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Education

Ph.D.	University of California, Berkeley, Civil (Environmental) Engineering	1988
M.S.	University of California, Berkeley, Civil (Environmental) Engineering	1983
B.S.	Purdue University, Civil Engineering	1981

Academic Appointments

2018 – Present: Lee A. Rieth Professor in Environmental Engineering, Purdue University.
 2011 – Present: Professor, Division of Environmental and Ecological Engineering, Purdue University.
 1999 – Present: Professor, Lyles School of Civil Engineering, Purdue University.
 1995 - 1996: Visiting Scientist (Sabbatical Leave), CIRSEE, Lyonnaise des Eaux, Le Pecq, France.
 1994 – 1999: Associate Professor, School of Civil Engineering, Purdue University.
 1988 - 1994: Assistant Professor, School of Civil Engineering, Purdue University.
 1986 - 1986: Teaching Assistant, School of Civil Engineering, University of California, Berkeley.
 1983 - 1988: Graduate Student Research Assistant, Lawrence Berkeley Laboratories.

Non-Academic Positions

2025 – Present: President, International Ultraviolet Association
 2023 – Present: Advisory Board Member, SafeTraces, Pleasanton, CA
 2021 – Present: Principal Scientist, Process Engineering, XCMR, Philadelphia, PA
 2003 - 2005: Fellow, Northeast-Midwest Institute, Washington, DC.
 1992 - 1996: Concurrent Appointment as Research Engineer, Department of the Army, Waterways Experiment Station, Vicksburg, MS.
 1992: Summer Faculty Research and Engineering Program, Department of the Army, Waterways Experiment Station, Vicksburg, MS.
 1981 - 1982: Environmental Engineer, Howard, Needles, Tammen & Bergendoff, Indianapolis, IN.

Licenses, Registrations, and Certifications

Professional Engineer, State of Indiana, Registration No. PE60900120
 Board Certified Environmental Engineer, American Academy of Environmental Engineers, Certificate No. 06-E0001

Awards, Recognition, and Honors

- EPA Training Fellowship, University of California, Berkeley, 1982 – 1983
- Chi Epsilon, 1994 – present
- Harold Munson Outstanding Teacher Award, School of Civil Engineering, Purdue University, 1997
- Roy E. and Myrna G. Wansik Research Leadership Award, School of Civil Engineering, Purdue University, 1998
- William Edgar Award for Pioneering Research in Disinfection, Water Environment Federation, 2005

- Diplomate Environmental Engineer (DEE) (*aka*, Board Certified Environmental Engineer, BCEE), American Academy of Environmental Engineers, by Eminence in the Specialty of Water Supply and Wastewater, 2006-
- Sigma Xi, 2007 – present
- *Aquatics International* 2008 “Power 25” – Annual list of the 25 most influential aquatics professionals (see http://www.aquaticsintl.com/2008/feb/0802_power.html)
- Fellow, American Society of Civil Engineers, 2014 – present
- Engagement and Service Award, Purdue University, College of Engineering, 2016. Awarded for leadership in development of interdisciplinary service-learning class entitled “Water Supply in Developing Countries.” The class designs, builds, and implements holistic, community-scale water treatment systems for impoverished communities in developing countries.
- Corps of Engagement Award (with Alex Delworth, Rachel Gehr, Rebecca Johnson, Allison Koeppen, Vicki Simpson), Purdue University Office of Engagement, 2020.
- SEEE Instructional Excellence Award, Division of Environmental & Ecological Engineering, Purdue University, 2021.
- Book of Great Teachers, Purdue University, 2023.
- Most Impactful Journal Article Award, International Ultraviolet Association, 2025.
- Roy E. and Myrna G. Wansik Teaching Award, Lyles School of Civil & Construction Engineering, Purdue University, 2025.

Inventions and Patents

Apparatus for Improving UV Dosage Applied to Fluids in Open Channel UV Disinfection Systems, Ernest R. Blatchley III, Kuang-Ping Chiu, E. Ronald Magee, James M. Kallio, Zdravka Do-Quang, Dennis A. Lyn, U.S. Patent Number 5,952,663; issued 14 September 1999.

Dyed Microspheres for Characterization of Photochemical Reactor Behavior, Ernest R. Blatchley III, Chengyue Shen, Zorana Naunovic, Lian-Shin Lin, Dennis A. Lyn, Donald E. Bergstrom, Shiyue Fang, Yousheng Guan, J. Paul Robinson, Kathryn E. Ragheb, Gerald J. Gregori, U.S. Patent Number 7,842,512; issued 30 November 2010.

Continuous-Flow Solar Ultraviolet Disinfection System for Water, Ernest R. Blatchley III; Eric Gentil Mbonimpa; Bryan Vadheim, U.S. Patent Number 9,546,100 issued 17 January 2017.

Chlorination/UV Process for Decomposition and Detoxification of Microcystin-LR, Ernest R. Blatchley III; Jing Li; Xinran Zhang; Jer-Yen Yang, U.S. Patent Number 10,662,100 issued 26 May 2020.

Methods and Systems for Separation of Chloramines in Aqueous Solutions, Ernest R. Blatchley III, U.S. Patent Number 11,084,738 issued 10 August 2021.

Hydrophobic Surface Coating for Virus Inactivation and Methods Therefor, Tanya Purwar, Victor-Manuel Castano-Meneses, Xing Li, Ernest R. Blatchley III, Luciano Castillo, Ali Doostalab, Patent Application Number 17/586,319, Filed 27 January 2022.

Membership in Professional and Scholarly Societies

Society Memberships:

American Academy of Environmental Engineers	2006-
American Chemical Society	1984-
American Society of Civil Engineers	1988-

Association of Environmental Engineering & Science Professors	1988-
International Ultraviolet Association	2007-
International Water Association	1998-
Water Environment Federation	1981-

Committee Activity:

Water Environment Federation:

WEF Blue-Ribbon Panel on Biological Hazards and Precautions for Wastewater Personnel 2020

American Society of Civil Engineers:

Task Committee on Control of Microbes in Drinking Water 1989-1994

Author of Chapter Entitled "Ozone Disinfection of Drinking Water"

Concrete Canoe Committee, Faculty Advisor 1992-1994, 2015

Faculty Advisor, Purdue Student Chapter 1999-2002, 2012-2017, 2018-2022

International Water Association

Working Group on Micropollutants and Pathogen Modeling, Vice-Chair 2016-2021

International Ultraviolet Association

2010-

Conference Co-Chair, Research Frontiers Conference, 19-22 May 2015, Wetsus Centre of Excellence for Sustainable Water Technology and WTC Expo/Hotel, Leeuwarden, Netherlands 2014-2015

Vice President for the Americas 2016-2023

Program Committee, World Congress of IUVA 2015, 2017

Education Committee 2016-2020

Program Committee, Americas Conference 2020

Chair, Task Force on Far UVC Radiation 2020-2022

Chair, Research Innovation Symposium 2020-2022

President-Elect 2023-2025

President 2025-

National Conference on Interstate Milk Shipments

Scientific Advisory Committee 2021-

Overview

Research/Discovery

Professor Blatchley teaches and conducts research in the area of physico/chemical processes of Environmental Engineering, with particular emphasis on processes that are used in treatment of water and wastewater. However, the onset of the COVID-19 pandemic brought opportunities to explore the translation of these technologies, particularly those involving ultraviolet (UV) radiation, for disinfection of indoor air and surfaces. Specific areas of research within the Blatchley group are described below.

Photochemical Reactor Theory – As compared with more conventional chemical or biochemical reactors, photochemical reactor theory is less well-developed and historically has depended heavily on comparatively crude, empirical relationships. These empirical models are of limited utility in process design, thereby dictating the use of extensive experimentation, pilot testing, and generous safety factors in photoreactor design. The modeling approach developed by Professor Blatchley and collaborators has been shown to provide accurate predictions of photochemical reactor behavior; the ability of these models to accurately predict process performance is attributable to the inclusion of model terms that account for the physical and chemical behavior that govern these systems.

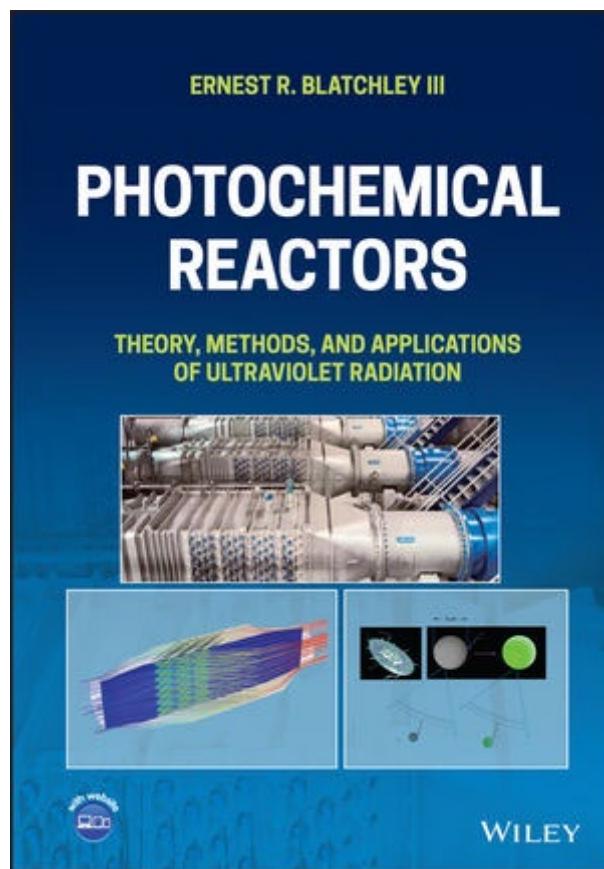
Professor Blatchley initiated research in this area soon after joining the Purdue faculty. At that time, photochemical reactors were emerging as an important alternative to conventional water treatment processes for disinfection and chemical transformation. The Blatchley group introduced the concept of the dose distribution as the basis of photochemical reactor modeling; this concept now represents the foundation for photochemical reactor models. His first sabbatical leave (1995-1996), during which he led a research team at *Le Centre International de Recherche Sur l'Eau et l'Environnement (CIRSEE)* of Lyonnaise des Eaux (now known as Suez Environnement) in Le Pecq, France, was focused on development of the principle of the dose distribution and tools to simulate this aspect of photochemical reactors. The Blatchley group was the first to incorporate detailed, multi-dimensional descriptions of fluid mechanics (including turbulence characteristics) and the spatial distribution of radiant energy (aka irradiance or fluence rate field) to simulate dose distributions in UV photoreactors and to predict reactor performance. Because this method allowed quantification of the dose distribution delivered by a reactor, it allowed development of an improved, highly-efficient reactor design, now protected by a U.S. Patent (U.S. Patent Number 5,952,663). Later, the Blatchley group and others introduced the use of coupled computational fluid dynamics and fluence rate field (CFD-E') modeling for predictions of photochemical reactor performance; CFD-E' models are now the industry standard for design and optimization of photochemical reactors. The Blatchley group and collaborators then developed Lagrangian Actinometry (LA) as a tool for measurement of the UV dose distribution delivered by a reactor. To date, LA is the only method that can accomplish this measurement and is protected by a U.S. Patent (U.S. Patent Number 7,842,512).

Research related to UV disinfection has focused on analysis and prediction of variability in the performance of UV disinfection systems. This work, which received support from the Water Environment & Reuse Foundation (WE&RF), together with several utilities (Citizens Energy, Indianapolis, IN; Greater Chicago (IL) Water Reclamation District; the New York City Department of Environmental Protection; Trinity River Authority, Houston, TX), and other organizations, has resulted in the development of a stochastic approach to simulation of the behavior of UV disinfection systems (Ahmed *et al.*, 2019; Zheng *et al.*, 2025). This approach is expected to yield improvements in the reliability and efficiency of UV disinfection. In so doing, it is expected that these systems can be safely operated with lower power requirements than current designs, yet with greater reliability.

Professor Blatchley's used a sabbatical leave to initiate writing of a book titled: *Photochemical Reactors: Theory, Methods, and Engineering Applications of Ultraviolet Radiation*. This book, which was published by Wiley in 2023, provides a summary of the tremendous advances that have been made over the last 20-30 years relative to our collective understanding of the behavior of photochemical reactors. It provides a comprehensive summary of photochemical reactor theory as the foundation for understanding

of the behavior of these systems. It also includes summaries of experimental and numerical methods that are used to measure or predict the performance of photoreactors, as well as descriptions of contemporary applications of these systems. At present, this book is the only title available that provides comprehensive coverage of the theory, methods, and applications of UV radiation.

In parallel with this effort, Professor Blatchley developed online coursework that uses his book as its foundation. This coursework is aimed at graduate students at Purdue and other research universities, as well as working professionals. This class was offered for the first time in the Spring 2022 semester.



Disinfection of Air and Surfaces – Several important human diseases are transmitted via aerosolized particles. Prominent examples include the common cold, influenza, measles, and tuberculosis. Among the engineering interventions that are available to reduce the risk of transmission of these diseases, UV irradiation has shown the greatest promise, as defined by its ability to reduce disease transmission risk, operate at low cost, and with low energy requirements. However, the application of UV-based systems for disinfection of air and surfaces has been modest, largely because of a lack of standardized methods for design, testing, and validation of these systems.

Starting at the outset of the COVID-19 pandemic, the Blatchley group made a substantial shift of emphasis toward this issue. Ongoing research within the Blatchley group and with collaborators is addressing the development of the standards described above. Some aspects of this work have evolved from Professor Blatchley's work as Principal Scientist at XCMR (<https://www.xcmr.co>), who are developing next-generation personal protective equipment (PPE) and related devices with the goal of providing users with tools to reduce the risk of disease transmission. Professor Blatchley serves on the Board of Advisors for SafeTraces (<https://www.safetraces.com/>), who are developing media and methods

for *in-situ* testing of Germicidal Ultraviolet (GUV) systems that are used to disinfect indoor air. He is currently serving as a technical advisor to a group at the Pacific Northwest National Laboratory (PNNL) to examine the use and optimization of GUV systems. He also is participating in a collaborative effort that is being coordinated by NIEHS/CDC to conduct a critical review of the literature and past practices related to GUV applications.

Disinfection By-Product Formation and Analysis – The Blatchley group has examined the fundamental chemistry that drives the formation and decomposition of several important classes of disinfection by-products (DBPs) that result from chlorination, UV irradiation, or both. This work was initiated through collaboration with faculty in the Analytical Chemistry Division of the Chemistry Department at Purdue University, which facilitated the use of Membrane Introduction Mass Spectrometry (MIMS) for identification and quantification of volatile DBPs in water samples. Since that time, the Blatchley group has used MIMS and other analytical methods to examine the kinetics and mechanisms of DBP formation and decomposition.

Original work by the Blatchley group in this area addressed the dynamic behavior of +1-valent chlorine and some common DBPs formed in water treatment as a result of chlorination. Much of the recent work by the Blatchley group in this area has focused on swimming pool chemistry. Prior to this work, the composition of water in chlorinated swimming pools was undefined or poorly-defined. Given that swimming represents the 2nd most common form of exercise and that swimmers can be exposed to DBPs through ingestion, inhalation, or dermal uptake, an improved understanding of this chemistry was needed. The Blatchley group has made several important contributions to the literature in this area. The research of the Blatchley group relating to DBP chemistry in swimming pools has been featured on the covers of two prominent journals of the American Chemical Society in recent years (*Environmental Science & Technology*, *Environmental Science & Technology Letters*). Excerpts from an interview with Prof. Blatchley were included in an article that was featured on the cover of another ACS publication: *Chemical & Engineering News*.



Because of its connection to the exercise and recreational activities of so many people, the work by Professor Blatchley and collaborators related to swimming pool chemistry has also been featured in popular news media. Early work by the Blatchley group in this area was described in a story published by CNN (<http://www.cnn.com/2011/09/22/health/chlorine-indoor-swimming-pools/>). Later, Professor Blatchley appeared *Science Friday* (see <http://www.npr.org/templates/story/story.php?storyId=128410569>), a news

program produced by NPR. An article that was published in *Environmental Science & Technology* that summarized the chemistry of reactions between chlorine and uric acid demonstrated that chemical irritants and toxins are produced by these reactions (Lian *et al.*, 2014). Soon after publication of that work, articles appeared in numerous publications, including *Scientific American* (<https://blogs.scientificamerican.com/observations/don-t-go-in-the-water-the-chemistry-of-pee-in-the-pool-video/>) and *The Washington Post* (https://www.washingtonpost.com/national/health-science/beyond-the-ick-factor-a-toxic-byproduct-is-produced-when-someone-pees-in-a-pool/2014/04/07/3b257226-bb66-11e3-9a05-c739f29ccb08_story.html?utm_term=.3b67fd2fa5be) and other prominent news publications that included interviews with Professor Blatchley. An interview with Professor Blatchley on *Buzzfeed* (August 2015) that addressed swimming pool chemistry (<https://www.youtube.com/watch?v=ZnbRfspuLDs>) has been viewed more than 1.4 million times since its release. These and other popular fora represent potentially important media outlets for education of the general public about swimming pool chemistry and measures that can be implemented to improve the swimming environment; this represents one of the central motivations for Professor Blatchley and his collaborators to be involved in this research.

Much of the work of the Blatchley group on swimming pool chemistry relates to the effects of the combined application of chlorination and UV irradiation on water chemistry. This chemistry is particularly relevant to amine compounds; the amine group is quite responsive to chlorination and formation of N-Cl bonds activates amines toward subsequent UV photolysis. This discovery emerged from a series of papers by the Blatchley group. An extension of this work allowed identification of the chlorine/UV process as a method for degradation and detoxification of an array of common water contaminants, including cyanotoxins (*e.g.*, microcystin). A U.S. Patent was recently awarded to protect this work (U.S. Patent Number 10,662,100).

Ongoing research in the Blatchley group is aimed at quantifying the factors that affect indoor air quality (IAQ) in indoor swimming pool settings. Poor IAQ in these facilities has been linked to several adverse human health effects. Research in this area is aimed at providing science-based guidance on design and operation of indoor pools so as to optimize IAQ in these facilities. The project is being supported through the Council for the Model Aquatic Health Code (CMAHC, see <https://www.cmahc.org/>), which “...is a non-profit organization that promotes the health and safety of people, families, and workers at public swimming facilities.” The results of this project will be used to inform the *Model Aquatic Health Code* (MAHC), which is a living document sponsored by the *Healthy Swimming Program* of the Centers for Disease Control and Prevention (CDC). Specifically, the results of this project will be used to update language in the MAHC that addresses aspects of design and operation of indoor swimming pools that relate to IAQ.

Among the deliverables of this project will be a numerical model that is being developed to simulate IAQ dynamics. The model will be calibrated by comparison with data sets that are collected in the project to define time-course behavior of IAQ in indoor pool facilities. Once it has been validated, the model will be used to examine the effects of changes in indoor pool facilities that may influence IAQ dynamics, including design and operation of HVAC systems, as well as methods of water treatment.

The project has recently expanded to include collaboration with a research team at the Poznan University of Science & Technology (Poznan, Poland), headed by Professor Katarzyna Ratajczak. This collaboration is aimed at quantification and comparisons of IAQ in indoor pools in North America and Europe. The project is motivated by recognition of important differences in the design and operation of swimming pools in North America and Europe and the strong likelihood that these differences will have important implications with respect to IAQ and human health.

Professor Blatchley’s recently served as a technical expert on installation and testing of a new system for control of IAQ in indoor swimming pool facilities. The experiments related to this activity were conducted at the Olympic Swimming Venue (La Defense Arena) in Paris, France. The measurements associated with this project were conducted during the swimming competitions at the Olympic Games and

the Paralympics. The results of this work will be presented at an international conference and submitted for publication in the refereed literature.

Water Supply in Developing Countries – Access to potable water has been defined as a basic human right by the UN and other prominent organizations. Yet, roughly 1 billion people lack access to safe, affordable water, resulting in chronic illness, poor school attendance, impaired development of children, and early mortality among affected populations. The vast majority of these people live in near-equatorial developing countries. Women and children are affected disproportionately by this problem. Technical solutions exist to provide safe water, but important non-technical (cultural, economic, political, and social) barriers complicate implementation of sustainable solutions to provide access to safe water in developing countries.

Sustainable solutions to the problem of lack of access to safe, affordable water in developing countries share several common features, including engagement of the affected community, low cost, simplicity of application, and use of locally-available materials. The Blatchley group is conducting research to develop processes that meet the standards of treatment that are expected in developed countries, while also addressing the constraints that exist for implementation in developing countries. Specifically, the Blatchley group is developing methods to disinfect water using solar radiation. Part of the motivation for this work is the fact that the majority of people who lack access to safe water live in near-equatorial areas, where solar radiation tends to be an available, abundant resource. Among the systems that are being developed to address this technology are a continuous-flow solar UV disinfection system. This technology is now protected by a U.S. Patent (U.S. Patent Number 9,546,100). In addition, the team is working on the development of indirect solar UV disinfection systems. For these systems, solar panels are used to convert incoming solar energy into electrical energy, which in turn will be used to power off-the-shelf UV disinfection systems.

Several former students and post-doctoral research associates of Professor Blatchley have received awards for their work and gone on to successful careers in academia and practice:

Dr. Lian-Shin Lin (Chair, Wadsworth Department of Civil and Environmental Engineering, West Virginia University, Morgantown, WV)

A.H. Ismail Interdisciplinary Doctoral Research Award, Purdue University, 1997, established as an open competition among Ph.D. candidates in all departments at the University.

John R. Blandford Memorial Fellowship, Purdue University School of Civil Engineering, 1997, awarded to the best graduate student in the Environmental/Hydraulic Engineering Area.

Water Environment Federation Student Paper Competition, Third Place, 1997, selected from student papers presented at the Water Environment Federation Conference, Chicago, IL.

Dr. Marianne C. Nyman (Associate Professor at Rensselaer Polytechnic Institute)

Student Poster Competition, 50th Purdue Industrial Waste Conference, First Place, 1995, selected by a panel of plenary session speakers from among approximately 100 posters.

CAREER AWARD, National Science Foundation, Dr. Nyman received funding from this award to support her research program in Environmental Engineering at RPI over a five-year period beginning 2001.

Dr. Bruce A. Hunt (Senior Vice President, Process Design Engineering with Woodard and Curran in Portland, Maine)

Student Poster Competition, 50th Purdue Industrial Waste Conference, Second Place, 1995, selected by a panel of plenary session speakers from among approximately 100 posters.

Dr. Kuang-Ping Chiu (Executive Director, AECOM, Singapore and Lecturer, National University of Singapore):

Jacques Delleur Award, 1997, Purdue University School of Civil Engineering, awarded to graduate students in environmental/hydraulic engineering by the faculty of the Area.

Water Environment Federation, Best Paper, 1998, based on a ballot conducted at *Disinfection '98*, a specialty conference on the subject of disinfection sponsored by the Water Environment Federation, this paper was selected as the best from among all presentations made at the conference.

Dr. Chii Shang (Professor and Program Director, Environmental Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China)

Honorary Mention, Common Core Course Excellence Award 2015, the Hong Kong University of Science and Technology, 2016.

Outstanding Teaching Award 2013-2014, MSc Program in Environmental Engineering and Management, School of Engineering, the Hong Kong University of Science and Technology, 2015.

TOP 10 Water Analysis and the Environment papers in Environmental Science & Technology (ES&T) in the past 18 months, October 2015.

Certificate of Merit, 2015 HKIE Environmental Paper Award, HKIE, 2015.

Teaching Excellence Appreciation, School of Engineering, the Hong Kong University of Science and Technology, 2001.

Nominated for the AEESP Doctoral Thesis Award, AEESP, 1999.

John R. Blandford Memorial Award, School of Civil Engineering, Purdue University, 1999.

IAWQ Scholarship, IWA, 1998.

Purdue Research Foundation Scholarship, Purdue University, 1997.

Estus H. And Vashti L. Magoon Outstanding Teaching Assistant Award, School of Engineering, Purdue University, 1997.

Dr. John E. Thompson (Senior Bureau Official in the Bureau of Oceans and International Environmental and Scientific Affairs, U.S. Department of State, Washington, DC)

Dr. R. Mark Bricka (Professor, Dave C. Swalm School of Chemical Engineering, Mississippi State University)

Dr. Chengyue Shen (Project Manager and Technical Director of UV Validation & Research Center, HDR Engineering, Mahwah, NJ):

Outstanding Graduate Student Award, School of Civil Engineering, Purdue University, 2004

Joseph P. Chu Fellowship Award, School of Civil Engineering, Purdue University, 2004

Dr. Kelly Pennell (Professor, Earl Parker Robinson Chair, Department of Civil Engineering, University of Kentucky):

Ross Fellowship, Purdue University, 2002-2003

Matthew Kern Environmental Scholarship, School of Civil Engineering, 2004

Andrews Environmental Grant, Purdue University, 2004

Incentive Grant, Graduate School, Purdue University, 2004

Dr. Isaac Wait (Chair, Department of Civil Engineering, Marshall University):

Andrews Fellowship, Purdue University, 2002-2004

Dr. Zorana Naunovic (Associate Professor, Faculty of Civil Engineering, University of Belgrade):

Martha Dicks Stevens Fellowship, School of Civil Engineering, Purdue University, 2004

Dr. Eric Gentil Mbonimpa (Assistant Professor, Air Force Institute of Technology, Wright-Patterson Air Force Base, OH)

Dr. Jing Li (Associate Professor, Department of Applied Chemistry, China Agricultural University, Beijing, China)

Dr. ShihChi Weng (Principal Environmental Engineer at Brown and Caldwell, Adjunct Assistant Professor, Georgia Institute of Technology)

John R. Blandford Graduate Student Award, 2011-2012

College of Engineering Travel Award, 2012

Bilsland Dissertation Fellowship, College of Engineering, Purdue University, 2012-2013

Best Student Presentation Award, International Ultraviolet Association Meeting, "Effects and Mechanism of UV₂₅₄ Irradiation on Chlorination of Model Organic-N Precursors in Swimming Pools," Washington, DC, 12-14 August 2012.

Dr. Xinran Zhang (Associate Professor, School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou, China)

Dr. Caitlin Grady (Associate Professor, Director of Research and Policy at the Global Food Institute, Department of Engineering Management and Systems Engineering, George Washington University)

U.S. Borlaug Global Food Security Research Award May 2013

Challenge Program on Water and Food; CGIAR Opportunity Fund Award Apr. 2013

National Science Foundation Graduate Research Fellowship 2012 - 2015

Purdue Andrews Environmental Travel Grant Oct. 2011

Next Generation Delegate for the Chicago Council on Global Affairs May 2014

U.S. Borlaug Summer Institute on Global Food Security Jun. 2013

Across Borders Fellow, US Dept. of State Early Career Award Jun. – Jul. 2011

Purdue University Most Outstanding Interdisciplinary Project Apr. 2013

Purdue University Bilsland Strategic Initiatives Fellowship Mar. 2012

Purdue University Lynn Fellowship May 2010

CAREER AWARD, National Science Foundation, Dr. Grady received this award to support research for a period of five years, beginning in 2019

Dr. Yousra Mohamed Hamdy Ahmed (Assistant professor, Civil Engineering Department, Thebes

Higher Institute of Engineering, Thebes Integrated Academy, Cairo, Egypt)

Ronald Wukasch Environmental Engineering Scholarship 2013, 2014, 2015, 2016

Teaching/Learning

Professor Blatchley has developed or co-developed 15 classes in his time at Purdue University. These classes are roughly evenly divided between the graduate and undergraduate levels. At the undergraduate level, Professor Blatchley's current primary teaching responsibility is for the class "Introduction to Environmental & Ecological Engineering" (CCE/SEE 350). The class introduces students to basic principles of Environmental & Ecological Engineering. It is characterized by large enrollment across a wide range of academic disciplines. Typically, the class enrolls 10-170 students from 15-19 academic units. Professor Blatchley recently changed the format of the class to incorporate active learning methods; these changes were included following his participation in the IMPACT program (Spring 2014).

At the graduate level, Professor Blatchley teaches CCE/SEE 550 ("Physico/Chemical Processes of Environmental Engineering). The material presented in CCE/SEE 550 is foundational to Environmental Engineering; virtually every graduate program in Environmental Engineering has a class like this one. As such, the majority of graduate students in CCE (ENV) and SEE take this class.

Professor Blatchley also leads an interdisciplinary class "Water Supply in Developing Countries," which is co-listed across several academic units (AGEC 498-012, BIOL 595-066, CCE 597-116, SEE 595-011, NUR 599-011). For this class, which follows the service-learning model, graduate and undergraduate students are tasked with the design, construction, and implementation of sustainable, community-scale water treatment systems to provide water to people in impoverished communities in developing countries. The class operates continuously, and students who remain in the class are provided with opportunities to assume leadership responsibilities. The current focus of effort in this class relates to several communities in the vicinity of Santiago, Dominican Republic. However, the approach that has been developed through this class has the potential for application in other developing countries and in disaster-response scenarios.

Professor Blatchley is the chair of the committee within the Lyles School of Civil Engineering that administers and manages the launch of the School's "Affordable Online MS Program." The Online MS Program in the Lyles School of Civil Engineering provides students with access to MS degrees with emphasis in any of three emerging theme areas: Infrastructure, Resiliency, and Sustainability (IRS), Sustainable Water, and Smart Mobility. The program is currently ranked #1 by *US News & World Report* (<https://www.usnews.com/education/online-education/engineering/online-civil-rankings>).

As part of this program, Professor Blatchley developed two online classes: CCE/SEE 550 (Physico/Chemical Processes of Environmental Engineering) and CCE 650, a new class "Photochemical Reactors: Theory, Methods, and Applications of UV Radiation," which was developed from the material presented in the textbook published by Professor Blatchley with the same title.

Service/Outreach

Professor Blatchley is engaged in a number of service/outreach activities, both on- and off-campus. At Purdue, he has served as Faculty Advisor for the Student Chapter of ASCE. Beyond Purdue, he has served on the Board of Directors of Aqua Clara International (<http://aquaclara.org/>), a non-profit organization that provides safe, affordable water to impoverished communities in developing countries. He currently serves as President of the International Ultraviolet Association (IUVA), and has led numerous conferences and programs that have been sponsored by IUVA. He also serves as Vice-Chair for the Working Group on Micropollutants and Pathogen Modeling of the International Water Association (IWA).

TEACHING (Last Five Years)

Semester	Course Number Title	Credits	Enrollment	Responsibility
Spring 2021	CE/EEE 350 Environmental Engineering	3	160	100
	CE 597 Water Supply in Developing Countries	2	16	40
Fall 2021	CE 550 Phys/Chem Processes of Env. Eng.	3	21	100
	CE 597 Water Supply in Developing Countries	1	11	40
Spring 2022	CE 697 Photochemical Reactors: Theory, Methods, and Applications of Ultraviolet Radiation	3	8	100
	CE 597 Water Supply in Developing Countries	2	7	40
Fall 2022	CE/EEE 350 Environmental Engineering	3	107	100
	CE 550 Phys/Chem Processes of Env. Eng.	3	17	100
	CE 597 Water Supply in Developing Countries	1	10	40
Spring 2023	CE/EEE 350 Environmental Engineering	3	170	100
	CE 697 Photochemical Reactors: Theory, Methods, and Applications of Ultraviolet Radiation	3	4	100
	CE 597 Water Supply in Developing Countries	2	10	40
Fall 2023	CE 550 Phys/Chem Processes of Env. Eng.	3	21	100
	CE 597 Water Supply in Developing Countries	1	7	40
Spring 2024	CE/EEE 350 Environmental Engineering	3	175	100
	CE 597 Water Supply in Developing Countries	2	10	40
Fall 2024	CE 550 Phys/Chem Processes of Env. Eng.	3	17	100
	CE 597 Water Supply in Developing Countries	1	7	40
Spring 2025	CE/EEE 350 Environmental Engineering	3	120	100
	CE 597 Water Supply in Developing Countries	2	10	50
Fall 2025	CCE/SEE 550 Phys/Chem Processes of Env. Eng.	3	30	100
	CE 597 Water Supply in Developing Countries	1	10	100

Courses Developed

Course Number	Course Title	Contribution to Development
CE 296/396/496	EPICS	Engineering students developed the design for a youth soccer complex for the Tippecanoe Soccer Association (Tippco). Design responsibilities included site layout, drainage, irrigation, surveying, design of a building (to house restrooms, first aid, concessions, etc.), access and parking, turf selection, water and wastewater management.
CE 350 (now co-listed as EEE 350)	Introduction to Environmental & Ecological Engineering	Professor Blatchley has developed a complete set of course notes and lectures for this class, which as a first course in environmental engineering has a large, diverse enrollment.
CE 353	Physico/Chemical Principles of Environmental Engineering	Professor Blatchley developed course notes and laboratories for this 4-credit class (3 credits lecture + 1 credit lab).

CE 355	Engineering Environmental Sustainability	Professor Blatchley developed course notes, assignments, and coordinated class activities for this 3-credit class in conjunction with Dr. Stephen Hoffmann
CE 497	Service Learning: Water Supply in Developing Countries	This class allowed students to learn about water problems in developing countries. Students built and tested bench-scale reactors, then based on the results of these tests, a field-scale reactor was designed and built for a school near Eldoret, Kenya.
CE 498b	Senior Design (Environmental)	This class was co-developed with Professor Jacques Delleur to provide students with interests in Environmental Engineering access to a senior design experience in this area. Students were given a semester-long design project requiring them to work in diverse groups and communicate their findings and recommendations in oral and written form.
CE 550	Physico/Chemical Processes of Environmental Engineering	CE 550 represents a complete re-working of a previously taught course in which several new physico/chemical principles are presented. This course has served as a foundational class for the environmental engineering emphasis of the Civil Engineering graduate program since its development in 1990.
CE 593	Environmental Geotechnology	This interdisciplinary class addresses the fundamental environmental and geotechnical principles applied to hazardous waste remediation, containment, and storage. The course was developed collaboratively with Professors Jean-Lou A. Chameau and Philippe L. Bourdeau of the Geotechnical Engineering Area.
CE 597a	Physico/Chemical Process Laboratory	As the laboratory companion course to CE 550, this course provided graduate students with opportunities to explore physico/chemical processes through hands-on experience as well as introducing them to several fundamental analytical protocols and instruments. Laboratory experiments were used to illustrate the principles of reactor behavior, reaction kinetics, filtration, disinfection, gas transfer, adsorption, and ion exchange.
CE 597	Environmental Engineering Collaboratory	This team-taught laboratory class was offered in the Fall 2012. The class provided graduate students in CE with opportunities to conduct experiments and become familiar with important analytical methods of the field of Environmental Engineering. Responsibility for teaching of this class was shared with Professors Nies, Jafvert, Rao, and Hua.
CE 497 (co-listed as AGEC 598, BIOL 595, and NURS 599)	Water Supply in Developing Countries	This multi-year, team-taught, service-learning class was first offered in the Fall 2012 semester. An interdisciplinary team of faculty from Agricultural Economics (Ken Foster), Biology (Bruce Applegate), and Nursing (Vicki Simpson and Libby Richards) worked with Professor Blatchley and students from their respective academic units to design, implement, and characterize the effects of implementation of

		a community-scale water treatment systems in impoverished communities near Santiago, Dominican Republic.
CE 697	Advanced Physico/Chemical Processes	This represents a second course in physico/chemical processes for Environmental Engineering students. Topics covered include gas-liquid transfer, solid-fluid transfer, precipitation/dissolution systems, membrane-based systems, and photochemical reactors.
EEE 595 (now EEE 560)	Direct Potabilization	This 1-credit module was co-developed and co-taught with Professors Zhi (George) Zhou and Marisol Sepulveda. The class provided students with information pertaining to processes needed to transform municipal wastewater into potable water. Direct potabilization is the most extreme form of water reuse, a practice that is becoming increasingly important in water-starved areas.
EEE 560	Photochemical Reactors: Theory and Applications	This 1-credit module was taught as a precursor to the 3-credit class that will be taught by distance education and aimed at research universities around the world that have research programs that are active in the area of photochemical reactors.
CE 650	Photochemical Reactors: Theory, Methods, and Applications of Ultraviolet Radiation	This class provides comprehensive coverage of the principles that govern photochemistry and photochemical reactors, as well as the numerical and analytical methods that are used to evaluate their performance. Based on this information, the class also provides comprehensive coverage of common applications of UV radiation, including disinfection, direct photolysis, advanced oxidation and reduction processes, as well as disinfection of air and surfaces.

RESEARCH AND SCHOLARSHIP

PUBLISHED WORK

Book

Blatchley III, E.R. (2023) *Photochemical Reactors: Theory, Methods, and Applications of Ultraviolet Radiation*, Wiley, Hoboken, NJ, Print ISBN: 9781119871309, Online ISBN: 9781119871606, DOI:10.1002/9781119871606.

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40. Wait I.W., Blatchley E.R., Johnston C.T. (2003) *Fouling of Quartz Surfaces in Potable Water Ultraviolet Disinfection Systems*, Poster Presentation, 4th Annual Environmental Science Symposium, Lafayette, Indiana.

41. Naunovic, Z.; Pennell, K. Blatchley III, E.R. (2003) *Water Disinfection for the Mission to Mars*, Poster Presentation, 4th Annual Environmental Science Symposium, Lafayette, Indiana.
42. Pennell, K.; Blatchley III, E.R. (2003) *Complementary Disinfection: UV Radiation and Iodine*, Poster Presentation, 1st Annual NSCORT External Advisory Committee Review, Purdue University-West Lafayette, Indiana.
43. Naunovic, Z.; Lyn, D.A.; Blatchley III, E.R. (2003) *Water Disinfection: UV Radiation*, Poster Presentation, 1st Annual NSCORT External Advisory Committee Review, Purdue University-West Lafayette, Indiana.
44. Wait, I.W., Johnston, C.T. and Blatchley, E.R. "Fouling of Quartz Surfaces in Potable Water Ultraviolet Disinfection Systems: Effect of Phosphate Addition." Purdue Environmental Sciences and Engineering Institute Symposium, April 8 - April 9, 2004, West Lafayette, Indiana.
45. Wait, I.W.; Blatchley III, E.R.; Johnston, C.T. (2004) "Fouling of Quartz Surfaces in Potable Water Low Pressure High Output Ultraviolet Disinfection Systems," Presented at World Water & Environmental Resources Congress, American Society of Civil Engineers, June 27 - July 1, 2004, Salt Lake City, Utah.
46. Naunovic, Z.; Blatchley III, E.R.; Lyn, D.A. (2004) "Process Performance of Ultraviolet Disinfection Systems for Long-Term Space Missions," Presented at International Conference on Environmental Systems (ICES) in Colorado Springs July 2004.
47. Pennell, K.; Blatchley III, E.R. (2003) "Disinfection for Long-term Space Missions: Preliminary System Design," Presented at International Conference on Environmental Systems (ICES) in Colorado Springs July 2004.
48. Wait, I.W.; Johnston, C.T.; Blatchley III, E.R. (2004) "Fouling of Quartz Surfaces in Potable Water Ultraviolet Disinfection Systems: Effect of Phosphate Addition." World Water & Environmental Resources Congress, 2004: Proceedings of the Congress: June 27 - July 1, 2004, Salt Lake City, Utah.
49. Pennell, K.G.; Blatchley III, E.R. "Photochemical Kinetics of the Iodide/Iodate Actinometer and Iodine Dose-Response for *B. subtilis* Spores." Poster Presentation. NASA Specialized Center of Research and Training (NSCORT) Advisory Board. Howard University, Washington DC. 2004.
50. Blatchley III, E.R.; Meeusen, A.; Aronson, A.I.; Brewster, L. (2005) "UV or Gamma Radiation for inactivation of *Bacillus* Spores in Aqueous Suspension and on Surfaces," presented at *Disinfection 2005*, Co-sponsored by the Water Environment Federation, the American Water Works Association, and the International Water Association, Mesa, AZ, February 7-9, 2005.
51. Blatchley III, E.R.; Gong, W.; Sears, K.J.; Alleman, J.E.; Rose, J.B.; Huffman, D.E.; Otaki, M.; Lisle, J.T. (2005) "Effects of Wastewater Disinfection on Human Health," presented at *Disinfection 2005*, Co-sponsored by the Water Environment Federation, the American Water Works Association, and the International Water Association, Mesa, AZ, February 7-9, 2005.
52. Blatchley III, E.R.; Shen, C.; Naunovic, Z.; Lin, L.; Lyn, D.A.; Robinson, J.P.; Ragheb, K.; Grégori, G.; Bergstrom, D.E.; Fang, S.; Guan, Y.; Jennings, K.; Gunaratna, N. (2005) "Dyed Microspheres for Quantification of UV Dose Distributions: Photochemical Reactor Characterization by Lagrangian Actinometry," presented at *Disinfection 2005*, Co-sponsored by the Water Environment Federation, the American Water Works Association, and the International Water Association, Mesa, AZ, February 7-9, 2005.
53. C. Shen, S. Fang, D. E. Bergstrom, and E. R. Blatchley III (2005) "Local Actinometry in Characterizing UV Irradiance in UV Systems", *3rd International Congress on Ultraviolet Technologies*, Whistler, BC Canada, May 24th-27th, 2005.
54. Derrick, B.; Wait, I.W.; Blatchley III, E.R. (2005) "Field Investigation of Inorganic Fouling of UV Systems in Groundwater Applications," *3rd International Congress on Ultraviolet Technologies*, Whistler, BC Canada, May 24th-27th, 2005.

55. Naunovic, Z.; Shen, C.; Lyn, D.A.; Blatchley III, E.R. (2005) "Modeling and Design of an Ultraviolet Water Disinfection System," Proceedings of the International Conference on Environmental Systems (ICES), Rome, Italy, July 2005.

56. Shen, C.; Blatchley III, E.R.; Robinson, J.P.; Bergstrom, D.E.; Mofidi, A.A. (2005) "Quantification of UV Dose Distributions by Lagrangian Actinometry for UV Reactors Delivering Radiation Other than 254 nm," Water Quality Technology Conference, Quebec, Quebec, Canada, 9 November 2005.

57. Wait, I.W.; Johnston, C.T.; Schwab, A.P.; Blatchley III, E.R. (2005) "The Influence of Oxidation Reduction Potential on Inorganic Fouling of Quartz Surfaces in UV Disinfection Systems," Water Quality Technology Conference, Quebec, Quebec, Canada, 9 November 2005.

58. Pennell, K.G.; Blatchley III, E.R. (2005) "Effect of Sequential Disinfection on *Bacillus subtilis* Spores using Ultraviolet Irradiation and Iodination," Water Quality Technology Conference, Quebec City, Quebec, Canada, 8 November 2005.

59. Pennell, G.G.; Blatchley III, E.R. (2005) "Dual Use of the Iodide/Iodate Actinometer to Monitor Ultraviolet Irradiation and to Provide a Residual Disinfectant," Water Quality Technology Conference (WQTC), Quebec City, Quebec, Canada, 7 November 2005.

60. Pennell, K.G.; Blatchley III, E.R. "Water Disinfection using UV Irradiation and Iodination for Long-Term Space Missions." Oral presentation at the 5th Annual Environmental Research Symposium-West Lafayette, Indiana. 2004.

61. Naunovic, Z.; Pennell, K.L.; Lyn, D.A.; Blatchley III, E.R. (2006) "Inactivating Waterborne Microbial Pathogens with an Excimer Ultraviolet Disinfection System," Habitation International Journal for Human Support Research, Abstract Issue, 10, (3/4).

62. Pennell, K. G., and E. R. Blatchley III "Process Optimization of the Iodide/Iodate Actinometer to Achieve Residual Disinfection and to Monitor UV Reactor Performance," 10th ASCE Aerospace Division International Conference on Engineering, Construction and Operations in Challenging Environments (Earth and Space), League City/Houston, TX. March 2006.

63. Blatchley III, E.R.; Shen, C.; Mofidi, A.; Yun, T.; Lee, C.; Robinson, J.P.; Ragheb, K.; Bergstrom, D.E. (2006) "Application of Dyed Microspheres for Characterization of Dose Distribution Delivered by a Demonstration-Scale UV Reactor," *Proceedings, WQTC*, Denver, CO, American Water Works Association.

64. Wait, I.W.; Yonkin, M.; Blatchley III, E.R. (2006) "Impact Assessment of Quartz Cleaning System Interruption in a Medium Pressure Ultraviolet Disinfection Reactor," *Proceedings, WQTC*, Denver, CO, American Water Works Association.

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66. Blatchley III, E.R.; Shen, C.; Scheible, O.K.; Robinson, J.P.; Ragheb, K.; Bergstrom, D.E.; Rokjer, D. (2006) "Validation of Large-Scale, Monochromatic UV Disinfection Systems Using Dyed Microspheres," *Proceedings, WQTC*, Denver, CO, American Water Works Association.

67. Li, J. and Blatchley III, E.R. (2007) "Combined Application of UV Radiation and Chlorine: Implications with Respect to DBP Formation and Destruction in Recreational Water Applications," *Disinfection 2007*, Pittsburgh, PA, 6 February 2007.

68. Shen, C.; Scheible, O.K.; Blatchley III, E.R.; Chan, P. (2007) "Validation of Full-scale UV Disinfection Systems Using Dyed Microspheres," *Disinfection 2007*, Pittsburgh, PA, 6 February 2007.

69. Li, J.; Blatchley III, E.R. (2007) "Volatile Byproduct Formation Resulting from Chlorination of Organic-N Precursors in Recreational Water," American Chemical Society National Meeting, Chicago, 28 March 2007, Chicago, IL.

70. Blatchley III, E.R.; Shen, C.; Scheible, O.K.; Mofidi, A. (2007) "Validation and Characterization of UV Reactors by Lagrangian Actinometry (Dyed Microspheres)," American Water Works Association, Research Symposium, Annual Conference and Exposition, Toronto, Ontario, Canada, June 2007.

71. Blatchley III, E.R.; Shen, C.; Scheible, O.K.; Mofidi, A. (2007) "Lagrangian Actinometry's Role in UV Reactor Validation and Optimization," IUVA/IOA World Congress on Ozone and Ultraviolet Technologies, 27-29 August 2007, Los Angeles, CA. **(Keynote Address)**.

72. Shen, C., Scheible, O.K., P. Posy, E. Blatchley III "Multi-Faceted Validation Testing Of A Unique UV Disinfection Reactor", IUVA/IOA World Congress on Ozone and Ultraviolet Technologies, 27-29 August 2007, Los Angeles, CA..

73. Chengyue Shen, O. Karl Scheible, Ernest R. Blatchley III, Ytzhak Rozenberg "Characterization & Validation Of A Unique Reactor Design By Lagrangian Actinometry Using Dyed Microspheres", proceedings, ECOMONDO 2007, Rimini, Italy, November 7-10, 2007.

74. Naunovic, Z.; Pennell, K.L.; Shen, C.; Chan, P.; Lim, S.; Sun, B.; Lyn, D.A.; Blatchley III, E.R. (2007) "Modeling and Design of a UV Disinfection System Employing Excimer Lamps," WEFTEC, Anaheim, CA, 17 October 2007.

75. Wait, I.W., Mofidi, A., Blatchley III, E.R. (2007) "Long term interior and exterior sleeve fouling in a medium-pressure ultraviolet drinking water disinfection reactor." American Water Works Association Water Quality Technology Conference, November 4-8, 2007, Charlotte, North Carolina.

76. Weaver, W.A.; Li, J.; Wen, Y.; Johnston, J.; Blatchley, M.R.; Blatchley III, E.R. (2008) "Volatile Disinfection By-Products from Indoor Chlorinated Swimming Pools," World Aquatic Health Conference, Colorado Springs, CO, 15-17 October 2008.

77. Li, J.; Weaver, W.A.; Blatchley III, E.R. (2008) "Effects of UV Disinfection Systems on Swimming Pool Chemistry," World Aquatic Health Conference, Colorado Springs, CO, 15-17 October 2008.

78. Scheible, O.K.; Shen, C.; Blatchley III, E.R. (2008) "Validation of UV Reactors by Lagrangian Actinometry Using Dyed Microspheres," WEFTEC, Chicago, IL, 19-23 October 2008.

79. Li, J.; Blatchley III, E.R. (2008) "UV Photodecay of Inorganic Chloramines: Kinetics, Products and Mechanisms," Water Quality and Technology Conference, Cincinnati, OH, 16-19 November 2008.

80. Cox, E.M.; Xia, J.; Craig, B.; Shen, C.; Scheible, O.K.; DiToro, D.; Blatchley III, E.R. (2009) "Numerical Methods in Lagrangian Actinometry: Solving for a UV Reactor's Dose Distribution," Disinfection 2009, WEF/IWA/AWWA, Atlanta, GA, 28 February – 3 March 2009.

81. Shen, C.; Blatchley III, E.R.; Cox, E.M.; Chan, P.; Scheible, O.K. (2009) Protocol to Validate UV Reactors by Lagrangian Actinometry Using Dyed Microspheres, Disinfection 2009, WEF/IWA/AWWA, Atlanta, GA, 28 February – 3 March 2009.

82. Shen, C.; Blatchley III, E.R.; Cox, E.M.; Scheible, O.K. (2009) "Standardized Lagrangian Actinometry Protocol for UV Reactor Validation," IUVA/IOA North American Conference, Boston, MA, 4-5 May 2009.

83. Chan, P.; Shen, C.; Scheible, O.K.; Holdman, C.; Robinson, J.P.; Blatchley III, E.R. (2009) "Wavelength-dependent UV dose responses of three different types of dyed microspheres for Lagrangian Actinometry," 2009 Water Quality Technology Conference and Exposition, November 15-19, Seattle, WA.

84. Chan, P.; Shen, C.; Scheible, O.K.; Rochelle, P.; Huang, P; Blatchley III, E.R. (2009) "Validation of UV Disinfection Systems for Recalcitrant Microorganisms Using Lagrangian Actinometry," 2009 Water Quality Technology Conference and Exposition, November 15-19, Seattle, WA.

85. Cox, E.M.; Blatchley III, E.R (2009) "Use of Lagrangian Actinometry for Validation of CFD-I Models and Reactor Behavior. Modeling UV Disinfection Using CFD," Pre-Conference Workshop. Disinfection 2009, WEF/IWA/AWWA, Atlanta, GA, 28 February – 3 March 2009.

86. Cox, E.M.; Xia, J.; Craig, B.; Shen, C.; Scheible, O.K.; DiToro, D.; Blatchley III, E.R. (2009) "Computational Methods for Lagrangian Actinometry Measurements of UV Dose Distributions," SIAM at Purdue Student Conference 2009.

87. E. R. Blatchley III, J. Li, S. Weng (2010), "Effects of UV Irradiation on Water Chemistry in Chlorinated, Indoor Swimming Pools," Pacificchem 2010, Honolulu, HI, 15 December 2010.

88. Ernest R. Blatchley III, Steven Berube, Philip Burbrink, Bruce Cooley, Miladin Crnkovic, Tiago Forin, Eugenia Ghozali, Nancy Hammel, Katie Jones, Sung Jun Ma, Mark Moehling, Sarah Rutkowski, Kyle Vester, Jeffrey Wojcicki, Emmanuel C. Kipkorir, Jonathan K. Ng'etich, Joy Chepngeno, Scott Rumpsa, Claire Rumpsa (2011) "Development of a Community-Scale, Biologically-Active Sand Filter in Western Kenya," Presented at Disinfection 2011, Water Environment Federation, Cincinnati, OH, 10 April 2011.

89. Blatchley III, E.R. (2011) "Design and Validation Protocol for UV Disinfection Systems," Presented at Disinfection 2011, Water Environment Federation, Cincinnati, OH, 11 April 2011.

90. Blatchley III, E.R.; Weng, S.C.; Afifi, M.Z.; Chiu, H.H.; Reichlin, D.B.; Jousset, S.; Erhardt, R.S. (2011) "Application of Ozone and UV₂₅₄ Radiation for Effluent Disinfection at Municipal Wastewater Treatment Facilities," Presented at Disinfection 2011, Water Environment Federation, Cincinnati, OH, 12 April 2011.

91. Shen, C.; Scheible, O.K.; Blatchley III, E.R.; Cox, E.; Valade, M. (2011) "New York City UV System Validation By Lagrangian Actinometry Using Dyed Microspheres," World Congress of the International Ozone Association and the International Ultraviolet Association, Paris, France, 23 May 2011.

92. Weng, S.C. and Blatchley III, E.R. (2011) "Effects of UV₂₅₄ Irradiation on Residual Chlorine and DBPs in Chlorination of Model Organic-N Precursors in Swimming Pools," Keynote Presentation, World Congress of the International Ozone Association and the International Ultraviolet Association, Paris, France, 25 May 2011.

93. Scheible, O.K.; Shen, C.; Blatchley III, E.R. (2011) "Validation of UV Reactors For Recreational Waters," World Congress of the International Ozone Association and the International Ultraviolet Association, Paris, France, 25 May 2011.

94. Blatchley III, E.R. (2011) "Basics of UV Disinfection Systems and Validation Methods," World Aquatic Health Conference, Seattle, WA, 13 October 2011.

95. Shen, C.; Scheible, O.K.; Blatchley III, E.R. (2011) "Performance Validation of UV Reactors for Recreational Water," World Aquatic Health Conference, Seattle, WA, 13 October 2011.

96. Blatchley III, E.R. (2012) "UV Technologies for Aquatics Applications: State of the Art, Research Needs, and Translation to Other Settings," Keynote Presentation Given to: *Moving Forward: Sustainable UV Solutions to Meet Evolving Regulatory Challenges IUVA Americas Meeting*, Washington, DC, 14 August 2012.

97. Blatchley III, E.R.; Mbonimpa, E.G.; Vadheim, B.; Chadwick, R.; Fuller, K.; Venort, T. (2012) "Continuous-Flow Solar UVB Disinfection of Drinking Water: Point-of-Use or Community-Scale Application in Developing Countries," Presented at: *Moving Forward: Sustainable UV Solutions to Meet Evolving Regulatory Challenges IUVA Americas Meeting*, Washington, DC, 14 August 2012.

98. Blatchley III, E.R.; Ortiz, A.; Chiu, D. Peng, P. (2012) "Design and Validation of UV Disinfection Systems Used in Wastewater Treatment and Reuse," Presented at: *Moving Forward: Sustainable UV Solutions to Meet Evolving Regulatory Challenges IUVA Americas Meeting*, Washington, DC, 14 August 2012.

99. Weng, S.; Blatchley III, E.R. (2012) "Effects and Mechanism of UV₂₅₄ Irradiation on Chlorination of Model Organic-N Precursor (*L*-histidine) in Swimming Pools," Presented at: *Moving Forward: Sustainable UV Solutions to Meet Evolving Regulatory Challenges IUVA Americas Meeting*, Washington, DC, 14 August 2012.

100. Blatchley III, E.R.; Shen, C. (2012) "Biodosimetry, CFD-I, and Lagrangian Actinometry for UV System Validation," Presented at: WEFTEC Pre-Conference Workshop: *Computational Fluid Dynamics: Fundamentals and Applications for Wastewater Treatment, Disinfection, and Reuse*, New Orleans, LA, 29 September 2012.

101. Blatchley III, E.R. (2012) "Effects of UV-Based Treatment on Water and Air Chemistry in Chlorinated Indoor Pools," Presented at: *World Aquatic Health Conference*, Norfolk, VA, 12 October 2012.

102. Weng, S.; Blatchley III, E.R. (2012) "Effects and Mechanism of UV₂₅₄ Irradiation on Chlorination of Model Organic-N Precursor (*L*-arginine) in Swimming Pools," Presented at: *Water Quality Technology Conference*, Toronto, Ontario, Canada, 6 November 2012.

103. Grady, C.; Blatchley III, E.R. (2013) "Performance of Biologically-Active Sand Filters for Drinking Water Treatment: Exploration of Biophysical Factors and Consumer Social Behavior Trends in Eldoret, Kenya," Presented at Disinfection 2013, Indianapolis, IN, 24 February 2013.

104. Blatchley III, E.R. (2013) "Water Supply in Developing Countries: Roles for Universities," Keynote Presentation, Disinfection 2013, Indianapolis, IN, 25 February 2013.

105. Weng, S.; Afifi, M.; Staton, R.W.; Sun, Z.; Berry, R.; Zhu, X.; Blatchley III, E.R. (2013) "Dynamic Behavior of Volatile DBPs and their Precursors in Chlorinated, Indoor Swimming Pools," Presented at Disinfection 2013, Indianapolis, IN, 26 February 2013.

106. Afifi, M.; Blatchley III, E.R. (2013) "Effects of UV-Based Treatment on Air and Water Chemistry in Chlorinated, Indoor Pools," Presented at Disinfection 2013, Indianapolis, IN, 26 February 2013.

107. Weng, S.C.; Blatchley III, E.R. (2013) "Degradation of Acetaminophen by UV₂₅₄," IOA-IUVA World Congress, Las Vegas, NV, 24 September 2013.

108. Ortiz, A.P.; Chiu, D.; Grady, C.; Blatchley III, E.R. (2013) "Variability in the Performance of Municipal Wastewater UV Disinfection Systems," IOA-IUVA World Congress, Las Vegas, NV, 25 September 2013.

109. Afifi, M.Z.; Blatchley III, E.R. (2013) "Monitoring Water and Air Chemistry in Chlorinated, Indoor Pool Facilities: Effects of UV-Based Treatment in Three-Year Case Study," IOA-IUVA World Congress, Las Vegas, NV, 25 September 2013.

110. Blatchley III, E.R.; Ortiz, A.P.; Ahmed, Y.M.H.; Chiu, H.H.; Shen, C.; Scheible, O.K. (2014) "Inclusion of Variability in Design and Validation of UV Disinfection Systems," IUVA Americas Regional Conference, White Plains, NY, 28 October 2014.

111. Ernest R. Blatchley III, Margaret M. Busse, Joseph W. Camp, Bruce M. Applegate, Yousra Ahmed, Matouš Becker, Paul Xingping Shen (2015) "Solar UV Disinfection for Water Production in Developing Countries," Pacificchem, Waikiki, HI, 15 December 2015.

112. Ernest R. Blatchley III, Jing Li, Xinran Zhang, Jer-Yen Yang, ShihChi Weng (2015) "Chlorine/UV for Selective Degradation of Micropollutants," Pacificchem, Waikiki, HI, 16 December 2015.

113. Zhe Sun and Ernest R. Blatchley III (2016) "Tetraselmis as a Challenge Organism for Validation of Ballast Water UV Systems," *IUVA World Congress*, Vancouver, BC, Canada, 2 February 2016.

114. Margaret M. Busse, Joseph W. Camp, Bruce M. Applegate, Yousra Ahmed, Matouš Becker, Ernest R. Blatchley III (2016) "Solar UV Disinfection for Water Production in Developing Countries," *IUVA World Congress*, Vancouver, BC, Canada, 2 February 2016.

115. Yousra Mohamed hamdy Ahmed, Mark Jongewaard, Margaret M. Busse, Tianren Wu, Zhe Sun, and Ernest R. Blatchley III (2016) "UV Fluence Rate Field Simulation by Ray Tracing," *IUVA World Congress*, Vancouver, BC, Canada, 3 February 2016.

116. Yousra Ahmed and Ernest R. Blatchley III (2016) "Stochastic Evaluation of Disinfection Performance in Open Channel UV Photoreactors," IWEA Conference, Indianapolis, IN, 20 August 2016.

117. Ernest R. Blatchley III (2016) "Analysis of Variability in UV Disinfection Systems Following a Stochastic Approach," IUVA Workshop, WateReuse Symposium, Tampa, FL, 11 September 2016.

118. Yousra M.H. Ahmed, Xing Li, Angela P. Ortiz, Chengyue Shen, O. Karl Scheible², E.R. Blatchley III (2017) "Stochastic Analysis of UV Disinfection System Performance," World Congress, International Ultraviolet Association, Dubrovnik, Croatia, 20 September 2017.

119. Margaret M. Busse, John Maiyo, Emmanuel C. Kipkorir and Ernest R. Blatchley III (2017) "Solar UV Disinfection Technologies in Western Kenya," World Congress, International Ultraviolet Association, Dubrovnik, Croatia, 19 September 2017.

120. Mengkai Li, Zhimin Qiang, Ernest R. Blatchley III (2017) "Experimental assessment of photon fluence rate distributions in a medium-pressure UV photoreactor," World Congress, International Ultraviolet Association, Dubrovnik, Croatia, 20 September 2017.

121. Ernest R. Blatchley III, Joseph V. Sinfield, W. Travis Horton, Luna Lu, Zoe Nyssa, Cary Mitchell, Gary Burniske, Zhi Zhou, John Sullivan, Dan Schuster, Elizabeth Cronin (2018) "Potential For Recovery And Reuse of Heat From Municipal Wastewater Treatment Facilities in Urban Areas," *4th IWA Specialized International Conference* 26 June 2018, Western University, London, Ontario, Canada.

122. Nikhil Sangwan; Yousra M. Ahmed; Ernest R. Blatchley III (2020) "Dose Distribution Scaling: A Novel Approach for UV Disinfection Reactors," presented at IUVA Americas Conference, Orlando, FL, 9 March 2020.

123. Zhe Sun; Zhi Zhou; Ernest R. Blatchley III (2020) "Using algal virus *Paramecium bursaria* chlorella virus (PBCV-1) as a human adenovirus surrogate for the validation of UV treatment systems," presented at IUVA Americas Conference, Orlando, FL, 9 March 2020.

124. Xing Li and Ernest R. Blatchley III (2020) "UV dose response behavior variability quantification of ambient bacterial and viral indicators in municipal secondary effluent and influential factors, presented at IUVA Americas Conference, Orlando, FL, 10 March 2020.

125. Ernest R. Blatchley III (2020) "Dynamics of Indoor Air Quality in Indoor Pool Facilities," presented at World Aquatic Health Conference, Virtual Event, 15 October 2020.

126. Ernest R. Blatchley III and Haiying Cui (2022) "Quantitative Microbial Risk Assessment for Examination of the Effects of UVGI on COVID-19 Transmission," presented at IUVA Americas Conference, Cincinnati, OH, 27 September 2022.

127. Jason A. Randall, Karl G. Linden, Christopher Bowers, Joel Ducoсте, Chris Jones, Deborah Mosca, Eric Prast, Richard A. Rasansky, and Ernest R. Blatchley III (2023) "Next Generation Personal Protective Equipment for Real-time Inactivation of Airborne Biological Threats, Part 1: Experimental Measurements," Presented at IUVA World Congress, Dubai, UAE, 11 September 2023.

128. Christopher Bowers, Chris Jones, Eric Prast, Ernest R. Blatchley III, Karl G. Linden, Richard A. Rasansky, and Joel Ducoste (2023) "Next Generation Personal Protective Equipment for Real-time Inactivation of Airborne Biological Threats, Part 2: Multi-physics computational fluid dynamics (CFD) simulation, Presented at IUVA World Congress, Dubai, UAE, 11 September 2023.

129. Eric Prast, Christopher Bowers, Chris Jones, Ernest R. Blatchley III, Karl G. Linden, Joel Ducoste and Richard A. Rasansky (2023) "Next Generation Personal Protective Equipment for Real-time Inactivation of Airborne Biological Threats, Part 3: UV-C Powered Symmetrical Flow Disinfection (SFD) Device," Presented at IUVA World Congress, Dubai, UAE, 11 September 2023.

130. Ran Yin, Jing Zhao, Emma M. Payne, Bryan Liu, Chii Shang, Ernest R. Blatchley III, William A. Mitch (2023) "Opportunities and Challenges of Applying Far-UVC Radiation in Controlling Micropollutants in Water," Presented at IUVA World Congress, Dubai, UAE, 12 September 2023.

131. Ernest R. Blatchley III and Katarzyna Ratajczak (2024) "How to Address Chloramines and Improve Indoor Air Quality (IAQ)," presented at AOAP Annual Conference and Exposition, Reno, NV, 13 February 2024.

132. Xing Li, Sung-Jin Park, Christopher Jones, Christopher Bowers, Ernest R. Blatchley III (2024) "Far UV-C Radiation for Personal Protection Against Airborne Pathogens," presented at IUVA Americas Conference, Orlando, FL, 20 May 2024.

133. Bilal Mohd Shabad, W. Travis Horton, Jonathon Douglas, Ernest R. Blatchley III (2024) "Decision Making in the Context of ASHRAE 241," presented at IUVA Americas Conference, 21 May 2024.

134. Shohoria Afrin Shorno, W. Travis Horton, Jon Douglas, Brian Stern, Holger Claus, Laura Callahan, Ernest R. Blatchley III (2024) "Disinfection Efficacy of Commercial FAR UVC Fixtures Using the Continuous Challenge Agent Introduction and Decay Methods," presented at IUVA Americas Conference, Orlando, FL, 21 May 2024.

135. Annabelle M. Johnson, Brandon E. Boor, W. Travis Horton, Zhi Zhou, Ernest R. Blatchley III (2024) "Surveillance and Mitigation of Airborne Pathogens in Learning Environments," presented at IUVA Americas Conference, Orlando, FL, 21 May 2024.

136. Xing Li, Yasuko Kadomura-Ishikawa, Toshihiko Aizawa, Shigeharu Yamauchi, Yasuo Fujikawa, Tomotake Tanaka, Kai Ishida, Yushi Onoda, Kazuaki Mawatari, Akira Takahashi, Andrew Miller, Richard Kuhn, Ernest R. Blatchley III (2024) "Action Spectra of Respiratory Syncytial Virus and Phage Challenge Agents," presented at IUVA Americas Conference, Orlando, FL, 21 May 2024.

137. Nicholas Heredia, Ernest R. Blatchley III, Phil Arnold, Ashley Fry, Maria Topete, William Palmer, Patrick Piper, Ling Zhou, Ilan Arvelo (2024) "Development of a UV-Sensitive Aerosol Tracer for Accurate Measurement of Effective Air Changes per Hour in Real-World Environments," presented at IUVA Americas Conference, Orlando, FL, 21 May 2024.

138. Shohoria Afrin Shorno, Annabelle M. Johnson, Xing Li, W. Travis Horton, Jonathan Douglas, Holger Claus, Brian Stern, Laura Callahan, Daryus Patel, Jesse Sfetsas, Nicholas Heredia, Ashley Fry, Ernest R. Blatchley III (2024) "Dynamic Responses of Viral Challenge Agents in an IAQ Chamber," presented at Second International Congress of Far-UVC Science and Technology (ICFUST), St. Andrews, Scotland, 19 June 2024.

139. Ernest R. Blatchley III, J. Vivian Belenky, Holger Claus, Christopher T. DeGroot, Amin Hadizade, Waseem F.M. Hiwar, Catherine J. Noakes, Shohoria Afrin Shorno, Richard D. Williamson (2025) "Large-Scale Chamber Tests of GUV Systems: Best Practices," presented at Third International Congress of Far-UVC Science and Technology (ICFUST), Boulder, CO, 16 June 2025.

140. Mohd Bilal Shadab, Kyle Schei, Giulia Santi, Ernest R. Blatchley III (2025) "Quantitative Assessments of ASHRAE 241 Conformance and the Contributions of GUV Systems," presented at IUVA World Congress, Lisbon, Portugal, 8 September 2025.

141. Xing Li, Kazuaki Mawatari, Yushi Onoda, Yasuko Kadomura-Ishikawa, Takahiro Emoto, Momoka Yamaguchi, Nozomi Hirano, Sae Toda, Mina Matsubara, Takashi Uebano, Toshihiko Aizawa, Shigeharu Yamauchi, Yasuo Fujikawa, Tomotake Tanaka, Eduardo Suarez-Lopez, Geeta Buda, Richard J. Kuhn, Akira Takahashi, Chong Gu, Ernest R. Blatchley III (2025) "Method for Quantification of Action Spectra for Phage and Human Viruses, Presented at Pacificchem 2025, Honolulu, HI, 19 December 2025.

INVITED PRESENTATIONS

1. Ernest R. Blatchley III "Physico/Chemical Processes of Environmental Engineering," short course provided for Mobil Oil Company, Mobil Technical Center, Princeton, NJ, 3 March 1993.
2. Ernest R. Blatchley III "Environmental Engineering Research: Physico/Chemical Processes," presented to NALCO Chemical Corp., Naperville, IL, 24 November 1992.
3. Ernest R. Blatchley III "Ultraviolet Disinfection," *Clean Water Solutions Conference*, Co-sponsored by AWWA Research Foundation, Duke Power, Electrical Power Research Institute, and Water Environment Research Foundation, Charlotte, North Carolina, 9 March 1993.
4. Ernest R. Blatchley III "Physico/Chemical Processes of Environmental Engineering," short course provided for Mobil Oil Company, Purdue University, 24 June 1993.

5. Ernest R. Blatchley III "Physico/Chemical Processes of Environmental Engineering," short course provided for Mobil Oil Company, Mobil Technical Center, Princeton, NJ, 11 August 1993.
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Reviewer for the following professional organizations:

American Chemical Society

Environmental Science & Technology

Langmuir

Industrial and Engineering Chemistry Research

Division of Industrial and Engineering Chemistry

American Institute of Biological Sciences

BioScience

American Society of Civil Engineers

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Journal of Irrigation and Drainage Engineering
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Journal, American Water Works Association
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ETH Zürich, Switzerland
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International Journal of Heat and Fluid Flow
International Journal of Environmental Analytical Chemistry
International Water Association
Water Research
Water Science and Technology
Biennial World Water Congress Abstracts and Papers
Israel Science Foundation
McGill University, Montreal, Quebec, CANADA
External Reviewer for Graduate Theses
National Institutes of Health
Study section panelist for review of unsolicited proposals
SBIR Proposal Review Panelist
National Science Foundation
Panelist for review of unsolicited proposals
SBIR Proposal Review Panelist
University of Buffalo, State University of New York, Buffalo, New York
External Reviewer for Graduate Theses
U.S. Environmental Protection Agency
SBIR Proposal Review Panelist
EPA/WEF Biosolids Task Force
Water Environment Federation
Water Environment Research

INVOLVEMENT IN GRADUATE RESEARCH PROGRAM
Completed Thesis Graduate Students

<u>Name</u>	<u>Title</u>	<u>Degree</u>	<u>Year</u>	<u>Publications, Presentations</u> ¹
Richard W. Johnson	Determination of Henry's Law Constants for Hypochlorous and Hypobromous Acid	MSE	1989	b1, b2, b4
Gregory A. Loraine ²	Toxicity of Scrubber Water and Formation of Cyanide from Sewage Sludge Incineration	MS	1990	
Gretchen L. Hein	Treatment of Ferric Chloride Solutions by Sulfide Precipitation: Selective Removal of Non-Ferrous Metals	MSE	1992	Presentation ³
Shari D. Al-Abbas	Compliance Maintenance Annual Report Software for Municipal Wastewater Treatment Plants	MSCE	1992	Software ⁴
Bruce A. Hunt	Ultraviolet Dosimetry Using Microbial Indicators and Theoretical Modelling	MS	1992	b6, d1, d2
Bonnie J. Binkley	Partitioning of 3,3'-Dichlorobenzidine in Sediment, Water, and Lipid Phases	MSE	1993	
Robb A. Velasco	Heavy Metal Distributions in Surficial Sediment and Water at Muskegon Lake	MS	1993	
Jiangong Zhao	Toxicity Reduction Alternatives Evaluation	MSCE	1994	b12
Bruce A. Hunt	Optimization of Halogen Dose for Biofilm Control	Ph.D.	1995	b12, d18
Ravikrishna Duggirala	Effect of Copper on Trihalomethane Formation During Chlorination of Water and Wastewater	Ph.D.	1996	b10, b12, b35, d1, d3, d27, e3
Lian-Shin Lin	Inorganic Fouling at Quartz:Water Interfaces in Ultraviolet Photoreactors	Ph.D.	1997	b21, b22, b23, b30, b36, b42, d7, d13, d14, d24, d39, Software ⁵
Marianne C. Nyman	The Fate of 3,3'-Dichlorobenzidine in the Aqueous Environment	Ph.D.	1997	b13, b26, b32, b33, b38, d5, d8, d15
John E. Thompson	Gamma Irradiation for Disinfection of Water and Wastewater	Ph.D.	1997	a2, a7, a10, b12, b19, b27, d12, d19, d26, d28

R. Mark Bricka ²	Evaluation of Exothermic Solidification/Stabilization Binding Agents to Enhance the Removal of Trichloroethylene from Combined Waste	Ph.D.	1998	b11, d6, e1
Kuang-Ping Chiu	Process Behavior of Vertical Ultraviolet Disinfection Systems	Ph.D.	1998	b17, b18, b20, d9, d10, d11, d17, e3, Software ⁶
Tawfic Halaby	Physiological Responses of Bacteria Subjected to Physical Disinfectants	MSE	1998	b12, b29, d28
Chii Shang	Membrane Introduction Mass Spectrometry for Identification and Quantitation of Active Chlorine	Ph.D.	1999	b24, b28, b31, e5
Dimitris Margetas	Copper Catalysis in Halogenated Disinfection By-Product Formation	MS	1999	b35, d27
Heather Landis	Inactivation of <i>Cryptosporidium parvum</i> by UV and Gamma Irradiation	MS	1999	d26, d28
Martina Donnermair	Organic Chloramines as Disinfectants and the Evaluation of a Miniature Membrane Introduction Mass Spectrometer for Residual Chlorine Monitoring	MS	2001	b34, d31
Anna Lyssandridou	Numerical Modeling of Process Behavior in Ultraviolet Disinfection Systems	MSCE	2002	d29
Woei-Long Gong	Long-Term Effects of Disinfection on Wastewater Effluents	Ph.D.	2002	b28, b34, b37, b43, b44, d25, d30, d38
Anne Meeusen ⁷	Inactivation of <i>Bacillus cereus</i> and <i>Bacillus subtilis</i> spores by Ultraviolet Radiation	MS	2003	b41, d37
Chengyue Shen	Characterization of Ultraviolet Irradiance Fields by Local Actinometry	PhD	2004	a9, b36, b40, b50, b57, b42, b43, b48, d32, d39, d40, d42, d43, d49, d52, d54, d56, d57, d58, d59, d60, d64, d66, d67,

Isaac W. Wait	Fouling of Quartz Surfaces in Potable Water Ultraviolet Disinfection Reactors	PhD	2005	d68, d69, d70, d72, d77, d79, d81, d86, d96, e6 d33, d36, d41, d43, d44, d50, d64, e8, e12
Bradford Derrick	Inorganic Fouling and Effects on Intensity in Groundwater Applications of Ultraviolet Photoreactors	MSCE	2005	d41
Kelly Pennell	Sequential Water Disinfection Using UV Irradiation and Iodination for Long-term Space Missions	PhD	2005	b49, b51, b53, d35, d44, d45, d46, d47, d48, d51, d60, e7, e9, e10, e13, e14
Zorana Naunovic	Modeling and Design of an Ultraviolet Disinfection System for Long-Term Space Missions	PhD	2006	b42, d34, d39, d42, d47, d51, d60, e7, e9, e11
William A. Weaver	Volatile Disinfection Byproduct Analysis from Chlorinated Indoor Swimming Pools	MS	2008	b59, b63, d62, d63
Beibei Zhu Sun	Numerical Simulation of Inorganic Fouling of Quartz Surfaces in Ultraviolet Photoreactors	PhD	2009	b52, d60
Soojung Lim	Modeling and Design of an Ultraviolet Disinfection System for Air Recirculation Systems	Ph.D.	2010	b54, b60, b66, d60
Eric Cox	Numerical and Statistical Methods for Lagrangian Actinometry	Ph.D	2010	d66, d67, d68, d71, d72, d77
Po-Shun Chan	Validation of UV Disinfection Systems for Recalcitrant Microorganisms Using Lagrangian Actinometry	Ph.D.	2010	b57, b65, d60, d67, d69, d70
Eric Gentil Mbonimpa ⁸	Disinfection of drinking water using solar UV: A low cost system applicable in developing countries	Ph.D.	2010	d68, d83
Steven Berube	Biosand Filtration Applications in Developing Countries	M.S.E.	2011	d74

Katrin Holmgren	Appropriate Technologies for Defluoridation of Water	M.S.E.	2013	
Angela P. Ortiz	Design of UV Disinfection Systems for Wastewater Treatment Based on a Stochastic Approach	M.S.C.E.	2013	d84, d94, d96
Amanda Costello	Effects of Water Treatment Systems Used in Haiti on Drinking Water Quality	M.S.C.E.	2013	
ShihChi Weng	The Dynamics of Volatile Disinfection Byproducts in Indoor, Chlorinated Swimming Pools	Ph.D.	2013	a8, b63, b64, b67, b69, b70, b71, b73, b83, d73, d76, d78, d85, d88, d91, d93, d98
Caitlin Grady	International Water and Food Security Development: Performance Evaluation and Assessment of Research Needs at Multiple Scales.	Ph.D.	2015	a8, b75, d89, d94
Mehrnaz Zare Afifi	Effects of UV-Based Treatment on Water and Air Chemistry in Chlorinated, Indoor Pools	Ph.D.	2015	b63, b67, b76, b77, b80, d76, d91, d92, d95
Ling Ding	Assessing the Performance of Antimicrobial Concrete Admixtures in Concrete Subjected to Microbially Induced Corrosion	M.S.	2015	b82
Margaret M. Busse	Optimization of a Continuous-Flow Reactor for Solar UV Water Disinfection in Developing Countries	M.S.E.	2016	d97, d100, d101
Lester Lee	Fate and Behavior of Pharmaceuticals and Personal Care Products in Chlorinated Swimming Pools	M.S.C.E.	2016	b73
Yousra Ahmed	Stochastic Evaluation of Disinfection Performance in Large-Scale, Open-Channel UV Photoreactors	Ph.D.	2017	b90, b99, b123, c110, c111, c114, c115, c116, c118, c122
Xing Li	Variability in UV Disinfection System Performance in Municipal Wastewater Treatment	M.S.	2017	

Kehui Zhang	Degradation of Trihalomethanes and Chloramines by UVC and VUV Radiation	M.S.E.E. E.	2018	
Moshan Chen	Chlorine/UV Treatment of Anatoxin-A	M.S.C.E.	2018	b106
Margaret M. Busse	Applications and Acceptance of Solar UV Technologies for Drinking Water Disinfection in Low-Income Settings	Ph.D.	2021	b101, b120, c111, c114, c115, c119, d104
Lester T.C. Lee	Dynamic Behavior of Water and Air Chemistry in Indoor Pool Facilities	Ph.D.	2021	b74, b113, b116, b121, d104
Haiying Cui	Quantitative Microbial Risk Assessment for Airborne Transmission of SARS-CoV-2 and the Efficacy of Ultraviolet Germicidal Irradiation (UVGI) Systems	M.S.	2022	b124, c126
Jason A. Randall	Experimental Measurements on Devices for Real Time Inactivation of Airborne Biological Threats	M.S.	2023	b130, c127
Annabelle M. Johnson	Scientific Responses to Concerns With Use of UV-C as an Indoor Disinfection Process	M.S.	2024	pending
Mohd Bilal Shadab	Decision-Making in Indoor Air Quality: Evaluating ASHRAE 241 Standard for Infectious Aerosol Control	M.S.	2025	
Shohoria Afrin Shorno	Disinfection Efficacy of Commercial Far UV-C Fixtures Using the Continuous Challenge Agent Introduction and Decay Methods	M.S.	2025	
Xing Li	Phages as Surrogates for Pathogenic Viruses in Analysis and Validation of UV Disinfection and Thermal Disinfection Processes for Air and Surfaces	Ph.D.	2025	

¹Information in this column refers to subsection and article numbers in Part B, Section 1, Publications

²Co-Major Professor with James E. Alleman, School of Civil Engineering

³Presentation given as part of Research Symposium entitled: "Treatment of Ferric Chloride Solutions by Sulfide Precipitation: Selective Removal of Non-Ferrous Metals," no proceedings published.

⁴Developed software entitled *Compliance Maintenance Annual Report Software* for use by the U.S. Environmental Protection Agency for Municipal Wastewater Treatment Facilities.

⁵Developed software entitled *Double-Layer Simulation* and *Ballistic Deposition Model*. The former provides an animated version of the dynamics of ion movement and "double-layer" formation in aqueous solutions in the vicinity of a charged surface. The latter is a model of particle accumulation and fouling at quartz surfaces based on known physico/chemical behavior at these surfaces and elements of chaos theory.

⁶Developed software entitled *Particle Tracking Model* for purposes of simulating particle trajectories through the irradiated zone of an ultraviolet disinfection system. This software is the first of its kind and is a key element of a new modelling paradigm being applied to photochemical reactor systems.

⁷Ms. Meeusen received her Masters' degree from the International Programme in Water Resources Engineering (IUPWARE), which is jointly administered by the Vrije Universiteit Brussel (VUB, Brussels, Belgium) and the Katholieke Universiteit Leuven (KUL, Leuven, Belgium). Ms. Meeusen completed her second year of coursework and all of her research at Purdue University under the direction of Professor Blatchley as part of the EWRES exchange program (see <http://www.ecn.purdue.edu/EWRES/#25>); VUB, KUL, and Purdue University all participate in the EWRES program.

⁸Dr. Mbonimpa was a co-inventor on U.S. patent of continuous-flow solar UV disinfection.

Current Topics - Active Thesis Graduate Students and Researchers Serving as Major Professor:

Name	Topic	Degree	Date
Shohoria Afrin Shorno	Dynamic Behavior of Far UV-C Systems for Disinfection of Indoor Air	Ph.D.	2027
Avanthi Venugopal Sridhar	Effects of Cyanuric Acid on Chlorine Dynamics and Algal Control in Swimming Pools	M.S.	2026

Non-Thesis Graduate Students (Special Project)

Ken Glotzbach	Evaluation of DBNPA as a Wastewater Disinfectant	1994
Chii Shang	Chlorine/DBNPA for Municipal Wastewater Disinfection	1996
Tanya Harless	Photochemically-Induced Changes in Indicator Organisms	1997
Monika Taparia	Bromate Formation and Control in Drinking Water Treatment	1997
Brian Ramey 1997	Organic Solderability Preservatives for Mixed Technology Circuit Boards	
Dan Vicari	Wavelength-specific characteristics of UV disinfection	2001
Brian Schmude	Wavelength-specific characteristics of UV disinfection	2001

Research Involvement of Undergraduate and Post-Baccalaureate Students

Name(s)	Topic	Year
Charandeep Bhasin, Lora Heckman, Tim Gallagher, John Thomas	Hydraulic Characterization of UV Disinfection Model	1992
Ronald Cowger and Chris Straub	Toxicity Induced by Disinfection Processes	1993
Donna Ness	Manganese Dioxide for Water Treatment	1994
Tawfic Halaby	Toxicity Induced by Disinfection Processes	1995
Kimberly A. Cole	Wavelength-specific characteristics of UV disinfection	2000
Lindsay Brewster (Biology Department)	Inactivation of Biological Warfare Agents Using Physical Disinfectants	2002 2003
Jessica Johnston	Swimming Pool Chemistry	2007
James Cramer	Air Quality in Indoor Swimming Pool Facilities	2009
Roderick Lammers	Water Supply in Developing Countries	2011
Alexandra Cosgrove	Water Supply in Developing Countries	2011
Matous Becker	UVB Action Spectra of Waterborne Bacteria	2015 2016
Nathanial Kallmyer	Recovery of Nutrients from Human Urine	2015

Mustafa Ghuneim
Jake Slaveck

Recovery of Nutrients from Human Urine
Solar UV Disinfection

2016
2015
2016

Research Grants and Awards

Project Period	Sponsor	Topic	Names of PI and Co-PIs	Total Budget	Share of Total Budget
1989-1990	Great Lakes Chemical Corp.	Evaluation of Hypohalous Acid Volatility	Blatchley (100%)	\$5,000	\$5,000
1990-1991	Amoco Foundation	Gift Funds used for Purchase of Analytical Equipment	Blatchley (50%) with Alleman	\$30,000	\$15,000
1990-1992	Atlas Chem-Milling Div.	Selective Removal of Non-Ferrous Metals	Blatchley (100%)	\$47,000	\$47,000
1991-1992	U.S. Environmental Protection Agency	Municipal Water Pollution Prevention Program Software Development	Blatchley (100%)	\$36,000	\$36,000
1991-1992	City of West Lafayette (\$21,000) Katadyn Systems, Inc. (\$80,000)	Large-Scale Pilot Testing of Ultraviolet Disinfection	Blatchley (90%) with Alleman	\$101,000	\$90,900
1991-1992	U.S. Geological Survey	Pollutant Transport due to High Energy Events	Blatchley (50%) with Wood	\$19,000	\$9,500
1991-1992	PRF	Trihalomethane Formation in Halogen Disinfection	Blatchley (100%)	\$19,350	\$19,350
1991-1994	Great Lakes Protection Fund	Contaminant Transport and Bioavailability in the Great Lakes	Blatchley (40%) with Wood and Spacie	\$209,570	\$83,828
1992-1994	Petroleum Environmental Research Forum	Optimization of Halogen-Based Antimicrobial Processes	Blatchley (100%)	\$120,000	\$120,000
1992-1993	Georgetown (KY) Municipal Water and Sewer Service	Alternatives for Minimization of Effluent Toxicity	Blatchley (100%)	\$42,225	\$42,225
1992-1993	U.S. Geological Survey	Energetics of Storm Induced Contaminated Sediment Transport	Blatchley (20%) with Wood	\$10,000	\$2,000
1992-1993	RainSoft Corporation	Application of MnO ₂ for Water Treatment	Blatchley (100%)	\$80,000	\$80,000
1993	PRF	Laboratory Evaluation of Hydrodynamic Behavior in Ultraviolet Disinfection	Blatchley (100%)	\$5,000	\$5,000
1993-1995	PRF	Hydrodynamic Behavior in	Blatchley (100%)	\$19,200	\$19,200

		Ultraviolet Disinfection Systems			
1993-1995	Stranco	Gift of Control Hardware for Investigation of Disinfection By-Product Formation	Blatchley (100%)	\$5,000	\$5,000
1994-1996	Dow Chemical	Viral and Bacterial Inactivation in Wastewater Disinfection	Blatchley (100%)	\$184,332	\$184,332
1994-1997	Severn-Trent Ltd.	Inorganic Fouling of Quartz Surfaces in Ultraviolet Disinfection Systems	Blatchley (100%)	\$180,538	\$180,538
1995	White River Environmental Partnership	Chronic Toxicity Induced by Alternative Disinfection Processes	Blatchley (60%) with Alleman	\$44,374	\$26,624
1995-1997	PRF	Fate and Transport of Sediment-Associated Contaminants in Great Lakes Estuaries	Blatchley (100%)	\$20,400	\$20,400
1995-1996	U.S. Army Corps of Engineers, WES	Kinetics of Heavy Metal Extraction from Contaminated Soils	Blatchley (50%) with Johnston	\$21,000	\$10,500
1996	Dow Chemical, U.S.A.	Field Testing of DBNPA/Chlorine	Blatchley (100%)	\$7,000	\$7,000
1996-1997	Lyonnaise des Eaux	Experimental Characterization of Hydrodynamic Behavior in a Vertical UV Disinfection System	Blatchley (50%) with Lyn	\$26,979	\$13,490
1997-1998	NSF	Gamma Irradiation for Disinfection of Water and Wastewater	Blatchley (80%) with Clikeman and Robinson	\$96,424	\$77,139
1997-1999	PRF	Speciation of Active Chlorine Compounds in Aqueous Solutions	Blatchley (100%)	\$23,500	\$23,500
1999-2000	Lyonnaise des Eaux	Experimental Measurement of Dose Distribution in Photochemical Reactors	Blatchley (100%)	\$72,018	\$72,018
1999-2001	PRF	Dynamic Behavior in Membrane-Based Photocatalytic Reactors	Blatchley (100%)	\$23,332	\$23,332
1999-2002	Water Environment Research Foundation	Effects of Wastewater Disinfection on Human Health	Blatchley (40%) w/ Rose and Lisle	\$300,000	\$119,351
2000-2004	Water Environment Research Foundation	Numerical and Experimental Characterizations of Dose Distributions in UV Disinfection Systems	Blatchley (75%) w/ Lyn	\$199,764	\$150,317
2000-2002	Showalter Trust	Experimental Methods for Characterization of Ultraviolet Reactors	Blatchley (37%) w/ Bergstrom, Robinson	\$100,000	\$37,000

2000-2002	US EPA	Wavelength-Dependence in UV Dose-Response Behavior Among Waterborne Microorganisms	Blatchley (80%) w/ Banks and Alleman	\$55,776	\$44,621
2000-2002	Office of Naval Research	Construction and Evaluation of a New MIMS-CIT System for On-Line Wastewater Monitoring	RG Cooks w/ Blatchley (20%)	\$170,000	\$35,668
2002-2003	NSF	Inactivation of Biological Warfare Agents by Physical Disinfectants	Blatchley (70%) w/ Aronson	\$95,419	\$95,419
2003-2008	NASA	NSCORT: Center of Excellence in Advanced Life Support	Mitchell w/ many others	\$10,000,000	\$500,000
2002-2005	US EPA	Fouling of Quartz Surfaces in Potable Water Ultraviolet Disinfection Systems	Blatchley w/ Johnston, Moran, and Cairns	\$375,000	\$250,000
2004-2008	Metropolitan Water District of Southern California	Demonstration-Scale Evaluation of Dyed Microspheres for Quantification of Dose Delivery in Ultraviolet Disinfection Systems	Blatchley w/ Bergstrom and Robinson	\$200,179	\$90,000
2006-2008	American Water Works Association Research Foundation	Challenge Organisms for Inactivation of Viruses by Ultraviolet Treatment	Blatchley (subcontract to Metropolitan Water District of Southern California)	\$834,180	\$150,978
2005-2006	DuPont Experimental Station	Water Treatment by Combined Application of Chlorine, Monopersulfate, and UV Radiation	Blatchley	\$92,559	\$92,559
2006-2007	National Swimming Pool Foundation	Combined Application of UV Radiation and Chlorine for Recreational Waters-Phase I: Basic Chemistry and Photochemistry	Blatchley	\$99,868	\$99,868
2006-2007	Center for the Environment, Purdue University (Lilly Endowment)	Development of a Peptide Nucleic Acid Actinometer	Blatchley with Bergstrom	\$18,671	\$18,671
2006-	HydroQual	Analysis and Validation of Large-Scale Ultraviolet Disinfection Systems	Blatchley with Scheible, Bergstrom, and Robinson	\$61,929	\$62,929
2007-2008	Trojan Technologies, Inc.	Fellowship Support for Ms. Beibei Sun	Blatchley	\$26,430	\$26,430
2007-2008	National	Combined Application of UV	Blatchley	\$135,303	\$135,303

	Swimming Pool Foundation	Radiation and Chlorine for Recreational Waters: Synergistic Effects and Field Monitoring			
2008-2009	American Chemistry Council	Reactions Between Free Chlorine and Reduced Nitrogen: Effects on Water and Air Chemistry in Indoor Swimming Pools	Blatchley	\$133,750	\$133,750
2009-2010	American Water Works Association Research Foundation	Lagrangian Actinometry for Validation of Large-Scale UV Photoreactors	Blatchley	\$100,000	\$100,000
2008-2009	Trojan Technologies, Inc.	Fellowship Support for Ms. Beibei Zhu Sun	Blatchley	\$50,000	\$50,000
2009	Malcom-Pirnie	Combined Application of Ozone and Ultraviolet Radiation for Disinfection	Blatchley	\$35,137	\$35,137
2009-2012	Water Research Foundation (formerly American Water Works Association Research Foundation)	Numerical Models for Prediction of Fouling and its Effects on Reactor Performance in UV Disinfection Systems	Blatchley	\$100,000	\$100,000
2010-2011	Discovery Park	Water Supply in Developing Countries	Blatchley and Schulze	\$25,000	\$25,000
2010-2011	International Programs Office, Purdue University	Water Supply in Developing Countries	Blatchley	\$7000	\$7000
2010-2011	International Programs Office, Purdue University	Water Supply in Developing Countries	Blatchley	\$11,360	\$11,360
2011-2012	Orange County (CA) Water District	Characterization of Chloramines in Source Waters from an Advanced Water Purification Facility by Membrane Introduction Mass Spectrometry (MIMS)	Blatchley	\$29,958	\$29,958
2012-2013	DuPont/Teijin Films	Removal of Organic Contaminants from Drinking Water Using Functionalized Polyester Films	Blatchley	\$38,364	\$38,364

2011-2016	National Swimming Pool Foundation	Effects of UV-Based Treatment on Water and Air Chemistry in Chlorinated, Indoor Pools	Blatchley	\$267,000	\$267,000
2012-2013	EPA	Community-Scale Water Treatment System for Application in Developing Countries	Blatchley, Applegate (Food Science and Biology), Simpson (Nursing), and Foster (Ag Econ)	\$15,000	\$15,000
2012-2014	Citizens Energy Group	Design And Validation Protocol For Large-scale UV Disinfection Systems For Municipal Wastewater: Quantification of UV Dose-response Behavior, Including Variability	Blatchley	174,974	174,974
2013	Gift of Water	Effects of Process Changes on Finished Water Quality	Blatchley	21,136	21,136
2013-2014	Indiana Water Resources Research Center	Attached-Growth Lagoons for Wastewater Nitrification in Small Communities	Blatchley	15,000	15,000
2013-2016	Concrete Sealants Inc	Assessing the Performance of Antimicrobial Concrete Admixtures in Concrete Exposed to Microbially Induced Corrosion (MIC)	Weiss and Blatchley	114,746	57,373
2013-2015	NSF International	<i>Tetraselmis</i> as a Challenge Organism for Validation of Ballast Water UV Systems	Blatchley	88,416	88,416
2014-2015	Purdue GPRI Mellon Grand Challenges	Open Skies: Alternative Studies into Sanitation Solutions Related to Open Defecation	Clair, Blatchley, Clawson, Erdman, Lee, Rastogi	59,970	10,000
2014-2015	Dr. William M Scholl Foundation	Water Supply in Developing Countries: Community-Scale Water Treatment System for Las Canas, DR	Blatchley, Simpson, Foster, Applegate	\$10,000	\$10,000
2015	Trask Innovation Fund	Continuous-Flow Solar UV Disinfection System	Blatchley, Applegate, Camp	30,512	20,000
2015-2016	Water Environment Research Foundation	Stochastic Approach to Design and Validation of UV Disinfection Systems	Blatchley	310,000	170,000
2016-2017	Global Engineering Program Office	Continuous-Flow Community-Scale Solar UV Disinfection Systems for Water Treatment	Blatchley	23,055	23,055
2017-2018	PoolPak	Examination of the Effects of	Blatchley	51,920	51,920

		Treatment Process Changes on Water and Air Chemistry in a Chlorinated, Indoor Swimming Pool			
2019-2021	Council for the Model Aquatic Health Code	Monitoring and Control of Gas-Phase NCl ₃ in Indoor Swimming Facilities	Blatchley	251,201	251,201
2019-2021	DeNora Tech	Effects of Electrochlorination on Disinfection Byproduct Dynamics in Chlorinated Swimming Pools	Blatchley	126,253	126,253
2020	Whirlpool	Removal and Inactivation of Viruses in Residential Laundry Operations	Blatchley	24,820	24,820
2021	Center for High Performance Buildings	Photocatalytic Air Purification for HVAC Systems	Warsinger and Blatchley	60,000	20,000
2021	Regal Beloit America, Inc.	Testing of the performance of a UV-based air disinfection system	Blatchley	24,150	24,150
2022-2023	Eden Park Illumination	Development of Miniature Far UV-C Microplasma Lamps with Improved Safety Factors for Personal Protective Respirators	Blatchley	72,188	72,188
2022-2023	AFWERX (subcontract from University of Colorado)	Next Generational Personal Protective Equipment for Real-time Inactivation of Airborne Biological	Blatchley	102,212	102,212
2024	XCMR	Action Spectra for RSV and HMPV	Blatchley	22,455	22,455
2023-2024	Lyles School of Civil Engineering	Surveillance and Mitigation of Airborne Pathogens in Learning Environments	Blatchley, Boor, Horton, and Zhou	42,000	42,000
2023-2024	Johnson Controls, Puro Lighting, Ushio America	Disinfection Efficacy of Commercial Far UVC Fixtures Using the Continuous Challenge Agent Introduction and Decay Methods	Blatchley and Horton	93,173	93,173
2023-2025	NIOSH/CDC	IPA Agreement: Review of Literature and Past Practices for GUV Systems	Blatchley	22,725	22,725
2024-2026	HASA	Effects of Cyanuric Acid on Chlorine Dynamics and Algal Control in Swimming Pools	Blatchley	176,452	176,452

2025	Center for High Performance Buildings	Testing and Simulation of GUV Devices in Configurable Spaces	Blatchley and Horton	48,000	48,000
2026	Blueprint Biosecurity	UVC Dose-Response Behavior of Airborne (Aerosolized) Challenge Agents	Blatchley, Jongewaard, Claus, and Hernandez	165,932	165,932
Total				\$17,157,179	\$5,773,994

INTERDISCIPLINARY ACTIVITIES

In conjunction with members of the geotechnical engineering faculty, Professor Blatchley developed a course titled "Environmental Geotechnology" (CE 593). This team-taught course presents environmental and geotechnical engineering principles used in remediation, containment, and control of hazardous and solid wastes. A large fraction of the current and future work of environmental and geotechnical engineers relates to the material taught in this class. Professor Blatchley coordinated the Environmental Engineering Seminar (CE 691) from Spring 1991 to Fall 1994. Speakers in this seminar have addressed a broad array of topics in and related to environmental engineering, including: aquatic chemistry, air pollution, global environmental phenomena, hazardous wastes, and industrial wastewater treatment. Seminar speakers have come from academia, government, legislature, industry, consulting, and business.

Professor Blatchley has been involved in multi-disciplinary research dealing with contaminant fate and transport in lake systems. Until the untimely death of Professor William L. Wood, the project was co-directed by Professors Wood and Blatchley of the environmental/hydraulics group. The project continued with Professor Blatchley directing the aspects of the project related to environmental transformation processes: photochemical, biochemical, and sorptive phenomena. The diverse nature of the experiments and analytical procedures required to evaluate these processes has required significant contributions from several other faculty, including: Professor Larry Nies (Civil Engineering); Professor Hilkka Kenttämaa (Chemistry); and Professor Linda Lee (Agronomy). The results of these experiments will provide data on transformation process kinetics that will be incorporated into a transport model, which was developed under the direction of Professor Wood. Model predictions have been in qualitative agreement with field measurements - an assessment of the model's quantitative capabilities will be performed later. This work has recently attracted the attention of several federal agencies (NOAA, EPA, DOD) and is likely to receive additional financial support in the near future. The further development of this model will be conducted in conjunction with Dr. Guy A. Meadows, Director of the Cooperative Institute for Limnology and Ecosystem Research (CILER) and a professor within the Department of Naval Architecture and Marine Engineering at the University of Michigan.

In conjunction with Professors W.L. Wood and D.A. Lyn of the hydraulics group, as well as Drs. Zdravka Do-Quang and Marie-Laure Janex of Lyonnaise des Eaux (Le Pecq, France), Professor Blatchley has evaluated process behavior in ultraviolet (UV) disinfection systems. Prior to this work, only qualitative information existed regarding fundamental process behavior in UV systems. Elucidation of the complex, three-dimensional hydrodynamic behavior and radiation intensity fields of UV systems has improved predictive capabilities for UV systems and led to improvements in process design. This was the focus of Professor Blatchley's sabbatical research. He is currently directing a large research team that is applying numerical and experimental techniques to further evaluate the characteristics of these systems and incorporate this knowledge into a fundamental process model for photochemical reactors.

In collaboration with Professor R. Graham Cooks of the Purdue University Department of Chemistry (Analytical Chemistry Division), Professor Blatchley has developed analytical methods for characterization of water supplies based on membrane introduction mass spectrometry (MIMS). MIMS offers many advantages over conventional analytical methods, including speed, MS-based detection, and relatively low susceptibility to analytical interference. Currently, work in this area is focused on adaptation of MIMS-based methods for development of on-line monitoring and control devices for water and wastewater treatment operations.

In collaboration with Professor Arthur Aronson of the Purdue University Department of Biological Sciences, Professor Blatchley is investigating the application of physical disinfectants (UV and ionizing

radiation) for control of biological warfare agents. These methods have tremendous potential in these applications, yet much of the basic information needed to develop reliable designs is lacking. The research directed by Professors Blatchley and Aronson will address these issues.

Professor Blatchley collaborated with a group of roughly 24 faculty from three universities (Howard University, Alabama A&M, and Purdue University) to develop a proposal that was submitted to NASA to support research relating to life-support issues in extended space travel missions. The proposal was selected for funding and provided \$10,000,000 that was used to support research programs at these three institutions over the five years of the project.

In collaboration with research groups directed by Professor Donald E. Bergstrom (Walther Professor of Medicinal Chemistry, Purdue University Department of Pharmacy and Pharmacal Sciences) and Professor J. Paul Robinson (Director, Purdue University Cytometry Laboratories, School of Veterinary Medicine), as well as industry partners (Polysciences, Inc. and Bangs Laboratories), Professor Blatchley's group has developed a tool for measurement and characterization of process performance in ultraviolet (UV) photochemical reactors. These systems, which are being used with increasing frequency to treat water and wastewater, are known to deliver a distribution of UV doses to fluid elements and suspended particles that traverse the system during treatment operations. This new measurement tool, which relies on the use of dyed microspheres that were developed as part of this collaborative effort, allows for accurate, detailed measurement of the dose distribution delivered by a system during actual operations. By being able to measure the dose distribution in a UV system, it is then possible to make quantitative predictions of the ability of the UV system to convert essentially any photochemically reactive constituent in the fluid being treated. Prior to the development of this tool, estimates of dose distributions delivered by UV systems could only be accomplished by numerical methods.

The Blatchley group has collaborated with Professor Bruce Applegate (Food Science and Biological Sciences) and Professor Joseph W. Camp, Jr. (Comparative Pathobiology, School of Veterinary Medicine) to develop solar UV disinfection systems for water treatment in developing countries. This collaboration has allowed demonstration of the effectiveness of ambient solar radiation for inactivation of many important microbial pathogens.

Professor Blatchley collaborated with Professor Jer-Yen Yang (Basic Medical Sciences, School of Veterinary Medicine) to define the behavior of the chlorine/UV process for degradation and detoxification of cyanotoxins and other common aquatic contaminants that include amine functional groups, as well as other functional groups that are activated toward photolysis by reactions with chlorine.

The Blatchley group collaborated with Professors David Warsinger and Travis Horton to develop photochemical and photocatalytic air purification devices for HVAC systems. This ongoing work has the potential to reduce disease transmission for airborne pathogens in indoor facilities. The results of this work could yield systems that reduce transmission of diseases such as COVID-19, as well as other diseases that are known to have airborne transmission mechanisms, including influenza, tuberculosis, and the common cold.

SECTION C. EXTENSION, SERVICE, AND UNIVERSITY OUTREACH ACTIVITIES

EDUCATIONAL ACTIVITIES

University Programs

- EIT/FE Review Session, Chemistry, Spring 2000, Fall 2000, Spring 2001, Spring 2002, Fall 2002, Fall 2008, Spring 2009, Fall 2009, Spring 2010, Fall 2010, Spring 2011, Fall 2011, Spring 2012, Fall 2012.
- Co-author of (funded) proposals to the U.S. Department of Education (DOEd) (1991 and 1994) for support of graduate student education. The grants received from these proposals made funds available for graduate students pursuing research in “Areas of National Need,” as defined by DOEd. Funding from this program has been used to support students in all areas of Civil Engineering. These funds were used to support approximately ten students per year for each of the past six years in their pursuit of advanced degrees. Fourteen faculty within the School of Civil Engineering have had students supported under this program.
- Principal author of a proposal to DOEd for a third grant under the GAANN program. In the 1998 proposal solicitation, the “Areas of National Need” defined by DOEd were more restrictive than in past years. Of the three need areas listed by the agency, only “Environmental Engineering” was identified as being appropriate for the School of Civil Engineering at Purdue. For each of the next three years, the program supported by this grant will provide fellowships to U.S. citizens or permanent residents to pursue Ph.D.s in the broadly-defined area of environmental engineering. The program was developed to include financial resources dedicated to recruitment of the best students for the program. The program was designed to provide fellows with an active mentoring program, and with opportunities to develop their teaching and research skills such that they will be in a strong position to pursue an academic career. The program also incorporates a longer-term goal of student recruitment and community involvement in areas of Indiana that are economically and environmentally stressed. A particular target of this program is northwest Indiana, which contains some of the country’s worst environmental problems; alternatively, these may be viewed as some of the best opportunities for recruitment of new students, and development of new remediation approaches. Fellows will be required to participate in a community outreach and education program in northwest Indiana, specifically targeted at K-12 educators and students. The goal of this outreach program is to provide information regarding the nature of existing environmental problems and to motivate the students to pursue higher education related to the field of environmental engineering. The program started in the Fall 1998 semester, with Professor Blatchley serving as the chair of the committee that will implement the program. The total value of the program will be approximately \$500,000.
- Co-author, with Professor Jacques Delleur, of a proposal to the Fund for the Improvement of Post-Secondary Education (FIPSE) within the U.S. Department of Education. The funds received under this grant are being used to develop and implement an international exchange program for students with interests in the areas of environmental/water resources engineering and sciences. A consortium of U.S. universities (Purdue [lead], Illinois, Minnesota, and Iowa) and a consortium of European institutions (Vrije Universiteit Brussel [lead], Technical University Denmark, Aristotle University of Thessaloniki, University College London, University of Lancaster, and Suez-Lyonnais des Eaux) are the participants in this program that was specifically designed to foster trans-Atlantic exchange opportunities for students and faculty. The motivation for this program was that water supply and water quality represents critical issues on both sides of the Atlantic Ocean, yet expertise in the relevant areas is not

equally developed on the two continents. By providing these exchange opportunities, it is anticipated that students and faculty will have opportunities to exchange information that will benefit all concerned. Moreover, this exchange program will provide students and faculty with the opportunity to benefit from cultural and social exchanges, thereby improving their presence and ability to compete in a more global setting. The total value of the U.S. portion of this program will be approximately \$200,000; a similar monetary value is associated with the European portion of the grant.

- Co-author of a proposal to the National Science Foundation which, together with matching funds from Purdue University, provided more than \$900,000 for use in renovation of environmental engineering laboratory facilities within the School of Civil Engineering.
- Blatchley III, E.R. (2014) “Water Supply in Developing Countries,” Presentation to North Ridge Middle School Students, Purdue University, West Lafayette, IN, 2 October 2014.

CONFERENCES, WORKSHOPS, AND SHORT COURSES

- Program Coordinator, Advanced Disinfection Processes Seminar, Purdue University, West Lafayette, IN, August 1992.
- Instructor in Mobil Oil Short Course - March 1993, June 1993, August 1993: This short course was offered to engineers and operators from Mobil Oil facilities in the U.S. and abroad. The course was developed to educate participants in the fundamental principles of environmental engineering. The course was taught on the Purdue campus and at the Mobil Technical Center in Princeton, NJ.
- Presenter, WEFTEC Pre-Conference Workshops on the subject of wastewater disinfection, 1997, 1998: These workshops are geared toward practicing engineers who work in the design, implementation, and operation of wastewater disinfection systems. Professor Blatchley's responsibility within these workshops has been to define the fundamental principles of UV disinfection systems, as well as the state-of-the-art.
- Scientific and Technical (Program) Committee, 2nd International Conference on Ultraviolet Technologies, Sponsored by the International Ultraviolet Association, Vienna, Austria, 9-11 July 2003.
- Instructor, Short Course entitled “Advanced Physico/Chemical Processes of Environmental Engineering,” Universitat Politècnica de Catalunya, 25 August – 5 September, 2003, Barcelona, Spain.
- Session Coordinator: Aquatics Applications of UV, IOA/IUVA World Congress, Paris, France, 23-27 May 2011.
- Session Coordinator: UV Applications in Aquatics Facilities, World Aquatics Health Conference, Seattle, WA, 12-14 October 2011.
- Conference Co-Chair, Research Frontiers Conference, 19-22 May 2015, Wetsus Centre of Excellence for Sustainable Water Technology and WTC Expo/Hotel, Leeuwarden, Netherlands.
- Scientific and Technical (Program) Committee, World Congress of International Ultraviolet Association, 2015, 2017.

STUDENT COUNSELING - UNDERGRADUATE

Professor Blatchley is typically responsible for counseling of 5-10 undergraduate students per academic year within the Lyles School of Civil Engineering, and a similar number of students from the Division of Environmental & Ecological Engineering.

Professor Blatchley has served as Faculty Advisor for the Purdue Crew. This club sport organization provides opportunities for competition in intercollegiate rowing events to approximately 100 student/athletes each year. He has also served as faculty advisor for the Purdue Chapter of ASCE and for the student organization “Wine to Water,” which aims to improve access to safe water among people in impoverished communities in developing countries.

UNIVERSITY ADMINISTRATION AND COMMITTEE ASSIGNMENTS

Civil Engineering Committees

- Purdue University Civil Engineering Advisory Council 1992-1996
- Civil Engineering Seminars 1991-1994
- Undergraduate Committee 1992-1994
- Search Committee, Lee A. Rieth Chaired Professorship 1994-1995
- Graduate Committee 1996-1997
- Faculty Search Committee 1989-1990, 1996-1997
- Primary Committee 1999-
- Search Committee, School Head 2000-2001
- Wansik Award Committee 2001-
- Chair, Geotechnical Engineering Search Committee 2001-2002
- Executive Committee 2003-2005
- Environmental Engineering Group Coordinator 2003-2004
- Search Committee (Chair), Environmental Engineering Faculty Position(s) 2005-2007
- Graduate Committee 2006-2009
- Faculty Governance Committee 2010-2013, 2015-2016, 2019-2020
- Online MS Committee (Chair) 2020-
- *Ad-Hoc* Committee to Evaluate Functions of the CE Primary Committee [1996-1997]. This committee was charged with performing a critical review of the procedures used by the Primary Committee within the Purdue School of Civil Engineering to evaluate faculty for tenure and promotion. The committee solicited and received information from peer institutions regarding the processes by which tenure and promotion issues were addressed within their respective institutions. Based on this information, the committee made recommendations to the Primary Committee regarding its procedures. Many of these recommendations were implemented by the Primary Committee in the development of the new procedures being used within the School of Civil Engineering. Professors Tarko and Blatchley were chosen to represent Assistant and Associate Professors, respectively, on this *ad-hoc* committee.
- Faculty Forum Committee [1996-1997]. As a result of suggestions made at the 1996 Civil Engineering faculty retreat, a Faculty Forum was developed for the purpose of developing open, detailed discussions of issues of importance to Civil Engineering faculty and the School itself. The committee was charged with developing procedures to be used in fora, developing a list of forum topics, and organizing fora.

- Committee on Enhancement of Graduate Education and Research (Chair) [1997-1998]. This *ad-hoc* committee was charged with examination of the graduate program in Civil Engineering and development of recommendations for improvements to the graduate program. Members of the committee developed and implemented a survey of faculty at peer institutions in Civil Engineering around the United States, as well as peer faculty within the Schools of Engineering at Purdue University. The survey was designed to allow an assessment of the use of faculty time and other resources within the teaching, research, and service components of academia. Based on the results of this survey, a list of recommendations was presented to the Civil Engineering faculty regarding the use of faculty time and School resources. The recommendations were formally presented to the faculty in the form of motions at the 1998 Faculty Retreat, and because of a favorable vote on the part of the faculty, they were scheduled for implementation beginning with the Fall 1999 semester.

College of Engineering Committees

- Schools of Engineering Research Advisory Committee [1996-1997]. The Dean of the Schools of Engineering selected one faculty member from each of the Schools of Engineering to examine the research environment within the Schools at Purdue University and to develop a list of recommendations for improvement in this area.
- Academic Personnel Grievance Committee 2000-2001
- Engineering Area Promotions Committee 2000-2004, 2015-2017
- Committee on Tenure and Promotion Processes and Practices 2003-2004
- Engineering Awards Committee 1999-2000
- Implementation Committee [2005-2006] – recommended formation of Division of Environmental and Ecological Engineering within the College of Engineering that will encompass environmental and ecological engineering issues.

University Committees

- Resource Management Committee [1999-2000]: Formed by the Vice President for Research, this committee is charged with evaluating the use of resources to promote research on campus.
- Chorafas Prize Committee [2000-2001]; Committee established to identify and reward the best PhD student at Purdue University from within the Schools of Engineering, Science, and Management.
- Seminar Committee, Center for the Environment (Chair) [2005-2006]; charged with initiation of a campus-wide seminar series for the Center.
- Sigma Xi Executive Council (2007 -) President, Purdue Chapter of Sigma Xi (2009-2010)
- Graduate Council (2007 - 2010)
- University Senate (2008-2011)
- Leadership Team – Purdue Water Community
- Leadership Team – Global Sustainability Initiative at Purdue University
- Executive Committee – Purdue Center for the Environment
- Athletic Affairs Committee (2020-2025), Chair 2024-2025

c. Outside Service Activities

- Wabash Area Lifetime Learning Association, Lecturer
- Associate Editor, *Journal of Environmental Engineering (ASCE)* 2006-2010
- Board of Directors, Aqua Clara International, Holland, MI 2008 -
- Chair, Strategic Initiative on UV Applications in Aquatics Facilities, International Ultraviolet Association, 2010 – 2012

- Conference Co-Chair, Research Frontiers Conference, 19-22 May 2015, Wetsus Centre of Excellence for Sustainable Water Technology and WTC Expo/Hotel, Leeuwarden, The Netherlands 2014-2015
- Scientific Advisory Committee, National Conference in Interstate Milk Shipments, 2020 –
- Editorial Board, *Water (MDPI)*, 2021 -

COMMUNITY ACTIVITIES

Youth Soccer Coach - Greater Lafayette Recreational Soccer Alliance	1994 – 1998
Youth Soccer Coach – Tippco Soccer Club	1998 – 2006
Youth Basketball Coach – West Lafayette Parks & Recreation	1998 – 2003
Instructor's Assistant / Translator – French Club, Cumberland Elementary School	1998 – 2000
West Lafayette Traffic Commission	2021 –
West Lafayette Mobility Safety Committee	2024-
West Lafayette Safe Streets for All Steering (SS4A) Steering Committee	2024-

CONSULTING ACTIVITIES

Crowell & Moring, Irvine, CA	
Analysis of residual chlorine composition in chlorine-based disinfection	2003
HDR Engineering, Folsom, CA	
Analysis of residual chlorine composition in chlorine-based disinfection	2003
BioVir Laboratories, Benicia, CA	
Collimated-Beam UV Source for Bench-Scale Experimentation	2003
Brown & Caldwell, Syracuse, NY	
Collimated-Beam UV Source for Bench-Scale Experimentation	2004
CFM Greenway, Guelph, ON, Canada	
Collimated-Beam UV Source for Bench-Scale Experimentation	2004
HydroQual	
Collimated-Beam UV Source for Bench-Scale Experimentation	2005
Wilmer-Hale, Boston, MA	
2006	2005-
Expert Witness: Water Treatment Patent Infringement	
Hazen & Sawyer/Camp, Dresser & McKee (Joint Venture)	
Consultant on Study of Fouling in a Drinking Water UV Disinfection System for the New York City Department of Environmental Protection	2007
Montgomery-Watson-Harza Americas	
Consultant on Study of Fouling in a Drinking Water UV Disinfection System for the City of San Francisco, CA	2007
Metropolitan Water Districts of Southern California	
Collimated-Beam UV Source for Bench-Scale Experimentation	2007

Water Quality & Treatment Solutions, Inc.		
Collimated-Beam UV Source for Bench-Scale Experimentation		2007
Metropolitan Water Reclamation District of Greater Chicago		
Expert Witness: Water Quality Standards		2008
Brown University		
Collimated-Beam UV Source for Bench-Scale Experimentation		2009
Biovir, Inc.		
Collimated-Beam UV Source for Bench-Scale Experimentation		2009
Research Foundation for Health and Environmental Effects		
Development of Workshop Agenda for Research on Swimming Pool Chemistry		2009
Clorox		
Chlorine Chemistry		2009
Siemens Corp./ITT		
Photochemical Reactor Design Optimization		2010
DuPont/Teijin Films		
Membrane-Based Water Treatment Systems		2011
Nalco		
Chlorine Chemistry		2011
Xylem		
Optimization of UV Reactor Design for Water Treatment		2012-2013
AmiNO LLC		
Professor Blatchley formed this small business to allow pursuit of research funding through Federal and other granting agencies.		2016-
Trojan Technologies		
Development of a textbook on the topic of photochemical reactors.		2017-2022
Trojan Technologies		
Evaluation of the use of UV radiation in the dairy industry		2019-2021
XCMR		
Development of near-field infection control protection		2021-
SafeTraces		
Development of in-situ testing methods and materials for disinfection of indoor air		2023-
Martin Aquatic		
Analysis of chlorine consumption in Blue Mar Basins		2023-2024

Myrtha Pools

Development of system for improvement of indoor air quality in aquatics facilities 2023-