

# Laurie Couture Haws, Ph.D., DABT

MANAGING PRINCIPAL SCIENTIST

## CONTACT INFORMATION

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## PROFESSIONAL PROFILE

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Dr. Laurie Haws is a cofounder and Managing Principal Scientist with ToxStrategies and is based in Austin, Texas. She is a board-certified toxicologist with 30 years of experience in the areas of toxicology, human health risk assessment, risk communication, and scientific and regulatory policy.

Dr. Haws has substantial experience evaluating potential human health risks associated with exposures to a wide variety of chemicals and metals present as additives, ingredients, or contaminants in foods, consumer products, personal care products, pharmaceuticals, medical devices, and environmental media (air, water, soil, and sediments). She also has extensive experience assessing potential human health risks associated with personal, occupational, and community-wide exposures to air contaminants, particularly related to chemical, petrochemical, and shale gas exploration and production activities. Dr. Haws is a recognized expert at evaluating data concerning modes and mechanisms of action and in using this type of data to assess the relevance of findings to humans. She routinely applies these skills in the development of state-of-the-science toxicity values via the application of both default and more rigorous approaches, such as benchmark dose modeling, application of weight-of-evidence techniques, and consideration of mode-of-action information. In addition, Dr. Haws also has experience designing, placing, and overseeing a broad range of toxicology laboratory studies, including ADME (absorption, distribution, metabolism, and excretion), developmental toxicity, and cross-fostering studies. She also has experience designing, conducting, and interpreting data from biomonitoring studies, and is adept at using such data to assess concerns regarding potential exposures.

While Dr. Haws is an internationally recognized authority on the toxicity of and exposures to dioxin-like compounds, she has conducted assessments involving many other toxicants throughout her career, including chlorinated hydrocarbons, aromatic hydrocarbons, volatile organic compounds, PFAS, pesticides, phthalates, glycol ethers, metals, persistent organic pollutants, and others. She is knowledgeable about numerous state and federal regulatory programs and has assisted in the preparation of reports for submission to regulatory agencies such as the FDA, EPA, and California's Proposition 65 program. Dr. Haws also has substantial experience working with federal, state, and local government agencies, industry, trade associations, legislative representatives, the media, and members of the general public on matters related to the toxicity of chemicals encountered in our daily lives.

Dr. Haws has a diverse background, having worked as a researcher, a regulatory toxicologist with a government agency, and a scientific consultant. In fact, a substantial portion of her career has been spent in the government sector, both as a researcher and most recently as a manager in the Toxicology and Risk Assessment Section at the Texas Commission on Environmental Quality (TCEQ). In her position with the TCEQ, Dr. Haws was responsible for overseeing all human health risk assessment activities and was one of the primary authors of the agency's comprehensive risk-based corrective action rule (the Texas Risk Reduction Program [TRRP] rule).

Dr. Haws is an author on 60 peer-reviewed publications and has presented at many scientific conferences throughout her career. She is an active member of numerous professional societies, including the Society of Toxicology, Society for Risk Analysis, Toxicology Forum, American College of Toxicology, and the Regulatory Affairs Professional Society. Dr. Haws has served on numerous elected and appointed committees within the Society of Toxicology, including serving on Council, as well as serving as president of the Risk Assessment Specialty Section and the Women in Toxicology Special Interest Group.

Dr. Haws has participated in a number of scientific panels, technical workgroups, and advisory committees, including the World Health Organization's Toxic Equivalency Factor Review Panel. She was a panelist for a workshop convened in 2021 by the Alliance for Risk Assessment, discussing practical, problem-driven approaches to "fit-for-purpose" risk assessments. She also chaired the International Symposium on Halogenated and Persistent Organic Pollutants, held in San Antonio, Texas, in September 2010, and served on the Exposure and Human Health Committee of the USEPA's Science Advisory Board.

## EDUCATION AND DEGREES EARNED

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1990	Ph.D., Toxicology, School of Medicine, Curriculum in Toxicology, University of North Carolina (Chapel Hill)
1987	M.S., Environmental Sciences & Engineering (Toxicology), School of Public Health, University of North Carolina (Chapel Hill)
1985	B.S., Environmental Biology ( <i>magna cum laude</i> ), Long Island University (Southampton, NY)

## CERTIFICATIONS

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1994—present Diplomat, American Board of Toxicology

## PROFESSIONAL HONORS/AWARDS

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1998, 1990	Society of Toxicology-Student Travel Award
1988	Level III Scientific & Technological Achievement Award (National Institute of Environmental Health Sciences)
1987, 1990	North Carolina Chapter of the Society of Toxicology—Student Travel Award
1983–1985	Presidential Scholarship
1983	Faculty Honors Award
1983	Outstanding Campus Leadership Award
1984–1985	Beta Beta Beta; Biological Honor Society

## PROFESSIONAL ASSOCIATIONS

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### Society of Toxicology

- Audit Committee (2021–2024)
- Council, Secretary-Elect (2017–2018), Secretary (2018–2020)
- Risk Assessment Specialty Section, Councilor (2008–2010), Vice President-Elect (2011–2012), Vice President (2012–2013), President (2013–2014), Past President (2014–2015)
- Women in Toxicology, Councilor (2013–2015), Vice President (2015–2016), President-Elect (2016–2017), President (2017–2018), Past President (2018–2019)
- Scientific Liaison Coalition (2015–present)
- Special Interest Group Collaboration and Communication Group (2016–2017)
- Contemporary Concepts in Toxicology Committee Chair (2013–2014), Co-chair (2012–2013), member (2011–2014)
- Nominating Committee member (2008–2010)
- Continuing Education Committee, Chair (2006–2007), member (2004–2007)

### Toxicology Forum

- Past President (2023–2024)
- President (2022–2023)
- Vice President (2020–2022)
- Secretary (2018–2020)
- Board of Directors, Member (2016–2018)
- Program Planning Committee, member (2015), co-chair (2016), chair (2017)

### American College of Toxicology

### Product Stewardship Society

### Regulatory Affairs Professionals Society

### Society of Risk Analysis

## SCIENTIFIC ADVISORY PANELS, COMMITTEES, & WORKGROUPS

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2021	Panelist for an Alliance for Risk Assessment (ARA) virtual workshop titled, <i>Beyond Science &amp; Decisions: From Problem Formulation to Dose-Response Assessment</i>
2010	Chair, International Symposium on Halogenated Persistent Organic Pollutants, San Antonio, Texas
2009–2017	U.S. Environmental Protection Agency Scientific Advisory Board Exposure and Human Health Committee
2007–2017	International Advisory Board Member, International Symposium on Halogenated Persistent Organic Pollutants

2005	Resource Expert, World Health Organization, Dioxins Toxic Equivalency Factor Review, Geneva, Switzerland, June 27–30
2001–2003	STAPPA/ALAPCO Residual Risk Steering Committee
2001	USEPA-State-Tribal Risk Assessment Workshop Planning Committee
1999–2003	Texas Risk Reduction Program Rule Target Chemicals of Concern (COC) Workgroup
1999–2003	Texas Risk Reduction Program Rule Chemicals of Concern (COC) Screening Workgroup
1999–2003	Texas Risk Reduction Program Rule Representative Concentrations Workgroup
1999–2003	Texas Risk Reduction Program Rule Exposure Factors Workgroup
1999–2001	Texas Risk Reduction Program Rule Probabilistic Risk Assessment Workgroup
1996–2003	Texas Commission on Environmental Quality Combustion Strategy Implementation Team
1995–1998	EPA Workgroup on Maximum Achievable Control Technology (MACT) Standards for Hazardous Waste Combustors
1995–2003	Federal/State Toxicology and Risk Analysis Committee
1994–1997	Texas Medical Association Committee on the Environment
1994–1999	Scientific Advisory Committee on Birth Defects in Texas

## PUBLICATIONS

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Chappell GA, Heintz MM, **Haws LC**. 2021. Transcriptomic analyses of livers from mice exposed to 1,4-dioxane for up to 90 days to assess potential mode(s) of action underlying liver tumor development. *Curr Res Toxicol* 2:30–41; <https://doi.org/10.1016/j.crttox.2021.01.003>.

Wikoff DS, Urban JD, Ring C, Britt J, Fitch S, **Haws LC**. 2020. Development of a range of plausible non-cancer toxicity values for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) based on effects on sperm count: Application of systematic review methods and quantitative integration of dose response using meta-regression. *Toxicol Sci* 179(2):162–182, <https://doi.org/10.1093/toxsci/kfaa171>.

Urban JD, Wikoff DS, Chappell GA, Harris C, **Haws LC**. 2020. Systematic evaluation of mechanistic data in assessing in utero exposures to trichloroethylene and development of congenital heart defects. *Toxicology* 436:152427, doi: 10.1016/j.tox.2020.152427. PMID: 32145346.

Chappell GA, Thompson CM, Wolf JC, Cullen JM, Klaunig JE, **Haws LC**. 2020. Assessment of the mode of action underlying the effects of GenX in mouse liver and implications for assessing human health risks. *Toxicol Pathol* 48(3):494–508, doi: 10.1177/0192623320905803. PMID: 32138627.

Wikoff D, **Haws L**, Ring C, Budinsky R. 2019. Application of qualitative and quantitative uncertainty assessment tools in developing ranges of plausible toxicity values for 2,3,7,8-tetrachlorodibenzo-p-dioxin. *J Appl Toxicol*, doi: 10.1002/jat.3814. Open access, <https://onlinelibrary.wiley.com/doi/full/10.1002/jat.3814>.

Thompson CM, Fitch SE, Ring C, Rish W, Cullen JM, **Haws LC**. 2019. Development of an oral reference dose for the perfluorinated compound GenX. *J Appl Toxicol*, open access: <https://onlinelibrary.wiley.com/doi/full/10.1002/jat.3812>.

- Urban J, Wikoff D, **Haws L**, Fitch S, Ring C, Thompson C, Suh M. 2018. Systematic review protocol: Systematic review and meta-regression to characterize the dose-response relationship between exposure to dioxin-like compounds during sensitive windows of development and reduced sperm count. Zenodo. <http://doi.org/10.5281/zenodo.1636357>.
- Wikoff DS, Rager JE, Chappell GA, Fitch S, **Haws L**, Borghoff SJ. 2018. A framework for systematic evaluation and quantitative integration of mechanistic data in assessments of potential human carcinogens. *Toxicol Sci* 167(2):322–335. <https://doi.org/10.1093/toxsci/kfy279>.
- Thompson CM, Kirman CR, Hays SM, Suh M, Harvey SE, Proctor DM, Rager JE, **Haws LC**, Harris MA. 2018. Integration of mechanistic and pharmacokinetic information to derive oral reference dose and margin-of-exposure values for hexavalent chromium. *J Appl Toxicol* 38:351–365. doi: 10.1002/jat.3545.
- Wikoff D, Urban JD, Harvey S, **Haws LC**. 2018. Role of risk of bias in systematic review for chemical risk assessment: A case study in understanding the relationship between congenital heart defects and exposures to trichloroethylene. *Int J Toxicol*, DOI: 0.1177/1091581818754330.
- Thompson CM, Wolf, JC, McCoy A, Suh M, Proctor DM, Kirman CR, **Haws LC**, Harris MA. 2017. Comparison of toxicity and recovery in the duodenum of B6C3F1 mice following treatment with intestinal carcinogens captan, folpet, and hexavalent chromium. *Toxicol Pathol* 45(8):1091–1101. DOI: 10.1177/0192623317y4324.
- Thompson CM, Suh M, Proctor DM, **Haws LC**, Harris MA. 2017. Ten factors for considering the mode of action of Cr(VI)-induced gastrointestinal tumors in rodents. *Mut Res/Genetic Toxicol Environ Mutagen* 823:45–57.
- Rager JE, Ring CL, Fry RC, Suh M, Proctor DM, **Haws LC**, Harris MA, Thompson CM. 2017. High-throughput screening data interpretation in the context of *in vivo* transcriptomic responses to oral Cr(VI) exposure. *Toxicol Sci* kfx085. doi: 10.1093/toxsci/kfx085.
- Wikoff D, Borghoff S, Rager J, Harvey S, **Haws L**. 2016. A systematic review of the mechanistic evidence of tetrabromobisphenol TBBPA as a human carcinogen according to the ten key characteristics of carcinogens (TKCC) identified by Smith et al. (2016). PROSPERO 2016:CRD42016046429 Available from: [http://www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42016046429](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016046429)
- Wikoff DS, Rager JE, **Haws LC**, Borghoff SJ. 2016. A high dose mode of action for tetrabromobisphenol A-induced uterine adenocarcinomas in Wistar Han rats: A critical evaluation of key events in an adverse outcome pathway framework. *Regul Toxicol Pharmacol*. doi: 10.1016/j.yrtph.2016.01.018.
- Borghoff SJ, Wikoff D, Harvey S, **Haws L**. 2016. Dose- and time-dependent changes in tissue levels of tetrabromobisphenol A (TBBPA) and its sulfate and glucuronide conjugates following repeated administration to female Wistar Han rats. *Toxicol Rep*. doi:10.1016/j.toxrep.2016.01.007.
- Thompson CM, Wolf JC, Elbekai RH, Paranjpe MG, Seiter JM, Chappell MA, Tappero RV, Suh M, Proctor DM, Bichteler A, **Haws LC**, Harris MA. 2015. Duodenal crypt health following exposure to Cr(VI): Micronucleus scoring, crypt immunostaining, and synchrotron x-ray fluorescence microscopy. *Mut Res* 789-790:61–66.
- Thompson, CM, Seiter J, Chappell MA, Tappero RV, Proctor DM, Suh M, Wolf JC, **Haws LC**, Vitale R, Mittal L, Kirman CR, Hays SM, Harris MA. 2015. Synchrotron-based imaging of chromium and  $\gamma$ -H2AX immunostaining in the duodenum following repeated exposure to Cr(VI) in drinking water. *Toxicol Sci* 143(1):16–25.
- Wikoff D, Thompson C, Perry C, White M, Borghoff S, Fitzgerald L, **Haws LC**. 2014. Development of toxicity values and exposure estimates for tetrabromobisphenol A (TBBPA): Application in a margin of exposure assessment. *J Appl Toxicol* 35(11):1292–308.

Suh M, Thompson C, Kirman C, Carakostas M, **Haws LC**, Harris M, Proctor D, Abraham L, Hixon JG. 2014. High concentrations of hexavalent chromium in drinking water alter iron homeostasis in F344 rats and B6C3F1 mice. *Food Chem Toxicol* 65:381–388.

Bunch AG, Perry CS, Abraham L, Wikoff DS, Tachovsky JA, Hixon JG, Urban JD, Harris MA, **Haws LC**. 2014. Evaluation of impact of shale gas operations in the Barnett Shale region on volatile organic compounds in air and potential human health risks. *Sci Tot Environ* 468–469(2014): 832–842.

Urban JD, Wikoff DS, Bunch ATG, Harris MA, **Haws LC**. 2014. A review of background dioxin concentrations in urban/suburban and rural soils across the United States: Implications for site assessments and the establishment of soil cleanup levels. *Sci Tot Environ* 466–467:586–597.

Kirman CR, Aylward LL, Suh M, Harris MA, Thompson CM, **Haws LC**, Proctor DM, Lin SS, Parker W, Hays SM. 2013. Physiologically based pharmacokinetic model for humans orally exposed to chromium. *Chem Biol Interact* 204(1):13–27.

O'Brien T, Ding H, Suh M, Thompson C, Parsons BL, Harris MA, Winkelman WA, Wolf JC, Hixon JG, Schwartz AM, Myers MB, **Haws LC**, Proctor DM. 2013. Assessment of K-Ras mutant frequency and micronucleus incidence in the mouse duodenum following 90-days of exposure to Cr(VI) in drinking water. *Mutat Res* 754(1–2):15–21.

Thompson CM, Proctor DM, Suh M, **Haws LC**, Kirman CR, Harris MA. 2013. Assessment of the mode of action underlying development of rodent small intestinal tumors following oral exposure to hexavalent chromium and relevance to humans. *Crit Rev Toxicol* 43(3):244–274.

Dourson ML, Gadagbui B, Griffin S, Garabrant DH, **Haws LC**, Kirman C, Tohyama C. 2013. The importance of problem formulations in risk assessment: A case study involving dioxin-contaminated soil. *Regul Toxicol Pharmacol* 66(2):208–216.

Thompson CM, Gaylor DW, Tachovsky JA, Perry C, Carakostas MC, **Haws LC**. 2013. Development of a chronic noncancer oral reference dose and drinking water screening level for sulfolane using benchmark dose modeling. *J Appl Toxicol* 33(12):1395–1406.

Thompson CM, Kirman CR, Proctor DM, **Haws LC**, Suh M, Hays S, Hixon JG, Harris MA. 2013. A chronic oral reference dose for hexavalent chromium-induced intestinal cancer. *J Appl Toxicol* 34:525–536.

Kirman CR, Hays SM, Aylward LL, Suh M, Harris MA, Thompson CM, **Haws LC**, Proctor DM. 2012. Physiologically based pharmacokinetic model for rats and mice orally exposed to chromium. *Chem Biol Interact* 200(1):45–64

Kopec AK, Kim S, Forgacs AL, Zacharewski TR, Proctor DM, Harris MA, **Haws LC**, Thompson CM. 2012. Genome-wide gene expression effects in B6C3F1 mouse intestinal epithelia following 7 and 90 days of exposure to hexavalent chromium in drinking water. *Toxicol Appl Pharmacol* 259(1): 1326.

Proctor DM, Suh M, Aylward LL, Kirman CR, Harris MA, Thompson CM, Gürleyük H, Gerads R, **Haws LC**, Hays SM. 2012. Hexavalent chromium reduction kinetics in rodent stomach contents. *Chemosphere* 89(5):487–93.

Thompson CM, Fedorov Y, Brown DD, Suh M, Proctor D, Kuriakose L, **Haws LC**, Harris MA. 2012. Assessment of Cr(VI)-induced cytotoxicity and genotoxicity using high content analysis. *PLoS ONE* 7(8):e42720.

Thompson CM, Hixon JG, Proctor DM, **Haws LC**, Suh M, Urban JD, Harris MA. 2012. Assessment of genotoxic potential of Cr(VI) in the mouse duodenum: An in silico comparison with mutagenic and nonmutagenic carcinogens across tissues. *Regul Toxicol Pharmacol* 64(1):68–76.



- Thompson CM, Proctor DM, Suh M, **Haws LC**, Hebert CD, Mann JF, Shertzer HG, Hixon JG, Harris MA. 2012. Comparison of the effects of hexavalent chromium in the alimentary canal of F344 rats and B6C3F1 mice following exposure in drinking water: Implications for carcinogenic modes of action. *Toxicol Sci* 125(1):79–90.
- Thompson CM, Proctor DM, **Haws LC**, Hebert CD, Grimes SD, Shertzer HG, Kopec AK, Hixon JG, Zacharewski TR, Harris MA. 2011. Investigation of the mode of action underlying the tumorigenic response induced in B6C3F1 mice exposed orally to hexavalent chromium. *Toxicol Sci* 123(1):58–70.
- Thompson CM, **Haws LC**, Harris MA, Gatto NM, Proctor DM. 2011. Application of the U.S. EPA mode of action framework for purposes of guiding future research: A case study involving the oral carcinogenicity of hexavalent chromium. *Toxicol Sci* 119(1):20–40.
- Tachovsky JA, Urban JD, Wikoff DS, **Haws LC**, Harris MA. 2010. Reduction of a large fish tissue analyte database: Identifying and assessing data specific to a remediation site for risk assessment application. *Chemosphere* 80(5):481–488.
- Urban J, Tachovsky JA, **Haws L**, Wikoff Staskal D, Harris M. 2010. Response to Mugdan et al.'s comment on Urban et al. "Assessment of human health risks posed by consumption of fish from the Lower Passaic River, New Jersey." *Sci Tot Environ* 408(6):1468–1470.
- Urban JD, Tachovsky JA, **Haws LC**, Staskal DF, Harris MA. 2010. Response to Buchanan et al.'s comment on Urban et al. "Assessment of human health risks posed by consumption of fish from the Lower Passaic River, New Jersey." *Sci Tot Environ* 408(8):2004–2007.
- DeSesso JM, Watson RE, Keen CL, Hazelden KP, **Haws LC**, Li AA. 2009. Analysis and integration of developmental neurotoxicity and ancillary data into risk assessment: a case study of dimethoate. *J Toxicol Environ Health A* 72(2):94–109.
- Scott LLF, Staskal DF, Williams ES, Luksemburg WJ, Urban JD, Nguyen LM, **Haws LC**, Birnbaum LS, Paustenbach DJ, Harris MA. 2009. Levels of polychlorinated dibenzo-p-dioxins, dibenzofurans, and biphenyls in southern Mississippi catfish and estimation of potential health risks. *Chemosphere* 74(7):1002–10.
- Urban JD, Tachovsky JA, Staskal DF, **Haws LC**, Harris MA. 2009. Assessment of human health risks posed by consumption of fish from the Lower Passaic River, New Jersey. *Sci Tot Environ* 408(2):20924.
- Donovan EP, Staskal DF, Unice KM, Roberts JD, **Haws LC**, Finley BL, Harris MA. 2008. Risk of gastrointestinal disease associated with exposure to pathogens in the sediments of the Lower Passaic River. *Appl Environ Microbiol* 74:1004–1018.
- Haws LC**, Tachovsky JA, Williams ES, Scott LF, Paustenbach D, Harris M. 2008. Assessment of potential human health risks posed by benzene in beverages. *J Food Sci* 73(4):33–T41
- Scott LLF, Harris M, Unice KM, Scott P, Nguyen LM, **Haws LC**, Paustenbach D. 2008. Addendum to: Evaluation of PCDD/F and dioxin-like PCB serum concentration data from the 2001–2002 National Health and Nutrition Examination Survey of the United States population. *J Exp Sci Env Epidemiol* 1–9.
- Staskal DF, Scott LLF, **Haws LC**, Luksemburg WJ, Birnbaum LS, Nguyen LM, Urban JU, Williams ES, Paustenbach DJ, Harris MA. 2008. Assessment of polybrominated diphenyl ether exposures and health risks associated with consumption of southern Mississippi catfish. *Environ Sci Technol* 42(17):6755–6761.
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- Haws L**, Su M, Harris MA, DeVito MJ, Walker NJ, Farland WH, Finley B, Birnbaum LS. 2006. Development of a refined database of mammalian relative potency estimates for dioxin-like compounds. *Toxicol Sci* 89(1): 4–30.
- Van den Berg M, Birnbaum L, Denison M, DeVito M, Farland W, Feeley M, Fiedler H, Hakansson H, Hanberg A, **Haws L**, Rose M, Safe S, Schrenk D, Tohyama C, Tritscher A, Tuomisto J, Tysklind M, Walker N, Peterson RE. 2006. The 2005 World Health Organization reevaluation of human and mammalian toxic equivalency factors for dioxins and dioxin-like compounds. *Toxicol Sci* 93(2): 223–241.
- Grant RL, Rodriguez R, Hofelt CS, **Haws LC**. 2002. Shortcomings in USEPA's approach for predicting risk due to consumption of animal food products impacted by air emissions from hazardous waste combustion facilities: a case study involving phthalates. *Hum Ecol Risk Assess* 8(5):1137–1154.
- Hofelt CS, Honeycutt M, McCoy JT, **Haws LC**. 2001. Development of a metabolism factor for polycyclic aromatic hydrocarbons for use in multipathway risk assessments for hazardous waste combustion facilities. *Reg Toxicol Pharmacol* 33:60–65.
- Haws LC**, Jackson BA, Turnbull D, Dressler WE. 1994. A comparison of two approaches for assessing human cancer risk from disperse blue 1. *Reg Toxicol Pharmacol* 19:80–96.
- Couture LA**, Abbott BD, Birnbaum LS. 1991. A critical review of the developmental toxicity and teratogenicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin: recent advances in understanding the mechanism. *Teratology* 42:619–627.
- Couture-Haws L**, Harris MW, Lockhart AC, Birnbaum LS. 1991. Evaluation of the persistence of hydronephrosis induced in mice following in utero and/or lactational exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). *Toxicol Appl Pharmacol* 107:402–412.
- Couture-Haws L**, Harris MW, McDonald MM, Lockhart AC, Birnbaum LS. 1991. Hydronephrosis in mice exposed to TCDD-contaminated breast milk: identification of the peak period of sensitivity and assessment of potential recovery. *Toxicol Appl Pharmacol* 107: 413–428.
- Frankos VH, Schmitt DF, **Haws LC**, McEvily AJ, Iyengar R, Miller SA, Munro IC, Clydsdale FM, Forbes AL, Sauer RM. 1991. Generally recognized as safe (GRAS) evaluation of 4-hexylresorcinol for use as a processing aid for the prevention of melanosis in shrimp. *Reg Toxicol Pharmacol* 14: 202–212.
- Couture LA**, Harris MW, Birnbaum LS. 1990. Characterization of the peak period of sensitivity for the induction of hydronephrosis in C57BL/6N mice following exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin. *Fundam Appl Toxicol* 15: 142–150.
- Couture LA**, Harris MW, Birnbaum LS. 1989. Developmental toxicity of 2,3,4,7,8-pentachlorodibenzofuran (4-PeCDF) in the Fischer 344 rat. *Fundam Appl Toxicol* 12: 358–366.
- Birnbaum LS, **Couture LA**, Elwell MR. 1989. Subchronic effects of exposure to octachlorodibenzo-p-dioxin (OCDD). *Chemosphere* 18(1–6): 389–390.
- Couture LA**, Elwell MR, Birnbaum LS. 1988. Dioxin-like effects observed in male rats following exposure to Octachlorodibenzo-p-dioxin (OCDD) during a 13-week study. *Toxicol Appl Pharmacol* 93:31–46.
- Birnbaum LS, **Couture LA**. 1988. Disposition of octachlorodibenzo-p-dioxin (OCDD) in male rats. *Toxicol Appl Pharmacol* 93: 22–30.



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**BOOK CHAPTER**

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Staskal DF, Birnbaum LS, **Haws LC**. 2011. Application of a relative potency factor approach in the assessment of health risks associated with exposures to mixtures of dioxin-like compounds. In: Mumtaz M (Ed), *The Principles and Practice of Mixtures Toxicology*. Wiley, ISBN 978-3-527-63211-4.

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**ABSTRACTS AND PRESENTATIONS**

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**Haws, LC**. Invited Speaker. Risk Characterization of PFAS – Challenges and Opportunities. The Science of PFAS: Chemistry, Health, and Multimedia Measurements. Air & Waste Management Association Virtual Conference. September 2020.

Ring C, Fitch S, **Haws L**, Harris M, Wikoff D. Quantitative integration of dose-response data for relative potency estimates of dioxin-like chemicals. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P3385>.

Thompson CM, Ring C, Pham L, Chappell GA, **Haws LC**. Assessment of the relevance of toxicological findings in the development of an oral reference dose for GenX. Poster for Society of Toxicology, Virtual Annual Meeting, 2020, <https://eventpilotadmin.com/web/page.php?page=Session&project=SOT20&id=P2764>.

**Haws L** (Session Co-Chair). Introduction — Use of New Approach Methods in Risk Characterization of PFAS: Challenges and Opportunities. 44<sup>th</sup> Annual Winter Meeting, the Toxicology Forum, Tysons, VA, January 27–29, 2020 (see: <https://dialogue.toxforum.org/d/do/894>).

Thompson C, Chappell G, Cullen J, Wolf JC, **Haws L**. Development of an oral reference dose for GenX using the latest toxicological and risk assessment methodologies: Environmental risk assessment of per- and polyfluoroalkyl substances (PFAS). SETAC North America Focused Topic Meeting, Durham, NC, August 2019.

Urban J, **Wikoff D**, **Haws L**. Three-tiered approach to integrating evidence streams assessing gestational trichloroethylene exposure and congenital heart defects (TCE-CHD). Poster at Evidence Integration in Chemical Assessments: Challenges Faced in Developing and Communicating Human Health Effect Conclusions. National Academies of Sciences, Engineering, and Medicine. Washington, DC, June 2019.

Urban J, Wikoff D, Suh M, Britt J, Harvey S, Chappell G, **Haws L**. Comparison of NTP OHAT and US EPA TSCA study quality criteria: Trichloroethylene (TCE) and congenital heart defects (CHDs) as a case study. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

Ring CL, Urban J, Wikoff D, Thompson C, Budinsky RA, **Haws LC**. Application of systematic review and quantitative evidence integration methods to support risk assessment: Characterization of the dose-response relationship between exposure to dioxin-like compounds (DLC) and sperm count. Poster at Society of Toxicology Annual Meeting, Baltimore, MD, March 2019.

**Haws LC**. Building a firm from the ground up. Society of Toxicology Career Resources and Development Committee webinar: So, You Want to Be a Consultant. February 12, 2019.

Thompson CM, Wolf JC, Suh M, Proctor DM, **Haws LC**, Harris MA. Toxicity and recovery in the duodenum of B6C3F1 mice following treatment with intestinal carcinogens; captan, folpet, and hexavalent chromium: Evidence for an adverse outcome pathway. Society of Toxicology Annual Meeting, San Antonio, TX, March 11–15, 2018.

Thompson CM, Suh M, Proctor DM, **Haws LC**, Harris MA. Ten factors for considering the mode-of-action of Cr(VI)-induced intestinal tumors in rodents. Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

Wikoff D, Goodrum P, **Haws L**, Budinsky R. Application of quantitative approaches to assess uncertainties in the development of toxicity values: A case study involving the reference dose (RfD) for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

Urban JD, Harvey S, **Haws LC**, Wikoff, D. Assessment of study quality (risk of bias) in understanding the relationship between congenital heart defects (CHDs) and exposures to trichloroethylene (TCE). Society of Toxicology Annual Meeting. March 11–15, 2018. San Antonio, TX.

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**Haws LC**. Is there a need for short-term response actions for trichloroethylene? A toxicologist's view. Invited Speaker. Presented at the Air and Waste Management Association's Vapor Intrusion, Remediation, and Site Closure Conference – Balancing Technical Defensibility, Risk, Sustainability, and Costs. December 7–8, 2016. San Diego, CA.

**Haws LC**. Vapor intrusion – Solid ground or quick sand? Invited Speaker. Presented at the 28th Annual Texas Environmental Superconference. August 5, 2016. Austin, TX.

**Haws LC**. Vapor intrusion – Technical issues. Invited Speaker. Presented at the Semi-Annual South Central Regional Meeting of the Auditing Roundtable. August 3, 2016. Austin, TX.

**Haws LC**. Trichlorethylene exposure and development of fetal cardiac malformations: What do the data tell us about inhalation exposures resulting from vapor intrusion and potential health risks to pregnant women? – Introduction. Presented at the Society of Toxicology's 55th Annual Meeting, March 13–17, 2016. New Orleans, LA.

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Harris MA, Thompson CM, Proctor DM, Suh M, Wolf JC, Seiter JM, Chappell MA, **Haws LC**. Analysis of duodenal crypt health following exposure to Cr(VI) in drinking water. Presented at the Society of Toxicology's 54th Annual Meeting. San Diego, CA, March 22-26, 2015.

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**Haws L**, Tachovsky A, Aylward L, Urban J, Fitzgerald L, Harris M, Wikoff D. Using toxicokinetics to improve soil exposure and risk assessments. Presented at the 37th Annual Summer Meeting of The Toxicology Forum. Aspen, CO, July 10-14, 2011.

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Tachovsky JA, **Haws L**. Application of principal components analysis and sequential gaussian simulation to a comprehensive soil sampling dataset to predict PCDD/F concentrations in Midland, MI. Presented at Dioxin 2010. San Antonio, TX, September 12-17, 2010.

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