

# Curriculum Vitae for John C. Crittenden, Ph.D., P.E., F.ASCE, N.A.E. (Revised 5/7/2018)

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

828 West Peachtree, Suite 320B  
Atlanta, Georgia 30332-0595  
Tel: (404) 894-5676 Fax: (404) 894-7896  
Email: john.crittenden@ce.gatech.edu

## 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-in-Chief, 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 engineering practice, 1/3 ownership, Houghton, MI (1993 to 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

No.	Name	Dates	Home Institution/Current Position
1.	Saturo Kato	1989 - 1990	Tokyo Metropolitan University
2.	Ke Li	2001 - 2004	MTU
3.	Qiong Zhang	2001 - 2003	MTU
4.	Yongsheng Chen	2002 - 2004	MTU

**GEORGIA INSTITUTE OF TECHNOLOGY**

5.	Ming Xu	2009 - 2010	Assistant Professor, University of Michigan, School of Natural Resources and Environment
6.	Jean-Ann James	2016 - 2017	Turner Foundation
7.	Zhongming Lu	2016 - 2017	GT
8.	Jinming Luo	2017-Present	GT

**PH.D STUDENTS ADVISED****UNIVERSITY OF ILLINOIS**

No.	Name	Grad. Date
1.	Bill Thacker (Co-Advisor: Vern Snoeyink)	1979
2.	Mike Lee (Co-Advisor: Vern Snoeyink)	1980

**MICHIGAN TECHNOLOGICAL UNIVERSITY**

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

3.	Harish Arora	1989
4.	Mohamed El-Behlil	1990
5.	Sawang Notthakun	1991
6.	David Hand	1991
7.	Shanmugalingam Bhuvendralingam	1992
8.	Yin Zhang	1994
9.	Junbiao Liu	1995
10.	Rominder Suri	1995
11.	Dinorah Audeves	1998
12.	Qiong Zhang	2001
13.	Hebi Li (Co-Advisor: Jim Mihelcic)	2001
14.	Sompop Sanongaj	2001
15.	Wipada Dechapanya	2001
16.	Ron Martin (Co-Advisor: Jim Mihelcic)	2002
17.	Ke Li	2002
18.	Ji Yang	2003
19.	Dave Hokanson (Co-Advisor: David Hand)	2003

**ARIZONA STATE UNIVERSITY**

20.	Yang Zhang (Co-Advisor: Paul Westerhoff)	2007
21.	Dan Gerrity (Co-Advisor: Morteza Abbaszadegan)	2007

**GEORGIA INSTITUTE OF TECHNOLOGY**

22.	Daisuke Minakata	2010
23.	Ryan Ravenelle (Co-Advisor: Carsten Sievers)	2011

24.	Hyunju Jeong	2013
25.	Arka Pandit	2014
26.	Zhongming Lu	2015
27.	Chen Chen	2015
28.	Elizabeth Minne	2015
29.	Jean-Ann James	2015
30.	Xuewie Yu	2015
31.	Xin Guo	2015
32.	Su Liu	Current
33.	Xiaoyang Meng	Current
34.	Oswaldo Broesicke	Current
35.	Weiqiu Zhang	Current
36.	Junchen Yan	Current

**MS STUDENTS ADVISED**

**WASHINGTON STATE UNIVERSITY**

No.	Name	Grad. Date
1.	S. Ganesan	1978

**UNIVERSITY OF ILLINOIS**

2.	Bryant Wong	1980
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**MICHIGAN TECHNOLOGICAL UNIVERSITY**

3.	Hannu Hautakangas	
4.	Rominder Suri	1992
5.	Shumin Hu	
6.	John Trynoski	
7.	John Berrigan	
8.	Randy Cortright	
9.	Brad Rick	
10.	Paul Luft	
11.	Gary Freedman	
12.	Scott Loper	
13.	Sompop Sanongaj	
14.	Wipada Dechapanya	
15.	Chunhua Zhao	
16.	Ji Yang	
17.	Dave Hand	
18.	Kartik Vaith	
19.	George Jacque	
20.	John Mourand	
21.	Nicolas Mougamadou	

22.	Eric Klun	
23.	Peter Allgeier	
24.	Peter Koepfgen	
25.	John Bulloch	
26.	Shumin Hu	
27.	Volker Selzer	
28.	Shin-Ru Tang	
29.	Chandrashekar Koganti	

**ARIZONA STATE UNIVERSITY**

30.	Erin Lyons	2006
31.	Peng Zhang	2008
32.	Ramzy Kahat	2009

**GEORGIA INSTITUTE OF TECHNOLOGY**

33.	Ruthie Taylor	2011
34.	Ruoren Yu	2012
35.	Nicholas Cooper	2012
36.	Supreet Gupta	2014
37.	Yixin Liu	2014
38.	Yu Feng	2014
39.	Sen Yang	2016
40.	Junchen Yan	2016
41.	Junyi Shen	Current
42.	Yaye Wang	Current
43.	Kathleen DeBrot	Current
44.	Yanchao He	Current
45.	Qiguang Ji	Current
46.	Shengtao Jiang	Current

**RESEARCHERS AND VISITING FACULTY**

**MICHIGAN TECHNOLOGICAL UNIVERSITY**

No.	Name	Dates	Position / Home Inst.
1.	David Hand	1980 - 1988	Research Engineer / MTU
2.	David Hokanson	1998 - 2004	Research Engineer / MTU

**ARIZONA STATE UNIVERSITY**

3.	Ke Li	2004- 2008	Research Assistant Professor/ ASU
4.	Yongsheng Chen	2004 - 2008	Research Associate Professor / ASU
5.	Satoshi Kaneco	2006	Associate Professor / Mie University, Japan
6.	Hugo Destailats	2006 - 2008	Research Associate / Professor, ASU
7.	A. H. Konsowa	2008	Visiting Scholar / Professor of Chemical Engineering, Faculty of Engineering, Alexandria

			Univ., Alexandria, 21544 Egypt.
8.	Wenhui Xu	2008	Visiting Scholar / ZheJiang Forestry Institute, China

**GEORGIA INSTITUTE OF TECHNOLOGY**

9.	Daisuke Minakata	2010 - 2013	Research Engineer / Brook Byers Institute for Sustainable Systems, Georgia Institute of Technology
10.	Lifen Liu	2010 - 2011	Visiting Scholar / Dalian University of Technology, School of Environmental Science and Technology
11.	Xiao Lin	2010 - 2011	Visiting Scholar / Chinese Academy of Sciences, Institute of Process Engineering
12.	LinLin Xing	2010 - 2011	Visiting Scholar / Chinese Academy of Sciences, Institute of Process Engineering
13.	Baicang Liu	2011 - 2012	Visiting Scholar / Sichuan University
14.	Wenhui Yuan	2011 - 2012	Visiting Scholar / South China University of Technology
15.	Dapeng Li	2011 - 2012	Visiting Scholar / National Natural Science Foundation of China
16.	Joohyun Baek	2011 - 2012	Visiting Scholar / Seoul National University
17.	Guangshan Zhang	2010 - 2012	Visiting Scholar / Harbin Institute of Technology
18.	Chi Peng	2012 - 2013	Visiting Student / RCEES
19.	Yuheng Feng	2012 - 2013	Visiting Student / Zhejiang Univ
20.	Yupeng Li	2012 - 2013	Visiting Scholar / IPE
21.	Sergiy Smetana	2012 - 2013	Visiting Student / Institute of Nature Management Problems and Ecology, NAS of Ukraine
22.	Jianbing Wang	2012 - 2013	Visiting Scholar / Chinese University of Mining & Technology
23.	Haiyan Wang	2012 - 2013	Chinese Research Academy of Environmental Sciences
24.	Ruzhen Xie	2012 - 2014	Visiting Student / Sichuan University
25.	Xia Yang	2012 -2013	Visiting Scholar / Northeast Normal University
26.	Zongsheng Zhao	2012 - 2013	Visiting Scholar / Beijing Jiaotong University
27.	Jinfeng Wang	2013 - 2014	Visiting Scholar / Shandong University of Science and Technology
28.	Heping Shi	2013 - 2014	Visiting Scholar / Inner Mongolia Agricultural University
29.	Min Song	2013 -2014	Visiting Scholar / Southeast University
30.	Yaping Zhang	2013 - 2014	Visiting Scholar / Jimei University
31.	Peng Zhao	2013 - 2014	Visiting Scholar / Tianjin University
32.	Hongbin Yu	2013 - 2014	Visiting Scholar / Northeast Normal University
33.	Liang Wang	2013 - 2014	Visiting Scholar / Tianjin Polytechnic University
34.	Jianfeng Peng	2013 - 2014	Visiting Scholar / Chinese Research Academy of Environmental Sciences
35.	Xubiao Luo	2013 - 2014	Visiting Scholar / Nanchang Hangkong

			University
36.	Tianxin Li	2013 - 2014	Visiting Scholar / University of Science and Technology Beijing
37.	Manhong Huang	2013 - 2014	Visiting Scholar / Donghua University
38.	Hongbin Cao	2013 - 2014	Visiting Scholar / Chinese Academy of Sciences
39.	Yajie Qian	2014 - 2015	Visiting Student / Tongji University
40.	Jinming Luo	2014 - 2016	Visiting Student / Chinese Academy of Sciences
41.	Jing Ren	2014 - 2015	Visiting Student / Tianjin University
42.	Qizhou Dai	2014 - 2015	Visiting Scholar / Zhejiang University of Technology
43.	Qian Feng	2014 - 2015	Visiting Scholar / Hohai University
44.	Wenchao Liao	2014 - 2015	Visiting Scholar / Xiamen University of Technology
45.	Xiaodong Ma	2014 - 2015	Visiting Scholar / Nankai University
46.	Peng Yue	2014 - 2015	Visiting Scholar / Tsinghua University
47.	Ting Qiu	2014 - 2016	Visiting Scholar / Fuzhou University
48.	Hong Sui	2014 - 2015	Visiting Scholar / Tianjin University
49.	Ying Wang	2014 - 2015	Visiting Scholar / Beijing Normal University
50.	Yuan Wang	2014 - 2015	Visiting Scholar / Guizhou University
51.	Jinhai Yuan	2014 - 2015	Visiting Scholar / Chongqing University of Science & Technology
52.	Wei Zhang	2014 - 2015	Visiting Scholar / East China University of Science and Technology
53.	Fang Tang	2014 - 2015	Visiting Student / Tsinghua University
54.	Yulan Tang	2014 - 2015	Visiting Scholar / Shenyang Jianzhu University
55.	Yongjun Liu	2015 - 2016	Visiting Scholar / Dalian Maritime University
56.	Gaolan Hou	2015	Visiting Scholar / Beijing Institute of Technology
57.	Heping Huang	2015 - 2016	Visiting Scholar / Jiangxi University of Finance and Economics
58.	Mili Weng	2015	Visiting Scholar / Zhejiang Agriculture and Forestry University
59.	Yu Tao	2015 - 2016	Visiting Student / Chinese Academy of Sciences
60.	Cong Li	2015 - 2016	Visiting Scholar / Zhejiang University
61.	Ling Li	2015 - 2016	Visiting Scholar / Fuzhou University
62.	Xueyuan Li	2015 - 2016	Visiting Scholar / Suzhou University of Science and Technology
63.	Tianyin Huang	2015 - 2016	Visiting Scholar / Suzhou University of Science and Technology
64.	Guozhu Mao	2015 - 2016	Visiting Scholar / Tianjin University
65.	Qi Wang	2015 - 2016	Visiting Scholar / Zhejiang Gongshang University
66.	Lihua Zhang	2015 - 2016	Visiting Scholar / Sanming University
67.	Dongqin He	2015 - 2016	Visiting Student / University of Science and Technology of China
68.	Yinghong Guan	2016	Visiting Scholar / Northeast Agricultural

			University
69.	Zan Qu	2016	Visiting Scholar / Shanghai Jiao Tong University
70.	Jinming Luo	2016 - 2017t	Visiting Student / Chinese Academy of Sciences
71.	Mei Lan	2016 - Current	Visiting Scholar / Hebei University of Engineering
72.	Li Lin	2016 - 2017	Visiting Scholar / Changjiang River Scientific Research Institute
73.	Honghong Lyu	2016 - 2017	Visiting Scholar / Nankai University
74.	Yang Pan	2016 - 2017	Visiting Scholar / Suzhou University of Science and Technology
75.	Chunyan Sun	2016 -2017	Visiting Scholar / Shaoxing University
76.	Xiao Sun	2016 - 2017	Visiting Scholar / Chinese Academy of Sciences
77.	Xiang Tu	2016 - 2017	Visiting Scholar / Chinese Research Academy of Environmental Sciences
78.	Lin Deng	2017 - Current	Visiting Scholar / Hunan University
79.	Bing Wang	2017	Visiting Scholar / Shenyang Jianzhu University
80.	Linling Wang	2016 - 2017	Visiting Scholar / Huazhong University of Science and Technology
81.	Jie Yang	2017	Visiting Scholar / Zhejiang University of Water Resources and Electric Power
82.	Haixia Zhang	2017 - Current	Visiting Scholar / Hebei University of Engineering
83.	Wen Zhang	2017 - Current	Visiting Scholar / Tianjin University
84.	Yan Zhang	2016 - 2017	Visiting Scholar / Shandong University of Science and Technology
85.	Shiqing Zhou	2017 - Current	Visiting Scholar / Hunan University
86.	Runlong Hao	2017 - Current	Visiting Scholar / North China Electric Power University
87.	Wei Wang	2017 - Current	Visiting Scholar / Heilongjiang Institute of Technology
88.	Lin Wu	2017 - Current	Visiting Scholar / Yancheng Teachers University
89.	Ji-Feng Yang	2017 - Current	Visiting Scholar / Hunan University of Arts and Science
90.	Shumin Zhu	2017 - Current	Visiting Student / Tongji University

## 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 PARTS OF BOOKS**

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.

## **B. REFEREED PUBLICATIONS**

256. Yang Li, Jian Zhao, Enxiang Shang, Xinghui Xia, Junfeng Niu, and John Crittenden, “Effects of Chloride Ions on Dissolution, ROS Generation, and Toxicity of Silver Nanoparticles under UV Irradiation,” 2018, *Environmental Science & Technology*, 52 (8), 4842–4849, DOI: 10.1021/acs.est.7b04547.
255. Jean-Ann James, Sangwoo Sung, Hyunju Jeong, Osvaldo A. Broesicke, Steven P. French, Duo Li, John C. Crittenden. “Impacts of Combined Cooling, Heating and Power Systems, and Rainwater Harvesting on Water Demand, Carbon Dioxide, and NOx Emissions for Atlanta,” 2018, *Environmental Science & Technology*, 52 (1), 3–10, DOI: 10.1021/acs.est.7b01115.

254. Meng Sun, Chiheng Chu, Fanglan Geng, Xinglin Lu, Jiuhui Qu, John C. Crittenden, Menachem Elimelech, Jae-Hong Kim, "Reinventing Fenton Chemistry: Iron Oxochloride Nanosheet for pH Insensitive H<sub>2</sub>O<sub>2</sub> Activation," 2018, Environmental Science & Technology, 5, 186–191, DOI: 10.1021/acs.estlett.8b00065.
253. Hong Pan, Huijie Hou, Yao Shi, Hongbo Li, Jing Chen, Linling Wang, John C. Crittenden, "High Catalytic Oxidation of As(III) by Molecular Oxygen Over Fe-Loaded Silicon Carbide with MW Activation," 2018, Chemosphere, 198, 537-545, DOI: 10.1016/j.chemosphere.2018.01.116.
252. Shiqing Zhou, Yanghai Yu, Weiqiu Zhang, Xiaoyang Meng, Jinming Luo, Lin Deng, Zhou Shi, and John C. Crittenden, "Oxidation of Microcystin-LR via Activation of Peroxymonosulfate Using Ascorbic Acid: Kinetic Modeling and Toxicity Assessment," 2018, Environmental Science & Technology, DOI: 10.1021/acs.est.7b06560.
251. Guozhu Mao, Tongtong Shi, Shu Zhang, John C. Crittenden, Siyi Guo, Huibin Du, "Bibliometric Analysis of Insights into Soil Remediation," 2018, Journal of Soils and Sediments, 15 pages, DOI: 10.1007/s11368-018-1932-4.
250. Hanxuan Zeng, Weiqiu Zhang, Lin Deng, Jinming Luo, Shiqing Zhou, Xia Liu, Yong Pei, Zhou Shi, John C. Crittenden, "Degradation of Dyes by Peroxymonosulfate Activated by Ternary CoFeNi-Layered Double Hydroxide: Catalytic Performance, Mechanism and Kinetic Modeling," 2018, Journal of Colloid and Interface Science, 515, 92–100, DOI:10.1016/j.jcis.2018.01.016 0021-9797.
249. Xiao Sun, John C. Crittenden, Feng Li, Zhongming Lu, Xiaolin Dou, "Urban Expansion Simulation and the Spatio-Temporal Changes of Ecosystem Services, a Case Study in Atlanta Metropolitan Area, USA," 2018, Science of the Total Environment, 622–623, 974–987, DOI: 10.1016/j.scitotenv.2017.12.062.
248. Honghong Lyu, Bin Gaoc, Feng He, Andrew R. Zimmerman, Cheng Ding, Jingchun Tang, John C. Crittenden, "Experimental and Modeling Investigations of Ball-Milled Biochar for the Removal of Aqueous Methylene Blue," 2018, Chemical Engineering Journal, 335, 110-119, DOI: 10.1016/j.cej.2017.10.130.
247. Shuai Wang, Tong Li, Chen Chen, Sheng Chen, Baicang Liu, John C. Crittenden, "Non-woven PET Fabric Reinforced and Enhanced the Performance of Ultrafiltration Membranes Composed of PVDF Blended with PVDF-g-PEGMA for Industrial Applications," 2018, Applied Surface Science, 435, 1072–1079, DOI: 10.1016/j.apsusc.2017.11.193.
246. Baicang Liu, Shuai Wang, Pingju Zhao, Heng Liang, Wen Zhang, John C. Crittenden, "High-performance Polyamide Thin-Film Composite Nanofiltration Membrane: Role of Thermal Treatment," 2018, Applied Surface Science, 435, 415–423, DOI: 10.1016/j.apsusc.2017.11.126.
245. Shuai Wang, Tong Li, Chen Chen, Baicang Liu, John C. Crittenden, "PVDF Ultrafiltration Membranes of Controlled Performance via Blending PVDF-g-PEGMA Copolymer Synthesized Under Different Reaction Times," 2018, Frontiers of Environmental Science & Engineering, DOI:10.1007/s11783-017-0980-0.
244. Jun Zhang, Shuangshi Dong, Xueying Zhang, Suiyi Zhu, Dandan Zhou, John C. Crittenden, "Photocatalytic Removal Organic Matter and Bacteria Simultaneously from Real WWTP Effluent with Power Generation Concomitantly: Using an ErAlZnO Photo-Anode," 2018, Separation and Purification Technology, 191, 101-107, DOI: 10.1016/j.seppur.2017.09.024.
243. Jinming Luo, Xiaoyang Meng, John C. Crittenden, Jiuhui Qu, Chengzhi Hu, Huijuan Liu, Ping Peng, "Arsenic Adsorption on  $\alpha$ -MnO<sub>2</sub> Nanofibers and the Significance of (1 0 0)

- Facet as Compared with (1 1 0)," 2018, Chemical Engineering Journal, 33, 492–500, DOI: 10.1016/j.cej.2017.08.123.
242. Honghong Lyu, Bin Gao, Feng He, Cheng Ding, Jingchun Tang, and John C. Crittenden, "Ball-Milled Carbon Nanomaterials for Energy and Environmental Applications," 2017, ACS Sustainable Chemistry and Engineering, 5 (11), pp 9568–9585, DOI: 10.1021/acssuschemeng.7b02170.
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#### **D. PRESENTATIONS**

##### **2017**

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.

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.

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.

John C. Crittenden, "Create More Sustainable and Resilient Infrastructure," plenary talk presented to the Beijing Humboldt Forum, Beijing, China, September 16, 2017.

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.

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.



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.

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.

## **2016**

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.

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.

John Crittenden, "Development of Efficient Electrochemical Anodes for Organic Pollutant Destruction: From Bench Scale to Full Scale Application," presented at the 2016 Hong Kong University of Science and Technology, Institute of Advanced Studies Summit, Session 3, Hong Kong, October 20.

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.

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.

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.

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, 2016 Beijing, China, February 24–26.

Oswaldo A. Broesicke, John C. Crittenden, Michael Chang, "Assessing the Potential for Growth and Innovation at the Nexus of Food, Energy, Water, and Transportation Systems," presented at the National Science Foundation's Expert Workshop, organized by the BBISS, Arlington, VA, February 11, 2016.

John C. Crittenden, "Gigatechnology: Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented to the Jockey Club Institute for Advanced Study at the Hong Kong University of Science and Technology, Hong Kong, China, January 20, 2016.

John C. Crittenden, Zhongming Lu, Arka Pandit, "Welcome to Mars: A Toolbox for Sustainable Science and Engineering," presented at the National Academy of Science Conference - *Transition Toward Sustainability after 15 Years: Where Do We Stand in Advancing the Scientific Foundation*, Newport Beach, CA, USA, January 14-15, 2016.

John C. Crittenden, "Gigatechnology: Developing a Metamodel of Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the National Science Foundation Workshop on Research Challenges in Modeling & Simulation for Engineering Complex Systems, Arlington, VA, USA, January 13-14, 2016.

## **2015**

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.

John C. Crittenden, Hyunju Jeong, Arka Pandit, "Sustainable Urban Water Management," presented at the 6th IWA-ASPIRE Conference, Beijing, China, September 21, 2015.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the Chinese Academy of Sciences, Beijing, China, July 28, 2015.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the Institute of Urban Environment, Chinese Academy of Sciences, Xiamen, China, July 26, 2015.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the Chinese Academy of Sciences President's Distinguished Scientist Award Lecture, University of Science and Technology of China, Hefei, China, July 20, 2015.

John C. Crittenden, Arka Pandit, "Infrastructure Ecology: An Evolving Paradigm for Sustainable Urban Development," presented at the Association of Environmental Engineering and Science Professors (AEESP) Conference, Yale University, New Haven, Connecticut, USA, June 13 - 16, 2015.

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.

John C. Crittenden, Xin Guo, Xiaoyang Meng, Jiuwei Qu, Huachun Lan, Jinming Luo, Junfeng Niu, Ruzhen Xie, Duo Li, Qian Feng, "Treatment of Refractory Industrial Wastewater Using Chemical Oxidation and Biological Treatment," presented at the 12th International Water Association Leading Edge Conference on Water and Wastewater Technologies, Hong Kong, China, June 2, 2015.

John C. Crittenden, Yongsheng Chen, Xiaoyang Meng, Yue Peng, Jinming Luo, Guangshan Zhang, Xubiao Luo, Wen Zhang, Junfeng Niu, Qizhou Dai, "Nanoscale Analysis for Designing Nanoparticles for Environmental Applications," presented at the International Water Association Nano and Water Regional Conference, Dalian, China, May 20 - 23, 2015.

Crittenden, J.C., "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," presented at the M. Gordon Wolman Seminar Series, Department of Geography & Environmental Engineering, Johns Hopkins University, Baltimore, MD, February 17, 2015.

Crittenden, J.C., Meng, X., "Review of Advanced Oxidation Technologies for the Removal of Emerging Contaminants," presented at the GAO Municipal Water Technology Workshop, Washington, D.C., January 29-30, 2015.

Crittenden, J.C., Meng, X., "Review of Adsorption Technology for the Removal of Emerging Contaminants," presented at the GAO Municipal Water Technology Workshop, Washington, D.C., January 29-30, 2015.

## **2014**

Crittenden, J.C., Pandit, A., "Grand Challenges for Energy Production in the 21st Century," presented at the American Institute of Chemical Engineers 2014 Annual Meeting, Atlanta, GA, USA, Nov. 16-21, 2014.

Crittenden, J.C.; Song, Y.; "Urbanization in China and US: The Challenges and Opportunities," ASCE - International Conference on Sustainable Infrastructure, Long Beach, California, USA, November 6-8, 2014.

Pandit, A.; Crittenden, J.C.; DesRoches, R.; Rix, G.; "A Framework to Identify the Sustainable and

Resilient Zone of Urban Infrastructure System Planning and Design," ASCE - International Conference on Sustainable Infrastructure, Long Beach, California, USA, November 6-8, 2014.

Crittenden, J.C., "Infrastructure Ecology: An Evolving Paradigm for Sustainable Urban Development," IWA: Science Summit for Urban Water, Harbin Institute of Technology, Harbin, China, June 13, 2014.

Crittenden, J.C., "Advances in Advanced Oxidation Processes for Water Treatment," School of Environment, Tsinghua University, Beijing, China, June 5, 2014.

Crittenden, J.C., "The Gigaton Problem: Challenges & Opportunities," International Conference on Engineering Science and Technology (ICEST 2014), Beijing, China, June 2, 2014.

Crittenden, J.C., "Infrastructure Ecology: An Evolving Paradigm for Sustainable Urban Development," presented at the American Planning Association's 106th National Planning Conference, Atlanta, Georgia, April 26, 2014.

Crittenden, J.C., "Gigaton Problems Require Gigaton Solutions," Trottier Institute for Sustainability in Engineering and Design, Annual Symposium, McGill University, Montreal, Quebec, Canada, March 17, 2014.

Crittenden, J.C., "Gigaton Problems Need Gigaton Solutions," Beijing Zhao Tung University, Beijing, China, April 10, 2014.

Pandit, A., James, J.C., Jeong, H., Crittenden, J.C. "Water and Energy Impacts: A comparison of urban growth scenarios and the implementation of decentralized water and energy alternatives" 247th ACS National Meeting and Exposition, Session: ENVR Advances in Materials for Water and Energy – PM Session. Dallas, TX, March 18, 2014.

### **2013**

Crittenden, J.C., Lu, Zhongming, "Infrastructure Ecology: An Evolving Paradigm for Sustainable Urban Development," for the forum on Urban Ecological Infrastructure for New Urbanization: Engineering and Management, presented by the International Council on Ecopolis Development, Chinese Academy of Engineering, Beijing, China, November 28-29, 2013.

Crittenden, J.C., "Sustainable Cities: People and the Energy-Climate-Water Nexus," Environmental Policy and Sustainability Committee, Metro Atlanta Chamber of Commerce, Atlanta, Georgia, USA, November 13, 2013.

Crittenden, J.C., "Sustainable and Resilient Urban Infrastructure for the Next 100 Years," Sustainable Systems Forum, University of Michigan, Ann Arbor, Michigan, USA, November 8, 2013.

Crittenden, J.C., "Infrastructure Ecology: The Water-Energy-Transportation-Land Use-Socioeconomic Nexus," Department of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, Maryland, USA, October 29, 2013.

James, J.-A.; Jeong, H.; Sung, S.; Frankland, J.; French, S.; Bras, B.; Crittenden, J.C., "Water and Energy Impacts: A Comparison of Urban Growth Scenarios and the Implementation of Decentralized Water and Energy Alternatives," 86th annual Water Environment Federation Technical Exhibition and Conference (WEFTEC), Chicago, Illinois, USA, October 5 - 9, 2013.

Crittenden, J.C., "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," Richard L. Valentine Distinguished Lecture in Civil and Environmental Engineering, University of Iowa, Iowa City, Iowa, USA, September 27, 2013.

Pandit, A., Bras, B., Minne, E.A., Dunham-Jones, E., Augenbroe, G., Jeong, H., James, J.-A.C., Newell,

J.P., Weissburg, M., Brown, M.A., Chang, M.E., Xu, M., Begovic, M.M., Yang, P., Fujimoto, R.A., French, S.P., Thomas, V.M., Yu, X., Chen, Y., Lu, Z., Crittenden, J.C., "Infrastructure Ecology: An Evolving Paradigm for Sustainable Urban Development," Session Keynote: Environmental Engineering Education, World Engineers Summit, Singapore, September 9-15, 2013.

Davidson, C.I., Crittenden, J.C., Zimmerman, J.B., Zhang, Q. "Bringing Sustainability into the Engineering Curriculum," Association of Environmental Engineering and Science Professors Conference Workshop in Golden, CO, July 14–16, 2013.

Zhang, W., Huang, J., Zhang, G., Minakata, D., Chen, Y., Crittenden, J.C. "Applications of Heterogeneous Visible Light-Adsorbing Photocatalytic Water Splitting for H<sub>2</sub> Production," Association of Environmental Engineering and Science Professors Conference in Golden, CO, July 14–16, 2013.

Crittenden, J.C. "Collaborating with Faculty Members in China," Workshop held at the Association of Environmental Engineering and Science Professors Conference Workshop in Golden, CO, July 14–16, 2013.

Pandit, A., Crittenden, J.C. "The Effect of Network Topology on the Resilience and Water Quality in Urban Water Distribution Systems," Association of Environmental Engineering and Science Professors Conference in Golden, CO, July 14–16, 2013.

Pandit, A., Thomas, V.M., Jeong, H., Augenbroe, G., Bras, B., Minne, E.A., Dunham-Jones, E., James, J.C., Newell, J.P., Weissburg, M., Brown, M.A., Chang, M.E., Xu, M., Begovic, M.M., Yang, P., Fujimoto, R.A., French, S.P., Yu, X., Chen, Y., Lu, Z., Crittenden, J.C. "Infrastructure Ecology: The Water-Energy-Transportation-Land Use-Socioeconomic Nexus," Association of Environmental Engineering and Science Professors Conference in Golden, CO, July 14–16, 2013.

Pandit, A., Crittenden, J. C., "A Conceptual Framework for Sustainable and Resilient Urban Water Systems," 2013 World Environmental and Water Resources Congress, Session: Sustainability in Water Management 2: Systems Analysis, Cincinnati, OH.

Jeong, H., James, J.C., Pandit, A., Crittenden, J. C., French, S. P., Noonan, D., Begovic, M., Bras, B., Brown, M. "A Conceptual Framework for Sustainable and Resilient Urban Water Systems," 2013 World Environmental and Water Resources Congress, Panel Discussion: Future Needs and Solutions for Performance-based Sustainable Water Resources Infrastructure, Cincinnati, OH.

Pandit, A., Crittenden, J. C., "Full Spectrum Resilience for Urban Water Systems," International Symposium on Sustainable Systems & Technology 2013, Session: Resilience. Cincinnati, OH.

Pandit, A., Jeong, H., Lu, Z., Minne, E.A., James, J.C., Sung, S.M., Frankland, J., Kim, I., French, S. P., Bras, B., Begovic, M.M., Crittenden, J.C., "A Decision Support Tool for Sustainable and Resilient Urban Infrastructure Development," International Symposium on Sustainable Systems & Technology 2013, Session: Infrastructure, Cincinnati, OH.

Minakata, D.; Mezyk, S.; Jones, J. and Crittenden, J.C., "Mechanistic Insights in Peroxyl Radical Formation and Degradation and Associated Reaction Rate Constants Prediction in Aqueous Phase Advanced Oxidation Processes," April 7, 2013, ACS National Meeting in New Orleans, Louisiana.

Crittenden, J. C., "Water and Energy Savings, and Carbon Emission Reductions From Rain Water Harvesting, Combined Heat and Power, and Compact Residential Communities," March 13, 2013, Greenprints, Georgia Tech Research Institute (GTRI) Conference Center, Atlanta, Georgia.

Crittenden, J. C., "Gigaton Problems Require Gigaton Solutions: Urban Systems and Technology Opportunities," March 3, 2013, Zhejiang University, Hangzhou, China.

## **2012**

Crittenden, J. C., "High performance simulation framework development for multi-component environmental modeling," Knowledge Systems for Sustainability – Advancing Towards Prototypes, November 27, 2012, Oak Ridge, TN.

Minakata, D.; Guo, X.; Crittenden, J.C. "Computer-Based First-Principles Kinetic Model for Aqueous Phase Advanced Oxidation Processes: Proof of Reaction Pathway and Byproducts Formation." AOTs-18, November 11-15, 2012, Jacksonville, FL.

Crittenden, J.C. "A Life Cycle Assessment Comparison of Low Impact Development Technologies to Centralized Water, Wastewater and Stormwater Systems for 11 Residential Community Types," Korea Advanced Institute of Science and Technology - Energy, Environment, Water and Sustainability, November 8, 2012, Daejeon, South Korea.

LinLin, Xing; Minakata, D.; Cao, Hongbin; Crittenden, J.C., Experimental and computational simulation of oxalate degradation during ozonation with activated carbon. AOTs-17, November 7-10, 2011, San Diego, CA.

Crittenden, J.C., "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," and "Computer-based First-principles Kinetic model for Aqueous Phase Advanced Oxidation Processes: Proof of Reaction Pathway and Byproducts Formation," V. L. Snoeyink Distinguished Visiting Lecturer, University of Illinois at Urbana-Champaign, October 31 - November 1, 2012, Urbana, Illinois.

Pandit, A., Jeong, H., Lu, Z., Minne, E.A., James, J.C., Crittenden, J.C., "Infrastructure Ecology: An Integrative Approach for Sustainable Urban Development," Third ISIE Asia-Pacific Meeting, Session: Sustainable urban systems and infrastructure (SUS). Tsinghua University, October 20, 2012, Beijing, China.

Crittenden, J.C., "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," University of Nevada, October 18, 2012, Reno, Nevada.

Crittenden, J.C., "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems," University of Georgia, October 11, 2012, Atlanta, Georgia.

Pandit, A., Crittenden, J. C., "Infrastructure Ecology: A Resilience Based Approach to Sustainability of Urban Infrastructure Systems" 4th International Ecosummit – Ecological Sustainability: Restoring the Planet's Ecosystem Services, Session: GS07 - Sustainability and Resilience, October 4, 2012, Columbus, OH.

Crittenden, J.C., "Infrastructure Ecology: The Water, Energy, Transportation, Land Use and Socioeconomic Nexus," keynote presented to the 8th International Conference on Sustainable Water Environment, July 17, 2012, Guilin, China.

Crittenden, J.C., "The Gigaton Problem," and "Infrastructure Ecology: An Integrative Approach Towards More Sustainable Urban Systems," Center for Sustainable Engineering Workshop, June 4 - 8, 2012. Syracuse Center of Excellence, Syracuse, N.Y.

Pandit, A., Crittenden, J. C. "Resilience of Urban Water Systems," International Symposium on Sustainable Systems & Technology 2012, Session: Urban Infrastructure, May 17, 2012, Boston, MA.

Pandit, A., Crittenden, J.C., Jeong, H., Lu, Z., Minne, E.A., James, J.C., Xu, M., French, S. P., Sung, S.M., Noonan, D., Brown, M., DesRoches, R., Bras, B., Begovic, M., "Infrastructure Ecology: An Integrative Approach towards More Sustainable Urban Systems," 2012 International Symposium on Sustainable Systems & Technology, Session: Urban Infrastructure. May 17, 2012, Boston, MA.

Pandit, A., Crittenden, J. C. (2012) "Index of Network Resilience (INR) for Urban Water Distribution Systems," 2012 Critical Infrastructure Symposium, Session 1A: Infrastructure Network Analysis. April 23,

2012, Arlington, VA.

## **2011**

LinLin, Xing; Minakata, D.; Cao, Hongbin; Crittenden, J.C., Experimental and computational simulation of oxalate degradation during ozonation with activated carbon. AOTs-17, November 7-10, 2011, San Diego, CA.

Crittenden, J.C. EFRI-RESIN Project. Water, Energy, Land Use, Transportation and Socioeconomic Nexus: A Blueprint for More Sustainable Urban Systems. 201, Summit Forum for Urban Water, Harbin Institute of Technology, China

Crittenden, J.C. Sustainable and Resilient Urban Infrastructure Design: A Holistic Approach, June 13, 2011, Yale-Tsinghua Environment and Sustainable Development Leadership Program, Yale University, USA.

Crittenden, J.C. Developing Sustainable Urban Infrastructure to Solve Gigaton Problems. GCOE Symposium on Sustainability in Environmental Engineering, July 21st, 2011. Kyoto University, Kyoto, Japan.

Minakata, D.; Li, K.; Crittenden, J.C. Rational Design of Advanced Oxidation Processes using Computational Chemistry. GCOE Symposium on Sustainability in Environmental Engineering, July 21st, 2011. Kyoto University, Kyoto, Japan.

Crittenden, J.C. Gigaton Problems Require Gigaton Solutions: Urban Systems and Technology Opportunities. June 17, 2011, Tianjin University. China.

Crittenden, J.C. Tools and Metrics in Sustainable Engineering. 2011 Center for Sustainably Engineering, May 23-27, 2011, Syracuse University, NY, USA.

## **2010**

Minakata, D.; Li, K.; Crittenden, J.C.; Hand, D. Rational Design of Advanced Oxidation Processes using Computational Chemistry. The 16th International Conference on Advanced Oxidation Technologies for Treatment of Water, Air and Soil (AOTs-16). San Diego, California, USA. November 15-18, 2010.

Hyunju Jeong, Arka Pandit, John C. Crittenden\*, Ming Xu, Charles Perrings, Dali Wang, Eric Williams, George Karady, Ke Li, Marilyn Brown, Miroslav Begovic, Samuel Ariaratnam, Steve French, "Infrastructure Ecology for Sustainable and Resilient Infrastructure Design", 2010 American Institute of Chemical Engineers, Salt Lake City, Utah, November 7-12, 2010.

Hyunju Jeong, Arka Pandit, John C. Crittenden\*, Ming Xu, Sam Ariaratnam, Miroslav Begovic, Bert Bras, Marilyn Brown, Reginald DesRoches, Steve French, Aris Georgakakos, George Karady, Ke Li, Doug Noonan, Charles Perrings, Eric Williams, "Sustainable and Resilient Urban Infrastructure Design: A Holistic Approach", the 83rd Annual Water Environment Federation Technical Exhibition and Conference, New Orleans, Louisiana, October 4-6, 2010.

Hyunju Jeong, Arka Pandit, John C. Crittenden\*, Ming Xu, Sam Ariaratnam, Miroslav Begovic, Bert Bras, Marilyn Brown, Reginald DesRoches, Steve French, Aris Georgakakos, George Karady, Ke Li, Doug Noonan, Charles Perrings, Eric Williams, "Sustainable and Resilient Urban Infrastructure Design: A Holistic Approach", 9th International Symposium (International Urban Planning and Environment Association) for Sustainable Planning Challenges: Rapid Urbanization, Global Recession and Climate Change, Guangzhou, China, August 4-6, 2010.

Hyunju Jeong, Arka Pandit, John C. Crittenden\*, Ming Xu, Sam Ariaratnam, Miroslav Begovic, Bert Bras, Charles Perrings, Eric Williams, "Sustainable and Resilient Urban Infrastructure Design: A Holistic Approach", The Sixth International Conference on Sustainable Water Environments, Clayton Hall, University of Delaware, July 29-31, 2010.

John C. Crittenden, "Sustainability Issues and Research Opportunities" Environmental Protection Agency ORD Seminar, July 12, 2010.

John C. Crittenden, "Grand Challenges in Sustainability", Chinese Environmental Engineering Science and Technology and Long-Term Development Strategy Forum for Environmental Protection, Chinese Academy of Engineering, Beijing, China, June 12-13, 2010.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems", US-China Workshop on Energy and Environment in the Development of Sustainable Asphalt Pavements, Chang An University, Xian, China, June 7, 2010.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems", East China University of Science and Technology, Shanghai, China, June 2, 2010.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems", Dalian University, Dalian, Liaoning, China, May 31, 2010.

John C. Crittenden, "Sustainable Urban Infrastructure", The Center for Bio Energy Sustainability, Oak Ridge National Laboratory, Oak Ridge, TN, May 20, 2010.

John C. Crittenden, "Developing Sustainable Urban Infrastructure to Solve Gigaton Problems", 2010 Sino-US Environmental Protection and Energy Summit and Expo, Georgia State University, Atlanta, GA, April 24-25, 2010.

John C. Crittenden, "Gigaton Problems Need Gigaton Solutions, 15th Annual Conference Western Hemisphere and Global Recovery: Trade and Investment, Texas A&M International University, Laredo, TX, April 14-16, 2010.

John C. Crittenden, "Understanding and Engineering the Complexity of Sustainable Urban Systems", Ezra's Round Table, College of Engineering, Systems Engineering Program, Cornell University, Ithaca, NY, March 5, 2010.

## **2009**

John Crittenden and Ke Li, "Understanding and Engineering the Complexity of Sustainable Urban Systems", Second Multinational Enterprise and Sustainable Development Conference: Strategies for Sustainable Technologies and Innovations, Nancy-Metz, France, November 4-6, 2009.

Crittenden, John, "Grand Challenges for Sustainability", Institute for Process Engineering, Chinese Academy of Sciences, Beijing, China, October 19, 2009.

Crittenden, John, "Sustainable Urban Engineering", Shanghai Jiao Tong University, Shanghai, China, October 19, 2009.

Crittenden, John, "Sustainable Urban Engineering", University of South Florida at Tampa, Tampa, FL, September 30, 2009.

Crittenden, John, "The Use of Litree's Membrane at a Water Reuse Facility", International Water Association: 5th IWA Specialized Membrane Technology Conference for Water and Wastewater Treatment, Beijing, China, September 1-3, 2009.

Crittenden, John, "Advanced Oxidation Processes", Institute for Process Engineering, Chinese Academy of Sciences, Beijing, China, 2009.

Crittenden, John, "Sustainable Urban Infrastructure", Tsinghua University, Department of Environmental Science and Engineering, Beijing, China, July 31, 2009.

Crittenden, John, "Challenges and Opportunities for Sustainable Engineering", Center for Sustainable Engineering: Engineering in Transition, Pittsburgh, PA, Workshop 1, July 12-14, 2009; Workshop 2, July 16-17, 2009.

Crittenden, John, "Sustainable Urban Infrastructure", Tsinghua University, Department of Architecture, Beijing, China, June 7, 2009.

John Crittenden, Recorded interview about sustainability and water and energy infrastructure, which was then broadcast by National Public Radio, April, 2009.

Crittenden, John, "Sustainable Systems", Directorate for Engineering Advisory Committee Meeting, National Science Foundation, Arlington, VA, April 22-23, 2009.

Crittenden, John, "The Future of U.S. Infrastructure: Sustainable Urban Systems", Georgia Tech Civil and Environmental Engineering Alumni Weekend, Washington, D.C., April 17-19, 2009.

Crittenden, John, "Understanding and Engineering the Complexity of Urban Systems", EPA Decision Analysis: Supporting Environmental Decision Makers Workshop, Cincinnati, OH, March 31-April 1, 2009.

## **2008**

Crittenden, Li, Minakata, & Westerhoff, "Overview of Advanced Oxidation Processes (AOPs) – Understanding and Improving Process Performance," Potable Water Reuse Conference, November 19, 2008.

Minakata, Li, Crittenden\*, & Westerhoff, "Development of Group Contribution Method (GCM) for Hydroxyl Radical (HO) Reaction Rate Constants in the Aqueous Phase", AOT-14, September 22, 2008.

John C. Crittenden, et al., "Understanding and Improving Process Performance of Advanced Oxidation Processes (AOPs)", Hong Kong University of Science and Technology, June 27, 2008.

## **2007**

John C. Crittenden, "Sustainable Urban Engineering and Science," Walter J. Weber Lecture, University of Michigan, November 29, 2007.

John Crittenden, "Life Cycle Assessment of Three Water Scenarios: Importation, Reclamation, and Desalination," EPRI, EPRI Workshop to Assess Research Opportunities for Water Use Efficiency Technologies, Palo Alto, CA, November 14-15, 2007.

Minakata, D., Crittenden, J., Li, I., "Evaluation and Design Advanced Oxidation Processes (AOPs)," Workshop on AOTs at the 2007 Water Quality Technology Conference in Charlotte, North Carolina, November 4, 2007.

John Crittenden, "Sustainable Urban Engineering and Science," NSF Engineering Advisory Board, Arlington, VA, October 24-25, 2007.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," Clemson University, Clemson, SC, September 28, 2007.

John Crittenden, Erin Lyons, Peng Zhang, Troy Benn, Miles Costanza, and Ke Li, "Life Cycle Assessment of Three Water Scenarios: Importation, Reclamation, and Desalination", Arizona Society of Professional Engineers Symposium, The Future of Water in the Desert, Scottsdale, AZ, August 17, 2007.

John Crittenden, Yang Zhang, Brian Koeneman, Kiril Hristovski, Paul Westerhoff, Yongsheng Chen, David Capco, Daniel Gerrity, Hodon Ryu, and Morteza Abbaszadegan, "Nanoparticles in the Water Environment: Characterization, Removal, Environmental Applications, Bioaccumulation and Cytotoxicity,



Department of Environmental Science and Engineering, Chinese Academy of Sciences, Institute of Chemistry. July 30<sup>th</sup>, 2007.

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John Crittenden, Yang Zhang, Brian Koeneman, Kiril Hristovski, Paul Westerhoff, Yongsheng Chen, and David Capco, "Application of Nanotechnology for Adsorption Processes," Plenary Lecture, International Water Association Leading Edge Technology Conference, Singapore, June 6, 2007.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," Keynote Speaker at the Energy and Environment Conference, Washington University, St Louis, MO, May 6, 2007.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," University of Vermont, April 13, 2007.

Crittenden, J., "Advances in Adsorption Processes for Drinking Water Treatment" ACS 233<sup>rd</sup> Annual Meeting, Chicago, IL, March 25-29, 5 pages on CD-ROM (2007).

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," Department of Civil and Environmental Engineering, University of California - Riverside, February 2, 2007.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," American Association of Environmental Engineering and Science Professors Workshop: Frontiers in Environmental Engineering Education, Arizona State University, Tempe, AZ, January 10, 2007.

## **2006**

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," Department of Civil and Environmental Engineering, Stanford University, December 1, 2006.

John C. Crittenden, Yongsheng Chen, Ke Li, and Paul Westerhoff, Invited Lectures: (1) Emerging Contaminants in Water Treatment and (2) Grand Environmental Challenges for the 21st Century, Hong Kong University of Science and Technology, Aug. 10, 2006.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Regional Futures 2100 – Decision and Education Support for Regional Development", 3rd International Conference on Environmental Enhancement and Sustainable Development, Inner Mongolia, China, August 4-8, 2006.

John Crittenden, "Sustainable Engineering: What can we do with it?" Center for Sustainable Engineering, Carnegie Mellon University, Pittsburgh, PA, July 17-18, 2006.

Yang Zhang, Brian Koeneman, Kiril Hristovski, Paul Westerhoff, Yongsheng Chen, David Capco, Daniel Gerrity, Hodon Ryu, Morteza Abbaszadegan, John Crittenden, "Characterization, Toxicity and Fate of Metal Oxide Nanoparticles in Water," Gordon Research Conference, Holderness School Plymouth, June 25-30, 2006.

John C. Crittenden, Yongsheng Chen, and Paul Westerhoff, "Grand Environmental Challenges," Ocean University of China, Tsingdao, May 16, 2006.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Sustainable Urban Engineering and Science," Chinese Academy of Sciences, Eco-Environmental Center, Beijing, May 10, 2006.

John C. Crittenden, Yongsheng Chen, and Ke Li, "Regional Futures 2100 Decision and Education Support for Regional Development" Invited Seminar, Chemical Transport Systems/ Biological Environmental Systems, NSF, April 6, 2006.

John C. Crittenden, Yongsheng Chen, and Paul Westerhoff, Emerging Contaminants and Technologies, Plenary Session, Chinese Water Association Meeting, Hangzhou, China, March 8, 2006.

## **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.

Wen Zhang, Guangshan Zhang, John C. Crittenden, Yongsheng Chen. Experimental Determination of Conduction and Valence Bands of Semiconductor Nanoparticles using Kelvin Probe Force Microscopy. Conception of invention October 2011. Disclosed to GTRI December 2011. Funded by USEPA Science to Achieve Results Program Grant RD83385601, Semiconductor Research Corporation (SRC)/ESH Grant (425.025), and research/education fund from Brook Byers Institute for Sustainable Systems.

Hristovski, K., Westerhoff, P., Crittenden, J. C., Olson, L., "Nanostructured Zirconium Oxide Spheres," U.S. Provisional Patent Application Attorney Docket No. 22193-047P01, 2009.

Zhang, Yin, John C. Crittenden, David W. Hand, and David L. Perram, "Method and Apparatus for Destroying Organic Compounds in a Fluid," US Patent No. 5,501,801, March 26, 1996.

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 H<sub>2</sub>O<sub>2</sub>, O<sub>2</sub>, 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 (AdOx™), AdOx™ 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/H<sub>2</sub>O<sub>2</sub> process in various reactor configurations.

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

## Reports

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, 156 pgs.

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.

Baillo, 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 Bislute 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**

### **A. PROFESSIONAL CONTRIBUTIONS**

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 - Present

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 - Present.

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 – present.

Appointed to American Society of Civil Engineers (ASCE) Task Committee on Sustainable Design (TCSD), April, 2013 - present.

Study Committee - “Scientific Tools and Approaches for Sustainability,” National Research Council, 2013 - present.

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-Present, 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, International Institute of Industrial Ecology  
Member, 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. PIs: 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. PIs: 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. PIs: 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. PIs: 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. PIs: 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. PIs: 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. PIs: 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. PIs: 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. 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, 1989-September 30, 1990; Award Amount: \$60,500.
23. PIs: 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. PIs: 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. PIs: 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. PIs: 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: \$1,116,00
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 Date: 2011-2016, Award Amount: \$663,309.
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 - 8/31/2017; Award Amount: \$2,799,988 (including supplement 1 for \$200,000 to include Food, Energy, and Water Systems (FEWS) into scope of work, and supplement 2 for \$100,000 to host a workshop on the same topic).
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; Award Amount: \$500,000.
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.

**TOTAL RESEARCH VOLUME: \$30,487,860**

## **VII. HONORS AND AWARDS**

- 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 TiO<sub>2</sub>-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 3<sup>rd</sup> 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