

GILBERT BARTH

Associate, Hydrologist/Hydrogeologist

AREAS OF EXPERTISE

- Water Resource Evaluations
- Stream/Aquifer Interactions
- Simulating Flow and Transport
- Sensitivity Analysis and Parameter Estimation
- Prediction Uncertainty Estimation

SUMMARY OF QUALIFICATIONS

Dr. Barth provides quantitative assessments of water-resource and environmental conditions at the local-, basin- and watershed-scale to address questions associated with water planning, water rights, water-quality assessment, and remediation. He specializes in model development and calibration, with a focus on quantifying exchanges between surface-water and groundwater systems and the application of sensitivity analysis and parameter estimation. He has developed and applied groundwater simulation models to assist private and public clients throughout the Western United States.

REPRESENTATIVE EXPERIENCE

S.S. Papadopoulos & Associates, Inc., Boulder, CO

- **Roswell Artesian Basin Groundwater Model and Water Rights Assessment**, New Mexico — Re-calibrated and applied the Roswell Artesian Basin Groundwater Model to evaluate the impacts of water transfers. Updated the model calibration using recent data including observations from a 72-day pump test and applying PEST parameter estimation software in a parallel implementation. Performed sensitivity analysis and parameter estimation to establish parameterization that provided the best fit for the pump-test observations. Explored prediction uncertainty using Pareto-front methods and estimated weighting. Provided expert testimony.
- **Stream/Aquifer Interactions Evaluation**, California — To evaluate stream depletion impacts from groundwater pumping, constructed a high-resolution groundwater flow model. Incorporated pilot points with zone boundaries and used PEST to generate hydraulic conductivity fields and to support parameterization. Developed code and implemented process for basin-wide mapping of stream depletion factors to support discussions of potential benefits of groundwater management options on stream flow conditions.
- **Glacial-Sediment Stream/Aquifer Model**, Washington — For Whatcom County, Washington, developed a three-dimensional flow model of the region encompassing Lynden, Everson, Nooksack, and Sumas down to tertiary bedrock. The model was developed as part of Washington's Water Resource Inventory Area 1 (WRIA1) Watershed Management Plan to assess potential impacts of future growth and/or management practices. The model combines a multi-layer system with a detailed (LIDAR) representation of the land surface and stream network and routing. Model construction includes pilot point representation of hydraulic parameters to accommodate spatial variability.

YEARS OF EXPERIENCE: 20+

EDUCATION

Post-Doctoral, USGS/NAS&E, NRC
Research Associate, 1999–2001
PhD, Civil Engineering (Water Resources),
University of Colorado, Boulder, 1999
MS, Civil Engineering (Water Resources),
University of Colorado, Boulder, 1992
BA, Mathematics and Economics, University
of Colorado, Boulder, 1987

PROFESSIONAL HISTORY

S.S. Papadopoulos & Associates, Inc.
2003 to present
University of Colorado at Boulder,
Dept. of Civil Engineering, 2013
Waterstone Inc., 2001–2003
**National Academies of Sciences and
Engineering**, 1999–2001
U.S. Geological Survey, 1997–2001
University of Colorado at Boulder
Dept. of Civil Engineering, 1995–1997
EG&G Rocky Flats, 1992–1995
**Center for Advanced Decision Support
for Water and Environmental
Systems**, 1991–1992

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- **Forest Management Impacts on Watershed Yield**, Northwestern Washington — Working with Ecotrust for the Upper Columbia Salmon Recovery Board implemented PNNL's Distributed Hydrology Soil Vegetation Model (DHSVM) for the Entiat, Chiwawa and Upper Methow watersheds. Explored parameter sensitivity and developed approach for quantifying predictions of forest management changes on flow metrics critical to salmonid populations.
- **Multiphase Simulation of Methane Gas Migration**, Mississippi — Developed TOUGH2/TMVOC simulations of methane gas release from a salt cavern storage facility. Evaluated updip migration potential moving against regional hydraulic gradients. Estimated potential migration rates and performed a series of sensitivity runs to determine probable range of migration rates. Created animated visualization for client discussions on potential capture scenarios.
- **Numerical Flow Simulation of Chloride Migration Potential**, Montana — For an area impacted by brine discharge, used particle-tracking simulations to predict transport travel times. Applied PEST and analytical methods to conduct parameter sensitivity analysis and particle-tracking prediction uncertainty. Conducted model simulations to support decision-making regarding the need for replacement water supplies in areas anticipated to be impacted by the brine plume.
- **Lower Rio Grande Regional Model for Groundwater Management**, New Mexico — For the State of New Mexico, in collaboration with a technical committee including agency and stakeholder experts, re-constructed and calibrated a regional model that simulated the surface-water distribution system (river, canals and drains), groundwater extraction systems (urban and rural), farm irrigation recharge, and riparian evapotranspiration for the Rincon and Mesilla Bolsons in southern New Mexico. Conducted parameter estimation and sensitivity analyses (UCODE and PEST, including parallel implementation).
- **High-Resolution Modeling of Riparian Zones**, California and New Mexico — Updated, extended, and applied very high-resolution groundwater models of the near-river zone along major rivers in California and New Mexico, with capability for simulation of rapidly changing river conditions including overbank flooding. Conducted sensitivity analyses to assess policy-change and drought impacts on riparian-zone restoration plans. Identified net impacts of removing non-native species, and hydrologic conditions and associated management practices that offered potential for native species restoration.
- **Model Review to Support State Agency Rule-Making**, Colorado — Evaluated simulation details of a model that was developed to identify the impacts of stream depletion from coalbed methane extraction for purposes of rule-making in a tributary/non-tributary delineation. Decomposed input files and conducted simulations. Evaluated the model's effectiveness in representing the complex geologic structure and surface-water/groundwater interactions. Created visual representations of model output and examined potential problem areas and/or inconsistencies with the conceptual model.
- **Model Development for Flathead Nation Water Management**, Montana — For the Confederated Salish and Kootenai Tribes, developed and/or updated three basin-scale models to support evaluation of alternate water-management scenarios. Reviewed initial models, incorporated updated farm budget input, conducted visualization exercises to identify areas where calibration could be improved, and re-calibrated models using a variety of methods, including parameter estimation and sensitivity analysis. Applied pilot points and PEST to generate varying hydraulic conductivity fields within lithologic zones, invoking a variety of PEST utilities to incorporate parameterization through external functions.
- **Coupling Analytical Solutions with PEST for Stream Depletion Predictions**, San Juan Basin, Colorado — Developed a preliminary but defensible assessment of stream depletion impacts on groundwater production from coalbed methane wells. Implemented a modeling approach to rapidly assess the impacts of over 3000 production wells on nearby streams. Used available pressure

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observations in an automated parameter estimation procedure in conjunction with a conceptually similar, simple, analytical model to estimate aquifer parameters for use in the Glover analysis. Applied the Glover-Balmer analytical model to calculate the historical and projected stream depletion impacts over a multi-decade period that included monthly well-dependent pumping schedules. The results were used by agency regulators to assess the potential need for additional protective legislation.

Waterstone Environmental Hydrology and Engineering, Inc., Boulder, CO

- **Central Gulf Coast GAM**, Texas — Directed the development of a large (>24,000 sq. mile) regional flow model for the Central Gulf Coast of Texas that evaluated “safe-yield” potential and surface-water impacts for different water-demand scenarios under drought-of-record conditions. Supervised GIS and database personnel who developed structure, screening electronic datasets, and parameterized numerical model inputs (wetlands, evapotranspiration, recharge, and streams). Presented findings to, and interacted with, stakeholders throughout the Central Gulf Coast Region, educating the public on project objectives and status, and responding to public input.
- **Oil Refinery Remediation Planning and Implementation of Oversight**, Casper, Wyoming — For the Wyoming Department of Environmental Quality, in collaboration with BP, provided expert input during BP’s investigation and cleanup of an oil refinery. Provided oversight that included reviewing LNAPL monitoring and recovery operations simulation of site hydrologic conditions and of sparging, phytoremediation, in-situ bioremediation; and monitoring of natural attenuation remedies.

National Academies of Sciences and Engineering, National Research Council, Boulder, CO

Sensitivity Methods for Advection-Dominated Flow-and-Transport Modeling — Simulated conservative and reactive transport in heterogeneous saturated subsurface systems using standard flow-and-transport codes, MODFLOW and MT3DMS, respectively. Applied UCODE to develop techniques for parameter estimation and sensitivity analysis under advection-dominated, sharp-front conditions. Implemented the techniques on both PC and UNIX platforms, using a variety of programming languages and operating-system scripts.

EG&G Rocky Flats Environmental Technology Site, Golden, CO

- **Atmospheric, Vadose Zone and Groundwater Field-Site Characterization** — Evaluated vadose zone hydrology and contaminant fate-and-transport potential. Developed a hydrologically based management practice to minimize contaminant movement. Designed and installed a solar-powered, remote automated sensor network for real-time remote monitoring of precipitation, temperature, mass flux, soil moisture, and groundwater elevation. Analyzed sensor data that provided insight to surface-water/vadose-zone/groundwater interaction. Provided samples to analyze the potential for surface infiltration affecting groundwater quality. Directed researchers, engineers, and health-and-safety personnel in equipment design, installation, and operations.
- **Design and Oversight of Vadose Zone Data Collection Solutions** — Designed, provided oversight, and implemented a graphical user interface (GUI) and hardware for automated collection, archiving, and display of vadose-zone conditions including soil moisture, flow, and water quality. The system measured and recorded approximately 3000 observations/day. Development of the GUI was based on project objectives and the needs of collaborators (DOE, USEPA, and the Colorado Department of Health). Supervised the team of engineers and programmers developing the GUI.

Center for Advanced Decision Support for Water and Environmental Systems, Boulder, CO

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Surface-Water Allocation under Prior Appropriation, Colorado — Developed a flow-routing algorithm that satisfied prior appropriation and the constraints of the Colorado State Engineer's Office. Collaborated on incorporating the algorithm into an on-line, graphical, Spatial Decision Support System for the South Platte River. Collected adjudicated losses and transit times. Developed algorithms to evaluate water-rights priority and to reallocate the call on the South Platte River based on changes in river flow. Also developed reservoir-exchange algorithms that accounted for impacts to timing of flow delivery in the river and differences in reach losses.

AWARDS & HONORS

Associateship Award, National Research Council, 1999–2001

Editor's Citation, American Geophysical Union, 2000

PROFESSIONAL SOCIETIES

National Ground Water Association

International Association of Hydrological Sciences

American Geophysical Union

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APPOINTMENTS

- 2013 to present: Adjunct Faculty, University of Colorado, Boulder, Department of Civil Environmental and Architectural Engineering
2007 to present: Member, Colorado Riparian Association Board (President, 2010–2011)
2006–2008: Boulder Creek Watershed Initiative
2001–2006: Member, Water Resources Advisory Board, City of Boulder (Chair, 2005–2006)
2002–2006: Member, Greenways Advisory Committee, City of Boulder

PEER-REVIEWED PUBLICATIONS

- Hathaway, D.L., G. Barth, and K. Kirsch, 2016. Evaluating Flow Diversion Impacts to Groundwater-Dependent Riparian Vegetation with Flow Alteration and Groundwater Model Analysis. *Journal of the American Water Resources Association (JAWRA)*, v. 52, no. 6, pp. 1311-1326. DOI: 10.1111/1752-1688.12454. December 2016.
- Barth, G.R., and M.C. Hill, 2005. Parameter and Observation Importance in Modeling Virus Transport in Saturated Porous Media — Investigations in a Homogenous System. *Journal of Contaminant Hydrology*, v. 80, pp. 107–129.
- Barth, G.R., and M.C. Hill, 2005. Numerical Methods for Improving Sensitivity Analysis and Parameter Estimation of Virus Transport Simulated Using Sorptive-Reactive Processes. *Journal of Contaminant Hydrology*, v. 76, pp. 251–277. February 1, 2005
- Barth, G.R., T. Illangasekare, and H. Rajaram, 2003. The Effect of Entrapped Nonaqueous Phase Liquids on Tracer Transport in Heterogenous Porous Media: Laboratory Experiments at the Intermediate Scale. *Journal of Contaminant Hydrology*, v. 67, no. 1, pp. 247–268.
- Barth, G.R., M.C. Hill, T.H. Illangasekare, M.C. Hill, and H. Rajaram, 2001. Predictive Modeling of Flow and Transport in a Two-Dimensional Intermediate-Scale, Heterogeneous Porous Media: *Water Resources Research*, v. 37, no. 10, pp. 2503–2512.
- Barth, G.R., T. Illangasekare, M.C. Hill, and H. Rajaram, 2001. A New Tracer-Density Criterion for Heterogeneous Porous Media: *Water Resources Research*, v. 37, no. 1, pp. 21–31. January 2001.
- Barth, G.R., M. Hill, T. Illangasekare, and H. Rajaram, 2000. Predictive Modeling of Flow in a Two-Dimensional Intermediate-Scale, Heterogeneous Porous Media. *in Proceedings of the ModelCARE'99 Conference*. F. Stauffer, W. Kinzelbach, K. Kovar, and E. Hoehn, eds. International Association of Hydrological Sciences (IAHS) Publication 265.
- Litaor, M.I., G. Barth, E. Zika, G. Litus, J. Moffitt, and H. Daniels, 1998. The Behavior of Radionuclides in the Soils of Rocky Flats, Colorado. *Journal of Environmental Radioactivity*, v. 38, no. 1, pp. 17–46.
- Barth, G.R., T. Illangasekare, H. Rajaram, and H. Ruan, 1996. Model Calibration and Verification for Entrapped NAPL Using Tracer Tests in a Large, Two-Dimensional Tank with Heterogeneous Packing. *in Proceedings of ModelCARE 96, Calibration and Reliability in Groundwater Modeling*. K. Kovar, and P. van der Heijde, eds. IAHS Publication 237, pp. 169–178.
- Litaor, M.I., G.R. Barth, and E.M. Zika, 1996. Fate and Transport of Plutonium-239+240 and Americium-241 in the Soil of Rocky Flats, Colorado. *Journal of Environmental Quality*, v. 25, no. 4, pp. 671–683.
- Nachabe, M.H., T. Illangasekare, M. Litaor, and G. Barth, 1995. Assessment of Free-Flowing Soil Solution Using Zero Tension Samplers. Presentation at Models for Assessing and Monitoring Groundwater Quality, Boulder, CO, July 2–14, 1995. *in Models for Assessing and Monitoring*

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Groundwater Quality. B. Wagner, T. Illangasekare, and K. Jensen, eds., IAHS-AISH Publication 227, pp. 67–74. January 1, 1995.

Litaor, M.I., M. Thompson, G. Barth, and P. Molzer, 1994. Plutonium-239 + 240 and Americium-241 in Soils East of Rocky Flats, Colorado. *Journal of Environmental Quality*, v. 23, pp. 1231–1239.

OTHER PUBLICATIONS AND PRESENTATIONS

Hathaway, D., G. Barth, and K. Kirsch, 2015. Assessment of Potential Gila River Flow Alteration on Riparian Groundwater Conditions. Presentation at the National Ground Water Association (NGWA) Conference on Hydrology and Water Quality in the Southwest, Albuquerque, NM, February 23-24, 2016.

Barth, G.R., 2012. Field Workshop for the Eagle River Valley Groundwater Demonstration Monitoring. Presentation at the *2012 Sustaining Colorado Watersheds Conference*, Avon, CO, October 9–11, 2012.

Barth, G., D. Hathaway, and S. Makepeace, 2012. Assessing Ecosystem Benefits of Irrigation System Efficiency: Lessons for Colorado from Montana. Presentation at the *2012 Sustaining Colorado Watersheds Conference*, Avon, CO, October 9–11, 2012.

Barth, G., S. Larson, G. Lewis and K. Green, 2011. Estimating Simulated-Drawdown Uncertainty in the Seven Rivers Augmentation Well Field. Presentation at the American Water Resources Association (AWRA) 2011 Annual Water Resources Conference, Albuquerque, NM, November 7–10, 2011.

Hathaway, D., and G. Barth, 2011. High-Resolution Modeling of Groundwater Responses to Streamflow and Channel Conditions in New Mexico. Presentation at the AWRA 2011 Annual Water Resources Conference, Albuquerque, NM, November 7–10, 2011.

Barth, G.R., 2011. Interpreting Synoptic Flow and Water-Quality Data: Developing Groundwater-Seepage or Concentration Bounds as Parameter Estimation Constraints. Presentation at *MODFLOW and More 2011: Integrated Hydrologic Modeling*, Golden, CO.

Barth, G.R., 2011. Estimating Uncertainty of Predicted Seven Rivers Augmentation-Field Drawdown. Presentation at the 2011 National Ground Water Association (NGWA) *Ground Water Summit*, Baltimore, MD, May 1–5, 2011.

Barth, G.R., 2010. Chloride-Migration Prediction Uncertainty in the Vicinity of Poplar, Montana. Presentation at the 2010 NGWA *Ground Water Summit*, Denver, CO, April 11–15, 2010.

Llewellyn, D., G. Barth, D. Hathaway, and E. Jones, 2009. Application of Shallow, Riparian Groundwater Models to Evaluate Maintenance and Alignment Alternatives for the Rio Grande Channel, Central New Mexico (*Abstract*). Presentation at the 2009 National Ground Water Association (NGWA) *Groundwater Summit*, Denver, CO.

Barth, G., and C. Andrews, 2009. Practical Problems, Practical Solutions. Presentation at the National Ground Water Association (NGWA) 2009 *Groundwater Summit*, Tucson, AZ, April 19–23, 2009.

Barth, G.R., 2009. Transparency in Modeling: Mylar Overlays Might Be Out of Fashion, But We Still Need to Shed Light on the System. Presentation at the National Ground Water Association (NGWA) 2009 *Groundwater Summit*, Tucson, AZ, April 19–23, 2009.

Hathaway, D., P. Barroll, G. Barth, and K. MacClune, 2009. Identifying the Canary in the Lower Rio Grande Basin: Hydrologic Signals to Support Groundwater Management in a Transboundary

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- Stream-Aquifer System. Presentation at the National Ground Water Association (NGWA) 2009 *Groundwater Summit*, Tucson, AZ, April 19–23, 2009.
- Hathaway, D., G. Barth, and K. MacClune, 2008. High Resolution Groundwater Models of the San Joaquin River Riparian Zone for Evaluation of Surface Water/Groundwater Interactions under Alternate River Flow Regimes. Presentation at the California Central Valley Groundwater Modeling Workshop, *California Water and Environment Modeling Forum*, Berkeley, CA. July 10–11, 2008.
- Barth, G.R., P. Barroll, D. Hathaway, T. Maddock III, N. Shafike, J.P. King, J. Shomaker, P. King, and B. Liu, 2008. Building a New Groundwater Flow Model for the Rincon and Mesilla Bolsons. Presentation at *MODFLOW and More 2008: Ground Water and Public Policy*, International Ground Water Modeling Center, Colorado School of Mines, Golden, CO, May 18–21, 2008, pp. 252-256.
- Barth, G.R. and H. Rajaram, 2008. Parameter Estimation Precursor: Simple Tools for a Better Tracer-Test and Observations. Presentation at *MODFLOW and More 2008: Ground Water and Public Policy*, International Ground Water Modeling Center, Colorado School of Mines, Golden, CO, May 18–21, 2008, pp. 445-449.
- Barth, G.R., and C. Schott. 2007. Assessing Mountain Pine Beetle Infestation: Anticipated Hydrologic Impacts and Suggestions for Minimizing Watershed Impacts. Presentation at *Sustaining Colorado Watersheds*, Breckenridge, CO, October 2–4, 2007.
- Barth, G., K. MacClune, D. Hathaway, and F.B. Grigsby, 2007. Making the Most of a Simple Model: Using Extensive Data Sets and Parameter Estimation to Get Basin-Scale Insight on Outcrop Recharge. Presentation at the 2007 NGWA Groundwater Summit, Albuquerque, NM, April 30–May 2, 2007.
- Hathaway, D., K. MacClune, N. Shafike, G. Barth, and M. Novotny, 2006. Application of High Resolution Groundwater Models of the Near-River Zone to Problems in River Restoration and Water Management: Lessons Learned. (Abstract and Presentation). in *Proceedings of the American Water Resources Association's 2006 Annual Water Resource Conference*, Baltimore, MD, November 2006. AWRA TPS-06-3, CD-ROM.
- Barth, G.R., 2006. Adjusting Canal Conductance to Represent Drought Effects in a Regional Groundwater Simulation. 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. 552-556.
- Barth, G.R., 2006. An Innovative Use of Observations to Alleviate Weighted-Residual Asymmetry. Presentation at *MODFLOW and More 2006, Managing Ground-Water Systems*, International Ground Water Modeling Center, Colorado School of Mines Golden, Colorado, CO, May 22–24, 2006. v. 1, pp. 305-309.
- Barth, G.R., K. MacClune, N. Shafike, and D.L. Hathaway, 2006. Beyond Simulated Versus Observed: Gaining Insight to Shallow Ground Water/Surface-Water Exchange Using Visualization and Sensitivity Analysis. 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. 1, pp. 84–88.
- Hathaway, D., G. Barth, F.B. Grigsby, and K.L. MacClune, 2006. MODFLOW....NOT: A Simple but Effective Solution to a Regulatory Question. 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. 1, pp. 137-141.

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- MacClune, K.L., G. Barth, N. Shafike, and D. Hathaway, 2006. High-Resolution Groundwater Models for the Assessment of Riparian Restoration Options and River Conveyance Efficiency. 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. 1, pp. 159-163.
- Hathaway, D.L., N. Shafike. K. MacClune, and G. Barth, 2005. High-Resolution Groundwater Models for the Assessment of Riparian Restoration Options and River Conveyance Efficiency. Presentation at the *2005 New Mexico Water Research Symposium*, New Mexico Water Resources Research Institute, August 16, 2005.
- Barth, G.R. 2003. Incorporating Surface-Water/Groundwater Interaction in a Texas Central Gulf Coast Water-Demand-Forecasting Flow Model. Presentation at *MODFLOW and More 2003, Understanding Through Modeling*, International Groundwater Modeling Center (IGMC), September 16–19, 2003, Golden, CO. in *Proceedings of MODFLOW and More 2003*, E. Poeter, C. Zheng, M.Hill, J.Doherty, and S. Seo, eds., v. 1, Sec. 3, pp. 139–143.
- Barth, G.R., M.C. Hill, T.H. Illangasekare, and H. Rajaram, 2002. Is it More Important to Characterize Heterogeneity or Differences in Hydraulic Conductivity Measurements? Bridging the Gap between Measurement and Modeling. Presentation at the Groundwater 2002 International Association of Hydraulic Engineering and Research (IAHR) Conference, Berkeley, CA, March 2002. in *Proceedings of Groundwater 2002 IAHR (International Association of Hydraulic Engineering and Research)*.
- Barth, G.R., T.H. Illangasekare, M.C. Hill, and H. Rajaram, 2002. Creating and Explicitly Characterizing Heterogeneity and NAPL Macro-Scale Entrapment at the Intermediate Scale, Bridging the Gap between Measurement and Modeling. Presentation at Groundwater 2002 IAHR Conference, Berkeley, CA, March, 2002. in *Proceedings of Groundwater 2002 IAHR (International Association of Hydraulic Engineering and Research)*.
- Barth, G.R., and M.C. Hill, 2000. Importance of Parameters Controlling Virus Transport in Groundwater. Presentation at the American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 14–19, 2000.
- Barth, G.R., T.H. Illangasekare, and M. Hill, 1998. Discrepancies in Hydraulic Conductivity Obtained from Laboratory Evaluation and Regression Modeling of Intermediate Scale Flow and Transport Experiments. Presentation at the American Geophysical Union (AGU) Hydrology Days, Ft. Collins, CO, March 1998.
- Barth, G.R., T.H. Illangasekare, M.C. Hill, and H. Rajaram, 1998. Characterization of NAPL Contaminated Sites Using Tracer Techniques: Intermediate-Scale Experimental Validation. Presentation at the Great Plains/Rocky Mountain Hazardous Substance Research Center, Kansas State University, *Conference on Hazardous Waste Research, Bridging Gaps in Technology and Culture*, Snow Bird, UT, May 19–21, 1998.
- Barth, G.R., T.H. Illangasekare, M.C. Hill, and H. Rajaram, 1998. An Evaluation of Intermediate-Scale Tracer Tests in Heterogeneous Porous Media: Sensitivity to NAPL Entrapment. Presentation at the American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 6–10, 1998.
- Barth, G.R., T.H. Illangasekare, M.C. Hill, and H. Rajaram, 1997. Predictive and Regression Modeling of Heterogeneous, Intermediate Scale, Flow and Transport Experiments. Presentation at the American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 8–12, 1997.

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- Barth, G.R., T.H. Illangasekare, M.C. Hill, and H. Rajaram, 1997. Tracer Techniques to Determine Effective Field-Site-Scale Parameters for Remediation Design. Presentation at the 12th Annual Conference on Hazardous Waste Research, Kansas City, MO, May 19–22, 1997.
- Barth, G.R., T.H. Illangasekare, and H. Rajaram, 1996. Use of Tracer Techniques to Characterize Nonaqueous Phase Liquid Entrapment in Heterogeneous Aquifers (*Abstract*). American Geophysical Union (AGU) 1996 Fall Meeting, San Francisco, CA, December 15–19, 1996. *in* *Eos*, v. 77, no. 46, Supplement, November 1996. F243.
- Barth, G.R., T.H. Illangasekare, and H. Rajaram, 1996. Use of Tracers for the Characterization of Scale Dependent Subsurface Properties: Initial Evaluation. Presentation at the HSRC and WERC Joint Conference on the Environment, Albuquerque, NM, May 21-23, 1996. *in* *Proceedings of the HSRC and WERC Joint Conference on the Environment*.
- Barth, G.R., and J. Moffitt, 1995. A Graphical User Interface for Data Management of an Environmental Monitoring Site. Presentation at the U.S. Department of Energy *Environmental Remediation Conference*, Denver, CO.
- Barth, G.R., M.I. Litaor, and P. Molzer, 1993. An Automated Monitoring System for the Study of Actinides in the Soil Environment at Rocky Flats Plant. Presentation at the U.S. Department of Energy (DOE) *Technology Information Exchange*, Denver, CO.
- Barth, G.R., D. Sieh, and K. Strzepek, 1992. Colorado Water Law Rule—Routing Algorithm for a Decision Support System. Presentation at the 1992 Front Range Meeting of the American Geophysical Union (AGU).