

Curriculum Vitae

Joel Ducoste
Associate Professor
North Carolina State University
Department of Civil, Construction, and Environmental Engineering

I. BRIEF RESUME:

1. Include Education (Degrees, Dates, Institutions, Locations):

Ph.D., Environmental Engineering, 1996, University of Illinois, Urbana-Champaign, IL
M.Eng., Mechanical Engineering, 1989, Rensselaer Polytechnic Institute, Troy, NY
B.S., Mechanical Engineering, 1988, Rensselaer Polytechnic Institute, Troy, NY

2. Professional Experience (Titles, Organizations, Locations, Dates of Employment):

Associate Professor of Civil Engineering, North Carolina State University, 8/04 – Present
Assistant Professor of Civil Engineering, North Carolina State University, 8/98 – 8/04
Water Treatment Process Engineer, CH2M HILL, 1996-1998
Graduate Research Assistant, University of Illinois, 1991-1996
Manufacturing Engineer, GE Aircraft Engines, 1989-1991

3. Scholarly and creative activities: (INSTRUCTION: ADD/DELETE ACTIVITY TYPES TO THE LIST BELOW AS APPLICABLE; USE THE TAB KEY TO ADD ADDITIONAL ROWS; [ACTIVITY TYPE EXAMPLES](#))

<i>Type</i>	<i>Number</i>
Refereed Journal Article (Published)	30
Refereed Journal Editorial (Published)	1
Refereed Journal Article (Submitted)	3
Refereed Journal Article (In preparation)	3
Edited Special Issue Refereed Journal (Published)	1
Technical Report, Refereed	7
Conference Proceeding, Refereed	1
Conference Proceeding Edited Book, Refereed	1
Non-Refereed Journal Article (Published)	2
Conference Proceedings	41
Research Presentation, Invited (without paper)	31
Conference Presentations (without paper)	9

4. Professional Society Memberships:

- 1) Member, International Ultraviolet Association (2006-Present)
- 2) Member, American Water Works Association (1992-Present)
- 3) Member, Association of Environmental Engineering and Science Professor (1999-Present)
- 4) Member, National Society of Professional Engineers (1991-2002)
- 5) Member, American Society of Engineering Education (2003-2005)

5. Scholarly and Professional Honors:

<i>NSF Advance Scholar</i>	2009
<i>National Academy of Engineering Frontier of Engineering Japan Symposium Participant</i> (30 engineers selected from the USA to join 30 from Japan)	2008
<i>Fulbright Fellow</i> (Council for International Exchange of Scholars award)	2006
<i>FWO Visiting Faculty Scholar at Ghent University, Belgium</i> (Visiting research award provided by the National Science Foundation, Belgium)	2006
<i>NSF Career Award</i> (The award is the highest honor given by NSF to young university faculty in science and engineering)	2001
<i>Ralph Metcalfe Chair for Minority Scholars at Marquette University</i> (Visiting lecturer award) (The primary purpose of the Metcalfe Chair is to bring to Marquette University outstanding African-American and other minority scholars and professionals to interact with and enrich the academic life of Marquette University's students and faculty)	2000

Professional Licenses: Engineer-in-Training: Ohio, 1991

6. Professional service on campus: (INSTRUCTION: LIST ONE ON-CAMPUS SERVICE PER LINE, INCLUDE SERVICE DATES; NOTE LEADERSHIP ROLE IF HELD, E.G., CHAIR, CO-CHAIR, ETC.)

North Carolina State University Committee:

- 1) NSF Advance Scholar (Part of Developing Diverse Departments (3-D) program at NC STATE <http://www.ncsu.edu/odi/advance/>) (2009-Present)

Civil, Construction, Environmental Department Committees:

- 1) WREE group coordinator (2004-2006)
- 2) Lab Equipment Committee (1999-present)
- 3) ABET Subcommittee: Senior Design and Lab (2001-2004)
- 4) Engineering Open House (1998-1999)
- 5) Executive Committee Member (2005-2006)
- 6) Awards committee member (2005-2009)
- 7) Seminar committee member (2005-2007)
- 8) ABET subcommittee member (2005-present)
- 9) ABET ENE Coordinator (2006-present)

7. Professional service off campus:

- 1) Board Member, EPA Science Advisory Board Drinking Water Committee (2009-Present)
- 2) Board Member, North Carolina Fulbright Association (2008-Present)
- 3) Editorial Board Member, Journal of Environment Engineering ASCE (2008-Present)
- 4) North Carolina House of Representative Offshore Energy Exploration Study Committee (2009-Present)
- 5) International Population Balance Modeling Organizing Committee (2002-2009)
- 6) International Population Balance Modeling Scientific Committee (2002-Present)

II. RESEARCH ACCOMPLISHMENTS:

Journal publications (Peer-reviewed)

Published

- 1) Zhao, Xi, Alpert, S., Ducoste, J., 2009, Assessing the Impact of Upstream Hydraulics on the Dose Distribution of UV Reactors using Fluorescence Microspheres and Computational Fluid Dynamics, Environmental Engineering Science, Vol 26, 5, pp. 947-959
- 2) Keener, K.K., Ducoste, J.J., Holt, L. M., 2008, Properties Influencing FOG Deposit Formation, Water Environment Research, 80(12):2241-6
- 3) Richards, B., Ducoste, J.J., 2008, Application of Non-Biological Surrogates for Analysis of Sequential Disinfection Continuous Flow systems, Journal of Water Supply and Research, AQUA, 57(4), pp 225-238
- 4) Liu, D., Ducoste, J.J., Wu, C., Linden, K.G., 2007, Numerical Simulation of UV Disinfection Reactors: Evaluation of Alternative Turbulence Models, Applied Mathematical Modeling, 31, pp. 1753-1769
- 5) Prat, O., Ducoste, J.J., 2007, Simulation of Flocculation in Stirred Vessels: Eulerian vs. Lagrangian Approaches, Trans IChemE, 85(A2): 207-219
- 6) Bohrerova Z., Mamane, H, J. Ducoste, K. G. Linden, 2006, Comparative inactivation of Bacillus subtilis spores and MS-2 coliphage in a UV reactor: implications for validation, Journal of Environmental Engineering ASCE, 132, pp 1554-1561
- 7) Mamane, H, Ducoste, J.J and Linden, K.G, 2006, Impact of Particles on UVC Light Penetration in Natural and Engineered Systems, Applied Optics, 45(8), 1844-1856
- 8) Prat, O.P., Ducoste, J.J., 2006, Modeling Spatial Distribution of Floc size in Turbulent Processes Using Quadrature Method of Moment and Computational Fluid Dynamics, Chemical Engineering Science, 61(1), pp. 75-86
- 9) Liu, Y., J.J., Ducoste, 2006, Impact of turbulent mixing on the CFD chloramine model performance, Environmental Engineering Science, 23(2), pp. 341-356
- 10) Bohrerova Z., G., Bohrer, S. Mohanraj, J. Ducoste, K. G. Linden, 2005, Experimental measurements of fluence distribution in a UV reactor using fluorescent dyed microspheres, Environmental Science and Technology, 39, pp. 8925-8930
- 11) Ducoste, J.J., Linden, K.G., Rojker, D., Liu, D., 2005, Assessment of Reduction Equivalent Fluence Bias Using Computational Fluid Dynamics, Environmental Engineering Science, 22 (5): 615-628
- 12) Liu, Y., Ducoste, J.J., 2005, Numerical Simulation of Chloramines Formation in Turbulent Flow using a Multi-Fluid Micromixing Model, Journal of Environmental Modeling and Software, 21(8), pp. 1198-1213
- 13) Ducoste, J.J., D. Liu, K. Linden, 2005, Alternative Approaches to Modeling Dose Distribution and Microbial Inactivation in Ultraviolet Reactors: Lagrangian vs Eulerian, Journal Environmental Engineering, ASCE, 131(10), pp 1393-1403.

- 14) Jin, S., K. Linden, J.J. Ducoste, D., Liu, 2005, Impact of Lamp Shadowing and Reflection on the Fluence Rate Distribution in a Multiple Low-Pressure UV Lamp Array, *Water Research*, 39, pp. 2711-2721
- 15) Ormezi, B., Ducoste, J.J., Linden, K.G., 2005, UV Disinfection of a Chlorinated Water: Impact on Chlorine concentration and UV Dose Delivery, *Journal of Water Supply: Research & Technology –AQUA*, 54(3), pp. 189-199
- 16) Ducoste, J.J. and K. Linden, 2005, Determination of UV Sensor Location for Sensor Set-point Monitoring using Computational Fluid Dynamics, *Journal of Environmental Engineering and Science*, 4(S1), pp. S33-S43
- 17) Liu, D., J.J. Ducoste, S. Jin, K. Linden, 2004, Evaluation of Alternative Fluence Rate Distribution Models, *Journal Water Supply and Research-AQUA* 53(6) pp 391-408.
- 18) Baeza, C. and J.J. Ducoste, 2004 A Non-Biological Surrogate for Sequential Disinfection Processes, *Water Research*, 38, pp 3400-3410.
- 19) Ortiz, V., J.J., Ducoste, 2004, Modeling Low Energy Mixers for Chemical Dispersion in Drinking Water Treatment, *Environmental Engineering Science* 21(2) 241-262
- 20) Hopkins, C., J.J. Ducoste, 2003, Characterizing Flocculation under Heterogeneous Turbulence, *Journal of Colloid and Interface Science*, (264), pp. 184-194.
- 21) Chaiprapat, S., J.J. Cheng, J.J. Classen, J.J. Ducoste, S.K. Liehr, 2003, Modeling Nitrogen Transport In Duckweed Pond For Secondary Treatment Of Swine Wastewater, *Journal of Environmental Engineering ASCE*, Vol. 129, No. 8, pp. 731-739.
- 22) Peplinski, D, J.J. Ducoste, 2002, Modeling Disinfection Contactor Hydraulics Under Uncertainty, *Journal of Environmental Engineering ASCE*, 128 (11), pp. 1056-1067.
- 23) Ducoste, J.J., 2002, A Two-Scale PBM for Modeling Turbulent Flocculation in Water Treatment Processes, *Chemical Engineering Science*, Vol. 57, No. 12, pp. 2157-2168.
- 24) Ducoste, J.J., Carlson, K., Bellamy, W., 2001, The Integrated Disinfection Design Framework Approach to Reactor Hydraulics Characterization, *Journal of Water Supply: Research and Technology-AQUA*, 50(4) pp 245-261.
- 25) Doby, T. A., D. H. Loughlin, F. L. de los Reyes III, and J. J. Ducoste, 2001, Optimization of Activated Sludge Designs Using a Genetic Algorithm, *Water Science and Technology*, Vol. 45, No. 6, pp 187-198.
- 26) Bellamy, W., Carlson, K., Pier, D., Ducoste, J., Carlson, M., 2000, Determining Disinfection Needs, *Journal American Water Works Association*, Vol. 92, No. 5, pg. 44-52.
- 27) Ducoste, J.J. and Clark, M.M. 1999, Turbulence in Flocculators: Comparison Between CFD Simulations and LDV Experiments, *AICHE J*, Vol. 45, No. 2, pp. 432-436.
- 28) Ducoste, J.J. and Clark, M.M. 1998, The Influence of Tank Size and Impeller Geometry on Turbulent Flocculation: I Experimental, *Environmental Engineering Science*, Vol. 15, No. 3, pp. 215-224.
- 29) Ducoste, J.J. and Clark, M.M. 1998, The Influence of Tank Size and Impeller Geometry on Turbulent Flocculation: II Model, *Environmental Engineering Science*, Vol. 15, No. 3, pp. 225-235.
- 30) Ducoste, J.J., Clark, M.M., Weetman, R.J. 1997, Turbulence Measurements in Flocculators: Effects of Tank Size & Impeller Type, *AICHE J*, Vol. 43, No. 2, pp. 328-338.

Editorial (Peer Reviewed)

- 1) Nopens, I., Brisen, H., Ducoste, J., 2009, Celebrating a Milestone in Population Balance Modeling, Chemical Engineering Science, 64, pg 627

Submitted

- 1s) Keener, K., Ducoste, J.J., Bush, D, Holt, L., Groninger. J., Honeywell, A., 2008, Mechanisms Associated with FOG Accumulation in Sanitary Sewers, Submitted to Water Environment Research
- 2s) Alpert, S., Knappe, D., Ducoste, J.J., 2009, Modeling of UV/Hydrogen Peroxide Advanced Oxidation Processes using Computational Fluid Dynamics, Water Research
- 3s) Aziz, T., Keener, K., Holt, L., Ducoste, J.J., 2009, Evaluating Design Configurations of Grease Interceptor using computational Fluid Dynamics, Water Environment Research

In Preparation

- 1p) Aziz, T., Keener, K., Holt, L., Ducoste, J.J., 2009, Field Assessment of Grease Interceptor Performance
- 2p) Aziz, T., Keener, K., Holt, L., Ducoste, J.J., 2009, An Alternative Approach to Sizing Grease Interceptors for Food Service Establishments
- 3p) Alpert, S., Knappe, D., Ducoste, J.J., 2009, Selection of Appropriate Numerical Techniques for Analyses of UV-Initiated Advanced Oxidations Processes

Special Editor (Peer-reviewed)

- 1) Nopens, I., Ducoste, J.J., Briesen, H., 2009, Advances in Population Balance Modeling, Chemical Engineering Science, 64

Technical Reports (Peer-reviewed) Final reports to the American Water Works Association Research Foundation undergo a rigorous two-stage peer review by a project advisory committee comprised of three to four members from academia and environmental engineering practice. Reports are published by AWWARF and are the principal product for AWWARF subscribers (900 utilities in the US, Canada, United Kingdom, Germany, France, Australia, and Brazil as well as 43 consulting firms and 11 manufacturers).

Published

- 1) Ducoste, J.J., Keener, K., Groninger. J., Holt, L., 2008, Fats, Roots, Oil, Grease (FROG) in Centralized and Decentralized Systems: Characterization FOG Deposits and Root Control, Water Environment Research Foundation, Alexandria, VA.
- 2) Ducoste, J.J., Keener, K., Groninger. J., Holt, L., 2008, Assessment of Grease Interceptor Performance, Water Environment Research Foundation, Alexandria, VA.
- 3) Ducoste, J.J., Keener, K., Groninger. J., Holt, L., 2008, FOG Interceptor Design and Operation (FOGIDO) Guidance Manual, Water Environment Research Foundation, Alexandria, VA.

- 4) Hulsey, R., Linden, K.G., Ducoste, J.J., 2007, UV Disinfection for Large Water Treatment Plants, American Water Works Association Research Foundation, Denver, CO.
- 5) Ducoste, J.J. and K.G., Linden, 2006, Hydrodynamic Characterization of UV Reactors, American Water Works Association Research Foundation, Denver, CO.
- 6) Crozes, G., Hagstrom, J.P., Clark, M.M., Ducoste, J.J., Burns, C. 1998, Improving Clearwell Design for CT Compliance, American Water Works Association Research Foundation, Denver, CO.
- 7) Carlson, K.H., Bellamy, W., Ducoste, J., Amy, G., 2001, Implementation of the Integrated Disinfection Design Framework, American Water Works Association Research Foundation, Denver, CO.

Submitted

- 1) Ducoste, J.J., Knappe, D., Alpert, S., 2009, Evaluation of Computational Fluid Dynamics (CFD) for Modeling UV Initiated Advance Oxidation Processes, Water Research Foundation, Denver, CO.

Conference Proceedings Book (Peer-reviewed) (The full conference papers are reviewed by a panel of experts with an acceptance rate of 50%)

- 1) Nopens, I., K., Malise, C., Biggs, J.J., Ducoste, 2004, Advances in Population Balance Modeling, Eurosis, Ghent, Belgium

Conference Proceedings (Peer-reviewed) (The full conference papers are reviewed by a panel of experts with an acceptance rate of 50%)

- 1) Ducoste*, J.J., Malmrose, P., Weil, G., Beacham, T., 1999, Determining Design Criteria for New WTP Solids Handling Facility, AWWA/WEF Residuals and Biosolids conference, Charlotte, NC.

Journal publications (Non-Peer-reviewed)

- 1) Ducoste, J.J., 2009, Computational Fluid Dynamics as an Integral Part of Water and Wastewater Treatment Process Design, Influents: Water Environment Association of Ontario, Volume 4, pp 40-44
- 2) Ducoste, J.J., Wood, J., Aziz, T., Groninger, J., Holt, L., Keener, K., 2008, Rooting out SSOs: Evaluating Popular Root Control Methods in a Pilot Sanitary Sewer, Water Environment Technology, Vol. 20, No. 6 pp 56-60

Conference Proceedings (Other) (* = Presenter)

- 1) *H. Hong, J.C. Williams, J. Hsieh, J. Ducoste, and F.L. de los Reyes III, 2008, Monitoring Microbial Shifts During Activated Sludge Floc and Aerobic Granule Development, 81th Water Environment Federation Annual Conference and Exposition (WEFTEC 2008), October 21-25, Chicago, IL, CDROM

- 1) Hyunsuk H, J.C. Williams, J. Hsieh, J. Ducoste, *F. L. de los Reyes, 2008, Floc Size Control and Microbial Shifts during Aerobic Flocculation in Couette-Taylor Bioreactors, International Water Association Leading edge conference, June 1-4, Zurich, Switzerland, CDROM
- 2) *Zhao, X., Ducoste, J., 2008, Analysis Of A Low Pressure UV Reactor Under Multiple Upstream Elbow Configurations Using UV Sensitive Fluorescent Microspheres , American Water Works Association National Conference, Atlanta, GA, June 8-12, CDROM
- 3) *Aziz, T., Holt, L., Keener, K., Ducoste, J., 2007, Field Observations of Grease Interceptor Performance, Water Environment Federation Workshop, Raleigh, NC, 4-5, CDROM
- 4) *Aziz, T., Holt, L., Keener, K., Ducoste, J., 2007, Experimental and Numerical Analysis of Grease Interceptor Performance, NCAWWA/WEA, Greensboro, NC, December 3-5, CDROM
- 5) *Wood, J., Aziz, T., Groninger, J., Holt, L., Keener, K., Ducoste, J., 2007, Observation and Analysis of Poplar Root Control Methods in Pilot Scale Sanitary Sewer, Water Environment Federation Technology Conference, San Diego, CA, October 15-17, CDROM
- 6) Richards, B., *Ducoste, J., 2007, Evaluating Sequential Disinfection in Continuous Flow Water Treatment Systems, American Water Works Association Water Quality Technology Conference, Charlotte, NC, November 4-8, CDROM
- 7) *Alpert, S., Ducoste, J., 2007, Modeling Organics Degradation with the UV/H₂O₂ Advanced Oxidation Process Using Computational Fluid Dynamics, American Water Works Association Water Quality Technology Conference, Charlotte, NC, November 4-8, CDROM
- 8) *Alpert, S., Knappe, D., Ducoste, J., 2007, The Use of Computational Fluid Dynamics (CFD) to Model UV-Initiated Advanced Oxidation Processes, International Ozone Association - International Ultraviolet Association World Congress, Los Angeles, CA August 27-30, CDROM
- 9) *Alpert, S., Knappe, D., Ducoste, J.J., 2007, Incorporation of Micromixing models within CFD Simulations of UV Advanced Oxidation Processes, American Water Works Association National Conference, Toronto, Canada, June 4-8, CD-ROM
- 10) *Bohrerova, Z., H, G.I., Bohrerova, Mohanraj, M., Ducoste, J.J and Linden, K.G, 2005, Experimental Measurements of Fluence distribution in a UV Reactor using Fluorescent Microspheres, Proceedings American Water Works Association Water Quality Technology Conference, Quebec City, Quebec. CD-ROM
- 11) *Mamane-Gravetz, H, Ducoste, J.J and Linden, K.G, 2005, Impact of Particles on UVC Light Penetration in Natural and Engineered Systems, Proceedings International Ultraviolet Association Conference, Whistler, British Columbia, May 24-27, 10 pgs

- 12) *Ducoste J.J., D., Liu, K.G., Linden, Zuzana, H., Mamane-Gravetz, 2005, Impact of Influent Pipe Configuration on UV Reactor Performance: Is the Elbow Truly the Worst Case Hydraulic Condition, Proceedings WEF Disinfection Conference, Phoenix, AZ, February 6-9
- 13) *Ducoste, J.J., K.G., Linden, D., Rokjer, 2004, Numerical Prediction of the Reduction Equivalent Fluence Bias, Proceedings AWWA Water Quality Technology Conference, San Antonio, TX, November 14-18
- 14) *Ducoste, J.J. and Y., Liu, 2004, Numerical Prediction of Mixing Performance for Chloramines Formation, Proceedings AWWA Water Quality Technology Conference, San Antonio, TX, November 14-18
- 15) *Prat, O., Ducoste, J.J., 2004, Modeling Spatial Distribution of Floc size in Turbulent Processes Using Quadrature Method of Moment and Computational Fluid Dynamics. 2nd International Conference on Population Balance Modeling, Valencia, Spain, May 5-7
- 16) *Richards, B.H., C, Baeza, J. Ducoste, 2004, Assessing Sequential Disinfection Performance in a Flow Through System Using a Non-Biological Surrogate, Proceedings, AWWA Research Symposium in Baltimore, Maryland, April 18-20,
- 17) *Liu, Y., J. Ducoste, 2003, Using CFD Model to Analyze Mixing Performance for the Formation of Chloramines, Proceedings NC AWWA/WEF Annual Conference, Greensboro, NC, November 17-20, 12 pgs.
- 18) *Baeza, C., B.H. Richards, J. Ducoste, 2003, Evaluation Of Sequential Disinfection Strategy in Drinking Water Treatment using a Non-Biological Surrogate, NC AWWA/WEF Annual Conference, Greensboro, NC, November 17-20, 12 pgs.
- 19) *Rokjer, D., M. Valade, D. Keesler, M. Borsykowsky, J. Ducoste, 2003, Medium Pressure UV Reactor Models for Validation Purposes, Proceedings AWWA Water Quality and Technology Conference, Philadelphia, PA, 22 pgs.
- 20) *Hulsey, R., H. Mackey, J. Neemann, K. Linden, J. Ducoste, 2003, Implementing UV into Large Water Treatment Plants, Proceedings International Ultraviolet Association Conference, Vienna, Austria, July 9-11., 10 pgs
- 21) *Ducoste, J.J., D. Liu, J. Shanshan, K.G. Linden, 2003, Evaluation of UV Fluence Rate Distribution Models, Proceedings International Ultraviolet Association Conference, Vienna, Austria, July 9-11., 10 pgs
- 22) *Jin, S., J.J. Ducoste, K.G. Linden, 2002, Determination of fluence rate distribution in UV reactors using spherical actinometry and mathematical analysis approaches, Proceedings American Water Works Association WQTC Conference, Seattle, WA, November 10-14., 15 pgs
- 23) *Hopkins, C., J.J. Ducoste, 2002, Characterizing The Spatial Variation In Particle Aggregation Due To Heterogeneous Turbulence In A Flocculation Reactor, NC AWWA/WEF Annual Conference, Winston-Salem, NC, November 17-20, 12 pgs.

- 24) *Ducoste, J.J., D. Liu, K. Linden, 2002, Modeling Drinking Water UV Disinfection Reactors using PHOENICS: Comparison between Eulerian and Lagrangian Approach, Proceedings, Phoenix User Conference, Moscow, Russia, September 21-28, 15 pgs.
- 25) Ortiz, V. and J.J. *Ducoste, 2002, Characterization of Drinking Water Treatment Chemical Mixing Performance using CFD, Proceedings Joint CSCE/EWRI of ASCE International Conference, Niagara Falls , Ontario , Canada July 21 – 24, 15 pgs.
- 26) *Ducoste, J.J. and K. Linden, 2002, An Alternative Approach to Determining Dose Distribution and Microbial Inactivation in UV Reactors using Computational Fluid Dynamics (CFD), Proceedings American Water Works Association National Conference, New Orleans, LA, June 17-21, 20 pgs.
- 27) *Doby, T., D. Loughlin, F. de los Reyes, J. J. Ducoste, 2002, Use of Design Scenarios and Chance-Constrained Genetic Algorithm for Wastewater Treatment Plant Design, Environmental & Water Resources Systems, Analysis (EWRSA) Symposium, in conjunction with the Water EWRI Conference, Roanoke, Virginia, USA, on May 19-22, 20 pgs.
- 28) Doby, T., D. *Loughlin, J. Ducoste, and F. L. de los Reyes III 2001, System-Wide Optimization of Wastewater Treatment Unit Processes Using a Distributed Genetic Algorithm, Environmental and Water Resources Institute/ASCE World Water and Environmental Resources Congress, May 20-24, Orlando FL. 15 pgs.
- 29) *Peplinski, D. and Ducoste, J.J., 2001, Lessons for Applying Computational Fluid Dynamics Modeling to Disinfection Clearwells, Environmental and Water Resources Institute/ASCE World Water and Environmental Resources Congress, May 20-24, Orlando FL, 10 pgs.
- 30) *Terry, S.D. and Ducoste, J.J., 2000, Modeling density current events in drinking water sedimentation processes using CFD, Proceedings NCAWWA/WEA Conference, Charlotte, NC, 10 pgs.
- 31) *Ducoste, J.J. Carlson, K., Bellamy, W., Carlson, M., 1999, A Systematic Approach to Reactor Hydraulic Characterization: Part 1 of the Integrated Disinfection Design Framework Protocol, Proceedings AWWA Water Quality and Technology Conference, Tampa, FL., 10 pgs.
- 32) *Ducoste, J.J., Daigger, G.T., Smith, R., 1999, Evaluation of Stacked Secondary Clarifier Design using Computational Fluid Dynamics, Proceedings Water Environment Federation Technology Conference, New Orleans, LA., 10 pgs.
- 33) *Peplinski, D. and Ducoste, J.J., 1999, Enhancement of Computational Fluid dynamics (CFD) Modeling of Clearwell Performance, Proceedings NCAWWA/WEA Conference, Asheville, NC., 10 pgs.
- 34) *Ducoste, J.J. and Brauer, R., 1999, Computational Fluid Dynamics Model of WTP Clearwell: Evaluation of Critical Parameters Influencing Model Performance, Proceedings, ASCE-CSCE Environmental Engineering Conference, Norfolk, VA., 10 pgs.

- 35) *Carlson, K.H., Bellamy, W., Pier, D., Ducoste, J., Carlson, M., 1999, Implementation of the Integrated Disinfection Design Framework, Proceedings American Water Works Association National Conference, Chicago, IL., 10 pgs.
- 36) *Ducoste, J.J. and Clark, M.M. 1997, The Influence of Tank Size and Impeller Type on Flocculation, Proceedings of the American Water Works Association National Conference, Atlanta, Georgia., 10 pgs.
- 37) *Hagstrom, J.P., Crozes, G., Reddy, S., Verghes, V., Clark, M.M., Ducoste, J.J., Burns, C. 1997, The Use of Computational Fluid Dynamics for Improving Clearwell Design for CT Compliance, Proceedings of the American Water Works Association Computer Conference, Austin, Texas., 10 pgs.
- 38) *Crozes, G., Hagstrom, J.P., Clark, M.M., Ducoste, J.J., Hermanowicz, S.W., Huntamer, J., 1996, Hydraulic Modeling for Improved CT Contactor Design, Proceedings of the American Water Works Association Annual Conference, Toronto, Ontario, 10 pgs.
- 39) *Clark, M.M. and Ducoste, J.J. 1996, A Journey in Understanding Mixing and Flocculation, Proceedings of the American Water Works Association Virginia Section, Williamsburg, Virginia., 1 pg.
- 40) *Ducoste, J.J., Clark, M.M., Weetman, R.J., 1995, The Evaluation of the Fluid Mechanics Generated in the Flocculation Process: Effects of Tank Size and Impeller Type, Proceedings of the American Water Works Association National Conference, Anaheim, California, 10 pgs.

Invited Presentations (No Paper)

- 1) Ducoste, J.J., 2009, Assessment of Root Control Methods and Root Regrowth in a Pilot Scale Sanitary Sewer, Invited Presentation, CMOM Conference, Austin, TX
- 2) Ducoste, J.J., 2009, Analysis of Field Grease Interceptors, Invited Presentation, CMOM Conference, Austin, TX
- 3) Ducoste, J.J., 2009, The Intricacies of Analyzing/Designing Ultraviolet UV Disinfection Reactors using CFD, Invited Presentation, Water Reuse Workshop, Polytechnic University at Bari, Taranto, Italy
- 4) Ducoste, J.J., 2009, Population Balance Modeling in CFD Simulations, Invited Presentation, Water Reuse Workshop, Polytechnic University at Bari, Taranto, Italy
- 5) Ducoste, J.J., 2009, Computational Fluid Dynamics Modeling for Unit Process simulations in Drinking Water Treatment, Invited Presentation, Water Reuse Workshop, Polytechnic University at Bari, Taranto, Italy
- 6) Ducoste, J.J., 2009, Analysis of Fat, Oil, and Grease (FOG) in Sanitary Sewer Systems: Challenges to a Sustainable system, Invited Presentation, Villanova University, Villanova, PA
- 7) Ducoste, J.J., 2009, CFD Modeling for UV Disinfection and UV-Initiated Advanced Oxidation Processes, Invited Presentation, Disinfection 2009, Atlanta, GA

- 8) Ducoste, J.J., 2009, Simulating Ultraviolet Advance Oxidation Processes in Continuous Flow UV Reactors, Invited Presentation, University of Michigan, Ann Arbor, MI
- 9) Ducoste, J.J., 2008, Analysis of FOG and Roots in Sewer Collection systems, Invited Presentation, Water Environment Research Foundation Forum, Clearwater Beach, FL
- 10) Ducoste, J.J., 2008, Analysis and Design of Grease Interceptors, Invited Presentation, Water Environment Technology Conference, Workshop 115, Chicago, IL
- 11) Ducoste, J.J., 2008, FAT, Roots, Oil, and Grease (FROG) in Sanitary Sewers: Results from a Recent WERF Sponsored Study, Invited Presentation, Water Environment Research Foundation Webinar
- 12) Ducoste, J.J., 2008, An Introduction to Population Balance Modeling, Invited Presentation, MBR Training Seminar, Ghent University, Belgium
- 13) Ducoste, J.J., 2008, An Overview of Computational Fluid Dynamics Modeling, Invited Presentation, MBR Training Seminar, Ghent University, Belgium
- 14) Ducoste, J.J., 2008, Some Thoughts on CFD Modeling for Membrane Bioreactor Processes, Invited Presentation, 2nd Workshop CFD Modeling for MBR Applications, Ghent University, Belgium
- 15) Ducoste, J.J., 2008, Analysis of FAT, Roots, Oil, and Grease (FROG) in Sanitary Sewers, Invited Presentation, CMOM Conference, Austin, TX
- 16) Ducoste, J.J., 2008, Modeling UV reactors in Drinking Water Systems, Invited Presentation, Chemical Engineering Department, Mississippi State University
- 17) Ducoste, J.J., 2008, Analysis of Grease Interceptors for the Removal of FAT, Oil, and Grease (FOG): Are they Sufficient to Stop FOG related Sanitary Sewer Overflows, Invited Presentation, Civil and Environmental Engineering Department, Arizona State University
- 18) Ducoste, J.J., 2008, Analysis of Fat, Oil, and Grease Deposits in Sanitary Sewer Systems, Invited Presentation at Borchardt Conference, University of Michigan, Ann Arbor, MI
- 19) Ducoste, J.J., 2006, Modeling the Regulatory Behavior of *E coli* in Heterogeneous Substrate Environment, University of Ghent, Belgium, Biomath Department
- 20) Ducoste, J.J., 2006, Modeling Flocculation in Secondary Clarifiers using Quadrature Method of Moments, Water Environment Federation Technology (Weftec) Workshop, Dallas, Texas.
- 21) Ducoste, J.J., 2006, The Impact of Upstream turbulence characteristics on Ultraviolet (UV) Disinfection Reactors Performance, Invited Presentation at Purdue University, Department of Chemical Engineering
- 22) Ducoste, J.J., 2005, The Intricacies of Designing Ultraviolet (UV) Disinfection Reactors using Numerical Models, Invited Presentation at ATLANTIUM LTD, Har Tuv, Israel
- 23) Ducoste, J.J., 2005, Simulation of Flocculation in Stirred Vessels using Quadrature Method of Moments: Evaluation of Lagrangian versus Eulerian Approaches, Invited

Presentation at Department for Applied Mathematics, Biometrics and Process Control, Ghent University, Ghent, Belgium

- 24) Ducoste, J.J., 2005, Impact of Upstream Hydraulic Structures on UV Reactor Performance, Invited Presentation at Borchardt Conference, University of Michigan, Ann Arbor, MI
- 25) Ducoste, J.J., 2004, Numerical Prediction of the Reduction Equivalent Fluence Bias, Invited Presentation at Degremont North American Research & Development Center, Richmond, VA
- 26) Ducoste, J.J., 2004, Characterization of Dose Distribution in UV Reactors, Invited Presentation at Pennsylvania State University Department of Civil Engineering
- 27) Ducoste, J.J., 2003, The Intricacies of using Numerical Models for Analyzing/Designing Ultraviolet UV Disinfection Reactors, Invited Presentation at North Carolina Central University Environmental Engineering Science Program
- 28) Ducoste, J.J., 2001, An Overview of Computational Fluid Dynamics Modeling for Evaluation of Water and Wastewater Treatment Process Performance, Invited Presentation at Duke University Department of Civil and Environmental engineering
- 29) Ducoste, J.J., 2000, Modeling Flocculation in Water Treatment Processes: Impact of Tank Size and Impeller Configuration, Invited Presentation, Engineering Foundation on Population Balance Modeling of Particulate Systems, Kailua-Kona, Hawaii. (A portion of the invited speakers conference fee's are waived by the conference organizers.)
- 30) Ducoste, J.J., 2000, IDDF Approach to Enhanced Reactor Hydraulic Characterization, Invited Presentation, Department of Civil and Environmental Engineering, Marquette University, (Seminar part of the Metcalf Chair)
- 31) Ducoste, J.J., 2000, Water Scarcity in the 21st Century: Has Time Come for Water Reuse, Invited Presentation, Public Forum at Marquette University, (Seminar part of the Metcalf Chair)

Presentations (No Paper) (* = Presenter)

- 1) *de los Reyes, F., *Ducoste, J., 2009, Factors Affecting the Formation of FOG Deposits in Sewer Lines, Urban Water Consortium Meeting, March 11, Burlington NC
- 2) Ducoste, J., *Aziz, T., Buckley, T., Movahed, Z., Card, C., Gallimore, E., 2008, Design Considerations for Volume Based Grease Interceptors, Chesapeake Water Environment Association Conference on Collection Systems, November 14, Linthicum, MD
- 3) *Ducoste, J., 2008, Improving our Understanding of Complex Reacting Processes in Water and Wastewater Treatment through Computational Fluid Dynamics, National Academy of Engineering Frontiers of Engineering Conference, November 17-19, Kobe, Japan

- 4) *Sobrimisana A., de los Reyes, F., Ducoste, J., 2008, A Numerical Approach for Modeling Carbon and Nitrogen Removal under the Influence of Floc Size Distribution poster presentation, NCAWWA/WEA 88th Annual Conference, November 16-19, Winston Salem, NC
- 5) *Gallimore, E., Ducoste, J.J., 2008, Performance of Grease Interceptors: Evaluating Design Alternatives, poster presentation, NCAWWA/WEA 88th Annual Conference, November 16-19, Winston Salem, NC
- 6) *Liu, Y. and Ducoste. J.J., 2005, Impact of Turbulent Mixing on Chloramines Formation Proceedings Chesapeake Section AWWA Annual Conference, Dover, DE
- 7) *Richards, B., J.J., Ducoste, Characterizing Sequential Disinfection in Flow Through Systems, 4th Annual Eastern Regional Conference, New Bern. NC
- 8) *Prat, O., Ducoste, J.J., Performance Analysis of Quadrature Method of Moments (QMOM) for PBM Systems used in Assessing Flocculation Processes in Water and Wastewater Treatment, 2nd International Population Balance Modeling, Valencia, Spain May 7-9
- 9) *Ducoste, J.J., V., Ortiz, Y., Liu, 2002, A Multifluid Modeling Approach to Characterizing Chemical Dispersion in Drinking Water Treatment, Water Resources Research Institute Annual Conference, Raleigh, NC, April 9

Recognized Creative Artistry and Professional Accomplishments - Include publication of creative or professional works, exhibitions, honors, awards, fellowships, prizes, competitions, and other pertinent evidence.

NSF Advance Scholar	2009
National Academy of Engineering Frontiers of Engineering Japan Symposium Participant	2008
Associate Editor, Journal of Environmental Engineering ASCE	2007
Fulbright Scholar	2006
FWO Visiting Faculty Scholar University of Ghent, Belgium	2006
Faculty Early Career Development (CAREER) Award from NSF	2001
Ralph Metcalfe Chair for Minority Scholars at Marquette University	2000

Research Project Record - Include externally and internally sponsored grants and contracts and unsponsored and independent research.

Sponsored Research:

Evaluation of Continuous Flow Ultraviolet Light Emitting Diode Reactors

Joel Ducoste (PI)
NSF-CBET
\$356,795
9/2009-9/2012

An Integrated Approach to Understanding and Reducing Fat Oil and Grease (FOG) Deposit Formation for Sustainable

Joel Ducoste (PI)
EPA-STAR
\$569,568
9/2009-9/2012

Regulation and Modeling of Lignin Biosynthesis

Vincent Chiang (PI, NCSU Forestry) (Co-PI: Ron Sederoff, Forest Biotechnology, Joel Ducoste, CCEE, Fikret Isik, Forestry)
NSF-DBI
\$3,738,869 (Ducoste will lead the modeling, REU, and Kenan Fellow component of project)
9/2009-9/2013

Factors affecting the formation of fats, oils and grease (FOG) deposits in sewer systems

Francis de los Reyes (PI) (Co-PI: Joel Ducoste, NCSU)
WRI
\$50,000
3/2009-3/2010

CFD modelling of wastewater reclamation processes and validation through Technological Pilot Platform Monitoring

Joel Ducoste (PI)
Politecnico di Bari, Italy
\$20,700
1/2009-12/2011

Evaluation of Computational Fluid Dynamics (CFD) for Modeling UV-Initiated Advanced Oxidation Processes

Joel Ducoste (PI) (Co-PI: Detlef Knappe, NCSU)
AWWARF
\$150,000
1/2006-6/2009

Characterizing the structure of Fat, oil and Grease Deposits from Sewer Collection systems

J.J. Ducoste (PI) (Co-PI: Kevin Keener, Purdue University)
Altria research
25,000
8/2005-5/2007

Fats, Roots, Oils, and Grease (FROG) in Centralized and Decentralized Systems

J.J. Ducoste (PI) (Co-PI: Kevin Keener, Purdue University; John Groninger, Southern Illinois University; Leon Holt, Town of Cary)

WERF

\$276,000

3/2005-12/2008

Ecophysiology of Nitrifying and Denitrifying Microbial Communities and their Interactions in Microbial Flocs

J.J. Ducoste (Co-PI) (PI: Francis de los Reyes: CCEE, Co-PI: Michael Hyman: Microbiology)

NSF

\$430,000

7/2004-7/2009

REU Supplement to Career: A Unified Approach to Understanding, Education, and Design of Disinfection Processes using Computational Fluid Dynamics

J.J. Ducoste (PI)

NSF

\$6,000

9/2004 to 9/2005

Characterization of Fat, Oil, and Grease Blockages in Sanitary Sewer Collection Systems

J.J. Ducoste (PI) (Co-PI: Kevin Keener in NCSU Food Science)

NCSU Faculty Research and Professional Development Grant

\$20,000

6/2003 to 6/2004

NCSU/NC A & T Program for STEM Enrollment Enhancement

J.J. Ducoste (Co-PI) (PI: John Fountain, MEAS; Co-PIs: Carrie Thomas, MEAS, Robert Borden, CCE; David Haase, Physics; Christine Grant, CHE; Christopher Gould, Physics; Jesus Rodriguez, Math; William Switzer, Chem)

NSF

\$399,938

1/2003 to 12/2005

REU Supplement to Career: A Unified Approach to Understanding, Education, and Design of Disinfection Processes using Computational Fluid Dynamics

J.J. Ducoste (PI)

NSF

\$6,000

9/2003 to 9/2004

Analysis of Computational Fluid Dynamics Results for Ultraviolet Reactor Design: A Subcontract to UV Disinfection for Large Water Treatment Plants: AWWA Research Foundation No. 2768

J.J. Ducoste (PI) (AWWARF Co-PIs: Bob Hulsey, Black and Veatch; Karl Linden, Duke University)

Black & Veatch
\$69,000
9/2002 to 12/2004

Career: A Unified Approach to Understanding, Education, and Design of Disinfection Processes using Computational Fluid Dynamics

J.J. Ducoste (PI)
NSF
\$375,000
9/2001 to 8/2008

Hydraulic Characterization of UV Reactors

J.J. Ducoste (PI) (Co-PI: Karl Linden, Duke University)
AWWARF
\$318,017
8/2001 to 9/2004

REU Supplement to Career: A Unified Approach to Understanding, Education, and Design of Disinfection Processes using Computational Fluid Dynamics

J.J. Ducoste (PI)
NSF
\$12,000
9/2002 to 9/2003

Analysis of Drinking Water Treatment Dynamic Simulator: An Undergraduate Research Award

J.J. Ducoste (PI)
NCSU
\$2,500
5/2002 to 9/2002

Developing Web-Based CE 596D for Teaching Physical Principles in Environmental Engineering to Campus and Distance Learning Students

J.J. Ducoste (PI)
NCSU Engineering Online
\$5000
5/2002-7/2002

REU Supplement: Career: A Unified Approach to Understanding, Education, and Design of Disinfection Processes using Computational Fluid Dynamics

J.J. Ducoste (PI)
NSF
\$12,250
9/2001 to 9/2002

RARE: Reconfigurable Computing VIA the Internet

J.J. Ducoste (Co-PI) (PI: Clay Gloster, Howard University)
NSF
\$60,723
7/2001 to 6/2002

Development and Integration of Hydraulic Efficiency Module for the Integrated Disinfection Design Framework Model

J.J. Ducoste (PI)
CH2M HILL
\$18,706
10/1998 to 6/2000

Determining Hydraulic Characteristics of Disinfection Contactors

J. J. Ducoste (PI)
NCSU Faculty Research and Professional Development Grant
\$10,000
1/1999 to 12/1999

Research Participant

NSF Kenan Fellow RET Program

Ruben Carbonell, Deborah Mangum (Kenan Institute for Engineering, Technology, and Science)
National Science Foundation
1/2004-1/2007
(Provides 1 teacher for project duration)

NSF Green Processing Undergraduate Research Program

Christine Grant, Steven Peretti (Dept. of Chemical Engineering)
National Science Foundation
1/2000-1/2005
(Provides 1-3 students per year for project duration)

Master's and Doctoral Theses Directed or Under Direction.

Ph.D. Thesis

Dong Liu (Numerical Modeling of UV Reactor Systems: Impact of Fluence Rate Distribution and Turbulence) (Ph.D., Graduated December 2004)

Yanjin Liu (Modeling Chloramine Formation in Turbulent Flow) (Ph.D., Graduated December 2004)

Scott Alpert (Impact of Dynamic Fluence Rate Distribution on Direct Photolysis in UV Systems) (Ph.D., Graduation Date: May 2009) (Defended in December 2008 and passed)

Tarek Aziz (Analysis of Grease Interceptor Performance) (Ph.D., Expected Graduation date: May 2010) (Post-prelim)

Antonio Sobremisana (Understanding the Impact of Floc size and structure on Simultaneous Nitrification/Denitrification processes) (Ph.D., Expected Graduation Date: May 2011) (prelim exam ongoing)

Yi Wang (Fate and transport of FOG Deposit chemical Precursor in Sewer Collection system) (Ph.D., Expected Graduation Date: May 2013)

Mahbuba Iasmin (Modeling FOG Deposit formation kinetics) (Ph.D., Expected Graduation Date: May 2013)

M.S. Thesis

Dan Peplinski (Computational Fluid Dynamics Modeling of Rectangular Disinfection Clearwells) (M.S., Graduated Fall 2000)

Veronica Ortiz (The Use of Computational Fluid Dynamics for Evaluating Low Energy Mixers) (M.S., Graduated Summer 2001)

Cory Hopkins (Characterizing the Spatial Variation in Particle Aggregation due to Heterogeneous Turbulence in a Flocculation reactor) (M.S., Graduated Summer 2002)

Carolina Baeza (Using Fluorescent Microspheres as a Non-Biological Surrogate Indicator for Sequential disinfection Performance) (M.S., Graduated Summer 2003)

Brannon Richards (Modeling Microbial Inactivation under Sequential Disinfection) (M.S., Graduated December 2004)

Xi Zhao (Impact of Upstream Hydraulic Configurations for UV Disinfection Processes using Microspheres) (M.S., Graduated May 2007)

Kiseok Wang (A Novel Approach for Characterizing UV Reactor Performance using Lagrangian Sensors) (M.S., Graduated August 2008)

Erin Gallimore (Challenge Testing of Grease Abatement systems) (M.S., Expected Graduation in May 2010)

Colleen Bowker (Analysis of Continuous Flow UV LED reactors) (M.S., Expected Graduation in May 2010)

Siddarth Lokineni (Enhanced Removal FOG Deposit Chemical Precursors) (M.S., Expected Graduation in May 2011)

Hunter Long (Reduction of FOG Deposit Formation Potential by Transesterification) (M.S., Expected Graduation in May 2011)

MCE Projects Directed

John Schrum (Disinfection Reactor Design using Computational Fluid Dynamics) (Graduated Spring 2000)

Stephen Terry (Modeling Sedimentation Processes using the Algebraic Slip Model) (Transferred to Mech E.)

Liz Feliberty-Ruperte (The Impact Of Shell-Core Alpha Function And Higher Order Numerical Solution Techniques On Turbulent Population Balance Model) (Graduated Fall 2000)

Corey Cavalier (A Comparison of the Integrated Disinfection Design Framework and Computational Fluid Dynamic models: Differing Approaches to the Disinfection Performance in Continuous Flow Systems) (Graduated Spring 2001)

Nandita Akunuri (Secondary Clarifier Modeling using QMOM and CFD) (MCE expected Aug 2010)

Vidya Mohandas (Simulating Sewer Collection System Hydraulics with EPA-SWMM) (MCE Expected in Aug 2010)

- E. **Technology Transfer** - Include invention disclosures, patents files and patents awarded, new cultivars developed and released, major software packages, design patents, and other pertinent evidence.

N/A

- F. **Cross-Disciplinary Activities** - Include participation in centers, institutes, and other organized research efforts between departments within and across colleges.

- **Collaborated on a proposal involving Marty Hubbe and Orlando Rojas from Pulp and Paper Science and Melissa Pasquinelli from Textile Engineering to understand the structure and reactivity of zero-valent iron nanoparticles, using molecular dynamics simulations. A proposal to NSF was submitted in September 2009.**
- **Collaborating on an NSF project involving Vincent Chiang and Ron Sederoff from Forestry department, and William Edmonson and Windser Alexander from Electrical engineering on developing biosystem models for the analysis tree plant cell metabolism for the production of lignin.**
- **Collaborated with Michael Hyman in Microbiology with Francis de los Reyes to understand how the microbial ecology changes with physical floc conditions in an activated sludge reactor.**
- **Collaborated with the Kenan Institute for Engineering, Technology, and Science as a University mentor for the Kenan Fellows for Curriculum and Leadership Development**

program. The program involves working with a middle school teacher to integrate water quality and treatment concepts into the K-12 curriculum.

- Collaborated on a project involving fat, oil, and grease deposit formation in sanitary sewers with Kevin Keener in the Food Science department.**
- Collaborated on a project to develop a program designed to increase the number of graduates in science, technology, engineering and mathematics (STEM) with John Fountain in MEAS department**
- A participant in a 5 yr NSF REU project with Christine Grant and Steven Peretti (CHE Dept.)**
- Collaborated on a proposal involving the demonstration and evaluation of a constructed wetland and spray field system for leachate treatment with Sarah Liehr of BAE. The proposal has been submitted to SEAGRANT and is pending**
- Collaborated on a project involving modeling nitrogen transport in duckweed ponds for secondary treatment of swine wastewater with Jiayang Cheng of BAE**
- Collaborated on two proposals and a project involving the design and implementation of a reconfigurable computer for simulation of turbulent-induced flocculation models with Clay Gloster (formerly of the ECE Dept.)**
- Collaborated on Combined Research-Curriculum Development (CRCDD) NSF Proposal with Christine Grant NCSU-CHE, Clay Gloster NCSU-ECE, Richard Felder NCSU-CHE, Sandra Williams NCSU-Education, and Fred Boadu DUKE-CE, that looks at using high computing techniques to integrate engineering research into curriculum development.**

III. EXTENSION AND ENGAGEMENT WITH CONSTITUENCIES OUTSIDE THE UNIVERSITY

A. List accomplishments as applicable

- A.1 **Scholarly Accomplishments** - Include refereed publications, brochures, reports, pamphlets, non-refereed publications, computer software, educational videotapes, slide sets, popular press articles, and other pertinent evidence.

Collaborating with Professor Lorenzo Liberti, Politecnico di Bari. The project involves the development and validation of computational fluid dynamic models of unit process for water reuse applications. This project is only one phase of a larger project entitled "Integrated Strategies For Municipal Wastewater Productive Reuse In Apulia Region" This multiphase research also involves collaboration with Dr. J. Cotruvo from USEPA Prof. C. Haas from Drexel University, USA, Prof. R. Gehr from McGill Univ., Canada, Prof. H. Shuval from Jerusalem Hadassah Academy, Israel, and Prof. G. Huppes from Leiden Univ., Netherlands.

- A.2 **Technology Transfer** - Include major accomplishments, program impacts.

Ducoste, J.J., 2003, **The Intricacies of Designing Ultraviolet (UV) Disinfection Reactors using Numerical Models**, Design Your Own Workshop series, NCSU, November 18, Raleigh N.C.

Ducoste, J.J., 2002, **The Intricacies of Designing Ultraviolet (UV) Disinfection Reactors using Numerical Models**, Design Your Own Workshop series, NCSU, December 4, Raleigh N.C.

Ducoste, J.J., 2001, **Overview of Integrated Drinking Water Disinfection Design Framework Approach**, Design Your Own Workshop series, NCSU, December 5, Raleigh N.C.

- A.3 **Recognized Creative and Professional Achievement** - Include exhibitions, honors, awards, prizes, grants and contracts, and other pertinent evidence.

- A.4 **Public Service** - Include seminars and meetings arranged, special intervention programs, workshops, special projects, design assistance, and other pertinent evidence.

Working with Washington Suburban Sanitation Commission on evaluating Grease Abatement Systems for removal of Fat Oil and Grease Laden waste streams

Associate Editor for Journal of Environmental Engineering ASCE

Moderator of Technical Session at Disinfection 2009 Conference Atlanta, GA

Guest Instructor at Leesville Middle School 8th grade Science Class

Moderator at an NSF Workshop WATERS 08 DC

Speaker at a workshop on Fat, Oil, and Grease for engineers and pretreatment coordinators in NC

Organizer of a Workshop on modeling membrane bioreactors for researchers and scientists at Ghent University

Member of the conference organizing and scientific committee for the 3rd International Conference on Population Balance Modeling, September 2007, Quebec City, Quebec Conference website :<http://modelEAU.org/pbm2007>

Member of the conference organizing and scientific committee for the 2nd International Conference on Population Balance Modeling, May 2004, Valencia (Spain) Conference website:<http://biomath.rug.ac.be/PBM2004>

Developed a proposal/project for the Senior Design Course in Civil Engineering that involves the neutralization of wastewater for a local company: Kennametal. The work is being performed with Lisa Bullard of Chemical Engineering to foster both process and waste treatment solutions and multidisciplinary activities for the students in the design course

Member of Senior Project Review for New York City Department of Environmental Protection (DEP) Catskill Turbidity Control Study

This work involves the evaluation of computer modeling developed for a multi-level Shandaken Tunnel Intake facility and reservoir dredging/Cofferdam removal project. I am also responsible for helping review the technical and economic feasibility and environmental benefits for the alternatives developed through the modeling performed.

Co-chaired the UV Measurement sessions at the IUVA 2nd International Congress on Ultraviolet Technologies in Vienna, Austria, July, 2003

Developed a proposal/project for the Senior Design Course in Civil Engineering that involves the neutralization of wastewater for a local pharmaceutical company: Novo Nordisk.

Member of Senior Project Review for New York City Department of Environmental Protection (DEP) Catskill and Delaware UV Disinfection Facility

This work consists of the evaluation of computer modeling and/or biosimetry testing data developed for validation of the ultraviolet light (UV) reactors to be installed within the New York City Department of Environmental Protection (DEP) Catskill and Delaware UV Disinfection Facility. The Catskill and Delaware system supplies nearly 90% of the 2 billion gallons of drinking water consumed daily in New York City. The DEP has developed a Conceptual Design of the UV disinfection facility that incorporates low pressure high output (LPHO) UV reactors with nominal capacities of 40-mgd. As part of the Conceptual Design, DEP began a modeling program with the basic goal of using modeling as a means for validating full-scale UV reactors.

Member of Senior Project Review for Hydraulic Feasibility and Demonstration-Scale UV Testing at the Richard Miller Treatment Plant

The Greater Cincinnati Water Works (GCWW) requests for professional engineering services to conduct a hydraulic feasibility and cost effective analysis for the purpose of evaluating an optimal location for UV (Ultra Violet) technology installation into the existing treatment process and to provide recommendations for the most viable and cost effective UV technology for the Richard Miller Treatment Plant (RMTP). The project include services to design and conduct a yearlong demonstration-scale UV study at the RMTP to collect operation and maintenance data including performing feasible microbial inactivation tests and Computational Fluid Dynamics (CFD) modeling.

Performed consulting work for ATLANTIUM Inc and Gas Delivery Systems (GDS) that involved the review of Ultraviolet modeling work performed by both companies. In addition, modeling work was performed by me to review strategies for GDS to improve their UV reactor design.

Provided senior review of the modeling section of the EPA UV Guidance manual

Summary of Consulting Services

Fall 1999, Fall 2000, Fall 2003	CH2M HILL	Senior reviewer for CFD models of disinfection contactor designs and UV systems (See Extension section)
Spring 2002, Fall 2002, Fall 2003	Hazen & Sawyer	Senior reviewer for CFD models of UV reactor designs with the city of New York (See Extension section)
Spring 2003	Novo Nordisk	Senior reviewer for waste discharge project. This project was performed through CE 481 senior design course.
Spring 2004	Kennametal	Senior reviewer for waste discharge project. This project was performed through CE 480/481 senior design course.
Fall 2003 and Spring 2004	Hazen & Sawyer	Senior reviewer for CFD models of New York City’s Catskill Turbidity Control Study (See Extension section)
Spring 2004	CH2M HILL	Senior reviewer for CFD models of Anaerobic digester project (See Extension section)
Summer 2005	Atlantium	Senior reviewer for CFD models of UV reactor for drinking water disinfection (See Extension section)
Spring 2006		
Fall 2005	GDS Inc	Senior reviewer for CFD models of UV reactor for drinking water disinfection (See Extension section)
Fall 2006	CH2M HILL	Senior Reviewer UV Disinfection System, Cincinnati

A.5 Cross-Disciplinary Activities - Include contributions to special University-wide initiatives.

Participant in a 3 yr (2004-2007) NSF RET project with Ruben Carbonell and Deborah Mangum (Kenan Institute for Engineering, Technology, and Science). The proposed site will provide science and engineering research projects for 20 middle and high school teachers from multiple school districts in order to develop a cohort of teacher leaders who will bring enhanced knowledge of engineering and technological innovation into their classrooms.

Participant in a 5 yr (2000-2005) NSF REU project with Christine Grant and Steven Peretti (CHE Dept.). This project involves several researchers from different departments all providing research projects that can be completed by an undergraduate student during the summer months. As a member of this research team, I have provided research projects related to water and wastewater treatment processing and design.

IV. SERVICE TO THE UNIVERSITY AND PROFESSIONAL SOCIETIES:

Include University service (department, college, and NCSU committees), state and regional, and national and international activities and committee work.

Department Committees:

- 1) WREE group coordinator (2004-2006)
- 2) Lab Equipment Committee (1999-present)
- 3) ABET Committee: Senior Design (2002-present) and Lab (2001-2002)
- 4) CCEE Engineering Open House (1998-1999)
- 5) CCEE Executive Committee Member (2005-2006)
- 6) Awards committee member (2005-2009)
- 7) Seminar committee member (2005-2006)
- 8) ABET subcommittee member (2005-2009)
- 9) ABET ENE degree Coordinator (2007-present)

University Activities:

- 1) Work with Minority Engineering Program Office to help with African American Visitation Day 2009
- 2) NSF Advance Scholar (Part of Developing Diverse Departments (3-D) program at NC STATE <http://www.ncsu.edu/odi/advance/>) (2009-2011)

North Carolina State Assembly Committees

- 1) North Carolina House of Representative Offshore Energy Exploration Study Committee (2009-present)

National and International Committees:

- 1) American Water Works Association Research Particulate Contaminants Subcommittee (1998-2003)
- 2) International Conference on Population Balance Modeling Organizing and Scientific Committee (2002-present)
- 3) EPA Science Advisory Board Drinking Water Committee (2009-Present)

Manuscript Review Activities

I have reviewed manuscripts for the following journals since 1998:

- Journal of American Water Works Association (3 manuscripts)
- ASME Journal of Fluids Engineering (2 manuscripts)
- ASCE Journal of Environmental Engineering (20 manuscripts)
- Journal of Water Supply and Research (AQUA) (11 manuscripts)
- Journal of Chemical Engineering Science (17 manuscript)
- Water Research (6 manuscript)
- Environmental Engineering Science (12 manuscripts)
- Journal of Environmental Engineering and Science (7 manuscripts)
- Environmental Science and Technology (1 manuscript)
- Journal of Chemical Engineering (1 manuscript)
- Urban Water Journal (1 manuscript)
- American Institute of Chemical Engineers (3 manuscripts)

I am currently an Associate Editor of ASCE Journal of Environmental Engineering