



Brooke D Simmons, MPH, CIH

Current Position

Principal Health Scientist

Discipline Areas

- > Industrial Hygiene
- > Exposure Assessment
- > Human Health Risk Assessment

Years' Experience

13 Years

Joined Cardno

2007

Education

- > MPH, Environmental Health Science, University of California, Berkeley, 2013
- > BA, Integrative Biology, University of California, Berkeley, 2007

Summary of Experience

Ms. Brooke Simmons is a Principal Health Scientist with Cardno ChemRisk. She is a board certified industrial hygienist with over 13 years of professional experience in exposure assessment and human health risk assessment. Her primary training and areas of expertise include industrial hygiene, exposure assessment, exposure reconstruction and human health risk assessment. She has been involved in researching, measuring exposure, reconstructing dose and exposure, and assessing risk to consumers and workers exposed in occupational settings, from consumer products, in the home, in the environment, and in other settings to a variety of chemicals and agents including asbestos, benzene, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxins, trichloroethylene (TCE), tetrachloroethylene (PCE), formaldehyde, hexane, cadmium, copper, arsenic, mercury, nickel, lead, silica and mold. She has also investigated the health risks associated with heat and noise in occupational settings. Ms. Simmons is experienced in determining contaminants of potential interest and designing industrial hygiene sampling protocols for various agents and settings. She has evaluated historical and contemporary compliance with applicable federal and state-level standards and regulations.

Significant Projects

Exposure Reconstruction and Health Risk Assessment

Designed and conducted a sampling campaign to evaluate potential airborne exposures to PCBs as a result of construction-related activity.

Designed and conducted an exposure simulation study to characterize short- and long-term potential worker and bystander exposure to asbestos during the application and removal of HVAC duct sealant material.

Designed and conducted a lead sampling campaign to evaluate potential exposures through soil, paint and water. Evaluated potential exposures based on activity patterns in relation to potential health effects.

Evaluated and provided continued monitoring of indoor air quality in response to odor concerns in a commercial facility.

Evaluated the available data regarding the presence of mold in a residential setting in relation to potential health effects.

Conducted sampling for mold spores to assess potential contamination and remediation efforts in a commercial facility.

Designed and conducted an exposure simulation study to characterize short term potential airborne exposures due to a sodium chlorite spill. Evaluated potential health risk.

Conducted an exposure assessment of potential exposures to PCBs in a school setting.

Conducted a human health risk assessment of residential exposure to airborne contaminants associated with a refinery duct fire. Work included conducting a literature review of COPCs associated with refinery fires and the burning of petroleum products.

Contributed to the design and completion of an exposure simulation study to characterize potential short-term formaldehyde exposures to consumers during the use of self-tanning products.

Designed and conducted an exposure simulation study to characterize short-term potential worker and bystander exposures to asbestos while cutting a commercial siding material.

Contributed to the design and completion of an exposure simulation study to characterize short- and long-term potential worker and bystander exposures to asbestos during removal of motorcycle brakes.

Assisted in conducting an exposure and health risk assessment of residential exposure to various volatile organic compounds, including toluene, benzene, ethylbenzene, PCE, TCE, and others, due to potential vapor intrusion in a mobile home.

Assisted in conducting a large-scale exposure reconstruction in refinery workers, which involved analysis of a large industrial hygiene dataset focusing on benzene exposure.

Designed and conducted a simulation study to understand para-occupational exposures to chrysotile asbestos fibers. Conducted personal and area airborne concentration sampling during contamination and clothing "shake-out" events. The manuscript summarizing this analysis was published in 2014 (Sahmel et al. 2014).

Conducted a health risk assessment of residential exposures to PCE, TCE, and 1,1-DCE. Assessment included environmental modeling of exposure to the abovementioned chemicals by way of ingestion of and direct/indirect inhalation of potentially contaminated ground water.

Assessed potential polychlorinated biphenyl (PCB) exposure to community residents surrounding a superfund site. Reviewed levels of PCBs found in serum and conducted a literature review of PCB related health effects and background levels. Also reviewed and analyzed methodology used in related risk assessments.

Assessed theoretical exposures and associated cancer and non-cancer risk to dioxins/furans and polycyclic aromatic hydrocarbons (PAHs) of a community surrounding a wood treating facility.

Evaluated potential health risks associated with fish consumption among recreational and subsistence anglers in the San Diego Bay. Exposure pathways were developed to assess cancer and non-cancer risks associated with consumption of fish and shellfish. Potential chemicals of concern included PCBs, arsenic, copper, cadmium, and mercury.

Assisted in conducting a health risk assessment of worker exposure to cobalt, molybdenum trioxide, nickel, and aluminum dust during reactor catalyst loading and unloading procedures based on historical air monitoring conducted at a large refinery. Reviewed and summarized risk assessment and nickel related exposure and toxicology literature.

Evaluated the potential for benzene and other VOC exposure from solvent materials. Reviewed and analyzed VOC exposure and disease literature.

Evaluated the potential for welding fume exposure. Reviewed and analyzed relevant literature to determine exposure levels and potential chemicals of concern.

Evaluated the regulatory expectations and industry practice of multi-employer worksites as they relate to contractor employee health and safety.

Assisted in the assessment of diseases and other health claims alleged to have occurred following contamination of groundwater by chlorinated hydrocarbon solvents.

Consumer Products

Assessed exposure to diethanolamine from use of sunscreen product in relation to California's Proposition 65 regulations.

Assisted in conducting a quantitative exposure assessment associated with lead in consumer products containing PVC. Accessible lead was measured by wiping all product surfaces with the potential for consumer contact using commercially available wipes. Hand to mouth lead exposure was estimated for the normal use of the product, and dose estimates were compared to the California Office of Environmental Health Hazard Assessment Maximum Allowable Dose Level mandated by the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

Assessed potential cadmium exposures from glassware and other consumer products through incidental ingestion and hand to mouth transfer. Reviewed exposure and toxicology literature, sampling methodology and regulatory action.

Industrial Hygiene and Safety

Assisted in preparing re-opening guidelines associated with the AIHA COVID-19 Re-Open America/Back to Work Safely Guidance Review Team.

Advised small businesses regarding best safety and industrial hygiene practices regarding COVID-19.

Investigated potential emissions from four types of 3D printers: material extrusion, material jetting, powder bed fusion, and vat polymerization. Developed a framework to identify contaminants of potential concern (COPCs), and applied the framework to each printer type to design an IH sampling strategy. Conducted an emissions assessment for VOCs, potentially hazardous gases, and particulate matter including nanoparticles for a 3D printing laboratory.

Evaluated and revised a medical surveillance standard for a major oil and gas company. Reviewed and updated policies for general medical surveillance as well as fitness for duty for specific refinery groups and emergency response personnel.

Performed qualitative and quantitative exposure assessment and established similar exposure groups (SEGs) at multiple oil refineries. Project consisted of a review of personnel job titles as well as process units at each refinery. Collected on-site information regarding job duties, exposure potential, PPE usage, and other control measures. In

addition, collected baseline personal VOC, welding fume, and noise samples to inform future sampling efforts.

Performed noise monitoring in engine room spaces aboard two oil tankers. Determined areas where double hearing protection should be required and implemented procedural changes.

Performed volatile organic compound sampling during crude oil cargo transport and transfer. Conducted ergonomic evaluations of shipboard clerks and personnel.

Developed Near Miss Study methodology and conducted a review of all reported near misses from 2009 through 2011 for a crude oil shipping company. Identified activities and procedures with highest near misses and highlighted areas for improvement.

Reviewed and revised existing heat illness procedures. Developed additional guidance and training materials for crude oil shipping company employees.

Regulatory

Researched and drafted Canadian governmental guidelines regarding the environmental concentrations and typical daily intake of naphthalene

Certifications

- > Certified Industrial Hygienist (CIH), Comprehensive Practice (CP# 10397), American Board of Industrial Hygiene (ABIH), Re-certified 2019

Professional Honors/Awards

- > National Institute of Occupational Health and Safety (NIOSH) training grant recipient, 2011-2013

Membership and Service to Professional Societies

- > American Conference of Governmental Hygienists (ACGIH) 2019-present
- > American Industrial Hygiene Association (AIHA) 2009-present
 - > COVID-19 Re-Open America/Back to Work Safely Guidance Review Team
 - > AIHA Risk Committee
 - > AIHA Students and Early Career Professionals Committee
 - > AIHA Northern California Section (AIHA-NCS), 2010-present
- > Genetic and Environmental Toxicology Association (GETA), 2007-present
 - > Executive Board Member, 2010-2015

Publications

- > Zisook, R.E., B. D. Simmons, M. Vater, A. Perez, E. P. Donovan, D. J. Paustenbach & W. D. Cyr (2020) Emissions associated with operations of four different additive manufacturing or 3D printing technologies, Journal of Occupational and Environmental Hygiene, DOI: 10.1080/15459624.2020.1798012
- > Gaffney, S.H., M. Grespin, L. Garnick, D.A. Drechsel, R. Hazan, D.J. Paustenbach, and B.D. Simmons. 2017. Anthophyllite asbestos: State of the science review. J Appl Toxicol. 37:38-49.
- > Sahmel, J., C.A. Barlow, B. Simmons, S.H. Gaffney, H.J. Avens, A.K. Madl, J. Henshaw, R.J. Lee, D. Van Orden, M. Sanchez, M. Zock, and D.J. Paustenbach.

Presentations and
Published Abstracts

2014. Evaluation of take-home exposure and risk associated with the handling of clothing contaminated with chrysotile asbestos. *Risk Anal.* 34(8):1448-68.
- > Donovan, E.P., B.L. Donovan, M.A. McKinley, D.M. Cowan, and D.J. Paustenbach. 2012. Evaluation of take home (para-occupational) exposure to asbestos and disease: A review of the literature. *Crit Rev Tox.* 42(9):703-731.
 - > Donovan E.P., B.L. Donovan, J. Sahmel, P.K. Scott and D.J. Paustenbach. 2011. Evaluation of bystander exposures to asbestos in occupational settings: A review of the literature and application of a simple eddy diffusion model. *Crit Rev Toxicol.* 41(1):52-74.
 - > Simmons, B., L. Hallett, J. Maskrey, and D. Paustenbach. Asbestos Exposure during Simulated Use of Synthetic Rubber Solution Duct Sealer. Poster Presentation at American Industrial Hygiene Conference & Exposition (AIHce) May 24-26, Dallas TX.
 - > Simmons, B. 2018. Invited Presentation. Current Science Debate Regarding Anthophyllite Asbestos and Other Non-Commercial Amphiboles. Presented at Cardno ChemRisk Science seminar. June 27th, 2018. Nashville, TN.
 - > Gaffney, SH, BD Simmons, ME Grespin, L Garnick, DJ Paustenbach and A Gauthier. 2016. Anthophyllite Asbestos: State of the Art Understanding of its Toxicological Properties. Podium Presentation at American Industrial Hygiene Conference & Exposition (AIHce) May 21-26, 2016, Baltimore, MD.
 - > Zisook, R. and B. Simmons 2016. Characterization of Emissions from 3-Dimensional Printing Operations: A Literature Review and Sampling Framework for Future Evaluations. Poster Presentation. American Industrial Hygiene Conference & Exposition (AIHce) May 21-26, 2016, Baltimore, MD.
 - > Simmons, B. 2016. Invited Presentation. Exposure Reconstruction & Background Exposure Levels. Presented at the Asbestos Defense Strategic Summit. November 9, 2016. New Orleans, LA.
 - > Simmons, B. 2016. Invited Presentation. Take Home and Bystander Asbestos Exposures: What is the Correlation with Exposures in the Workplace? Presented at the American Railroad Claims Conference. October 11, 2016. Nashville, TN.
 - > Simmons, B. 2016. Invited Presentation. How Fast do Asbestos Fibers Settle out of the Air and What is the Effect of Air Flow Rates in Homes? Presented at Cardno ChemRisk Science Seminar. June 8, 2016. Las Vegas, NV.
 - > Simmons, B. 2016. Invited Presentation. Take Home and Bystander Asbestos Exposures: What is the Correlation with Exposures in the Workplace? Presented at the National Association of Railroad Trial Counsel. March 15, 2016. St. Petersburg, FL.
 - > Navarro, K., J. Balmes, A. Bradman, B. Simmons. 2014. Improving Exposure Assessment Methods by Measuring Breathing Rates of Farm Workers. American Industrial Hygiene Conference and Exposition, May 31-June 5. San Antonio, TX.
 - > Simmons, B. 2014. Invited Presentation. Controlling the Insanity and Hype of the Exam. Presentation at American Industrial Hygiene Conference and Exposition (AIHce). May 30-June 4. Salt Lake City, UT.
 - > Hammond, K., S. Liu, S. Horiuchi, B. Donovan. 2013. Neurologic and Reproductive Effects of Solvents on Automotive Repair Workers: Assessment of Exposure for the Bay Area Solvent Study (BASS). American Industrial Hygiene Conference and Exposition, May 18-23, 2013. SR-146-01. Montreal, Quebec

- > Gaffney, S., J. Sahmel, C.A. Barlow, B. Donovan, A.K. Madl, J. Henshaw, R.J. Lee, D. Van Orden, D.J. Paustenbach. 2013. Evaluation of Potential Para-Occupational Exposure to Chrysotile Asbestos during Laundering Activities through a Simulation Study. American Industrial Hygiene Conference and Exposition, May 18-23, 2013. SR-108-05. Montreal, Quebec
- > Donovan, E.P., B.L. Donovan, M.A. McKinley, D.M. Cowan and D.J. Paustenbach. 2011. Evaluation of Para-Occupational Exposures to Asbestos: A Review of the Literature (1900-Present). Presented at the 21st Annual ISES Conference. Advancing Exposure Science for Environmental Health. October 23 - 27, 2011. Baltimore, Maryland.
- > Adams, R., A. Perez, B. Donovan, D. Fillos, and E. Donovan. 2011. Evaluation of risks due to children's exposures to cadmium in consumer products. Abstract #2858. Poster presented at the Society of Toxicology (SOT) Annual Meeting, Wednesday, March 9, 2011, Washington, D.C.
- > Donovan, B.L., P. Chowdhary, A. Foda and E.P. Donovan. 2010. Possible risks associated with coalbed methane-produced water. Poster presentation at Society of Environmental Toxicology and Chemistry 31st Annual Meeting, Abstract #MP235. November 7-11. Portland, OR.
- > Perez, A.L., C.L. Chen, J.J. Keenan, W.D. Cyr, B.L. Donovan, S.E. Serrano, L. Vishneyskaya, and A.K. Madl. 2010. An analysis of the proposed benefits and risks of nanotechnology-enabled water treatment. Poster presentation at Society of Environmental Toxicology and Chemistry 31st Annual Meeting. Abstract #WP212. November 7-11. Portland, OR.
- > Donovan, B.L., E.P. Donovan, S.H. Gaffney, P.K. Scott and B.L. Finley. 2010. Human health risks associated with Fish and Shellfish Consumption in an industrial leasehold in a Southern California Bay. Poster presentation at Society of Toxicology 49th Annual Meeting, Abstract #2315. March 7-11, 2010. Salt Lake City, UT.
- > Donovan, E.P., B.L. Donovan, S.H. Gaffney, P.K. Scott and B.L. Finley. 2008. Human health risks associated with fish and shellfish consumption in an industrialized leasehold in a Southern California bay. Abstract #1723. International Society for Environmental Epidemiology & International Society of Exposure Analysis 2008 Joint Annual Conference, Exposure and Health in a Global Environment, October 12-16, 2008. Pasadena, CA.
- > Donovan, B.L., E.P. Donovan, J. Sahmel, B. Epstien, and D.J. Paustenbach. 2008. Evaluation of Bystander Exposure to Asbestos: Review of the Literature (1950s – Present). International Society for Environmental Epidemiology & International Society of Exposure Analysis Joint Annual Conference, Exposure and Health in a Global Environment, October 12-16, 2008. Pasadena, CA.