

Orren D. Schneider, Ph.D., P.E.
Senior Environmental Engineer
American Water

Office

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PROFESSIONAL SUMMARY

Dr. Schneider joined American Water in March 2005 as a Senior Environmental Engineer in the Innovation and Technology Group. Currently he is involved with research leading to optimization of water treatment and distribution system operations. Dr. Schneider is a technical resource for American Water and is routinely called upon to provide guidance and ideas for troubleshooting of existing treatment processes and for business development opportunities.

Dr. Schneider has been a technical manager with primary expertise in evaluation and design of advanced coagulation, clarification, filtration, disinfection, and membrane technologies for water treatment. He has extensive experience with pilot plants specializing in collection and analysis of data for scale-up to full-scale operations. He has shown proven abilities in development of new water treatment facilities, water quality evaluation, and treatment optimization.

Dr. Schneider has conducted many applied research studies and is well integrated with research community having initiated and led research projects and pursuits. Dr. Schneider has been either Principal Investigator (PI) or Co-PI on approximately \$2M worth of funded research projects. Dr. Schneider has made numerous presentations on a wide variety of topics related to drinking water treatment and has published many papers as author or co-author.

PROFESSIONAL REGISTRATION

Professional Engineer (Civil Engineering) - New Jersey

PROFESSIONAL AFFILIATIONS

American Water Works Association

National Plant Operations Research Committee 2006 to present; chair 2006 to 2009

National Coagulation and Filtration Committee 1997 to 2003, 2004 to 2009

National Emerging Water Quality Issues Committee 1998 to 2004

National Particulate Contaminant Research Committee, 2004 to present

New Jersey Research and Technical Transfer Committee 2005 to present

Vice Chair 2009 to present, incoming chair (2010)

International Ultraviolet Association – Board of Directors 1999 to 2001

International Water Association

REFEREE FOR PEER REVIEWED PUBLICATIONS

Journal of the American Water Works Association
Ozone Science and Engineering
Journal of Water Supply: Research and Technology (Aqua)
Science of the Total Environment

EMPLOYMENT HISTORY

AMERICAN WATER <i>Senior Environmental Engineer, Innovation and Technology</i>	2005 – present
FAY, SPOFFORD & THORNDIKE <i>Manager of Water Research, Environmental Services</i>	2004 – 2005
BLACK & VEATCH <i>Director of Water Process Research</i>	2001 – 2004
HAZEN AND SAWYER, P.C. <i>Senior Principal Engineer</i>	1996 – 2001

SELECTED PROJECT EXPERIENCE

Technical Project Manager
Jumping Brook WTP
NJ American Water

- Planned and coordinated testing of a demonstration scale (10 MGD) chlorine dioxide testing program

Principal Investigator
WRF Project 4280 – Novel Methodologies for Evaluation of Fouling Reduction of Desalination Membranes

- Principal Investigator for 18 month, \$490,000 project
- Investigating new methods of pretreatment optimization to reduce fouling of desalination membranes
- Coordinating all aspects of project including quarterly project report, invoices, QA/QC, and communications with partners and Research Foundation.

Project Engineer
Tampa Bay Water Seawater Desalination Facility
American Water-Pridesa (AWP)

- Compiled data and wrote Acceptance Test Report to certify contractual compliance for 25 MGD seawater desalination facility
- Provided trouble-shooting for coagulation/filtration processes during pilot testing and full scale operation

Project Engineer
Coastal Water Project
California American Water Company

- Providing technical guidance for 10 MGD seawater desalination facility

Principal Investigator

AwwaRF Project 4103 – Comparison of Zinc vs. Non-Zinc Corrosion Control for Lead and Copper

- Principal Investigator for 30 month, \$460,000 project
- Investigating impact of zinc on corrosion control protection for lead and copper release
- Coordinating all aspects of project including quarterly project report, invoices, QA/QC, and communications with partners and Research Foundation.

Principal Investigator

AwwaRF Project 3022 – Cross-Connection and Backflow Vulnerability: Monitoring and Detection

- Principal Investigator for 3 year, \$635,000 project
- Investigating susceptibility of system to backflow incidents, detection, and monitoring of backflow
- Coordinating all aspects of project including quarterly project report, invoices, QA/QC, and communications with partners and Research Foundation.

Evaluation of Orthophosphate Corrosion Inhibitor Programs

American Water

- Conducted internal paper study evaluating phosphate-based corrosion control programs
- Determined that converting existing zinc orthophosphate programs to high concentration phosphoric acid would lead to potential cost savings on over \$750,000/yr and would reduce zinc in wastewater sludges by up to 500,000 lb/yr.

Treatment Plant Start-Up and Optimization

United Water New York

Lake DeForest Water Treatment Plant

- Key member of start-up team working with plant personnel on start-up of several new treatment processes at 20-mgd treatment plant with primary responsibility for process optimization of high-rate dissolved air flotation (DAF) systems, chemical feed, and carbon dioxide.
- Quickly analyzed and adjusted chemical dosing and DAF process allowing plant to meet all standards in face of continually changing water quality.

Co-Principal Investigator

AwwaRF Project 2940 – Long-Term Effects of Disinfection Changes on Water Quality

- Initiated pursuit and was co-principal investigator and technical lead on 2-year, \$400,000 project.
- Responsible for strategic development of scope of work and authored technical portions of winning proposal.

Engineering Feasibility Study for UV Disinfection

New York City Dept. of Environmental Protection

Catskill-Delaware Reservoir Supply for New York City

- Managed feasibility study examining ultraviolet light disinfection for New York City's \$350M, 2,000-mgd NYC Catskill and Delaware Supplies.

- Interacted directly with client and New York State Department of Health (NYSDOH), and Region II and National EPA officials to convince them of project success.
- Presented results at EPA public testimony, local and national conferences.

Pilot Plant Operations

New York City Dept. of Environmental Protection

Croton Reservoir Supply for New York City

- Supervised daily operation of multi-year, multi-million dollar pilot facility.
- Developed experimental designs and implemented plant modifications.
- Managed personnel, bench-scale testing, coordination of special studies, and sampling events.
- Presented results at progress meetings with project managers, client, and state officials.
- Evaluated data and wrote draft and final pilot plant reports.
- Presented results at local, national, and international conferences.

Treatment Plant Start-Up

California Water Company

Northeast Bakersfield Water Treatment Plant

- Assisted plant personnel with successful start-up of new 20-mgd coagulation/microfiltration plant.
- Determined optimal chemical dosing for organic carbon removal while minimizing formation of treatment residuals to allow plant to achieve water quality meeting all regulations.

Desalination Study

Swansea Water Board, Swansea, MA

- As technical advisor, examined feasibility of \$8M, 3-mgd reverse osmosis plant.
- Results indicated plant was feasible and would allow town to develop new water source.

EDUCATION

B.S. Chemical Engineering - Cornell University - 1987

M.S. Environmental Engineering - University of Massachusetts at Amherst - 1990

Ph.D. University of Massachusetts at Amherst - 1996

ACADEMIC APPOINTMENTS

Massachusetts Institute of Technology

Spring 2002, Spring 2003

Lecturer

PUBLICATIONS AND PRESENTATIONS

Bennett, M.; **Schneider, O.D.**; Dyksen, J.E.; Iversen, G. "Occurrence and Treatment of Lead at the Tap". Proceedings of American Water Works Association Annual Conference and Exhibition, Orlando, FL. June 1988.

Schneider, O.D. "The Effect of Ozonation on Direct Filtration Performance". Unpublished Master's Project. University of Massachusetts at Amherst. January, 1990.

Schneider, O.D.; Fox, M.B.; Tobiason, J.E.; Edzwald, J.K. "The Effect of Ozonation and Peroxonation on Direct Filtration Performance". Presented at the American Water Works Association Annual Conference and Exhibition, Cincinnati, OH. June 1990.

Schneider, O.D.; Nickols, A.D.; Lehan, E.R. "Polyaluminum Chloride and Dissolved Air Flotation - An Effective, Economical Combination". Proceedings of the American Water Works Association Annual Conference and Exhibition, Philadelphia, PA. June, 1991.

Tobiason, J.E.; Edzwald, J.K.; **Schneider, O.D.;** Fox, M.B.; Dunn, H.J. "Pilot Study of the Effect of Ozone and PEROXONE on In-line Direct Filtration". Journal of the American Water Works Association. Vol. 84, No. 12. December 1992.

Schneider, O.D.; Tobiason, J.E.; Reckhow, D.A.; Weiner, J. M. "A Bench Scale Evaluation of Oxidant Effects on the Treatment of a River Supply". Proceedings of the American Water Works Association Annual Conference and Exhibition, San Antonio, TX. June 1993.

Schneider, O.D.; Tobiason, J.E. "Dynamics of the Oxidant-Induced Particle Destabilization Phenomenon". Presented at the 1995 New England Water Works Association Conference. Bretton Woods, NH. September, 1995.

Schneider, O.D.; Tobiason, J.E. "Dynamics of the Oxidant-Induced Particle Destabilization Phenomenon". Poster presented at the 1996 American Water Works Association Annual Conference and Exhibition. Toronto, Canada. June 1996.

Tobiason, J.E.; Burns, M.; Gaffney, L.; **Schneider, O.D.** "Particles in Filtered Water: Effects of Backwash Remnants and Initial Filtration Rate". Proceedings of the 1996 American Water Works Association Annual Conference and Exhibition. Toronto, Canada. June 1996.

Schneider, O.D. Dynamics of the Oxidant-Induced Particle Destabilization Phenomenon. Doctoral Dissertation. University of Massachusetts at Amherst. 1996.

Schneider, O.D.; Daly, W.; Silverman, D. "Testing the Possibilities: Four Treatment Processes Evaluated at the New Croton Reservoir". Presented at the New York Water Works Association Fall Conference. Corning, NY. 1997.

Schneider, O.D.; Schaefer, J.K.; Kurtz, W. "Identification and Prevention of Particle Breakthrough at Low Filtered Water Turbidities in High Rate Filtration". Proceedings of the American Water Works Association Annual Conference and Exhibition, Dallas, TX. June 1998.

Schneider, O.D.; Collins, M.R.; Sharp, R.R.; Schaefer, J.K.; Kurtz, W.; Nickols, A.D. "The Use of Ozone and High Rate Biologically Active Carbon Filtration to Enhance the Biological Stability of Water – Amélioration de la stabilité biologique de l'eau: utilisation de l'ozone couplé la filtration biologique sur charbon actif" Proceedings of the International Ozone Association Conference, Poitiers, France. September 1998.

- Schneider, O.D.;** Schaefer, J.K.; Nickols, A.D.; Kurtz, W. "A Comparison of Biologically Active Filter Media for High Rate Direct Filtration with Preozonation". Proceedings of the International Ozone Association Conference, Vancouver, B.C. October 1998.
- Schneider, O.D.** "Diatomaceous Earth Filtration for Pathogen Removal". Presented at the Edwin C. Tiff, Jr. Water Supply Symposium (NYSWWA), Syracuse, NY. October 1998.
- Schneider, O.D.;** Schaefer, J.K.; Nickols, A.D.; Kurtz, W. "The Use of Ozone and High Rate Biological Filtration to Meet Simultaneous Treatment Goals". Proceedings of the American Water Works Association Water Quality Technology Conference, San Diego, CA. November 1998.
- Schneider, O.D.** "Trends in Acute Waterborne Disease Outbreaks 1976 – 1994". Proceedings of the American Water Works Association Water Quality Technology Conference, San Diego, CA. November 1998.
- Schneider, O.D.;** Nickols, A.D., VandeVenter, L.; Leggiero, S. "The Importance of Particle Counting as an Optimization Tools for High Rate Filtration". Proceedings of the American Water Works Association Specialty Conference on Particle Monitoring and Characterization in Drinking Water. Nashville, TN. March 1999.
- Schneider, O.D.,** Nickols, A.D.; Acs, E.; Leggiero, S. "The Use of Microfiltration for Treatment of Backwash Water". Proceedings of the American Water Works Association Annual Conference and Exhibition. Chicago, IL. June 1999.
- Alvarez, M.; Clark, S.; **Schneider, O.D.** "Meeting new Regulations: Enhanced Treatment Helps Control DBPs." Opflow. June 1999.
- Sharp, R.; Zornes, G.; Camper, A.; **Schneider, O.;** VandeVenter, L.; Leggiero, S.; "The Use of Biofilm Methods to Evaluate Pilot Studies and the Effect of Design and Operation on Biological Stability". Proceedings of American Water Works Association Water Quality and Technology Conference. Tampa, FL. November 1999.
- Schneider, O.D.,** Nickols, A.D.; Leggiero, S."Pilot Testing of High-Rate DAF for New York City". Proceedings of the IWA Conference DAF2000. Helsinki, Finland. September 2000.
- Schneider, O.D.,** Nickols, A.D.; VandeVenter, L.; Leggiero, S. "An Evaluation of High Rate Filtration Using Particle Counting and Turbidimetry for Low Turbidity Waters" Proceedings of the International Water Association/AWWA Conference – Innovations in Conventional and Advanced Water Treatment Processes. Amsterdam, NL. September 2000.
- Schneider, O.D.;** Tobiason, J.E. "Effects of Preozonation on Coagulant/Particle/NOM Interactions". Journal of the American Water Works Association. Volume 92, No. 10. October, 2000.

Schneider, O.D.; Crossley, I.; Nickols, A.D.; Kurtz, W. "Ozonation Systems Design – Translating Pilot-Scale Data to Full-Scale Design for New York City". Proceedings of the International Ozone Association Conference. Orlando, FL. October 2000.

Schneider, O.D.; Herzner, J.; Nickols, A.D.; Ashe, C.R.; Malanchuk, D. "The Feasibility of Constructing a Medium Pressure UV Facility for NYC's Catskill and Delaware Supplies". Proceedings of the AWWA Water Quality and Technology Conference. Salt Lake City, UT. November, 2000.

Schneider, O.D.; Nickols, A.D.; Ashe, C.R.; Malanchuk, D. "Evaluation of Large Scale UV Systems for an Unfiltered Surface Water Supply". Proceedings of the First International Ultraviolet Association International Congress. Washington, D.C. June 2001.

Schneider, O.D.; Hulsey, R. "Retrofit of Ultraviolet Reactors". Proceedings of the AWWA Water Quality and Technology Conference. Nashville, TN. November 2001.

Schneider, O.D.; Nickols, A.D.; Acs, E.; Leggiero, S. "The Use of Microfiltration for Treatment of Backwash Water". In AWWA's "Membrane Practices for Water Treatment". S. Duranceau, ed. 2001.

Logsdon, G.S.; Hess, A.F.; Budd, G.; **Schneider, O.D.** "Inspection and Maintenance of Rapid Rate Granular Media Filters". Proceedings of the South Carolina Environmental Conference. January 2002.

Schneider, O.D.; Hulsey, R. "Implementation, Design, and Operation of UV Systems". Joint Meeting of the New England Water Works Association and New Hampshire Water Works Association. Bedford, NH. January 2002.

Schneider, O.D. "Basics of Enhanced Coagulation" and "Secondary Effects of Enhanced Coagulation". Enhanced Coagulation Technologies and Laboratory Techniques. Small Public Water Systems Technology Assistance Center. Harrisburg, PA. January 2002.

Schneider, O.D. "Experiences with Submerged and Encased Microfiltration and Ultrafiltration Treatment Membranes for Surface Water Treatment". NJWWA Annual Conference. Atlantic City, NJ. March 2002.

Schneider, O.D. "Counter Terrorism and Security in the Water Industry: A Manager's Guide to Keeping Your Utility Safe". Co-sponsored by AWWA and USEPA. Holliston, MA. April, 2002 and Delaware, OH. May, 2002.

Schneider, O.D.; Freeman, S.; "Recent Advances in Microfiltration and Ultrafiltration". Multiple locations 2003.

Logsdon, G.S.; **Schneider, O.D.;** Budd, G. C.; Hargette, A.C. "Hindsight is 20/20 Avoiding Disease Outbreaks by Understanding the Past". South Carolina Environmental Conference. January 2003.

Mackey, H.; Sebastiani, E.; **Schneider, O.D.**; Boozarpour, M. "On-Line UV Transmittance: Developing Monitoring Programs and Evaluating Commercially Available Monitors". Proceedings of the American Water Works Association Annual Conference and Exhibition. Anaheim, CA, 2003.

Schneider, O.D.; Nichols, C.O. "Taunton's Ultraviolet and Chloramination Retrofit". Presented at the New England Water Works Association Water Quality Symposium. Boxborough, MA. May 2004.

Logsdon, G.S.; **Schneider, O.D.**; Budd, G. C. "Hindsight is 20/20 Avoiding Disease Outbreaks by Understanding the Past". Journal of the American Water Works Association. Volume 96, Number 7. July, 2004.

Schneider, O.D. "Selection of Clarification Processes". Presented at the New England Water Works Association Annual Conference. Newport, RI. September, 2004.

Schneider, O.D. "Selection of Clarification Processes". Presented at the New Jersey Water Works Association Annual Conference. Atlantic City, NJ. March, 2005.

Schneider, O.D.; Kirwan, K.; Ramsden, P.; Jones, K. "Identification and Resolution of a Distribution System Water Quality Event". Proceedings of the American Water Works Association Annual Conference and Exhibition. San Antonio, TX. June, 2006.

Schneider, O.D. "Cross-Connection & Backflow Vulnerability: Monitoring & Detection". Awwa Research Foundation Technology Transfer Conference -- Distribution System Operations. Orlando, Florida. October, 2006.

Schneider, O.D. "On-Line Monitoring for System Security". New Jersey Section AWWA Fall Seminar. October 2006.

Schneider, O.D. "New Monitors for Improved Distribution System Operations". Proceedings of the American Water Works Association Water Quality and Technology Conference. Denver, CO. November 2006.

Schneider, O.D.; LeChevallier, M.L.; Reed, H.; Corson, M. "The Role of Zinc in Phosphate-Based Corrosion Control Programs". Presented at the New Jersey Water Works Association Annual Conference. Atlantic City, NJ. March, 2007.

Schneider, O.D.; LeChevallier, M.L.; Reed, H.; Corson, M. "A Comparison of Zinc and Nonzinc Orthophosphate-Based Corrosion Control". Journal of the American Water Works Association. Volume 99, Number 11. November 2007.

Schneider, O.D.; Hughes, D.; LeChevallier, M.L.; Bukhari, Z.; Fleming, K. "Cross-Connection and Backflow Vulnerability: Monitoring and Detection". Proceedings of the American Water Works Association Annual Conference and Exhibition. Atlanta, GA. June 2008.

Schneider, O.D.; LeChevallier, M.L.; Reed, H.; Corson, M. "The Role of Zinc in Phosphate-Based Corrosion Control Programs". Proceedings of the American

Water Works Association Annual Conference and Exhibition. Atlanta, GA. June 2008.

Schneider, O.D.; Hughes, D.; LeChevallier, M.L.; Bukhari, Z.; Fleming, K. "Cross-Connection and Backflow Vulnerability: Monitoring and Detection". Presented at the Edwin C. Tiffitt, Jr. Water Supply Symposium (NYSWWA), Syracuse, NY. November 2008.

Schneider, O.D.; Parks, J.; Atassi, A.; Edwards, M. "A Comparison of Zinc vs. Non-Zinc Corrosion Control for Lead and Copper". To be presented at the American Water Works Association Annual Conference and Exhibition. Atlanta, GA. June 2008.