

D. Frederick Bodishbaugh, Ph.D.
Managing Ecotoxicologist

Professional Profile

Dr. Rick Bodishbaugh is a Managing Ecotoxicologist in Exponent's EcoSciences practice. He has 19 years of diverse experience in aquatic toxicology research, chemical and site assessment, ecological risk assessment (ERA) in aquatic and terrestrial systems, and natural resource damage assessment (NRDA). His specific areas of technical expertise include fish and wildlife toxicity assessment, resource/habitat equivalency analysis (REA/HEA), bioavailability of chemical contaminants in aquatic and terrestrial ecosystems, and chemical structure-activity relationships. Dr. Bodishbaugh's graduate research focused on the aquatic toxicology of synthetic surfactant and other organic pollutants. Originally trained as a chemical engineer, he also has 4 years of experience as a geophysical and geochemical engineer in the international offshore oil and gas industry, and is trained and experienced in geophysical surveying and reservoir geology. Dr. Bodishbaugh also has formal training in marine biochemistry, molecular biology, and bioremediation principles.

Dr. Bodishbaugh is experienced in evaluating the effects of contaminated soil, groundwater, surface water, and sediments on ecological receptors. He has conducted assessments of chemical risk at dozens of sites for energy, petrochemical, pulp and paper, manufacturing, and mining industry clients. He is intimately familiar with federal, regional, and various state guidance and standards or practice for ERA under common regulatory frameworks, and has extensive face-to-face negotiation experience with federal and state regulatory agency technical staff across the U.S. He is also experienced in evaluating and interpreting field bioaccumulation and laboratory toxicity bioassay data for use in assessing ecological risk. He is well versed in the environmental toxicology and assessment of metals and persistent organic pollutants, especially PCBs and PAHs.

Dr. Bodishbaugh is experienced in providing technical support in a litigation context. He has extensive NRDA experience, and has helped clients develop defensive and settlement strategies for NRDA claims by federal, state, and tribal trustees at sites in Alaska, California, Indiana, Missouri, New Jersey, New York, Texas, and Washington. He is an expert in the application of REA and HEA, including applications for assessment of groundwater injury. He has worked closely with client legal teams to assess and critically evaluate the technical merits and costs of natural resource liability and settlement options, and has represented industry clients in both formal and informal trustee negotiations to arrive at rational injury assessments and cost effective, restoration-based compensation options. He has provided deposition testimony on NRD liability for east and west coast clients, and has contributed to numerous expert reports for NRD cases.

Academic Credentials and Professional Honors

Ph.D., Aquatic Toxicology, Duke University, 1995

B.S., Chemical Engineering, University of Tulsa (*cum laude*), 1985

Publications

Pastorok RA, Noftsker C, Iannuzzi TJ, Ludwig DF, Barrick RC, Ruby MV, Bodishbaugh DF. Natural remediation of polynuclear aromatic hydrocarbons and other petroleum hydrocarbons. In: Natural Remediation of Environmental Contaminants: Its Role in Ecological Risk Assessment and Management. Swindoll M, Stahl Jr RG, Ells SJ (eds), SETAC General Publications Series, Society of Environmental Toxicology and Chemistry, SETAC Press, Pensacola, FL, pp. 159–198, 2000.

Bodishbaugh DF. Acute toxicity mechanisms and quantitative structure-activity relationships of alkylphenol polyethoxylate surfactants in fish. Dissertation. Duke University, Durham, NC, 1995.

Bonaventura C, Bonaventura J, Bodishbaugh DF. Environmental bioremediation: Approaches and processes. In: Ecotoxicity and Human Health: A Biological Approach to Environmental Remediation. Bloom AD and de Serres FJ (eds) CRC Press, Boca Raton, FL, 1995.

Bonaventura C, Bonaventura J, Bodishbaugh DF. Environmental bioremediation: Applications and new horizons. In: Ecotoxicity and Human Health: A Biological Approach to Environmental Remediation. Bloom AD and de Serres FJ (eds) CRC Press, Boca Raton, FL, 1995.

Selected Presentations

Ginn T, Bodishbaugh DF. Key issues for use of habitat equivalency analysis in scaling compensatory restoration projects. Presentation at SETAC Annual Meeting, Portland, OR, November 2004.

Bodishbaugh DF, Moore ML, Godtfredsen KL. Congener composition of environmental PCB mixtures: An empirical analysis. Presentation at SETAC Annual Meeting, Austin, TX, November 2003.

Bodishbaugh DF. Toxicity endpoint extrapolation for characterization of ecological risk: Which method is right? Invited presentation at SETAC Annual Meeting, San Francisco, CA, November 1997.

Bodishbaugh DF. Toxicity assessment for calculation of ecological risk: The deterministic vs. probabilistic approaches to endpoint extrapolation. Presentation at SETAC Annual Meeting, Washington, DC, November 1996.

Bodishbaugh DF. *In vitro* studies of acute toxicity mechanisms and structure-activity relationships of nonionic surfactants in fish. Presentation at SETAC Annual Meeting, Denver, CO, November 1994.

Project Experience

Natural Resource Damage Assessment

Performed injury assessments and developed restoration alternatives for more than a dozen NRDA sites, involving PCBs, mining wastes, pulp mill effluent, chemical plant discharges and other hazardous releases. Habitats assessed include freshwater rivers and lakes, estuaries, and marine systems, as well as terrestrial habitats.

Familiar with NOAA, DOI, and various state trustee guidance and standard NRDA methods. Experienced in emerging NRDA issues, such as evaluation of groundwater resource damages, resource scaling in sensitive habitats, allocation at complex industrial sites, and allegations involving wood waste.

Developed client-customizable HEA computational tools for real-time evaluation of injury and restoration alternatives. Provided technical support and strategy in preparation for and during legal negotiations between industry clients and trustees on NRD settlements.

Developed and provided scientific rationale for cost-effective HEA-based restoration alternatives to avoid an expensive and arbitrary cash settlement. Presented and defended NRDA alternatives and technical justifications to trustees during face-to-face settlement negotiations.

Ecological Risk Assessment

Conducted or supervised ERAs for numerous industrial facilities where a combination of organic and inorganic contaminants were risk drivers. Sites have included pipelines, foundries, refineries, petrochemical plants, wood preservative sites, manufactured gas plant sites, shooting ranges, pulp mills, landfills, shipyards, mining sites, research facilities, and munitions plants. State-of-the-art approaches for ecological screening assessments, receptor exposure modeling, toxicity assessment, and chemical hazard characterization were integrated to form rational, science-based site assessments.

Conducted extensive bioavailability and bioaccumulation assessments for organic and inorganic contaminants in aquatic systems to provide higher tiers of assessment at complex sites where conventional bulk sediment assessment failed to produce feasible remedial alternatives. Successfully implemented habitat assessment and bioavailability analysis as tools to focus the scope of ecological risk assessments and make site assessment manageable.

Conducted ERAs of PCB contamination for numerous industrial clients. Contamination scenarios evaluated include direct product discharges and indirect transport of product to soil, groundwater, and surface water, including sensitive habitats. Industrial sites evaluated include pipeline facilities, heavy manufacturing facilities, and landfills. Developed site-specific food

web modeling approaches to the assessment of risk from PCBs, and negotiated technical approaches to assessment with state and federal regulatory agencies. Reviewed and critiqued recent research developments and helped design original research into environmental toxicity of PCBs.

Developed, supported, and negotiated site-specific approaches to the assessment of metals toxicity at mining sites where natural mineralization and physical disturbance make bulk concentration a poor indicator of exposure and risk from site activities.

Litigation Support

Testified in deposition on general and site-specific NRDA issues on liability insurance case for a pulp and paper industry client in Alaska.

Testified in deposition on potential groundwater injuries at an industrial facility in New Jersey.

Authored and contributed to expert reports on NRDA issues submitted to state and federal courts on several NRD cases across the country.

Reviewed literature and served as an expert technical consultant for client legal teams, and authored affidavits on aquatic toxicity and biodegradation issues in support of active litigation concerning client product liability.

Conducted ERA and NRDA training for client legal staff.

Aquatic Toxicology Research and Consulting

Designed and conducted aquatic toxicity investigations using a variety of *in vivo* and *in vitro* techniques and test species, including studies on the toxicity mechanisms and structure-activity relationships of surfactant chemicals, detergents, and oil spill dispersants to fish.

Provided oversight for client-supported independent research used to establish the value of potential restoration projects.

Participated in the design of chronic dietary exposure studies to assess risk of endangered salmon species to PCBs and PAHs in estuarine sediments.

Served as technical consultant on potential endocrine disruptor effects of chemicals and client operations. Conducted training for client technical staff.

Professional Affiliations

- American Chemical Society
- Society of Environmental Toxicology and Chemistry