

Curriculum Vitae for John C. Crittenden, Ph.D., P.E., F.ASCE, N.A.E., C.A.E.
(Revised 2/21/2022)

**Director of the Brook Byers Institute for Sustainable Systems
Hightower Chair and GRA Eminent Scholar in Sustainable Technologies
School of Civil and Environmental Engineering**

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I. EARNED DEGREES

University of Michigan, Ann Arbor	Ph.D. Civil Engineering: Environmental Engineering	1976
University of Michigan, Ann Arbor	MSE Civil Engineering: Environmental Engineering	1972
University of Michigan, Ann Arbor	BSE Chemical Engineering	1971

II. EMPLOYMENT

Director of the Brook Byers Institute for Sustainable Systems, Hightower Chair and GRA Eminent Scholar in Sustainable Systems, Professor of Civil and Environmental Engineering, Georgia Institute of Technology (January 1, 2009-present).

Co-Editor-in-Chief, Frontiers in Environmental Science and Engineering, publication of the Transactions of the Chinese Academy of Engineering, co-published by Higher Education Press (Beijing, China) and Springer Science+Business Media (2015 to present).

Crittenden and Associates, Atlanta, GA, President (2009 to present).

Executive Associate Editor, Frontiers of Chemical Science and Engineering (2014 to 2017).

Richard Snell Presidential Chair, Civil and Environmental Engineering, Arizona State University (January 1, 2004 to December 31, 2008).

Presidential Professor, Department of Civil Engineering (Environmental Engineering Program), and Adjunct Professor of Chemical Engineering, Michigan Technological University, Houghton, Michigan (1988 to 2003).

Associate Editor, Environmental Science and Technology, American Chemical Society Publication with a Readership of about 10,000, Washington, D. C. (1998 to present).

Director, Center for Clean Industrial and Treatment Technology, an EPA Funded Research Center of Excellence dedicated to Pollution Prevention, Consortium of MTU, UW-Madison, UM-Minneapolis-St. Paul (June 1992 to Present).

Superior Engineering Technologies, consulting eng. practice, 1/3 ownership, Houghton, MI (1993 - 2004).

Professor of Civil Engineering (Environmental Engineering Program) and Adjunct Professor of Chemical Engineering, Michigan Technological University, Houghton, Michigan (1984 to 2003).

Adjunct Associate Professor of Chemical Engineering, Michigan Technological University, Houghton, Michigan (September 1981 to September 1984).

Associate Professor of Civil Engineering, Environmental Engineering Section, Michigan Technological University, Houghton, Michigan (September 1981 to September 1984).

Assistant Professor of Civil Engineering, Environmental Engineering Section, Michigan Technological University, Houghton, Michigan (November 1979 to September 1981).

Assistant Professor of Civil Engineering, Environmental Engineering Section, University of Illinois, Urbana, Illinois (August 1978 to November 1979).

Assistant Professor of Civil and Environmental Engineering, Environmental Engineering Section, Washington State University, Pullman, Washington (February 1977 to August 1978).

Senior Vice President (Principal in the company with 1/3 ownership), Limno Tech, Inc., Ann Arbor, Michigan (August 1975 to February 1977).

III. TEACHING

Georgia Institute of Technology:

- CEE 4803 - Sustainable Engineering
- CEE 6345 - Sustainable Engineering
- CEE 8813 - Sustainable Engineering

Michigan Technological University:

- CEE 351 - Introduction to Environmental Engineering
- CEE 361 - Hydromechanics
- CEE 451 - Water and Wastewater Treatment
- CEE 452 - Examination of Water and Wastewater, Water Chemistry
- CEE 453 - Environmental Impact and Protection
- CEE 552 - Industrial Waste Treatment
- CEE 553 - Environmental Process Eng.: Fundamentals of Material Balances and Reactor Eng.
- CEE 556 - Separation and Oxidation Processes

Arizona State University:

- CEE 598 - Environmental Process Engineering
- CEE 598 - Sustainability Engineering
- CEE 561 - Physical and Chemical Treatment
- CEE 568 - Unit Operations
- CEE 462 - Water and Waste Water Treatment

A. INDIVIDUAL STUDENT GUIDANCE

POSTDOCTORAL FELLOWS

Michigan Technological University

Name	Dates
Saturo Kato - Tokyo Metropolitan University	1989 - 1990
Ke Li	2001 - 2004
Qiong Zhang	2001 - 2003
Yongsheng Chen	2002 - 2004

Georgia Institute of Technology

Name	Dates
Ming Xu - Asst. Prof., Univ. of Michigan, School of Natural Resources & Env.	2009 - 2010
Arka Pandit - Assistant Professor, University of South Alabama	2015 - 2017
Jean-Ann James - Turner Foundation	2016 - 2017
Zhongming Lu - Beijing Normal University	2016 - 2017
Jinming Luo	2017 - 2020
Siyu Zhang	2018 - 2020
Xin Tong	2018 - 2021
Dong Wang	2018 - 2020
Xiaoyang Meng	2019 - 2021

Su Liu	2021 - Present
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PH.D STUDENTS ADVISED

University of Illinois

Name	Grad. Date
Bill Thacker (Co-Advisor: Vern Snoeyink)	1979
Mike Lee (Co-Advisor: Vern Snoeyink)	1980

Michigan Technological University

(note: MTU's Ph.D. program started in 1986.)

Name	Grad. Date
Harish Arora	1989
Mohamed El-Behlil	1990
Sawang Notthakun	1991
David Hand	1991
Shanmugalingam Bhuvendralingam	1992
Yin Zhang	1994
Junbiao Liu	1995
Rominder Suri	1995
Dinorah Audeves	1998
Qiong Zhang	2001
Hebi Li (Co-Advisor: Jim Mihelcic)	2001
Sompop Sanongaj	2001
Wipada Dechapanya	2001
Ron Martin (Co-Advisor: Jim Mihelcic)	2002
Ke Li	2002
Ji Yang	2003
Dave Hokanson (Co-Advisor: David Hand)	2003

Arizona State University

Name	Grad. Date
Yang Zhang (Co-Advisor: Paul Westerhoff)	2007
Dan Gerrity (Co-Advisor: Morteza Abbaszadegan)	2007

MS STUDENTS ADVISED

Washington State University

Name	Grad. Date
S. Ganesan	1978

University of Illinois

Bryant Wong	1980
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Georgia Institute of Technology

Name	Grad. Date
Daisuke Minakata	2010
Ryan Ravenelle (Co-Advisor: Carsten Sievers)	2011
Hyunju Jeong	2013
Arka Pandit	2014
Zhongming Lu	2015
Chen Chen	2015
Elizabeth Minne	2015
Jean-Ann James	2015
Xuewei Yu	2015
Xin Guo	2015
Xiaoyang Meng	2018
Weiqiu Zhang	2019
Junchen Yan	2020
Su Liu	2021
Osvaldo Broesicke	Current
Kaihang Zhang	Current
Zefang Chen	Current

Arizona State University

Name	Grad. Date
Erin Lyons	2006
Peng Zhang	2008
Ramzy Kahat	2009

MS STUDENTS ADVISED (CONTINUED)**Michigan Technological University**

Name	Grad. Date
Hannu Hautakangas	
Rominder Suri	1992
Shumin Hu	
John Trynoski	
John Berrigan	
Randy Cortright	
Brad Rick	
Paul Luft	
Gary Freedman	
Scott Loper	
Sompop Sanongaj	
Wipada Dechapanya	
Chunhua Zhao	
Ji Yang	
Dave Hand	
Kartik Vaith	
George Jacque	
John Mourand	
Nicolas Mougamadou	
Eric Klun	
Peter Allgeier	
Peter Koepfgen	
John Bulloch	
Shumin Hu	
Volker Selzer	
Shin-Ru Tang	
Chandrashekar Koganti	

VISITING STUDENTS**Georgia Institute of Technology**

Name	Dates
Chi Peng - RCEES	2012 - 2013
Yuheng Feng - Zhejiang University	2012 - 2013
Sergiy Smetana - NAS of Ukraine	2012 - 2013
Ruzhen Xie - Sichuan University	2012 - 2014
Manhong Huang - Donghua University	2013 - 2014
Yajie Qian - Tongji University	2014 - 2015
Jinming Luo - Chinese Academy of Sciences	2014 - 2017
Jing Ren - Tianjin University	2014 - 2015

Georgia Institute of Technology

Name	Grad. Date
Ruthie Taylor	2011
Ruoren Yu	2012
Nicholas Cooper	2012
Supreet Gupta	2014
Yixin Liu	2014
Yu Feng	2014
Sen Yang	2016
Junchen Yan	2016
Junyi Shen	2018
Yaye Wang	2018
Kathleen DeBrotta	2018
Yanchao He	2018
Qiguang Ji	2018
Shengtao Jiang	2018
Sihan Qiu	2019

RESEARCHERS**Michigan Technological University**

Name	Dates
David Hand - Research Engineer	1980 - 1988
David Hokanson - Research Engineer	1998 - 2004

Arizona State University

Ke Li - Research Assistant Professor	2004- 2008
Yongsheng Chen - Research Assoc.Prof.	2004 - 2008
Hugo Destailats - Research Assoc.Prof.	2006 - 2008

Georgia Institute of Technology

Daisuke Minakata -Research Engineer	2010 - 2013
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VISITING STUDENTS (CONTINUED)**Georgia Institute of Technology**

Name	Dates
Fang Tang - Tsinghua University	2014 - 2015
Yu Tao - Chinese Academy of Sciences	2015 - 2016
Dongqin He - Univ. of Sci. & Tech. of China	2015 - 2016
Shumin Zhu - Tongji University	2017 - 2018
Saige Wang - Beijing Normal University	2018 - 2019
Feilong Dong - Zhejiang University	2018 - 2019
Liping Wang - Chang'an University	2018 - 2020

VISITING STUDENTS (CONTINUED)**Georgia Institute of Technology**

Guangpeng Yang - Chongqing University	2018 - 2020
Dong Wang - Visiting Post-Doctoral Fellow	2018 - 2020
Guanglan Di - Tongji University	2019 - 2021
Wei He - Chongqing University	2019 - 2021
Deyou Yu - Zhejiang Sci-Tech University	2019 - 2020
Qiong Wu - Liaoning University	2019 - 2020

VISITING FACULTY**Arizona State University**

Name	Dates
Satoshi Kaneco - Mie University, Japan	2006
A. H. Konsowa - Alexandria Univ., Egypt.	2008
Wenhui Xu - ZheJiang Forestry Institute, China	2008

VISITING FACULTY**Georgia Institute of Technology**

Name	Dates
Lifen Liu - Dalian University of Technology	2010 - 2011
Xiao Lin - Chinese Academy of Sciences	2010 - 2011
LinLin Xing - Chinese Academy of Sciences	2010 - 2011
Baicang Liu - Sichuan University	2011 - 2012
Wenhui Yuan - South China University of Technology	2011 - 2012
Joohyun Baek - Seoul National University	2011 - 2012
Guangshan Zhang - Harbin Institute of Technology	2010 - 2012
Yupeng Li - IPE	2012 - 2013
Jianbing Wang - Chinese University of Mining & Technology	2012 - 2013
Haiyan Wang - Chinese Research Academy of Environmental Sciences	2012 - 2013
Xia Yang - Northeast Normal University	2012 - 2013
Zongsheng Zhao - Beijing Jiaotong University	2012 - 2013
Jinfeng Wang - Shandong University of Science and Technology	2013 - 2014
Heping Shi - Inner Mongolia Agricultural University	2013 - 2014
Min Song - Southeast University	2013 - 2014
Yaping Zhang - Jimei University	2013 - 2014
Peng Zhao - Tianjin University	2013 - 2014
Hongbin Yu - Northeast Normal University	2013 - 2014
Liang Wang - Tianjin Polytechnic University	2013 - 2014
Jianfeng Peng - Chinese Research Academy of Environmental Sciences	2013 - 2014
Xubiao Luo - Nanchang Hangkong University	2013 - 2014

Georgia Institute of Technology (continued)

Name	Dates
Hongbin Cao - Chinese Academy of Sciences	2013 - 2014
Tianxin Li - University of Science and Technology Beijing	2013 - 2014
Qizhou Dai - Zhejiang University of Technology	2014 - 2015
Qian Feng - Hohai University	2014 - 2015
Wenchao Liao - Xiamen University of Technology	2014 - 2015
Xiaodong Ma - Nankai University	2014 - 2015
Peng Yue - Tsinghua University	2014 - 2015
Ting Qiu - Fuzhou University	2014 - 2016
Hong Sui - Tianjin University	2014 - 2015
Ying Wang - Beijing Normal University	2014 - 2015
Yuan Wang - Guizhou University	2014 - 2015
Jinhai Yuan - Chongqing University of Science & Technology	2014 - 2015
Wei Zhang - East China University of Science and Technology	2014 - 2015
Mili Weng - Zhejiang Agriculture and Forestry University	2015
Cong Li - Zhejiang University	2015 - 2016
Ling Li - Fuzhou University	2015 - 2016
Xueyuan Li - Suzhou University of Science and Technology	2015 - 2016
Tianyin Huang - Suzhou University of Science and Technology	2015 - 2016
Guozhu Mao - Tianjin University	2015 - 2016
Qi Wang - Zhejiang Gongshang University	2015 - 2016
Lihua Zhang - Sanming University	2015 - 2016

VISITING FACULTY

Georgia Institute of Technology (continued)

Name	Dates
Yinghong Guan - Northeast Agricultural University	2016
Zan Qu - Shanghai Jiao Tong University	2016
Mei Lan - Hebei University of Engineering	2016 - 2019
Li Lin - Changjiang River Scientific Research Institute	2016 - 2017
Honghong Lyu - Nankai University	2016 - 2017
Yang Pan - Suzhou University of Science and Technology	2016 - 2017
Chunyan Sun - Shaoxing University	2016 -2017
Xiao Sun - Chinese Academy of Sciences	2016 - 2017
Xiang Tu - Chinese Research Academy of Environmental Sciences	2016 - 2017
Lin Deng - Hunan University	2016 - 2019
Bing Wang - Shenyang Jianzhu University	2017
Lining Wang - Huazhong University of Science and Technology	2016 - 2017
Jie Yang - Zhejiang University of Water Resources and Electric Power	2017
Haixia Zhang - Hebei University of Eng.	2017 - 2018
Wen Zhang - Tianjin University	2017 - 2018
Yan Zhang - Shandong University of Science and Technology	2016 - 2017
Yulan Tang - Shenyang Jianzhu University	2014 - 2015
Yongjun Liu - Dalian Maritime University	2015 - 2016
Gaolan Hou - Beijing Institute of Technology	2015
Heping Huang - Jiangxi University of Finance and Economics	2015 - 2016
Shiqing Zhou - Hunan University	2017 - 2018
Runlong Hao - North China Electric Power University	2017 - 2018
Wei Wang - Heilongjiang Institute of Tech	2017 - 2018
Lin Wu - Yancheng Teachers University	2017 - 2018
Ji-Feng Yang - Hunan University of Arts and Science	2017 - 2018
Yunxiang Bai - Jiangnan University	2018 - 2019
Jing Deng - Zhejiang University of Science	2018 - 2019

VISITING FACULTY

Georgia Institute of Technology (continued)

Name	Dates
Feng Gao - Tianjin University	2018 - 2019
Songyan Qin - Tianjin University	2018 - 2019
Can Wang - Tianjin University	2017 -2018
Xiaoxia Wang - Qingdao University	2018 - 2019
Guoquan Zhang - Dailan University of Technology	2018 - 2019
Jing Chen - Huazhong University of Science and Technology	2018 - 2019
Zihilin Ran - Shenzhen Institute of Information Technology	2018 - 2019
Xiaojun Wang - Chinese Academy of Sciences	2018 - 2019
Jialiang Zhang - University of Science & Tech. Beijing	2018 - 2019
Jingge Shang - China Pharmaceutical University	2019 - 2019
Guoquan Zhang - Dailan University of Technology	2018 - 2019
Yuling Zhang - North China Electric Power University	2018 - 2019
Fatao Wang - Hebei University of Economics and Business	2019 - 2020
Dan Qu - Tianjin University of Technology	2019 - 2020
Baolin Hou - Hunan University of Science and Technology	2019 - 2020
Junjing Li - Tiangong University	2019 - 2020
Lihua Sun - Beijing University of Civil Engineering and Architecture	2019 -2020
Li Zhang - Jiangnan University	2019 -2020
Dongjin Wan - Henan University of Tech	2019 - 2020
Yan Chen - Liaoning University	2019 - 2020
Shuzhan Li - Zhengzhou University	2019 - 2020
Yaobin Ding - South-Central University for Nationalities	2019 - 2020
Jing Wang - Henan Academy of Sciences	2019 - 2020
Peng Xu - Hunan University	2019 - 2020
Zhenzhen Xu - Chinese Academy of Agricultural Sciences	2019 - 2020
Wenyi Yuan - Shanghai Polytechnic Univ.	2019-2020
Yanrong Peng	2020-2021

B. OTHER TEACHING ACTIVITIES

Crittenden, John C.; Smetana, Sergiy; Pandit, Arka; "Target Plots for Environmentally Responsible Selection of Chemicals," Center for Sustainable Engineering Electronic Library for Educational Modules, 2016.

Center for Sustainable Engineering, Teach the Teacher Workshop, Instructor, Georgia Institute of Technology, July, 2013.

Center for Sustainable Engineering, Teach the Teacher Workshop, Instructor, Syracuse University, June, 2012.

Center for Sustainable Engineering, Teach the Teacher Workshop, Instructor, Syracuse University, May, 2011.

Center for Sustainable Engineering, Teach the Teacher Workshop, Instructor, Carnegie Mellon University, July, 2009.

Crittenden, John; Minakata, Daisuke; Guo, Xin; "Development of Simplified First Principle Models for Advanced Oxidation Processes," Center for Sustainable Engineering Electronic Library for Educational Modules, 2013.

Bridges, Michael; Pijawka, David; Murphy, Cynthia; Allen, David; Crittenden, John; Matthews, Scott; Allenby, Braden; Hendrickson, Chris; Davidson, Cliff; "Benchmarking Sustainable Engineering Education: Appendix D Syllabi for Sustainable Engineering – Final Report," Center for Sustainable Engineering Electronic Library for Educational Modules, 2013.

Bridges, Michael; Pijawka, David; Murphy, Cynthia; Allen, David; Crittenden, John; Matthews, Scott; Allenby, Braden; Hendrickson, Chris; Davidson, Cliff; "Benchmarking Sustainable Engineering Education: Appendix D Syllabi for Sustainable Engineering - Part 1," Center for Sustainable Engineering Electronic Library for Educational Modules, 2013.

Bridges, Michael; Pijawka, David; Murphy, Cynthia; Allen, David; Crittenden, John; Matthews, Scott; Allenby, Braden; Hendrickson, Chris; Davidson, Cliff; "Benchmarking Sustainable Engineering Education: Appendix D Syllabi for Sustainable Engineering - Part 2," Center for Sustainable Engineering Electronic Library for Educational Modules, 2013.

Bridges, Michael; Pijawka, David; Murphy, Cynthia; Allen, David; Crittenden, John; Matthews, Scott; Allenby, Braden; Hendrickson, Chris; Davidson, Cliff; "Benchmarking Sustainable Engineering Education: Appendix D Syllabi for Sustainable Engineering - Part 3," Center for Sustainable Engineering Electronic Library for Educational Modules, 2013.

Bridges, Michael; Pijawka, David; Murphy, Cynthia; Allen, David; Crittenden, John; Matthews, Scott; Allenby, Braden; Hendrickson, Chris; Davidson, Cliff; "Benchmarking Sustainable Engineering Education: Appendix D Syllabi for Sustainable Engineering - Part 4," Center for Sustainable Engineering Electronic Library for Educational Modules, 2013.

IV. SCHOLARLY ACCOMPLISHMENTS

A. PUBLISHED BOOKS AND BOOK CHAPTERS

Kerry Howe, D.W. Hand, J.C Crittenden, R. Trussell, and G. Tchobanoglous, *Principles of Water Treatment*, First Edition, 672 pages, ISBN 0470405384, John Wiley, NY (2012).

Minne, L., Pandit, A., Crittenden, J.C., Begovic, M., Kim, I., Jeong, H., James, J.-A., Lu, Z., Xu, M., French, S.P., Subrahmanyam, M., Noonan, D.S., Brown, M.A., Chandler, J., Chen, Y., Williams, E., Desroches, R., Bras, B., Li, K., Chang, M., "Energy and Water Interdependence, and Their Implications for Urban Areas", in: Meyers, R.A. (Ed.), *Encyclopedia of Sustainability Science and Technology*, pp. 3449-3471, Springer, 2012, ISBN 978-1-4419-0852-0, DOI: 10.1007/978-1-4419-0851-3.

Crittenden, John, Steve French, Arka Pandit, Hyunju Jeong, Ke Li, Ming Xu, "Sustainable Infrastructure and Alternatives for Urban Growth," in Cabezas, H. and Diwekar, U. (eds.), *Sustainability: Multidisciplinary Perspectives*, pp. 141-172 (32), ISBN: 978-1-60805-429-9, Bantam, 2012.

Pandit, A., Jeong, H., Crittenden, J.C., French, S., Xu, M., Li, K., "Sustainable Infrastructure and Alternatives for Urban Growth," in Cabezas, H. and Diwekar, U. (eds.), *Sustainability: Multidisciplinary Perspectives*, pp. 173-196 (24), ISBN: 978-1-60805-429-9, Bantam, 2012.

Hand, D.W., D.R. Hokanson, and J.C. Crittenden, Chapter 6. "Gas-Liquid Processes: Principles and Applications," *Water Quality and Treatment*, AWWA, Denver, CO published 2011.

Crittenden, J.C., R. Trussell, D.W. Hand, Kerry Howe, and G. Tchobanoglous, *Water Treatment: Principles and Design*, Third Edition, 1984 pages, John Wiley, NY (2011).

S. Guhathakurta, Y. Kobayashi, M. Patel, J. Holston, T. Lant, J. C. Crittenden, K. Li, K. Date. "Digital Phoenix project: A Multidimensional Journey Through Time," In., G. Steinebach, S. Guhathakurta, H. Hagen. Eds., *Visualizing Sustainable Planning*, Springer, Heidelberg, 2009.

Westerhoff, P. and Crittenden, J. "Urban infrastructure and use of mass balance models for water and salt". Chapter 4 in *The Water Environment of Cities* (Ed. Larry Baker), Springer, 49-68 (2009).

Westerhoff, P., Zhang, Y., Crittenden, J., Chen, Y. Chapter 4: "Properties of Commercial Nanoparticles that Affect Their Removal During Water Treatment," in *Fate and Transport of Nanomaterials in Nanoscience and Nanotechnology Environmental and Health Impacts*, Edited by Vicki H. Grassian, Wiley, pg 69-90 (2008).

John C. Crittenden (Member of a NRC Committee), "New Source Review for Stationary Sources of Air Pollution," National Research Council, National Academies Press, Washington, D.C., 310 pps (2006).

Crittenden, J.C., R. Trussell, D.W. Hand, Kerry Howe and G. Tchobanoglous, *Water Treatment: Principles and Design*, Second Edition, 1984 pages, John Wiley, NY (2005).

P.P. Radecki, Crittenden, J.C., D.R. Shonnard, and J.L. Bulloch, eds., *Emerging Separation and Separative Reaction Technologies*, Center of Waste Reduction Technologies, American Institute of Chemical Engineers, 1999 (319 pages).

Hand, D.W., D.R. Hokanson, and J.C. Crittenden, "Chapter 5. Air Stripping and Aeration", *Water Quality and Treatment*, AWWA, Denver, CO published 1999.

Sontheimer, H., J.C. Crittenden, and R.S. Summers, "Adsorption for Water Treatment", *DVGW Forschungsstelle*, Engler Bunte Institut, University of Karlsruhe, Federal Republic of Germany, distributed by AWWARF Denver, CO, 722 pp., 1988.

Fernando, H.J.S., Fink, J., Hyde, P., Crittenden, J. And Corley, E., "Challenges of Tackling Urban Systems," "Cities as Heroes" *Yale-IGES International Workshop on Urbanization and Environmental Change*, Oxford University Press, In Press.

REFEREED PUBLICATIONS

436. Kaixing Fu, Xia Liu, Chunyu Lv, Jinming Luo, Mingxing Sun, Shenglian Luo, John C. Crittenden. "Superselective Hg(II) Removal from Water Using a Thiol-Laced MOF-Based Sponge Monolith: Performance and Mechanism." *Environ. Sci. Technol.*, 56, 2677–2688 (2022). doi.org/10.1021/acs.est.1c07480
435. Xiang Zhang, Yue Xuan, Bin Wang, Chuan Gao, Shengli Niu, Gaiju Zhao, Dong Wang, Junhua Li, Chunmei Lu, John C. Crittenden. "Precise Regulation of Acid Pretreatment for Red Mud SCR Catalyst: Targeting on Optimizing the Acidity and Reducibility." *Front. Environ. Sci. Eng.*, 16, 7, 88, (2022). doi.org/10.1007/s11783-021-1447-x
434. Cong Zhang, Xin Zhao, Can Wang, Israel Hakizimana, John C. Crittenden, Azhar Ali, Laghari. "Electrochemical Flow-through Disinfection Reduces Antibiotic Resistance Genes and Horizontal Transfer Risk Across Bacterial Species." *Water Research*, 212, 118090 (2022). doi.org/10.1016/j.watres.2022.118090
433. Yan Huo, Dan Zhang, Jinghui Wu, Xianze Wang, Xiaohong Wang, Changlu Shao, John C. Crittenden, Mingxin Huo. "Oxidation of Phthalate Acid Esters Using Hydrogen Peroxide and Polyoxometalate/Graphene Hybrids." *Journal of Hazardous Materials*, 422, 136867 (2021). doi.org/10.1016/j.jhazmat.2021.126867
432. Xiaoran Zhao, Huaqing Zhao, Yan Zhang, Xianjun Lyu, Stephen Nyabire Akanyange, Cosmos Anning, John C. Crittenden, Xue Li. "KW-GO, a Graphene-like Carbon Extracted from Kitchen Waste (KW) Advances the Hydrogen Production of V₂O₅." *International Journal of Hydrogen Energy*, 47, 7, 4584-4593 (2021). doi.org/10.1016/j.ijhydene.2021.11.093
431. Xin Liu, Peng Xu, Qi Fu, Runhan Li, Chenxi He, Wenxuan Yao, Lei Wang, Shiqi Xie, Zhiyi Xie, Jingwei Ma, Qiulai He, John C. Crittenden. "Strong Degradation of Orange II by Activation of Peroxymonosulfate Using Combination of Ferrous Ion and Zero-valent Copper." *Separation and Purification Technology*, 278, 119509, (2021). doi.org/10.1016/j.seppur.2021.119509
430. Yueshuang Mao, Pengfei Wang, Dongpeng Zhang, Yuguo xia, Yi Li, Wenlu Zeng, Sihui Zhan, John C. Crittenden. "Accelerating Fe^{III}-Aqua Complex Reduction in an Efficient Solid-Liquid-Interfacial Fenton Reaction over the Mn-CH Co-catalyst at Near-Neutral pH." *Environ. Sci. Technol.*, 55, 19, 13326–13334, (2021). doi.org/10.1021/acs.est.1c04534
429. Yumeng Wang, Lai Lyu, Di Wang, Han-Wing Yu, Tong Li, Yaowen Gao, Fan Li, John C. Crittenden, Lili Zhang, Chun Hu. "Cation- π Induced Surface Cleavage of Organic Pollutants with OH Formation from H₂O for Water Treatment." *iScience*, 24, 8, 102874, (2021). doi.org/10.1016/j.isci.2021.102874
428. Osvaldo A. Broesicke, Junchen Yan, Valerie M. Thomas, Emily Grubert, Sybil Derrible, and John C. Crittenden. "Combined Heat and Power May Conflict with Decarbonization Goals-Air Emissions of Natural Gas Combined Cycle Power versus Combined Heat and Power Systems for Commercial Buildings." *Environ. Sci. Technol.*, 55, 15, 10645–10653 (2021). doi.org/10.1021/acs.est.1c00980

427. Bin Wang, Guangpeng Yang, Qilei Yang, Bing Li, Dong Wang, Yue Peng, Junhua Li, Chumei Lu, John C. Crittenden. "Fabrication of Nanohybrid Spinel@CuO Catalysts for Propane Oxidation: Modified Spinel and Enhanced Activity by Temperature-Dependent Acid Sites." *ACS Appl. Mater. Interfaces*, 13, 23, 27106–27118, (2021). doi.org/10.1021/acscami.1c06633
426. Xin Tong Su Liu, Yangying Zhao, Yongsheng Chen, John C. Crittenden. "Influence of the Exclusion-Enrichment Effect on Ion Transport in Two-Dimensional Molybdenum Disulfide Membranes." *ACS Appl. Mater. Interfaces*, 13, 23, 26904–26914 (2021). doi.org/10.1021/acscami.1c03832
425. Stephen Nyabire Akanyange, Xianjun Lyu, Xiaohan Zhao, Xue Li, Yan Zhang, John C. Crittenden, Cosmos Anning, Tianpeng Chen, Tianlin Jiang, Huaqing Zhao. "Does Microplastic Really Represent a Threat? A Review of the Atmospheric Contamination Sources and Potential Impacts." *Science of the Total Environment*, 777, 146020 (2021). doi.org/10.1016/j.scitotenv.2021.146020
424. Xin Lu, Qi Fu, Peng Xu, Pengfei Zhu, Zhuoyu Yang, John C. Crittenden. "Rapid Determination of Monopersulfate with Bromide Ion-catalyzed Oxidation of 2, 2'-axio-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS))." *Chemical Engineering Journal*, 133551 (2021). doi.org/10.1016/j.cej.2021.133551
423. Li, Xue, Xianjun Lyu, Xiaohan Zhao, Yan Zhang, Stephen Nyabire Akanyage, John C. Crittenden, Huaqing Ahao Tianlin Jiang. "Enhanced Photocatalytic H₂ Evolution over In₂S₃ via Decoration with GO and Fe₂P Co-catalysts." *International Journal of Hydrogen Energy*, 46, 35, 18376-18390, (2021), doi.org/10.1016/j.ijhydene.2021.03.017
422. Xin Wang, Yuchao Zhang, Hongli Zhang, Xiaolong Wu, Jaiqi Ding, Linling Wang, Jing Chen, Xiaohui Wu, Jinguang Xiao, Lei Wang, Daniel C.W. Tsang, John Crittenden. "Insights Into Deep Decline of As(III) Partial Oxidation During Lime Stabilization of As-Ca Sludge." *Journal of Hazardous Materials*, 44, 127575 (2022). doi.org/10.1016/j.hazmat.2021.127575
421. Guozhu Mao, Yixin Han, Xi Liu, John C. Crittenden, Ning Huang, Umme Marium Ahmad. "Technology Status and Trends of Industrial Wastewater Treatment: A Patent Analysis." *Chemosphere* 288, 132783 (2022). doi.org/10.1016/j.chemosphere.2021.132483
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D. PRESENTATIONS

157. John Crittenden and Oswaldo Broesicke, "Air Pollutant, Water, and Greenhouse Gas Emission Reductions Using Decentralized Power Generation," presented at the International Summit Forum on Environmental Protection and Low-Carbon Technology," hosted by Tianjin University, November 28, **2021**. (>1000 in attendance).
156. Dr. John C. Crittenden, Dr. Can Wang, Dr. Xin Tong, Dr. Su Liu, Dr. Xiaojun Wang, Kaihang Zhang, Zefang Chen, Hualiang Feng, Zhang Cong, Zhao Xin, Junfeng Nui, David Kujawski and Yuanzheng Zhang, "Advances in Electrochemical Advanced Oxidation and Reduction Processes for Water Treatment," presented at the National Alliance for Water Innovation Symposium on Electrification of Water Treatment, Lawrence Berkeley Lab, Berkeley, CA, October 27, **2021**.
155. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at iFAST: The International Forum on Advanced Environmental Sciences and Technology, University of Oklahoma (virtual), September 15, **2021**.
154. John C. Crittenden, "Electrochemical advanced oxidation/reduction processes (EAOP/EARP)," keynote speaker for Electrified Water Treatment Processes Symposium presented at American Chemical Society National Meeting, and Exposition Atlanta, GA, August 24, **2021**.
153. John C. Crittenden, "Advances in Chemical Oxidative Processes for Emerging Contaminants in Water & Wastewater," presented at American Chemical Society National Meeting and Exposition, Atlanta, GA, August 23, **2021**.
152. John C. Crittenden (Coeditor in Chief), "Opening Remarks at the 15th anniversary of the Launch of the Frontiers in Environmental Science and Engineering Journal," presented at a Forum at Tsinghua University Meeting, Beijing, China, August 23, **2021**.
151. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at Georgia Tech Tianjin Shenzhen Institute, July 12, **2021**.
150. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at Princeton University, Princeton, NJ, February 20, **2020**.
149. Kaihang Zhang, Zefang Chen, John C. Crittenden, Can Wang, "Development of electrochemical flow through anodes composed of enhanced TiO₂-nanotubes and SnO₂-Sb₂O₃," presented at Nanchang Hangkong University, Nanchang, China, January 10, **2020**.
148. Kaihang Zhang, Zefang Chen, Duo Li, Chao Huang, John C. Crittenden, "Our Recent Developments in Electrochemical Advanced Oxidation Processes (EAOPs)," presented at Dongguan University of Technology, Dongguan, Guangdong, China, November 3, **2019**.
147. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at Soochow University, Suzhou, China, November 2, **2019**.
146. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at Tsinghua University, Beijing, China, August 26, **2019**.
145. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the 2019 CSES Annual Conference on Environmental Science and Technology, Xian, China, August 23 - 25, **2019**.

144. John C. Crittenden, Osvaldo A. Broesicke, Junchen Yan, "The Water-Energy Nexus: Technology and Policy," presented at the 4th Annual IWA Summit on Urban Water, Harbin Institute of Technology, Harbin, P.R. China, November 25-27, **2018**.
143. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the 2018-19 Rockwell Lecture Series, University of Houston, Houston, Texas, USA, October 19, **2018**.
142. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the (combined) 9th Annual USA India Business Summit & 24th Annual Georgia Tech Global Business Forum, Georgia Institute of Technology, Atlanta, Georgia, USA, August 29, **2018**.
141. Weiqiu Zhang, Shiqing Zhou, Shiqing Zhou, Jinming Luo, John C. Crittenden, "Insight Into the Oxidation Mechanism of UV/Free Chlorine Process," presented at the 256th American Chemical Society Annual Meeting, Boston, Massachusetts, USA, August 21, **2018**.
140. Xiaoyang Meng, Weiqiu Zhang, John C. Crittenden, "The Application of Advanced Oxidation Processes (AOPs) and Development of Electrochemical and Development of Electrochemical Advanced Oxidation Processes (EAOPs): from Bench to Pilot Scale," presented at the 256th American Chemistry Society Annual Meeting, Boston, Massachusetts, USA, August 21, **2018**.
139. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the Georgia Tech Tianjin University Shenzhen Institute Forum, Shenzhen, China, July 18, **2018**.
138. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the Changjiang River Scientific Institute, Wuhan, China, June 5, **2018**.
137. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the South China University of Technology, Guangzhou, China, June 3, **2018**.
136. John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the Tsinghua Environmental Forum, Special Session for the Chinese and U.S. Academies of Engineering to coincide with the 14th Chinese Academy of Engineering General Assembly, Tsinghua University, Beijing, China, May 29, **2018**.
135. John C. Crittenden, Xiaoyang Meng, Jinming Luo, Junfeng Niu, Duo Li, "Treatment of Refractory Petrochemical Wastewater Using Advanced Oxidation and Biological Treatment: Bench to Full Scale," presented at the International Downstream Water Conference, CNPC and Suez, Chengdu, China, March 13 - 14, **2018**.
134. Weiqiu Zhang, Xiaoyang Meng, John C. Crittenden, "Summary of Advanced Oxidation Processes Work at the Brook Byers Institute for Sustainable Systems," presented at the Nanchang Hang Kang University, Nanchang City, China, September 18, **2017**.
133. John C. Crittenden, "Petroleum Refinery Wastewater Treatment, Water Recycle and Reuse-North American Experience," keynote presentation to the Beijing Humboldt Forum, Beijing, China, September 17, **2017**.
132. John C. Crittenden, "Create More Sustainable and Resilient Infrastructure," plenary talk presented to the Beijing Humboldt Forum, Beijing, China, September 16, **2017**.

131. John C. Crittenden, Zhongming Lu, Sun Xiao, Osvaldo Broesicke, "Welcome to Mars: Systems Level Approaches to Create More Sustainable Water Resources," presented to the Chinese Academy of Engineering International Summit Forum, Beijing, China, August 27 - 29, **2017**.
130. John C. Crittenden, "Create More Sustainable and Resilient Infrastructure - Gigatech: The Largest Infrastructures in Which Humans Manipulate Matter and Energy," presented to the Scientific Planning and Green Forum, Hebei University, Beijing, China, August 13, **2017**.
129. John C. Crittenden, "Gigatechnology: The Largest Infrastructures in Which Humans Manipulate Matter and Energy," presented at the inauguration of The Research Center for Green Buildings and Sponge Cities at the Georgia Tech Tianjin University Shenzhen Institute, Shenzhen, China, May 20, **2017**
128. John C. Crittenden, "Remediation in China: Challenges and Opportunities," presented as Session Chair to Track 3 (International Experiences: It's a Small World After All) of the Remediation Technology Summit (REMTEC), Denver, Colorado, USA, March 8, **2017**.
127. John Crittenden, "Water for Everything and the Transformative Technologies to Improve Water Sustainability," presented at the Water-Energy Nexus Seminars, Lawrence Berkeley National Laboratory, Berkeley, California, November 15, **2016**.
126. John Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the 2016 Hal and Nina Fetner Fellow Seminar, Sustainable Enterprise Partnership, Syracuse University, Syracuse, New York, October 29-30, **2016**.
125. John Crittenden, "Development of Efficient Electrochemical Anodes for Organic Pollutant Destruction: From Bench Scale to Full Scale Application," presented at the Hong Kong University of Science and Technology, Institute of Advanced Studies Summit, Session 3, Hong Kong, October 20, **2016**.
124. John Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the 2016 International Conference on Sustainable Infrastructure, Session 4, Shenzhen, China, October 17, **2016**.
123. John Crittenden, "State-of-Practice in Urban Sustainability Assessment and Management," participant in panel discussion, U.S. EPA Urban Sustainability Assessment and Management Workshop, Chicago, IL, July 20, **2016**.
122. John C. Crittenden, "What's Happening in Research?" presented at the International Water Association Nano & Water Specialist Conference, Rice University, Houston Texas, May 18, **2016**.
121. John Crittenden, Yongsheng Chen, Xiaoyang Meng, Yue Peng, Jinming Luo, Guangshan Zhang, Wen Zhang, Junfeng Niu, Qizhou Dai, "Nanoscale Analysis for Designing Nanomaterials for Environmental Applications," presented at the Frontiers of Chemical Science and Engineering Conference, Beijing, China, February 24–26, **2016**.
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116. John C. Crittenden, "Water for Everything and the Transformative Technologies to Improve Water Sustainability," presented at the NWRI Athalie Richardson Irvine Clarke Prize Lecture, October 30, **2015**.
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110. John C. Crittenden, "The Future of the Earth: The Need to Transform the Urban Infrastructure Systems," presented at the first Shanghai International Urban Design Forum, Tongji University, Shanghai, China June 5, **2015**.
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E. OTHER SCHOLARLY ACCOMPLISHMENTS

Patents and Patent Disclosures

Xiaoyang Meng, Yongsheng Chen, John C. Crittenden, "Using Titanium Dioxide Nanotubes as an Electrode Material to Increase Electrode Conductivity and Decrease Energy," U.S. Provisional Patent Application, Attorney Docket No.62/382,659, September 1, 2016.

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Crittenden, John C., Sawang Notthakun, David W. Hand, and David L. Perram, "Regeneration of Adsorbents Using Photocatalytic Oxidation," U.S. Patent Number 5,182,030, Effective Date: January 26, 1993.

Liu, Junbiao, David Hand, John C. Crittenden, and David L. Perram, "Magnetic Photocatalyst," Patent Application No. 931,859, I.D. 9126, M. Best & Friedrich File 66040/9567, August, 1991.

Yongsheng Chen, John C. Crittenden, Dave Perram, and David W. Hand, Production of Methanol from Methane in the Gas Phase, Our invention subjects methane and/or H₂O₂, O₂, air and water vapor to the light in contact with a transition metal oxide photocatalyst in the gas phase. Here, the photocatalyst may contain surface coatings chosen from the group of metals comprising vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, gold, ruthenium, rhodium, lanthanum, silver, palladium, platinum, strontium, and combinations thereof. The transition metal is chosen from the group comprising titanium, vanadium, cobalt, zinc, tungsten, niobium, cadmium, bismuth, iron, and combinations thereof.

Computer Software (Copywritten)

Hand, D.W., D.R. Hokanson, J.C. Crittenden, and T.N. Rogers, "Adsorption Simulation Software." This software has a user-friendly graphical user interface written in Visual Basic. It links data and FORTRAN routines and provides expert guidance. It contains about 10,000 lines of code and ties together many routines that have been written in the past 15 years. The software can be used to predict the removal of organics from air and water using fixed bed adsorbers.

Hokanson, D.R., D.W. Hand, J.C. Crittenden, and T.N. Rogers, "Air Stripping and Aeration Processes Simulation Software." This software has a user-friendly graphical user interface written in Visual Basic. It links data and FORTRAN routines and provides expert guidance. The software can be used to predict the removal of organics from water using air stripping towers, and aerated basins.

Hokanson, D.R., M. Miller, D.W. Hand, T.N. Rogers, and J.C. Crittenden, "Software to Estimate Physical Properties of Chemicals." This software has a user-friendly graphical user interface written in Visual Basic. It links data and FORTRAN routines and provides expert guidance. The software can be used to predict the physical properties of organic compounds in air and water (e.g., diffusivities, Henry's constants, octanol water partition coefficients, etc.).

Hokanson, D.R., D.W. Hand, J.L. Bulloch, and J.C. Crittenden, "Software to Simulation the Multifiltration Bed of the International Space Station." This software has a user-friendly graphical user interface written in Visual Basic. It links data and FORTRAN routines and provides expert guidance. It contains about 15,000 lines of code and ties together many routines that have been written in the past 15 years. The software can be used to predict the removal of inorganics and organics from water using fixed bed adsorbers and ion exchange resins.

Ke Li, John C. Crittenden, David Hand, David Hokanson, "Software to Predict the Performance of Advanced Oxidation Processes (AdOxTM), AdOxTM is designed for the Microsoft Windows environment with a graphical user interface (GUI) to maximize user-friendliness. The GUI consists of a Microsoft Visual Basic front-end shell that calls FORTRAN subroutines to perform the calculations. The model can be used to predict removal of up to 10 target compounds by UV/H₂O₂ process in various reactor configurations.

John C. Crittenden, James R. Mihelcic, Hebi Li, Software to Predict the Performance of Biofilters (BiofilterTM). BiofilterTM consists of a Microsoft Visual Basic front-end shell that calls FORTRAN subroutines to perform the calculations. The eBiofilterTM software includes a II-phase and a III-phase model to simulate performance of biofilter under different flow pattern.

Reports

Domenico Grasso, John C. Crittenden (in his role as member of the National Academy of Engineering Committee On Grand Challenges and Opportunities In Environmental Engineering For The Twenty-First Century), and numerous coauthors, "Environmental Engineering for the 21st Century: Addressing Grand Challenges," National Academies Press, ISBN 978-0-309-47652-2, 2018, 120 pgs., [DOI: 10.17226/25121](#).

Michael C. Cavanaugh, John C. Crittenden (in his role as member of the National Research Council of the National Academies' Committee on Scientific Tools and Approaches for Sustainability), and numerous coauthors, "Sustainability Concepts in Decision-Making: Tools and Approaches for the US Environmental Protection Agency," ISBN 978-0-309-31232-5, 2014, 155 pgs., [DOI: 10.17226/18949](#).

Westerhoff, P.; Crittenden, J.; Moon, H.; Minakata, D. Oxidative Treatment of Organics in Membrane Concentrates. Water Reuse Research. 2010. Water Reuse Research Foundation. Alexandria, VA. 75 pgs.

John C. Crittenden (Member of EPA's National Advisory Council and Environmental Policy and Technology), "EPA Technology Programs and Intra-Agency Coordination," EPA Report, EPA 100-R00-021, 2006, 46 pgs.

Crittenden, J.C. and numerous Co PIs at MTU, the University of Wisconsin-Madison and the University of Minnesota-Minneapolis: "Activities Report for Center for Clean Industrial and Treatment Technologies", Annual Report to Office of Research and Development, Washington, D.C., USEPA for October 1997 to September 1998, 58 pps.

Crittenden, J.C. and numerous Co PIs at MTU, the University of Wisconsin-Madison and the University of Minnesota-Minneapolis: "Activities Report for Center for Clean Industrial and Treatment Technologies", Annual Report to Office of Research and Development, Washington, D.C., USEPA for October 1996 to September 1997, 59 pps.

Crittenden, J.C. and numerous Co PIs at MTU, the University of Wisconsin-Madison and the University of Minnesota-Minneapolis: "Activities Report for Center for Clean Industrial and Treatment Technologies", Annual Report to Office of Research and Development, Washington, D.C., USEPA for October 1995 to September 1996, 55 pps.

Hand, D.W., B. Clancy, J.L. Bulloch, D.R. Hokanson, D.L. Perram, and J.C. Crittenden, "Development and Verification of the Space Station Multifiltration Model", ION Electronics/NASA, Huntsville, AL, 400 pps (1995).

Crittenden, J.C., R. Suri, Y. Zhang, M.E. Mullins, and D.W. Hand, "Phases I, II, III - Evaluation of the Technical Feasibility of Photocatalytic Oxidation and Phase Transfer Catalysis for Removal and Destruction of Contaminants from Water", U.S. Air Force, Tyndall AFB, FL (1995).

Hand, D.W., Capt. E. Marchand, and J.C. Crittenden, "Catalytic Oxidation of Trichloroethene with Ambercat", U.S. Air Force, Tyndall AFB, FL (1995).

Crittenden, J.C. and numerous Co PIs at MTU, the University of Wisconsin-Madison and the University of Minnesota-Minneapolis: "Activities Report for Center for Clean Industrial and Treatment Technologies", Annual Report to Office of Research and Development, Washington, D.C., USEPA for October 1994 to September 1995, 90 pps.

Crittenden, J.C. Crittenden and numerous Co PIs at MTU, the University of Wisconsin-Madison and the University of Minnesota-Minneapolis: "Activities Report for Center for Clean Industrial and Treatment Technologies", Annual Report to Office of Research and Development, Washington, D.C., USEPA for June 1992 to September 1994, 53 pps.

Liu, J., J.C. Crittenden, and D.W. Hand, "Destruction of Toxic Organics Using Adsorption and Photocatalytic Regeneration with Sunlight or Low Intensity Artificial Lights", American Water Works Research Foundation, Denver, CO (1995).

Selzer, V. and J.C. Crittenden, "Technological and Economic Feasibility of the Full Scale Photocatalytic Oxidation Processes Applied to Air and Water Treatment", A Research Summary, 22 pps, 1995.

Bailod, C.R., J.C. Crittenden, J.R. Mihelcic, T.N. Rogers, and C.P. Les Grady, Jr., "Transport and Fate of Toxic Compounds in Wastewater Facilities", Water Pollution Control Federation Research Foundation Report, Washington, D.C., 205 pp., December 15, 1990.

Hand, D.W. and J.C. Crittenden, "Non-Thermal Regeneration of Spent GAC - A Comprehensive Assessment", American Water Works Association Research Foundation Report, 47 pp., September, 1990.

Hand, D.W., S. Notthakun, D.L. Perram, J.C. Crittenden, and M.E. Mullins, "Destruction of Disinfection By-Products Precursors Using Photocatalytic and Phase Transfer Oxidation - Phase Research Report", American Water Works Association Research Foundation Report, 102 pp., August, 1990.

Crittenden, J.C., et al, (American Water Works Association Organic Contaminants Committee), "Long Term Research Needs for the Control of Organics in Drinking Water", Committee Research Report, 32 pp., 1990.

Crittenden, J.C., P.S. Reddy, D.W. Hand, and H. Arora, "Prediction Of GAC Performance Using Rapid Small Scale Column Tests", AWWARF Executive Summary and Full Report, Denver, CO, 1989, 185 pps.

Hand, D.W., J.C. Crittenden, J.M. Miller, and J.L. Gehin, "An Evaluation of the Performance of Air Stripping and GAC for Removing SOCs and VOCs From Groundwater", Project Summary and Final Report, Wausau, WI (1987).

Crittenden, J.C., R.D. Cortright, B. Rick, S.R. Tang, and D. Perram, "Removal of Volatile Organic Chemical from Air Stripping Tower Off gas Using Granular Activated Carbon", AWWARF Executive Summary and Full Report, Denver, CO, 1987.

Crittenden, J.C., Editor, AEEP Computer Software Manual, 1986.

Speth, T.F., J.C. Crittenden, and D.W. Hand, "The Use of Equilibrium Theory to Evaluate Multicomponent Competition in Fixed Beds", 1986 AEEP Computer Software Manual.

Speth, T.F., J.C. Crittenden, and D.W. Hand, "Prediction of Multicomponent Adsorption Equilibria Using Ideal Adsorbed Solution Theory", 1986 AEEP Computer Software Manual.

Hand, D.W., J.C. Crittenden, and R.C. Cortright, "User Oriented Solutions to the Homogeneous Surface Diffusion Model for Design of Gas Phase Fixed Bed Adsorbers", 1986 AEEP Computer Software Manual.

Hand, D.W., J.C. Crittenden, and R.C. Cortright, "User Oriented Solutions to the Homogeneous Surface Diffusion Model for Design of Gas Phase Fixed Bed Adsorbers", 1986 AEEP Computer Software Manual.

Hand, D.W. and J.C. Crittenden, "Design of Packed Tower Aeration Systems", 1986 AEEP Computer Software Manual.

James M. Montgomery Consulting Engineers, Inc., Pasadena, California, "Water Treatment Principles and Design", John Wiley and Sons, New York, J.C. Crittenden wrote and edited Chapter 6, pp. 189-194, 1985.

Crittenden, J.C. and D.W. Hand, "Fixed bed Adsorption Experiment", a Chapter IX. in the AEEP Environmental Engineering Unit Operations and Unit Processes Laboratory Manual, May, 1984, pp. IX 4 1 to IX 4 18.

Thacker, W.E., V.L. Snoeyink, and J.C. Crittenden, "Modeling of Activated Carbon and Coal Gasification Char Adsorbents in Single Solute and Bolute Systems", Research Report UILU WRC 81 0161, prepared for Illinois Water Resources Center, 166 pp., July, 1981.

Crittenden, J.C., "Pollution from the Mallard Lake Landfill", prepared for Jenner and Block, Attorneys at Law, Chicago, IL and Environmental Engineering, Inc., Springfield, IL.

Crittenden, J.C., "Evaluation of Synthetic Resins and Activated Carbon for the Renovation of Secondary Effluents", prepared for Nishihara Environmental Sanitation Research Corporation, Ltd., Tokyo, Japan, 143 pp., 1979.

Crittenden, J.C., "Statement on the Proposed Regulations for Control of Organic Contaminants in Drinking Water Using Granular Activated Carbon", submitted in behalf of the Metropolitan Water District of Southern California, submitted to the Deputy Assistant Administrator for Water Supply, U.S. EPA, Washington, D.C., 55 pp., August, 1978.

Crittenden, J.C., "Water Quality Modeling Analysis of Discharge Alternatives for Madison Metropolitan Sewerage District", prepared for Limno Tech., Inc., Ann Arbor, MI, 343 pp., 1976.

Crittenden, J.C., "Mathematical Modeling of Fixed Bed Adsorber Dynamics Single Component and Multicomponent", Ph.D. Thesis, Department of Civil Engineering, University of Michigan, 1976.

V. SERVICE

NAWI RFP Review Meeting: Technical Expert Review Panel: Precision Separations (PFAS & Nutrients=9 Applications), Virtual, October 11-13, 2021.

NAWI Research Advisory Council, April 12, 2021

Advisory Board, Environmental Science & Ecotechnology (ESE), journal formed July 5, 2019, 2019 - Present.

Member, National Academy of Engineering, Civil Engineering Peer Committee, February, 1 2018 - January, 31, 2021.

Member, National Academies of Sciences, Engineering, and Medicine Study Committee on the Grand Challenges and Opportunities in Environmental Engineering and Science for the 21st Century, 2017 – 2018.

Science Advisory Board, Nanosystems Engineering Research Center for Nanotechnology-Enabled Water Treatment, 2016 – Present.

Chair, International Conference on Sustainable Infrastructure (ICSI) 2016, October 17-19, Shenzhen, China.

Editorial Board, Green Energy & Environment, a publication of the Institute of Process Engineering, 2016 - present.

Editorial Board, Engineering, a publication of the Chinese Academy of Engineering, 2015 - present.

Board of Directors of the Civil and Environmental Engineering Friends Association (CEEFA) of the

University of Michigan, 2014 - 2016.

Steering Committee - American Society of Civil Engineers Conference on Sustainable Urban Infrastructure, Long Beach, California, USA, 2014.

Steering Committee - NSF Resilient and Sustainable Buildings and Infrastructure Workshop, 2013 – 2015.

Appointed to American Society of Civil Engineers (ASCE) EWRI Performance-Based Sustainable Design of Water Resources Infrastructure, April, 2013 - present.

Member, National Academies of Sciences, Engineering, and Medicine Study Committee on the Scientific Tools and Approaches for Sustainability, 2013 - 2014.

Advisory Committee for Environmental Research and Education (AC-ERE), National Science Foundation, 2007–2010.

Engineering Advisory Board for Engineering Directorate, National Science Foundation, 2006–2009.

2002–2009, Member of the Environmental Engineering Committee, EPA Science Advisory Board (SAB). EPA's SAB was established as an independent Board that provides advice to the EPA administrator on EPA's programs that safeguard public health and the environment.

2003–2009, Member, the National Advisory Council for Environmental Policy and Technology (NACEPT). The EPA administrator has asked NACEPT to review EPA's strategy that promotes environmentally responsible technologies in industry.

2002-2004, Member, National Research Council (NRC) Committee, reviewing changes in the way EPA is enforcing the New Source Review of Clean Air Act.

1998-Present, Associate Editor, Environmental Science and Technology.

1998-2002, Advisory Board, Journal of Clean Products and Processes.

1985-1990, Chairman, Organic Contaminants Committee, American Waterworks Association, Research Division, Chairman 1985-86.

1985-1986, Chairman, Role of Computers in Environmental Engineering, AEEP, ASEE, AEE Conference on Environmental Education.

1983-1985, Board of Directors, Association of Environmental Engineering and Science Professors.

1982-1991, Member, Organic Contaminants Committee, American Waterworks Association, Research Division.

1981-1989, Member, National and Michigan American Waterworks Association, Student Activities Committees.

1981-1986, Chairman, Association of Environmental Engineering and Science Professors, Computer Software Committee.

C. OTHER CONTRIBUTIONS

Membership in Professional Organizations

Fellow, American Society of Civil Engineers

Member, American Association of Environmental Engineering and Science Professors

Member, American Water Works Association
Member, American Institute of Chemical Engineers
Member, American Chemical Society
Member, American Academy of Environmental Engineers
Member, Water Environment Federation
Member, American Association for the Advancement of Science
Member, Air & Waste Management Association (A&WMA)
Member, International Water Association (IWA)
Member, National Academy of Engineering

Professional Registration - PE State of Michigan No. 29638

Selected Consulting Experience

Air Environmental Engineering Laboratory, USEPA, Research Triangle Park, NC
Amway, Grand Rapids, MI
Arthur D. Little, Cambridge, MA
Baker and Daniels, Indianapolis, IN
BCM Engineers, Plymouth Meeting, PA
Black and Veatch, Aurora, CO and Kansas City, MO
Boyle Engineering, Newport Beach, CA
Brown and Caldwell, Sacramento, CA
Camp, Dresser and McKee, Newark, NJ
Canviro, Inc., Toronto, Ontario, Canada
Carbon Air Services, Hopkins, MN
EDI Science and Engineering, Grand Rapids, MI
GCA, Technology Division, New Bedford, MA
Geotrans, Boulder, CO
James M. Montgomery Engineers, Reston, VA
Jenner and Block, Chicago, IL
Kraus and Kriscunas, P.C., Grand Rapids, MI
Malcomb-Pirnie, Nationwide
Martin Marietta Energy Systems, Oak Ridge, TN
McClaren Plansearch, Inc., Toronto, Ontario, Canada
Merix Corporation, Wellesley, MA
City of Mesa, CA
Milwaukee Metropolitan Sewage District, Milwaukee, WI
Nishihara Environmental Sanitation Research Corporation, Ltd., Tokyo, Japan
Parsons, Denver, CO
Purus, San Jose, CA
SAIC, CA
Shell Oil, Houston, TX
South Adams County Water and Sanitation District, Commerce City, CO
Trussel Technologies, Pasadena, CA
University of Missouri, Columbia
University of Karlsruhe, Germany
Walker Process Corporation, a division of Chicago Bridge and Iron, Aurora, IL
Waste Management, Denver, CO
Westates Carbon, Los Angeles, CA
Westvaco Corp., Charleston, SC
Williams and Works, Grand Rapids, MI
Zimpro, Inc., Rothchild, WI

VI. GRANTS AND CONTRACTS

1. PI: John C. Crittenden; Title: "Mathematical Modeling of Multicomponent Adsorption in Fixed Beds";

- Funding Source: National Science Foundation; Award Date: April 15, 1978-August 31, 1979; Award Amount: \$25,000.
2. PI: John C. Crittenden; Title: "Multicomponent Adsorption in Fixed Beds: Its Effectiveness in Removing Toxic and Carcinogenic Organics from Water Supplies"; Funding Source: Research Board, University of Illinois; Award Date: August 21, 1978-August 21, 1979; Award Amount: \$5,500.
 3. PIs: John C. Crittenden and Vernon L. Snoeyink; Title: "Design and Operational Control of Fixed Bed Adsorption Systems for Removal of Trace Organic Contaminants from Drinking Water"; Funding Source: Illinois State Water Resources Center; Award Date: July 1, 1979-July 1, 1981; Award Amount: \$18,000.
 4. PI: John C. Crittenden; Title: "Mathematical Modeling of Adsorbent Systems Used for Removal of Toxic Organics from Drinking Water"; Funding Source: Research Council, Michigan Technological University; Award Date: January 28, 1980-December 31, 1980; Award Amount: \$2,800.
 5. PI: John C. Crittenden; Title: "Mathematical Modeling of Fixed Bed Adsorption Systems and Its Usefulness in Design and Operational Control"; Funding Source: National Science Foundation; Award Date: May 15, 1980-May 15, 1983; Award Amount: \$133,330.
 6. PIs: John C. Crittenden and Neil J. Hutzler; Title: "Identification and Quantification of Principal Transport Mechanisms Responsible for Movement of Toxic Organics in Saturated Groundwater Flow"; Funding Source: Environmental Protection Agency; Award Date: October 11, 1982-October 10, 1984; Award Amount: \$181,356.
 7. PIs: John C. Crittenden and David W. Hand; Title: "Modeling the Fate of Complex Mixtures and Known Components in Fixed Bed Adsorbers"; Funding Source: National Science Foundation; Award Date: June 1, 1983-May 31, 1985; Award Amount: \$134,345.
 8. PIs: John C. Crittenden and David W. Hand; Title: "Evaluation of GAC Treatment and Packed Tower Aeration to Remove Volatile Organic Chemicals and Total Organic Halogen Precursor from a Contaminated Groundwater Supply"; Funding Source: EPA; Award Date: October 1, 1983-September 30, 1987; Award Amount: \$653,031.
 9. PIs: John C. Crittenden and David W. Hand; Title: "Recovery of Volatile Organic Chemical Vapors from Air Stripping Towers using Gas Phase Adsorption: Cleanup of a Contaminated Well for the City of Wausau, WI"; Funding Source: AWWA Research Foundation; Award Date: September 1, 1984-August 31, 1986; Award Amount: \$213,105.
 10. PIs: John C. Crittenden, David W. Hand, and Satoru Kato; Title: "A Novel Fixed Bed Adsorption, Solvent Regeneration Process"; Funding Source: EPA and MERIX Corporation, Wellesley, MA; Award Date: October 1, 1984-March 31, 1986; Award Amount: \$11,100.
 11. PIs: Neil J. Hutzler and John C. Crittenden; Title: "Volatile Organic Chemical Transport in Unsaturated Soil"; Funding Source: NSF; Award Date: July 1, 1985-June 30, 1987; Award Amount: \$216,549.
 12. PIs: David W. Hand and John C. Crittenden; Title: "Preliminary Design of Air Stripping Towers and Fixed Bed Adsorbers to Clean up the New Brighton Munition Hazardous Waste Site in Minnesota"; Funding Source: DOD, Honeywell and Conestoga Rovers, Ltd.; Award Date: October 7, 1986-January 1, 1988; Award Amount: \$39,080.
 13. PI: John C. Crittenden; Title: "Removal of Pesticides from Groundwater using Granular Activated Carbon"; Funding Source: EPA and Suffolk County, New York; Award Date: June 10, 1986 to August 15, 1987; Award Amount: \$43,891.

14. Pls: John C. Crittenden and David W. Hand; Title: "Removal of Low Levels of Trihalomethane Precursors Using Granular Activated Carbon at the Metropolitan Water District of Southern California"; Funding Source: Metropolitan Water District of Southern California and AWWA Research Foundation; Award Date: July 18, 1986 March 31, 1988; Award Amount: \$60,623.
15. Pls: John C. Crittenden and David W. Hand; Title: "Fixed Bed Adsorption Modeling of Known and Unknown Components in a Complex Mixture"; Funding Source: NSF; Award Date: July 15, 1986 December 31, 1988; Award Amount: \$216,632.
16. Pls: John C. Crittenden and David W. Hand; Title: "Development of Rapid Small Scale Adsorption Tests"; Funding Source: AWWA Research Foundation; Award Date: January 1, 1987 December 30, 1988; Award Amount: \$125,000.
17. Pls: John C. Crittenden and David W. Hand; Title: "Evaluation of Rapid Synthetic Adsorbents for the Removal Of Synthetic Organic Chemicals"; Funding Source: Union Carbide (Allied Signal); Award Date: October 1, 1988 March 30, 1989; Award Amount: \$60,228.
18. Pls: David W. Hand and John C. Crittenden; Title: "Consistent Removal of Synthetic Organic Chemicals Using Granular Activated Carbon"; Funding Source: American Water Works Association Research Foundation; Date: January 1, 1989-May 30, 1990; Award Amount: \$55,000.
19. Pls: David W. Hand, John C. Crittenden, and David Perram; Title: "Evaluation of Synthetic Resin Adsorbents"; Funding Source: Rohm and Haas Company; Award Date: January 31, 1989-August, 1990; Award Amount: \$105,904.
20. Pls: David W. Hand, and John C. Crittenden; Title: "Destruction of Disinfection By Products and Precursors Using Photocatalytic and Phase Transfer Oxidation"; Funding Source: American Water Works Research Foundation, Denver, CO; Award Date: August 1, 1989-December 31, 1991; Award Amount: \$229,165.
21. Pls: David W. Hand and John C. Crittenden; Title: "General Consulting Services"; Project Description: Solve various technical engineering problems for groundwater cleanup sites; Funding Source: Conestoga Rovers Ltd., Waterloo, Ontario; Award Date: March 26, 1986-1990; Award Amount to Date: \$16,248.
22. Pls: David W. Hand, C. Robert Baillod, John C. Crittenden, Neil J. Hutzler, and David L. Perram; Title: "Clean Technologies for Water and Waste Processing"; Funding Source: Research Excellence Fund, Dept. of Commerce, State of Michigan; Award Date: October 1, 1989-September 30, 1990; Award Amount: \$60,500.
23. Pls: Michael E. Mullins, David W. Hand, and John C. Crittenden; Title: "An Evaluation of the Technical Feasibility of Photocatalytic Oxidation and Phase Transfer Catalysis for the Removal and Destruction of Contaminants from Water"; Funding Source: U.S. Air Force; Award Date: May 1, 1992-April 31, 1996; Award Amount: \$460,051.
24. Pls: David W. Hand, John C. Crittenden, John S. Gierke, and David L. Perram; Title: "Development of a Mathematical Model to Evaluate the Operation of the Multifiltration Unit in the Space Station's Drinking Water Treatment System"; Funding Source: McDonnell Douglas Space Systems Company; Award Date: January 1, 1991-December 31, 1991; Award Amount: \$172,689.
25. Pls: C. Robert Baillod, John C. Crittenden, James R. Mihelcic, Tony N. Rogers, and C.P. Les Grady, Jr.; Title: "Transport and Fate of Toxic Compounds in Wastewater Facilities"; Funding Source: Water Pollution Control Federation Research Foundation; Award Date: June 1, 1990-December 15, 1990; Award Amount: \$83,737.
26. Pls: C. Robert Baillod, John C. Crittenden, David W. Hand, Neil J. Hutzler, and James R. Mihelcic;

- Title: "Clean Manufacturing and Treatment Technologies"; Funding Source: State of Michigan Research Excellence Fund; Award Date: July 1, 1991-June 30, 1992; Award Amount: \$150,000.
27. PIs: John C. Crittenden, David W. Hand, and Michael E. Mullins; Title: "Destruction of Toxic Organics Using Adsorption and Photocatalytic Regeneration with Sunlight or Low Intensity Artificial Lights"; Funding Source: National Science Foundation; Award Amount: \$193,000.
 28. PIs: C. Robert Baillod, Neil J. Hutzler, and John C. Crittenden; Title: "Ph.D. Fellowships for Environmental Engineering"; Funding Source: U.S. Department of Education, Washington, D.C.; Award Date: September 1, 1991-August 31, 1994; Award Amount: \$341,280.
 29. PIs: John C. Crittenden, David W. Hand, and Michael E. Mullins; Title: "Destruction of Toxic Organics Using Adsorption and Photocatalytic Regeneration with Sunlight or Low Intensity Artificial Lights"; Funding Source: American Water Works Association Research Foundation; Award Date: September 1, 1992-August 31, 1994; Award Amount: \$200,644.
 30. PI: John C. Crittenden and Numerous Co-PIs at MTU, University of Wisconsin-Madison, University of Minnesota-Minneapolis; Title: "Clean Industrial and Treatment Technologies"; Funding Source: US EPA; Award Date: June 1, 1992-August 31, 2002; Award Amount: \$11,362,500.
 31. PIs: David W. Hand, David L. Perram, and John C. Crittenden; Title: "Development of a Rational Modeling Approach for the Design, and Optimization of the Multifiltration Unit"; Funding Source: NASA/Ames Research Center; Award Date: January 1, 1993-December 31, 1995; Award Amount: \$238,575.
 32. PIs: David W. Hand, John C. Crittenden, and David L. Perram; Title: "Development and Verification of Multifiltration Unit for the Potable Water Processor On-board the International Space Station (ISS)"; Funding Source: ION Electronics/NASA, Huntsville, AL; Award Date: April 1, 1993 to August 31, 1997; Award Amount: \$1,116,000.
 33. PIs: David W. Hand, Edward G. Marchand, and John C. Crittenden; Title: "Ambercat Catalytic Oxidation"; Funding Source: U.S. Air Force, Tyndall AFB, FL; Award Date: 1994-1996; Award Amount: \$17,014.
 34. PIs: David W. Hand, C. Robert Baillod, John C. Crittenden, Neil J. Hutzler, and David L. Perram; Title: "Clean Technologies for Water and Waste Processing"; Funding Source: Research Excellence Fund, Dept. of Commerce, State of Michigan; Award Date: October 1, 1993-September 30, 1994; Award Amount: \$226,000.
 35. PIs: Peter R. Radecki, James R. Mihelcic, David W. Hand, James R. Baker, Bruce A. Barna, David L. Perram, Judith A. Perlinger, John C. Crittenden; Title: "Pollution Prevention Capability Advancement Program"; Funding Source: Research Excellence Fund, State of Michigan; Award Date: October 1993 – September 1996; Award Amount: \$346,000.
 36. PIs: David W. Hand, Volker H. Selzer, and John C. Crittenden; Title: "Photocatalytic Oxidation of Airborne Trace Contaminants"; Funding Source: NASA/JSC, Houston, TX; Award Date: December 1, 1996 to May 31, 1997; Award Amount: \$22,500.
 37. PIs: David W. Hand, Michael E. Mullins, Andrew A. Kline, John C. Crittenden, David R. Hokanson, and Tony N. Rogers; Title: "Phase II - Developing an Analytical Model of the SSF Water Processor Catalytic Oxidation Reactor on-board the International Space Station"; Funding Source: ION/NASA, Huntsville, AL.; Award Date: March, 1996 - 1999; Award Amount: \$154,050.
 38. PIs: John C. Crittenden, David R. Hokanson, David W. Hand, and James R. Baker; Title: "Program for the Advancement of Environmental Engineering Research: Development of Clean Manufacturing and Processing Research Centers"; Funding Source: Michigan Research Excellence Fund; Award

Date: 1997-2000; Award Amount: \$145,000.

39. PIs: Barry Solomon, James R. Baker, Scott Butner, Wayne Pherdihert, Rick Grote, and John C. Crittenden, Title: "EPA/Compliance Assistance Center for the Chemical Industry"; Funding Source: EPA Office of Compliance Assistance; Award Date: September 15, 1997 to September 14, 2000; Award Amount: \$864,087.
40. PIs: John C. Crittenden, John L. Bulloch and James R. Baker; Title: "Pollution Prevention Partnership Program"; Funding Source: US EPA Office of Pollution Prevention and Toxics; Award Date: January 1, 1998 to August 31, 2000; Award Amount: \$120,000.
41. PIs: Richard Honrath, Jim Mihelcic John C. Crittenden; Title: "Environmental Engineering Doctoral Fellowship Program for Risk Reduction of Persistent and Global Change Compounds." Funding Source: US Department of Education; Award Date: February 1, 2000 to January 31, 2003; Award Amount: \$478,125.
42. PIs: Jim Mihelcic John C. Crittenden; Title: "Development of a User-Friendly Model for Optimizing and Understanding Biofiltration Performance at the Cedar Rapids Water Pollution Control Facility." Funding Source: City of Cedar Rapids; Award Date: February 1, 2000 to January 31, 2000; Award Amount: \$50,000.
43. PIs: John C. Crittenden; Title: "Establishing the Sustainable Futures Institute." Funding Source: Wege Foundation; Award Date: November 1, 2002 to November 1, 2005; Award Amount: \$180,000.
44. PIs: Rhodes Trussel, John Crittenden, George Tchobanoglous, Dave Hand, "Write the 2nd Edition of Water Treatment: Principles and Practice," Funding Source: Montgomery Watson Harza, November 2000 to 2004; Award Amount: \$1,000,000.
45. PIs: John Crittenden, Elizabeth Corley, Joe Fernando, Nancy Grimm, Subhrajit Guhathakurta, Peter McCartney, Anil Sawhney, Yongsheng Chen; Title: "Decision Support for Urban Development: Air Quality, Social Injustice, Material and Energy and the Impact of Social Decision Making – A Proof of Concept Demonstration"; Funding Source: NSF; Award Date: 2004-2005; Award Amount: \$115,000.
46. PIs: John Crittenden, Nancy Grimm, Subhrajit Guhathakurta, Peter McCartney, Elizabeth Corley, Paul Westerhoff, Peter Fox; Title: "P3 Design: A Decision Support Tool for Sustainable Urban Water Management"; Funding Source: EPA; Award Date: 2004-2005; Award Amount: \$10,000.
47. PIs: Joe Fernando, John Crittenden, Sethuraman Panchanathan, James Anderson; Title: "NSF Multi-scale Environmental Analysis in Urban and Regional Ecosystems (MEASURES) - A Proof of Concept Demonstration"; Funding Source: NSF; Award Date: 2004-2005; Award Amount: \$100,000.
48. PIs: David T. Allen, Cynthia F. Murphy, Cliff Davidson, Braden Allenby, John Crittenden, Dave Pijawka, Yongsheng Chen; Title: "Benchmarking Sustainability Engineering Education"; Award Date: 2004-2005; Funding Source: EPA; Award Amount: \$87,500.
49. PIs: Paul Westerhoff, Yongsheng Chen, John Crittenden, and David Capco; Title: "The Fate, Transport, Transformation and Toxicity of Manufactured Nanomaterials in Drinking Water"; Funding Source: EPA; Award Date: 2004-2007; Award Amount: \$349,881.
50. PIs: Paul Westerhoff, and John Crittenden; Title: "RSSCT Analysis for Scottsdale GAC Procurement"; Award Date: 2004-2005; Funding Source: City of Scottsdale; Award Amount: \$42,000.
51. PIs: Paul Westerhoff, and John Crittenden; Title: "Organics Destruction in Membrane Concentrate Streams"; Award Date: 2006-2008; Funding Source: Water Reuse Foundation; Award Amount: \$100,000.

52. PIs: Paul Westerhoff, John Crittenden, Yongsheng Chen, William Bourcier, Peggy O'Day; Title: "Understanding and Improving Nano-structured Arsenic Adsorptive Medias"; Award Date: 2004-2005; Funding Source: American Water Works Association Research Foundation; Award Amount: \$100,000.
53. PIs: Yongsheng Chen, Absar Alum, David Capco, and John Crittenden; Title: "Potential Toxicity Evaluation of Nanoparticles in Drinking Water"; Funding Source: NSF Water Quality Center at ASU; Award Date: 2004-2005; Award Amount: \$15,000.
54. PIs: David Allen, Cliff Davidson, Chris Hendrickson, Braden Allenby and John Crittenden; Partners: U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics and Prentice Hall; Title: "Sustainability Science and Engineering Education," Funding Source: NSF; Award Date: 2004-2008; Award Amount: \$750,000.
55. PIs: John Crittenden, Paul Westerhoff, Ke Li, Title: "Pathway Generation and Byproduct Estimation for Chemical Oxidation Processes in Water Treatment" Funding Source: NSF; Award Date: 2004-2007; Award Amount: \$280,000.
56. PIs: Yongsheng Chen, John Crittenden; Title: "Potential Bioaccumulation of Manufactured Nanomaterials in Aquatic Organisms"; Funding Source: EPA; Award Date: 2007-2010; Award Amount: \$400,000.
57. PIs: Yongsheng Chen, John Crittenden; Title: "Evaluation of Litree's Ultrafiltration Membranes"; Funding Source: Litree Corporation, Haikou, China; Award Date: 2007-2009; Award Amount: \$43,000.
58. PIs: Yongsheng Chen, John Crittenden; Title: "Evaluation of Lynntech's Disinfection Process"; Funding Source: NIH; Award Date: 2007-2009; Award Amount: \$70,000.
59. PIs: John Crittenden, Ke Li, Yongsheng Chen; Environmental and Economic Impacts of Material Used in Future Urban Development Funding Source: Arizona Science Foundation. Award Date: 2007-2008; Award Amount: \$400,000.
60. PIs: Yongsheng Chen, John Crittenden; Development of an In Vitro Test and a Prototype Model to Predict Cellular Penetration of Nanoparticles Supported by EPA, 06/01/08-05/30/11, Award Amount: \$399,628.
61. PIs: John Crittenden; Co-PIs: Charles Perrings, George Karady, Ke Li, Samuel Ariaratnam, and Eric Williams; "Sustainable Infrastructure for Energy and Water Supply (SINEWS)," Funding Source: National Science Foundation, Award Date: 8/1/2008 – 8/31/2016; Total Award Amount (including supplements): \$2,324,821; Supplement Award Date: 8/25/2015.
62. PIs: Paul Westerhoff, John Crittenden; Pathway Generation and Byproduct Estimation for Chemical Oxidation; Funding Source: Water Reuse Research Foundation; Award Date 1/1/2009 – 6/30/2009; Award Amount: \$69,000.
63. PIs: Morteza Abbaszadegan, John Crittenden; Novel Photocatalyst for Reduction of Disinfection Byproducts, Funding Source: Water Quality Center, Arizona State University; Award Date: 05/04/2009; Award Amount: \$9,485.
64. PDPI: John Crittenden; ARRA: Rate Constants and Toxicity Estimation for the Computer Discovery of Byproducts Fate in Advanced Oxidation Systems; Funding Source: National Science Foundation; Award Date: 9/1/2009 – 9/1/2012; Award Amount: \$399,010.
65. PI: John C. Crittenden; "NSCE Symposium on Resilience and Sustainability," Funding Source: National Science Foundation; Award Date: 9/15/2012 – 8/31/2013, Award Amount: \$49,999.

66. PI: John C. Crittenden; support for the students of the Brook Byers Institute for Sustainable Systems, Funding Source: Crittenden and Associates, Award Dates: 2011-2018, Award Amount: \$1,189,609.
67. PI: John C. Crittenden; Co-PI's: Baabak Ashuri, Jennifer J. Clark, Richard M. Fujimoto, Marc J. Weissburg; "Resilient Interdependent Infrastructure Processes and Systems (RIPS) Type 2: Participatory Modeling of Complex Urban Infrastructure Systems (Model Urban SysTems)," Funding Source: National Science Foundation; Award Dates: 9/1/2014 - 8/31/2019; Total Award Amount (including supplements listed below): \$2,999,946.
- Supplement 1: 9/1/2016 - 8/31/2017, \$200,000 to include Food, Energy, and Water Systems (FEWS) into scope of work.
 - Supplement 2: 9/1/2016 - 6/30/2017, \$100,000 to host a workshop on the topic of Food, Energy, and Water Systems.
 - Supplement 3: 7/23/2018 - 8/31/2019, \$150,000 to study real-world implementation of the proposed Principles of Infrastructure Ecology.
68. PI: Bert Bras; Co-PI's: John C. Crittenden, Marc Weissburg; "U.S.-China: Systems-Based Approaches for Sustainable Steel Manufacturing," Funding Source: National Science Foundation; Award Date: 5/2015 - 5/2019; Total Award Amount (including supplement listed below): \$549,924.
- Supplement: 9/1/2015 to 7/31/2019, \$49,925.
69. Co-PI: John C. Crittenden: PI: Juan Moreno-Cruz; "Grant to Study Regional Industry, Economic Resilience and Energy Consumption," Funding Source: National Science Foundation, CBET Program; Award Date: 9/2015 - 8/2018; Award Amount: \$299,927.
70. PI: John C. Crittenden, "Characterization and Quantification of Solid Waste Disposed in Georgia," Funding Source: Georgia Environmental Protection Division; Award Dates: April – September, 2015; Award Amount: \$31,004.
71. PI: John C. Crittenden, Co-PI: Richard Fujimoto, "EAGER: SSDIM: Superimposed Simulations: Fast Generation of Synthetic Data of Interdependent Critical Infrastructures," Funding Source: National Science Foundation; Award Dates: 8/2017 – 9/2019; Award Amount (including supplements): \$180,000.
- Supplement: 8/25/2018 – 9/1/2019, \$30,000 for a Graduate Student Industrial Internship at Arcadis.
72. PI: Yongsheng Chen; Co-PI's: John Koon, Valerie Thomas, Perry Yang, Marc Weissburg, John C. Crittenden, Ching-Hua Huang, Kaye Husbands-Fealing, "Use of Domestic Wastewater for Food Production", Funding Source: United States Department of Agriculture; Award Dates: 7/15/2018 - 1/14/2023; Award Amount: \$5.7 M (USDA: \$4,838,263; plus cost share).
73. Yongsheng Chen, **PI; Co-PIs:** Kaye- Husband; Perry Yang; John Crittenden; Zhaohui Tong. (a) Award: #1936928; Amount: \$100,000; Period: 9/1/2019-8/31/2021. (b) Title: "Planning Grant: Engineering Research Center for Urban Agricultural Infrastructure Systems."

TOTAL RESEARCH VOLUME: \$37,192,374

VII. HONORS AND AWARDS

- 2020 Future of Photocatalysis Paper Winning Best Feature Paper Award (Paper title: The Technology Horizon for Photocatalytic Water Treatment: Sunrise or Sunset?), American Chemical Society (ACS), 2020
- 2020 Simon W. Freese Environmental Engineering Award and Lecture for his extraordinary accomplishments in using fundamental scientific principles and current research findings to solve the most challenging water quality problems, American Society of Civil Engineers (ASCE), 2020

2019 Selected to become a Member of the European Union Academy of Sciences

2019 Chinese Government Friendship Award, Beijing, China, September 30, 2019

2019 Honorary Professor, School of Engineering, Tsinghua University, Beijing, China, August 26, 2019

2018 Foreign Dean, Regional Green Low-carbon Development Institute, Hebei University of Economics and Business, 2017 to 2020

2017 Honorary Professor, Huazhong University of Science and Technology, Wuhan, China, 2017 to 2020

2017 Honorary Professor of Civil and Environmental Engineering, Tsinghua University, Beijing, China, 2017 to 2020

2016 Hal and Nina Fetner Fellow, Sustainable Enterprise Partnership, Syracuse University, New York

2016 Elected as a Fellow of the American Society of Civil Engineers

2015 Professorship, Chinese Academy of Sciences President's International Fellowship Initiative for Distinguished Scientists

2015 Lifetime Member, Association of Environmental Engineering and Science Professors

2015 Athalie Richardson Irvine Clarke Prize, National Water Research Institute

2015 Honorary Director of Sustainable Urban Infrastructure, Chinese Research Academy of Environmental Sciences

2015 Chinese Academy of Sciences President's Distinguished Scientist Award

2014 Alumni Merit Award, University of Michigan, Department of Civil and Environmental Engineering

2014 Honorary Professor, Northeast Normal University, Changchun, Jilin Province, China, 2014 to 2019

2014 Guest Professor of Civil and Environmental Engineering, State Key Laboratory of Urban and Regional Ecology, Chinese Academy of Sciences, Beijing, China, 2014 to 2017

2013 Elected into the Chinese Academy of Engineering

2013 Honorary Professor of Civil and Environmental Engineering, Harbin Institute of Technology, Harbin, Heilongjiang Province, China, 2013 - 2016

2012 Honorary Professor of Civil and Environmental Engineering, Sichuan University, Sichuan, China, 2012 – 2014

2011 Guest Professor of Civil and Environmental Engineering, Tianjin University, Tianjin, China 2011 to 2013

2010 Honorary Professor of Civil and Environmental Engineering, Dalian University of Technology, Dalian, China, 2010 - 2016

2010 Honorary Professor of Civil and Environmental Engineering, East China University of Science and Technology, Shanghai, China, 2010 - 2013

2009 Advising Professor, Shanghai Jiao Tong University, Shanghai, China, 2009 - 2012

- 2009 Visiting Professor, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China, 2009 - 2011
- 2008 Recognized by the American Institute of Chemical Engineers as one of the "100 Chemical Engineers of the Modern Era" in the category of "New Frontiers"
- 2007 Top viewed article in Journal of Scripta Materialia for January - March 2007: Satoshi Kaneco, Yongsheng Chen, Paul Westerhoff and John C. Crittenden, "Fabrication of uniform size titanium oxide nanotubes: Impact of Current Density and Solution Conditions," Scripta Materialia 56:373-376 (2007)
- 2006 Runner-up for the Editor's Choice Award for the most significant technology-based paper that was submitted to the Journal of Environmental Science and Technology: Chen, Y., J.C. Crittenden, S. Hackney, L. Sutter and D.W. Hand, "Preparation of a Novel TiO₂-based p-n Junction Nanotube Photocatalyst," Environmental Science and Technology, Vol. 39, No. 5, 1201-1208 (2005)
- 2006 Appointed visiting faculty member of Ocean University of China, 2006-2009. (May 15, 2006 to 2009)
- 2005 Advised a student group who received Honorable Mention at EPA's People, Planet and Prosperity Competition for their project entitled, "A Decision Support Tool for Sustainable Urban Water Management." May 16, 2005, National Academies, Washington D.C.
- 2002 Elected to the National Academy of Engineering
- 2000 AEESP Outstanding Publication Award. This award is presented annually to authors of an outstanding publication that has made a valuable contribution to the field and has withstood the test of time. The citation is: Crittenden, J.C., D.W. Hand, H. Arora, and B.W. Lykins Jr., "Design Considerations for GAC Treatment of Organic Chemicals," Journal of American Water Works Association, Vol. 79, No. 1, pp. 74-82 (1988).
- 2000 Velázquez Carrillo, Marcela, James R. Mihelcic, John C. Crittenden, "Use of Material Selection Target Plots for Screening Chemicals based on Environmental and Health Properties," presented at Society of Environmental Toxicology & Chemistry (SETAC) Annual Meeting, Philadelphia, Pennsylvania, November 14-18, 1999. Awarded 3rd place best student poster presentation
- 1999 Who's Who (Lifetime Member), 1997 Who's Who in the World and Who's Who in Science and Engineering
- 1995 Major Advisor of Yin Zhang, Second Place finisher in the American Water Works Association Academic Achievement Award for the Doctoral Dissertation Competition
- 1994 Major Advisor of Rominder Suri, Best Paper at the Water Environment Federation's National Meeting, Doctoral Student Category on the Regeneration and Recovery of Organics Using Adsorption Technology
- 1993 Major Advisor of Rominder Suri, Best Paper at the Water Environment Federation's National Meeting; Master's Student Category on the Development of Photocatalysts.
- 1991 Recipient of the Walter L. Huber Research Prize, awarded by ASCE for Research Contributions on Removal of Organics from Water
- 1989 Co-recipient of the American Water Works Association Publication's Award for the paper which represents the Most Significant Advancement in Science and Engineering as it Applies to Water Supply Practice

- 1988 Co-recipient of the Engineering Construction Division's Best Paper Award in the American Water Works Association Journal
- 1987 Major Advisor of B. Rick, Second Place Finisher in the American Water Works Association Academic Achievement Award for the best Master Thesis Competition
- 1986 Major Advisor of J.K. Berrigan, First Place Finisher in the American Water Works Association Academic Achievement Award for the best Master Thesis Competition
- 1985 Michigan Association of Governing Boards for Higher Education Distinguished Faculty Member, Recognized for Extraordinary Contributions to Michigan Higher Education. (This award includes special recognition by Michigan State Legislature by passage of House Bill 89
- 1984 Researcher of the Year, Michigan Technological University
- 1983 Co-recipient (with M.C. Lee and V.L. Snoeyink) of the Research Division Best Paper Award in the AWWA Journal
- 1982 Elected to the Board of Directors, the Association of Environmental Engineering Professors
- 1981 Co-recipient (with W.E. Thacker and V.L. Snoeyink) of the NALCO Chemical Award which is awarded by the Association of Environmental Engineering Professors for the best doctoral thesis (Thacker's Thesis in the area of industrial waste treatment
- 1981 Co-recipient (with C.R. Baillod and N.J. Hutzler) of the Michigan Society of Professional Engineers Outstanding Achievement Award for our graduate program in Environmental Engineering offered in Grand Rapids, Michigan.
- 1980 Co-recipient of the Rudolph Hering Medal (with W.J. Weber), awarded by ASCE for the most valuable contribution to the Journal of Environmental Engineering Division Proceedings of ASCE

Health Issues

- Cross-country skied, roller-skied and roller bladed approximately 75,000 miles
- PR for 50 km cross country ski 2:21
- PR for 15 km cross country ski 42:00
- PR for Marathon run: 2:59:19
- PR for 100 mi bike ride: 4:45
- PR for 24 hours of biking: 385 miles