

Douglas M. Owen, P.E., BCEE, ENV-SP

President, Owen Water Consulting LLC
 Carlsbad, CA 92008

(914) 659-9980, cell
 Dougowenwater@gmail.com

EDUCATION

<u>School</u>	<u>Dates Attended</u>	<u>Degree Received</u>	<u>Specialization</u>
Miami University, Ohio		1975-77	AA Mathematics
Purdue University	1977-80	BSCE	Civil Engineering
University of North Carolina, Sciences & Engineering Chapel Hill		1980-82	MSEE Env

OVERVIEW

Mr. Owen is the President of Owen Water Consulting LLC, providing advice on technology, regulatory, and strategic issues for public and private water agencies. Prior to this position, Mr. Owen was an Executive Vice President of ARCADIS-US and was the Chief Technical Officer for the Water Business Line. In that role, Mr. Owen was responsible for the application and distribution of technology in client solutions, for applied research, for outreach to the academic community in technical areas, and for maintaining technical perspectives in the firm's executive level decision-making. Mr. Owen was also responsible for the North America Region's sustainability approach, integrating sustainable practices into client services and evaluating adaptation strategies for climate change. Prior to that position, Mr. Owen had increasingly responsible roles in project execution and senior management, including serving as the President for a \$250M water environment business unit with Malcolm Pirnie, Inc. and serving on that firm's Board of Directors.

Mr. Owen has specialized in water treatment, planning, and policy since he completed his Masters Degree in Environmental Sciences and Engineering from the University of North Carolina at Chapel Hill in 1982. He has led applied research projects on advanced technologies, consulted with utilities on treatment and facility improvements for over 6 billion gallons per day of treatment capacity throughout the United States, and has provided technical and facilitation support to USEPA and AWWA on a range of policy issues since 1990, including drinking water regulatory development, advanced technology implementation, and utility compliance. Mr. Owen is currently the Co-Chair of the Board of Directors for the newly merged Water Environment & Reuse Foundation, having been the Chair of the Board for the WateReuse Research Foundation, and is a member of the WateReuse Association Board. He has served two terms on USEPA's National

Drinking Water Advisory Council (NDWAC), as the Chair of the Editorial Advisory Board for *Journal AWWA*, as a Trustee for AWWA's Water Science and Research Division, on advisory boards for the universities of Texas, New Hampshire, Columbia, and the North Carolina School of Public Health, on the board of the Zofnass Sustainability Institute at the Harvard Graduate School of Design and on the Executive Committee of the National Action Council for Minorities in Engineering (NACME). He has published widely on water treatment and planning topics in books, peer-reviewed journals, and at national and international conferences.

PROFESSIONAL POSITIONS

Owen Water Consulting, LLC

9/2016 – present President

Arcadis-US

2011 – 8/2016 Executive Vice President and Chief Technical Officer, Water Business Line

Malcolm Pirnie, Inc.

2008 – 2010	Chair, Audit Committee, Board of Directors
2003 – 2010	Chair, Professional Conduct and Ethics Committee, Board of Directors
2002 – 2010	Member, Board of Directors
2007 – 2010	Chief Technical Officer
2004 - 2006	President, Municipal Water Environment Business Unit
2000 - 2003	Director of Quality
1995 - 2010	Vice President
1992 - 1994	Senior Associate
1989 - 1991	Associate
1982 - 1988	Project Engineer

University of North Carolina, Chapel Hill

1980 – 1982 Research Assistant

Howard, Needles, Tammen and Bergendoff

1977 – 1980 Intern Engineer, Co-op work/study program with Purdue University

PROFESSIONAL ORGANIZATIONS

American Academy of Environmental Engineers

American Water Works Association

Water Environment & Reuse Foundation

Water Environment Federation

WaterReuse Association

Association of Environmental Engineering and Science Professors

CERTIFICATIONS, BOARDS, COMMITTEES AND HONORS

Registered Professional Engineer; New York, Texas, Michigan

Board Certified Environmental Engineer, American Academy of Environmental Engineers; Water/Wastewater and Sustainability Specialty Areas

Envision Sustainable Professional, Institute for Sustainable Infrastructure

Board member and Co-Chair, Water Environment & Reuse Foundation, 5/2016 – present

Board member, WaterReuse Association, 5/2016 - present

Board member and Chair, WaterReuse Research Foundation, 2010 – 4/2016

Board member, Zofnass Sustainable Industry Advisory Board, Harvard, 2012 – 9/2016

Board Member, National Action Council for Minorities in Engineering (NACME), 2009 – 9/2016

Board Member, School of Public Health Foundation, UNC Chapel Hill, 2006 – 2014

Member, National Drinking Water Advisory Council, USEPA, 2007 – 2012

Chair, Journal Editorial Advisory Board, *Journal of American Water Works Association*, 2007-09; Board member, 2000-2006

Advisory Committee, Department of Civil, Architectural and Environmental Engineering, University of Texas, Austin, 2006 – 2009

Industry Advisory Committee, Department of Civil Engineering and Engineering Mechanics, Columbia University, 2005 – 2008

Environmental Engineering Advisory Board, Department of Civil Engineering, University of New Hampshire, 2004 – 2008.

Trustee, Water Science and Research Division, American Water Works Association, 1998 – 2003.

Chair, Publications Award Committee, American Water Works Association, 2000 – 2001; Member 1996 – 1999.

Technical Advisory Workgroup, Disinfection and Disinfection By-Products, Water Utility Council, American Water Works Association, 1995 – 2001.

Member, Information Collection Rule A-Team, American Water Works Association and USEPA, 1996 - 1998.

Member, Technologies Working Group for the D/DBP Rule, USEPA, 1992 - 2000.

Adjunct Faculty, University of Cincinnati, 1994 – 1996. Served on Master's Thesis Committee for two students; Stuart Hooper and Gabriele Solarik.

Project Advisory Committee, Water Research Foundation, "Development of Exposure Assessment Methods for THM and HAA in Water Distribution Systems," 2001.

Peer Reviewer, Water Research Foundation, "Advance Water Treatment of Estuarine Water Supplies," 2007.

Project Advisory Committee, Water Environment and Reuse Foundation, "Demonstrating Redundancy and Monitoring to Achieve Reliable Potable Reuse," 2017.

Project Advisory Committee, Water Environment and Reuse Foundation, "Guidelines for Source Water Control Options and the Impact of Selected Strategies on Direct Potable Reuse," 2016.

Project Advisory Committee, Water Research Foundation, "Characterization of Natural Organic Matter in Drinking Water," 2000.

Water Resources Division Best Paper Award, American Water Works Association, "Impacts of Climate Change on Infrastructure Planning and Design: Best Practices and Future Needs," 2010.

Research Division Best Paper Award, American Water Works Association, "Evaluation of GAC for NOM Control," 1997.

SPECIAL ACTIVITIES

Expert Panel, Determining Water Treatment Costs Associated with Potential Water Quality Scenarios Supporting Development of a Drinking Water Policy, California Urban Water Agencies, 2007.

Lecturer, "Translating the Stage 2 Disinfectant and Disinfection By-Products Rule," webcast sponsored by the American Water Works Association, February 15, 2006.

Lecturer, "What Are the Limits on the Quality of Our Potable Water Supplies," World Water Forum, Shell Sustainability Institute, Rice University, February 24, 2004.

Blue Ribbon Panel, UV Treatment for the New York City Catskill/Delaware Water Supply, NYC Department of Environmental Protection, 2001.

Lecturer, "The New Disinfection By-product and Surface Water Treatment Rules: Operational Issues and Treatment Strategies," presented at a Satellite Teleconference of the American Water Works Association, November 9, 1999.

Chair, Expert Panel, Bay Delta Water Quality Evaluation, California Urban Water Agencies, 1996-1998

Faculty Member, International Conference on Water Pollution and Health, National Association of Physicians for the Environment, May 22-23, 1997, Chicago, IL.

Microbial and Disinfection By-Product Research Needs Workshop, sponsored by Water Research Foundation and AWWA Water Utility Council, November 3-5, 1993, Miami, FL.

International Specialty Conference On Characterization of Natural Organic Matter and Research Needs, sponsored by the Water Research Foundation, Chamonix, France, September 1993.

FUNDED RESEARCH PROJECTS

Co-Principal Investigator, "Conventional Water Treatment of Alternative Water Sources: Source Water Requirements," Water Research Foundation, in progress.

Co-Principal Investigator, "Fostering Innovation Within Water Utilities," Water Research Foundation, in progress.

Co-Principal Investigator, "Conventional Drinking Water Treatment of Alternative Water Sources: Source Water Requirements," Water Research Foundation, 2016

Co-Principal Investigator, "Fostering Research and Innovation Within Water Utilities," Water Research Foundation, 2014

Co-Principal Investigator, "Integrating UV Disinfection into Existing Treatment Plants," Water Research Foundation, 2001.

Co-Principal Investigator, "Case Studies for DBP Removal," Water Research Foundation, 1996.

Principal Investigator, "Removal of DBP Precursors by Granular Activated Carbon Adsorption," Water Research Foundation, 1993.

Principal Investigator, "Characterization of Natural Organic Matter and Its Relationship to Treatability," Water Research Foundation, 1990.

CONSULTING

- City of San Diego, CA Water Department: Project Manager for the Basis of Design for the Alvarado Filtration Plant, which won ASCE's 2013 Outstanding Civil Engineering Achievement Award, and for water quality evaluation/treatability studies for the city's water quality improvement program. Water Quality Evaluation/Treatability Studies. Project manager for water quality evaluation/treatability studies for the city's water quality improvement program. The three-plant study determined water treatment process modifications/additions to meet the regulations of the 1986 Amendments to the Safe Drinking Water Act for a combined 320 mgd of production facilities, expandable to 500 mgd in the future. Alternative processes evaluated on bench and pilot scale included ozone, enhanced coagulation, GAC, and membranes.
- City of San Diego, CA Metropolitan Wastewater Department: Advanced Water Treatment Plant. Project Manager for the design of an 18-mgd advanced water reuse treatment plant, as part of the city's water repurification project. The AWTP was designed to treat tertiary wastewater effluent using pretreatment membranes (MF or UF), reverse osmosis, ion exchange, and ozone, and delivers the water to the San Vicente Reservoir, the drinking water source for the Alvarado Filtration Plant. The program was suspended at 30% design and now has been re-started with broad-based community support.
- City of San Diego, CA: Otay Water Treatment Plant. Served on a VE panel to evaluate improvements to San Diego's 40-mgd Otay Water Treatment Plant. Led VE recommendation discussion on the addition of UV disinfection.
- International Boundary and Water Commission: South Bay International Wastewater Treatment Plant / San Diego, CA. Task Manager for the process design of a new 25-mgd (expandable to 100 mgd) wastewater treatment plant. Process evaluation included evaluation of flow and load data from current and previous sampling programs, determination of loading factors and preparation of process criteria, evaluation of pretreatment, bench-scale studies for enhanced primary treatment, and comparison of conventional and selector biological treatment processes, including aeration alternatives.

- Los Angeles Department of Water and Power: Design of Ultraviolet Disinfection Facilities / Los Angeles CA. Technical Advisor for preliminary design and procurement services for two ultraviolet (UV) disinfection facilities: a 600-million-gallon-per-day (mgd) facility for the Los Angeles Aqueduct Filtration Plant (LAAFP) and a 650-mgd facility for the Los Angeles Reservoir (LAR). The UV facility at the water filtration plant adds multi-barrier disinfection capability to the treatment process, while the UV facility at the reservoir will help maintain compliance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).
- Metropolitan Water District of Southern California: Evaluation of GAC Regeneration / CA. Project manager for a study that evaluated the impacts that providing post-filtration GAC treatment would have on air emissions, space requirements, and costs for five plants with a total of three billion gallons per day of treatment capacity.
- Metropolitan Water District of Southern California: Evaluation of Safe Drinking Water Act Amendments / CA. Project manager for an evaluation of the SDWA Amendments on the member agencies for the district. The study implemented a model for THM formation and assessed the impact of changing treatment processes on disinfection by-product concentrations for a combined capacity of 1.5 billion gallons per day.
- Metropolitan Water District of Southern California: Safe Drinking Water Act Impacts / CA. Project manager for a modeling evaluation of the impact of variation in source water quality from the San Francisco Bay/ Sacramento-San Joaquin River Delta on treatment requirements and disinfection by-product formation. Developed limiting source water quality and treatment requirements to meet alternative regulatory constraints.
- Metropolitan Water District of Southern California/CA. Facilitated Metropolitan's Water Quality Committee meetings, consisting of 12 members representing 27 member agencies, to address short and long-term needs to address compliance with the Stage 1 and 2 D/DBP and LT2ESWTR. Chaired an expert panel to review chlorine dioxide technology recommendations from Metropolitan's Water Quality Committee.
- Metropolitan Water District of Southern California: Weymouth Water Treatment Plant Upgrade / LaVerne CA. Technical Advisor for the development of a comprehensive strategy for upgrading the Weymouth WTP. The purpose of this effort was to plan the most appropriate improvements for achieving two primary objectives: 1) accommodating water quality trends and future regulations; and 2) ensuring long-term reliability of the plant at the rated capacity of 520-mgd.
- El Paso Water Utilities: Advanced Water Purification Facility / El Paso, Texas. Technical Advisor for a direct potable reuse (DPR) project using treated wastewater from the Bustamante WWTP and producing drinking water for potable distribution. The project will augment supply options that include indirect potable reuse as well as brackish water desalting and aquifer reinjection. This project will be the first planned DPR delivery in the United States that does not require re-treatment at a drinking water treatment facility, and is being observed closely throughout the regulatory community. The

National Water Research Institute convened an expert panel to oversee treatability testing results and operational performance from the pilot facilities.

- Tucson Water Decision H2O, Tucson, AZ. Technical Advisor for the development of an indirect potable reuse plan that includes ground water recharge following advanced treatment. Salinity requirements governed treatment and a life cycle assessment for various treatment alternatives was conducted to reduce salinity in potable water for Tucson Water (AZ), using the GaBi model. The process used criteria weighting established by Tucson Water staff and community stakeholders for a triple bottom line evaluation.
- California Urban Water Agencies: Water Quality Evaluation of San Francisco Bay/San Joaquin River Delta / CA. Chairman of an expert panel evaluating source water quality required from the San Francisco Bay/San Joaquin River Delta to allow downstream users to produce potable water that meets future drinking water regulations. Funded by the California Urban Water Agencies, the panel's efforts provide input to the CALFED process evaluating Bay-Delta management alternatives.
- Seattle Public Utilities: Development of UV Disinfection Strategy / Seattle WA. Developed the Public Health and Regulatory Compliance Strategy for Seattle Public Utilities. Responsible for developing water quality and process requirements for the design-build-operate (DBO) documents for the 120-mgd Tolt filtration plant and the 180-mgd Cedar River ozone/UV disinfection facilities, the largest drinking water DBO procurements in the United States at the time. Served as Owner's Agent to review proposals, sat on interview panels, and reviewed process implementation for the selected proposers. For the Cedar UV facilities, reviewed the first successful validation for a drinking water application.
- City of Phoenix, AZ: Water Quality Master Plan. Prepared the 480-mgd surface water treatment strategy based upon treatability studies and evaluations of existing production facilities. Long-term strategies were developed for surface water treatment, groundwater treatment, and distribution system operations to enable the city to proceed in a step-by-step fashion in order to comply with the 1986 Amendments to the Safe Drinking Water Act. Initial strategies included optimizing coagulation for improved organics removal, followed by possible alternative disinfectants or GAC adsorption.
- City of Phoenix, AZ: 23rd Avenue Wastewater Treatment Plant. Responsible for the process design modifications and additions to upgrade and expand plant from 37 mgd to an ultimate capacity of approximately 57 mgd. Evaluated all processes including biological treatment for denitrification. Designed, supervised construction, and operated two 5-gpm BNR pilot treatment trains in parallel to evaluate the effectiveness of selector design on nutrient removal and filamentous bulking. Accommodating the recommended processes within the constraints of the existing site was a major factor affecting the feasibility of modified processes.
- City of Houston, TX: Wastewater Treatment Plant Expansion Projects. Responsible for process design for expansion of two wastewater treatment plants. The Northwest Wastewater Treatment Plant is expanding from 18 mgd to 41 mgd with an ultimate capacity of 64 mgd. The Almeda-Sims facility is

expanding from 20 to 55 mgd, with 90 mgd ultimate capacity. This plant also will serve as a regional sludge facility. Tasks included screening and cost analysis of wet-stream treatment alternatives including flow equalization, primary clarification, single- and two-stage nitrification, anaerobic/ aerobic processes, effluent filters, microscreens, and flocculating clarifiers. Designed and assisted in operation of 4-gpm pilot plant to evaluate nutrient removal process that was eventually employed in the Northwest plant upgrade. Wrote functional and operational instrumentation specifications for both plants.

- U.S. Environmental Protection Agency: Total Coliform Rulemaking. Provided technical facilitation of stakeholder representatives to support the USEPA's Total Coliform Rule negotiated rulemaking beginning in 2007. Facilitated technical discussions with a diverse stakeholder group comprised of consumer advocates, environmental advocates, public health agencies and the water industry to prepare technical solutions to address EPA's rulemaking process. These solutions were presented to the negotiating committee under the Federal Advisory Committee Act.
- U.S. Environmental Protection Agency: DBP Rulemaking. Provided technical facilitation of USEPA's microbial/disinfection by-product regulatory negotiation beginning in 1992. Participated in and facilitated technical discussions with a diverse stakeholder group comprised of consumer advocates, environmental advocates, public health agencies and the water industry to prepare technical solutions to address EPA's rulemaking process. These solutions were presented to the negotiating committee under the Federal Advisory Committee Act. The first stage of these regulations became effective in January 2002 and the second stage was finalized in December 2005.
- U.S. Environmental Protection Agency: Regulatory Technical Support. UV workshops sponsored by the AWWA and EPA to assist in identifying, evaluating, and resolving issues related to guidance for utilities implementing UV disinfection.
- Served as Project Officer for the development of USEPA's UV Disinfection Guidance Manual, finalized in November 2006. Project manager for development and application of a water treatment plant simulation model used by the U.S. EPA to assist in developing requirements for the disinfectant/disinfection by-product (D/DBP) rule. Project leader for completion of a document entitled *Technologies and Costs for Control of Disinfection By-Products*, prepared for the U.S. EPA's Office of Science and Technology in support of the D/DBP Rule. Project manager for the preparation of the Guidance Manual to assist utilities in complying with the requirements of Enhanced Coagulation and Enhanced Precipitative Softening, the treatment techniques for Stage 1 of the D/DBP Rule.
- U.S. Environmental Protection Agency: Contaminant Candidate Listing Facilitation Process. Provided technical facilitation for USEPA's Contaminant Candidate Listing (CCL) workgroup process with a diverse stakeholder group from public agencies, environmental advocates, and the water profession. Over this 18-month facilitation, the workgroup developed steps to implement a process conceived by the National Research Council to cull hundreds of thousands of microbial and chemical contaminants to a list of 50 to 100.

- City of Poway, CA: Water Treatability Studies. Project manager for water treatability studies for the upgrading of a 24-mgd plant to meet the provisions of the SDWA as implemented by the California Department of Health Services. Evaluated modifications to conventional treatment (enhanced coagulation), backwash recycle treatment, and disinfectant alternatives to free chlorine.
- San Patricio Water District: Water Treatment Improvements / Corpus Christi TX. Responsible for quality assurance and process selection for an 8-mgd ultrafiltration drinking water plant for the San Patricio Water District. This treatment facility acts as a 'water factory' by providing various levels of treatment for municipal and industrial customers. The UF-treated water is for municipal consumption and was designed for incremental capacity increases as demand increased. Reverse osmosis will also be added to meet low TDS water for industrial customers.
- Gulf County Water Authority: Water Quality Master Plan / Texas City TX. Project manager for the preparation of a water quality master plan for a utility that currently uses the first full-scale chlorine dioxide (ClO₂) generating system in the State of Texas to supply ClO₂ as a preoxidant and postdisinfectant as well as ozone. The effort included evaluation of the new system and of the use of GAC filter caps for removal of chlorite and chlorate and the manner of reducing taste and odor problems.
- Irvine Ranch Water District: Royalty Carpets Mills / Irvine CA. Project officer for the implementation of reclaimed water at Royalty Carpet Mills in Orange County. Royalty is the largest industrial user of reclaimed water for process-specific applications (500,000-gpd) for IRWD, and won IRWD's 1998 reclamation project of the year.
- South Central Connecticut Regional Water Authority: Pumping Facility Design / New Haven CT. Prepared preliminary design for a stripping tower/ clearwell/ distribution pumping facility to remove TCE and DCP from a groundwater source. Performed preliminary design for a 5.1-mgd water treatment facility removing VOCs and iron and manganese.
- City of Jackson: O.B. Curtis Water Treatment Plant / Jackson MS. Responsible for a treatability study to determine treatment strategy for the new 25-mgd water treatment plant. Performed bench-scale testing and recommended treatment process as to limit trihalomethane (THM) formation, remove iron and manganese, and meet desired bacteriological quality.
- Cincinnati Water Works: California Water Treatment Plant / Cincinnati OH. Evaluated filter underdrain system and support gravel behavior for the 170-mgd plant. Recommended alternative maintenance procedures and measures to mitigate air entrainment during backwash as a part of the plant renovation for GAC addition.
- American Water Works Association: Arsenic in Drinking Water Compliance / CO. Project manager for Malcolm Pirnie's role in the development of a regulatory impact assessment to evaluate the national cost for utility compliance for a range of potential arsenic maximum contaminant levels, sponsored by the AWWA. The national costs are being determined based upon computer model linking occurrence data, existing facilities, treatment data, and unit process costs. Malcolm Pirnie was a subcontractor to the

University of Colorado and was responsible for defining technologies and costs for arsenic removal processes.

- Confidential Client: Industrial Wastewater Treatment / Mexico City, Mexico. Project Manager for the facility assessment, wastewater characterization, and process design for three soft-drink bottling plants totaling 1.5 mgd of wastewater treatment capacity. Processes evaluated included sequencing batch reactors (SBRs), dual biological treatment, and extended aeration. SBRs were recommended for the high-strength bottling wastewater, together with equalization, effluent disinfection, and sludge dewatering. The design/build project was bid in 1995.
- County of Westchester: Leachate Quality Prediction Program / Cortlandt NY. Developed a program to predict leachate quality produced from rainfall percolating through an ash residue landfill as part of a 2,250-tpd refuse-to-electric power project. Acted in advisory capacity for acid rainfall collection and simulation, pilot leachate column design, construction and operation, and development of ash disposal management strategies based upon results.
- New York City Department of Environmental Protection: Jamaica Bay Ecosystem Study / Queens NY. Responsible for developing a sampling program and management strategies to determine the effects of chlorinated wastewater effluent discharge on the Jamaica Bay ecosystem. Tasks included on-site sampling and analysis for chlorine-produced oxidants (CPO), using existing computer simulation models of the bay to determine CPO distribution, and development of alternative disinfection processes to mitigate identified problem sources.
- Confidential Client: Remedial Action Alternative Development. Responsible for developing remedial action alternatives for Superfund sites previously owned by chemical manufacturers and tanneries. Waste consolidation, drainage rerouting, and gas-venting systems were conceptually designed in the recommended plan.

BOOKS AND BOOK CHAPTERS

Owen, D. M., "Treatment Costs for Disinfection By-Product Control," in *Formation and Control of Disinfection By-Products in Drinking Water*, 1999, American Water Works Association, P. Singer, Editor.

Krasner, S. W., Sclimenti, M. J., Chinn, R., Owen, D. M., "Impact of TOC, Bromide and Bromide-to-TOC Ratio on Chlorination By-products," in *Disinfection By-products in Water Treatment: The Chemistry of Their Formation and Control*, 1995. Lewis Brothers Publishers.

Owen, D. M., "Surrogates for Natural Organic Matter in Water Treatment," in *Natural Organic Matter in Drinking Water: Origin, Characterization and Treatment*, 1994. American Water Works Association Research Foundation.

Owen, D. M. (contributing author); "Biological Nutrient Removal" in *Design of Wastewater Treatment Plants, Manual of Practice 8, 3rd Edition*, 1991, Water Environment Federation.

SCIENTIFIC AND PROFESSIONAL PUBLICATIONS (*Refereed)

Means, E.G., Laugier, M.C. and Daw, J.A., Owen, D.M., "Impacts of Climate Change on Infrastructure Planning and Design: Past Practices and Future Needs, Vol. 102, No. 6, pp. 56-65, June 2010.

Cotton, C. A., Owen, D. M., Cline, G. C., Brodeur, T. P., "UV Disinfection Costs for Inactivating *Cryptosporidium*," *Journal of the American Water Works Association*, Vol. 93, No. 6, pp. 82-94, June 2001.

Frey, M. M., Owen, D. M., Raucher, R. S., Edwards, M. A., "Cost to Utilities of a Lower MCL for Arsenic," *Journal of the American Water Works Association*, Vol. 90, No. 3, pp. 89-102, March 1998.

Hooper, S. M., Summers, R. S., Solarik, G. , Owen, D. M., "Improving GAC Performance By Optimizing Coagulation," *Journal of the American Water Works Association*, Vol. 88, No. 8, August 1996.

Summers, R. S., Hooper, S. M., Shukairy, H. M., Solarik, G. , Owen, D. M., "Assessing DBP Yield: Uniform Formation Conditions," *Journal of the American Water Works Association*, Vol. 88, No. 6, June 1996.

Liang, S., Owen, D. M., and Welch, D. "Siting a Large GAC Regeneration Facility," *Journal of the American Water Works Association*, Vol. 88, No. 2, February 1996.

Roberson, J.A., Cromwell, J.E., Krasner, S.W., McGuire, M.J., Owen, D.M., Regli, S., Summers, R.S., "The D/DBP Rule; Where Did the Numbers Come From," *Journal of the American Water Works Association*, Vol. 87, No. 10, November 1995.

Summers, R. S., Hooper, S. M., Solarik, G., Owen, D. M., "Bench-Scale Evaluation of GAC for NOM Control," *Journal of the American Water Works Association*, Vol. 87, No. 8, August 1995.

Owen, D. M., "Planning for the Three Components of the ICR -- Analysis, Data Entry and Treatability Studies," *Journal of the American Water Works Association*, Vol. 87, No. 2, February 1995.

Jacangelo, J. G., DeMarco, J. , Owen, D. M., Randtke, S. , "Removal of Natural Organic Matter by Selected Physical/Chemical Treatment," *Journal of the American Water Works Association*, Vol. 87, No. 1, January 1995.

Owen, D. M., Amy, G. L., Chowdhury, Z. K., Paode, R., McCoy, G., Viscosil, K., "Characterization and Treatment of NOM," *Journal of the American Water Works Association*, Vol. 87, No. 1, January 1995.

Harrington, G. W., Chowdhury, Z. K., Owen, D. M., "Developing a Computer Model to Simulate DBP Formation During Water Treatment," *Journal of the American Water Works Association*, Vol. 84, No. 11, p.78, November 1992.

SCIENTIFIC AND PROFESSIONAL PROCEEDINGS

Owen, D.M., "Accommodating Design Uncertainties: Past Practices and Future Needs" USEPA First National Expert and Stakeholder Workshop on Water Infrastructure Sustainability and Adaptation to Climate Change, Washington, DC, January 6-7, 2009.

Owen, D.M., Means III, E.G., Laugier, M., Daw, J.A., Hurley, M.B., "Impacts of Climate Change on Planning and Design Standards," presented at the 2009 Water Resources Symposium, New England Water Works Association (NEAWWA) and U.S. EPA Region 1, Milford MA, November 3, 2009.

Daw, J.A., Owen, D.M., "Impact of Climate Change on Water Utilities and Adaptation Strategies," presented at the Spring Meeting and Exposition of the American Water Works Association, New York Section, Saratoga Springs NY, April 21-23, 2009.

Daw, J.A., Owen, D.M., "Sustainability: How Small Changes in Approach Can Result in Big Benefits," presented at a Seminar/Workshop of the Water Environment Association of Texas, Dallas TX, February 6, 2009.

Cotton, C.A., Chandler, T., Hubel, R., Passantino, L.B., Owen, D.M., "Power Quality and UV Disinfection: How Prevalent Are Power Quality Problems at WTPs?," *Proceedings*, 124th Annual Conference and Exposition of the American Water Works Association, San Francisco CA, June 12-16, 2005.

Cotton, C.A., Passantino, L.B., Owen, D.M., Prasad, R., "Integration of UV Disinfection into Existing WTPS: An Electronic Tool to Assist Water Utilities in Making Decisions," *Proceedings*, Water Quality Technology Conference and Exhibition of the American Water Works Association, San Antonio TX, November 14-17, 2004.

Cromwell, J., Bishop, M., Owen, D.M., "Selecting Treatment Alternatives to Minimize Risks Using REGRETS Analysis," *Proceedings*, Annual Conference and Exposition of the American Water Works Association, Orlando FL, June 13-17, 2004.

Cotton, C.A., Chandler, T., Hubel, R., Passantino, L.B., Owen, D.M., "The Effects of Power Quality on UV Disinfection: Will It Kill UV Disinfection," *Proceedings*, Water Quality Technology Conference and Exhibition of the American Water Works Association, Philadelphia PA, November 2-6, 2003.

Cotton-Leto, C.A., Passantino, L.B., Owen, D.M., Valade, M., Becker, W., "Critical Process Control Points and Risks of UV Disinfection," *Proceedings*, Annual Conference and Exposition of the American Water Works Association, Anaheim CA, June 15-19, 2003.

Owen, D.M., "Setting the Stage: Design and Implementation Issues with UV," *Proceedings*, Annual Conference and Exposition of the American Water Works Association, New Orleans LA, June 14-18, 2002.

Cotton, C. A., Owen, D. M., Schmelling, D. C., "UV Disinfection Retrofits: How Much Does it Cost to Inactivate Cryptosporidium?" *Proceedings*, First Annual Conference of the International Ultraviolet Association, Washington DC, June 14-16, 2001.

Rojachandran, S. R., Krasner, S. W., Owen, D. M., Chowdhury, Z. K., Buffet, I. H., "Development of a Case-Study Protocol to Examine the Implementation of Treatment Modifications to Meet New D/DBP Regulations.," *Proceedings*, National Conference of the American Water Works Association, Chicago IL, June 21-24, 1999.

Owen, D. M., Millar, R., Shamloufard, J., "Gaining Acceptance for Repurified Water Through Innovative Design: Blending Engineering, Architecture and Public Art.," *Proceedings*, Annual Conference and Exposition of the American Water Works Association, Dallas TX, June 21, 1998.

Owen, D. M., Dyksen, J. E., Cromwell, J. E., Means, E. G., "Managing for Water Quality and System Reliability," *Proceedings*, Annual Conference of the American Water Works Association, Atlanta GA, June 15-19, 1997.

Solarik, G., Owen, D. M., "Natural Organic Matter Removal by GAC Adsorption: Implications of Blending," *Proceedings*, Annual Conference and Exhibition of the American Water Works Association, Toronto ON, June 23-27, 1996.

Solarik, G., Hooper, S. M., Summers, R. S., Owen, D. M., "The Effect of Ozonation and Biotreatment on GAC Performance for NOM Removal and DBP Control," *Proceedings*, Annual Conference and Exhibition of the American Water Works Association, Toronto ON, June 23-27, 1996.

Owen, D. M., "Determination of Technologies and Costs for GAC Treatment Using the ICR Methodology," *Proceedings*, Annual Conference of the American Water Works Association, Anaheim CA, June 18-22, 1995.

Hooper, S.M., Summers, R.S., Shukairy, H.M., Owen, D.M., "Development of a New Test for the Assessment of Disinfection By-product Formation: Uniform Formation Conditions," *Proceedings*, Water Quality Technology Conference, San Francisco CA, November 6-10, 1994.

Owen, D. M., "Development of Surface Water Treatment Regulations: Controlling DOC," *Proceedings*, Annual Conference of the American Water Works Association, New York NY, June 19-23, 1994.

Owen, D. M., Brennan, W. P., Chowdhury, Z. K., "Practical Implications of Enhanced Coagulation," *Proceedings*, Water Quality Technology Conference of the American Water Works Association, Miami FL, November 7-11, 1993.

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