

# Jenifer S. Heath, Ph.D.

Toxicologist/Risk Assessor

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## Overview

Dr. Heath serves as a testifying or non-testifying witness on cases related to toxicology and human health risk assessment. She has been deposed and has testified at both bench and jury trials.

Dr. Heath applies her expertise in mammalian toxicology, focusing on evaluation of the hazards associated with chemicals of interest. Her work has included in-depth evaluation of information about the toxicity of chemicals in both laboratory animals and humans; assessment of exposure pathways and patterns, including conceptual site models; appropriate application of knowledge about mechanisms of action; and effective integration of this information into risk assessment, risk management, and community relations efforts.

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## Areas of Expertise

Toxicology  
Risk Assessment  
Childhood and Adult Lead (Pb)  
Poisoning  
Accidental Exposure to Chemicals  
PFOS/PFOA  
Consumer Product Toxicity

## Years of Experience

30 years

## Education

PhD/Environmental Toxicology/  
1987/ Cornell University  
MA/Public Policy Studies/1986/  
Duke University  
MS/Toxicology/ 1983/North  
Carolina State University  
BS/Public Health/1980/  
University of Massachusetts at  
Amherst  
A.S./Nursing / 2007 / Ellis  
Hospital School of Nursing  
Registered Nurse (R.N.) CO, NY

She has also participated in toxicological evaluations and registration of pesticide and animal health products. She has assessed the health and environmental risks of raw materials and products (e.g., agricultural chemicals; dyes, pigments, and organics), prepared submissions to regulatory agencies, evaluated the quality and usefulness of laboratory studies, and responded to customer requests for information.

Dr. Heath previously was responsible for assessing the human health risks associated with environmental exposure to chemical and physical agents in North Carolina and for conveying recommendations to state-level regulators in various media programs (e.g., groundwater, vector control, drinking water, solid and hazardous waste) as well as to private citizens, Commission/Board members (e.g., Pesticide Board), and the news media. She also made presentations describing program activities to outside groups.

She has managed and contributed to hundreds of risk assessments for contaminated sites under many regulatory programs (including state and federal Superfunds, RCRA, UST, and property transfers). These risk assessments have involved a variety of media (soil, mine waste and tailings, groundwater, surface water, ambient air, indoor air, paint, food sources) and a range of constituents (including total petroleum hydrocarbon, pesticides, solvents, metals, PAHs, PCBs, asbestos, and explosives). She has developed risk-based strategies for RCRA Corrective Actions, Superfund sites, and brownfield or redevelopment sites, including risk-based screening of source areas, facility-wide evaluation of exposure pathways, and site-specific, facility-wide assessment of risks to humans and ecological receptors,

ultimately contributing to cost-effective site investigation/ characterization, remediation, and long-term monitoring. Dr. Heath has worked in EPA Regions 1, 2, 4, 6, 7, 8, 9 and 10, and in most of the 50 states. She has successfully presented results to regulatory agencies, jury members, and the public.

## Select Case/Project-Specific Experience Litigation Support/Expert Testimony

- Provided expert support in several infant/child lead poisoning cases. Topics included evaluation of exposure pathways to lead in paint and lead from nonpaint sources, seasonality of blood lead levels, realistic rates of decline following elimination of source/exposure, venipuncture versus fingerstick (capillary) sampling methods, timing of exposure, and potential for other exposures (illicit drugs) to cause alleged adverse effects. (2003 – current)
- Product liability defense including evaluation of medical and other records as well as the literature related to potential causes of specific adverse effects in humans and to elucidate key concepts related to product-specific exposure and toxicity. (2016-current)
- Provided expert support (including a report) in the context of proposed new state surface water criteria for molybdenum, specifically related to the unique sensitivity of cattle to molybdenum toxicity. Hearings have been postponed. (2017 - 2018)
- As testifying expert, evaluated the exposure to hydrogen sulfide associated with an accidental industrial release. Testified at deposition. This case settled. (2016-2017)
- As testifying expert, evaluated potential toxicity associated with consumption of a specific botanical supplement in the context of unexpected bleeding following a planned surgery. This case involved evaluating medical records, efficacy claims by manufacturer and published literature on potential effects associated with the active ingredient. This case settled. (2016)
- As a testifying expert, reviewed medical files, case documents, and the literature related to specific adverse effects potentially related to fire smoke inhalation. This case settled. (2015)
- As a non-testifying expert, reviewed autopsy reports, technical literature, witness statements and other materials related to potential causes of the sudden death of a worker during manual tank gaging (using a thief hatch) at a tank battery in an oil and gas production field. (2014)
- As a testifying expert, researched the state groundwater quality regulations, bases for numerical criteria, and other aspects in a case related to historical and ongoing releases from a power company's coal ash pits to groundwater. Provided deposition testimony. The case settled prior to the court hearing. (2015)
- On behalf of an international consumer product manufacturer, conducted research over two years on historical animal toxicity data related to a specific type of lung cancer. (~2003 – 2006)
- Screened case materials related to potential adverse effects associated with an accidental increase in medication dose. (2016)
- As testifying expert, lead team evaluating the toxicity of hydrogen sulfide (H<sub>2</sub>S) and sulfur dioxide (SO<sub>2</sub>) in the context of a specific industrial accident. Involved preparation of 2 expert reports as well as comments on Plaintiffs' experts' reports. Nearly 50 reviews, experimental animal studies, and human studies on hydrogen sulfide toxicity were ordered and critically reviewed. Results from more than 20 studies were analyzed and interpreted in order to identify a hierarchy of effects of increasing severity from exposure to hydrogen sulfide and the concentrations associated with those effects (including no observed adverse effect levels). This information was used to develop weight-of-evidence understanding of whether hydrogen sulfide at predicted concentrations would produce specific health effects. The client indicated that the risk assessment and expert witness report on the toxicity of hydrogen sulfide were technically an "A+ in quality."
- As testifying expert, directed toxicologist drafting an affidavit on long-term toxicity of CS (a tear gas or minimally lethal weapon). Nearly 50 reviews, experimental studies, and human epidemiological studies on tear gas toxicity were ordered and critically reviewed. Results from twenty-four studies were analyzed and interpreted in order to identify a hierarchy of effects of increasing severity from exposure to tear gas and the concentrations associated with those effects (including no observed adverse effect levels). This information was used to develop weight-of-evidence information about whether tear gas at predicted concentrations would produce the specific health effects. The judge's order on summary judgment

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specifically cited this work as constituting sound science. The toxicologic aspects of this case were resolved through a favorable summary judgment.

- On behalf of a PRP group, provided testimony at a bench trial demonstrating that the sole non-settling party at a Superfund site was indeed a source (as both a generator and an owner/ operator) of each chemical driving risk and remediation at the site.
- Prepared a report about the toxicologic basis for a tort suit alleging adverse neurobehavioral effects following a traffic accident that released a mixture of chemicals being transported in one of the vehicles.
- Expert witness at a jury trial (including deposition) in Georgia related to potential adverse effects of petroleum products released from a gas station.
- Provided expert testimony on human health risk at a jury trial to determine the impact of off-site contamination on the value of adjoining property.

### **Chemical Safety Evaluation**

- Evaluated potential toxicity of drinking water affected by leaching from PEX piping.
- Summarized potential for adverse effects associated with use of human growth hormone in adults.
- Evaluated recent literature related to potential toxicity of mineral-based nanomaterials (zinc oxide and titanium dioxide) used in sunscreen.
- Drafted literature review on methane, ethane, ethene, propane, propene, butane and butene for a community with an on-going natural gas leak. Topics included risk to humans, livestock and pets, and plants/crops.
- Contributed to information sheets prepared for the public and for local veterinarians related to copper supplementation and copper and molybdenum toxicity in cattle, horses, and sheep.
- Prepared the toxicology section (molybdenum toxicity to wildlife) for a tailings facility closure wildlife report.
- Provided in-depth detailed evaluation of historic literature related to ability of a material to cause squamous cell carcinoma in laboratory animals.
- Evaluated the quality, usefulness, and implications of mammalian and wildlife toxicology portions of the registration package for a new pesticide; summarized the database, and performed a risk assessment for applicators; and conveyed the information to product management, registration, and marketing staff.
- Managed the evaluation of both public and proprietary reports on the potential non-cholinesterase neurotoxicity of a pesticide, and designed an approach to convey the results to customers and to the public.
- Evaluated the *in vitro* and short-term *in vivo* toxicity of an experimental plant growth regulator, contributing to a cost/benefit-based decision to abandon further development of the product.
- Evaluated interspecies differences in the magnitude of peroxisome proliferation induced by an experimental product; reviewed the published literature on peroxisome proliferation and carcinogenicity; recommended a modified series of *in vivo* toxicity studies for product registration; and participated in negotiations with U.S. and Canadian agencies to obtain approval for the registration approach.
- Reviewed the published literature on the reproductive and developmental toxicity of an inert ingredient; compared an accidental exposure scenario with dose-response data; and recommended revisions to the product's label and Material Safety Data Sheet (MSDS).
- Evaluated the risks posed by different formulations of a pesticide to agricultural workers (mixer/loader/applicators).
- Reviewed the incidence of reversible eye and skin injury caused by inadequately shielded mercury vapor lamps and prepared advisory materials for public health professionals and facility maintenance staff.
- Used structure-activity relationship information to demonstrate acceptable human health risk associated with *de minimus* levels of a food packaging component leaching into food.
- Prepared a literature review on aflatoxins in peanut butter and implications for human health.

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## Human Health (Site) Risk Assessment

- Interim leader for human health risk assessments at several former phosphate mine sites in Idaho. Due to potential subsistence land uses, the projects included extensive monitoring and sampling of culturally significant plants (for human ingestion) and modeling of concentrations of inorganics in game. Coordination with other firms doing similar risk assessments at nearby sites was ongoing.
- On behalf of an active hard rock mine in New Mexico over the course of roughly a decade:
  - Prepared an in-depth summary of the literature pertaining to the toxicity of molybdenum to wildlife, including mammals, the sensitive subset of mammals, birds and reptiles.
  - Evaluated the safety of livestock (cattle, sheep and horses) grazing (forage and soil ingestion) and drinking water on privately owned off-site property potentially affected by mine-related metals. Peer reviewed the sister report which evaluated risk to humans from exposure to environmental media and ingestion of beef.
  - Drafted information sheets prepared for the public and for local veterinarians related to copper supplementation and copper and molybdenum toxicity in cattle, horses, and sheep.
  - Attended meetings with many parties (EPA and their contractors, mine and multiple contractors, USGS, USFWS, state environmental and mine permitting agencies) approximately monthly for several years. Prepared live notes and action items that were simultaneously projected (and corrected by meeting participants); these were the primary form of documentation of the meetings and related commitments by the parties.
  - Negotiated a detailed conceptual site model, including receptors, exposure media, fate and transport, and post-closure exposures. This process took several months and meetings due to the then-contentious relationships among the parties.
  - Participated in development of DQOs to guide sampling for human health risk assessment needs.
  - Prepared the toxicology section (molybdenum toxicity to wildlife) for a tailings facility closure wildlife report.
  - Managed the preparation of a mine closure report on wildlife for this large open pit and underground (block cave) site in southwestern U.S.
  - Task manager for two wildlife evaluations and the work plan for a plant uptake study at this active mine.
  - Prepared comments on EPA Region 6's Human Health Risk Assessment Work Plan and on the Human Health Risk Assessment. This included incorporation of comments by other mine contractors as well as in-depth review of specific toxicological issues and comments on appropriate use of extensive site data in the documents.
  - Evaluated the presence of potentially site-related dioxins in the context of dioxins from other local sources (most notably forest fires).
  - Facilitated a multi-party meeting related to mine permitting, geotechnical safety, and acid generating potential aspects of planned remedial action at several large mine rock (waste) piles.
- For an active gas plant in the Wyoming Voluntary Remediation Program and on behalf of the former Plant owner:
  - Risk assessment task manager.
  - Wrote the human health risk assessment work plan. The draft Risk Assessment Work Plan was accepted by the agency with no comments requiring revisions.
  - Identified risk-based needs for further soil sampling and assisted in preparation and negotiation of the sampling plan. Led the team that developed a unique, statistically-based analysis of historical data with varying detection limits to identify additional data needs and locations.
  - Contributed to refinement of the analyte list (and detection limits) for on-going groundwater sampling.

- Contributed to evaluation of potential surrogate-based approaches for use of historical PAH data for soil and groundwater with detection limits exceeding risk-based levels. Ultimately determined that defensible surrogates could not be identified.
- Managed the human health risk assessment, including writing the 3-volume document. Several unique agreements were implemented, including a process to meaningfully combine older and newer soil data and area-weight the results.
- At the client's request, engaged in a multi-year collaborative process with the Wyoming Department of Environmental Quality involving a series of technical meetings and conference calls.
- For over a dozen meetings and calls, drafted meeting notes and action items for agency approval.
- Managed the updated ecological exclusion assessment, which demonstrated that plants, invertebrates, fish and wildlife are not likely to be affected. This document was accepted by the agency.
- When the agency's project manager resigned near the end of this multi-year process, helped bring WDEQ's new team up to date on historical agreements and the agreed-upon risk assessment process.

## **Publications**

Dr. Heath has authored or co-authored over 50 publications, and has written and edited newsletters on topics including lead and arsenic and practical toxicology and risk assessment. She has also been active in several professional associations, including holding elected office, presenting papers at annual meetings, and chairing sessions at meetings. She has taught graduate-level toxicology/risk assessment classes at two universities and given dozens of presentations and training sessions related to toxicology and risk assessment.

She has recently written about and presented on the perfluorinated chemicals PFOS and PFOA. In addition, her series of posts on topics such as human health risk assessment, testifying and consulting experts in litigation, PFOS/PFOA, and other topics is available on her LinkedIn profile. In 2016, Dr. Heath designed and presented a 4-hour webinar, through the Northwest Environmental Training Center, on chemically contaminated drinking water; this webinar used lead and PFAS as example chemicals.