



**Vice President, Global Practice and Technology Leader**

*Specialization:  
Water Treatment Process Development and Design*

**Office Location**

Kansas City, Missouri

**Education**

B.S., Chemical Engineering, Lehigh University, 1968

M.S., Environmental Science, Rutgers University, 1980

Ph.D. Candidate, Environmental Health Engineering, University of Kansas

**Professional Registration**

PE – 1975, Missouri, 16360

**Professional Associations**

AICE, AWWA, WEF

**Joined Black & Veatch**

1980

**Total Years Experience**

38

**Citizenship**

United States of America

**Language Capabilities**

English

Mr. Long is the Global Water Practice and Technology Leader for Black & Veatch. He is responsible for assessing and developing design parameters for water treatment technologies for the firm's water treatment plant design projects. He also designs pilot plant testing facilities and test programs, evaluates the resultant data for upscaling to full-scale treatment processes, and provides process operation optimization and SDWA compliance assessments for our water clients. He is experienced in making presentations to city councils and in updating authorities and the general public. He has performed several studies on alum sludge dewatering with and without alum recovery.

**Project Experience**

**System Engineer, Tampa Bay Water, Tampa, FL**

Provided process engineering for preparation of the Basis of Design Report for a new surface water treatment plant to treat Hillsborough River water. The BODR was used as the datum to which DBO teams' proposals were compared.

Provided technical assistance to Tampa Bay Water staff in the review and evaluation of DBO SWTP proposals. Attended and provided technical input to Tampa Bay Water's selection panel during the SWTP DBO contractor selection interviews.

- Have provided and/or coordinated technical consultation on SWTP performance issues.
- Assisted in the technical review of SWRO desalination plant DBO submittals, pilot plant data and reports.
- Have been assisting in the review of AWP design submittals and facilitating cooperative interaction between the owner's team and AWP staff.
- Coordinated technical support and review of impacts of conversion from free chlorine to chloramines on Pinellas County's distribution system water quality
- Participated in the assessment of water quality issues attendant to Tampa Bay Water's surface water impoundment

**Fred P. Griffith, Jr. Water Treatment Plant, Fairfax County Water Authority, Fairfax County, VA**

Lead Process Engineer Study and process design for a new 120-mgd WTP. Process includes ozone and biologically active filters. Worked with state agencies.

**Pilot Plant Design, Charlotte-Mecklenburg Water District, Charlotte, NC**

Lead Process Engineer - Design 10 gpm, 2-train, permanent pilot plant using ozone and conventional treatment of surface water.

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**Ozone System Evaluation, Public Utilities Board, Springfield, MO**

Lead Process Engineer - Evaluate operating data from longest-running ozone system treating municipal wastewater in the United States. Recommend monitoring program to develop strategy for expansion of ozone system to handle higher flow rates. Provide basis for comparison to UV and/or other disinfection technology.

**Ozone System Design, City of Milwaukee, WI**

Process Consultant - Consulted on process design of two liquid oxygen-based ozone systems to be retrofitted into existing facilities (105 and 275 mgd) including control of ozone dosage based on attaining target CT for 2-log Cryptosporidium inactivation.

**Pilot Plant Design, Tampa Bay Water, Tampa, FL**

Lead Process Engineer - Oversaw design of pilot facilities (design/build basis) for water treatment plant to model existing operations and improvements such as deep bed filtration, GAC filtration, and ozone oxidation

**Water Treatment Facilities, City of Fargo, ND**

Lead Process Engineer - Oversight of design of oxygen-based ozone facility for a 30 mgd water treatment plant. Evaluated oxygen versus air feed system involving low ozone doses at high feed gas ozone percentages.

**Ashland Water Treatment Plant, Lincoln Water Systems, Lincoln, NE**

Lead Process Engineer - Led process design for 50 mgd water treatment plant using ozone for primary oxidation/disinfection of a groundwater supply

**Water Treatment Plant, Bloomington, MN**

Process Consultant - Consulted on the design of a water treatment plant renovation and expansion. The plant utilizes lime softening followed by recarbonation and filtration.

**Alfred Merritt Smith Water Treatment Plant, Southern Nevada Water Authority, Las Vegas, NV**

Process Consultant - Consulted on design of ozone disinfection facilities for the 600 mgd Alfred Merritt Smith Water Treatment Plant. The facilities included a 100 tpd VSA air separation facility.

**Little Falls WTP Basis-of-Design Report, Passaic Valley Water Commission, Clinton, NJ**

Consulted on process design for improvements to the water treatment plant to continuously meet Stage I and proposed Stage II D/DBP Regulations and IESWTR and proposed LTSWTR Regulations. The upgrade also includes many other facility and process control improvements to enable improved operations and maintenance at the plant. The design addresses the dynamic fluctuation in source water quality, quantity and treatability

**Water Treatment Plant Expansion, City of Elgin, IL**

Process Consultant - Process design consultant for expansion of 16 mgd surface water clarification/lime softening plant to 32 mgd capacity.



**Water Treatment Processes Evaluations, City of Sauget, IL**

Project Manager - Evaluated scrubber water treatment processes. Designed air pollution control system.

**Water Treatment, City of Roseville, MN**

Project Manager - Consulted with Minnesota Pollution Control Agency concerning removal of asbestiform fibers from water supplies.

**Water Treatment, City of Battle Creek, MI**

Project Engineer - Assessed treatment alternatives for removal of volatile organic chemicals from water supply.

**Water Treatment, City of Lansing, MI**

Project Manager - Developed softening sludge management, treatment, and disposal procedures.

**Water Treatment, City of Denver, CO**

Project Engineer - Prepared process design of 30 mgd addition to the Marston Water Treatment Plant.

**Wastewater Sludge Treatment, City of Baltimore, MD**

Project Engineer - Prepared process design of dissolved air flotation for thickening waste activated sludge.

**Johns-Manville, NY**

Research Engineer - Four years experience in research and development. In charge of R&D of application of rotary vacuum precoat filtration to waste treatment problems. Supervised the startup of two full-scale RVPF installations in Johns-Manville plants for the close-up of plant process water systems. Engineer in charge of mechanical development of Johns-Manville's Moving Bed Filter. Engineer in charge of two federal government wastewater treatment contracts (acid mine drainage and alum sludge dewatering). Engineer in charge of contract with New York State Department of Environmental Conservation for physical-chemical treatment of combined paper mill-domestic wastewater.

**Pilot Plant, Process Design, Greenville Water System, Greenville, SC**

Process Consultant - Oversaw performance of pilot plant testing and process design for a new 75 mgd water treatment plant incorporating dissolved air flotation. Directed interactions with South Carolina DHEC to obtain process design approval.

**Pilot Plant Testing Process Design, Charlotte-Mecklenburg Utility Department, Charlotte, NC**

Process Engineer - Directed pilot plant testing program to compare direct filtration versus conventional treatment both with and without ozonation. Directed interactions with North Carolina DEHNR to obtain process acceptance and design approval.



**Pilot Plant Testing and Preliminary Design, Greater Vancouver Water District, Vancouver, British Columbia**

Process Consultant - Participated in the design of pilot plant facilities and testing program, analysis of results and process design. Managed Technical Advisory Committee participation.

**Pilot Plant Testing and Preliminary Design, Fairfax County Water Authority, Merrifield, VA**

Task Director - Participating in the design of a one year pilot plant testing program evaluating conventional treatment with ozone and biologically active filtration as well as alternative membrane processes. Directing efforts of Project Advisory Group and interactions with Virginia Department of Health.

**Advanced Oxidation Process, Electric Power Research Institute, Palo Alto, CA**

Project Engineer - Supervising a pilot plant testing program to assess the effectiveness and cost of ozone, ozone/hydrogen peroxide, and ozone ultraviolet irradiation for the reduction of color from several pulp and paper mill waste streams. The testing program is following a statistical design and is intended to provide data applicable to a multitude of pulp and paper mills.

**Raw Water Transmission Main Capacity Restoration, City of Raleigh, NC**

Process Engineer - Provided thorough evaluation of causes for raw water transmission main capacity reduction. Determined the cause and provided process design of remediation alternatives.

**Ozone System Process Design, East Bay Municipal Utilities District, Oakland, CA**

Process Engineer - Provided process design for ozonation facilities to be retrofitted into 5 EBMUD water treatment plants. Process design included ozone contactors and dissolved ozone monitoring system.

**Pilot Plant, City of Tucson, AZ**

Pilot Plant Engineer - Designed and operated pilot plant to evaluate conventional treatment versus direct filtration, filter media design, and possible inclusion of ozone in treatment train for treatment of central Arizona Project water. Pilot plant included full laboratory tests on performance of THM, THMFP, TOC/DOC, TON particle count and site distribution, and conventional wet chemistry.

Pilot plant lent to design of 225 mgd direct filtration plant incorporating preozonation and deep bed monomedium filtration

**Flocculation Process Performance, City of Fort Collins, CO**

Process Consultant - Provided process consultation. Evaluated flocculation process performance leading to modifications from cross-flow paddle wheel to co-axial flow. Provided consultation on pilot plant facility design, data interpretation, and testing programs.





**Water Treatment Process Consultation, City of Waukesha, WI**

Process Engineer - Provided alternative treatment process design for the removal of Radium 226 and 228. Providing ongoing consultation on discussions with regulatory personnel.

**SDWA Assessment, City of Decatur, IL**

Process Engineer - Provided SDWA Assessment of two water treatment plants. Providing ongoing consultation on regulatory issues.

**Process Design, Washington Suburban Sanitary Commission, Washington, DC**

Process Engineer - Designed treatment process alternatives for several raw water supply scenarios. Processes included desalination, ozonation, and GAC in addition to conventional treatment technologies.

**Plant Expansion, City of Hannibal, MO**

Process Consultant - Provided process consultation on project to expand and enhance water treatment plant using higher rate processes. Assisted in discussions with regulatory personnel.

**PUBLICATIONS**

The Influence of Raw Water Quality on the Formation of Disinfection By-Products During Drinking Water Treatment, WQTC, November 1994, Author

High Rate and Direct Filtration Pilot Plant Testing for CMUD's New North Mecklenburg WTP, NCAWWA, November 1993, Author

Innovate Design Combines High Concentration Ozone Generation with Low Ozone Dosages, 11TH Ozone World Congress, August 1993, Author

Optimizing Water Treatment Processes to Meet Future Challenges, Kansas AWWA, March 1993, Author

The Chemistry of Solids Handling, South Carolina AWWA, November 1992, Author

Options for Controlling Disinfection By-Products in Greater Vancouver Water Supply, WQTC, November 1992, Author

Application of an Integrated Oxygen-Ozone System to an Advanced Wastewater Treatment Facility, 9TH Ozone World Congress, New York City, June 1989, Author

The "How" and "What" of SDWA Impact Studies, Water Engineering and Management, March 1989, Author

SDWA Amendments: Small Community Compliance, JAWWA, August 1988, Author

Cryptosporidium: A New Water Supply Threat?, Journal of the New England Water Works Associations, September 1988, Author

Ozone: A Workable Solution to Meeting Tomorrow's Water Standards, Water Engineering and Management, May 1988, Author

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Use of Ozone in Promoting Microflocculation and Oxidation of Organics in Colorado River Water, 8TH Ozone World Congress Zurich, September 1987, Author

Tucson Pilot Plant Evaluating Alternatives for Treatment CAP Water, Water Engineering and Management, February 1987, Author

**PRESENTATIONS**

Membrane Technology and the Use of Pilot Plants for Drinking Water Treatment, University of Wisconsin Short Course, March 1995.

Advanced Water Treatment Technologies, Ohio AWWA Annual Meeting, September 1994.

A Comprehensive Assessment of DBP Precursor Removal By Enhanced Coagulation and Softening, AWWA Annual Conference, June 1994.

Cryptosporidium: Our Next Challenge, South Carolina AWWA Environmental Conference, March 1994.

Plant Facility Design and Operational Enhancements to Meet Future Drinking Water Standards, University of Kansas Sanitary Engineer Conference, February 1994.

Electrotechnologies in Drinking Water Treatment, EPRI Water and Energy Conference, November 1993.

Oxidation of Color and Organics in Pulp and Paper Mill Wastewater by Ozone and Advanced Oxidation Processes, International Ozone Association, Pan American Conference, Toronto, September 1991.

Advanced Water Treatment Technologies, North Carolina AWWA/WPCA 70th Annual Convention, November 1990.