

BRUCE A. FOWLER, P.G.

EDUCATION

University of Vermont - M.S. in Environmental Engineering, 1984
Boston University - B.S. in Geology, 1977

PROFESSIONAL REGISTRATION

Professional Geologist – Georgia PG001576, North Carolina 0741

AFFILIATIONS

Association of Engineering Geologists
National Water Well Association

EMPLOYMENT HISTORY

1988 to Present - Sevee & Maher Engineers, Inc., Principal and Senior Hydrogeologist
1984 to 1988 - E.C. Jordan Co., Portland, Maine, Senior Hydrogeologist
1979 to 1982 - Exploration Logging, Inc., Houston, Texas, Geologist/Subsurface Pressure
Detection Engineer

EXPERIENCE

Mr. Fowler has over 38 years of experience in hydrogeologic investigations related to: (1) groundwater characterization of landfills, dams and hazardous waste sites; (2) feasibility, design, and installation of remedial action alternatives for groundwater clean-up, as well as groundwater extraction/mounding and impoundment applications; and (3) water resource development. He has broad experience in the application of surface and groundwater delineation principles along with the fate and transport analysis of contaminants related to these sites. His geologic engineering experience includes subsurface pressure detection analysis and numerical reservoir analysis in exploration drilling for gas and oil. Assignments in his various areas of expertise have included:

- Evaluation of groundwater impacts from dam and hydroelectric plant construction: Performed field data collection and 3-dimensional numerical modeling of proposed dam construction and impacts on soil stability and groundwater level increases on abutting residences in central Maine. Field data collection included seismic refraction study; boring, monitoring well and piezometer installations, soils analysis (grain size, hydraulic conductivity, triaxial, shear strength, triaxial compression, and consolidation testing); in situ hydraulic conductivity and pore pressure testing, groundwater level measurements; and bedrock outcrop fracture mapping and photolineament analysis.
- Hydrogeologic Investigation for major Landfill Cell Permitting and Development – As part of the Civil engineering design for a new landfill cell at a paper mill in central Maine, Mr. Fowler provided and managed the hydrogeologic investigation for the groundwater assessment component of the application. The program included installation of some 24 monitoring wells in both bedrock and overburden regimes, borehole geophysics as they relate to groundwater movement, three pumping test programs with numerical analysis to assess groundwater movement in the overburden soils, bedrock fractures as well as potential wetland impacts. Ultimately, three-dimensional modeling was

used to predict the fate and transport of a future leak from the landfill and its potential impact on the area natural resources and neighboring domestic wells.

- Landfill Permitting – Assisted with hydrogeologic investigations and reporting for several proposed landfill locations in Maine, Pennsylvania and North Carolina. His contributions have included detailed rock and soil descriptions, field collection and interpretation of geophysical data, identification of highly hydraulically transmissive zones in bedrock and soils, long-term groundwater pumping tests, manual and computer assisted analysis of hydrogeologic investigation data, identification of potential sensitive receptors, and localized and regional groundwater flow modeling.
- Groundwater Extraction Design and Analysis - Project manager and technical director of design and installation of groundwater extraction and treatment system to capture TCE/DCE in highly contaminated aquifer in a karst geologic setting at an U.S. Army base in Georgia. Responsibilities included installation of 14 bedrock/regolith extraction wells in three contaminated areas, step-drawdown and constant discharge pumping tests of these wells to evaluate aquifer characteristics and plume capture zones. Chemical data collected during the step-drawdown pumping tests was also evaluated to establish design criteria for long-term groundwater treatment system. Field requirements involved design and construction of interim air stripper/activated carbon treatment system and the management of over one million gallons of chemical-containing groundwater.
- Remedial Investigation/Feasibility Study - As technical director, Mr. Fowler was responsible for geologic/hydrogeologic site investigations at a former transformer recycling scrap yard, now a NPL site. The site investigations included a photogrammetric analysis and outcrop study to evaluate bedrock fracture characteristics and patterns; biological sampling/ sampling, decontamination, and removal of 23 aboveground waste oil storage tanks, as well as former transformers and capacitors; and detailed evaluation of two-phase fluid flow in desiccated clays in fractured bedrock aquifers. As part of the study, Mr. Fowler implemented a recently developed innovative PCB field screening procedure to determine PCB concentrations in site soils and sediments using field gas chromatography. The technique provided accurate, cost-effective and expeditious delineation of all PCB-containing soils and sediments. As part of this project, Mr. Fowler: (1) developed work plans for the investigations; (2) designed and supervised the installation of groundwater monitoring wells; (3) performed field sampling; (4) analyzed data; and (5) prepared a comprehensive remedial investigation report including site maps and geologic/hydrogeologic cross-sections.
- Analysis and Design of a Landfill Dewatering System - Mr. Fowler headed the Superfund site investigation and performed the pump test analysis of a dewatering system to drawdown water levels in a slurry wall-contained closed landfill site in central Michigan. Numerical modeling of point well sources with image well theory was employed to predict head depression beneath a saturated clay-capped zone. Nine well-points were used to control pore pressures in the contaminated soils so that construction of the impermeable cap could be completed.
- Oversight of a Remedial Investigation/Feasibility Study -Investigation addressed a TCE plume which had migrated over 2 miles impacting domestic and industrial water supplies. As part of this project, Mr. Fowler designed and analyzed three pump tests for the site, in a vicinity of complex hydrogeologically confined and unconfined aquifer environments. William Walton's B-29 program (after Prickett and Lonquist), was selected to determine capture zones and the magnitude of drawdown in a two-layer leaky artesian aquifer.
- Mass-balance Analysis on a Contaminated Plume - Mr. Fowler applied extensive numerical and mass-balance modeling techniques to evaluate the individual contribution of a single point source pollutant to a larger contaminated plume body. The Konikow and Bredehoeft 2-D transport and dispersion model was utilized to evaluate the effect of various injection and pumping wells on plume migration.
- Fractured Bedrock Pump Test Analysis - Mr. Fowler designed, implemented and monitored 14 test wells during a 72-hour pump test of fractured bedrock at a Superfund Site in Gray, Maine. The

analysis of results culminated in design of a groundwater extraction and air stripper treatment system to capture and remove TCE in the groundwater at the site.

- DOT Highway Construction Technical Support - For construction of highway connector over contaminated peat deposits, Mr. Fowler performed 3-dimensional numerical simulation to support feasibility analysis and design of a comprehensive dewatering project to allow construction of highway connector over coal tar contaminated peat deposits. Provided field engineering of system installation and operation during project construction.
- Development of a Patented Well Maintenance System to Unclog Relief Wells at Dams and Lower Pore Water Pressure in Related Structures – initially called in as a consultant for redevelopment of repeated clogging relief wells at a Dam site in upstate New York, Mr. Fowler conceived of, designed, constructed, tested and implemented the Packer Purge™ System to provide long term maintenance for the problematic wells. The system provides a long-term and cost-effective means of maintaining pore water pressures at the dam without the need for well redevelopment.

Community Supply Well Siting and Development - Mr. Fowler is a Project Manager and technical lead for exploration, location, design, construction and permitting of Community Supply Well (CSW) for public water supplies in New England, New Jersey, and Ohio. CSW projects typically involve a combination of well siting issues including regional hydrogeologic review, fracture trace analysis as well as environmental and neighboring well assessments. Test drilling and CSW construction, pumping test analysis, water quality analysis and assessment, along with numerical modeling of pumping impacts provide the information to support permitting of a CSW and determination of wellhead protection areas and management.

Mr. Fowler is also Project Manager on a multitude of infrastructure projects to bring CSWs into service. Project components include, state and local permitting, design of all wellhead, piping and appurtenances, cost estimation, project bidding and construction oversight.

PUBLICATIONS/PRESENTATIONS

Fowler, Bruce A., "Phosphorus Diffusion in Lake Sediments," presented at the 14th Annual Great Lakes Research Conference Proceedings, 1984.

Fowler, Bruce A., "Nutrient Regeneration from Lake Sediments," masters thesis, University of Vermont, 1984.

Fowler, B.A., J.C. Drake, and D.R. Hemenway, "An Inexpensive Water Circulation System for Study of Chemical Exchange Using Intact Sediment Cores." Freshwater Biology (In Press).

Fowler, B.A., and J.T. Bennett. "Screening for Characterization of PCB-Containing Soils and Sediments." Proceedings of the National Conference on Hazardous Wastes and Hazardous Materials. Washington, D.C. March 1987.

Fowler, B.A. "A Case for Regional Numerical Analysis in Complex Water Supply Investigations." Proceedings of the NWWA Focus Conference on Eastern Regional Ground Water Fissures, Portland, Maine, October 1991.

Fowler, B.A. "Inverse Step-Testing – Short-Term Testing to predict Safe Yield in non-Uniform Wells." Proceedings of Maine Sustainability and Water Conference, Augusta, Maine March 2015.

Fowler, B.A., Stephen Rabaska, P.E., Laura Devaudreuil and Colin O'Conner. "Reducing Relief Well Clogging and Pore Water Pressures using Natural Groundwater Pressures and a Packer Purge™ System. Proceedings of the National Dam Safety Conference. San Antonio, Texas. September 2017

Fowler, B.A., Stephen Rabaska, P.E., Laura Devaudreuil and Colin O'Conner "Reducing Relief Well Clogging and Pore Water Pressures using Natural Groundwater Pressures and a Packer Purge™ System. Journal of Dam Safety, March 2018.