

**SUSAN E. POWERS**  
Clarkson University  
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## **EDUCATION**

*The University of Michigan*

Doctor of Philosophy, Environmental Engineering, July 1992.

*Clarkson University*

Master of Science, Civil and Environmental Engineering, May 1985.

Bachelor of Science, Chemical Engineering, May 1983 (with Great Distinction).

## **PROFESSIONAL REGISTRATION**

New York State Professional Engineer, License #071061

## **PROFESSIONAL EXPERIENCE**

- 2005-present Associate Dean of Engineering for Research and Graduate Studies, Coulter School of Engineering, Clarkson University, Potsdam NY
- 1992-present Department of Civil and Environmental Engineering, Clarkson University, Potsdam, NY: Professor (2002-present), Associate Professor (1998-2002), Assistant Professor (1992-1998)
- 2004 Visiting Researcher, DOE National Renewable Energy Laboratory, Golden CO (sabbatical leave, January-May)
- 2002-2003 Director, Clarkson University Center for the Environment
- 1988-1992 Department of Civil and Environmental Engineering University of Michigan, Ann Arbor, MI: Lecturer (1991), Research Assistant (1988-1992), Teaching Assistant (1989-1990)
- 1985-1987 Engineering-Science, Liverpool, NY: Project Engineer
- 1984-1985 Department of Civil and Environmental Engineering, Clarkson University, Potsdam, NY: Research Assistant.

## **TEACHING INTERESTS**

In the wide range of classes that Dr. Powers has taught, she focuses on teaching the *process* of engineering problem solving in a real-world environment. By focusing on complex and relevant environmental problems, the importance of societal impacts and communication can be stressed as well as providing a basis and relevance for technical material needed to address the engineering problem. This approach has been used in classes designed for middle school science and technology subjects, undergraduate environmental engineering lab and design classes, and graduate classes in groundwater flow, physico-chemical processes, and industrial ecology.

## **RESEARCH INTERESTS**

Dr. Powers' has historically worked in the area of multiphase flow and contaminant transport in subsurface systems, with specific emphasis on the fate, transport, and remediation of nonaqueous phase liquids (NAPLs) in complex systems. Research projects have included the physical and chemical complexities associated with aquifer heterogeneities and non-ideal chemical mixtures such as coal tars and oxygenated gasoline.

Research on the environmental fate of oxygenated gasoline led to her interest in the application of this subsurface science to aid in regulatory and policy decisions with a broader perspective on the environmental impacts of energy policy over the life cycle of energy systems. Current projects in this area include environmental life cycle management issues for gasoline, other transportation fuels, and dairy waste-to-energy systems. This research is especially focused on defining and quantifying metrics that can be used to assess the energy and environmental benefits and liabilities associated with bioenergy systems.

**HONORS AND AWARDS**

“Best Paper Award” out of 76 submitted papers. Awarded by the ASEE K-12 Division at the 2008 Annual ASEE conference. Powers, S.E., B. Brydges, P. Turner, G. Gotham, J.J. Carroll, D.G. Bohl “Successful Institutionalization of a K-12 - University STEM Partnership Program.” In: *Proceedings* of the 115th Annual ASEE Conference & Exposition (Pittsburgh PA, June, 2008, on CD, Session # AC 2008-1652)

NSF Directors Award – Distinguished Teaching Scholar, 2004

PUBLIC WORKS magazine, identified as one of 50 Trendsetters of the year, 2004 (vol 135, no. 12).

Appointed EPA Science Advisory Board, Environmental Engineering Committee, 2003

AEESP Distinguished Service Award, Assoc. Environmental Engineering and Science Professors, 2001

Boeing Outstanding Educator Award (one member of winning team of Clarkson faculty and staff), 2001

Albert D. Merrill Award, Dept. Civil & Environmental Engineering, Clarkson University, 2001

Listed in Who’s Who in America - Science and Engineering, 5<sup>th</sup> ed., 1999

J.W. Graham, Jr. Faculty Research Award, Clarkson University, 1998

Listed in Who’s Who Among America’s Teachers, 5<sup>th</sup> ed., 1998

Albert D. Merrill Award, Dept. Civil & Environmental Engineering, Clarkson University, 1998

Dow Outstanding New Faculty Award, St. Lawrence Section of ASEE, 1997

Clarkson University Outstanding New Teacher Award, 1995

Clarkson University Outstanding Advisor Award, 1995

Best Presentation Award in the session on “Engineering and Technology Curricula for the 21st Century” at the St. Lawrence Section ASEE Meeting, 1995

Alcoa Faculty Award, Clarkson University, 1992

Graduate Student Award, Lewis Publishers/ACS Environmental Division, 1992

Benton Fellowship, The University of Michigan, 1987-1988

Civil Engineering Scholarship, The University of Michigan, 1987-1990

Omega Chi Epsilon Senior Award, Clarkson University, 1983

Pablo Guttman Memorial Award, Clarkson University, 1982

Awards Received by Students

First place award at the Energy Smart EXPO competition, college division. Sponsored by WPBS, Watertown NY. Received by Nate Barlow and Mathew Ingraham for poster “Energy Choice Game,” March 2008.

Honorable Mention, Faculty co-advisor to biodiesel student team competing in the EPA P3 Sustainability Competition, May 2006.

Third place award, student presentation competition at the annual NYWEA meeting received by Wenqian Dou, PhD candidate, 2006.

Second place award in the Association for Environmental Engineering and Science Professors Annual Masters Thesis Award Competition. Received by Cory McDowell for thesis entitled: “Effects of Ethanol on the Migration and Distribution of Gasoline in the Vadose Zone,” 2003.

First place, student presentation competition at the annual NYWEA meeting. Received by Cory McDowell, M.S. candidate, 2002.

First place award and "Best Paper." Faculty advisor to students receiving this award at WERC Environmental Engineering Design Competition, 1999.

ACS Graduate Student Award in Environmental Chemistry, received by Jianzhong Zheng, PhD candidate, 1998.

Best Presentation-Task 3. Faculty co-advisor to students receiving this award at WERC Environmental Engineering Design Competition, 1997.

Second place in Water Environment Federation Student Paper Competition, Undergraduate Division. Received by Thomas Seacord, undergraduate laboratory assistant, 1996.

First place award and "Best Bench-scale Demonstration." Faculty co-advisor to students receiving this award at WERC Environmental Engineering Design Competition, 1996.

First place award and "Best Bench-scale Demonstration." Faculty co-advisor to students receiving this award at WERC Environmental Engineering Design Competition, 1995.

Best Paper Design. Faculty co-advisor to students receiving this award at WERC Environmental Engineering Design Competition, 1993.

## **PUBLICATIONS**

### Refereed Journal Papers

1. Powers, S.E., A.G. Collins, J.K. Edzwald, and J.M. Dietrich, "Modeling an Aerated Bubble Ammonia Stripping Process." *J. WPCF*, 59: 92-100, 1987.
2. Powers, S.E., C.O. Loureiro, L.M. Abriola, and W.J. Weber, Jr., "Theoretical Study of the Significance of Nonequilibrium Dissolution of Nonaqueous Phase Liquids in Subsurface Systems." *Water Resour. Res.*, 27(4): 463-478, 1991.
3. Powers, S.E., L.M. Abriola, and W.J. Weber, Jr., "An Experimental Investigation of NAPL Dissolution in Saturated Subsurface Systems: Steady-State Mass Transfer Rates." *Water Resour. Res.*, 28(10): 2691-2706, 1992.
4. Powers, S.E., L.M. Abriola, and W.J. Weber, Jr., "An Experimental Investigation of NAPL Dissolution in Saturated Subsurface Systems: Transient Mass Transfer Rates." *Water Resour. Res.*, 30(2): 321-332, 1994.
5. Powers, S.E., L.M. Abriola, and W.J. Weber, Jr., "Development of Phenomenological Models for NAPL Dissolution Processes." *J. Contam. Hydrol.*, 16(1): 1-33, 1994.
6. Ripp, J., J. Villaume, and S.E. Powers, "The Application of Geochemical Principles to the Investigation of DNAPL Contamination at Manufactured Gas Plant Sites." *Land Contamination and Reclamation*, 3(4), 1995.
7. Powers, S.E., and M.E. Tamblin, "Wettability of Porous Media after Exposure to Synthetic Gasolines." *J. Contam. Hydrol.*, 19(2): 105-125, 1995.
8. Powers, S.E., W.H. Anckner, and T.F. Seacord, "The Wettability of NAPL-Contaminated Sands." *J. Environ. Engrg.*, 122(10): 889-897, 1996.
9. Powers, S.E., and A.K. Zander, "Stabilization of a Mixed Waste Sludge for Land Disposal." *Hazardous Waste and Hazardous Materials*. 13(4): 515-524, 1996.
10. Gierke, J.S., and S.E. Powers, "Increased Implementation of In Situ Treatment Technologies Through Field Scale Performance Assessments." *Water Environ. Res.*, 69(2): 196-205, 1997.
11. Powers, S.E., J.F. Villaume, and J.A. Ripp, "Multivariate Analyses to Improve Understanding of NAPL Pollutant Sources." *Ground Water Monitoring and Remediation*, 17(2), 130-140, 1997.
12. Powers, S.E., and S.J. Grimberg, "Experiments to Illustrate Phase Partitioning and Transport of Environmental Contaminants." *CEE: Chemical Engineering Education*, 32(1): 40-45, 1998.
13. Heermann, S.E., and S.E. Powers, "Modeling the Partitioning of BTEX in Water - Reformulated Gasoline Systems Containing Ethanol." *J. Contam. Hydrol.*, 34(4): 315-341, 1998.
14. Powers, S.E., I. M. Nambi, and G.W. Curry, Jr., "NAPL Dissolution in Heterogeneous Systems: Mechanisms and a Local Equilibrium Modeling Approach." *Water Resour. Res.*, 34(12): 3293-3302, 1998.
15. Zheng, J., and S.E. Powers, "Organic Bases in NAPLs and their Impact on Wettability." *J. Contam. Hydrol.*, 39(4): 161-181, 1999.
16. Morshed, J., and S.E. Powers, "Regression and Dimensional Analysis for Two-Phase Flow Modeling." *Transport in Porous Media*, 38(1-2): 205-221, 2000.
17. Davis, S.W., and S.E. Powers, "Evaluation of Alternative Sorbents for Removal of MTBE from Groundwater." *J. Environ. Engrg.*, 126(4): 354-360, 2000.

**PUBLICATIONS (cont.)**

18. Nambi, I.M., and S.E. Powers, "NAPL Dissolution in Heterogeneous Systems: Experimental Results in a Simplified System." *J. Contam. Hydrol.*, 44(2): 161-184, 2000.
19. Powers, S.E., D. Rice, B. Doohar P.J.J. Alvarez, "Replacing MTBE with Ethanol as a Gasoline Oxygenate –How May Ground Water Resources Be Impacted?" *Environ. Sci. Technol.* 35(1), 24A-30A, 2001.
20. Powers S.E., C.S. Hunt, S.E. Heermann, H.X. Corseuil, D. Rice, and P.J.J Alvarez. "The transport and fate of ethanol and BTEX in groundwater contaminated by gasohol." *Critical Reviews in Environmental Science and Technology.* 31(1): 79-123, 2001.
21. Zheng, J., S. Behrens, M. Borkovec, and S.E. Powers, "Predicting the Wettability of Quartz Surfaces Exposed to Dense Non-aqueous Phase Liquids" *Environ. Sci. Technol.* 35(11): 2207-2213, 2001.
22. Zheng, J., S.E. Powers, "Asphaltenes from coal tar and creosote: Their role in reversing the wettability of aquifer systems." *J. Colloid Interface Sci.* 244(2): 365-371, 2001.
23. Hwang, S., K. Lee, D. Lee, and S.E. Powers, "Models for Estimating Soil Particle-Size Distributions." *Soil Sci. Am. J.* 66(4): 1143-1150, 2002.
24. Giese, S.W., and S.E. Powers, "Using Polymer Solutions to Enhance the Recovery of Coal Tar and Creosote DNAPLs." *J. Contam. Hydrol.* 58(1-2): 147-167, 2002.
25. Hugaboom, D.A., and S.E. Powers, "Recovery of Coal Tar and Creosote from Porous Media: The Influence of Wettability." *Ground Water Monitoring and Remediation*, 22(4): 83-90, 2002.
26. Ahmadi, A., B. Williamson, T.L. Theis, S.E. Powers, Life Cycle Inventory of Toner Produced for Xerographic Processes. *J. Cleaner Production*, 11(5): 573-582, 2003.
27. Hwang, S., and S.E. Powers, "Estimating Unique Soil Hydraulic Parameters from Multi-Step Outflow Experiments with Sandy Media." *Adv. Water Res.* 26(4): 445-456, 2003.
28. Hwang, S.I. and S.E. Powers, "Lognormal Distribution Model for Estimating Soil Water Retention Curves for Sandy Soils." *Soil Science*, 168(3): 156-166, 2003.
29. Nambi, I.M., and S.E. Powers, "Mass Transfer Correlations for NAPL Dissolution from Regions with High Initial Saturations." *Water Resour. Res.*, 39(2): SBH 4-1 – 4-11, 2003.
30. McDowell C.J., and S.E. Powers, "Mechanisms Affecting the Infiltration and Redistribution of Ethanol-Blended Gasoline in the Vadose Zone." *Environ. Sci. Technol.* 37(9): 1803-1810, 2003.
31. Hwang, S., and S.E. Powers, "Using Particle-Size Distribution Models to Estimate Soil Hydraulic Properties." *Soil Sci. Soc. Am. J.*, 67(7), 1103-1112, 2003.
32. Zheng, J. and S.E. Powers, "Identifying the Effects of Polar Constituents in Coal-Derived DNAPLs on Interfacial Tension." *Environ. Sci. Technol.* 37(14): 3090-3094, 2003.
33. McDowell C.J., T. Buscheck and S.E. Powers, "Behavior of Gasoline Pools Following a Denatured Ethanol Spill." *Ground Water* 41(6): 746-757, 2003.
34. Hwang, S.I., K.P. Lee, D.S. Lee, S.E. Powers, "Effects of fractional wettability on capillary pressure-saturation-relative permeability relations of two-fluid systems." *Adv. Water Res.* 29(2): 212-226, 2006.
35. Powers, S.E., "Integrating Variability into Inventory Estimates of Non-point Source Nutrient Loads from Energy Crop Production." *Int. J. LCA*, 12(6): 391-398, 2007. (<http://dx.doi.org/10.1065/lca2007.02.307> )
36. Grimes, H.G., T.P. Seager, T.L. Theis, S.E. Powers, "A game theory framework for cooperative management of refillable and disposable bottle lifecycles." *J. Cleaner Prod.*, 15(17): 1618-1627, 2007 ([doi:10.1016/j.jclepro.2006.08.007](http://dx.doi.org/10.1016/j.jclepro.2006.08.007) ).
37. Lavigne, A., S.E. Powers, "Valuing fuel ethanol feedstock options from multiple energy perspectives: corn and corn stover feedstocks." *Energy Policy*, 35: 5918–5930, 2007.

**PUBLICATIONS (cont.)**

38. Grimberg, S.J., T.A. Langen, L.D. Compeau, S.E. Powers, "A Theme-Based Seminar on Environmental Sustainability Improves Participant Satisfaction in an Undergraduate Summer Research Program." *J. Engrg. Educ.*, 97(1), 95-103, 2008.
39. Dou, W., Omrane, K., S.J. Grimberg, M. Denham and S.E. Powers, "Characterization of DNAPL from the U.S. DOE Savannah River Site." *J. Contam. Hydrol.*, 97(1-2): 75-86, 2008. (doi:10.1016/j.jconhyd.2008.01.002)
40. Dominguez-Faus, R., S.E. Powers, J. Burken, P. Alvarez, "The Water Footprint of Biofuels: A Drink or Drive Issue?" Accepted for publication *Env. Sci. Technol.* November 2008
  - Lavigne, A., S.E. Powers, "Waste biomass as fuel ethanol feedstocks: An energy and environmental assessment." Submitted to *Biomass and Bioenergy*, July 2008.
  - Lavigne, A., S.E. Powers, "Net Recovered Value: A metric to assess the use of waste biomass materials as energy resources." Submitted to *Env. Sci. Technol.* October 2008.
  - Dou, W., M. Denham, S.E. Powers, "Metal solution – NAPL interactions leading to substantially lowered interfacial tension." In preparation.
  - DeWaters, J., M. Graham, S.E. Powers, "Designing an Energy Literacy Survey for Middle and High School Youth." In preparation for submission to the *Journal of Research in Science Teaching*.

Peer-Reviewed Books, Book Chapters, Reports

41. Rice, D.W., S.E. Powers, and P.J.J. Alvarez, "Potential Scenarios for Ethanol-containing Gasoline Released into Surface and Subsurface Waters." In: *Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate*. Volume IV, Chapter 1. Published by the State of California, UCRL-AR-135949, 1999 (<http://www-erd.llnl.gov/ethanol/etohdoc/> ).
42. Powers, S.E., and S.E. Heermann, "A Critical Review: The Effect of Ethanol in Gasoline on the Fate and Transport of BTEX in the Subsurface." In: *Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate*. Volume IV, Chapter 2. Published by the State of California, UCRL-AR-135949, 1999 (<http://www-erd.llnl.gov/ethanol/etohdoc/> ).
43. Rice, D.W., P.J.J. Alvarez, S.E. Powers, *et al.*, "Knowledge Gaps Regarding the Surface Water and Groundwater Impacts of Ethanol-containing Gasoline and Recommendations for Future Research." In: *Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate*. Volume IV, Chap. 9. Published by the State of California, UCRL-AR-135949, 1999 (<http://www-erd.llnl.gov/ethanol/etohdoc/>).
44. Powers, S.E., J. Bisogni, J. Burken, K. Pagilla (eds.) *AEESP Environmental Engineering Processes Laboratory Manual*. Association of Environmental Engineering and Science Professors, Champaign IL, 2001 (on CD).
45. Grimberg, S.J. and S.E. Powers, "An Introduction to Phase Partitioning and Environmental Transport," In: *AEESP Environmental Engineering Processes Laboratory Manual* (Powers, S.E., J. Bisogni, J. Burken, K. Pagilla, eds.). Association of Environmental Engineering and Science Professors, Champaign IL, 2001 (Section 1-3-1, on CD).
46. Powers, S.E., "Residence Time Distributions in a Chlorine Contact Chamber." In: *AEESP Environmental Engineering Processes Laboratory Manual* (Powers, S.E., J. Bisogni, J. Burken, K. Pagilla, eds.). Association of Environmental Engineering and Science Professors, Champaign IL, 2001 (Section 1-2-4, on CD).
47. Powers, S.E., P.J.J. Alvarez, and D. Rice, "Increased Use of Ethanol in Gasoline and Potential Groundwater Impacts." In: *Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate: Subsurface Fate and Transport of Gasoline Containing Ethanol*, (D.W. Rice and R.T. Depue, eds.), Chapter 1. State of California, UCRL-AR-145380, 2001. (<http://www-erd.llnl.gov/ethanol/etohdocII/> )

**PUBLICATIONS (cont.)**

48. Powers, S.E., C.J. McDowell, "Infiltration and Distribution of Ethanol and Ethanol-blended Gasoline in the Vadose Zone." In: *Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate: Subsurface Fate and Transport of Gasoline Containing Ethanol*, (D.W. Rice and R.T. Depue, eds.), Chapter 2. State of California, UCRL-AR-145380, 2001. (<http://www-erd.llnl.gov/ethanol/etohdocII/>)
49. Powers, S.E., A.A. Williamson, "Lifecycle Management." In: *Strategic Environmental Management for Engineers*, R. Bellandi (ed.) J. Wiley and Sons, New York, Chapter 2, pp. 71-130, 2004.
50. Powers, S.E., "Quantifying Cradle-to-Farm Gate Life Cycle Impacts Associated with Fertilizer used for Corn, Soybean, and Stover Production." Technical Report prepared for National Renewable Energy Laboratory, Golden CO, NREL/TP-510-37500, May, 2005 (<http://www.nrel.gov/docs/fy05osti/37500.pdf> OR [www.osti.gov/servlets/purl/15016223-sQ9ssZ/native/](http://www.osti.gov/servlets/purl/15016223-sQ9ssZ/native/)).
- Powers, S.E., L.A. Deer-Ascough, R. Nelson, "Soil and Water Quality and Other Environmental Implications Associated With Corn Stover Removal and Herbaceous Energy Crop Production in Iowa." Draft technical report submitted to the National Renewable Energy Laboratory for review, November, 2007

Other Refereed Publications

51. Anckner, W.H., and S.E. Powers, "Relating the Wettability of Contaminated Sands to NAPL Composition." In: *NAPLs in the Subsurface Environment: Assessment and Remediation*, L.N. Reddi (ed.), ASCE, New York, NY, pp. 502-512, 1996.
52. Manivannan, I., S.E. Powers, and G.W. Curry, "Dissolution of NAPLs Entrapped in Heterogeneous Subsurface Systems." In: *NAPLs in the Subsurface Environment: Assessment and Remediation*, L.N. Reddi (ed.), ASCE, New York, NY, pp. 563-574, 1996.
53. Powers, S.E., "Editorial - ABET's Engineering Criteria 2000 – An opportunity to improve environmental engineering education." *Journal of Environmental Engineering*, 124(5): 395, 1998.
54. Alvarez, P.J.J., R.C. Heathcote, and S.E. Powers, "Forum - Caution against Interpreting Gasoline Release Dates Based on BTEX Ratios in Groundwater." *Ground Water Monitoring and Remediation*, 18(4): 69-76, 1998.
55. Powers, S.E., "Editorial - Environmental Engineers Must Look Beyond Their Traditional Approaches to Solve Environmental Problems in the Coming Century." *Journal of Environmental Engineering*, 125(4): 301, 1999.
56. Powers, S.E., J. DeWaters, P.K. Hopke, and A. Polissar, "Chemometric-Based Identification of Nonaqueous Phase Liquids in the Subsurface at Manufactured Gas Plant Sites." Final Report EPRI, Palo Alto CA, March 2000.
57. Powers, S.E., "Editorial - Environmental Engineering Professionals Needed for Educational Outreach." *Journal of Environmental Engineering*, 126(10): 891, 2000.
58. Powers, S.E., D. Rice, "The Subsurface Fate of Ethanol - A Look at the Emerging Oxygenate Alternative to MTBE." *L.U.S.T. Line Bulletin* (a report on federal and state programs to control leaking underground storage tanks), 36: 5-10, 2000.
59. McDowell, C.J., and S.E. Powers, "The Infiltration and Distribution of Ethanol Blended Gasoline in the Subsurface." *Clearwaters*, 33(1): 18-24, 2003.
60. Powers, S.E., "Preparing College Students to Teach an Environmental Problem Solving Curriculum to Middle School Students." In: *ASEE 2003 Annual Conference Proceedings: Staying in Tune with Engineering Education*. (Nashville TN, June 2003, paper number 2003-369).
61. Powers, S.E., M. Graham, T. Schwob, J. Dewaters, "Diversity in K-12 Initiatives to Attract a Diverse Pool of Engineering Students." In: *Proceedings of the Frontiers in Education Conference*, (Boulder CO November 5-8, 2003).

**PUBLICATIONS (cont.)**

62. Powers, S.E., J. DeWaters, "Creating Project-Based Experiences for University- K-12 Partnerships." In: *Proceedings of the Frontiers in Education Conference*, (Savannah GA November, 2004, on CD).
63. Agogino, A.M., Jamieson, L.H., Kalonji, G., Ollis, D., Poor, H.V., Powers, S.E., Rogers, C. "Panel - Integrating Education, Research, and Outreach: Exemplars from the NSF Distinguished Scholars Program, In: *Proceedings of the 35<sup>th</sup> ASEE/IEEE Frontiers in Education Conference* (Indianapolis, IN, Oct 2005, on CD).
64. DeWaters, J., S.E. Powers. "Improving science and energy literacy through project-based K-12 outreach efforts" In: *Proceedings of the 113th Annual ASEE Conference & Exposition* (Chicago IL June 2006, paper number 2006-262).
65. DeWaters, J., S.E. Powers, M. Graham. "Partners in Engineering: Outreach efforts provide holistic engineering education for middle school girls" In: *Proceedings of the 113th Annual ASEE Conference & Exposition* (Chicago IL June 2006, on CD, paper number 2006-1471).
66. DeWaters, J., S.E. Powers. "WIP: A Pilot Study to Assess the Impact of a Special Topics Energy Module on Improving Energy Literacy of High School Youth." In: *Proceedings of the 35<sup>th</sup> ASEE/IEEE Frontiers in Education Conference* (San Diego CA, Oct 2006, on CD).
67. Powers, S.E., "Note from Guest Editor - Pushing the Boundaries: Making Research and Education in Environmental Engineering and Science Count," *Environmental Engineering Science*, 23(3): 417, 2006.
68. DeWaters, J.E., S.E. Powers and M. Graham, "Developing an Energy Literacy Scale." In: *Proceedings of the 114<sup>th</sup> Annual ASEE Conference & Exposition* (Honolulu HI, June, 2007, session AC 2007-1069, on CD).
69. Powers, S.E., B. Brydges, P. Turner, G. Gotham, J.J. Carroll, D.G. Bohl "Successful Institutionalization of a K-12 - University STEM Partnership Program." In: *Proceedings of the 115<sup>th</sup> Annual ASEE Conference & Exposition* (Pittsburgh PA, June, 2008, on CD, Session # AC 2008-1652) (winner of best paper award from the ASEE K-12 Division).
70. DeWaters, J., S.E. Powers, "Energy Literacy among Middle and High School Youth." In: *Proceedings of the 36<sup>th</sup> ASEE/IEEE Frontiers in Education Conference* (Saratoga Springs NY, Oct 2008, Session TA1-11, on CD)
71. Hotaling, L., J. Bonner, T. Ojo, S.E. Powers, "SENSE IT: Student Enabled Network of Sensors for the Environment using Innovative Technology." Abstract submitted for the *Proceedings of the 116<sup>th</sup> Annual ASEE Conference & Exposition* (Austin TX, June, 2009).
72. DeWaters, J., S.E. Powers, "Using a Real-world, Project-based Energy Module to Improve Energy Literacy among High School Youth." Abstract submitted for the *Proceedings of the 116<sup>th</sup> Annual ASEE Conference & Exposition* (Austin TX, June, 2009).
73. Reinhart, D.R., C. R. Baillod (plus 15 co-authors, including S.E. Powers), "Environmental Engineering Body of Knowledge." Report prepared for AAEE, 2008.

Conference Proceedings (not reviewed)

1. Powers, S.E., "Graphical Tools for Characterizing NAPL Spill Sites." In: *Proceedings of the 5th WERC Technology Development Conference*, pp. 49-58, (Las Cruces, NM, April 1995).
2. Zander, A.K., S.E. Powers, and N.L. Ackermann, "The Advantages and Organization of Interdisciplinary Design Projects." In: *ASEE 1995 Annual Conference Proceedings: Investing in the Future*. Vol 1: pp. 601-606, (Anaheim, CA, June 1995).
3. Powers, S.E., "Understanding the Nature of NAPL Pollution Sources: Improving Analysis of Groundwater Data." In: *Proceedings of the WEF 68th Annual Conference, Vol. II: Residuals & Biosolids\ Remediation of Soils and Groundwater*, (Miami, FL, October 1995) pp. 423-423.

**PUBLICATIONS (cont.)**Conference Proceedings (not reviewed)

4. Gierke, J.S., and S.E. Powers, "In Situ Groundwater Treatment Technologies: Increased Implementation Through Results of Field Scale Performance Assessments." In: *Proceedings: WEF 68th Annual Conference, Vol. II: Residuals & Biosolids \ Remediation of Soils and Groundwater*, (Miami, FL, October 1995) pp. 547-558.
5. Powers, S.E., A.K. Zander, M. Reardon, and M. Abatto, "Stabilization of a Solar Pond Sludge for Land Disposal." In: *Proceedings: Waste Management '96*, (Tucson, AZ, February 1996) on CD-ROM.
6. Moosbrugger, J.C., S.E. Powers, and A.K. Zander, "Student Design Proposal for Mechanical Mobilization and Retrieval of Radioactive Wastes from Underground Storage Tanks." In: *Proceedings: Waste Management '96*, (Tucson, AZ, February 1996) on CD-ROM.
7. Anckner, W.H., and S.E. Powers, "Effects of Petroleum Products on Soil Wettability." In: *Proceedings*, ACS Division of Environmental Chemistry, (New Orleans, March 1996), 36(1): 243-245.
8. Heermann, S.E., and S.E. Powers, "The Dissolution of BTEX Compounds from Oxygenated Gasoline." In: *Proceedings*, ACS Division of Environmental Chemistry, (New Orleans, March 1996), 36(1): 221-224.
9. Young, T.C., S.E. Powers, A.G. Collins, and N.L. Ackermann, "A Unified Concentration in Environmental Engineering." In: *ASEE 1996 Annual Conference Proceedings: Investing in the Future*, (Washington D.C, June 1996), Session 2251 (on CD-ROM).
10. Zander, A.K., and S.E. Powers, "Underground Storage Tank Remediation: A Student Design Project." In: *Proceedings of the 4<sup>th</sup> International Congress on Environmentally Conscious Design and Manufacturing*, (Cleveland, OH, July 1996), 143-149.
11. Zander, A.K., S.E. Powers, and S.J. Grimberg "Underground Storage Tank Remediation." In: *Proceedings of the ACS Special Symposium, Emerging Technologies in Hazardous Waste Management, VII*. (Birmingham AL, September 1996).
12. Heermann, S.E., and S.E. Powers, "Modeling Cosolvency Effects on BTEX Partitioning from Reformulated Gasolines." In: *Proceedings*, ACS Division of Environmental Chemistry, (San Francisco, April 1997), 37(1): 389-392.
13. Nambi, I.M., and S.E. Powers, "Simplified Lab-Scale Experiments to Quantify DNAPL Dissolution in Heterogeneous Systems." In: *Nonaqueous Phase Liquids – Remediation of Chlorinated and Recalcitrant Compounds*, G.B. Wickramanayake and R.E. Hinchee (eds.). Batelle Press, Columbus, pp. 49-54, 1998.
14. Morshed, J., and S.E. Powers, "Regression and Dimensional Analysis for Modeling Two-Phase Flow. In: *Proceedings*, ENVIROMeet'98, (Irvine CA, July 1998), pp. 189-200.
15. Tornatore, P.M., S.E. Powers, and W.J. Cooper, "Emerging Treatments for MtBE: Synthetic Adsorbents and High Energy Electron Injection." *Proceedings*, Battelle International Conference on Remediation of Chlorinated and Recalcitrant Compounds in Aquifer Systems, (Monterey CA, May 2000).
16. Damstedt, B.G., and S.E. Powers, "The Effect of DNAPL-Quartz Electrostatic Attraction on Wettability Alteration." *Abstract Book*, 14<sup>th</sup> National Conference on Undergraduate Research (NCUR 2000), (Missoula MT, April, 2000), p. 151.
17. Tornatore, P.M., S.E. Powers, and W.J. Cooper, "Emerging Treatments for MtBE: Synthetic Adsorbents and High Energy Electron Injection." *Proceedings*, 32nd Mid-Atlantic Industrial and Hazardous Waste Conference (Troy NY), 2000, on CD, Technomics Publishers, Lancaster PA.
18. Giese, S.W. and S.E. Powers, "Polymer Flooding for Improved Recovery of Coal Tars and Creosotes in Aquifer Systems." *Proceedings*, 32nd Mid-Atlantic Industrial and Hazardous Waste Conference (Troy NY), 2000, on CD, Technomics Publishers, Lancaster PA.

**PUBLICATIONS (cont.)**Conference Proceedings (not reviewed)

19. Grimberg, S.J., S.E. Powers, M. Denham, K. Chen, "Field Study to Correlate Chlorinated Solvent Concentrations and Microbial Distributions in the Unsaturated Zone." In: *Proceedings*, ACS Division of Environmental Chemistry, (Washington DC, August 2000), 40(2): 348-352.
20. Powers, S.E., and J. DeWaters, "Introducing Environmental Problem Solving as a Means of Increasing Interest in Science and Engineering" American Chemical Society CONFICHEM conference (July 2001). Presented and published on-line (<http://www.ched-ccce.org/confchem/2001/b/index.html>).
21. Powers, S.E., C. McDowell, "Mechanisms Affecting the Infiltration and Redistribution of Ethanol-Blended Gasoline in the Vadose Zone." In: *Proceedings* of the NGWA/API Petroleum Hydrocarbons Conference, (Houston TX, November, 2001), pp. 32-39.
22. Powers, S.E., "Quantifying the Flux of Ethanol to Groundwater after a Gasohol Spill." In: *Proceedings* of the NGWA Focus Conference on MTBE Assessment, Remediation and Public Policy. (Baltimore MD. June 22-25, 2003), pp. 163-168.
23. Powers, S.E., Omrane, K., and Grimberg S.J., Unique Interfacial Properties of the Chlorinated Solvent DNAPL at Savannah River National Laboratory. In: *Extended Abstracts*, Environmental Division of the American Chemical Society (Anaheim CA, March 2004, on CD).
24. Powers, S.E., L.A. Ascough, R.G. Nelson, "Soil and Water Quality Implications Associated With Corn Stover Removal and Herbaceous Energy Crop Production in Iowa." In: *Proceedings* of the 2008 Annual International Meeting of the American Society of Agricultural and Biological Engineers (Providence RI, July 2008, paper number 083916).

**PATENTS**

"The Energy Game" Provisional Patent, 2006. S.E. Powers, J. DeWaters, Luke Dosiak, Amanda Lyndaker, Kirstin Schillemat, Chrissy Rubillo, Melissa Richards, Nate Barlow (Developed with support of NSF GK-12 and DTS awards) (Patent application submitted 08/07)

**RESEARCH GRANTS AND CONTRACTS**Proposals Pending

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Proposals Funded

- "Entrapment and Dissolution of Nonaqueous Phase Liquids in Heterogeneous Media," NSF-Research Initiation Award, September 1, 1993 - February 28, 1997 (\$96,500).
- "Research Experience for Undergraduates - Entrapment and Dissolution of Nonaqueous Phase Liquids in Heterogeneous Media," NSF, May 1, 1994 - February 28, 1997 (\$15,000).
- "Reformulated Gasoline Compositions to Minimize Impact of Subsurface Spills," General Motors Corp., January 1, 1995 - April 31, 1996 (\$40,000).
- "Interfacial Phenomena Associated with Complex NAPL Mixtures in the Subsurface," NSF-CAREER Program, July 1, 1995 - June 30, 1999 (\$271,263) (BES-9501567).
- "Reformulated Gasoline: Transport and Clean up of Subsurface Spills," EPA-Office of Exploratory Research, October 1, 1995-September 30, 1999 (\$240,800).
- "Chemometric Based Identification of Nonaqueous Phase Liquids in the Subsurface at Manufactured Gas Plant Sites," (with Dr. Philip K. Hopke, co-PI), Electric Power Research Institute, October 1, 1996 -Sept 30, 1998. (\$50,000).
- "Research Experience for Undergraduates - Interfacial Phenomena Associated with Complex NAPL Mixtures in the Subsurface," National Science Foundation, May 1, 1997 - September 30, 1999 (\$9,000).

“Innovative Treatment and Remediation of Groundwater Contaminated with Radioactive and Hazardous Chemicals,” (S.J. Grimberg, P.I.; S.E. Powers and A.K. Zander co-P.I.’s) National Collegiate Inventors and Innovators Alliance, February 1997 (\$7,000, 5 months).

“Preventing Discharges of Coal Tar and Creosote to Surface Waters through the Immobilization of Subsurface Sources,” (S.E. Powers, P.I.; A. J. Rabideau, co-P.I. (SUNY Buffalo)), Great Lakes Research Consortium, July 1997-July 1998 (\$20,000).

“REU Site: Multiphase Processes in Environmental Systems,” (S.E. Powers, P.I., S.J. Grimberg, co-P.I.), National Science Foundation, February 1998 – January 2001 (\$208,000) (EEC-9732294).

“IGERT – Environmental Manufacturing Management” (T.L. Theis, P.I.), National Science Foundation (SEP share = \$179,936) (DGE-9870646).

Proposals Funded (cont.)

“Partners in Engineering.” (J. DeWaters, co-P.I.) Engineering Information Foundation, June 1999 – June 2000 (\$20,000).

“The effects of ethanol in gasoline on the fate and transport of fuel hydrocarbons released to surface and ground waters,” Lawrence Livermore National Laboratory as a subcontract to the California State Water Review Board, July 1999 – September 2000 (\$25,900).

“DNAPL Surface Chemistry: Its Impact on DNAPL Distribution in the Vadose Zone and its Manipulation to Enhance Remediation,” (S.E. Powers, P.I., S.J. Grimberg, co-P.I.) DOE-EMSP, September 1999 – March 2003 (\$455,112).

“K-12 Fellows to Initiate a Problem Based Learning Partnership,” (S.E. Powers, P.I., and A.G. Collins, co-P.I.) National Science Foundation, September 1999 – August 2004 (\$987,190) (DUE 9979509).

“Partners in Engineering: A Problem-Based Learning Approach for Encouraging Women and Girls in SMET,” (S.E. Powers and J. DeWaters, co-P.I.) NSF, September 2000 – Aug 2003 (\$92,899) (DUE-9979279).

“Microbial Processes at Interfaces Affect NAPL Distributions,” National Science Foundation, (S.J. Grimberg, P.I.), July 1, 2000 – June 30, 2003 (\$353,401).

“The Effect of Ethanol and Ethanol-Containing Gasoline on the Migration of Petroleum Products in the Vadose Zone,” Lawrence Livermore National Laboratory as a subcontract to the California State Water Review Board, July 1, 2000 – September 31, 2003 (\$55,653).

“U.S.-Brazil Planning Visit: Environmental Impacts of Ethanol in Gasoline.” National Science Foundation (P.J. Alvarez, (Univ. Iowa) P.I., S.E. Powers, co-P.I.) August 15, 2001 - January 31, 2002 (\$12,915 to University of Iowa.)

“Creating Diversity in Middle School: A Project-Based Learning Partnership Program,” GE Fund, March 2002-March 2005 (\$315,000).

“Characterization of changes in Colloid and DNAPL Affecting Surface Chemistry and Remediation,” (S.E. Powers, P.I., S.J. Grimberg and M. Denham (WSRC) co-P.I.s) DOE-EMSP, September 2003 – August 2005 (\$396,323).

“K-12 Project Based Learning Partnership Program.” NSF GK-12 Program (S.E. Powers, P.I., P. Turner and E. Oey (SLU) co P.I.s), July 2004 – June 2009 (\$2M) (DGE-0338216).

“Methane Digester with added-value greenhouse,” NYSERDA, (S.Powers, PI, S.J. Grimberg, P. Pillay, E. Thacher, co-PIs; from NYSERDA through subcontract to JCJDC), September 2004 – August 2007, (\$45k).

“DTS Award - Energy and the Environment: Educating K-16 students to improve energy-related technological and environmental literacy.” NSF DTS Award, June 2004 – June 2008 (\$305,000) (DUE-0428127).

“Pushing the Boundaries: Making Research and Education in Environmental Engineering Count.” (A.K. Zander PI; S.E. Powers Co PI) NSF, November 2004 – October 2005 (\$25,000).

- “St. Lawrence-Lewis County Math-Science Partnerships.” (P. Turner PI of subcontract to Hermon-DeKalb Central School; S.E. Powers, B. Faber, K. Fowler and W. Hooper, co-PIs) NYSED, September 2004 – August 2007 (\$1.7 M total).
- “Exploring the Fate of Purinox Fuel in Subsurface Systems.” Lubrizol Corp. \$12,944 April 2005 – January 2006.
- “Soil and Water Quality and Other Environmental Implications Associated with Corn Stover Removal and Herbaceous Energy Crop Production in Iowa.” Enersol (as prime contractor to NREL), \$58,173, May 2005 – November 2007.
- Biodiesel as a sustainable alternative to petroleum diesel in school buses, EPA-P3 Award (A. Ferro, PI; A. Rossner and S. Powers co-PIs) September 2005 – May 2006 (\$10,000)
- Environmental and Economic Performance of an Integrated, Value Added Digester-Cogeneration Process, USDA (S.J. Grimberg PI; S. Powers, P. Pillay, E. Thacher, R. Welsh, co-PIs) January 2006 – Dec2008 (\$806k)
- Dairy Farm Power and Energy from Agricultural Wastes: Increasing Profitability and Reducing Environmental Impact. NYS Agriculture and Markets, (S.J. Grimberg, PI; S. Powers, P. Pillay, E. Thacher, R. Welsh, R. Robbins co-PIs) January 2006 – Dec2007 (\$1,000k).
- Energy Economics of Farm Biogas in Cold Climates. DOE (P Pillay, PI; S. Powers, S. Grimberg, E. Thacher, R. Welsh, co-PIs) May 2006 – May 2008 (\$247,500).
- High School Earth Science Education Units Based on NSF Antarctica Research. NSF (PI: J. Dempsey; co-PI on supplement: S. Powers) September 2006 – September 2007, (\$15,000, OPP-0338226)
- Demonstrating the Value of Waste Biomass Feedstocks for Fuel Ethanol Production from Energy Policy Perspectives. USDA, March 2007 – February 2009 (PI: S. Powers \$250k)
- Active Multi-Disciplinary Learning in Science, Technology, Engineering, and Mathematics Fields, NSF, April 2007 – March 2012 (PI: H.H. Shen, S. Powers one of several co-PIs; \$460k, DUE-0631024)
- STEM Partnership Program. NYSED, July 2007-June2010 (PI: P. Turner, S. Powers one of 7 co-PIs; \$328k in year 1)
- Methane Digester with added-value greenhouse, NYSERDA, (S.Powers, PI, S.J. Grimberg, P. Pillay, E. Thacher, co-PIs; from NYSERDA through subcontract to JCJDC), June 2008 – August 2010, (\$154k).
- The Student Enabled Network of Sensors for the Environment Using Innovative Technology (Sense It), NSF-ITest (PI: J. Bonner, co-PIs: S Powers, T. Ojo, L. Hotaling; \$1.3M (25% share for SEP))

## **PRESENTATIONS** (*speakers are underlined*)

### Invited Seminars and Presentations

1. Powers, S.E., L.M. Abriola, J.S. Dunkin, and W.J. Weber, Jr., "Experimental Assessment of the Impact of Pore Structure on Interphase Mass Transfer Rates and Blob Distributions During NAPL Dissolution Processes." American Geophysical Union Spring Meeting, Baltimore, Maryland, May 1991.
2. Powers, S.E., "Multiphase Flow in Porous Media," General Motors - Remediation Technology Section, Warren, MI, March 22, 1994.
3. Powers, S.E., "Groundwater Contamination and Remediation," SUNY Potsdam, April 1994.
4. Powers, S.E., "NAPL Entrapment and Dissolution in Subsurface Systems," SUNY Buffalo, May 6, 1994.
5. Powers, S.E., "Understanding the Nature of NAPL Pollution Sources: Improving Analysis of Groundwater Data," Parsons Engineering Science, Syracuse, NY, February 22, 1996.
6. Powers, S.E., "The Wettability of NAPL-Contaminated Sands," University of Massachusetts at Amherst, Sept. 13, 1996.
7. Powers, S.E., "Compositional Effects on the Wettability of NAPL-Contaminated Sands," University of Iowa, Iowa City, March 17, 1997.
8. Powers, S.E., "Chemometric Analysis for Characterizing NAPL Spills at MGP Sites," PECO Energy, Philadelphia, PA, May 8, 1997.

**PRESENTATIONS** (*cont.*)*Invited Seminars and Presentations (cont.)*

9. Powers, S.E., "NAPL Composition: Its Impact on Interfacial Phenomena and Multiphase Flow," Michigan Technological University, Houghton MI, November 3, 1997.
10. Powers, S.E., "Multidisciplinary Learning in CEE Capstone Design Classes," Michigan Technological University, Houghton MI, November 3, 1997.
11. Powers, S.E., "Multivariate Analysis for Characterizing NAPL Sources," Michigan Technological University, Houghton MI, November 3, 1997.
12. Powers, S.E., J. Zheng and D. Hugaboom, "Organic Bases in Complex NAPLs and Their Impact on Multiphase Flow in Subsurface Systems," AGU Fall Meeting-Session on Multicomponent Contaminants in Surface and Ground Waters, San Francisco, December, 1997.
13. Powers, S.E., D. Hugaboom, and J. Morshed, "Reduction in Creosote Mobility – A potential remedial technology," Blasland, Bouck and Lee, Syracuse NY, May 26, 1998.
14. Powers, S.E., D.A. Hugaboom, and J. Zheng, "Organic Bases in Complex NAPL Mixtures and their Effect on Recovery," University of Vermont, Burlington VT, October 23, 1998.
15. Hugaboom, D.A., S.E. Powers, and J. Zheng, "The Impact of NAPL Composition and Aqueous pH on the Recovery of NAPLs from Quartz Sand." AGU Fall Meeting, San Francisco CA, December 1998.
16. Powers, S.E., "An Environmental Basis for Selecting an Appropriate Material for Packaging." Tuskegee University AIChE chapter, September 20, 1999.
17. Powers S.E., and S.E. Heermann, "Gasohol in the Subsurface: Mechanisms of Mass Transfer Between a Gasoline Pool and Groundwater," Lawrence Livermore National Laboratory, Livermore CA, Oct. 4, 1999.
18. Powers S.E., and S.J. Grimberg, "Interfacial Phenomena and its Impact on the Distribution of DNAPL in the Subsurface," Savannah River National Laboratory, Aiken SC, November 5, 1999.
19. Powers S.E. "Impacts of gasoline oxygenates on groundwater pollution" Seminar presented at Syracuse University, Syracuse NY, March 22, 2000.
20. Powers S.E., "The role of gasoline blended with ethanol in the environment." Presented at the Forum on Ethanol Blending in Gasoline in the Northeast and Mid Atlantic, Sponsored by NESCAUM, Manchester NH, June 27, 2000
21. Powers S.E., "Mechanisms affecting the wetting conditions in NAPL-water-mineral systems." Presented at the University of Waterloo, Waterloo, Ontario, July 27, 2000.
22. Powers S.E., "Mechanisms affecting the wetting conditions in environmental systems contaminated by nonaqueous phase liquids." Presented at the Gordon Conference on Modeling Fluid Flow in Permeable Media, Andover NH, August 9, 2000.
23. Powers S.E., "The role of gasoline blended with ethanol on groundwater contamination." Presented at the New York Ethanol Roundtable Conference, Sponsored by DOE and NYSERDA, Albany NY, Sept. 14, 2000.
24. Powers S.E., "Transport and dissolution of ethanol and ethanol-blended gasoline in the subsurface." Presented at a workshop on the increased use of ethanol and alkylates in automotive fuels in California. Sponsored by the U.S. DOE and the Western States Petroleum Assoc. Oakland CA, April 11, 2001.
25. Powers S.E. "Impacts of gasoline oxygenates on groundwater pollution" Presented at a workshop on MTBE - Fate, Transport and Remediation. Sponsored by the Central New York Association of Professional Geologists. Syracuse NY, May 3, 2001.
26. Powers S.E. "Impacts of gasoline oxygenates on groundwater pollution" Seminar presented at University of Michigan, Ann Arbor MI, May 4, 2001.

**PRESENTATIONS** (*cont.*)*Invited Seminars and Presentations (cont.)*

27. Powers, S.E. "Problem Solving and Scientific Inquiry in Middle School Science: Clarkson's Project-Based Learning Partnership Program." Keynote presentation at the Ogdensburg Free Academy Science Symposium. Ogdensburg NY, June 6, 2001.
28. Powers S.E., "A Framework for Estimating the Lifecycle Energy Value of Alternative Transportation Fuels." Presented at the University of Michigan, Ann Arbor MI, March 15, 2002.
29. Powers S.E., and A. Lavigne, "Life Cycle Impacts of Fuel Ethanol" Seminar presented at the Universidade Federal de Santa Catarina, Dept. de Engenharia Sanitária e Ambiental, Florianópolis, BRAZIL, March 19, 2002.
30. Powers, S.E., "Transport and dissolution of ethanol and ethanol-blended gasolines in the subsurface." Petrobras, Rio de Janeiro, BRAZIL, March 20, 2002.
31. Powers, S.E., "Ethanol in your Gasoline: Energy and Environmental Implications." Women in Scientific and Environmental Professions Seminar Series, SUNY ESF, February 4, 2003.
32. Powers S.E., and A. Lavigne, "Lifecycle approach to alternative fuels: Ethanol in your Gasoline." North Country Sustainable Energy Fair, Canton NY, April 5, 2003.
33. Powers, S.E., "Transport and dissolution of ethanol and ethanol-blended gasolines in the subsurface." University of Oklahoma, April 8, 2003.
34. Powers, S.E., "Partners in Engineering - A middle school-collegiate mentoring and classroom partnership." University of Oklahoma, April 9, 2003.
35. Powers, S.E., "A Primer on Lifecycle Assessment as Applied to the Paper and Pulp Industry." 2003 Joachim Forum, SUNY ESF, Syracuse NY, October 23, 2003.
36. Powers, S.E., "Water Quality Issues Associated With Biomass Fuels: Field to Tank," DOE National Renewable Energy Laboratory, Golden CO, March 8, 2004.
37. Powers, S.E. "Project-Based Learning in Industrial Ecology Classrooms." Kettering Institute Industrial Ecology Advisory Committee, Flint MI, September 29, 2004.
38. Powers, S.E. "Water Quality Implications of Using Ethanol as a Transportation Fuel," Dartmouth University Jones Seminar Series, Hanover NH, January, 2005.
39. Powers, S.E. "What's in that DNAPL and Why does it Matter?" NIEHS DNAPL Source Zone Workshop, University of Arizona, Tucson AZ, February 2005.
40. Powers, S.E., W. Kissam, A. Sargent, "Teaching as a Career Science, Math, Engineering," 9th Annual Northern New York CSTEP Career Exploration Symposium, Clarkson U., Potsdam NY, March 2005.
41. Powers S.E. "Impacts of gasoline oxygenates on groundwater pollution" Seminar presented at Nanjing University, Nanjing China, May, 2005.
42. Powers S.E., "A historical perspective and future directions for environmental engineering research in the U.S." Seminar presented at Nanjing University, Nanjing China, May, 2005.
43. Powers S.E., "Synergy between Teaching, Research and Outreach: Energy and Environment Applications." Presented at the 2005 College-Wide Symposium on Teaching Research and Outreach, SUNY ESF, Syracuse NY, October 7, 2005.
44. Powers S.E., University Perspective –Engaging Students in Science and Engineering Education and Careers, Achieving Success through K-12, College and Business Collaboration. ESF Outreach STEM Forum, Syracuse NY, Dec 8, 2005.
45. Powers, S.E., "Project-Based Learning to Motivate Students in Science." First Annual JH-HS Science Conference, Massena NY, March 17, 2006.
46. Powers, S.E., "Environmental and Energy Benefits of Biofuels - A Lifecycle Perspective." SUNY ESF, Bionergy and Bioproducts Symposium Series, Syracuse NY, April 2006.
47. Powers, S.E., "Lifecycle Environmental and Energy Benefits of Biodiesel." North Country Sustainable Energy Fair, Canton NY, May, 2006.

**PRESENTATIONS** (*cont.*)*Invited Seminars and Presentations (cont.)*

48. Powers, S.E., "Environmental and Energy Benefits of Biofuels - A Lifecycle Perspective." Conference on Biomass to Chemicals and Fuels: Science, Technology and Public Policy, Rice University, Houston TX, September, 2006.
49. Powers, S.E., P. Turner, "Human Issues Symposium: Creating Global Perspectives in Learners." Panel presentation presented to SLL BOCES administrators and school board members. Potsdam NY, March 2007.
50. Powers, S.E., "Role of Industry in Today's PhD Education." Presented at General Motors Fuel Cell Division, Rochester NY, May 2007.
51. Powers S.E., "Perspectives on the lifecycle environmental impacts of ethanol fuel." Presented at a meeting of the Roundtable on Environmental Health Sciences, Research, and Medicine: Environmental Health, Energy, and Transport: Bringing Health to the Transportation Fuel, National Academy of Sciences, Washington DC, November 2007.
52. Powers, S.E., "Environmental and Energy Benefits of Biofuels - A Lifecycle Perspective." Indian Inst. Of Technology, Madras, January 2008. (and IIT Bombay, 01/08)
53. Powers, S.E., "What's in that DNAPL and Why is it Important?" Indian Inst. Of Technology, Madras, January 2008.
54. Powers, S.E., DeWaters, J., Visser, K., Promoting Energy Literacy – Results of STEM Institute, St. Lawrence Valley STEM Teachers' Conference, Clarkson University, March 20, 2008.
55. Powers, S.E., "Environmental and Energy Benefits of Biofuels - A Lifecycle Perspective." University of Michigan, Ann Arbor Michigan, April 2008.
56. Powers, S.E., "Sustainability of Biofuels – The Good and the Bad." North Country Sustainable Energy Fair, Canton NY April 2008.
57. Powers, S.E., "Water Quality Implications of our Nation's Ethanol economy," Presented at Rice University's James A. Baker III Institute for Public Policy Energy Forum: U.S. Biofuel Policy: Progress and Challenges, Houston TX August 2008.
58. Powers, S.E., "Environmental and Energy Benefits of Biofuels - A Lifecycle Perspective" Oxygenates & Hydrocarbons Summit and Research Management Meeting and Great Lakes Research Consortium jointly sponsored seminar, University of Waterloo, October 2008.
59. Wormsely, A.E., S.E. Powers, "Indicators of Human Health Impacts from Ethanol and Gasoline Lifecycle Air Emissions." Presented at the 78<sup>th</sup> Meeting of the Petroleum Environmental Research Forum (PERF) & AICHE 2008 Annual Meeting, Philadelphia PA, November 2008.
60. Powers, S.E., "Water and Soil Quality Implications Associated With Our Nation's Biofuels Mandate." Presented at the 78<sup>th</sup> Meeting of the Petroleum Environmental Research Forum (PERF) & AICHE 2008 Annual Meeting, Philadelphia PA, November 2008.

*Conferences*

61. Powers, S.E., A.G. Collins, J.K. Edzwald, and J.M. Dietrich, "Model for the Optimization of an Ammonia Stripping Process for a Semiconductor Manufacturing Wastewater." Presented at the 58th Annual Conference - Water Pollution Control Federation, Kansas City, Missouri, October, 1985.
62. Powers, S.E., Y.M. Chen, L.M. Abriola, W.J. Weber, Jr., "The Significance of Non-Equilibrium Effects on Interphase Partitioning of Organic Contaminants in Multiphase Systems." Presented at the American Geophysical Union Fall Meeting, San Francisco, California, November, 1988.
63. Powers, S.E., C.O. Loureiro, L.M. Abriola, and W.J. Weber, Jr., "The Effects of Interphase Mass Transfer Rates on Dissolution of NAPLs in Groundwater Systems." Presented at the American Institute of Chemical Engineers Summer Meeting, Philadelphia, Pennsylvania, August, 1989.

**PRESENTATIONS (cont.)**Conferences

64. Powers, S.E., L.M. Abriola, and W.J. Weber, Jr., "The Effects of Interphase Mass Transfer Rates on the Extent of Aquifer Contamination of NAPLs." Presented at the 22nd Central Regional Meeting of the American Chemical Society, Saginaw, Michigan, June, 1990.
65. Powers, S.E., L.M. Abriola, and W.J. Weber, Jr., "Development of Phenomenological Models for NAPL Dissolution Processes." Poster presentation at the Subsurface Restoration Conference - 3rd International Conference on Groundwater Quality Research, Dallas, Texas, June, 1992.
66. Abriola, L.M., S.E. Powers, and W.J. Weber, Jr., "Investigation of the Dissolution of Nonaqueous Phase Organic Liquid Contaminants in Soils." Presented at the NATO Advanced Study Institute on Migration and Fate of Pollutants in Soils and Subsoils, Basilica, Italy, June, 1992.
67. Dekker, T.J., L.M. Abriola, and S.E. Powers, "Implications of Rate-Limited NAPL-Water Mass Transfer Processes on Two-Dimensional Field-Scale Remediation Efforts." Presented at the Soil Science Society of America Fall Meeting, Minneapolis, MN, November, 1992.
68. Powers, S.E., L.M. Abriola, and W.J. Weber, Jr., "A Phenomenological Model for Transient NAPL Dissolution Processes." Poster presented at the American Geophysical Union Fall Meeting, San Francisco, CA, December, 1992.
69. Powers, S.E., "Scholarship Integrated with Teaching in Engineering Education." Invited presentation at the Associated Colleges of St. Lawrence County conference "The Teacher Scholar - the Interaction of Research and Teaching," Potsdam, NY, November 6, 1993.
70. Powers, S.E., and M.E. Tamblin, "Porous Media Wettability after Exposure to Complex NAPLs." Presented at the American Geophysical Union Fall Meeting, San Francisco, CA, December, 1993.
71. Tamblin, M.E., and S.E. Powers, "Porous Media Wettability Following Exposure to Synthetic Gasoline." Presented at the New York Water Environment Federation Annual Meeting, New York, NY, January, 1994.
72. Powers, S.E., and M.E. Tamblin, "The Wettability of NAPL Contaminated Soils." Poster presented at the Gordon Research Conference - Environmental Sciences, New Hampton, NH, June 19-24, 1994.
73. Powers, S.E., and M.E. Tamblin, "The Wettability of NAPL Contaminated Soils." Presented at the Ninth Annual Conference on Contaminated Soils, Amherst, MA, October 17-20, 1994.
74. Powers, S.E., "Graphical Tools for Characterizing NAPL Spill Sites." Presented at the 5th Waste-management Education and Research Consortium Technology Development Conference, Las Cruces, NM, April, 19-21, 1995.
75. Zander, A.K., S.E. Powers, and N.L. Ackermann, "The Advantages and Organization of Interdisciplinary Design Projects." Presented at the American Society of Engineering Education Annual Conference, Anaheim, CA, June, 1995.
76. Ripp, J., J. Villaume, and S. Powers, "Application of Geochemical Principles to the Investigation of DNAPL Contamination at MGP Sites." Presented at MGP'95: First International Symposium on the Clean-up of Manufactured Gas Plants, Prague, Czech Republic, September, 1995.
77. Keat, W., S. Powers, E. Thacher, and A. Zander, "Team-Based Design Competitions in Engineering Curricula." Presented at ASEE St. Lawrence Section 1995 Conference: Preparing for the 21st Century, Schenectady, NY, September, 1995.
78. Powers, S.E., "Understanding the Nature of NAPL Pollution Sources: Improving Analysis of Groundwater Data." Presented at the Water Environment Federation 68th Annual Conference, Miami, FL, October, 1995.
79. Gierke, J.S., and S.E. Powers, "In Situ Groundwater Treatment Technologies: Increased Implementation Through Results of Field Scale Performance Assessments." Presented at the Water Environment Federation 68th Annual Conference, Miami, FL, October, 1995.

**PRESENTATIONS (cont.)**Conferences

80. Powers, S.E., and A.K. Zander, "Multidisciplinary Projects: Environmental Restoration." Invited presentation at the Associated Colleges Conference - Teaching Effectiveness and Multidisciplinary Learning, Potsdam, NY, November, 1995.
81. Powers, S.E., and G.W. Curry, Jr., "Analysis of Processes Governing the Dissolution of NAPLs Entrapped in Heterogeneous Systems." Presented at the American Geophysical Union Fall Meeting, San Francisco, CA, December, 1995.
82. Manivannan, I., A.K. Sutheimer, and S.E. Powers, "Image Analysis for Estimating the Saturation of NAPLs in Heterogeneous Porous Media." Poster presented at the American Geophysical Union Fall Meeting, San Francisco, CA, December, 1995.
83. Anckner, W.H., and S.E. Powers, "The Impact of Nonaqueous Phase Liquids on Soil Wettability." Presented at the New York Water Environment Association Annual Conference, New York, NY, January 1996.
84. Powers, S.E., A.K. Zander, M. Reardon, and M. Abatto, "Stabilization of a Solar Pond Sludge for Land Disposal." Presented at the Waste Management '96 Conference, Tucson, AZ, February 1996.
85. Moosbrugger, J.C., S.E. Powers, and A.K. Zander, "Student Design Proposal for Mechanical Mobilization and Retrieval of Radioactive Wastes from Underground Storage Tanks." Presented at the Waste Management '96 Conference, Tucson, AZ, February 1996.
86. Anckner, W.H., and S.E. Powers, "Effects of Petroleum Products on Soil Wettability." Presented at the ACS Symposium: Petroleum Contamination in the Environment: Assessment and Remediation, New Orleans, March 1996.
87. Heermann, S.E., and S.E. Powers, "The Dissolution of BTEX Compounds from Oxygenated Gasoline." Presented at the ACS Symposium: Petroleum Contamination in the Environment: Assessment and Remediation, New Orleans, March 1996.
88. Young, T.C., S.E. Powers, A.G. Collins, and N.L. Ackermann, "A Unified Concentration in Environmental Engineering." Presented at the ASEE Annual Conference: Investing in the Future, Washington D.C, June 1996.
89. Zander, A.K., and S.E. Powers, "Underground Storage Tank Remediation: A Student Design Project." Presented at the 4<sup>th</sup> International Congress on Environmentally Conscious Design and Manufacturing, Cleveland, OH, July 1996.
90. Powers, S.E., "Laboratory Exercise: Partitioning of Solutes between Environmental Compartments." Poster presented at the AAEE/AEEP Environmental Engineering and Practice Conference, Orono, ME, August 1996.
91. Zander, A.K., S.E. Powers, and S.J. Grimberg, "Underground Storage Tank Remediation." Presented at the I&EC Division of ACS Special Symposium: Emerging Technologies in Hazardous Waste Management, VII, Birmingham, AL, September 1996.
92. Anckner, W.H., and S.E. Powers, "Relating the Wettability of Contaminated Sands to NAPL Composition." Presented at the ASCE Symposium: NAPLs in the Subsurface Environment: Assessment and Remediation, Washington DC, November 1996.
93. Manivannan, I., S.E. Powers, and G.W. Curry, "Dissolution of NAPLs Entrapped in Heterogeneous Subsurface Systems." Presented at the ASCE Symposium: NAPLs in the Subsurface Environment: Assessment and Remediation, Washington DC, November 1996.
94. Heermann, S.E., and S.E. Powers, "Modeling Cosolvency Effects on BTEX Partitioning from Reformulated Gasolines." Presented at the ACS Symposium: Environmental Fate and Effects of Gasoline Oxygenates, San Francisco, CA, April 1997.

**PRESENTATIONS (cont.)**Conferences

95. Powers, S.E., “Important Factors Associated with Successful Undergraduate Student Research Projects.” Presented at the ASEE – St. Lawrence Section Annual Conference, Utica NY, October 1997.
96. Heermann, S.E., and S.E. Powers, “Multicomponent Mass Transfer Between a Gasoline Containing Ethanol and Ground Water.” Presented at the AGU Fall Meeting, San Francisco CA, December 1997.
97. Davis, S.W., and S.E. Powers, “Adsorption of Methyl tert-Butyl Ether from Groundwater.” Presented at the New York Water Environment Association Annual Meeting, New York, February 1998.
98. Grimberg, S., S.E. Powers, and A.K. Zander, “Environmental Restoration Design Competition: Six Years of Participation by Clarkson University Students.” Presented at the ASEE – St. Lawrence Section Annual Conference, Binghamton NY, April 1998.
99. Nambi, I.M., and S.E. Powers, “Simplified Lab-Scale Experiments to Quantify DNAPL Dissolution in Heterogeneous Systems.” Presented at the First International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, May 1998.
100. Powers, S.E., J. Zheng, and D.A. Hugaboom, “NAPL Acid and Base Concentrations and Their Influence on the Wettability of Sand Particles.” Presented at the 72<sup>nd</sup> ACS Colloid and Surface Science Symposium, University Park PA, June 1998.
101. Zheng, J., and S.E. Powers, “Correlation between Quartz Wettability and its Water Film Stability – A Case Study of DLVO Theory.” Presented at the 72<sup>nd</sup> ACS Colloid and Surface Science Symposium, University Park PA, June 1998.
102. Morshed, J., and S.E. Powers, “Regression and Dimensional Analysis for Two-Phase Flow Modeling.” Presented at Enviromet ’98, Irvine CA, July 1998.
103. Powers S.E., and S.W. Davis, “Alternative Sorbents for Removing MTBE from Gasoline-Contaminated Groundwater” Poster presented at the Northeast Groundwater Focus Conference, Burlington VT, October 1998.
104. Nambi, I.M., and S.E. Powers, “Measuring and Modeling Local Mass Transfer Rates in Heterogeneous Saturated Subsurface Systems.” Presented at the AGU Fall Meeting, San Francisco CA, December 1998.
105. Furnans, J.E., S.E. Powers, and C.A. Peters, “The Wettability of Various Minerals Exposed to Nonaqueous Phase Liquids.” Poster presented at the AGU Fall Meeting, San Francisco CA, December 1998.
106. Zheng, J., and S.E. Powers, “Modeling Adhesion of NAPLs to Quartz with DLVO Theory.” Presented at the 73<sup>rd</sup> ACS Colloid and Surface Science Symposium, Cambridge MA, June 1999.
107. Powers S.E., T.L. Theis and H.A. Grimes, “A New Paradigm for Doctoral Research in Environmental Manufacturing Management.” Poster presented at the AEESP Research Frontiers in Environmental Engineering Conference, Pennsylvania State University, August 1999.
108. Tornatore, P.M., S.E. Powers, E.G. Isacoff, “Emerging Treatment Options for MTBE – Synthetic Adsorbents.” Presented at the 48th CPI Exposition, New York City November 16-18, 1999.
109. Heermann, S.E., and S.E. Powers, “Gasohol in the Subsurface: Ethanol Transport through a Gasoline Pool via Free Convection.” Poster presented at the AGU Fall Meeting, San Francisco CA, December 1999.
110. Geise, S., and S.E. Powers, “Recovery of Coal Tars and Creosotes in Aquifer Systems by Polymer Flooding.” Presented at the New York Water Environment Association Annual Meeting, New York, February 2000.
111. Tornatore, P.M., S.E. Powers, and W.J. Cooper, “Emerging Treatments for MtBE: Synthetic Adsorbents and High Energy Electron Injection.” Presented at the Battelle International Conference on Remediation of Chlorinated and Recalcitrant Compounds in Aquifer Systems, Monterey CA, May 2000.

**PRESENTATIONS (cont.)**Conferences

112. Giese, S.W. and S.E. Powers, "Polymer Flooding for Improved Recovery of Coal Tars and Creosotes in Aquifer Systems." Presented at the 32nd Mid-Atlantic Industrial and Hazardous Waste Conference, Troy NY, June 2000.
113. Tornatore, P.M., S.E. Powers, and W.J. Cooper, "Emerging Treatments for MtBE: Synthetic Adsorbents and High Energy Electron Injection." Presented at the 32nd Mid-Atlantic Industrial and Hazardous Waste Conference, Troy NY, June 2000.
114. Damstedt, B.G., and S.E. Powers, "The Effect of DNAPL-Quartz Electrostatic Attraction on Wettability Alteration." Presentation at the 14<sup>th</sup> National Conference on Undergraduate Research (NCUR 2000), Missoula MT, April 27-29, 2000.
115. Grimberg, S.J., S.E. Powers, M. Denham, K. Chen, "Field Study to Correlate Chlorinated Solvent Concentrations and Microbial Distributions in the Unsaturated Zone." Presented at the ACS Symposium: Chemical-Biological Interactions in Contaminant Fate, Washington DC, August 2000.
116. Heermann, S.E., and S.E. Powers, Subsurface Fate of Ethanol as a Gasoline Oxygenate – The Alternative to MTBE, Presented at the 2000 FOCUS Conference on Eastern Ground Water Issues, Newburgh NY, October 2000.
117. Heermann, S.E., and S.E. Powers, Ethanol in Gasoline: Will this MTBE alternative also create groundwater hazards? Presented at 45<sup>th</sup> Annual Midwest Ground-Water Conference, Columbus OH, Oct. 2000.
118. Nambi, I.M., and S.E. Powers, "A New Mass Transfer Correlation for NAPL Dissolution in Heterogeneous Subsurface Systems." Poster presented at the Annual Meeting of the Geological Society of America, Reno NV, Nov. 2000.
119. Lavigne, A., and S.E. Powers, "Life Cycle Issues Associated with Ethanol Use as a Gasoline Additive." Presented at the Clarkson-NSF Symposium on Sustainability. Potsdam NY, June, 2001.
120. Ahmadi, A., B. Williamson, T.L. Theis, and S.E. Powers, "Lifecycle Assessment of Toner Manufacturing Processes." Presented at the Clarkson-NSF Symposium on Sustainability. Potsdam NY, June, 2001.
121. Cianci, J., S.I. Hwang and S.E. Powers, "Photo-visualization Study Illustrating the Effects of Interfacial Properties on Multiphase Flow in Glass Bead Micromodels." Poster presented at the Spring Annual Meeting of the American Geophysical Union. Boston MA, June, 2001.
122. McDowell, C., S. Albers, and S.E. Powers, "Migration of Petroleum Pools Following an Ethanol Spill." Presented at the Spring Annual Meeting of the American Geophysical Union. Boston MA, June, 2001.
123. Hwang, S.I., and S.E. Powers, "Using a Multi-step Outflow Technique to Estimate k-S-P Parameters for Contaminated Solutions." Poster presented at the Spring Annual Meeting of the American Geophysical Union. Boston MA, June, 2001.
124. Powers, S.E., "Subsurface Fate of Ethanol as a Gasoline Oxygenate." Presented at the 17<sup>th</sup> Annual International Conference on Contaminated Soils, Sediments and Water, Amherst MA, October, 2001.
125. Ahmadi, A., B. Williamson, T.L. Theis, S.E. Powers. "Lifecycle Assessment of a Toner Manufacturing Process." Poster presented at the annual meeting of the International Society of Industrial Ecology - The Science & Culture of Industrial Ecology, Leiden, Netherlands, November, 2001.
126. Powers, S.E., C. McDowell, "Mechanisms Affecting the Infiltration and Redistribution of Ethanol-Blended Gasoline in the Vadose Zone." Presented at the NGWA/API Petroleum Hydrocarbons Conference, Houston TX, November, 2001.
127. Hwang, S.I., and S.E. Powers, "Using a Multi-Step Outflow Technique to Estimate Unsaturated Hydraulic Conductivity Function for Quartz Sands With Variable Interfacial Properties." Presented at the AGU Fall Meeting, San Francisco CA, December 2001.

**PRESENTATIONS (cont.)**Conferences

128. Link, A.N., S.J. Grimberg and S.E. Powers, "The Impact of Interfacial Properties in NAPL-Water-Mineral Systems on Bacterial Adhesion." Presented at the 102<sup>nd</sup> General Meeting of the American Society of Microbiologists, Salt Lake City UT, May 2002.
129. Doty, T.D., S.E. Powers, S.J. Grimberg, "The Role of Microorganisms of DNAPL Interfacial Properties and Transport". Presented at the 3<sup>rd</sup> International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 2002.
130. Lavigne, A.S. and S.E. Powers. "Out Of The Landfill And Into The Tank: Producing Fuel Ethanol From Waste Materials." Poster presentation at the 2002 Gordon Research Conference on Industrial Ecology, New London NH, June 2002.
131. Graham, M., A. Aeschbacher, J. DeWaters, and S.E. Powers. "Gender Differences in Engineering Pay Expectations Among Middle Schoolers." Presented at the ASEE Annual Conference, Montreal Ont. June 2002.
132. Powers, S.E., and A.G. Collins, "Clarkson's K-12 Project-Based Learning Partnership Program." Presented at the Eastern States Chief Academic Officers Conference, Binghamton NY, June 2002.
133. Omrane, K., S.E. Powers, S.J. Grimberg, "Factors contributing to the low interfacial tension of the Savannah River DNAPL." Presented at the 76<sup>th</sup> ACS Colloid and Surface Science Symposium, Ann Arbor MI, June, 2002.
134. Lavigne, A.S. and S.E. Powers, "From Concrete to Compost: Teaching Sustainability in the Classroom." Poster presentation at the AEESP/AEE Research and Education Conference, Toronto CA, August 2002.
135. Powers, S.E. and A.S. Lavigne, "A Framework for Estimating the Lifecycle Energy Value of Alternative Transportation Fuels." Presented at the AEESP/AEE Research and Education Conference, Toronto CA, August 2002.
136. Chen, M., A. Link; S.J. Grimberg, and S.E. Powers, "The Impact of Growth Stages and Carbon Sources on Bacterial Transport in a NAPL-Water-Mineral System." Presented at the American Chemical Society Summer Meeting, Boston MA, August 2002.
137. Powers, S.E., "Quantifying the Flux of Ethanol to Groundwater after a Gasohol Spill." Presented at the National Ground Water Association Conference on Fuel Oxygenates in the Environment. Baltimore MD, June 6-7, 2003.
138. Powers, S.E., "Preparing College Students to Teach an Environmental Problem Solving Curriculum to Middle School Students." Presented at the Annual Meeting of the American Society of Engineering Educators, Nashville TN, June 22-25, 2003.
139. Powers, S.E., "Diversity in K-12 Initiatives to Attract a Diverse Pool of Engineering Students." Presented at the Frontiers in Education Conference, Boulder CO November 5-8, 2003.
140. Powers, S.E., Omrane, K., Dou, W., and Grimberg S.J., Unique Interfacial Properties of the Chlorinated Solvent DNAPL at Savannah River National Laboratory. Presented at the American Chemical Society National Meeting, Anaheim CA, March 30, 2004.
141. Turner, P. J, Dewaters, S.E. Powers, E. Oey, "Environmental Projects in Math, Science and Technology Middle and High School Classes," SIAM National Meeting, Teachers Day, Portland OR, July 2004.
142. Powers, S.E., "Cradle to farm gate lifecycle inventory and water quality impacts associated with nutrients used for corn, soy, and stover biomass feedstocks." AIChE Annual Conference, Austin TX, November 12, 2004.
143. Bertrand, L.J., S.J. Grimberg, S.E. Powers, M. Denham, T.D. Doty, "Microbial Heterogeneity in the Subsurface and its Effects on DNAPL Interfacial Properties" Poster presented at the annual AGU conference, San Francisco CA Dec. 14, 2004.

**PRESENTATIONS (cont.)**Conferences

144. Powers, S.E., "Preparing for the Hydrogen Economy – An integrated MST curriculum." National Consortium for Specialized Secondary Schools of Mathematics, Science and Technology Professional Conference, Washington University in St. Louis, March, 2005.
145. Dou, W., S.E. Powers, "Colloids Partitioning between Organic and Aqueous Phase Cause the Low Interfacial Tension of DNAPL. Presented at the ACS Colloids and Surfaces Conference, Clarkson University, Potsdam NY, June 2005.
146. DeWaters, J., S.E. Powers, "A Project-based Learning Approach for Teaching Current Energy Topics in a Middle School Classroom," 2005 AEESP Research and Education Conference, Clarkson University, Potsdam NY, July, 2005.
147. Lavigne, A., S.E. Powers, "Demonstrating the value of utilizing waste biomass feedstocks for fuel ethanol production from energy policy perspectives." Poster presented at the 2005 ASEESP Research and Education Conference, Clarkson University, Potsdam NY, July, 2005.
148. Bertrand, L.J., S.J. Grimberg, S.E. Powers, T.D. Doty, M. Denham, "Microbial Heterogeneity in the Subsurface and its Effects on DNAPL Interfacial Properties." Poster presented at the 2005 ASEESP Research and Education Conference, Clarkson University, Potsdam NY, July, 2005.
149. Richards, M., J Cook, G. Ahmadi, S.E. Powers, D.H. Smith, "Multiphase Flow through Porous Media with Application to CO<sub>2</sub> Sequestration. Presented at the 2005 AAAR Conference, Austin TX October, 2005.
150. Agogino, A.M., L.H. Jamieson , D.F. Ollis , H.V. Poor , S.E. Powers , and C. Rogers, "Integrating Education, Research, and Outreach: Exemplars from the NSF Distinguished Scholars Program." Panel presented at the Frontiers in Education Conference, Indianapolis IN, October, 2005.
151. Negrón Vázquez, S., S.E. Powers, "Fate of Water-in-Oil Emulsified Diesel Fuel in Groundwater Systems." Presented at the 2006 NYWEA Conference, New York City, February 2006.
152. Zhang, C., S.E. Powers, "Water Quality Impacts Associated with Corn Stover Harvest for Energy Production." Presented at the 2006 NYWEA Conference, New York City, February 2006.
153. Dou, W., S.E. Powers, "Mechanisms Contributing to Low DNAPL-Water Interfacial Tension (IFT)." Presented at the 2006 NYWEA Conference, New York City, February 2006.
154. DeWaters, J.E., S.E. Powers, "Improving Science and Energy Literacy through Project-Based K-12 Outreach Efforts." Presented at the 2006 ASEE National Conference, Chicago IL, June 2006.
155. DeWaters, J.E., S.E. Powers, "Partners in Engineering: Outreach efforts provide holistic engineering education for middle school girls." Presented at the 2006 ASEE National Conference, Chicago IL, June 2006.
156. DeWaters, J.E., S.E. Powers, "WIP: A Pilot Study to Assess the Impact of a Special Topics Energy Module on Improving Energy Literacy of High School Youth" Presented at the 2006 ASEE/IEEE Frontiers in Education Conference, San Diego CA, October 2006.
157. DeWaters, J.E., S.E. Powers, "Developing an Energy Literacy Scale." Presented at the 2007 ASEE National Conference, Honolulu HI, June, 2007.
158. Powers, S.E., A. Lavigne, "Lifecycle Energy and Environmental Consequences of the Proposed New "Ethanol Economy." Presented at the 2007 AEESP Research and Education conference, Blacksburg VA, July 2007.
159. DeWaters, J.E., S.E. Powers, "Improving Energy Literacy through Project-based, STS-influenced Educational Programs." Poster presented at the 2008 AAAS annual meeting, Boston MA, Feb. 2008.

**PRESENTATIONS (cont.)**Conferences

160. Powers, S.E., B. Brydges, P. Turner, G. Gotham, J. Carroll, D. Bohl, "Successful Institutionalization of a K-12 - University STEM Partnership Program." Presented at the 115<sup>th</sup> Annual ASEE Conference & Exposition, Pittsburgh PA, June, 2008.
161. Powers, S.E., L. Ascough, R. Nelson, "Soil and Water Quality Implications Associated With Corn Stover Removal and Herbaceous Energy Crop Production in Iowa." Presented at the 2008 Annual International Meeting of the American Society of Agricultural and Biological Engineers (ASABE) – special session on Bioenergy, Providence RI, July 2008.
162. Venczel, M., S.E. Powers "Agricultural Energy Recovery: Environmental Benefits of Dairy Manure Anaerobic Digestion." Poster presented at the 2008 Gordon Conference on Industrial Ecology, Holden NH, August 2008.
163. Lavigne, A., S.E. Powers, "The "Garbage" Metric: Understanding the Energy Value of Biomass Wastes." Poster presented at the 2008 Gordon Conference on Industrial Ecology, Holden NH, August 2008.
164. DeWaters, J., S.E. Powers, "Energy Literacy among Middle and High School Youth." Presented at the 36<sup>th</sup> ASEE/IEEE Frontiers in Education Conference (Saratoga Springs NY, Oct 2008)
165. Kusiima, J., S.E. Powers, "Monetary Valuation of the Environmental and Health Externalities of Producing Ethanol from Different Feedstocks." To be presented at the NYWEA annual conference (New York NY, February 2009).
166. DeWaters, J.E., S.E. Powers, "Energy Literacy among Middle and High School Youth." To be presented at the American Solar Energy Society annual meeting (Buffalo NY, May 2009).
167. Venczel, M.C., N.L. de Juvigny, S.E. Powers, "Environmental Impacts and Costs for Manure Management with and without Anaerobic Digestion for Heat and Power." To be presented at the 2009 American Society of Agricultural and Biological Engineers annual international meeting (Session SE-25, Reno NV, June 2009).

Workshops Presented

168. Powers, S.E., Oey, E., "Project Based learning approaches to integrate STEM in middle and high school classrooms." Workshop presented as part of the St. Lawrence-Lewis BOCES Math Partnership Program, Canton NY, July 2005.
169. Powers, S.E., S. Scafidi-McGuire, "Energy in our Lives: Preparing middle school students for our energy future." Workshop for teachers presented at 2006 ASEE National Conference, Chicago IL, June 2006.
170. Powers, S.E., M. Ingraham, N. Barlow. "The Hydrogen Economy: An Integrated Curriculum for MST." Workshop for teachers presented at the SLL BOCES School Improvement and the Teachers' Learning Center High School Science Conference. Potsdam NY, March 2007.
171. Powers, S.E., J.E. DeWaters, "Energy Efficiency: Preparing middle school students for our energy future." Workshop for teachers presented at the 2007 ASEE Workshop on K-12 Education, Honolulu HI, June, 2007.
172. Powers, S.E., J.E. DeWaters, K. Visser. "Promoting Energy Literacy." Four-day workshop for teachers presented as part of the St. Lawrence-Lewis BOCES STEM Partnership Program. Norwood NY, February 2008.
173. Powers, S.E., "Energy Literacy: Preparing middle school students for our energy future." Workshop for teachers presented at the 2008 ASEE Workshop on K-12 Education. Pittsburgh PA, June, 2008.

**TEACHING EXPERIENCE** (through Spring 2009)*The University of Michigan*

CE428 Introduction to Groundwater Hydrology (1 semester)

*Clarkson University*

CE212 Introduction to Engineering Design (2 semesters)

CE403 Civil Engineering Laboratory (5 semesters)

CE481 Hazardous Waste Management Engineering (w/ CE581) (7 semesters)

CE491 CEE Senior Capstone Design (with MP401 and CE686) (7 semesters)

CE514 Groundwater Hydrology (3 semesters)

CE586 Industrial Ecology (became CE486/586 F05) (6 semesters)

CE587 Contaminant Transport in Groundwater (2 semesters)

CE681 Environmental Physico-Chemical Processes (7 semesters)

MP415/418 Partners in Engineering / Project-Based Learning Partnership (11 semesters)

HP208 Sustainable Energy Use at Clarkson (Honors Course) (1 semester)

**PROFESSIONAL ACTIVITIES***Editorial Duties*

Guest Editor, May/June 2006 issue (23(3)) of *Environmental Engineering Science*, Special edition–  
“Pushing the Boundaries, Making research and education in environmental engineering count.”

Associate Editor, *ASCE-Journal of Environmental Engineering* (1996-2000)

Editorial Board, *Advances in Water Resources* (2000-present)

Editorial Board, *Journal of Contaminant Hydrology* (1997-present)

Editorial Board, *Environmental Technology* (1995-1999)

*Advisory Boards*

Member, external advisory board, Kettering Inst. Industrial Ecology Initiative, Flint MI (2004-2007)

Member, Board of Directors, Community Energy Services, Inc. Canton NY (2004-present)

Member, SLLBOCES STEM advisory board, Potsdam NY (2007-present)

Guest member, Alcoa (corporate) Environmental Technologies Advisory Board (2007)

Member, Advisory Board of Visitors, Division of Engineering, University of Vermont (2007-present)

Member, External Advisory Board, WPI Environmental Engineering program (2008-present)

*Affiliations/Committees*

United States Environmental Protection Agency

Appointed member, Science Advisory Board, Environ. Engineering Committee (2003 – 2009)

Contaminated Sites and RCRA Multi Year Plan Panel (2004)

Pollution Prevention consultation (2008)

Association of Environmental Engineering and Science Professors (1993-present)

Member, AAEE/AEESP Environmental Engrg. Body of Knowledge committee (2007-present)

Elected member, Board of Directors, (1998-2001)

Chair, Publications committee (1998-2001)

Member: Long-Range Planning Committee (1997)

American Society of Engineering Education (1995-present)

Elected member of the board of the ASEE Engineering Research Council (2007-present)

Appointed interim vice Chair (2008-2009) (includes titles of “Chair elect” and Program committee chair)

American Chemical Society, Environmental Division (1988-present)

American Geophysical Union, Hydrology Section (1990-2005)

American Society of Civil Engineers (1997-present)

National Ground Water Association (1995-present)

Water Environment Federation (member 1984 - 1999)

member: Student Activities Committee (1994-1998)

member: Groundwater Committee (1994-1998)

*Review Panels / External Reviews*

NSF Phase II SBIR program (1995)  
 NRC/Air Force Office of Scientific Research – Particulate Mechanics Review Panel (1997)  
 NSF Environmental Engineering and Technology – CAREER Awards (2000)  
 External reviewer of Ph.D. Dissertation of John Molson, Univ. Waterloo (Aug. 2000)  
 External Reviewer of M.S. Thesis, J. Rayner, University of Western Australia (March 2002)  
 NSF Distinguished Teaching Scholar Award (March 2005)  
 NSF Engineering Education – CAREER Awards (August 2007)

*Reviewer* (past year - proposals, manuscripts, reports, other than as Assoc. Editor)

*Environmental Science and Technology*  
*Environmental Engineering Science*  
*Soil Science Society of America Journal*  
*Chemosphere*  
*Science of the Total Environment*  
 National Science Foundation  
 ASEE /FIE conference papers  
 Department of Energy

*Workshop/ Meeting Organization*

co-chair: Special symposium at WEFTEC '95 (Chicago, October, 1995)  
*Comprehensive Assessment of In Situ Groundwater Treatment Technologies*  
 moderator, ASCE National Meeting, (Washington DC, November 1996)  
*NAPLs in the Subsurface Environment: Assessment and Remediation*  
 moderator: AAEE/AEEP Environmental Engineering Education and Practice Conference  
*How to Incorporate Case Studies in Environmental Engineering Classes*  
 (Orono ME, August 1996)  
 co-convener special session at AGU Spring Meeting (Baltimore MD, May 1997)  
*Laboratory, Field, and Numerical Investigations of Reactive Transport*  
 organizing committee for the National Water Research Institute workshop to identify important issues  
 for comprehensive life cycle environmental impacts associated with automotive fuel options  
 (Pomona California, February, 2002)  
 co-chair, workshop presented at the AEESP/AAEE Research and Education Conference,  
*Industrial Ecology Topics for Environmental Engineering Classes* (Toronto CA, August  
 2002)  
 co-chair, 2005 AEESP Conference – *Pushing the Boundaries – Making research and Education in  
 Environmental Engineering Count* (Potsdam NY, July 2005)  
 co-chair, 2006 COEES *Fuel the Future Biomass Energy Summit* (Potsdam NY June 2006)  
 member, AEESP *Frontiers in Environmental Engineering*, workshop planning committee (Tucson  
 AZ, March 2006 – Feb. 2007)  
 co-chair, 2005-2008, Energy Science Fair component of the North Country Sustainable Energy Fair  
 (April, Canton NY)  
 coordinator, VW Diesellation and Clean Energy and Transportation Expo (Potsdam NY, Oct. 2007)  
 facilitator and moderator, Pelleting in the North Country: Keeping our heating dollars at home.  
 (Canton NY, November 7, 2007)  
 co-chair, 2008, ASEE ERC Workshop and Forum- “*Engineering Research: Opportunities and  
 Impact,*” (Alexandria Va, March 2008).  
 chair, 2009, ASEE ERC Conference, (Alexandria Va, March 2009).

*Workshops – invited attendee*

U.S. DOE and the Western States Petroleum Assoc. - workshop on the increased use of ethanol and  
 alkylates in automotive fuels in California. (Oakland CA, April 11, 2001).

US EPA -sponsored planning meeting for a Comprehensive Environmental Assessment of Reformulated Gasoline Options. (Research Triangle Park NC, May 2003).  
 University of Oklahoma – NSF-Sponsored workshop on Assessing the Sustainability of Bio-based Products (Norman OK, June 2003).  
 WELI - Women in Engineering Leadership Institute’s Advanced Leadership Conference, (Syracuse, New York, October 7-10, 2004).  
 AEESP – Frontiers in Environmental Engineering Education (Tucson AZ, January 2007) (on organizing committee, session facilitator)  
 Assoc. for the Protection of the Adirondacks - Adirondack Energy Forum (Lake Placid NY, May 2007; June 2008)

*Consulting*

Fognani and Faught, PLLC, 2007  
 GEI / Atlantic Environmental, 1993-1995  
 Canton (NY) Water Treatment Plant (*pro bono*), 1996  
 Village of Potsdam (NY), 1999-2000  
 Pennsylvania Power and Light, 1999

**SERVICE TO CLARKSON***CEE Departmental Committees*

Computer Committee	1992-93
Undergraduate Committee	1993-98
Publications Committee (Chair, 1996-1997)	1996-98
Graduate Committee	1998-99, 01-05
Ad hoc recruiting committee	2001
Ad hoc BS Env. Engrg implementation committee	2005

*SoE Committees*

Curriculum Committee	1995-97
Freshman Year Committee	1998-99
Search Committee - Dean, School of Engineering	2000-01; 02-03
SPEED Advisory Council	2002-03
Search Committee – SoE Faculty	2004 – 05
CSOE Web committee (chair)	2006-present

*University Committees*

Gender Issues Committee	1993-96
Greek Life Task Force	1997
Teaching Improvement Committee	1997
Task Force on Parking	1997-99
Committee to Evaluate Ph.D. Programs	1999
Environmental research focus area exploratory committee	2000
Center for Environment steering committee	1999-2002, 2004-present
Campus Sustainability Initiative - Steering Committee and Chair, Energy Issue Team	2001-02
Office of Educational Partnerships, steering committee	2003-present
Search Committee – Director of Research	2004-05
Web design committee	2006-present

*Other*

Representative, 6 <sup>th</sup> AISES Science and Engineering Fair	1993
Mentor, NSF Summer Science Research Program	1994-95
Mentor, McNair Scholarship Program	1996-97; 99
Advisor, Clarkson Environmental Club	1994-96
Co-advisor, Chi Epsilon	1996
Secretary, Clarkson Chapter of the Phi Kappa Phi Honor Society	1996-98

**STUDENTS AND RESEARCH PERSONNEL DIRECTED***Fulbright Visiting Scholar*

Dr. Robert Niven, University of New South Wales, Canberra Australia      January– February 2003

*Post-Doctoral Research Associates*

Dr. Jahangir Morshed      April 1997 – October 1998

Dr. Sang-il Hwang      January 2000 – April 2003

Dr. Kwang Pyo Lee      February 2005 – December 2005

Dr. Amanda Lavigne      May 2008 – August 2008

*Research Associate*

Jan DeWaters      October 1996 – June 2005

*Research Trainees*

Janet Kowles (B.S.C.E. '97)      January-August 1997

Lauren Malone      May 1997 – March 1998

*Ph.D. Students* (current location)

Indumathi M. Nambi (IIT Madras)      December 1999

“Dissolution of NAPLs in Heterogeneous Media”

Jianzhong Zheng (Nanjing Univ.)      March 2001

“Characterization of Constituents in Complex NAPLs that Affect Wettability”

Hilary Grimes (EvMM; co-advised with T. Theis) (SAIC)      August 2005

“Game theory analysis for improved bottle recycling and return policies”

Anahita Ahmadi Williamson (Xerox)      March 2006

“Separation of color toner waste for reuse” (EvMM)

Wenqian Dou (Sullivan International Group., Inc)      November 2007

“DNAPL constituents and mechanisms contributing to low interfacial tensions in the subsurface”

Amanda Lavigne (St. Lawrence Univ.)      April 2008

“A systems and industrial ecology approach to optimize fuel grade ethanol production in Upstate New York”

Stephen E. Heermann (Egan & Assoc.)      incomplete

“Fate of Oxygenated Gasolines in Subsurface Systems”

Jan DeWaters      on-going

“Energy and the Environment – Appropriate content and mechanisms for educating K-16 Students”

Mark Venczel      on-going

“Lifecycle assessment of dairy waste to energy alternatives”

*M.S. Students*

Michael Tamblin,      September 1994

“Effect of Synthetic Gasolines on Soil Wettability”

William Anckner,      May 1997

“The Effects of Environmentally Significant NAPLs on Soil Wettability ”

Garrey Curry,      not finished

“Dissolution of NAPLs in Heterogeneous Media”

Scott Davis,      September 1998

“Sorbents for Treating Groundwater Contaminated by Oxygenated Gasolines”

Daniel Hugaboom,      March 2000

“Effect of pH on NAPL Recovery by Waterflooding”

Steven Geise, “Polymer Flushing to Improve NAPL Recovery”	September 2000
Cory McDowell “Effects of ethanol on infiltration and spreading of gasoline in the vadose zone”	June 2002
John Cianci “Fractal analysis to define interfacial area for subsurface multiphase flow”	June 2002
Tao Fu “Microwave regeneration of synthetic carbonaceous adsorbents”	July 2002
Angela Link (co-advised with Stefan Grimberg) “Microbial transport and adhesion in NAPL-contaminated porous media”	January 2003
Kamel Omrane “Critical variables affecting interfacial properties in complex NAPL-contaminated systems.”	April 2003
Shelia Negron-Vázquez “Exploring the Fate of Water-in-Oil emulsion Diesel Fuel in Subsurface Systems”	September, 2006
Chu Zhang “EPIC modeling to quantify nutrient loading to surface waters from energy crop production”	October 2006
Amy Wormsley “Indicators of Human Health Impacts from Ethanol and Gasoline Lifecycle Air Emissions”	December 2008
Ke Ke Li “Lifecycle assessment of feedstock options for biodiesel production”	on-going
Rudras Baliga “Lifecycle assessment of algae as biodiesel feedstock”	on-going
Jamil Kusiima “Environmental costs of fuel ethanol production”	on-going
Yunhui (Rhoda) Deng “Separation of sand from dairy manure” (co-advised with Stefan Grimberg)	on-going
<i>M.E. Students</i>	
Aris, Azmi (w/ A.K. Zander) “Ozonation for Treating Organic Waste from a Printed Circuit Board Industry”	December 1993
Mastracchio, John “Soil Remediation and Reclamation Design”	May 1994
Robinson, Nathan “Soil Remediation and Reclamation Design”	May 1994
Reardon, Michael “Treatment, Solidification, and Disposal of the WERC Corporation Solar Pond Sludge”	May 1995
Templeton, Paul “Application of Bioslurper Technology to a Petroleum Spill Site at Plattsburgh AFB”	December 1995
Pond, Eric “In Situ Vitrification for Underground Storage Tank Remediation”	May 1996
Brown, Elizabeth “In Situ Vitrification for Underground Storage Tank Remediation”	May 1996
Bova, Lorraine “Remediation of an Acid Mine Drainage Superfund Site”	December 1999
Folsom, Jamie “Batch process design to produce biodiesel for Potsdam Central School District”	May 2006
Shiwei Hou “Environmental benefits of process intensification production of biodiesel”	August 2007
<i>Undergraduate Students</i>	
Thomas Seacord (2 <sup>nd</sup> place, WEF Student Paper Competition)	May 1994-December 1995
Anne Sutheimer	Summer 1995

Matthew Pelton	May 1996-May 1997
Thaddeus Owen	Summer 1996
Thomas Austin (McNair Scholars Program)	Summer 1996
David Rogers	October 1996-May 1997
Corrinna Cyr	Summer 1997
Kevin Graves	Summer 1997
Christi Yerks (Tuskegee University, McNair Scholars Program/REU)	Summers 1997, 1998
Jordan Furnans (Princeton University, REU)	Summer 1998
Tammy Boulais	Summer/Fall 1998
Ronald Rozwood	Spring/Summer 1999
Kwabena Adu-Sarkodie (Notre Dame University, REU)	Summer 1999
Benjamin Damstedt (Utah State University, REU)	Summer 1999
Sarah Albers (U. Missouri-Rolla, REU)	Summer 2000
Justin Spencer (Princeton University, REU)	Summer 2002
Rebecca M. Thomason (Texas Tech, REU student)	Summer 2005
Benjamin Brown-Steiner (Clarkson Honors thesis)	October 2006 – May 2008
Kyle Snyder (co-advisor, Clarkson Honors Thesis)	September 2007 – May 2008
Deagan Gonyea (McNair Scholar)	June 2008 – present
<i>High School Students (Clarkson's Summer Science Apprenticeship Program)</i>	
Denise Doig (Mt. Vernon NY)	Summer 1994
Sharinne Sukhnanand (Teaneck NJ)	Summer 1995
Hortensia Casas (Bronx NY)	Summer 1995