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## Areas of Expertise

- Contaminant Fate & Transport
- Groundwater Hydrology
- Remedial Investigation & Design
- Multiphase Flow & Reactive Transport
- Groundwater Modeling
- Green & Sustainable Remediation

## Services

- Ecological Risk & NRD
- Chemical Fate & Transport
- Remedial Strategies
- Water Resources
- Cost Estimation & Analysis
- Sustainability Consulting
- Climate Science

## Education

- Ph.D., Environmental Engineering, Tufts University
- M.Sc., Geotechnical Engineering, Iran University of Science & Technology, Iran
- B.Sc., Civil Engineering, Isfahan University of Technology, Iran
- Licensed Professional Engineer in Massachusetts

## Ali Boroumand, Ph.D., P.E.

### Senior Environmental Engineer

Dr. Boroumand is a senior environmental engineer specializing in groundwater hydrology and contaminant fate and transport. Dr. Boroumand has provided expertise on numerous projects, including remedial actions at National Priorities List (NPL) and Resource Conservation and Recovery Act (RCRA) sites, feasibility studies, risk assessments, and cost and responsibility allocations. These projects involved a wide variety of contaminants, such as chlorinated solvents, mercury, pesticides, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and hydrocarbons, at different industrial facilities. Dr. Boroumand has a solid background in mathematical and numerical modeling and has worked extensively on developing data-supported models, used for remedial design or other environmental contamination purposes. Before joining Gradient, Dr. Boroumand earned his doctorate at Tufts University, where he investigated the modeling techniques of interphase mass transfer and multiphase flow systems in the subsurface environment. He has authored several peer-reviewed articles and taught environmental engineering courses at California State Polytechnic University as a lecturer. Dr. Boroumand also has a background in geotechnical engineering and worked previously as a civil/geotechnical engineer in engineering consulting firms for several years.

## Selected Projects

**Surface and Groundwater Interactions:** Used regional-scale groundwater flow models to simulate aquifer-surface water interactions and estimate the impacts of groundwater consumptive use on stream flows in drought conditions. Analysis was used in a water rights dispute between two states tried before the US Supreme Court.

**NAPL Migration in Fractured Bedrock:** Developed a theoretical framework for evaluating the physical constraints on mobilizing manufactured gas plant (MGP) tar in fractured bedrock. This framework can be used to characterize the mobility of MGP tar in fractured bedrock up front in the site remediation process to help define appropriate remediation technologies and cleanup goals.

**Contaminant Fate and Transport Analysis:** In support of claims related to insurance coverage, performed technical literature review and data analysis to evaluate the potential for a relationship between historical application of herbicides and more recent detections in groundwater and surface water in multiple states across the US.

**Contaminant Fate and Transport Modeling:** For a Superfund site, reviewed the collected groundwater data and site characterization information obtained over the past two decades. Used this data to modify and recalibrate the original numerical groundwater and solute transport model to describe the existing tetrachloroethylene (PCE) plume more realistically and optimize the remediation system accordingly.

**Green and Sustainable Remediation (GSR) Analysis:** For a coal-powered utility company, modeled the site and supply chain activities associated with alternative coal ash impoundment closure options to evaluate the life cycle environmental and safety impacts associated with each option.

## Selected Publications and Presentations

**Boroumand, A;** Greenberg, G; Herman, K; Lewis, A. 2017. "Incorporating green and sustainable remediation analysis in coal combustion residuals (CCR) surface impoundment closure decision making." *Remediation Jour.* 27(4):29-38.

Langseth, D; **Boroumand, A.** 2017. "Pumping groundwater impacts rivers." *Gradient Trends - Risk Science & Application* 69:4.

Flewelling, SA; **Boroumand, A;** Herman, K. 2016. "A Conceptual Framework for the Feasibility of Remediating MGP Tar in Fractured Bedrock." Presented at Battelle's Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Palm Springs, CA, May 22-26.

**Boroumand, A;** Abriola, L. 2015. "On the upscaling of mass transfer rate expressions for interpretation of source zone partitioning tracer tests." *Water Resour. Res.* 51(2):832-847.