

CHARLES B. ANDREWS

Hydrologist

AREAS OF EXPERTISE

- Simulation of Groundwater and Surface-Water Flow / Contaminant Fate and Transport
- Water Resource and Water Rights Evaluations
- Contaminated Site Investigation and Remediation
- Expert Testimony
- Peer Review

SUMMARY OF QUALIFICATIONS

Dr. Andrews is nationally known for his creative solutions to difficult water-resource problems. His areas of expertise include the assessment and remediation of contaminated sites; formulation of water-resource projects; assessment of surface-water and groundwater flow and quality conditions at hazardous waste sites; design of water remediation systems; and development of new and modification of off-the-shelf numerical simulation models for adaptation to specific field projects. He has provided technical guidance to significant water-rights litigation.

Dr. Andrews is a frequently requested member of groundwater advisory panels for the evaluation of state-of-the-art hydrology and for pioneering research and evaluation of contaminant transport in the subsurface. He is the author and co-author of numerous publications on modeling of groundwater flow and transport of chemical constituents, and the use of analytical models in identifying appropriate remediation alternatives for a site.

REPRESENTATIVE EXPERIENCE

S.S. Papadopoulos & Associates, Inc., Bethesda, MD

- **Perfluorinated Compounds**, Minnesota – Conducted a detailed evaluation of nature and quantity of wastes containing perfluorinated compounds (PFCs) produced at a manufacturing facility, disposal of these wastes, and migration of PFCs from disposal sites to groundwater and surface water. This work was conducted to support expert opinions in litigation between State of Minnesota and 3M Company.
- **Nestle Waters North America**, Michigan — Provide on-going groundwater consulting services for the identification and development of spring-water sources. This work involves development of groundwater models to identify potential production rates, optimal pumping rates and locations, and environmental effects of water production for several sites in Michigan. Developed long-term monitoring plans and served as expert witness in litigation related to development and operation of spring-water sources.

YEARS OF EXPERIENCE: 35+

EDUCATION

- PhD**, Geology, University of Wisconsin, Madison, 1978
- MS**, Geology, University of Wisconsin, Madison, 1976
- MS**, Water Resources, University of Wisconsin, Madison, 1974
- BA**, Geology, Carleton College, 1973
American University of Beirut, Beirut, Lebanon, 1971–1972

REGISTRATIONS

Registered Geologist:

- Alabama No. 1175
- California No. 3853
- Georgia No. PG001689
- Illinois No. 196001360
- Mississippi No. 859
- Washington No. 2841

PROFESSIONAL HISTORY

S.S. Papadopoulos & Associates, Inc.,

- Senior Principal, 1984 to present
- President, 1994–2012

South University of Science and Technology of China, Shenzhen

- Visiting Professor, 2015 to present

Woodward - Clyde Consultants

- Hydrogeologist and head of Groundwater Section, 1980–1984

Northern Cheyenne Indian Tribe

- Scientist, 1978–1980

Wisconsin State Government

- Dept. of Justice and Dept. of Natural Resources, Consultant, 1977-1978

University of Wisconsin, Madison

- Dept. of Geology & Geophysics, Research Assistant, 1975–1978
- Dept. of Water Resources, Researcher, 1974–1975

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- **Agricultural Issues**, Wisconsin — Worked with operators and DAFOs of large irrigated farms and dairies to develop crop-rotation and nutrient-management plans to minimize potential for nitrogen contamination of groundwater. For one project involving the conversion of 4,000 acres from pine plantation to irrigated agriculture, developed a detailed nitrogen balance of the expected agricultural practices and a groundwater transport model. Subsequently used these tools to develop cropping and nutrient application schedules that minimize potential for nitrogen contamination of groundwater. These evaluations were incorporated into an environmental impact statement for the project. Provided several presentations regarding this work to State regulatory agency and growers' associations.
- **Chromium Contamination**, California. Developed and used a groundwater model to estimate historical chromium concentrations at private wells located downgradient of a compressor station near Hinkley, California, and to evaluate remedial approaches. The results of the modeling analyses were used as a foundation for expert opinions regarding historical concentrations of chromium in drinking and irrigation water.
- **Onondaga Lake**, Syracuse, New York — Headed the groundwater modeling effort for design of remedial alternatives for this reputed-to-be the most contaminated lake in the U.S. Remediation costs projected to cost several hundreds of millions of dollars. Interacted frequently with and made many presentations to the New York State Department of Environmental Conservation. This work is ongoing.
- **Large Industrial Site**, Georgia — Conducted a detailed field and laboratory evaluation of the leachability of PCBs from contaminated soils at this site. Developed innovative methods to distinguish dissolved- and particulate-phase PCBs in leachate from batch tests.
- **U.S. Army Corps of Engineers**, Washington — Conducted detailed modeling evaluations of seepage through the Howard Hanson Dam on the Green River. The evaluations were conducted to assist in evaluations of dam stability and actions required to improve that stability as dam failure would have large impacts on the lower river valley, including the Lower Duwamish Waterway.
- **Oregon Department of Environmental Quality and Cascade Corporation**, Oregon — Assisted the Department of Environmental Quality during the RI/FS process for the East Multnomah County Groundwater Contamination Site and designed the extensive pump-and-treat system for the site. In recent years, provided assistance to Cascade Corporation, one of the PRPs, on methods to enhance remedial progress.
- **Confidential Client**, Michigan — Conducted a detailed laboratory evaluation of analytical methods for phenols in water samples. Determined that certain analytical methods were prone to false-positive readings due to reactions with dissolved natural organic matter during the analytical procedure. Identified the probable reaction pathways for the reactions that create phenols from the dissolved organic matter.
- **Williams Companies** — Participated as a technical expert for a major pipeline company in a year-long Consent Decree negotiations with the U.S. Dept. of Justice regarding soil and groundwater contamination issues at 30 compressor station sites. Developed a comprehensive framework, which was incorporated in the Consent Decree, for efficient, cost-effective investigation and remediation of compressor stations. Subsequent to Consent Decree, provided (and continue to provide) technical oversight for site investigation and remediation.
- **Professional Review and Services**, miscellaneous U.S. sites — Served as Chair of External Peer Review Panel for Frenchman Flat CAU at the Nevada Test Site (2010). Served on a review panel for the Hanford (Washington) site-wide groundwater flow-and-transport model (1989–2001). Developed a groundwater model of the A- and M- areas at the Savannah River site, South Carolina, (1985–1986).

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- **Texas Eastern Pipeline Company**, Eastern U.S. — Directed a study to evaluate the mobility and fate of polychlorinated biphenyl compounds (PCBs) in the subsurface for over 30 contaminated sites. These studies involved laboratory and field experiments to investigate the interactions between PCBs and the subsurface materials, and to investigate the potential degradation of PCBs in the subsurface. Long-term monitoring was selected as the appropriate remedial action at all the sites.
- **New Mexico Attorney General: Hueco Bolson and the Mesilla Basins**, New Mexico — Evaluated the long-term availability of groundwater and the associated water-quality problems of these large regional aquifers in southern New Mexico. Served as an expert witness in litigation involving the proposed development of large water supplies from these basins.
- **Industrial Sites**, California and New Jersey — Managed remediation activities, including remedial investigations, feasibility studies, remedial design and implementation, for industrial sites that are extensively contaminated with arsenic and associated heavy metals. Several of these investigations involved the evaluation of geochemical parameters that govern arsenic mobility in the subsurface and groundwater/surface-water interactions.

Woodward-Clyde Consultants, San Francisco and Walnut Creek, California

Senior Project Manager of the 15-person Ground-Water Group: Responsible for water-resource business development, technical review of all water-resource projects, and staff administration. As Project Manager and Hydrology Task Leader, examples of projects included the development of groundwater flow models of Madison Aquifer in Wyoming and the San Juan Basin in New Mexico; analysis of reservoir-induced seismicity at the Aswan Dam; and development of a groundwater model and remediation plan for a 12,000-acre site having 200 major source areas. Responsible for developing the firm's state-of-the-practice capabilities in quantitative hydrology.

Northern Cheyenne Indian Tribe, Lame Deer, Montana

Directed and helped establish a comprehensive surface-water and groundwater monitoring program, and established and managed the tribal computer system. Trained tribal members in the operation and management of the hydrologic monitoring system and the computer system. Participated in numerous administrative and legislative proceedings as an advocate for tribal management of the reservation's natural resources.

Wisconsin Department of Justice and Department of Natural Resources, Madison, Wisconsin

Served as an expert witness for several judicial and administrative proceedings on cases involving groundwater contamination and wetland drainage.

University of Wisconsin, Department of Geology and Geophysics, Madison, Wisconsin

Researched the impacts of heated-water seepage from a power plant cooling lake. Developed a finite-element computer code to simulate water and heat transfer in shallow unconfined aquifers, and designed and maintained an extensive field monitoring program to collect the data needed for model verification.

University of Wisconsin, Department of Water Resources, Madison, Wisconsin

Conducted research that was funded by the U.S. Environmental Protection Agency-Denver, on the impact of oil shale development to the groundwater and surface-water resources of northwestern Colorado.

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APPOINTMENTS

Trustee and Treasurer, Geological Society of America, 2009 to present
Board of Visitors, Department of Geology, University of Wisconsin, 2004–2012
Water-Quality Advisory Group, Chairman, Montgomery County, Maryland, 2003–2007
Associate Editor, *Ground Water*, 1998–2013
Board of Directors of the Association of Groundwater Scientists and Engineers Division of the National Ground Water Association, 1997–2001
National Research Council Committee on Groundwater Cleanup Alternatives, National Academy of Sciences, 1991–1994
National Research Council Committee on Groundwater Modeling Assessment, National Academy of Sciences, 1987–1988

PROFESSIONAL SOCIETIES

American Chemical Society
National Ground Water Association
American Association for the Advancement of Science
Geological Society of America

PUBLICATIONS & PRESENTATIONS

Yao, Y., Y. Tian, C. Andrews, X. Li, Y. Zheng, and C. Zheng. 2018. Role of Groundwater in the Dryland Ecohydrological System: A Case Study of the Heihe River Basin. *Journal of Geophysical Research: Atmospheres*, 123. doi: 10.1029/2018JD028432.

Qin, H., C. Andrews, F. Tian, G. Cao, Y. Luo, J. Liu, and C. Zheng. 2017. Groundwater Pumping Optimization for Land Subsidence Control in Beijing Plain, China. *Hydrogeology Journal*. doi: 10.1007/s10040-017-1712-z.

Yao, Y. C. Zheng, C. Andrews, Y. Zheng, A. Zhang, and J. Liu. 2017. What Controls the Partitioning between Baseflow and Mountain Block Recharge in the Qinghai-Tibet Plateau? *Geophys. Res. Lett.*, v. 44. doi: 10.1002/2017GL074344

Huang, X., C.B. Andrews, J. Liu, Y. Yao, C. Liu, S.W. Tyler, J.S. Selker, and C. Zheng. 2016. Assimilation of Temperature and Hydraulic Gradients for Quantifying the Spatial Variability of Streambed Hydraulics. *Water Resources Research*. Accepted Author Manuscript. doi:10.1002/2015WR018408.

Andrews, C., 2011. How Much Modeling is Enough? Presentation at MODFLOW and More 2011: Integrated Hydrologic Modeling. International Groundwater Modeling Center (IGWMC), Colorado School of Mines, Maxwell, P., Hill, and Zheng, eds.

Andrews, C., 2011. Urban Recharge Myth: Case Study of Montgomery County, Maryland. Presentation at the 2011 Ground Water Summit and 2011 Ground Water Protection Council Spring Meeting. National Ground Water Association, Baltimore, MD.

Root, R.A., D. Vlassopoulos, N.A. Rivera, M.T. Rafferty, C. Andrews, and P.A. O'Day, 2009. Speciation and Natural Attenuation of Arsenic and Iron in a Tidally Influenced Shallow Aquifer: *Geochimica et Cosmochimica Acta, Science Direct*.

Johnson, T., C. Andrews, and M. Hennessey, 2009. Development of Chloride Profiles to Estimate Groundwater Discharge for Cap Design in Onondaga Lake. Presentation at the Fifth International Conference on Remediation of Contaminated Sediments, Jacksonville, FL. February 2-5, 2009.

Barth, G., and C. Andrews, 2009. Practical Problems, Practical Solutions. Presentation at the National Groundwater Association's Annual Groundwater Summit, Tucson, AZ, April 19–23, 2009.

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- Andrews, Charles, 2008. One Hydrogeology — A New Paradigm for Model Construction: Modeling with Google Earth. Presentation at MODFLOW and More 2008: Ground Water and Public Policy Conference, May 18-21, 2008, Golden, CO.
- Andrews, C.B., 2008. Review of "Effective Groundwater Model Calibration: With Analysis of Data, Sensitivities, Predictions, and Uncertainty": *Ground Water*, v. 46, no. 1, p. 5.
- Spiliotopoulos, A., and C.B. Andrews, 2007. Analysis of Aquifer Test Data – MODFLOW and PEST. *in Groundwater and Wells*. (3rd ed.). Sterrett, R.J., ed. Johnson Screens, New Brighton, MN, 812 p.
- Karanovic, M., C.J. Neville, and C.B. Andrews, 2007. BIOSCREEN-AT: BIOSCREEN with an Exact Analytical Solution: *Ground Water*, v. 45, no. 2, pp. 242-245.
- Andrews, C.B., and G. Swenson, 2006. Simulation of Brine Movement into Onondaga Lake. Presentation at MODFLOW and More 2006: Managing Ground-Water Systems. International Ground Water Modeling Center, Colorado School of Mines Golden, CO, May 22-24, 2006. v. 2, pp. 480-483.
- Neville, C.J., and C.B. Andrews, 2006. Containment Criterion for Contaminant Isolation by Cutoff Walls: *Ground Water*, v. 44, no. 5, September-October, pp. 682-686.
- Spiliotopoulos, A.A., and C.B. Andrews, 2006. Analysis of Aquifer Test Data – MODFLOW and PEST. Presentation at MODFLOW and More 2006: Managing Ground-Water Systems. International Ground Water Modeling Center, Colorado School of Mines, Golden, CO, May 22–24, 2006. v. 2, pp. 569-573.
- Vlassopoulos, D., N. Rivera, P.A. O'Day, M.T. Rafferty, and C.B. Andrews, 2005. Arsenic Removal by Zerovalent Iron: A Field Study of Rates, Mechanisms, and Long-Term Performance. *in Advances in Arsenic Research: Integration of Experimental and Observational Studies and Implications for Mitigation*. O'Day, P., D. Vlassopoulos, X. Meng, and L. Benning, eds. ACS Symposium Series, v. 915. Washington, DC: American Chemical Society, pp. 344-360.
- Andrews, C., and C. Neville, 2003. Ground Water Flow in a Desert Basin: Challenges of Simulating Transport of Dissolved Chromium. *Ground Water*, v. 41, no. 2, pp. 219-226.
- Rafferty, M.T., C.B. Andrews, D. Vlassopoulos, D. Sorel, and K.M. Binard, 2003. Remediation of an Arsenic Contaminated Site. Presentation at the 226th American Chemical Society National Meeting, September 7–11, 2003, New York City, NY.
- Vlassopoulos, D., C.B. Andrews, M. Rafferty, P.A. O'Day, and N.A. Rivera Jr., 2003. In Situ Arsenic Removal by Zero Valent Iron: An Accelerated Pilot Test Simulating Long-Term Permeable Reactive Barrier Performance. Presentation at the 226th American Chemical Society National Meeting, September 7-11, 2003, New York City, NY.
- Sorel, D., C.J. Neville, M.T. Rafferty, K. Chiang, and C.B. Andrews, 2002. Hydraulic Containment Using Phytoremediation and a Barrier Wall to Prevent Arsenic Migration. *In Proceedings of the Third International Conference on Remediation of Chlorinated and Recalcitrant Compounds*, May 20-23, 2002, Monterey, CA. Gavaskar, A.R., and A.S.C. Chen, eds. Battelle Press.
- Vlassopoulos, D., J. Pochatila, A. Lundquist, C.B. Andrews, M.T. Rafferty, K. Chiang, D. Sorel, and N.P. Nikolaidis, 2002. An Elemental Iron Reactor for Arsenic Removal from Groundwater. *in Proceedings of the Third International Conference on Remediation of Chlorinated and Recalcitrant Compounds*, May 20-23, 2002, Monterey, CA. Gavaskar, A., and A.S.C. Chen, eds. Battelle Press.
- Andrews, C., and C. Neville, 2001. Groundwater Flow in a Desert Basin: Complexity and Controversy. *in Proceedings of MODFLOW 2001 and Other Modeling Odysseys*, September 11–14, 2001, International Groundwater Modeling Center, Colorado School of Mines, Golden, CO, pp.770–775.

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- Andrews, C.B., 2000. The Great American Experiment: Pump-and-Treat for Groundwater Cleanup. *in* Proceedings of the International Symposium on Groundwater Contamination, Japanese Association of Groundwater Hydrology, Tokyo, Japan. June 26, 2000.
- Andrews, C.B., 2000. The Meaning of Success in Assessing Groundwater Remediation. Presentation at the Western Pacific Geophysics Meeting, June 27–30, 2000, Tokyo, Japan. *Eos*, v. 81, no. 22, May 30, 2000.
- Andrews, C.B., and D. Vlassopoulos, 2000. Modeling the Migration of Arsenic in Groundwater: Understanding the Processes. Geological Society of America, Annual Meeting, October 2000, Reno, NV. *in Geological Society of America Abstracts with Programs*, A406-7.
- Vlassopoulos, D., and C.B. Andrews, 2000. The Intertwined Fate of Iron and Arsenic in Contaminated Groundwater Entering a Tidal Marsh, San Francisco Bay. Invited Speaker Presentation at the National Ground Water Association *Theis 2000 Conference on Iron in Groundwater*, September 15–18, 2000, Jackson Hole, WY.
- Lolcama, J.L., and C.B. Andrews, 1999. Catastrophic Flooding of a Quarry in Karstified Dolomite (Abstract). Presentation at the NGWA National Convention and Exposition, December 3-6, 1999, Nashville, TN. *in Ground Water Supply Issues in the Next Century, 1999 Abstract Book*. Nashville, TN: National Groundwater Association.
- Vlassopoulos, D., C. Andrews, R. Hennet, and S. Macko, 1999. Natural Immobilization of Arsenic in the Shallow Groundwater of a Tidal Marsh, San Francisco Bay. Presentation at the American Geophysical Union 1999 Spring Meeting, May 31–June 4, Boston, MA.
- Andrews, C.B., 1998. MTBE: A Long-Term Threat to Ground Water Quality: *Ground Water*, v. 36, no. 5, pp. 705-706.
- Hennet, R., D.A. Carleton, S.A. Macko, and C.B. Andrews, 1997. Environmental Applications of Carbon, Nitrogen, and Sulfur Stable Isotope Data: Case Studies (abstract). Invited Speaker Presentation at the Geological Society of America Annual Meeting, Salt Lake City, UT, November 1997.
- Zhang, Y., C. Zheng, C.J. Neville, and C.B. Andrews, 1996. *ModIME User's Guide: An Integrated Modeling Environment for MODFLOW, PATH3D, and MT3D*. Version 1.1. Bethesda, MD: S.S. Papadopoulos & Associates, Inc.
- Larson, S.P., C.B. Andrews, and C.J. Neville, 1995. Parameter Estimation in Groundwater Modeling: Research, Development, and Application (abstract). American Geophysical Union (AGU) Spring Meeting, Baltimore, May 30–June 2, 1995, Hydrology Sessions. S145, Abstract H51C-02 0835h.
- Andrews C.B. (co-author), 1994. Chapter 3—Performance of Conventional Pump-and-Treat Systems, and Chapter 5—Characterizing Sites for Ground Water Cleanup. *in Alternative Ground Water Cleanup*. Washington, DC: National Academy Press.
- Hennet, R.J.-C., and C.B. Andrews, 1993. PCB Congeners as Tracers for Colloid Transport in the Subsurface—A Conceptual Approach. *in Manipulation of Groundwater Colloids for Environmental Restoration*. Ann Arbor, MI: Lewis Publishers, pp. 241-246.
- Zheng, C., G.D. Bennett, and C.B. Andrews, 1992. Reply to the Preceding "Discussion by Robert D. McCaleb of 'Analysis of Ground-Water Remedial Alternatives at a Superfund Site'": *Ground Water*, v. 30, no. 3, pp. 440-442.
- Zheng, C., G.D. Bennett, and C.B. Andrews, 1991. Analysis of Ground-Water Remedial Alternatives at a Superfund Site: *Ground Water*, v. 29, no. 6, pp. 838-848.
- Andrews C.B. (co-author), 1990. Chapter 5—Experience with Contaminant Flow Models in the Regulatory System. *in Ground Water Models: Scientific and Regulatory Applications*. Washington, DC: National Academy Press.

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- Andrews, C.B., D.L. Hathaway, and S.S. Papadopoulos, 1990. Modeling the Migration and Fate of Polychlorinated Biphenyls in the Subsurface. *in* Proceedings of the PCB Forum, Second International Conference for the Remediation of PCB Contamination, April 2–3, 1990, Houston, TX, pp. 64-82.
- Hathaway, D., and C. Andrews, 1990. Fate and Transport Modeling of Organic Compounds from a Gasoline Spill. *in* Proceedings of Petroleum Hydrocarbons and Organic Chemicals in Ground Water; Prevention, Detection, and Restoration, National Water Well Association and American Petroleum Institute, Houston, TX, October 31–November 2, 1990. *Ground Water Management*, v. 4, pp. 563–576.
- Stephenson, D.E., G.M. Duffield, D.R. Russ, C.B. Andrews, and E.C. Phillips, 1989. Practical Use of Models in Ground Water Assessment and Protection Programs at the Savannah River Site: Three Case Histories. Presentation at the Joint USA/USSR Conference on Hydrogeology, Moscow, USSR, June 30–July 11, 1989.
- Andrews, C.B., and S.P. Larson, 1988. Evolution of Water Quality in the Lower Rio Grande Valley, New Mexico. *Eos*, v. 69, no. 16, p. 357.
- Larson, S.P., C.B. Andrews, M.D. Howland, and D.T. Feinstein, 1987. Three-Dimensional Modeling Analysis of Groundwater Pumping Schemes for Containment of Shallow Groundwater Contamination. Presentation at *Solving Ground Water Problems with Models*, Association of Ground Water Scientists and Engineers, Denver, CO, February 10–12, 1987. *in* *Solving Ground Water Problems with Models: An Intensive Three-Day Conference and Exposition Devoted Exclusively to Ground Water Modeling*. Vol. 1. Dublin, OH: National Water Well Association, pp. 517–536. February 11.
- Looney, B.B., R.A. Field, G.B. Merrell, G. Duffield, and C.B. Andrews, 1987. Analyses of the Validity of Analytical Models Used for Assessment of Forty-Five Waste Site Areas: Subsurface Flow and Chemical Transport. *in* *Solving Ground Water Problems with Models*. Dublin, OH: National Water Well Association, pp. 954-982.
- Stephenson, D.E., B.B. Looney, C.B. Andrews, and D.R. Buss, 1987. Three-Dimensional Simulation of Groundwater Flow and Transport of Chemical and Low-Level Radioactive Constituents within Two Production Areas of the Savannah River Plant. *in* Proceedings of the 9th Annual Low-Level Radioactive Waste Conference, U.S. Department of Energy, Washington, DC, pp. 472-481.
- Auerbach, S.I., C. Andrews, D. Eyman, D.D. Huff, P.A. Palmer, and W.R. Uhte, 1984. Report of the Panel on Land Disposal. *in* *Disposal of Industrial and Domestic Wastes: Land and Sea Alternatives*. Washington, DC: National Academy Press, pp. 73–100.
- Andrews, C.B., 1983. Hydrogeology in North America — 1932 to 1982. *in* *The Revolution in Earth Sciences: Advances in the Past Half-Century*. Boardman, S., ed. Kendall/Hunt Publishing Company.
- Andrews, C.B., 1979. *Impacts of Coal-Fired Power Plants on Local Ground-Water Systems*. Wisconsin Power Plant Impact Study. U.S. Environmental Protection Agency. EPA 600/3-80-079. p. 203.
- Andrews, C.B., 1979. *Statement of Dr. Charles Andrews, Hydrologist, Northern Cheyenne Tribe*. Hearings before the Select Committee on Indian Affairs. U.S. Senate, 96th Congress, pp. 412-432.
- Andrews, C.B., and M.P. Anderson, 1979. Thermal Alteration of Groundwater Caused by Seepage from a Cooling Lake: *Water Resources Research*, v. 15, no. 3, pp. 595-602.
- Andrews, C.B., W. Woessner, and T. Osborne, 1979. The Impacts of Coal Strip Mining on the Hydrogeologic System of the Northern Great Plains — Case Study of Potential Impacts on the Northern Cheyenne Reservation. *Journal of Hydrology*, v. 43, pp. 445-467.

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- Andrews, C.B., 1978. The Impact of the Use of Heat Pumps on Groundwater Temperatures. *Ground Water*, v. 16, no. 6, pp. 437-443.
- Andrews, C.B., and M.P. Anderson, 1978. The Impact of a Power Plant on the Groundwater System of a Wetland. *Ground Water*, v. 16, no. 2, pp. 105-111.
- Andrews, C.B., and E. Quigley, 1975. Designing and Maintaining Ponds for Swimming. University of Wisconsin–Madison, Extension Publication G2678, p. 22.

DEPOSITION AND TESTIMONY EXPERIENCE

DEPOSITIONS

- 2017 State of Minnesota et al. v. 3M Company, Case No. 27-CV-10-28862 in Hennepin County Superior Court. Case No. 27-CV-10-28862. October 3.
- 2016 State of North Carolina ex rel. North Carolina Department of Environment and Natural Resources v. Catawba Riverkeeper Foundation Inc., et al. vs. Duke Energy Carolinas, LLC. State of North Carolina Mecklenburg County in the General Court of Justice Superior Court Division. Case No. 13-CVS-14661. November 10-11.
- 2015 Duke Energy Progress, Inc. v. N.C. Department of Environment and Natural Resources, Division of Water Resources. State of North Carolina, Wake County in the Office of Administrative Hearings. Case No. 15 HER 02581. July 31.
- 2014 Emhart Industries, Inc. vs. New England Container Company, Inc., et al. vs. United States Department of the Air Force, et al. vs. Black & Decker, Inc. United States District Court for the District of Rhode Island. C.A. 06-218S and C.A 11-023S (Consolidated). November 17–18.
- 2014 Emhart Industries, Inc. vs. New England Container Company, Inc., et al. vs. United States Department of the Air Force, et al. vs. Black & Decker, Inc. United States District Court for the District of Rhode Island. C.A. 06-218-S and C.A 11-023-S (Consolidated). May 28.
- 2012 Commissioner of the Department of Planning and Natural Resources, Alicia V. Barnes, et al. Century Alumina Company, et al. District Court of the Virgin Islands Division of St. Croix. Civil No. 2005-0062. June 28–29.
- 2010 United States Virgin Islands Department of Planning and Natural Resources vs. St. Croix Renaissance Group, L.L.L.P., et al. District Court of the Virgin Islands Division of St. Croix. Civil No. 2007/114. October 20.
- 2010 United States Virgin Islands Department of Planning and Natural Resources v. St. Croix Renaissance Group, L.L.L.P., et al. District Court of the Virgin Islands Division of St. Croix. Civil No. 2007/114. October 22.
- 2010 New Jersey Department of Environmental Protection, The Commissioner of the New Jersey Department of Environmental Protection and the Administrator of the New Jersey Spill Compensation Fund vs. Essex Chemical Corporation. Superior Court of New Jersey Law Division: Middlesex County. Docket No.: MID-L-5685-07. February 22.
- 2009 United States of America vs. Norfolk Southern Railway Company. U.S. District Court for the District of South Carolina, Aiken Division. Civil Action No. 1:08-CV-01707-MBS. August 5.
- 2009 Michigan Citizens for Water Conservation, et al. vs. Nestle Waters North America, Inc. State of Michigan Mecosta County Circuit Court. File No. 01-14563-CE. February 11 and March 6.
- 2008 The Gillette Company vs. Onebeacon America Insurance Company, et al. Commonwealth of Massachusetts Superior Court. 05-5102-BLS. December 4.

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- 2008 Brian Wayne Meixner et al. vs. Emerson Electric Co. et al. U.S. District Court for the District of South Carolina, Aiken Division. 06-CV-01359-MBS. April 29.
- 2007 Glenn Gates and Donna Gates v. Rohm & Haas Company, et al. U.S. District Court for the Eastern District of Pennsylvania. Civil Action No. 2:06-CV-01743-GP. November 16, 19.
- 2007 Methyl Tertiary Butyl Ether (MTBE) Products Liability Litigation, County of Suffolk and Suffolk County Water Authority vs. Amerada Hess Corporation et al., United Water New York, vs. Amerada Hess Corporation et al. U.S. District Court Southern District of New York. 04 CIV. 5424 and O4 CIV. 2389. November 27, 28.
- 2007 Kay Ryan Corley, et al. v. Colonial Pipeline Company, et al. Hale County Circuit Court, Alabama. CV-2005-138. September 6–7.
- 2003 American Home Products Corporation vs. Adriatic Insurance Company. Superior Court of New Jersey Law Division: Hudson County. Docket No. HUD-L-5002-92. April 29.
- 2003 H. Todd Brinkerhoff, Jr., Harriet B. Haslett and MBM Company I, LLC vs. Shell Oil Company and Motiva Enterprises, LLC. U.S. District Court, Southern District of New York. Civil Action No. 02cv939. March 27.
- 2003 Bernice Samples et al. vs. Conoco, Inc.; Agrico Chemical Company and Escambia Treating Company, Inc. Circuit Court of the First Judicial Circuit in and for Escambia County, Florida. No. 01-631-CA-01. March 18.
- 2002 Michigan Citizens for Water Conservation et al. vs. Nestlé Waters North America, Inc. et al. State of Michigan in the Circuit Court for the County of Mecosta. Case No. 01-14563-CE. October 14.
- 2001 JBG/JER Shady Grove, LLC vs. Eastman Kodak Company. Circuit Court for Montgomery County, Maryland. Civil No. 214877. October 25.
- 1999 Associated Aviation Underwriters, Inc. vs. Purex Industries, Inc. et al. Superior Court of the State of California for the County of Los Angeles. No. EC021744. August 9.
- 1999 Flintkote Company and Genstar Corp. vs. Liberty Mutual Insurance Company et al. Superior Court of New Jersey, Law Division, Bergen County. Docket No. 10288-97. March 26.
- 1998 GenCorp Inc. vs. Adriatic Insurance. Superior Court of New Jersey. Case No. 5:95CV 2464. September.
- 1997 C-I-L Corporation of America and Marsulex, Inc. vs. NL Industries, Inc. et al. U.S. District Court, District of New Jersey. Civil Action No. 93-2157 (WHW). January 21.
- 1995 Freehold-Carthage, Inc. vs. Lumbermans Mutual Casualty et al. vs. Hartford Insurance Company vs. Minnesota Mining and Manufacturing Company. Superior Court of New Jersey. Docket No. L-56812-90.
- 1995 Hughes Aircraft Company vs. Brian Eustace Beagley et al. Superior Court of the State of California, County of Los Angeles. No. BC062120. February 10.
- 1993 Martin Marietta Corporation vs. Aetna Casualty & Surety et al. Superior Court of the State of California for the County of Los Angeles. Case No. C610358.
- 1992 In re: Demand for Arbitration filed by Richard and Susan Ritchie and Exxon Corporation. State of New Jersey, Department of Environmental Protection. Damage Claim No. 86-54-0033. February 29.

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