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Caroline B. Tuit, Ph.D.

Principal Scientist

Dr. Tuit is an environmental chemist with more than 15 years of experience evaluating the sources, fate, and transport of chemicals in the environment. At Gradient, Dr. Tuit provides technical leadership on environmental forensics projects for source identification, cost allocation, and insurance recovery. She is experienced in designing sampling and quality assurance plans and interpreting environmental and characterization data, and has provided deposition testimony on data quality and usability. She has worked on projects evaluating petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), PCBs, PFAS, dioxin/furans, chlorinated solvents, and trace metals, among other contaminants. Before joining Gradient, she was a Hess postdoctoral fellow in the geosciences department of Princeton University, where she studied trace metal bioavailability and toxicity. Prior to that, she received her Ph.D. in Oceanography from the MIT/WHOI Joint Program, where she authored a thesis on the marine biogeochemistry of molybdenum.

Areas of Expertise

- Chemistry/Forensics
- Chemical Fate/Transport
- Cost Allocation
- Sediment Management
- Rare Earth & Minor Metals

Services

- Chemistry/Forensics
- PRP Cost Recovery/Allocation
- Data Quality Management
- Global Chemical Registration

Education

- Ph.D., Oceanography, Massachusetts Institute of Technology/Woods Hole Oceanographic Joint Program
- B.S., Chemistry and Geology, Beloit College

Selected Projects

Byproduct Dioxin Generation: Evaluated the potential for dioxin release during the historical manufacture of herbicides and pesticides and estimated the potential contributions to a nearby estuary.

Environmental Forensic Investigation: Identified the source of a chlorinated solvent (Freon) and BTEX groundwater plume adjacent to a former refinery site during an environmental forensic investigation of historical and compound specific stable isotope analyses.

PCB Sediment Forensics: Used principal component analysis and alternating least squares receptor modeling to estimate the source and relative contribution of different PCB Aroclors to estuary sediments.

PCB Cost Recovery: Performed a PCB fingerprinting analysis, a critical review of historical site data, and a review of Aroclor production figures in support of a cost allocation at a transportation facility.

Discharge Permitting: Directed a trace metal sampling and analysis program for water and fish tissue in support of permit renewal negotiations for a NPDES wastewater discharge.

Hydraulic Fracturing Fluid Chemistry: Evaluated the potential chemical reactions during hydrofracturing between fluid ingredients and source rocks at *in situ* temperatures and pressures.

Superfund Site Forensics: Developed PAH source model for sediments in an urban waterway with extensive historical contamination from petroleum, tar, and urban runoff.

Selected Publications and Presentations

Tuit, CB; Butler, EL; Reid, KR. 2010. "Evaluating Vapor Intrusion as a Source of Petroleum Hydrocarbons to Indoor Air: A Case Study." Presented to the 26th Annual International Conference on Soils, Sediment, Water and Energy, University of Massachusetts, Amherst, MA.

Tuit, CB; Moffett, J; Jaykumar, A; Naqvi, W; Rich, JJ; Ward, BB. 2005. "Copper Utilization by Denitrifying Bacteria in the ETNP and Arabian Sea." Presented to the ASLO Summer Meeting, Santiago de Compostela, Spain.

Tuit, CB; Waterbury, J; Ravizza, GE. 2004. "Diel cycling of Mo and Fe cellular quotas in nocturnal marine nitrogen fixing species *Chroocosphaera watsonii*." *Limnol. Oceanogr.* 49:341-346.

Tuit, CB; Ravizza, GE; Bothner, MH. 2000. "Anthropogenic platinum and palladium in the sediments of Boston Harbor." *Environ. Sci. Technol.* 34:927-932.