

#### TECHNICAL SPECIALTIES

Ms. Boston is a board-certified toxicologist with over thirteen years of experience. Ms. Boston's career has focused on the assessment of human health and environmental hazards. Her multidisciplinary training in geology, human health risk assessment and toxicology provides full-spectrum support for remedial investigations and in environmental litigation. Her understanding and experience with site assessment dovetails with her ability to determine the human health risk of the exposure to environmental impacts. Ms. Boston's areas of expertise include:

- Human health risk assessment
- Exposure assessment
- Toxicological evaluations
- Toxic tort evaluations
- California's Proposition 65 evaluations
- Site investigation and remediation
- Allocation of environmental hazard contribution
- Statistical data analysis, including ProUCL, SAS, Geographic Information Systems (GIS) and R.

Ms. Boston's work in toxicology and human health risk includes emerging contaminants, quantitative risk assessment, exposure assessments, and interpretation, critique, and analysis of epidemiological and toxicological evaluations. Ms. Boston has experience weaving together multiple lines of evidence to help fully understand general causation issues in toxic tort matters. She is involved in expanding the base of toxicological knowledge through research that seeks to improve understanding of exposures to a variety of per- and polyfluoroalkyl substances (PFAS).

In an environmental litigation context, Ms. Boston has estimated environmental clean-up costs, performed statistical analysis and interpretation, and evaluated compliance with the National Contingency Plan in support of allocation of environmental response costs. Ms. Boston has also provided technical support for environmental forensics evaluations including fate and transport of chemical contaminants and has completed state of knowledge assessments regarding disposal practices and standard of care.

#### CREDENTIALS

Boston University, Boston, MA School of Public Health  
Masters of Public Health, May 2019  
Environmental Hazard Assessment and Toxicology  
Colgate University, Hamilton, NY  
B.A. Geology, May 2009  
Diplomate of the American Board of Toxicology (2021)

#### EXPERIENCE SUMMARY

Roux Associates, Inc. (2009-Present)  
Island Creek Oysters (2005-2009)

#### RISK ASSESSMENTS AND TOXICOLOGY RESEARCH

- *PFAS Regulatory Evaluation:* Continued evaluation of differing regulatory, guidance, and health advisory levels by state for various PFAS; compared the toxicological basis for values including basis for the reference dose, relative source contribution, critical effects, use of

surrogate toxicological values and application of uncertainty factors.

- *PFAS Toxicokinetics and Lipid Homeostasis Review:* Compiled and evaluated epidemiological data on occupational, adult and child studies examining PFAS exposure and metabolic disruption. Critical review of toxicokinetic data regarding perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) and short chain replacements, including perfluorobutanoic acid (PFBA) and perfluorobutane sulfonate (PFBS).
- *PFAS Laboratory Toxicity Research:* Hands on experience conducting laboratory dose-response analysis of various PFAS in cultured human adipocytes and hepatocytes, examining the activation of the peroxisome proliferator-activated receptor alpha (PPAR $\alpha$ ) and PPAR $\gamma$  receptors. In vivo experiments in progress utilizing a PPAR $\alpha$  humanized mouse model to examine changes in liver and adipose gene expression.

#### KEY PROJECTS

##### Risk Assessment, Toxicology, Toxic Tort

Ms. Boston has assessed the potential for increased risk of adverse health outcomes following alleged exposure to a wide-variety of products and chemicals (including but not limited to asbestos, talc, heavy metals, chlorinated solvents, persistent chemicals, pesticides/herbicides and various volatile organic compounds). She has the ability to synthesize and integrate mechanistic and toxicokinetic data, rodent based toxicological evaluations, and epidemiological evaluations to opine on general causation. Experience evaluating numerous potential exposures with outcomes such as Parkinson's Disease, Non-Hodgkin's Lymphoma, Multiple Myeloma, mesothelioma, ovarian cancer, and various other types of cancer and non-cancer outcomes.

- *PFAS in Papermaking Sludge, Maine:* Retained to provide expert witness services for a class action and personal injury suit alleging exposure to PFAS in drinking water related to application of biosolids containing papermaking sludge (both direct application by paper-making industry, and municipal wastewater treatment biosolids containing papermaking sludge). In the process of assessing the client's relative contribution to observed PFAS impacts and the scientific basis for the health effects alleged by the Plaintiffs.
- *Alleged Asbestos Exposure, Canada:* Prepared expert report quantifying alleged worker exposure to a gasket at a large industrial facility.
- *Large Industrial Client, Nationally:* Assist in PFAS MDL cases providing underlying support related to toxicology, epidemiology and derivation of regulatory standards.
- *Industrial Lagoons, New Jersey:* Performed sophisticated statistical analysis using multiple lines of evidence to demonstrate that elevated arsenic levels in upland soil of an industrial facility were attributable to background/fill conditions, not site operations.

- *City of Napa, Lead Impacts:* Evaluated past, current and future exposure to City personnel training at the Napa Police Department Firing Range (impacts include lead, metals, and petroleum compounds). Developed best management practices for the City to ensure safe practices moving forward, and advised client regarding potential health risk associated with redevelopment work.
- *Air Modeling, Toxic Tort Case, Louisiana:* Assessed potential exposure to Plaintiffs using a surface water to air partitioning model and a Gaussian Plume model. Demonstrated that Plaintiff exposure to a volatile compound present in surface water was not occurring.
- *Multiple PCB Sites, South Boston MA:* Performed multiple complex Massachusetts Contingency Plan Method 3 Risk Characterizations for high profile redevelopment Sites in the Seaport of Boston. Demonstrated usability of historical data via spatial and statistical analysis. Statistical support helped to guide and streamline redevelopment and remediation efforts.
- *Prop 65: Litigation – Confidential Client, Japan:* Prepared memorandum for a large electronics manufacturer in response to a Notice of Violation of California EPA’s Proposition 65.
- *Assessment for Compliance with Prop65 – Multiple Clients:* Advised clients regarding 2018 labeling changes, product sampling and analysis, and evaluation of levels of exposure against Safe Harbor Levels for various consumer and food products.
- *Tank Car Facility, Ohio:* Performed a modified Risk Assessment Guidance for Superfund (RAGs) human health risk assessment for 160-acre tank car maintenance facility impacted with petroleum hydrocarbons, solvents, and metals. Exposure media of concern included soil, soil gas, indoor air, and groundwater. Evaluated current and future scenarios at various exposure units in accordance with Ohio EPA guidance. Prepared weight of evidence evaluation assessing the potential presence of Chromium VI at the Site in the absence of speciated Chromium data. Identified Remedial Action Objectives (RAOs) and calculated Preliminary Remediation Goals (PRGs).
- *Fish Ingestion, West Virginia:* Evaluated surface water and sediment contaminated with heavy metals and polycyclic aromatic hydrocarbons (PAHs) to estimate fish tissue concentrations in two rivers impacted by a former zinc smelting facility. Estimated risk for ingestion of contaminated fish to demonstrate that the exposure pathway not of concern at the Site.
- *Relative Dioxin Toxicity, New Jersey:* Performed toxicity equivalency evaluation of products allegedly containing dioxin congeners discharged to river. Determined congener weighted toxic equivalency factors (TEFs) of products were orders of magnitude less toxic than 2,3,7,8-Tetrachlorodibenzo-p-dioxin.
- *Synthetic Turf Exposure, California:* Performed data evaluation, and exposure assessment, a toxicity assessment, and risk characterization to evaluate potential child, adult and staff exposures to PAHs and metals detected in synthetic turf via incidental ingestion, dermal contact, and outdoor inhalation for a local municipality. Determined that the cumulative cancer risk and non-cancer hazard estimates for the most sensitive populations did not exceed Cal-EPA target health goals.
- *Risk Evaluations, California:* Performed numerous human health screening evaluations (HHSEs) and human health risk assessments (HHRA) consistent with Department of Toxic Substances Control (DTSC) Health and Ecological Risk Office (HERO) methodology. Prepared statistical evaluations attributing elevated levels of metals to background conditions and evaluated lead contamination using DTSC’s LeadSpread model. Familiarity with derivation of DTSC Screening Levels, and San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels (ESLs).
- *Former Petroleum Bulk Storage Facility, Vermont:* Performed a modified RAGs Human Health Risk Assessment consistent with VTDOH methodology at a former bulk storage facility impacted with PAHs, metals, solvents and petroleum compounds. Evaluated five complex exposure units from a future land use perspective; coordinated deed restrictions limiting future use of the property to position site for regulatory closure.
- *Surface Water Exposure, New Jersey:* Conducted quantitative human health risk assessment for a pond at a Site for which New Jersey’s Surface Water Quality Standards were not applicable (N.J.A.C 7:9b). Risk characterization for VOC impacts determined that the cumulative cancer risk and non-cancer hazard estimates did not exceed target health goals.
- *Surface Water Exposure, Philadelphia:* Completed quantitative human health risk assessment to evaluate potential child and adult residential and recreational exposures to surface water along a stream. Determined that the cumulative cancer risk and non-cancer hazard estimates, using the most conservative assumptions, did not exceed target health goals.
- *Multiple Sites, Massachusetts:* Prepared Massachusetts Contingency Plan Method 1 and Method 3 risk characterizations at Sites with petroleum, chlorinated solvents, metals, PAHs, PCBs and other environmental impacts. These sites have included dry-cleaning facilities, petroleum terminals and refineries, and redevelopment projects.
- *Abandoned Uranium Mines, Navajo Nation:* Evaluated environmental hazards and human health risks posed by seventy abandoned uranium mines in Arizona. Compiled a GIS database to assess complete exposure routes, and determine appropriate remediation measures.

**Other Litigation Support**

- *Former Dry Cleaning Facility, Oklahoma:* Provided expert opinions regarding the nature and extent of contamination, and causation of a release of tetrachloroethylene (PCE) at a former dry-cleaning facility in Oklahoma. Expert opinions supported an allocation indicating a *de minimus* contribution from client.
- *Former Iron Smelter, California:* Performed fingerprinting statistical analysis using trace metals signatures of electric arc furnace fugitive emissions (via principal component analysis). Determined arsenic and lead contamination associated with operation of former steel smelter migrated to neighboring school property.
- *NCP Compliance:* Reviewed technical reports and other documentation for a national electronics manufacturing facility, a wood-treating facility, a mining and chemical processing facility, a cast-plate facility and at two nuclear processing facilities to determine their compliance with USEPA and State requirements. Technical evaluation performed regarding a variety of response actions including: remedial actions, non-time critical removal actions, and time-critical removal actions under the National Contingency Plan. Evaluated compliance related to documentation of costs, appropriateness of response, public information and community relations.
- *National Industrial Client:* Involved in expert opinion related to multi-billion-dollar trial in Federal Bankruptcy Court. Scope involved estimating costs of legacy environmental liabilities that contributed to a historic \$5.15B environmental settlement. Legacy sites included wood-treating, agricultural and chemical manufacturing, mining, waste disposal and petroleum sites. Evaluated sensitive receptors, contamination pathways and magnitude of environmental impact to develop metric cost estimating methodology for wood-treating, agricultural and chemical manufacturing, and petroleum sites. Prepared a sensitivity analyses on estimated costs.
- *Evaluation of Twelve Historical Paper Mills, Michigan:* Performed an in-depth evaluation of the wastewater treatment systems of twelve paper mills over the span of 50-years in support of a total suspended solids (TSS) loading analysis. Compiled flow diagrams for twelve facilities illustrating operational changes and upgrades to each of the wastewater treatment systems, and evaluated against the historical standard of care and state of knowledge. Provided defensible estimates of TSS effluent from each of the twelve paper Mills, which another expert used to determine polychlorinated biphenyl (PCB) loadings to the river for allocation purposes. Project manager and client liaison.
- *Chemical Manufacturing Facility, New Jersey:* Evaluated the transport pathways from a large chemical manufacturing plant to the Lower Passaic River, and how contributions from the plant varied between owners/operators. Assessed the historical chemical manufacturing process,

and evaluated the effectiveness, implementability and costs of historical large-scale sediment dredging sites. Prepared deposition questions for two opposing Experts, and provided technical support to council during deposition of two opposing Expert witnesses.

- *Former Naval Facility, Various Contaminants, California:* Evaluated metals, PCB, total petroleum hydrocarbon (TPH), volatile organic compound (VOC), semi-volatile organic compounds (SVOC), and chlorinated solvent contamination in soil and groundwater to determine when contamination was known or reasonably knowable, necessity and reasonableness of remediation costs/insurance claims, and nature of the interaction with regulators.
- *Chemical Manufacturing Facility, Chlorinated Solvents, New Jersey:* Evaluated the historical standard of care and state of knowledge of trichloroethylene (TCE) handling and toxicity at a chemical manufacturing facility. TCE disposal allegedly contaminated groundwater and impacted residential neighborhood.
- *Industrial Complex, New Jersey:* Evaluated nexus to the Lower Passaic River, including evaluation of transport pathways, evaluation of historical sewer configuration, and quantification of possible contribution via mass loading calculations. Prepared correspondence to the United States Environmental Protection Agency (USEPA) illustrating *de minimus* contributions from the Site to the Lower Passaic River.
- *Industrial Complex, New Jersey:* Compiled historical data regarding tenancy, historical operations, chemical usage and standard of care to determine the nature and timing of a release at an industrial complex devastated by a fire. Completed a forensic evaluation to determine nature and timing of release of petroleum distillates via fingerprinting analysis. Evaluated the necessity and reasonableness of past response costs, and apportioned past and future costs between multiple parties using GIS software. Completed an evaluation of NRD claims and settlements for analogous sites in support of settlement negotiations.
- *Former Pesticide Manufacturing Facility, India:* Conducted a literature of background contamination of Indian soils, nallas, and groundwater. Demonstrated that elevated metal and pesticide concentrations surrounding the site were consistent with background concentrations, and not attributable to site conditions.
- *International Oil and Gas Exploration Client:* Analyzed data pertaining to major oil spill and impacts to shoreline, natural resources, and local industries. Evaluated fate and transport, weathering and fingerprinting of oil using chemical data analysis of product, sediment, water and shoreline samples.
- *National Electronic Manufacturing Client:* Evaluated the appropriateness of an analytical method of Ozone

Depleting Compound detection via data compilation and analysis.

**PUBLICATIONS AND SPEAKING ENGAGEMENTS**

Boston, C. and Coffin, S. Environmental Law Explored. A Podcast SEERies. ABA Section of Environment, Energy and Resources. Microplastics Human Health and Human Toxicology. 2023.

Boston, C., Goswami, E., and Cunningham, A.B. “Forever Young, Forever Chemicals? PFAS in Cosmetics: Health and Litigation Risks.” Roux Webinar. December 8, 2022.

Baroni, M., Boston, C. “Microplastics Regulations on the Horizon – How Might They Impact the Plumbing Manufacturing Industry?” Plumbing Manufacturers International. October 25, 2022.

Baroni, M., Boston, C. “Microplastics: Liability and Scientific Uncertainty.” American Bar Association. September 15, 2022.

Baroni, M., Boston, C., Dunn, A., Fleming, G. Plain, C. “Emerging Chemicals: From Microplastics to Forever Chemicals.” American Bar Association. Environmental & Energy, Mass Torts, and Products Liability Litigation Committees’ Joint Virtual Regional CLE Program. January, 2022.

Boston, C., Love, A.H., Keck, S. 2022. How the Scientific Community Studies Causation in Toxic Exposure and Disease: Perspectives from the Scientific, Regulatory and Legal Communities on Causation. The Journal of Science and Law. 10(1), 1-17.

Schlezingner J., Hyötyläinen, T., Sinioja, T., Boston, C., Puckett, H., Oliver, J., Heiger-Bernays, W., and Webster, T.F., 2021. Perfluorooctanoic acid induces liver and serum dyslipidemia in humanized PPAR $\alpha$  mice fed an American diet. Toxicol Appl Pharmacol. 2021.

Boston C., Buermann, G.H., Scholz, A.A., Olear, K. Scian, P. “Microplastics: An Overview of Emerging Risks.” Perrin Conferences Environmental Risk & Litigation. October, 2021.

Boston, C., Baroni, M., Henke, R. “Microplastics: Small Particles: Big Consequences?.” Roux webinar. September, 2021.

Boston, C., DeWitt, J. and Welter, J. “Scientific Analysis, Regulatory Perspective and Court Gatekeeping.” FETTT Chicago. September, 2021.

Boston, C., Arvola, M., Stack, D. “The Gatekeeper: The Court’s Rile in Allowing Scientific Evidence” Perrin Conferences MassTort Litigation Conference. June, 2021.

Boston, C., Buermann, G., Alvina, G., Deluderroy, N., Green, S. “PFAS 3.0: Staying Ahead of the Wave” Emerging Environmental Claims Management Association. April, 2021.

Boston C., Englot, S., Cunningham, A., Alviggi, C. “Under the Radar: PFAS in Products.” Perrin Conferences Environmental Risk & Litigation. October, 2020.

Boston, C., Miller, M., Valdez, S., Anderson, O., Denton, C. Environmental & Energy Committee Breakout: “PFAS: Forever Chemicals That Are Everywhere, Even Courthouses.” American Bar Association 2020 Environmental & Energy, Mass Torts, and Products Liability Litigation Committees’ Joint Regional CLE, January 2020.

Boston, C., Banacos, N. and Heiger-Bernays, W. “Per- and Polyfluoroalkyl Substances: A National Priority for Safe Drinking Water,” *SAGE journals: Public Health Reports*. 2019. Volume 134, Issue 2.

Boston, C. and Love, A. “Understanding the Uncertainty with Unregulated Contaminants,” *American Bar Association Environmental & Energy Litigation*. June 13, 2018.

Ram, N. Moore, C. and McTiernan, L. “Cleanup Options for Navajo Abandoned Uranium Mines,” *Journal of Remediation*. Spring, 2016.

Sullivan, D.G., Kwan, W., Gerbig, C., and Moore, C. “Proactive Evaluation of PRP Status at Hazardous Waste Disposal Sites,” *Environmental Claims Journal*, June 18, 2015.

Ram, N., Kwan, W., Gerbig, C. and Moore, C. “Extricating Membership as a PRP at Hazardous Waste Disposal Sites,” *Journal of Remediation*, Spring 2014, Volume 24, Number 2.

**HEALTH & SAFETY**

OSHA 29 CFR 1910.120 40-Hour Safety Training

OSHA 29 CFR 1910.120(e) (8) 8-Hour Refresher Training

DOT 49 CFR Hazardous Materials Awareness, Modal and Function- Specific Training

MSHA Part 48 Surface Metal/Non-Metal Mine Safety Training Loss Prevention System (LPS) Trained

**APPEARANCES AND EXPERT REPORTS**

Melford Berns, et al. vs. Monsanto Company. In the Circuit Court of the City of St. Louis State of Missouri. Case No. 1922-CC11326. Expert Report. Deposition February 3, 2023.

Michael Evard et al. vs. Monsanto Company. In the Circuit Court of Cook County, Illinois. Case No. 2019-L-011574 (Consolidated with 2019 L 010612). Expert Report. Deposition July 28, 2022.

In the matter of Raymond Desrosiers v. Potters Industries Canada. *Commission des normes, de l’équité, de la santé et de la sécurité du travail*. Expert Report. April 1, 2022.

Stratford Holding, LLC. vs. Foot Locker Retail, Inc., et al. In the United States District Court for the Western District of Oklahoma. Case No. CIV-12-722-HE. Expert Report.