

DAVID B. WUNDER

Date of Birth: August 20, 1968
Citizenship: United States of America

Home Address

603 Laurel Avenue SE
Grand Rapids, MI 49506
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Work Address

1734 Knollcrest Circle SE
Grand Rapids, MI 49546
phone: 616-526-6337
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Education

PhD, Environmental Engineering, 2010, University of Minnesota
MS, Civil and Environmental Engineering, 1994, University of Iowa
BS, Civil Engineering, 1991, University of Missouri-Rolla

Professional Registration and Board Certification

Professional Engineer
Minnesota No. 26151
Michigan No. 6201051106
Diplomate Environmental Engineer (Board certification: Water Supply and Wastewater)
American Academy of Environmental Engineers, No. 03-10113

Employment Experience

Calvin College, Grand Rapids, MI
Associate Professor, 2008-present
Assistant Professor, 2004-08
Fishbeck, Thompson, Carr and Huber, Grand Rapids, MI
Senior Process Engineer (part-time), 2010-present
Brown and Caldwell, Saint Paul, MN
Principal Engineer, 2002-03
Senior Engineer, 2000-02
Project Engineer, 1998-99
Consoer Townsend, Minneapolis, MN
Environmental Engineer, 1995-97
Engineering Ministries International, Colorado Springs, CO
Intern Engineer, 1994-95
Shive-Hattery Engineers and Architects, Iowa City, IA
Civil Engineering Technician, Summers 1989 & 90

Membership in Professional Societies

American Academy of Environmental Engineers
America Water Works Association
Water Environment Federation
Association of Environmental Engineering and Science Professors

Awards and Honors

Calvin Research Fellowship 2011-12
American Society of Civil Engineers ExCEED Teaching Fellow 2010
Calvin Research Fellowship 2007-08 (Diekema Fellow)
Who's Who in Environmental Engineering, 2003-present
WERC International Student Design Competition: 2008 Judges Choice (*faculty mentor*)
ACEC Minnesota, 2002 Grand Prize Project (*project engineer*)

TEACHING EXPERIENCE

Courses Taught

Calvin College, Engineering Department, Grand Rapids, MI, 2004-present

ENGR 101—Introduction to Engineering Design

ENGR 106—Engineering Chemistry and Materials Science (Coordinator for 2010)

ENGR 202—Vector Mechanics: Statics and Dynamics

ENGR 209—Introduction to Conservation Laws and Thermodynamics

ENGR 306—Principles of Environmental Engineering (***new course*)

ENGR 308—Environmental Engineering Design (***new course*)

ENGR 320—Hydraulic Engineering

ENGR 339 & 340—Senior Design Project (Coordinator for 2007-08 and 2008-09)

ENGR W85—Stormwater Management

ENGR W83—Water and Wastewater Treatment Design (***new course*)

University of Minnesota, Department of Civil Engineering, Guest Lecturer, Fall 2003

CE 3501—Environmental Engineering (2 lectures)

CE 4502—Water and Wastewater Treatment (2 lectures)

University of Iowa, Spring 1994, Teaching Assistant

53:071—Principles of Hydraulic & Hydrologic Engineering (4 lectures and tutoring)

Development of New Courses

ENGR 306—Principles of Environmental Engineering

Course Description: A study of environmental engineering and science principles relevant to engineered and natural systems. Topics include an overview of the areas of environmental engineering; units of measurement; population dynamics; contaminant types, sources and presence; chemical equilibria, and kinetics; mass balances; mass/particle transport processes; ecosystem structure/function; biogeochemical cycling; and oxygen demand.

ENGR 308—Environmental Engineering Design

Course Description: Application of environmental engineering and science principles to the design of environmental control measures and engineered systems. Design-based projects considered in this course include unit processes for water treatment; wastewater treatment; air pollution control, groundwater remediation; solid and hazardous waste management, and water/sanitation in developing global regions.

ENGR W83—Water and Wastewater Treatment Design

Course Description: Theory and application of chemical, physical, and biological processes for water and wastewater treatment systems. Problems considered include unit process design for the following potable water treatment plant components: screening, coagulation, mixing, flocculation, chemical softening, filtration, disinfection, membrane filtration, and residuals handling. Additional coverage includes unit process design for wastewater treatment components including: activated sludge, membrane bioreactors, aeration, clarification, and solids handling and stabilization.

ENGR W85—Stormwater Management

**existing course with new material (~35%): pollutant management, modeling and treatment.*

Course Description: Civil engineers today are frequently faced with the problem of managing the impact of storm water within the urban environment. Management involves addressing issues of both stormwater quantity as well as quality. There are three specific goals for this course. The first goal is to introduce the basic principles engineering and computational methods associated with stormwater flows, collection, storage, and treatment. The second goal is to understand basic stormwater management approaches used in practice today. The third goal is to learn how to use numerical modeling software to solve stormwater management design problems. Guest speakers, field trips, and case study reviews are also used to emphasize basic principles and management techniques.

SCHOLARSHIP AND PROFESSIONAL WORK

Publications

D.B. Wunder, V.A. Bosscher*, R.C. Cok*, and R.M. Hozalski (2011) "Sorption of Antibiotics to Biofilm" *Water Research* 45:6:2270-2280.

D.B. Wunder and R.M. Hozalski (2011) "Fate and Impact of Antibiotics Slow-rate Biofiltration Processes" *in print*, Water Research Foundation (*project 4135*), Denver, CO.

D.B. Wunder, D.T. Tan*, T.M. LaPara, and R.M. Hozalski "Effect of Mixtures of Antibiotics on the Structure and Function of Bacterial Biofilm Communities" *in preparation*.

D.B. Wunder, M.L. Stehouwer*, T.M. LaPara, and R.M. Hozalski "Bioattenuation and Effect of Antibiotics in Slow-rate Biofiltration Systems", *in preparation*.

Proceedings

D.B. Wunder, V. Horstman*, and R. Hozalski (2008) "Antibiotic Sorption to Slow-rate Biofilm", with V. Horstman and R. Hozalski, Proceedings of the American Waterworks Association Water Quality Technology Conference, Cincinnati, OH, November.

H. Melcer, P.Tam, D.B. Wunder, M. Stenstrom, and A. Parrella (2003) "Excellent Engineering Hits the Jackpot". Proceedings of Water Environment Federation Technology Exposition and Conference, Anaheim, CA.

D.B. Wunder and T Ekola (2000) "Design of Temperature Phased Anaerobic Digestion at the Western Lake Superior Sanitary District". Proceedings of Central States Water Environment Association Annual Conference, Chicago, IL, May.

E. Wahlberg, D.B. Wunder, D Fuchs, and K. Voigt (1999) "Chemically Assisted Primary Treatment: A New Approach to Evaluating Enhanced Suspended Solids Removal". with Atlanta, GA, Proceedings of Water Environment Federation Technology Exposition and Conference, October.

D.B. Wunder, D. Romans, and J. Cook (1997) "Addressing SSOs – A Sewer Separation Legacy"? Proceedings of Central States Water Environment Association Annual Conference, Chicago, IL, May.

D.B. Wunder and J.K. Johnson (1995) "Private Well-water Quality of the Karst and Agricultural Dry Creek Watershed in Eastern Iowa – Implications for Appropriate Management". Karst geohazards: engineering and environmental problems in karst terrane : proceedings of the Fifth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impact of Karst, Gatlinburg, Tennessee, 2-5 April.

Presentations

M. Stehouwer* and D.B. Wunder (2010) "Fate of Antibiotics in Slow Sand Biofiltration and Batch Tests", (poster, by invitation) Michigan College's Foundation: Healthcare and Millennials, Van Andel Institute, Grand Rapids, MI, November.

B. Robison* and D.B. Wunder (2010) "Sorption of p-nitrophenol to Bagasse Charcoal: for Water Treatment in Developing Countries", (poster) West Michigan Undergraduate Research Conference, Grand Rapids, MI, October.

A. Hayes* and D.B. Wunder (2009) “Bagasse Charcoal for Water Treatment: Preliminary Work” (poster) West Michigan Undergraduate Research Conference, Grand Rapids, MI, October.

A. Stegink*, D. Tan*, and D.B. Wunder (2008) “Impact of Antibiotics on Slow-rate Biofiltration Biofilm—Preliminary Data”. (poster) West Michigan Undergraduate Research Conference, Grand Rapids, MI, October.

D.B. Wunder, M.K. Heun, V. Horstman*, and C. Kluge* (2008) “Shared Learning—Student Research in Engineering” (podium presentation) Calvin College Regional Councils, Calvin College, Grand Rapids, Michigan, May.

V. Horstman* and D.B. Wunder (2007) “Sorption of Antibiotics to Biofiltration Biofilm”. (poster) West Michigan Undergraduate Research Conference, Grand Rapids, MI, October.

D.B. Wunder (2003) “2,4-Dichlorotoluene Pathway Map”. *updated by Michael Turnbull (2008)*. (web-page) University of Minnesota Biocatalysis/Biodegradation Database (http://umbbd.msi.umn.edu/dct/dct_map.html)

D.B. Wunder and K. Ellquist. (2002) “WLSSD’s New Biosolids Management System—Operation During and After Construction”. (podium presentation) with K. Ellquist. MnCSWEA/MWOA Innovative Approaches to Operational Problems Seminar, Saint Cloud, MN, February.

N. Stuckey, D.B. Wunder, B. Kross, and J.K Johnson (1993) “Temporary Variability of Atrazine & Nitrate Concentration in State of Iowa Private Well-water”. (poster) Agricultural Research to Protect Water Quality, Minneapolis, MN, February.

Research Grants, Fellowships, and Assistantships

Sabbatical Grant, 2011-12 “Membrane Softening Residuals and Activated Sludge: Effects, Modeling, and Optimization. Collaborating with Desmond Lawler (University of Texas).

Calvin Research Fellowship, 2010-11 “Bagasse Charcoal for Water Treatment: Sorption Studies. 1-course teaching relief.

American Waterworks Association Research Foundation (now Water Research Foundation)—Unsolicited Proposal Program, 2007-09. “Fate and Impact of Antibiotics in Slow-rate Biofiltration Processes”. Co-Principal Investigator with Ray Hozalski (University of Minnesota), Project # 4135). \$150,000.

Calvin Research Fellowship, 2007-08 “Antibiotics in Slow-rate Biofiltration Processes: Fate and Impact”. 2-course teaching relief.

Research Assistantship, 1992-93, Iowa Private Well-water Study, University of Iowa Field Coordinator for statewide study of triazines and nitrate concentration and variance in private well-water supplies.

Research Assistantship, 1993-94, Dry Creek Watershed Study, Linn County, IA Investigated water quality in agricultural basin underlain by karst terrane, and proposed management guidelines for residential and water supply development in watershed.

Research Assistantship, 1993-94, Hazelbrush Watershed Study, Carroll County, IA Surface water runoff modeling for agricultural watershed with distributive process model, CASC2D.

Advised Undergraduate Researchers

Bonnie Robison (2010-11) Jansma Fellowship (\$4,000 *to student*). Sorption of para-nitrophenol to Bagasse Charcoal.

Mark Stehouwer (2010-11) Cargill Fellowship (\$4,000 *to student*). Bench-scale column studies of Antibiotic Fate and Effect in Slow Sand Filters.

Amanda Hayes (2009-11) EPA GRO Undergraduate Fellowship (\$47,000 *to student*). Sorption of Atrazine and Estradiol to Bagasse Charcoal.

Rhiana Cok (2009-11) EPA GRO Undergraduate Fellowship (\$47,000 *to student*). Antibiotics Octanol-Water Partitioning.

David Tan (2008-09) Kuiper Research Fellowship (\$4,000 *to student*) Inhibition and Effect of Antibiotics on slow-rate biofiltration biofilm bacteria

Andrea Stegink (2008) Summer Research Fellowship (\$4,000 *to student*). Column studies: Impact of antibiotics on the biofilm mass and community structure in slow-rate biofiltration.

Valerie Bosscher (2007-09) EPA GRO Undergraduate Fellowship (\$41,000 *to student*) and Kuiper Fellowship (\$4,000 *to student*). Sorption Kinetics and Equilibrium of Antibiotics with Biofilm.

Corrine Kluge (2006-08) EPA GRO Fellowship (\$41,000 *to student*). Refined Methodology for Ion Chromatographic Analysis of Acetate in the Low Microgram per Liter Range for Water Supplies.

Scott Hekman (2006-07). Kuiper Research Fellowship (\$4,000 *to student*) Refined methodology for liquid chromatographic—mass spectrometric analysis of antibiotics in nanogram to microgram per liter range for water supplies.

Engineering Planning and Design (consulting, prior to 2004 unless noted)

Drinking Water Treatment

Water Treatment Plant Predesign Report, Eagle Water and Sanitation District, Vail, CO

Project Engineer. Predesign effort relating to ozonation, enhanced conventional treatment vs. membrane filtration, and UV-disinfection of 3-mgd surface water treatment plant. Assessed water quality concerns and space limitations as part of process evaluation and selection.

Water System Feasibility Study, Joint Water Commission, Twin Cities, MN

Project Manager. Assessment and development of new 20-mgd finished water supply for communities of Golden Valley, Crystal, and New Hope. Evaluated groundwater and surface water supplies, conventional lime softening and reverse osmosis (RO) treatment options, and storage and distribution requirements for water production. Identified greater than 25-percent in aggregate savings associated with new system when compared to continued use of Minneapolis water.

NDMA Treatment Predesign Report, So. California Water Co., Rancho Cordova, CA

Project Manager. Pre-design for 15-mgd UV treatment of NDMA in groundwater supply. Responsibilities included assessment of process, hydraulic, electrical, space, cost, schedule, and regulatory requirements. The likelihood of NDMA reformation and feasibility of coincident NDMA/disinfection was also assessed.

City Creek Water Treatment Plant Upgrades, Salt Lake City, UT

Project Engineer. Planning and design for water treatment residuals handling and treatment for plant expansion to 20-mgd. Lead assessment of residuals handling treatment with conventional and membrane treatment alternatives; final design for residuals handling and treatment systems.

Everett Water Filtration Plant Improvements, City of Everett, WA

Project Engineer. Design of chemical feed systems and clearwell improvements. Evaluation and development of solids handling and washwater treatment alternatives for 96-mgd surface water treatment plant.

Coloma Water Treatment Facility Plan, So. California Water Co., Rancho Cordova, CA

Project Engineer. Evaluation of 8.3-mgd surface water treatment plant for expansion to 24-mgd. Conditional and capacity assessment of existing facilities. Evaluation of water treatment alternatives under four expansion scenarios. Recommended short-term optimization of direct filtration with ultimate expansion to conventional filtration.

Sherard Water Treatment Plant Expansion, Board of Public Utilities, Cheyenne, WY

Project Engineer. 35-mgd surface water treatment plant expansion to include ozonation/biofiltration. Designed liquid, dry, and gaseous chemical feed systems for plant processes including manganese oxidation, pH control, coagulation and flocculation, chloramination, fluoridation, and final conditioning. Lead design of dual train 10-gpm pilot plant for high rate settling, ozonation, and dual-media biofiltration.

Wastewater Treatment

Class A Biosolids Assessment, Coldwater Board of Public Utilities, Coldwater, MI (2010)

Senior Process Engineer. Lead role and primary author for evaluation of alternatives and preliminary assessment for production of Class A biosolids at 3.2 mgd conventional AS plant. Summarized EPA requirements, identified and evaluated alternatives. Recommended *biosolids flow-through thermophilic treatment* to optimize use of current facilities and minimize cost.

Division D Interceptor Loadings Study, WLSSD, Duluth, MN (2004)

Project Manager. Assessment of loadings and the chemical and biological processes responsible for temporal and spatial changes in flow stream character and the identification of areas of concern relative to the optimization of future upgrades or system improvements. The need for localized attention to gas releases and pipeline corrosion was highlighted.

Wastewater Treatment Facility Improvements-2004, City of Melrose, MN (2004)

Project Manager. Planning, predesign and design for liquid and solid stream treatment process improvements for 3-mgd industrial/municipal wastewater treatment plant. Project included the increased of plant capacity without increasing tankage volume. Improvements include primary clarification optimization, trickling filter replacement, digester and biosolids mixing, sludge thickening, and new UV disinfection.

Liquid Stream Treatment Improvements, WLSSD, Duluth, MN

Project Manager. Biological process modeling (BioWin™) and design of high purity oxygen activated sludge and clarification improvements to expand plant capacity to 48-mgd, including: bioreactor mixer improvements to increase oxygen transfer; flow distribution upstream of secondary clarifiers, sludge pumping modifications, and disinfection system improvements. Development of D/B procurement documents for influent pumping modifications.

East-West Areawide Plan, MCES, St. Paul, MN

Project Engineer. Master planning for regional treatment plants ranging in capacity from 1 to 36-mgd. Responsibilities included establishment of flow and load projections, liquid stream process capacity assessment, alternatives development/evaluation and recommendations.

Effluent Quality Master Plan, WLSSD, Duluth, MN

Project Manager. Conditional assessment and process evaluation of high purity oxygen (HPO) activated sludge system, secondary clarifiers, and effluent filters. Evaluation of alternatives and recommendation of plant optimization and expansion measures over 20-year planning period.

Metro Wastewater Treatment Plant Liquid Stream Improvements, MCES, St. Paul, MN

Project Engineer. Facility planning and design for 250-mgd WWTP relating to treatment improvements and odor control measures for primary treatment process area. Responsibilities included conditional assessment of facilities, evaluation of alternatives, and design.

Biosolids Management Facility, WLSSD, Duluth, MN

Project Engineer. Design and construction support for new 29-dtpd biosolids management facilities at 43-mgd wastewater treatment plant. Project components: DAF thickening, temperature phased anaerobic digestion, storage/mixing, centrifuge dewatering, and . design/build off-site biosolids storage facility.

Wastewater Treatment Facility Improvements-1996, City of Melrose, MN

Project Engineer. Study and design for 3-mgd wastewater treatment plant improvements. Process areas considered and improved included final clarification; solids handling; anaerobic digestion, and chlorine disinfection.

Hydrology and Hydraulics

Cave Creek Road Water Facilities, City of Phoenix, AZ

Project Engineer. Process design, system-wide steady-state hydraulic modeling for pump validation, hydraulic transient analysis, and civil site design, for a series of four booster pump stations with capacities from 6 to 30-mgd.

Potable Water Wells 293, 294, and 295, City of Phoenix, AZ

Project Engineer. Site design and drainage, system hydraulic design, selection and setting of pumps for three separate wells with depths to 1600 feet and pump capacities up to 2600-gpm.

Surface Water Management Plan, City of Superior, WI

Project Engineer. Development of watershed based management approach to control surface water runoff quality and quantity. Project components consisted of storm sewer network mapping; dry weather flow sampling; mapping and characterization of the Newton Creek, Faxon Creek, and Howard Bay drainages; development of an area-wide water quality management plan; and design of snow disposal BMP demonstration project.

SSO Lift Station and Storage Improvements, City of Superior, WI

Project Engineer. Development of final design criteria; publication of contract documents; and construction support for 2 lift station and sanitary sewer overflow (SSO) storage sites. Project components include: instrumentation and control, diversion structures; storage basins (totaling 1.8-million gallons); and lift stations (500 to 1500-gpm).

Riverfront Interceptor Bypass Gate, City of Davenport, IA

Project Engineer. Feasibility study and design of bypass gate installation to relieve interceptor system during wet weather. Site survey; hydraulic analysis of 5-mile interceptor system, bypass gate installation; review of gate, operator, and instrumentation and control equipment; final design.

Water and Sanitation in Developing Regions

Engineering Ministries International, Colorado Springs, Colorado

Project Consultant and Engineer. Drinking water supply and sanitation projects for numerous international development and mission agencies. Assessment, planning and design for appropriate water and sanitation systems. Volunteer on-site assignments include

- Huehuetenango, GUATEMALA (2001)
- Malumghat, BANGLADESH (1997)
- Kijabe, KENYA (1994)
- Mantasoa, MADAGASCAR (1994)

SERVICE

Professional

Reviewer: Environmental Toxicology and Chemistry, Chemosphere
American Association of Engineering Education. Conference Referee, 2006, 2007.
Minnesota AWWA—Education Committee, 1999-2001
Minnesota AWWA—Research Committee, 2000-03
Intermediate District 287 (Eden Prairie, MN),
Advanced Learning and Academic Excellence—Mentor, 1999-2000
Engineering Ministries International--Twin Cities Representative, 1997-2003

College/University

Interim Faculty Advisor—American Society of Civil Engineers, Calvin College, 2011
Football Task Force, Calvin College, 2011
NCAA Faculty-Athletics Representative, Calvin College, 2010-present
Engineering Department Mission Statement Committee, Calvin College, 2010
Teaching Evaluator (Engineering Department), Tenure Review, Calvin College, 2010
Faculty Advisor—Engineers Without Borders, Calvin College, 2009-present
Chaplain Search Committee, Calvin College, 2008-09
Athletics Committee, Calvin College, 2005-present
Research and Scholarship Committee, Calvin College Science Division, 2005-07
Environmental Science Committee, Calvin College Science Division, 2007-present
Comprehensive Laboratory Plan, Calvin College Engineering Department, 2007-08
Assistant Soccer Coach—Goalkeepers, Men's and Women's Varsity Soccer
Macalester College, Saint Paul, MN, 1995-2001
All-American: Dan Welch (1997), Lisa Bauer (2001)
All-Region: Dan Welch (1997), Andre Slopar (1999), Anna Bacho (1999), Lisa Bauer (2001)

Advising

On-going responsibility for advising 30 to 35 undergraduate engineering students.