

CURRICULUM VITAE
Robert S. Bowman
1950–2009

Business Address:

Dept. of Earth and Environmental Science
New Mexico Tech
801 Leroy Place
Socorro, NM 87801

Academic Degrees:

New Mexico State University, Ph.D., Soil Chemistry, 1982
University of California, Berkeley, A.B., Chemistry, 1972

Professional Positions:

New Mexico Institute of Mining and Technology:
 Professor of Hydrology, 1995-2009
 Chairman, Dept. of Earth and Environmental Science, 2005-2008
 Director of Hydrology Program, 1995-2004
 Associate Professor of Hydrology, 1991-1994
 Assistant Professor of Hydrology, 1987-1991
Swiss Federal Institute of Technology (ETH), Institute of Terrestrial Ecology, Zürich:
 Visiting Professor, 1997
U.S. Department of Agriculture, Agricultural Research Service:
 Soil Scientist, 1982-1987
New Mexico State Univ., Agronomy Dept:
 Graduate Research Assistant, 1977-1982
American Exploration and Mining, Albuquerque, NM:
 Chemist, 1977
Medi-Physics, Inc., Emeryville, CA:
 Research Chemist, 1972-1976

Professional Organizations:

American Chemical Society
American Geophysical Union
American Society of Agronomy
Clay Minerals Society
International Natural Zeolite Association
International Zeolite Association
New Mexico Geological Society
Soil Science Society of America

Honors:

Fellow, Soil Science Society of America
Fellow, Japan Society for the Promotion of Science, 2008
New Mexico Earth Science Achievement Award, 2008
Distinguished Faculty Award, New Mexico Tech, 2008
Distinguished Research Award, New Mexico Tech, 2006

Refereed Articles in Journals:

Simpson, J.A., and R.S. Bowman. 2009. Nonequilibrium sorption and transport of volatile petroleum hydrocarbons in surfactant-modified zeolite. *J. Contam. Hydrol.* 108(1-2):1-11. doi:10.1016/j.jconhyd.2009.05.001

Kirk, M.F., L.J. Crossey, C. Takacs-Vesbach, D.L. Newall, and R.S. Bowman. 2009. Influence of upwelling saline groundwater on iron and manganese cycling in the Rio Grande floodplain aquifer. *Appl. Geochem.* 24:426-437. doi: 10.1016/j.apgeochem.2008.12.022

Wilcox, L.J., R.S. Bowman, and N.G. Shafike. 2007. Evaluation of Rio Grande management alternatives using a surface water/groundwater model. *J. Am. Wat. Resour. Assoc.* 43:1595-1603. doi: 10.1111/j.1752-1688.2007.00131.x

Duke, C.L., R.C. Roback, P.W. Reimus, R.S. Bowman, T.L. McLing, K.E. Baker, and L.C. Hull. 2007. Flow and transport in a variably-saturated system of layered sediment and fractured rock: Validating and parameterizing the conceptual model. *Vadose Zone J.* 6: 855-867, doi:10.2136/vzj2006.0102.

Bowman, R.S. 2007. Editorial. P. 213-214. *In* R.S. Bowman (ed.) *Zeolite'06*. Special issue of *Micropor. Mesopor. Mater.* 105:213-214, doi: 10.1016/j.micromeso.2007.08.034.

Altare, C.R., R.S. Bowman, L.E. Katz, K.A. Kinney, and E.J. Sullivan. 2007. Regeneration and long-term stability of surfactant-modified zeolite for removal of volatile organic compounds from produced water. *Micropor. Mesopor. Mater.* 105:305-316, doi:10.1016/j.micromeso.2007.04.001.

Zhang, P., D.M. Avudzeaga, and R.S. Bowman. 2007. Removal of perchlorate from contaminated waters using surfactant-modified zeolite. *J. Environ. Qual.* 36:1069-1075, doi:10.2134/jeq2006.0432.

Li, Z., H.K. Jones, P. Zhang, and R.S. Bowman. 2007. Chromate transport through columns packed with surfactant-modified zeolite/zero-valent-iron pellets. *Chemosphere* 68:1861-1866, doi:10.1016/j.chemosphere.2007.03.011.

Li, Z., C. Willms, J. Alley, P. Zhang, and R.S. Bowman. 2006. A shift in pathway of iron-mediated perchloroethylene reduction in the presence of sorbed surfactant—a column study, *Water Res.* 40:3811-3819, doi:10.1016/j.watres.2006.08.025.

- Bryant, E.M., R.S. Bowman, and J.S. Buckley. 2006. Wetting alteration of mica surfaces with polyethoxylated amine surfactants. *J. Petr. Sci. and Eng.* 52:244-252.
- Vivoni, E.R., R.S. Bowman, R.L. Wyckoff, R.T. Jakubowski, and K.E. Richards. 2006. Analysis of a monsoon flood event in an ephemeral tributary to the Río Grande and its downstream hydrologic effects. *Water Resour. Res.* 42:W03404, doi:10.1029/2005WR004036.
- Burt, T.A., Z. Li, and R.S. Bowman. 2005. Evaluation of granular surfactant-modified zeolite/zero valent iron pellets as a reactive material for perchloroethylene reduction. *J. Environ. Eng.* 131:934-942.
- Faghihian, H., and R.S. Bowman. 2005. Adsorption of chromate by clinoptilolite exchanged with various metal cations. *Water Res.* 39:1099-1104.
- Ranck, J.M., R.S. Bowman, J.L. Weeber, L.E. Katz, and E.J. Sullivan. 2005. BTEX removal from produced water using surfactant-modified zeolite. *J. Environ. Eng.* 131:434-442.
- Karapanagioti, H.K., D.A. Sabatini, and R.S. Bowman. 2005. Partitioning of hydrophobic organic chemicals (HOC) into anionic and cationic surfactant-modified sorbents. *Water Res.* 39:699-709.
- Hall, L.M., J.R. Brainard, R.S. Bowman, and J.M.H. Hendrickx. 2004. Determination of solute distributions in the vadose zone using downhole electromagnetic induction. *Vadose Zone J.* 3:1207-1214.
- Tao, X., P. Zhang and R. S. Bowman. 2004. An experimental study on external surface area of surfactant-modified zeolite. *Development and Application of Materials* 19:1-3 (in Chinese).
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- Barker, J.M., P.S. Freeman, G.S. Austin, and R.S. Bowman. 2004. Development of value-added zeolite products from St Cloud Mining. *CIM Bulletin* 97:52-58.
- Li, Z., C. Willms, S. Roy, and R.S. Bowman. 2003. Desorption of hexadecyltrimethylammonium from charged mineral surfaces. *Environ. Geosci.* 10:37-45.
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- Schulze-Makuch, D., R.S. Bowman, S. D. Pillai, and H. Guan. 2003. Field evaluation of the effectiveness of surfactant modified zeolite and iron-oxide-coated sand for removing viruses and bacteria from ground water. *Ground Water Monitoring and Remediation* 23:68-74.

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Oliver, D.S., F.J. Brockman, R.S. Bowman, and T. L. Kieft. 2003. Microbial reduction of hexavalent chromium under vadose zone conditions. *J. Environ. Qual.* 32:317-324.

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Schulze-Makuch, D., D. Pillai, S.D., Guan, H., Bowman, R. Couroux, E., Hielscher, F., Totten, J., Espinosa, I.Y., Kretzschmar, T. 2002. Surfactant-modified zeolite can protect drinking water wells from viruses and bacteria. *EOS* 83:193-201.

Li, Z., Alessi, D., Zhang, P., and R.S. Bowman. 2002. Organo-illite as a low permeability sorbent to retard migration of anionic contaminants. *J. Environ. Eng.* 128:583-587.

Mattson, E.D., R.S. Bowman, and E.R. Lindgren. 2002. Electrokinetic ion transport through unsaturated soil: 1. Theory, model development, and testing. *J. Contam. Hydrol.* 54:99-120.

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Li, Z., and R.S. Bowman. 2001. Retention of inorganic oxyanions by organo-kaolinite. *Water Res.* 35: 3771-3776.

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Bowman, R.S. 1984. Analysis of soil extracts for inorganic and organic tracer anions via high performance liquid chromatography. *J. Chromatogr.* 285:467-477.

Bowman, R.S., N.S. Urquhart, and G.A. O'Connor. 1984. Statistical evaluation of sorption isotherm data. *Soil Sci.* 137:360-369.

O'Connor, G.A., M.E. Essington, M. Elrashidi, and R.S. Bowman. 1983. Nickel and zinc sorption in sludge-amended soils. *Soil Sci.* 135:228-235.

Bowman, R.S., and G.A. O'Connor. 1982. Control of Ni and Sr sorption by free metal ion activity. *Soil Sci. Soc. Am. J.* 46:933-936.

Bowman, R.S., M.E. Essington, and G.A. O'Connor. 1981. Soil sorption of nickel: Influence of solution composition. *Soil Sci. Soc. Am. J.* 45:860-865.

Edited Books:

Bowman, R.S., and S.E. Delap (eds). 2006. *Zeolite'06: the 7th international conference on the occurrence, properties, and utilization of natural zeolites.* 288 p. International Natural Zeolite Association, Washington, D.C.

Book Chapters:

Bowman R.S., Z. Li, S. J. Roy, T. Burt, T.L. Johnson, and R.L. Johnson. 2001. Pilot test of a surfactant-modified zeolite permeable barrier for groundwater remediation. p. 161-185. *In* J.A. Smith and S. Burns, (eds.). *Physical and chemical remediation of contaminated aquifers.* Kluwer Academic/Plenum Publishers, New York.

Bowman, R.S., E.J. Sullivan, and Z. Li. 2000. Uptake of cations, anions, and nonpolar organic molecules by surfactant-modified clinoptilolite-rich tuff. p. 287-297. *In* C. Colella and F.A. Mumpton (eds.) *Natural zeolites for the third millennium.* De Frede Editore, Naples, Italy.

Bowman, R.S., G.M. Haggerty, R.G. Huddleston, D. Neel, and M. Flynn. 1995. Sorption of nonpolar organics, inorganic cations, and inorganic anions by surfactant-modified zeolites. p. 54-64. *In* D.A. Sabatini, R.C. Knox, and J.H. Harwell (eds.). *Surfactant-enhanced remediation of subsurface contamination.* ACS Symposium Series 594. American Chemical Society, Washington, DC.

Bowman, R.S. 1989. Manipulation of the vadose zone to enhance toxic organic chemical removal. p. 275-287. *In* Z. Gerstl, Y. Chen, U. Mingelgren, and B. Yaron (eds.). Toxic organic chemicals in porous media. Springer-Verlag, Berlin.

Bowman, R.S., and F.S. Nakayama. 1986. Salt distribution. p. 117-141. *In* F.S. Nakayama and D.A. Bucks (eds.). Trickle irrigation for crop production. Elsevier Scientific Publishing, Amsterdam.

Patents:

Bowman, R.S., E.J. Sullivan, L. Katz, K. Kinney, and S. Kwon. 2008. Treatment of produced or contaminated water using an SMZ-VPB-MBR combined system. Non-Provisional Application No.: S-109,100. US Patent Application No.: 12/202,007. Filed: 29 August 2008.

Schulze-Makuch, D., R.S. Bowman, and S. Pillai. 2007. Removal of biological pathogens using surfactant-modified zeolite. Patent No.: US 7,311,839. Date of Patent: Dec. 25, 2007.

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Book Reviews:

Bowman, R.S. Review of : D. Langmuir. 1997. Aqueous environmental geochemistry. Prentice Hall, Upper Saddle River, NJ. Eos 78:586.

Bowman, R.S. Review of : L.W. Canter, R.C. Knox, and D.B. Fairchild. 1987. Ground water quality protection. Lewis Publishers, Inc., Chelsea, MI, USA. J. Environ. Qual. 17:344-345.

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Symposia Proceedings:

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Salazar, C.M., R.S. Bowman, and D. Schulze-Makuch. 2004. Treatment of infectious pathogens in drinking water via engineered surfactant-modified zeolite. *In Proc. Society of Hispanic Professional Engineers National Technical & Career Conference*, 5-9 January 2004, Chicago, IL.

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Salazar, C.M., and R.S. Bowman. 2003. Removal of problematic species from water via surfactant modified zeolites. *In Proc. Society of Hispanic Professional Engineers National Technical & Career Conference*, 8-12 January 2003, New Orleans, LA.

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Callahan, T. J., P. W. Reimus, P. C. Lichtner, and R. S. Bowman, 2002, Multicomponent effects on the transport of cations undergoing ion exchange in fractured media. p. 523-528. *In A. N. Findikakis (ed.) Bridging the Gap Between Measurement and Modeling in Heterogeneous Media. Proceedings of the Intl. Groundwater Symposium*, 25-28 March 2002, Lawrence Berkeley National Laboratory.

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Bowman, R.S., D.B. Jaynes, R.C. Rice, and D.B. Stephens. 1991. Field determination of solute transport parameters in "homogeneous" versus "heterogeneous" soils. *Agron. Abstr.* 82:215.

Bowman, R.S., D.P. Grabka, J.F. Gibbens, and D.B. Stephens. 1990. Three-dimensional solute transport in a heterogeneous vadose zone. *Eos* 71:514.

Bowman, R.S., D.P. Grabka, and D.B. Stephens. 1990. Field determination of solute transport in a heterogeneous vadose zone. *Agron. Abstr.* 82:209.

Bowman, R.S., R.C. Rice, and D.B. Jaynes. 1990. Sample size and sample location impacts on calculated pesticide transport parameters. American Chemical Society National Meeting, 23-27 April, 1990, Boston, MA.

Bowman, R.S., R.C. Rice, and D.B. Jaynes. 1989. Evaluation of the magnitude and variability of solute velocities under intermittent ponding. *Internatl. Symp. on Processes Governing the Movement and Fate of Contaminants in the Subsurface Environment*, 24-26 July, 1989, Stanford, CA.

Bowman, R.S., D.B. Stephens, D.P. Grabka, and K.G. Flanigan. 1989. A multi-tracer field experiment to evaluate solute transport in variably-saturated soil. NWWA Conf. on Tracers in Hydrogeology: Principles, Problems, and Practical Applications, 31 October-1 November, 1989, Houston, TX.

Bowman, R.S., R.C. Rice, and D.B. Jaynes. 1988. A field experiment to evaluate the magnitude and variability of solute velocities under intermittent ponding. Proc. Conf. on Validation of Flow and Transport Models for the Unsaturated Zone, 23 - 26 May, 1988, Ruidoso, NM, USA.

Bowman, R.S., and R.C. Rice. 1987. Laboratory and field determination of bromacil sorption and transport. Agron. Abstr. 79:166-167.

Bowman, R.S., and R.C. Rice. 1986. Field calibration of equilibrium and nonequilibrium models of tracer and pesticide transport. Agron. Abstr. 78:155.

Bowman, R.S., and R.C. Rice. 1985. Measurement of percolating water velocities below agricultural fields. Spring Meeting, American Geophysical Union, Baltimore, MD.

Bowman, R.S., and R. C. Rice. 1985. Distribution of a mobile herbicide below a flood-irrigated agricultural field. Agron. Abstr. 7:21.

Bowman, R.S., and R.C. Rice. 1984. Transport of conservative tracers in the field under flood irrigation. Agron. Abstr. 76:164.

Bowman, R.S. 1983. Evaluation of some new tracers for soil water studies. Agron. Abstr. 75:139.

Bowman, R.S., N.S. Urquhart, and G.A. O'Connor. 1982. Statistical evaluation of sorption isotherm data. Agron. Abstr. 74:171

Bowman, R.S., and G.A. O'Connor. 1981. Control of nickel and strontium sorption by free metal ion activity. Agron. Abstr 73:146.

Bowman, R.S., M.E. Essington, and G.A. O'Connor. 1980. Influence of solution composition on sorption of nickel by soils. Agron Abstr 72:137.

Invited Lectures:

Department of Earth and Environmental Science, New Mexico Tech, Socorro, New Mexico, September 2008.

Department of Earth Resources Engineering, Kyushu University, Japan (2 lectures), June 2008.

5th International Conference on Interfaces Against Pollution (keynote lecture), Kyoto, Japan, June 2008.

Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, August 2007.

Department of Geology, Chinese University of Geosciences, Wuhan, August 2007.

Decision-Makers Field Conference, “Water Resources of the Middle Rio Grande”, Socorro, NM, May 2007.

Symposium on River Terrace and Floodplain Hydrology, Las Cruces, New Mexico, February 2007.

Chemistry Department, New Mexico Tech, Socorro, New Mexico, February 2007.

Water Management and Hydrological Science Graduate Program, Texas A&M University, College Station, October 2006.

Distinguished Researcher Lecture, New Mexico Institute of Mining and Technology, October 2006

Department of Earth & Atmospheric Sciences, City College of New York, SUNY, New York, March 2006.

Save Our Bosque Task Force, Socorro, New Mexico, May 2006.

Socorro Soil and Water Conservation District Annual Meeting, Socorro, New Mexico, February 2006.

Department of Chemical Engineering, New Mexico State University, Las Cruces, February 2006.

Environmental Science and Engineering Ph.D. Program, University of Texas, El Paso, January 2006.

Department of Geology, Washington State University, Pullman, WA, October 2005.

Vernadsky Institute of Geochemistry and Analytical Chemistry of Russian Academy of Sciences, Moscow, Russia, May 2005.

Russian Research Institute of Experimental Physics of the Russian Federal Nuclear Center, Sarov, Russia, May 2005.

Department of Chemistry, Kazan State University, Kazan, Russia, May 2005.

CLE International Law of the Rio Grande Symposium, Albuquerque, NM, January 2005.

Society of Geophysics of Taiwan National Meeting, Taipai, Taiwan, November 2004.

Institute for Terrestrial Ecology, Swiss Federal Institute of Technology (ETH), Schlieren, Switzerland, October 2004 (2 lectures).

Workshop on Adaptive Riparian Management in Arid Systems, San Antonio, NM, June 2004.

U.S.-Mexico Border Coalition of Resource Conservation & Development Councils, Las Cruces, NM, May 2004.

Water Lecture Series, New Mexico State University, Las Cruces, NM, February 2004.

Istituto di Scienze Geologico-Mineralogiche dell'Università di Sassari, Sassari, Italy, September 2003.

6th National Congress on Science and Technology of Zeolites, Vietri sul Mare, Italy, September 2003.

New Mexico Drought Symposium, Albuquerque, NM, September 2003.

Workshop on Fluid Flow and Transport through Faulted Ignimbrites and other Porous Media, Santa Fe, NM, September 2003.

North-Transdanubian Regional Environmental Authority, Győr, Hungary, August 2003.

Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, June 2003.

Department of Geology, University of Texas, El Paso, October 2002.

Department of Earth and Environmental Science, New Mexico Tech, September 2002.

6th International Conference on the Occurrence, Properties and Utilization of Natural Zeolites (Zeolite '02), 3-7 June 2002, Thessaloniki, Greece.

Department of Environmental Sciences, University of the Aegean, Mytilene, Lesbos, Greece, May, 2002.

Foundation for Research and Technology Hellas, Patras, Greece, May 2002

Annual meeting of Consortium for Sustainability of Arid-region Hydrology and Riparian Areas, 26-29 Feb. 2002, Tucson, AZ.

Chemistry Division, Los Alamos National Laboratory, February 2002.

Environmental Science and Engineering Ph.D. Program, University of Texas-El Paso, October 2001.

11th Annual V.M. Goldschmidt Conference, 20-24 May 2001, Roanoke, VA.

School of Civil Engineering and Environmental Science, University of Oklahoma, Norman, OK, April 2001.

Bouyoucos Conference on Environmental Chemistry at the Clay-Water Interface, Honolulu, HI, 2000.

Workshop on Testable Stochastic Features of Subsurface Structures, Flow and Transport, Ascona, Switzerland, 1999.

Mesilla Chemistry Workshop, Mesilla, NM, 1999.

Department of Chemistry and Biochemistry, New Mexico State University, Las Cruces, NM, 1998.
RTDF Permeable Barriers Action Group meeting, Beaverton, OR, 1998.

Department of Geology, Universitat Politècnica de Catalunya, Barcelona, Spain, 1997.

Institute for Terrestrial Ecology, Swiss Federal Institute of Technology (ETH), Schlieren, Switzerland, 1997.

Federal Institute for Geoscience and Natural Materials, Hannover, Germany, 1997.

Department of Hydrology, University of Bayreuth, Bayreuth, Germany, 1997.

Swiss Federal Institute for Environmental Science and Technology (EAWAG), Zürich, Switzerland, 1997.

Geological Institute, Eberhard-Karls-Universität Tübingen, Tübingen, Germany, 1997.

Dept. of Hydromechanics and Water Resources, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland, 1997.

Institute for Water Research, University of Stuttgart, Germany, 1997.

Engineering Foundation Conference, Davos, Switzerland, 1997.

Geological Society of America Annual Meeting, Denver, CO, 1996.

Third Annual International Petroleum Environmental Conf., Albuquerque, NM, 1996.

American Chemical Society, Division of Industrial and Engineering Chemistry, Birmingham, AL., 1996

American Geophysical Union National Meeting, San Francisco, CA, 1995.

Oak Ridge National Laboratory, Oak Ridge, TN 1995.

Los Alamos National Laboratory, Los Alamos, NM 1995.

Waste-management Education and Research Consortium Research Seminar Series (televised nationally), Socorro, NM, 1994.

Department of Plant and Soils Sciences, University of Delaware, Newark, DE, 1994.

DuPont Environmental Remediation Services, Wilmington DE, 1994.

Central New Mexico Section of the American Chemical Society, Albuquerque, NM, 1994.

American Chemical Society National Meeting, San Diego, CA, 1994.

American Water Resources Association National Meeting, Tucson, AZ, 1993.

ASCE-CSCE Joint Meeting on Environmental Engineering, Montreal, Quebec, Canada, 1993.

Texas Bureau of Economic Geology, Austin, TX, 1993.

Los Alamos National Laboratory, Los Alamos, NM 1992.

New Mexico Water Quality Control Commission, Santa Fe, NM, 1992

Workshop on On-Farm Irrigation Efficiency, Las Cruces, NM, 1992.

Waste-management Education and Research Consortium short course in hazardous waste management, Santa Fe, NM 1992.

American Society of Agronomy National Meeting, Denver, CO, 1991.

1st International Conf. on Environmentally Conscious Manufacturing, Santa Fe, NM, 1991.

Waste-management Education and Research Consortium Research Seminar Series (televised nationally), Socorro, NM, 1991.

Water Quality Subcommittee, New Mexico Food and Agriculture Council, Albuquerque, NM, 1991.

Workshop on Flow and Transport Through Unsaturated Fractured Rock, Tucson, AZ, 1991.

35th Annual New Mexico Water Conference, Albuquerque, NM, 1990.

Waste Management Education and Research Consortium, Albuquerque, NM, 1990.

American Chemical Society National Meeting, Boston, MA, 1990.

Western Weed Science Society Annual Meeting, Reno, NV, 1990.

New Mexico Civil and Agricultural Engineers Conference on Water Quality, Las Cruces, NM, 1990.

New Mexico Chapter of the Soil and Water Conservation Society, Albuquerque, NM, 1989.

Environmental Systems Monitoring Lab., USEPA, Las Vegas, NV, 1989.

Savannah River Ecology Laboratory, Aiken, SC, 1987.

Environmental Research Laboratory, USEPA, Athens, GA, 1987.

Dept. of Agronomy and Horticulture, New Mexico State Univ., Las Cruces, NM, 1987.

Arizona Hydrological Society, Tempe, AZ, 1987.

Snake River Water Conservation Research Laboratory, USDA-ARS, Kimberly, ID, 1987.

Arizona Dept. of Health Services, Phoenix, AZ, 1987.

Dept. of Civil Engineering, Arizona State Univ., Tempe, AZ, 1987.

Environmental Engineering Division, American Society of Civil Engineers National Meeting, Orlando, FL, 1987.

International Workshop on Pollutants in Porous Media, Bet Dagan, Israel, 1987.

American Society of Agronomy National Meeting, Atlanta, GA, 1986.

ARS Workshop on Groundwater Quality, USDA-ARS, Atlanta, GA, 1986.

Northwest Watershed Research Center, USDA-ARS, Boise, ID, 1986.

U.S. Committee on Irrigation and Drainage Regional Meeting, Mesa, AZ, 1986.

Pesticide Degradation Laboratory, USDA-ARS, Beltsville, MD, 1985.

Dept. of Soil and Water Science, Univ. of Arizona, Tucson, AZ, 1985.

Arizona Hydrological Society, Tempe, AZ, 1985.

Snake River Conservation Research Center, USDA-ARS, Kimberly, ID, 1984.

Los Alamos National Laboratory, Los Alamos, NM 1984.

Dept. of Agronomy and Soils, Washington State Univ., Pullman, WA, 1984.

Soil Conservation Service Engineers Conference, Phoenix, AZ, 1983.

Short Courses Taught:

Reactive and Nonreactive Solute Transport in Diverse Media. Swiss Federal Institute of Technology (ETH), Zürich, Switzerland, 1997.

Principles of Vadose Zone Hydrology. National Ground Water Association, San Antonio, TX, 1994.

Short Course on Site Characterization. Bureau of Land Management, Phoenix, AZ, 1992; Denver, CO, 1993.

Workshop on Vadose Zone Hydrology. Daniel B. Stephens and Associates, Albuquerque, NM, 1991, 1992.

Videoconference Training Series on Hazardous Waste Management. Waste Management Education and Research Consortium, Albuquerque, NM, 1991.

University Courses Taught:

ERTH 140, Water in the Rise and Fall of Civilizations

A survey of how water resources have nurtured the rise of civilizations and how changes in, or misuse of, these resources have led to their demise. The impact of hydrologic extremes such as floods and droughts on social sustainability will also be examined. Case studies from the ancient to the modern world will be considered in the context of the underlying hydrological processes and their environmental and social ramifications.

ERTH 140L, Water in the Rise and Fall of Civilizations Laboratory

Laboratory and field exercises in hydrologic processes including flood forecasting, erosion, salinization, and groundwater overdraft.

Hydrology 507, Hydrogeochemistry

The thermodynamics and aqueous chemistry of groundwater, including chemical equilibrium concepts, surface chemistry, redox reactions, and biochemistry. The interaction of groundwater with the atmosphere and aquifer matrix are applied to problems of groundwater quality evolution, water use, and groundwater contamination.

Hydrology 546, Contaminant Hydrology

The physics, chemistry, and biology of inorganic and organic contaminants in groundwater systems. Mechanisms by which contaminants are introduced. Transport and transformations of dissolved contaminants in both the vadose and saturated zones. Movement, trapping, and solubility of relatively immiscible organic compounds. Contaminant isolation and remediation using physical barriers, hydraulics, and in-situ treatment.

Hydrology 548, Laboratory and Field Methods in Hydrology

A course in experimental methods used in aquifer characterization and investigations of groundwater contamination. Monitoring well installation, slug tests, sampling methodologies, sorption isotherms, miscible displacement experiments, and other techniques. Theory and use of analytical instrumentation, including atomic absorption spectrophotometry, gas chromatography, and liquid chromatography, used in measuring contaminant levels.

Hydrology/Petroleum Engineering 552, Fluid/Surface Interactions

A course on the physics and chemistry of interfaces. Emphasis on interactions in multifluid systems both in the presence and absence of solids. The course is application-oriented, focusing on phenomena important in hydrology, petroleum engineering, and environmental engineering.

Geochemistry/Geology/Hydrology 555, Advanced Aqueous Geochemistry

Advanced topics in aqueous geochemistry, including chemical weathering, surface reactivity, colloidal phenomena, environmental organic chemistry, process-based reactive transport modeling, and other topics of interest to those enrolled. The course consists of introductory lectures on each topic followed by review and discussion of current papers from the literature.

Geochemistry/Geology/Geophysics/Hydrology 592, Graduate Seminar

A course on how to prepare and deliver a professional talk. Topics include organization, preparation of visuals, and delivery techniques.