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(he/him)

## Andrew B. Bittner, M.Eng., P.E.

### Principal

Mr. Bittner is a licensed environmental engineer with over 20 years of experience specializing in the fate and transport of contaminants in porous and fractured media, the migration of coal combustion products in groundwater and surface water, groundwater and surface water modeling, and groundwater corrective actions. Mr. Bittner has applied these skills for a wide range of projects, including at Superfund sites, landfills and surface impoundments, manufacturing facilities, and dry cleaning sites. Mr. Bittner has provided technical support related to the fate and transport of constituents in groundwater and surface water, both in consulting and testifying roles. Additionally, Mr. Bittner has extensive experience developing risk-based remedial strategies, designing remedial investigations, delineating and characterizing the distribution of environmental pollutants, and overseeing remedial operations in South America.

### Areas of Expertise

- Contaminant Fate & Transport
- NAPL Transport
- Coal Ash Surface Impoundments
- Groundwater & Surface Water Modeling
- Groundwater Hydrology
- Remedial Investigation & Design
- Soil Vapor Intrusion Modeling
- Hydraulic/WWTP Modeling

### Services

- Chemical Fate & Transport
- Remedial Strategies
- Water Resources
- Cost Estimation & Analysis
- Insurance Claims
- PRP Cost Recovery/Allocation
- NCP Consistency

### Education

- M.Eng., Environmental Engineering and Water Resources, Massachusetts Institute of Technology
- B.S.E., Environmental Engineering, University of Michigan
- B.S., Physics, University of Michigan
- Licensed Professional Engineer in New Hampshire and Idaho

### Selected Projects

**Metals Fate and Transport Modeling:** Prepared expert report related to the fate and transport of metal constituents in groundwater, including barium, boron, and arsenic, from multiple coal combustion residual surface impoundments.

**Arsenic Fate and Transport Modeling:** Modeled the fate and transport of arsenic and other coal ash-related constituents in groundwater and surface water downgradient of a large Midwestern coal ash surface impoundment located in a karst environment. Model simulations compared potential impacts to groundwater and surface water resulting from potential surface impoundment closure scenarios.

**Surface Water Fate and Transport Modeling:** Prepared expert report on human health and ecological risks due to a potential spill of barged coal combustion byproducts (CCBs) on a large Midwestern river. Modeled the fate and transport of key CCB constituents, including arsenic, in surface water for a range of spill scenarios and river flow conditions. Estimated potential downstream concentrations at drinking water intake locations.

**Groundwater and Solute Transport Modeling:** For a PRP group, developed a 3-D numerical groundwater and solute transport model for PCE at a Superfund site in New Hampshire. Calibrated the model using approximately 10 years of data with review and oversight by US EPA and USGS. Designed an optimization algorithm to develop an optimal groundwater pump-and-treat system.

**Metals Fate and Transport Modeling:** Evaluated the technical approach used by US EPA to simulate the migration of arsenic, selenium, and other metals in groundwater from overlying coal combustion storage units. Model analyses were included in regulatory comments submitted in response to US EPA's 2010 Coal Combustion Product Risk Assessment.

**Coal Ash Decision Framework:** Developed decision framework that aids utilities in selecting coal ash surface impoundment closure plans. Framework considers impacts to groundwater, surface water, and air, as well as risks to workers and consumption of national resources.

### Selected Publications and Presentations

Lewis, A; **Bittner, A**; Radloff, K; Hensel, B. 2017. "Storage of coal combustion products in the United States: Perspectives on potential human health and environmental risks." In *Coal Combustion Products (CCP's): Characteristics, Utilization and Beneficiation*. (Eds.: Robl, T; Oberlink, A; Jones, R), Woodhead Publishing, Duxford, United Kingdom, p481-507.

Lewis, AS; **Bittner, AB**; Lemay, JC. 2017. "Achieving Groundwater Protection Standards for Appendix IV Constituents: The Problem with Using Background Concentrations in the Absence of Maximum Contaminant Levels (MCLs)." Presented at the 2017 World of Coal Ash Conference (WOCA), Lexington, KY, May 8-11.

**Bittner, A.** 2017. "Evaluation of Groundwater Protectiveness of Potential Surface Impoundment Closure Options." Presented at the 2017 World of Coal Ash Conference (WOCA), Lexington, KY, May 11.