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Christopher M. Long, Sc.D., DABT

Principal

Dr. Long is an expert in the area of exposure and risk assessment, with particular expertise in indoor and outdoor air pollution, inhalation toxicology, air pollution epidemiology, air sampling and measurement, and exposure modeling. He has assessed exposures and health risks associated with airborne particulates such as diesel exhaust particulates, carbon black, coal ash, ambient sulfates and nitrates, asbestos, ambient ultrafines, engineered nanoparticles, metals (*e.g.*, hexavalent chromium, lead, arsenic), and bioaerosols, as well as with numerous gaseous criteria and hazardous air pollutants. Dr. Long's practice area includes evaluating product safety, with specific expertise in airborne exposures and electric and magnetic fields (EMF). He is a board-certified toxicologist (DABT).

Dr. Long has published more than 30 journal articles and book chapters in the areas of indoor and outdoor air pollution and exposure assessment. He is a member of the International Society of Exposure Science, the Air and Waste Management Association, and the American Chemical Society.

Areas of Expertise

- Exposure Assessment
- Human Health Risk Assessment
- Inhalation Toxicology
- Indoor/Outdoor Air Quality
- Electric and Magnetic Fields (EMF)

Services

- Toxicology & Risk Sciences
- Exposure & Risk Assessment
- Occupational Health & Safety
- Air Quality Sciences
- Renewables
- Climate Science
- Environmental Justice

Education

- Sc.D., Environmental Health, Harvard School of Public Health
- M.S., Environmental Engineering, Massachusetts Institute of Technology
- A.B., Chemistry and Environmental Studies, Bowdoin College
- Diplomate, American Board of Toxicology

Selected Projects

Indoor Air and Cancer Cluster Evaluation: Conducted a comprehensive indoor air evaluation for an office, sampling for volatile organic compounds (VOCs), particulate matter (PM), and other air pollutants. Evaluated the incidence of cancer among current and past employees and developed public communication materials.

Analysis of Air Quality Data and Public Health Studies Relevant to Marcellus Shale Development: Prepared a report providing an overview of the current science bearing on the potential community-level air quality impacts and public health risks associated with natural gas development activities in the Marcellus Shale region. Served as public health expert at local municipal hearings.

Transmission Line and Substation Electric and Magnetic Field (EMF) Assessments: Conducted modeling analyses of the EMF impacts of a variety of transmission line and substation projects involving both overhead and underground lines. Performed magnetic field monitoring studies. Served as EMF expert at regulatory hearings, open houses, and public meetings.

Offshore Wind Power Projects: To support the permitting of multiple offshore wind power projects, modeled EMF for both submarine and onshore export cables connecting the wind turbine generator arrays to the electrical grid system. Conducted EMF effects characterization for marine species and human health. Prepared reports for permitting filings and testified at regulatory hearings.

Inhalation Toxicity Assessment: Assessed relationship between occupational exposures to diesel engine exhaust and other substances (*e.g.*, creosote, silica dust, asbestos) and cancer risk among former railroad workers.

Selected Publications

Long, CM; Briggs, NL; Cochran, BA; Mims, DM. 2021. "Health-based evaluation of ambient air measurements of $PM_{2.5}$ and volatile organic compounds near a Marcellus shale unconventional natural gas well pad site and a school campus." *J. Expo. Sci. Environ. Epidemiol.* doi: 10.1038/s41370-021-00298-5.

Boomhower, SR; **Long, CM;** Li, W; Manidis, TD; Bhatia, A; Goodman, JE. 2021. "A review and analysis of personal and ambient PM2.5 measurements: Implications for epidemiology studies." *Environ. Res.* 204(Pt B):112019. doi: 10.1016/j.envres.2021.112019.

Long, CM; Briggs, NL; Bamgbose, IA. 2019. "Synthesis and health-based evaluation of ambient air monitoring data for the Marcellus Shale region." *J Air Waste Manag Assoc.* 69(5):527-547. doi: 10.1080/10962247.2019.1572551.

Long, CM; Valberg, PA. 2018. "Lowfrequency magnetic fields: Potential environmental health impacts." In *Encyclopedia of Environmental Health*, 2nd Edition, Vol. 3. (Ed.: Nriagu, JO), Elsevier, Burlington.