Betsy A. Semmens, R.G.

Principal Hydrogeologist

Education

M.S. Geology, Northern Arizona University, Flagstaff, 1999

B.S. Geology, Minor Mathematics, University of Minnesota, Minneapolis, 1995

Certifications

Registered Professional Geologist:

- *Arizona #40167*
- *Idaho #PGL-1656*
- *Indiana #2684*
- *Utah #11242390-2250*
- *Wyoming #PG-4118*

MSHA Certified Health and Safety Training

OSHA Health and Safety Supervisory Training for Hazardous Waste Sites and Emergency Response Training

Systems of Off-Shore Survival for Seismic and Oil Exploratory Operations

Professional Organizations

Colorado Groundwater Association

- *Member since 2015*
- *Scholarship Chair, 2020 -present*
- *Symposium Chair, 2019-2023*
- *Past-President, 2019*
- *President, 2018*
- *Vice-President, 2017*
- *Secretary, 2016*

Arizona Hydrological Society

- *Member since 1999*
- *Corporate Board Treasurer, 2001-2003*
- *Tucson Chapter Treasurer, 1999-2001*

National Groundwater Association
American Water Resources Association

Betsy Semmens is a Hydrogeologist and Principal of BAS Groundwater Consulting INC (BAS), specializing in numerical modeling for groundwater problems. Her role is to develop and calibrate models for use in predictive assessments of future conditions for compliance, permitting, and research purposes.

Ms. Semmens has over 25 years of practical experience as a consulting hydrogeologist. Her primary roles have included data analysis and management, and numerical modeling at mines, landfills, manufacturing sites, and Superfund sites, as well in support of municipal, utilities, and land development projects, litigation support, and third-party review.

Ms. Semmens specializes in saturated groundwater flow and transport modeling using MODFLOW, MODFLOW-SURFACT, MODFLOW-NWT, MODFLOW-USG, MODFLOW 6, MODPATH, MODPATH3DU, MT3D, MT3DMS, MT3D-USGS, and Groundwater Vistas. She has developed and applied groundwater models for regulatory compliance and permitting at mines, to obtain a Record of Decision at a Superfund site incorporating Monitored Natural Attenuation (MNA), for water supply purposes including Aquifer Storage and Recovery, impact analyses, and Assured Water Supply studies, to support compliance for the Coal Combustion Residuals (CCR) program, and to investigate groundwater/surface water interactions at sensitive stream, wetland, and spring ecosystems. Ms. Semmens is also experienced with 3D visualization and Leapfrog geologic modeling software, ArcGIS, and relational databases. She is a registered geologist in Arizona, Idaho, Utah, and Wyoming.

Areas of Expertise

- Hydrogeology
- Groundwater Compliance - Mining
- Numerical Groundwater Flow and Transport Modeling
- Leapfrog™ 3D Geologic Modeling
- Geographic Information Systems (GIS) Development
- Data Management
- Database Development

EMPLOYMENT HISTORY

Golder Associates – Tucson, Arizona
Project Hydrogeologist (2003 to 2019)
Ms. Semmens was a Senior Hydrogeologist specializing in groundwater flow and transport modeling for water supply, groundwater permitting, and groundwater contamination and remediation projects. Ms. Semmens was responsible for hydrogeologic evaluations for a variety of mining projects with an emphasis on groundwater flow and transport modeling.

Hargis + Associates, Inc. – Tucson, Arizona
Hydrologist (2000 to 2003)
Ms. Semmens was responsible for hydrogeologic investigations of Superfund projects and litigation involving first party claims for industrial facilities and major chemical manufacturing companies. Tasks included groundwater flow and transport modeling, creating GIS databases, analyzing hydrogeologic data, and creating computer animations.

HydroSystems, Inc. – Phoenix, Arizona
Hydrologist (1999 to 2000)
Ms. Semmens was responsible for hydrogeologic investigations to support a variety of water supply permits including Underground Storage Facility and recharge and recovery well permits, and Physical Availability Demonstrations through the ADWR Artificial Recharge Program and the Arizona Water Banking Authority.

Northern Arizona University – Flagstaff, Arizona
Graduate Research/Teaching Assistant (1996 to 1998)
Conducted hydrogeologic and geochemical research of alluvial deposits along the Colorado River in the Grand Canyon. Taught introductory geology classes and lab sections.

Geco-Prakla Schlumberger – Houston, Texas
Geophysicist (1995 to 1996)
Responsible for the field data processing of deep, land and off-shore seismic reflection surveys, including the quality control and quality assurance of the processed data sent directly to the client. Tasks included producing merged SEG-Y data tapes, velocity-corrected brute stacks, and linear move-out plots to correct for geometry errors.

TRAINING COURSES

- Calibrating Groundwater Models with PEST and PEST++IES
- Transport Modeling with MT3DMS, MODFLOW-USG, SEAWAT, and MODFLOW-SURFACT MODFLOW-USG, MODFLOW, and MORE
- Groundwater Calibration and Parameter Estimation Techniques
- UCODE 2005 and Six other Computer Codes for Universal Sensitivity Analysis, Calibrations, and Uncertainty Evaluation
- Advanced Groundwater Modeling Short Course: Using GIS with Models, Variably Saturated Modeling, Optimization, and Calibration Techniques
- IGWMC Advanced Groundwater Modeling Short Course: Conceptualization and Calibration Techniques

PUBLICATIONS

Birch, M., B. Semmens, L. Smith, D. Banton, and N. Hall, 2006. Modeling of Groundwater Inflow to a Large Open-Pit in Low-Permeability Mountainous Terrain. Presented at the 2006, 7th ICARD conference, March 26-30th, 2006, St. Louis, MO, Published by ASMR, 3134 Montavesta Rd, Lexington, KY 40502.

Leonhart, L.S., E.M. Roudebush, M.R. Long, B.A. Scully, and B.A. Semmens, 2003. Hydrogeology of the Alluvial Aquifer Along the Curtiss Reach of the San Pedro River. Published in First Interagency Conference on Research in the Watersheds, USDA-ARS, p. 474-479. October 2003.

Semmens, B.A., 1999. Hydrogeological and Geochemical Processes in Backwater Habitats Along the Colorado River, Grand Canyon, Arizona. Master's Thesis, Northern Arizona University, Flagstaff, Arizona.

Springer, A.E., W.D. Petroutsen, and B.A. Semmens, 1999. Spatial and Temporal Variability of Hydraulic Conductivity in Active Reattachment Bars of the Colorado River, Grand Canyon. *Ground Water*, volume 37, no. 3, p. 338-344.

Gilbert, B.A*., and A.E. Springer, 1997. Hydrogeologic Parameters Necessary to Conserve Backwater Habitats of the Colorado River, Grand Canyon, Arizona. Abstracts with Programs, volume 29, no. 6, Geological Society of America, Salt Lake City, Utah. **Maiden name*