

**PETER SHANAHAN, Ph.D.**  
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**Education**

Ph.D., Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1982  
M.S., Environmental Earth Sciences, Stanford University, Stanford, California, 1974  
B.S., Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1973  
B.S., Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1973

**Professional Experience**

**HydroAnalysis, Inc.**

*Consulting Engineer*, Acton, Massachusetts (1988–present)

Private practitioner offering services in hydrology, environmental water quality, computer modeling, and expert testimony. Dr. Shanahan has undertaken a wide variety of projects involving environmental water quality, waste site characterization and remediation, water resources development, and hydrology. Computer modeling applications have included ground-water flow and transport; stream and reservoir water quality; thermal discharges; stormwater hydrology and quality; nonpoint source pollution; and combined sewer system hydraulics. Dr. Shanahan has provided expert testimony on a proposed low-level radioactive waste disposal site, ground-water contamination and transport, surface-water flooding and water quality, and remediation of hazardous waste sites. HydroAnalysis' clients have included engineering firms, municipalities, state and federal agencies, citizen groups, private individuals, industrial firms, trade associations, international agencies, attorneys, and research institutions.

**Massachusetts Institute of Technology**

*Senior Lecturer*, Cambridge, Massachusetts (1996–present)

Senior Lecturer in the Department of Civil and Environmental Engineering at the Massachusetts Institute of Technology. Dr. Shanahan has taught undergraduate and graduate courses on the fate and transport of chemicals in the environment and environmental engineering. He has directed student projects that studied non-point source water quality in Singapore, rainwater harvesting in Rwanda, drinking-water supply in Thailand and Haiti, stream water quality in Lebanon and Massachusetts, hazardous waste site remediation in Massachusetts, and stream temperature and habitat protection in the Pacific Northwest.

**ERT, Inc. (later named ENSR Corporation and now AECOM)***Senior Water Resources Engineer, Acton, Massachusetts (1981–1988)*

Progressive responsibility as technical specialist, supervisor, and group manager. At the conclusion of his employment at ENSR, Dr. Shanahan was the Manager of the Water Resources Section with managerial responsibility for a staff of ten hydrologists and environmental engineers. Dr. Shanahan served as project or task manager of a variety of studies related to water resources and hazardous waste including water-quality modeling of industrial discharges, assessment of hydrologic and environmental impacts, ground-water supply studies, design of hazardous waste site remedial actions, and development of ground-water flow and transport models.

**International Institute for Applied Systems Analysis***Research Assistant, Laxenburg, Austria (1980)*

Conducted field studies and research wind-driven circulation and sediment transport as a contributor to a case study of Lake Balaton, Hungary.

**Massachusetts Institute of Technology***Graduate Research and Teaching Assistant, Cambridge, Massachusetts (1978–1981)*

As a research assistant, developed and applied computer models of wind-driven circulation and eutrophication in shallow lakes, and modified and tested a computer model of temperature in a power plant cooling lake. As a teaching assistant, aided in graduate course in water quality and undergraduate course in wastewater treatment.

**Resource Analysis, Inc. (now a part of CDM-Smith)***Water-Resources Engineer, Waltham, Massachusetts (1976–1979)*

Responsible for management of technical projects to develop a flow and reservoir operation model of the Cumberland River; a hydrologic modeling system as part of a comprehensive drainage study for Henrico County, Virginia; and the U.S. Army Corps of Engineers model for closed-conduit hydraulic transients in hydropower and pumping systems. Also supervised junior technical staff and managed computer equipment.

**Bechtel, Inc.***Hydrothermal Engineer, San Francisco, California and Gaithersburg, Maryland (1974–1976)*

Responsible for engineering studies of hydrothermal, hydraulic, and coastal engineering problems and systems. Analyzed and designed cooling ponds, effluent discharge structures, evaporation ponds, and other structures and systems associated with waste heat disposal from nuclear and fossil-fuel power generating facilities. Also contributed to a field dye dispersion study and a comprehensive coastal hydrographic characterization.

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## Professional Activities

### Affiliations

Fellow, American Society of Civil Engineers (Committee on Hydrologic Transport and Dispersion, Chairman 1989-1990)

Water Environment Federation (Committee on Research, 1986-1992)

Association of Ground Water Scientists and Engineers (Editorial Board, Journal of Ground Water, 1990-1992)

American Geophysical Union

International Water Association (Task Group on River Water Quality Modeling, 1996-2002; Specialist Group on Systems Analysis and Integrated Assessment, 2000-2012)

Conservation Commission, Acton, Massachusetts, 1990-1996

### Registration

Professional Engineer (Civil), Massachusetts

Professional Engineer, Maine

## Expert Testimony

Dr. Shanahan has testified as an expert witness on over sixty occasions on matters in civil lawsuits and environmental permit hearings. He has provided sworn testimony at ten civil trials and twelve adjudicatory hearings.

## Courses Taught and Offered

Courses in the Department of Civil and Environmental Engineering, Massachusetts Institute of Technology:

Course 1.34, Waste Containment and Site Remediation Technology, 2001-2009.

Course 1.013, Senior Civil and Environmental Engineering Design. 2007-2013.

Course 1.782, Environmental and Geoenvironmental M.Eng. Project. 1996-2014.

Course 1.083, Environmental Health Engineering. 2006-2011.

Course 1.725J, Chemicals in the Environment: Fate and Transport. 2005-2011.

Course 1.85, Water and Wastewater Treatment Engineering. 2004-2007.

Course 1.096, Environmental Engineering Clinic. 2005-2006.

Course 1.061/1.61, Transport Processes in the Environment. 2001.

Radiological Risk Assessment and Environmental Analysis Course, Bristol, United Kingdom. ITC School - Meiringen, Switzerland. June 22-26, 2009.

Saturated Zone Transport and Surface-Water Transport, Training Course in Environmental Risk Assessment Analysis for the U.S. Nuclear Regulatory Commission, Bethesda, Maryland. January 27 and 28, 2009.

Course ESD 1.7, Water Pollution Analysis, Master's course in Engineering for Sustainable Development, Cambridge University, Cambridge, United Kingdom. 2004-2005 academic year.

Ground-water Transport and Computer Codes for Estimating Transport, Emerging Topics in Radiation Protection and Risk Assessment, Kiawah Island, South Carolina. Risk Assessment Corporation. March 17, 2004.

Course CEE172, Fate and Transport of Chemicals in the Environment, Department of Civil and Environmental Engineering, Tufts University. 2003-2004 academic year.

Specialty Course on Diffuse Pollution Management, Vancouver, British Columbia, Canada. Technomic Publishing Company, Inc. June 25-26, 1998. Specialty Course on Diffuse Pollution Management, Vancouver, British Columbia, Canada. Technomic Publishing Company, Inc. June 25-26, 1998.

### **Theses Supervised**

Julia Choi, 1997. The Study of Biological Interactions using Water Quality Modeling: Massachusetts Military Reservation, Ashumet Pond. Master of Engineering, MIT.

Seth J. Schneider, 1997. Hydrothermal and Water Quality Modeling for Evaluation of Ashumet Pond Trophic State. Master of Engineering, MIT.

Tina L. Lin, 1997. Analysis of Geologic Parameters on Recirculating Well Technology Using 3-D Numerical Modeling: Massachusetts Military Reservation, Cape Cod. Master of Engineering, MIT.

Amy M. Rolfs, 1998. Interactive GIS Approach to Generate Capture Curves at the Massachusetts Military Reservation, Cape Cod, Massachusetts. Master of Engineering, MIT.

Elizabeth Shea, 2000. Optimization Study of a Pump-and-Treat System at Massachusetts Military Reservation. Master of Engineering, MIT.

Daniele S. Lantagne, 2001. Trihalomethane Production in Household Water Filtration Systems in Rural Haiti. Master of Engineering, MIT

Ka Yan Leung, 2001. One-Dimensional Model of Fecal Coliform in Nahr Ibrahim River (Lebanon). Master of Engineering, MIT.

Peter M. Oates, 2001. Solar Disinfection for Point of Use Water Treatment in Haiti. Master of Engineering, MIT.

Nadine van Zyl, 2001. Sodium Hypochlorite Generation for Household Water Disinfection in Haiti. Master of Engineering, MIT.

Farzana S. Mohamed, 2001. Household-level point-of-use water filtration system in Haiti : strategies for program management and sustainability. Master of City Planning, Department of Urban Studies and Planning, and Master of Engineering, Department of Civil and Environmental Engineering, MIT.

Arjun A. Nair, 2002. Implementation of the IWA River Water Quality Model No. 1 in US EPA

- WASP 5.0. Master of Engineering, MIT.
- Liam Bossi and Donald Rose, 2003. Hydrologic and Chemical Analysis of Salt Ponds on St. John, U.S. Virgin Islands. Master of Engineering, MIT.
- Geneviève Brin, 2003. Evaluation of the Safe Water System in Jolivert Haiti by Bacteriological Testing and Public Health Survey. Master of Engineering, MIT
- Julianna B. Connolly and Devin L. Shaffer, 2003. Development and Application of a Spatially-Explicit Nitrogen Mass-Balance Model for the Wood River Valley Watershed, Idaho. Master of Engineering, MIT.
- Alexa Gangemi, 2003. Ecological Assessment of Salt Ponds on St. John, USVI. Master of Engineering, MIT.
- Matthew B. Andrews, 2004. Natural Attenuation of Organophosphates in River Systems: Chattahoochee River Case Study. Master of Engineering, MIT.
- Samuel F. Haffey, 2004. Numerical Model of Phosphate Esters in the Chattahoochee River. Master of Engineering, MIT.
- Joseph C. Lin, 2004. Determining the Removal Effectiveness of Flame Retardants from Drinking Water Treatment Processes. Master of Engineering, MIT.
- James E. Brown, Jr., 2005. Encouraging Low-Impact-Development Stormwater-Management Practices: Assabet River Watershed Sub-Basin Case Study. Master of Engineering, MIT.
- Brian J. Friedlich, 2005. Low-Impact Development in the Assabet River Watershed: Site Hydrologic Design and Watershed-Scale Implications. Master of Engineering, MIT.
- Brian M. Loux, 2005. Spirasol: Improvements to Semi-Continuous Solar Disinfection Water Treatment Systems. Master of Engineering, MIT.
- Najwa Obeid, 2005. Modeling and Analysis of Phosphorus Reduction by Rain Gardens and Other BMPs in Stormwater Runoff from Small Urban Developments. Master of Engineering, MIT.
- Olympia Galenianou, 2006. Effects of Adding Wash Tower Effluent to Ano Liossia Landfill to Enhance Bioreaction. Master of Engineering, MIT.
- Tia M. Trate, 2006. Nutrient Load Analysis of Lago de Yojoa, Honduras. Master of Engineering, MIT.
- Mira Chokshi, 2006. Temperature Analysis for Lake Yojoa, Honduras. Master of Engineering, MIT.
- Daria Cresti, 2007. Analysis and Design of Household Rainwater Catchment Systems for Rural Rwanda. Master of Engineering, MIT.
- Helen F. McCreery, 2007. The Effect of Anthropogenic Development on Sediment Loading to Bays on St. John, U.S. Virgin Islands. Master of Engineering, MIT.
- Alfred Patrick Navato, 2007. The Effect of Development on Nitrogen Loading on St. John, U.S. Virgin Islands. Master of Engineering, MIT.
- Jeffrey D. Walker, 2007. Modeling the Fate and Transport of Nitrogen and Sediment within Coastal Embayments on St. John, U.S. Virgin Islands. Master of Engineering, MIT.
- Christiane A. Zoghbi, 2007. Rural Groundwater Supply for the Volcanoes National Park Region,

- Rwanda. Master of Engineering, MIT.
- Kelly C. Doyle, 2008. Sizing the First Flush and its Effect on the Storage-Reliability-Yield Behavior of Rainwater Harvesting in Rwanda. Master of Science, MIT.
- Mary Pierce Harding, 2008. GIS Representation and Assessment of Water Distribution System for Mae La Temporary Shelter, Thailand. Master of Engineering, MIT.
- Sameer A. Kamal, 2008. Development of a Landslide Hazard Map for the Island of Puerto Rico. Master of Engineering, MIT.
- Percy Anne Link, 2008. Improving Parameterization of Scalar Transport through Vegetation in a Coupled Ecosystem-Atmosphere Model. Master of Engineering, MIT.
- Navid Rahimi, 2008. Modeling and Mapping of MaeLa Refugee Camp Water Supply. Master of Engineering, MIT.
- Katherine A. Vater, 2008. Appropriate Technology Water Treatment Processes for MaeLa Temporary Shelter, Thailand. Master of Engineering, MIT.
- Cameron C. Dixon, 2009. Microbial Risk Assessment for Recreational Use of the Kranji Reservoir, Singapore. Master of Engineering, MIT.
- Carolyn Hayek, 2009. Maintaining Rainwater Harvesting in Southern Lebanon: the kaza of Tyre. Master of Engineering, MIT.
- Kathleen B. Kerigan and Jessica M. Yeager, 2009. Bacteria Attenuation Modeling and Source Identification in Kranji Catchment and Reservoir. Master of Engineering, MIT.
- Gianna D. Leandro, 2009. Water Quality and Sedimentation Implications of Installing a Hydroelectric Dam on the Rio Baker in Chilean Patagonia. Master of Engineering, MIT.
- Sameer A. Kamal, 2009. The Use of a Distributed Hydrologic Model to Predict Dynamic Landslide Susceptibility for a Humid Basin in Puerto Rico. Environmental Engineer, MIT.
- Kevin J. Foley, 2010. Wastewater Treatment and Energy: An Analysis on the Feasibility of Using Renewable Energy to Power Wastewater Treatment Plants in Singapore. Master of Engineering, MIT.
- Erika C. Granger, 2010. Water Quality Modeling in Kranji Catchment. Master of Engineering, MIT.
- Jean Pierre Nshimiyimana, 2010. Evaluating Human Fecal Contamination Sources in Kranji Reservoir Catchment, Singapore. Master of Science, MIT.
- Adriana Mendez Sagel, 2010. Water Quality Studies in Kranji Catchment, Singapore: Use of Organic Tracer and PEDs for Identifying Potential Sewage Sources. Master of Engineering, MIT.
- Ryan C. Bossis, 2011. Application of the SWAT Model to Bacterial Loading Rates in Kranji Catchment, Singapore. Master of Engineering, MIT.
- Genevieve E. Ho, 2011. Analysis of Wet and Dry Weather Bacterial Concentrations within Kranji and Marina Catchments, Singapore. Master of Engineering, MIT.
- Yangyue Zhang, 2011. Water Quality Prediction for Recreational Use of Kranji Reservoir, Singapore. Master of Engineering, MIT.
- Janhvi Doshi, 2012. An Investigation of Leaky Sewers as a Source of Fecal Contamination in the

- Stormwater Drainage System in Singapore. Master of Engineering, MIT.
- Kathyayani Shobhna Kondepudi, 2012. Analysis of the Efficacy of a Constructed Wetland in Treating Human Fecal Contamination. Master of Engineering, MIT.
- Suejung Shin, 2012. An Analysis of Spatial and Temporal Variation in Fecal Indicator Concentrations in Singapore. Master of Engineering, MIT.
- Laurie Kellndorfer, 2012. A Hydrologic Calibration of the SWAT Model in Kranji Catchment, Singapore. Master of Engineering, MIT.
- Tsung Hwa Burkhart, 2013. Biofilms as Sources of Fecal Bacteria Contamination in the Stormwater Drainage System in Singapore. Master of Engineering, MIT.
- Ndeye Awa Diagne, 2013. Evaluation of Sewer Leakage into the Stormwater Drainage System in Singapore. Master of Engineering, MIT.
- Margaret A. Hoff, 2013. Control of Agricultural Nonpoint Source Pollution in Kranji Catchment, Singapore. Master of Engineering, MIT.
- Anna C. Kelly, 2013. Finite Element Modeling of Flow Through Ceramic Pot Filters. Master of Engineering, MIT.
- Halle Ritter, 2013. Nitrogen Chemistry in an Urban Bioretention System in Singapore. Master of Engineering, MIT.
- Eveline Ekklesia, 2014. Identification of Suitable Indicators for Tracing Human Faecal Contamination and Sewage in Urban Catchments. Doctor of Philosophy, Nanyang Technological University.
- Justin Victor V. Angeles, 2014. Water Quality Modelling for Recreational Use in the Kallang River Basin, Singapore. Master of Engineering, MIT.
- Riana Larissa Kernan, 2014. Denitrification in a Best Management Practice Bioretention System. Master of Engineering, MIT.
- Tina Y. Liu, 2014. Enteric Adenovirus and Coliphage as Microbial Indicators in Singapore's Kallang Basin. Master of Engineering, MIT.
- Allison Park, 2014. Microbial Risk Assessment for Recreational Use of the Kallang Basin, Singapore. Master of Engineering, MIT.

### **Technical Reports and Open Literature Publications**

- Shanahan, P., "A Groundwater Model Used to Sense Subsurface Geology in an Alluvial Basin near Tombstone, Arizona," M.S. Report, Department of Applied Earth Sciences, Stanford University, Stanford, California, June 1974.
- Harleman, D.R.F., E. E. Adams and P. Shanahan, "Field Verification of a Stratified Cooling Pond Model," *Proceedings of the VXIII Congress*, International Association for Hydraulic Research, Cagliari, Italy, Volume 4, pages 309-316, September 1979.
- Shanahan, P. and B. M. Harley, "Graphics for Hydraulics Transients Simulation," *Proceedings of the Second Conference on Computers in Civil Engineering*, American Society of Civil Engineers, Baltimore, Maryland, pages 27-36, June 1980.

- Harleman, D.R.F. and P. Shanahan, "Aspects of Wind-Driven Circulation and Mixing in Eutrophication Studies of Lake Balaton," *Proceedings of the Second Joint MTA/IIASA Task Force Meeting on Lake Balaton Modeling*, Hungarian Academy of Sciences, Veszprém, Hungary, Volume I, pages 50-66, August 27-30, 1979.
- Shanahan, P., D.R.F. Harleman and L. Somlyódy, "Modeling Wind-Driven Circulation in Lake Balaton," Collaborative Paper 81-7, International Institute for Applied Systems Analysis, Laxenburg, Austria, February 1981.
- Shanahan, P. and D.R.F. Harleman, Discussion of "Cells-in-Series Simulation of Riverine Transport" by H.G. Stefan and C. Demetracopoulos, *ASCE Journal of the Hydraulics Division*, Volume 108, Number HY5, pages 731-734, May 1982.
- Shanahan, P. and D.R.F. Harleman, "Linked Hydrodynamic and Biogeochemical Models of Water Quality in Shallow Lakes," Report Number 268, Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, 279 pages, March 1982.
- Shanahan, P. and D.R.F. Harleman, "Users Manual for the M.I.T. Lake Circulation Models (MITLAKE)," Technical Report 285, Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Department of Civil Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, 47 pages, June 1982.
- Somlyódy, L., editor, "Eutrophication of Shallow Lakes: Modeling and Management, The Lake Balaton Case Study," *Proceedings of a Workshop Organized by the Hungarian Academy of Sciences, the International Institute for Applied Systems Analysis, the Hungarian National Water Authority and the Hungarian Committee for Applied Systems Analysis*, 29 August-3 September 1982, Veszprém, Hungary, Collaborative Paper 83-S3, International Institute for Applied Systems Analysis, Laxenburg, Austria, 1983.
- Harleman, D.R.F. and P. Shanahan, "Hydrodynamic and Mass Transport Aspects of the Lake Balaton Models"
- van Straten, G., P. Shanahan and L. Somlyódy, "State-of-the-Art Discussion on Eutrophication Modeling: Summary and Conclusions"
- Shanahan, P. and D.R.F. Harleman, "Transport in Lake Water Quality Modeling," *ASCE Journal of Environmental Engineering*, Volume 110, Number EE1, pages 42-57, February 1984.
- Shanahan P. and D.R.F. Harleman, "A Linked Hydrodynamic and Biogeochemical Model of Eutrophication in Lake Balaton," in *Analysis of Ecological Systems: State-of-the-Art in Ecological Modeling*, edited by W.K. Lauenroth, G.V. Skogerboe and M. Flug, Proceedings of Symposium held from 24 to 28 May, 1982, Fort Collins, Colorado, Sponsored by the International Society for Ecological Modelling, Elsevier Publishing Company, pages 837-843, 1983.
- Shanahan, P., "Water Temperature Modeling: A Practical Guide," Proceedings of the Stormwater and Water Quality Model Users Group Meeting, April 12-13, 1984, Detroit, Michigan, U.S. Environmental Protection Agency, Report EPA-600/9-85-003.
- Shanahan, P., "Adaption of the USGS 3-D Ground Water Flow Model for Simplified Mass Transport Analysis," *Proceedings of the Eastern Regional Ground Water Conference*, July 1984, Newton, Massachusetts. National Water Well Association, Dublin, Ohio, 1984.



- Shanahan, P. and D.R.F. Harleman, Discussion of "Phytoplankton Modeling in the Embayments of Lakes," by J.-T. Kuo and R.V. Thomann, *ASCE Journal of Hydraulic Engineering*, Volume 111, No. 1, pages 113-116, February 1985.
- Somlyódy, L. and G. van Straten, editors, *Modeling and Managing Shallow Lake Eutrophication with Application to Lake Balaton*, Springer-Verlag, 1986. (ISBN 3-540-16227-5)
- Chapter 9, "Wind-Induced Water Motion" by P. Shanahan, D.R.F. Harleman and L. Somlyódy
- Chapter 10, "Lake Eutrophication Model: A Coupled Hydrophysical-Ecological Model" by P. Shanahan and D.R.F. Harleman
- Shanahan, P. and D.P. Galya, "Mixing and Transport" (annual literature review), *Journal Water Pollution Control Federation*, Volume 60, Number 6, pages 933-940, June 1988.
- Cosgrave, T., P. Shanahan, J.C. Craun and M. Haney, "Gradient Control Wells for Aquifer Remediation: A Modeling and Field Case Study," *Proceedings of the Solving Ground Water Problems with Models Conference*, February 7-9, 1989, Indianapolis, Indiana. The Association of Ground Water Scientists and Engineers, Dublin, Ohio, 1989.
- Shanahan, P. and D.P. Galya, "Mixing and Transport" (annual literature review), *Journal Water Pollution Control Federation*, Volume 61, Number 6, pages 924-931, June 1989.
- Shanahan, P. and S.C. Gaudet, "Mixing and Transport" (annual literature review), *Research Journal of The Water Pollution Control Federation*, Volume 62, Number 4, pages 546-555, June 1990.
- Shanahan, P., "Mixing and Transport" (annual literature review), *Research Journal of The Water Pollution Control Federation*, Volume 63, Number 4, pages 536-543, June 1991.
- Beard, T.C., C.J. Perry, T.C. Fox, T.G. Naymik, and P. Shanahan, "Iterative Approach to Groundwater Flow Modeling of the Martinsville Alternative Site (MAS), under Consideration for Low-Level Radioactive Waste (LLRW) Storage in Clark County, Illinois," *Environmental Geology and Water Sciences*, Volume 18, Number 3, pages 195-207, November 1991.
- Henderson-Sellers, B., editor, *Water Quality Modeling: Volume IV: Applications to Lakes and Reservoirs*, CRC Press, 1991. (ISBN 0-8493-6974-6)
- Chapter 7, "Case Study of Lake Balaton, Hungary" by P. Shanahan, R.A. Luetlich, Jr. and D.R.F. Harleman.
- Shanahan, P., "Mixing and Transport" (annual literature review), *Water Environment Research*, Volume 64, Number 4, pages 514-523, June 1992.
- Shanahan, P., "A Water-Quality History of the Blackstone River, Massachusetts, USA: Implications for Central and Eastern European Rivers," *Water Science and Technology*, Volume 30, Number 5, pages 59-68, 1994. (Also published as Working Paper WP-94-31, International Institute for Applied Systems Analysis, Laxenburg, Austria, May 1994.)
- Shanahan, P., and L. Somlyódy, "Modeling the Impacts of Diffuse Pollution on Receiving Water Quality" in V. Novotny, editor, *Nonpoint Pollution and Urban Stormwater Management, Water Quality Management Library, Volume 9*. Technomic Publishing Company, Lancaster, Pennsylvania, 1995. (ISBN 1-56676-305-3) (Also published as Working Paper WP-95-2, International Institute for Applied Systems Analysis, Laxenburg, Austria, January 1995.)

- Shanahan, P., "Ground-Water Remediation and Modeling," in V. Novotny and L. Somlyódy, editors, *Remediation and Management of Degraded River Basins with Emphasis on Central and Eastern Europe*. Springer-Verlag, New York. 1995. (ISBN 3-540-60115-5)
- Shanahan, P., "The Changing Approach to Water-Quality Management in the United States," Working Paper WP-96-62. International Institute for Applied Systems Analysis, Laxenburg, Austria, June 1996.
- Somlyódy, L., and P. Shanahan, *Municipal Wastewater Treatment in Central and Eastern Europe; Present Situation and Cost-Effective Development Strategies*. The World Bank, Washington, D.C. 1998. (ISBN 0-8213-4085-9)
- Bonas, A.R., I.D. MacFarlane, P. Shanahan, H.E. Dawson, and L.W. Gelhar. "The use of groundwater modeling to predict DNAPL transport." Poster presented at *The First International Conference on Remediation of Chlorinated and Recalcitrant Compounds*, Monterey, California. May 18-21, 1998.
- Shanahan, P., and L. Somlyódy, "Task Group progress on river water quality model." *Water Quality International*, pages 56-57, June 1998.
- Rauch, W., M. Henze, L. Koncsos, P. Reichert, P. Shanahan, L. Somlyódy, and P. Vanrolleghem, "River Water Quality Modelling: I. State of The Art," *Water Science and Technology*, Volume 38, Number 11, pages 237-244, December 15, 1998.
- Shanahan, P., M. Henze, L. Koncsos, W. Rauch, P. Reichert, L. Somlyódy, and P. Vanrolleghem, "River Water Quality Modelling: II. Problems of The Art," *Water Science and Technology*, Volume 38, Number 11, pages 245-252, December 15, 1998.
- Somlyódy, L., M. Henze, L. Koncsos, W. Rauch, P. Reichert, P. Shanahan, and P. Vanrolleghem, "River Water Quality Modelling: III. Future of The Art," *Water Science and Technology*, Volume 38, Number 11, pages 253-260, December 15, 1998.
- Hellweger, F., E. Naranjo, P. Shanahan, K. Fellows, G. Ostroff and P. Anid, "Screening-Level GIS Tools for Modeling Environmental Contamination from Mining Activities," *19th Annual ESRI International User Conference*, San Diego, California, July 26-30, 1999.
- MacFarlane, I.D., J.E. Lige, A.R. Bonas, P.J.S. Colberg, E.J. Bouwer, and P. Shanahan, "Results of an Integrated Laboratory, Field, and Modeling Program to Demonstrate Natural Attenuation in a Low Redox Aquifer Impacted by Hydrocarbon DNAPL," *Geological Society of America Annual Meeting*, Denver, Colorado, October 25-28, 1999.
- Lehr, J., editor, *Standard Handbook of Environmental Science, Health and Technology*, McGraw-Hill Publishing Company, 2000. (ISBN 0-07-038309-X)
- Chapter 1, Section 5B, "Mixing and Transport of Pollutants in Surface Water" by P. Shanahan and S.C. Gaudet.
- Chapter 24, Section 3, "Sensitive Environmental Systems, Alpine Lakes" by P. Shanahan.
- Shanahan, P., D. Borchardt, M. Henze, W. Rauch, P. Reichert, L. Somlyódy, and P. Vanrolleghem, "River Water Quality Model No. 1: I. Modelling Approach." *Water Science and Technology*. Vol. 43, No. 5, Pp. 1-10, 2001.
- Reichert, P., D. Borchardt, M. Henze, W. Rauch, P. Shanahan, L. Somlyódy, and P. Vanrolleghem, "River Water Quality Model No. 1: II. Biochemical Process Equations." *Water Science and Technology*. Vol. 43, No. 5, Pp. 11-30, 2001.

- Vanrolleghem, P., D. Borchardt, M. Henze, W. Rauch, P. Reichert, P. Shanahan, and L. Somlyódy, "River Water Quality Model No. 1: III. Biochemical Submodel Selection." *Water Science and Technology*. Vol. 43, No. 5, Pp. 31-40, 2001.
- Reichert, P., D. Borchardt, M. Henze, W. Rauch, P. Shanahan, L. Somlyódy, and P. Vanrolleghem, *River Water Quality Model No. 1*. Scientific and Technical Report No. 12. ISBN 1 900222 82 5. IWA Publishing, London, England. 2001.
- Lantagne, D., P. Gschwend, and P. Shanahan, "Point-Of-Use Water Filtration in Rural Haiti: "Trihalomethane Production and Factors for Program Success." *WEFTEC Latin America 2001*, San Juan, Puerto Rico, November 11-14, 2001.
- Shanahan, P., "Modelling advance for river quality." *Water21, Magazine of the International Water Association*. Pp. 38-41. April 2002.
- Oates, P.M., P. Shanahan, and M.F. Polz, "Solar Disinfection (SODIS) for Point-of-Use Water Treatment in Haiti and Simulation of Solar Radiation Global for Global SODIS Assessment." *Water Research*. Vol. 37, No. 1, Pp. 47-54. January 2003.
- Anderson, P.D., V.J. D'Aco, P. Shanahan, S.C. Chapra, M.E. Buzby, V.L. Cunningham, E.P. Hayes, B.M. DuPlessie, F. Mastrocco, N.J. Parke, J.C. Rader, J.H. Samuelian, and B.W. Schwab. "Screening Analysis of Human Pharmaceutical Compounds in U.S. Surface Waters." *Environmental Science & Technology*. Vol. 38, No. 3, Pp. 838-849, February 01, 2004.
- Novotny, V. and P. Brown, editors. *Cities of the Future: Towards integrated sustainable water and landscape management*. ISBN 1843391368. IWA Publishing, London, England. September 2007.
- "Ground Water and Cities" by P. Shanahan and B.L. Jacobs.
- Lepore, C., S. Kamal, E. Bono, V. Noto, P. Shanahan, and R. L. Bras, "Data Resolution Effects on Landslide Hazard and Susceptibility Assessment of Puerto Rico," Poster presented at *AGU Fall Meeting*, December 15-19, 2008, San Francisco, California.
- Bras, R. L., F. Chagnon, E. E. Adams, J. Atkinson, O. Madsen, S. Murcott, U. Shamir, P. Shanahan, and L. Thatcher, "Donald R. F. Harleman: A Life of Excellence and an Excellent Life." *Journal of Hydraulic Engineering, ASCE*. Vol. 133, No. 11, Pg. 1187-1191. November 2007.
- Durant, J.L., B. Jacobs, and P. Shanahan, "Historical Inputs of N-nitrosodimethylamine to the Public Drinking Water Supply in Wilmington, Massachusetts," In: R.W. Babcock, Jr. and R. Walton, editors, *Proceedings of The World Environmental & Water Resources Congress, May 12-16, 2008, Honolulu, Hawai'i*. American Society of Civil Engineers, Reston, Virginia.
- Rood, A.S., B. Jacobs, P. Shanahan, H.J. Mohler, J.W. Aannenson, J.R. Rocco, L. Hay Wilson, H.A. Grogan, and J.E. Till, "Overview of Environmental Transport Models Contained in the Risk Analysis, Communication, Evaluation, and Reduction (RACER) Software Tools at Los Alamos National Laboratory," *WM2009 Waste Management for the Nuclear Renaissance*, March 1-5, 2009, Phoenix, Arizona.

Baker, L. A., Editor. 2009. *The Water Environment of Cities*. New York, Springer Science+Business Media, LLC.

“Groundwater in the Urban Environment” by P. Shanahan

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