

# Ali Boroumand, Ph.D.

## Senior Environmental Engineer

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Dr. Boroumand is a senior environmental engineer specializing in groundwater hydrology and contaminant fate and transport. Dr. Boroumand has provided expertise on 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, including 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 litigation 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 previously worked as a civil/geotechnical engineer in engineering consulting firms for several years.

### Representative 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.

**Multiphase Flow Analysis:** To assess the potential risk related to gas migration to potable aquifers, evaluated the physical conditions that lead to gas leakage along the casing of oil and gas wells. Analyzed available methane migration datasets to identify the potential pathways and gas migration regimes.

**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 and modified and recalibrated 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.

### Areas of Expertise

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

### 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

### 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.

**Boroumand, A;** Herman, K; Lewis, A. 2017. "Evaluating Worker and Community Safety in Coal Ash Surface Impoundment Closure Decision-making." Presented at the 2017 World of Coal Ash (WOCA) Conference, Lexington, KY, May 8-11.

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.

