

## Gregory P. Brorby, DABT (1994-2024)

SENIOR CONSULTANT

### CONTACT INFORMATION

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### PROFESSIONAL PROFILE

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Mr. Gregory P. Brorby is a toxicologist with more than 30 years of experience in the fields of human health risk assessment, exposure simulation, dose reconstruction, and toxicology (board-certified from 1994 to 2024). Mr. Brorby has evaluated potential human health risks according to risk assessment methods prescribed in CERCLA and other guidance issued by state or federal agencies. These evaluations have involved a wide variety of chemicals (asbestos, metals, VOCs, SVOCs, pesticides/PCBs, dioxins and furans, petroleum hydrocarbons, and radionuclides); environmental media (air, soil, groundwater, surface water, plant material); and exposure scenarios (residential, commercial/industrial, recreational). Mr. Brorby focuses on integrating risk assessment into an overall risk management approach to site investigation and remediation. This approach uses site conceptual models to design risk-based sampling and analysis plans based on the current or proposed future site use; the scope of the investigation is thus streamlined to collect only data needed to support a risk-based decision.

Mr. Brorby has directed or participated in studies to estimate exposure to chemicals from use of consumer products (e.g., PVC-coated electrical cables, children's toys, jewelry, and food and beverage containers), particularly with regard to potential exposure via incidental hand-to-mouth contact, to assess compliance with CPSC, FDA, and California Proposition 65 requirements. Mr. Brorby has also directed or participated in studies to reconstruct historical exposures in occupational settings (e.g., vehicle mechanic exposure to asbestos in friction materials).

Mr. Brorby also specializes in conducting independent review of risk assessment-related work performed by others. He played an instrumental role in the dose reconstruction projects at Rocky Flats and the Oak Ridge Reservation, the Environmental Restoration Project at the Los Alamos National Laboratory, the RCRA/ CERCLA process at the Pantex Plant, and cleanup and restoration of former Naval Air Station Treasure Island. In this capacity, he worked closely with advisory panels and steering committees to develop risk assessment strategies and communicate complicated technical information to a non-technical audience.

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**ACADEMIC CREDENTIALS**

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1984 University of California, Davis, B.S., Zoology

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**CERTIFICATIONS**

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Diplomate, American Board of Toxicology (DABT) (1994-2024)

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**PROFESSIONAL ASSOCIATIONS**

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Society of Toxicology

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**MANUSCRIPTS**

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Thompson CM, **Brorby G**, Keig-Shevlin Z, Smith R, Franzen A, Ulrich K, Blanchette AD, Doepker C. 2023. Assessment of the in vivo genotoxic potential of three smoke flavoring primary product mixtures. *Environ Mol Mutagen* 64(8–9):420–431; doi: 10.1002/em.22576.

Thompson CM, Bhat VS, **Brorby GP**, Haws LC. 2021. Development of updated RfD and RfC values for medium carbon range aromatic and aliphatic total petroleum hydrocarbon fractions. *J Air Waste Manag Assoc* 71(12):1555–1567; doi: 10.1080/10962247.2021.1974123.

Wikoff DS, Bennett DC, **Brorby GP**, Franke KS. 2020. Evaluation of potential human health risk associated with consumption of edible products from livestock fed ration supplemented with Red Lake Diatomaceous Earth. *Food Addit Contam A* 37(5):804-814; doi: 10.1080/19440049.2020.1727963.

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Hanlon P, **Brorby GP**, Krishan M. 2016. A risk-based strategy for evaluating mitigation options for processed-formed compounds in food: Workshop proceedings. *Int J Toxicol* 35(3):358–370; doi: 10.1177/1091581816640262.10.1177/1091581816640262.

Mahadevan B, Thorsrud BA, **Brorby GP**, Ferguson HE. 2014. A 3-week dietary safety study of octenyl succinic anhydride (OSA)-modified starch in neonatal farm piglets. *Food Chem Toxicol* 72(Oct):83-89; doi: 10.1016/j.fct.2014.07.009.

**Brorby GP**, Sheehan PJ, Berman DW, Bogen KT, Holm SE. 2013. Exposures from chrysotile-containing joint compound: Evaluation of new model relating respirable dust to fiber concentrations. *Risk Anal* 33(1):161–176; doi: 10.1111/j.1539-6924.2012.01847.x.

Berman DW, **Brorby GP**, Sheehan PJ, Bogen KT, Holm SE. 2012. More on the dynamics of dust generation: The effects of mixing and sanding chrysotile, calcium carbonate, and other compounds on the characteristics of joint-compound dusts. *Ann Occup Hyg* 56(7):852–867; doi: 10.1093/annhyg/mes008.

**Brorby GP**, Sheehan PJ, Berman DW, Bogen KT, Holm SE. 2011. Potential artifacts associated with historical preparation of joint compound samples and reported airborne asbestos concentrations. *J Occup Environ Hyg* 8(5):271–278; doi: 10.1080/15459624.2011.566805.

Sheehan PJ, **Brorby GP**, Berman DW, Bogen KT, Holm SE. 2011. Chamber for testing asbestos-containing products: Validation and testing of a re-created chrysotile-containing joint compound. *Ann Occup Hyg* 55(7):797–809; doi: 10.1093/annhyg/mer48.

Bogen KT, **Brorby GP**, Berman DW, Sheehan PJ, Floyd M. 2011. Measuring mixed cellulose ester (MCE) filter mass under variable humidity conditions. *Ann Occup Hyg* 55(5):485–494; doi: 10.1093/annhyg/mer003.

Sheehan P, Bogen KT, Hicks J, Goswami E, **Brorby G**, Lau E, Ott B. 2010. Benzene inhalation of parts washers: New estimates based on measures of occupational exposure to solvent coaromatics. *Risk Anal* 30(8):1249–1267; doi: 10.1111/j.1539-6924.2010.01412.x.

**Brorby GP**, Sheehan PJ, Berman DW, Greene JF, Holm SE. 2008. Re-creation of historical chrysotile-containing joint compounds. *Inhal Toxicol* 20(11):1043–1053; doi: 10.1080/08958370802290595.

Buffler PA, Kelsh MA, Kalmes RM, Lau EC, Chapman PS, Wood SM, **Brorby GP**, Silva JM, Hooper HC, Rizzo BD, Wood R. 2007. A nested case-control study of brain tumors among employees at a petroleum exploration and extraction research facility. *J Occup Environ Med* 49(7):791–802; doi: 10.1097/JOM.0b013e318076b7bf.

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Paustenbach DJ, Finley BL, Lu ET, **Brorby GP**, Sheehan PJ. 2004. Environmental and occupational health hazards associated with the presence of asbestos in brake linings and pads (1900 to present): A “state-of-the-art” review. *J Toxicol Environ Health B* 7(1):25-80; 10.1080/10937400490231494.

## BOOK CHAPTERS

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**Brorby GP**, Zemo DA. 1998. Cutting through the regulatory maze toward site closure. In: *Contaminated Soils*, Volume 3. Calabrese EJ, Kostecki PT, Bonazountas M (eds). Amherst Scientific Publishers, pp. 1–9.

## ABSTRACTS AND PRESENTATIONS

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Suh M, Mittal L, **Brorby G**, Pastula S, Vincent M, Proctor D. Epidemiology is critical in advancing cumulative impact assessment (CIA) research: A pilot study in San Antonio, Texas. International Society of Exposure Science Annual Meeting, Montreal, Canada, October 2024.

Franzen AC, Thompson CM, **Brorby GP**, Wikoff DS, Ilkbahar Z, Doepker C. Risk assessment of three smoke flavoring primary products currently under re-evaluation by EFSA. Poster presented at Society of Toxicology 62<sup>nd</sup> Annual Meeting, Nashville, TN, March 2023.

**Brorby GP**. The ongoing controversy surrounding the effects of short-term exposure to trichloroethene. Presented at the Association for Environmental Health and Sciences Foundation Annual International Conference, San Diego, CA, March 19–22, 2018.

**Brorby G**, Ring C, Loko F, Harris MA. Characterization of hexavalent chromium and total chromium in drinking water monitoring data. Poster MP 117. Society of Environmental Toxicology and Chemistry (SETAC) North America 39<sup>th</sup> Annual Meeting, Sacramento, CA, November 4–8, 2018.

Wikoff DW; Welsh BT, Henderson R, **Brorby G**, Britt J, Myers E, Goldberger J, Lieberman HR, O'Brien C, Doepker C. Application of systematic review in the evaluation of caffeine safety: Potential adverse effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. Society of Risk Analysis Annual Meeting, Arlington, VA, December 10–14, 2017.

**Brorby G**, Suh M, Thompson C, Mittal L, Proctor D. Inhalation cancer risk assessment of cobalt metal. Presented at the Society of Toxicology's 55<sup>th</sup> Annual Meeting, New Orleans, LA, March 13–17, 2016.

Doepker C, **Brorby G**. The role of the toxicologist in the required food safety plans: A case study of ochratoxin A (OTA) in coffee. Presented at the Society of Toxicology's 54<sup>th</sup> Annual Meeting, San Diego, CA, March 22–26, 2015.

Proctor DM, Suh M, Tachovsky JA, Abraham L, Hixon JG, **Brorby GP**, Campleman SL. Cumulative risk assessment of urban air toxics: A pilot study in San Antonio, Texas. Presented at the Society of Toxicology's 53<sup>rd</sup> Annual Meeting, Phoenix, AZ, March 23–27, 2014.

**Brorby G**, Proctor, D, Perry C, Fitzgerald L, Tachovsky A. Probabilistic risk assessment of human exposure to iron and steel slag. Presented at the Society of Toxicology's 51<sup>st</sup> Annual Meeting, San Francisco, CA, March 11–15, 2012.

Sheehan PS, **Brorby GP**, Bogen KT, Berman DW, Holm SE. New basis for interpreting historical exposures to dust from chrysotile-containing joint compound. American Industrial Hygiene Conference and Exposition, Portland, OR, May 14–19, 2011.

Lowney Y, **Brorby G**, Kalmes K. Site-specific bioaccessibility of dioxins/furans in soil. Society of Toxicology 50<sup>th</sup> Annual Meeting, Washington, DC, March 6–10, 2011.

**Brorby G**, Boelter F, Jones R, Simmons C, Berman W, Sheehan P. Spiraling consequences of poor data quality. Professional Conference of Industrial Hygienists, Fort Worth, TX, October 9–12, 2010.

Sheehan P, Bogen K, **Brorby G**, Goswami E. Improved estimates of worker exposure to benzene during parts washing based on a new approach analyzing solvent and air data for other aromatic constituents. American Industrial Hygiene Conference and Exposition, Denver, CO, May 22–27, 2010.

**Brorby GP**, Sheehan PJ, Berman DW, Holm SE. Re-interpreting historical exposure data associated with the use of chrysotile-containing joint compound. Society of Toxicology 49<sup>th</sup> Annual Meeting, Salt Lake City, Utah, March 7–11, 2010.

Sheehan P, Bogen K, **Brorby G**, Goswami E. Worker inhalation exposure to benzene from solvents during parts washing. Society for Risk Analysis Annual Meeting, Baltimore, MD, December 6–9, 2009.

Sheehan P, **Brorby G**, Berman D, Holm S, Kolk B, Kolk A, Floyd M. Potential preparation artifacts associated with historical preparation of joint compound samples and reported airborne asbestos concentrations. International Society for Environmental Epidemiology & International Society of Exposure Analysis Joint Annual Conference, Pasadena, CA, October 12–16, 2008.

Kalmes R, **Brorby G**. Lead, lead everywhere—Evaluating potential exposure to heavy metals in consumer products. American Industrial Hygiene Conference and Exposition, Minneapolis, MN, May 31–June 5, 2008.

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- Finley B, Mowat F, Richter R, **Brorby G**, Craven V, Sheehan P. Evaluation of proposed threshold doses for chrysotile exposure and respiratory disease. Society of Toxicology 44th Annual Meeting, New Orleans, LA, March 6–10, 2005.
- Greene J, **Brorby G**, Paustenbach D. Reentry criteria for dioxin and dioxin-like compounds for building surfaces. Society of Toxicology 43rd Annual Meeting, Baltimore, MD, March 21–25, 2004.
- Paustenbach DJ, **Brorby GP**, Finley BL. Environmental and occupational health hazards associated with the presence of asbestos in brake linings and pads (1900 to present). Society for Risk Analysis Annual Meeting, Baltimore, MD, December 8–10, 2003.
- Paustenbach D, Williams P, **Brorby G**, Sheehan P. Residential exposures to elemental mercury due to releases from gas pressure regulators. Society for Risk Analysis Annual Meeting, Baltimore, MD, December 8–10, 2003.
- Brorby GP**, Foote GR, Zemo DA. Update on petroleum hydrocarbon issues in California: implications for site closure. Workshop, 10th Annual West Coast Conference on Contaminated Soils and Water, San Diego, CA, March 20–23, 2000.
- Brorby GP**, Zemo DA. What's my risk? An innovative approach to assessing health risks in an established neighborhood. National Groundwater Association Conference, Petroleum Hydrocarbons and Organic Chemicals in Groundwater: Prevention, Detection, and Remediation, Houston, TX, November 17–19, 1999.
- Bloes MB, Spencer AL, **Brorby GP**. How deep do we go and what do we look for? Risk-based/planned use investigations. 9th Annual West Coast Conference on Contaminated Soils and Groundwater, Oxnard, CA, March 15–18, 1999.
- Brorby GP**, Job LB, Spencer AL, Zemo DA. An argument against developing TPH-based Tier 1 ecological screening values to evaluate petroleum hydrocarbon releases to soil and groundwater. Proceedings, National Groundwater Association Conference, Petroleum Hydrocarbons and Organic Chemicals in Groundwater: Prevention, Detection, and Remediation, Houston, TX, November 11–13, 1998.
- Job LB, **Brorby GP**. Feasible alternatives to TPH-Based Tier 1 ecological screening levels to evaluate petroleum hydrocarbon releases to soil and groundwater. Proceedings, 5th Annual International Petroleum Environmental Conference, Albuquerque, NM, October 20–23, 1998.
- Spencer AL, **Brorby GP**. Hitting a home run for the Giants' stadium: A risk management approach to site investigation and remediation. Proceedings, Conference of the American Society of Civil Engineers, Boston, MA, October 18–21, 1998.
- Zemo DA, **Brorby GP**, Bloes MB, Jefferson JL. Roadmap for closure: development and implementation of a risk-based "consistent approach" for a pipeline system. Proceedings, 5th Annual International Petroleum Environmental Conference, Albuquerque, NM, October 20–23, 1998.
- Brorby GP**, Spencer AL, Graf TE. 1997. Risk-based corrective actions begin with risk-based investigations—a case study. Proceedings, National Ground Water Association Conference, Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Remediation, Houston, TX, November 12–14, 1997.
- Brorby GP**, Hicks J, Otani-Wilson JM, Tull JD. Health risk assessment in the DOD base closure process. 2-Day Short Course, University of California at Davis Extension, Sacramento, CA, May 9–10, 1996.

**Brorby GP**, Dorries AM, Lewis JL, Smith V, Black KJ, McCann JP. Phased development of a background data set for evaluating polycyclic aromatic hydrocarbons in soil at the Los Alamos National Laboratory. Society for Risk Analysis Annual Meeting, Honolulu, HI, December 3–6, 1995.

**Brorby GP**. Designing the risk-based remedial investigation, basic applications in risk assessment short course. Society of Toxicology 34th Annual Meeting, Baltimore, MD, March 5–9, 1995.

**Brorby GP**, Bruce GM, Ripple SR, Widner TE. Use of screening methods to focus future investigations of off-site health risks from past Oak Ridge operations. Society of Toxicology 33rd Annual Meeting, Dallas, TX, March 13–14, 1994.

**Brorby GP**, Finley B. Standard probability density functions for routine use in environmental health risk assessment. Society for Risk Analysis Annual Meeting, Savannah, GA, December 5–8, 1993.

**Brorby GP**. The hazards of risk communication. National Safety Council, Research and Development Executive Committee Annual Meeting, April 22, 1993.