1992, 1996). Expert consultant on biological treatment and bioremediation.
- Malcolm-Pirnie, Inc., White Plains, NY (1991-1993). Expert panel on research and development project for drinking water treatment at Phoenix, AZ.
- Warzyn, Inc., Madison, WI (1991-1994). Member of Technical Advisory Board.
- Procter & Gamble Co., Cincinnati, OH (1992-94). Expert consultant on the fate of cleaning chemicals in wastewater treatment and on operation of treatment facilities.
- CH<sub>2</sub>M-Hill, Santa Ana, CA (1993-1994). Member of technical advisory committee for pilot project to treat highly colored water.
- Wildman, Harrold, Allen & Dixon, Chicago, IL (1993-1994). Expert witness on litigation for hazardous waste site.
- Fleeson, Gooing, Coulson & Kitch, Wichita, KS (1993-1995). Expert witness on litigation for hazardous waste site.
- United States Department of Justice, San Francisco, CA (1994-1995) Expert witness on Superfund site litigation.
- University of Western Ontario (1994-1997) Expert consultant on research on anaerobic biofilms.
- Malcolm-Pirnie, Inc., White Plains, NY (1994-1997). Member of technical advisory committee for Newport News, VA drinking-water treatment studies.
- Barr Engineering (1996-99). Expert consultant on remediation of Waukegan, IL manufactured gas site.
- United State Department of Justice, Boston, MA (1998-2000). Expert witness on biofiltration of drinking water.
- National Sanitation Foundation, Inc., Ann Arbor, MI (1999). Expert reviewer for technology-testing manual for denitrification of drinking water
- SQM Nitratos S.A., Santiago, Chile (1999-2000). Consultant on perchlorate issues in the United States.
- Compact Membrane Systems, Inc. (2001-2003). Consultant on development research for membrane bioreactor systems using H<sub>2</sub> transfer for denitrification.

- CH2M-Hill (2000-2002). Consultant on WERF project on membrane bioreactors.
- Montgomery-Watson-Harza Engineers (2002). Expert consultant on use of hybrid biofilm/suspended-growth processes for nitrification in St. Paul, Minnesota.
- Earth Tech (2002-2003). Expert consultant on biofiltration in drinking water.
- Metcalf & Eddy, Inc. (2003). Expert consultant on advanced nutrient removal for wastewater treatment in New York City.
- Montgomery County, Ohio (2003). Expert analysis of the treatment of VX hydrolysate by Perma-Fix of Dayton.
- Metropolitan Water District of Southern California (2004-2007). Expert consultant for biological processes on a project on the formation of disinfection by-products by wastewater treatment facilities.
- OpenCEL, Ltd. (2004-2014). Expert advice on application of OpenCEL technology for energy recovery.
- Applied Process Technology, Inc. (2004-2013). Expert advice on development and application of the membrane biofilm reactor.
- Argonne National Laboratory (2005-2006). Consultant on biological wastewater treatment.
- Sidley Austin Brown & Wood LLP (2005-2009). Consultant on fate of PCBs in wastewater treatment in along the Fox River, Wisconsin.
- Trussell Technologies, Inc. (2005). Chairman of panel of natural attenuation of MtBE at Santa Monica, California
- Orbach, Huff & Suarez LLP (2005-2006). Expert on biofiltration in drinking water at Costa Mesa, California.
- Trussell Technologies, Inc. (2007-2009). Consultant on field testing of the MBfR for wastewater treatment
- RTI (2007-2008). Consultant on fate modeling.
- CDM (2008). Consultant on the removing phosphorus from water.
- Siemens Water Technology (2009). Consultation on Cannibal wastewater treatment process
- The University of the State of New York (2009). Evaluation of the proposal of Dowling College to establish an MS program in environmental microbiology
- Territorial Engineers (2010). Consultation on industrial wastewater treatment
- Parsons Engineers (2010). Consultation on making sludge bioavailable
- Celulosa Arauco y Constitucion SA. (2011) Consultant on environmental impacts
- Chevron (2015). Consultant on bioremediation.
- Novus Technologies, LLC (2015). Expert evaluation of resource-recovery system.

### **Publications (chronological order)**

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