



Paul K Scott, QEP

Current Position

Principal Science
Advisor

Discipline Areas

- > Human Health Risk Assessment
- > Statistics
- > Environmental Forensics
- > Exposure Assessment
- > Fate and Transport Modeling
- > Epidemiology
- > Toxicology
- > Occupational Health

Years' Experience

30 Years

Joined Cardno

2006

Education

BS, Mathematics –
Missouri State
University (1990)

Summary of Experience

Mr. Paul Scott is a Principal Science Advisor with 30 years of experience applying statistics, exposure assessment methods, and fate and transport modeling in the areas of environmental forensics, epidemiology, toxicology, occupational health, and human health and ecological risk assessment. He has extensive experience with environmental issues associated with hexavalent chromium, lead, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs), and perfluorinated chemicals (PFCs), such as, perfluorooctanoic acid (PFOA).

Mr. Scott is an expert in the use of multivariate statistical methods to identify sources of chemicals in indoor dust, soil, sediment, air, surface water, biota, human serum, and groundwater. He has applied statistical sampling design methods to design environmental and biomonitoring studies. He is an expert in the use of various basic statistical data analysis methods for comparing and summarizing concentrations from soil, sediment, air, surface water, groundwater, human serum, and biota. He has experience applying benchmark dose methods to both animal toxicity and epidemiology data, using logistic regression analysis and other categorical data analysis methods for evaluating epidemiology data, and general linear methods, such as ANOVA, for analyzing animal toxicity testing and sediment toxicity data.

In addition, Mr. Scott has extensive expertise conducting probabilistic and deterministic exposure assessments for metals, PFCs, VOCs, PCBs, PCDD/Fs, and PAHs at various industrial facilities. He was one of the first to develop and publish probability density functions for common exposure factors used in human health risk assessment. He also has developed an empirical method for determining the exposure duration distribution from survey data. In addition, he has experience performing human health risk assessments of remedial alternatives for both chemical and physical hazards as part of the remediation decision process at several environmental sites.

Mr. Scott is an expert in the application of fate and transport models to understand historical, current, and future exposure concentrations for both environmental and occupational exposure assessment. He has applied vapor emission, air dispersion, and particulate emission models in support of the risk assessment or remedial investigation of over 30 sites. He also has experience using soil-to-groundwater, analytical groundwater solute transport, and food web models. Mr. Scott has commented extensively regarding fate and transport modeling, and probabilistic exposure assessment on several proposed soil standards and proposed risk assessment guidance documents.

Significant Projects

Human Health and Environmental Risk Assessment

Performed a baseline human health risk assessment for a former United States Air Force base in Bien Hoa, Vietnam as part of ongoing efforts to remediate the site. The risk assessment focused on risks from exposure to polychlorinated dibenzo-p-dioxins and furans and arsenic in soil and sediment before, during, and after remediation at the site.

The risk assessment evaluated exposure from direct contact with soil and sediment as well as the ingestion of impacted dietary items by local residents and air base personnel.

Assisted in the preparation of an expert report as part of a source allocation dispute resolution at a Superfund site. The expert report discussed why the baseline human health risk assessment performed as part of the RI/FS was not suitable as the sole basis for allocation between different sets of PRPs responsible for two different chemicals. This included a discussion of the purpose of the baseline risk assessment for Superfund sites and a discussion of the biases associated with the assumptions used in the risk assessment and their impact on the risks for the two chemicals.

Prepared a conceptual site model, designed a sampling plan, and compared the soil sampling data to health-based soil screening levels for a former wood treatment site that had been previously remediated that was being re-evaluated due to the changes in the 2,3,7,8-TCDD Reference Dose (RfD) used by the USEPA. The sampling plan was designed using the Incremental Sampling Methodology (ISM) with the site divided into 7 distinct decision units. Comparison of the soil concentrations for each decision unit to health-based soil levels indicated that there were no risks at the site under current and future land use scenarios.

Prepared a human health risk assessment for a former pumping station in San Luis Obispo, California. The primary chemical of concern was arsenic. Arsenic concentrations at the site were near regional background levels but statistical testing indicated that site concentrations were greater than background using standard comparison methods. The cancer risk associated with exposure to arsenic in site soil were compared to those associated with background and were shown to result in a de minimis increase relative to exposures to background levels in soil.

Performed an evaluation of the potential health risks associated with offsite exposures to MTBE from a spill in the Houston Ship Channel. The evaluation concluded that offsite resident exposures to MTBE based on air sampling data collected after the spill and until the completion of cleanup operations were below concern for acute and subchronic health effects. In addition, chronic health effects were not of concern because the exposure duration was less than one year.

Provided peer review of a risk assessment for Port Hedland and South Hedland in Western Australia. This risk assessment discussed the potential theoretical risks to the residents of Port Hedland and South Hedland from exposure to ambient air pollution including PM10, PM2.5, nitrogen dioxide, sulfur dioxide, respirable crystalline silica, asbestos fibers, manganese, copper and iron oxide based on air monitoring data collected between 2012 and 2014 at various locations in the Port Hedland area.

Provided litigation support services for the owner of a decommissioned pipeline located in Colorado and Nebraska. The client was involved in class action litigation in which the plaintiffs alleged that the asbestos pipe wrap that had been left behind after the pipeline had been removed had contaminated their property and was a human health risk. As part of litigation support, a report was compiled that compared how human health risks were assessed at other sites that were impacted by asbestos in soil, including sites with contamination from demolished buildings, asbestos mining and processing sites, and sites with naturally occurring asbestos; an ambient air and background air sampling program was designed; and a human health risk assessment for the plaintiff properties

based on air concentration data previously collected using activity-based sampling was performed.

Performed data evaluation, exposure point concentration estimation, and general technical review of human health risk assessment of Rio Grande surface water that was to be diverted and used as drinking water for Santa Fe, NM. The data evaluation included analysis of surface water concentrations of both chemicals and radionuclides from the Rio Grande during baseflow conditions; estimation of exposure point concentrations for use of the surface water as residential drinking water; estimation of vegetable concentrations due to use of water for irrigation; and analysis of surface water concentrations for stormwater sampling locations.

Reviewed and checked the Basic Comparison Levels (BCLs) developed by the Nevada Department of Environmental Protection (NDEP) for soil, air, and drinking water that are used as screening levels at hazardous waste sites in the state of Nevada. The review included comparison of the BCLs to the USEPA Region 6 Medium-Specific Screening Levels (MSSLs) and the USEPA Region 9 Preliminary Remediation Goals (PRGs) and an explanation of the differences between the BCLs and the other two methods.

Reviewed the human health risk assessment developed by the Australian firm Synergetics for a highway tunnel built underneath a residential section of Sydney. The risk assessment included complex data evaluation and refined air modeling analyses. The comments given to this client helped them to improve the risk assessment significantly and resulted in minimal comments from Australian regulators.

Performed a risk assessment of total petroleum hydrocarbons (TPH) and total chlorides in groundwater in support of litigation for a hydrocarbon storage facility in southern Louisiana. The risk assessment demonstrated that TPH and total chlorides did not pose a risk to human health and the environment. The results of the risk assessment resulted in a settlement favorable to the client.

Re-evaluated the baseline risk assessment for a site in Utah that had soils contaminated by hexachlorobenzene, arsenic, chromium, PCBs and PCDD/Fs. This baseline risk assessment included a probabilistic exposure assessment as well as the usual reasonable maximum exposure (RME) point estimate calculations. The re-evaluation of the baseline risk assessment included: revision of the exposure point concentration estimates, development of an exposure point concentration distribution, addition of a meteorological factor, addition of oral and dermal bioaccessibility factors, use of skin surface area-to-body weight correlation in the probabilistic exposure assessment, and use of an activity-specific soil-to-skin adherence factor distribution. This re-evaluation was used in negotiations with USEPA and has led to USEPA acceptance of additional site-specific evaluations of bioaccessibility and soil loading.

Developed Alternative Remediation Standards (ARs) based on the inhalation pathway for chromium (VI) in soil for 33 sites chromium sites in northern New Jersey. As part of the RI, soil ARs for chromium (VI) were calculated based on the inhalation pathway for onsite industrial, offsite residential, and onsite residential scenarios. The AP-42 vehicle disturbance particulate emission model and the fugitive dust model were used with site-specific data to calculate site-specific ARs based on current onsite vehicle traffic conditions.

Performed a screening-level comparative risk assessment for two remedial alternatives for a former pesticide manufacturing Superfund site in northern New Jersey with dioxin-contaminated soils. The comparative risk assessment presented the physical and chemical risks associated with two remedial alternatives: onsite containment, and excavation followed by offsite incineration in Kansas. The assessment showed that the chemical risks due to the excavation/offsite incineration remedy were 10 times greater than those associated with onsite containment; the risk of at least one job-related fatality during remedy implementation was more than 10 times higher for the excavation/ offsite incineration remedy versus onsite containment; and the risk of an accident or fatality while contaminated materials were being transported for excavation/offsite incineration remedy was 1,000 times higher than the onsite containment remedy. The USEPA Region 2 subsequently gave full approval to the onsite containment remedy.

Developed soil cleanup levels for lead using the USEPA's integrated exposure uptake/biokinetic model for lead, a physiologically based pharmacokinetic model for lead, and a USEPA Region 5 modified version of the lead model for a former steel manufacturing facility in Chicago, Illinois. These models were used to develop soil cleanup levels for residential, industrial, and construction future-use scenarios, and used site-specific oral and dermal bioaccessibility data from site soils impacted by blast furnace steel slag. The calculated cleanup levels are currently being used to expedite the remediation of this Brownfields site.

Conducted data evaluation, exposure assessment, soil/vapor modeling, and quantitative uncertainty analysis for a comparative dose study. The study compared uptake levels of contaminants with background levels of uptake and acceptable daily intake levels for a residential area built on a former wood treatment plant at which creosote, PCP, and dioxin were the chemicals of interest in soil. The results of the comparative dose study demonstrated that health risks to site residents were below regulatory levels of concern. The comparative dose study was successfully used to support expert testimony for the defendant against litigation by the residents.

Performed a site-wide air risk assessment under RCRA for a chemical manufacturing facility in southwest Louisiana. This site wide air risk assessment evaluated the human health risks to onsite workers and offsite residents from vapor emissions of chlorinated VOCs from contaminated groundwater beneath the facility. The chlorinated VOCs in groundwater at the facility included carbon tetrachloride, trichloroethene, tetrachloroethene, and vinyl chloride. In addition, mercury emissions from soil for an onsite chlor-alkali plant were also evaluated. The risk assessment showed that onsite risks to workers and offsite risks to residents were below levels of concern.

Performed an imminent hazard evaluation of vinyl chloride in onsite surface waters at multiple SWMU RCRA facilities in northeastern Ohio. This imminent hazard evaluation addressed the human health risks associated with onsite and offsite exposures to vinyl chloride in local surface water. Evaluated acute, subchronic, and chronic effects due to onsite recreational and offsite residential exposures via vapor inhalation. Used USEPA methods to estimate vapor emissions from surface water in conjunction with the box and ISCST2 models to estimate onsite and offsite air concentrations, respectively. Results of the hazard evaluation indicated that interim measures were not needed to mitigate the health hazard associated with vinyl chloride in surface water.

Prepared a letter report of comments on a Dutch approach for estimating health-based soil concentrations due to vapor emissions of benzene from soil, which was submitted to Dutch regulators as part of risk assessment at an oil refinery in the Netherlands.

Exposure Assessment

Supervised the development of background concentration distributions for various environmental media for ten chemicals (PFOA, PFOS, PCDD/Fs, methylnaphthalene, naaphthalene, F1 fraction of petroleum hydrocarbons, tetrachloroethylene, inorganic mercury, thallium, and manganese). These background concentration distributions were used to develop an estimated daily intake (EDI) that was used by Health Canada to develop soil screening levels for these chemicals. This project included an extensive literature search, literature summary, and data evaluation of the identified papers and background data sets.

Supervised and reviewed the probabilistic exposure assessment of asbestos exposures for a plaintiff with exposures associated with work at two different locations for two different employers. The exposure assessment was used to support expert opinions regarding the plaintiff's overall exposure to asbestos as well as his exposure at each of the two employers.

Developed probability distributions for parameters used in modeling assessment of historical exposures of hairdressers to vinyl chloride in hair spray for a variety of specific use scenarios. Distributions were applied both transient two-zone and steady state models, as part of a Monte Carlo sensitivity analysis. This work was published in the peer reviewed literature.

Performed and supervised several tasks associated with estimating historical exposures to perfluorooctanoic acid (PFOA) for residents near a polymer manufacturing facility in West Virginia due to air emissions from 1951 to 2003. This historical exposure reconstruction was performed to support expert witness testimony in a medical monitoring class action case. These tasks included:

- > Development of a PFOA material balance model to estimate the mass of PFOA released to air, water, landfills, and off-site disposal from the mass of PFOA used at the facility from 1951 to 2003.
- > Estimation of PFOA air concentrations and total deposition to soil from 1951 to 2003 using ISCST3 air dispersion model and the estimated air emissions from the material balance model.
- > Estimation of PFOA concentrations in homegrown vegetables from estimated surface soil concentrations using standard U.S. EPA methods.
- > Estimation of Average Daily Doses (ADDs) of PFOA for residents living in five water districts in the vicinity of the facility using estimated air, soil, drinking water, and homegrown vegetable concentrations.
- > Preparation of documentation binders that described and provided backup documentation for material balance model and air dispersion model and supervision of preparation of other binders for other modeling. These binders were created for use by the expert witness during deposition.
- > Co-author of expert report and manuscript that describe this historical exposure reconstruction.

Performed two probabilistic exposure assessments of benzene exposure for two oil tanker workers. These two probabilistic exposure assessments were used to support expert witness testimony on magnitude of each plaintiff's benzene exposure during his time working on the tanker.

Performed exposure assessment of inhalation and dermal exposures to benzene and carcinogenic PAHs at a former manufactured gas plant (MGP) site. This exposure assessment was performed to support expert witness testimony regarding the magnitude of the plaintiff's exposure while working at a yacht yard that built on a former MGP site. For this exposure assessment, vapor emissions and air concentrations were estimated based on several excavation scenarios using the Jury model and a method presented in the published literature. In addition, a comparison between the plaintiff's exposures to benzene and carcinogenic PAHs at the site and exposures from smoking, living in an urban area, and eating grilled meat was performed.

Performed a probabilistic exposure assessment for manganese in BOF and EAF slag, and for beryllium in BF slag. Conservative point-estimate calculations of risk for construction workers exposed to manganese in BOF and EAF slag via particulate inhalation, and for construction workers, industrial workers, farmers, and residents exposed to beryllium in BF slag via soil ingestion were greater than acceptable levels. Because of this, a Monte Carlo analysis of the particulate inhalation pathway for construction workers exposed to manganese in BOF and EAF slag was performed and indicated that noncancer hazards were actually at or below acceptable levels. Performed a Monte Carlo analysis of the soil ingestion pathway for all populations for beryllium in BF slag. The analysis showed that cancer risks for all populations were below acceptable levels. The results of these two analyses were included as part of the beneficial-use risk assessments for BOF, EAF, and BF slag.

Developed an exposure duration probability distribution for recreational anglers in southern California based on survey data. Age-specific probability distributions of exposure duration for two groups of recreational anglers in southern California were developed, from the reported number of years spent fishing at the surveyed location and the angler's age, using an empirical approach. This empirical approach was used to convert the reported durations into the total number of years that the angler would fish at the location. In addition, the exposure durations were corrected for both avidity and longevity biases. These two probability distributions were then used in a risk assessment in support of litigation.

Developed an exposure duration probability distribution for recreational anglers in Wisconsin based on survey data. Age-specific probability distributions of exposure duration for two groups of recreational anglers in Wisconsin were developed, from the reported number of years spent fishing at the surveyed location and the angler's age, using an empirical approach. This empirical approach was used to convert the reported durations into the total number of years that the angler would fish at the location. In addition, the exposure durations were corrected for both avidity and longevity biases. These two probability distributions were then used in the risk assessment for these sites.

Performed probabilistic risk assessment for a chlor-alkali facility in southwest Louisiana with soils contaminated by mercury. The point-estimate calculation of noncancer hazards at the facility using conservative point-estimate exposure parameters indicated that onsite worker exposures to mercury were at unacceptable levels. Because of this, the probabilistic risk assessment using probability distributions for the exposure parameters

showed that even the upper-bound or 99th-percentile hazard quotient for mercury was below acceptable levels. This analysis indicated that the concentrations of mercury in soil were not of concern for onsite industrial workers.

Air Quality Modeling

Provided expert witness testimony in trial in *Gough vs. Rogers Corporation et al.* regarding the asbestos air concentrations the plaintiff was exposed to from 1958 to 1991 at his home that was three miles from the Rogers Corporation facility in Manchester, CT. Asbestos air concentrations were estimated using the AERMOD air dispersion model based on historical emissions both before and after baghouse emission controls were implemented at the facility. The results of the air modeling that were presented in an expert report and in trial testimony indicated that the estimated asbestos concentrations at the plaintiff's residence were well below the range of background asbestos for the same time period.

In support of expert witness testimony for another expert, asbestos air concentrations for railroad workers at a facility in Bloomington, IL were estimated. Plaintiffs' included railroad workers who claimed that exposure to asbestos emissions from a plant that was located at the railyard caused mesothelioma. Asbestos air concentrations at the railyard due to emissions from the plant were estimated using the AERMOD air dispersion model based on historical emission information. The results were used by the expert as part of her exposure estimates for the case.

Supervised the use of AERMOD to perform an odor modeling evaluation for a gas turbine test facility run by the U.S. Navy in Philadelphia, PA. AERMOD was used to estimate the air concentrations of various hazardous air pollutants (HAPs) due to uncontrolled emissions from the turbines. Four fuel types were modeled, JP-5, number 2 fuel oil, digester gas, and biodiesel. The estimated air concentrations were compared to odor thresholds summarized by the U.S. EPA. The odor evaluation indicated that there were no exceedances of the odor thresholds for any of the HAPs even under maximum load conditions.

Provided comments on the Draft Bay Area Air Quality Management District (BAAQMD) Regulation 12 Miscellaneous Standards of Performance, Rule 15 Petroleum Refining Emissions Tracking and Rule 16 Petroleum Refining Emissions Analysis, Thresholds, and Mitigation. These draft rules require a refinery owner/operator to submit and maintain an approved health risk assessment that is prepared based on the most recent guidelines adopted by the State and to implement and maintain a fence line and community air monitoring program. The comments discussed the conservatism of the exposure assumptions used to calculate human health risks, the use of age sensitivity factors for all carcinogens not just mutagenic carcinogens, and the lack of guidance on how the community air sampling data would be interpreted.

Estimated and compared air emissions between unconventional gas development and production and industrial and residential emission sources in support of expert testimony in a local zoning board hearing in a southwestern Pennsylvania township. The emission comparison showed that emissions during unconventional well development were similar to those associated with residential and commercial development activities and emissions during well production were similar to those associated with residential and commercial land uses. In addition, the emission demonstrated that emissions during well

development and production were well below those associated with local heavy industrial facilities.

Developed an emission and indoor air dispersion modeling approach that was used to estimate diacetyl air concentrations associated with various tasks for flavoring workers. The emission model was developed for different mixtures of diacetyl in water, propylene glycol, and soybean oil using first principles and Raoult's Law. The activity coefficients for the emission model for each mixture were estimated based on headspace measurements of diacetyl for each mixture. Emissions from open containers of the diacetyl mixtures and from the filling of flavoring tanks were estimated. The emission model was coupled with a near field/far field indoor air dispersion model to estimate both the short term and TWA air concentration associated with each activity. This modeling approach was used as part of an exposure assessment in support of expert witness testimony.

As part of expert witness testimony, reviewed and critiqued the work of a plaintiff expert in the area of air dispersion modeling for the personal injury case, *Robyn Bourelle v Famcor Oil, Inc.* In this case, the plaintiff alleged that air emissions from the Famcor Oil compressor facility next door caused a variety of health problems. The plaintiff air dispersion modeling expert estimated the air concentrations of nitrogen oxides, total volatile organic compounds (VOCs), and benzene from the facility using the facility's state emission inventory and assuming all of the sources were fugitive emissions. However, most of the sources at the facility were not fugitive sources and the plaintiff expert's assumption that they were fugitive sources resulted in a significant overestimation of air concentrations.

Performed air dispersion modeling of historical emissions from 1976 to 2012 for a chemical manufacturing facility along the Ohio River in northwest West Virginia using the CALPUFF model as part of mass toxic tort litigation. The CALPUFF model was used to estimate air concentrations for 44 different chemicals at a 1,000 receptor locations within a 20 mile radius of the facility using the maximum emissions for the chemicals from 1976 to 2012. The estimated air concentrations were compared to U.S. EPA Risk-based Screening Levels (RSLs) for ambient air and only 4 chemicals had estimated air concentrations above the RSL for any of the receptor locations. This analysis was used to focus future exposure assessment activities only on those 4 chemicals.

Reviewed and critiqued the work of a plaintiff expert in the area of air dispersion modeling who estimated asbestos air concentrations from a mining site in Coalinga, California. Identified key areas where the experts' assumptions were questionable and assisted the attorneys in preparing for the deposition of the experts.

Performed a review and evaluation of the tire wear emission rate models used in the U.S. EPA's Report to Congress on Black Carbon to develop emission rate estimates of particulate matter (PM), elemental carbon (EC), and organic carbon (OC) due to tire wear. The review included an evaluation of the U.S. EPA emission factor model MOVES and the U.S. EPA model SPECIATE that were used in the Report to Congress to project black carbon emission due to tire wear. The review showed that the tire emission rates used in MOVES were from a study that included only four cars and the data on the percent of EC and OC in tire wear particulates was from the early 1980s.

Reviewed and critiqued the work of a plaintiff expert in the area of air dispersion modeling who estimated PM10 air concentrations from a construction site in northern California and compared them to possible emissions from other nearby construction sites. The plaintiffs

claimed that particulate emissions from the neighboring construction site were the cause of their *Coccidioides immitis* (Valley Fever) infection. Identified that the expert used the wrong methodology to estimate PM10 air concentrations and that the expert did not base his PM10 estimates for other sites on any site-specific information.

Performed air dispersion modeling of vapor emissions from soil that would occur during remediation of a former manufactured gas plant (MGP) in the metropolitan area of Chicago, IL. The modeling was to adjust fence-line risk-based air concentration objectives to be protective of off-site locations. The fence-line air concentration objectives were developed to insure that remediation activities did not pose a risk to the public living near the site.

Reviewed and critiqued the work of plaintiff experts in the areas of air dispersion modeling and particulate emission modeling who had estimated particulate emissions and air concentrations of metals and PCBs from a former scrap metal yard in Louisiana. The case was a class action in which the plaintiffs alleged that historical emissions from the site impacted their health. Identified key areas where the experts' assumptions were questionable and assisted the attorneys in preparing for the deposition of the experts.

Developed and applied two indoor air dispersion models that were used to bound the potential impact of a worker performing tasks that could lead to the emission of asbestos on another worker a fixed distance away. The results of this modeling were compared to industrial hygiene sampling data collected from workers and their associated bystander worker in order to develop a "rule of thumb" for the ratio of worker to bystander exposures. This work was published in the peer reviewed literature.

Performed air emission and dispersion modeling of vapor emissions from soil that would occur during remediation of a former manufactured gas plant (MGP) in the metropolitan area of Chicago, IL. The modeling was part of a risk assessment that was used to evaluate risks associated with remediation activities to the public living near the site.

Performed particulate emission modeling of indoor dust and outdoor soil associated with guard activities for a water treatment plant located in Iraq. The particulate emission modeling was used to estimate air concentrations of hexavalent chromium that various plaintiffs may have been exposed to during their normal activities as the site in support of expert testimony of another expert.

Re-evaluated the particulate emission/air dispersion modeling approaches to estimate onsite air concentrations of chromium (VI) at these sites. This re-evaluation was performed because of changes in the AP-42 particulate emission model and in the USEPA recommended air dispersion models over time. The re-evaluation concluded that the previous approach produced Cr(VI) air concentration estimates that were similar to an updated approach using the latest AP-42 particulate emission models and the Industrial Source Complex model, version 3 (ISC3).

Developed a particulate emission/air dispersion modeling approach to estimate onsite air concentrations of chromium (VI) at 33 chromium sites in northern New Jersey. The comparison of modeled air concentrations to measured air concentrations demonstrated that the best particulate emission and air dispersion models for these sites were the AP-42 vehicle disturbance particulate emission model and the fugitive dust model. This modeling approach was subsequently approved by the NJDEP for use in the risk assessment of these sites.

Developed and negotiated the use of generic particulate emission modeling parameters for those chromium sites in northern New Jersey that do not currently support vehicle traffic. These generic particulate emission modeling parameters were approved by the NJDEP for use in the risk assessments of these sites.

Performed particulate emission and air dispersion modeling of total and hexavalent chromium at an active ferrochromium facility in South Carolina to determine the air concentrations potentially impacting a nearby residential neighborhood. The results of the modeling were used in the risk assessment to determine the potential health impacts of the facility.

Supervised and provided technical review of particulate and vapor emission modeling, and air dispersion modeling activities for multiple SWMU RCRA facilities in northeastern Ohio. Evaluated and eliminated from further consideration particulate emissions using a screening approach. Vapor emission modeling indicated the need for a more refined evaluation of vapor emissions from onsite surface water. The modeling evaluation supported the conclusions of the risk assessment that indicated that particulate and vapor emissions from soil were not a concern at this site.

Performed vapor emission modeling for soils and groundwater contaminated with ethylene dichloride (EDC) at a chlorinated solvents manufacturing facility in Altona, Australia. Results of vapor emission modeling were used to demonstrate to the Victoria USEPA that the EDC in soils and groundwater posed no risk to onsite workers.

Performed an air dispersion modeling evaluation to identify engineering changes necessary for a bakeoff oven to meet Ohio EPA air standards for hydrogen chloride at a PVC manufacturing plant in Cleveland, Ohio. This evaluation was used by the client to select the most cost-effective emission control alternative.

Fate and Transport Modeling

Evaluated three unsaturated zone models (Chemflo, SWIM, and HYDROGEOCHEM) for use in simulating the movement of chromium (VI) from soil into puddle water. This evaluation was used to develop a liquid-to-solid (LSR) ratio for ASTM Method D3987 for soils containing chromite ore processing residue (COPR). This COPR-specific LSR was then used to develop site-specific Alternative Remediation Standards (ARSs) for the dermal pathway at 33 chromium sites in northern New Jersey.

Used HYDROGEOCHEM, a coupled geochemical/groundwater solute transport model to describe behavior of Cr(VI) in groundwater flowing through soils containing chromite ore processing residue.

Performed fate and transport evaluation of No. 2 diesel fuel in soils and groundwater due to a pipeline rupture in northeast Indiana. Results of the transport and fate modeling were compared to water-quality standards and it was determined that the residual soil and groundwater contamination at the site had no significant impact on the local stream. This evaluation was used as the basis for a no-action alternative under Indiana's voluntary action program.

Performed leachate and groundwater modeling to determine potential impacts of post-remediation levels of PAHs and total petroleum hydrocarbons at a former oil well site in Texas. The results of the evaluation were presented to the Texas Railway Commission. In addition, fate and transport modeling at the site was used to justify a total petroleum

hydrocarbon soil cleanup level of 3% based on the lack of carcinogenic PAHs or benzene at the site.

Environmental Forensics

Provided expert testimony regarding the potential sources of lead at rail yard sites in Missouri and usability of data collected by the plaintiff for source characterization as part of cost allocation litigation. The available concentration data at these sites were evaluated to determine whether potential sources of lead could be identified and remediation costs could be allocated to several defendants. Because site soils were only analyzed for total lead and cadmium, standard environmental forensic methods could not be used because the soils were not analyzed for a full suite of metals and lead isotope analyses were not performed. In addition, opinions were given on the potential sources of lead that could be present at a rail yard site due to normal rail activities and the use of Tri-State chat as ballast material.

Provided expert testimony in area of source apportionment for defendant in State of California vs. Sierra Pacific Industries. Testimony included critique of source apportionment performed by the plaintiff's expert and discussion of principal components analysis (PCA) performed for defendant using plaintiff expert's elemental data analyzed from particulate samples.

Supervised, developed and wrote an expert report regarding whether a paper mill located in Louisiana was a polluter in an insurance coverage case based on the criteria set forth in Doerr vs. Mobil Corp. Based on the presentation of research from company documents, U.S. EPA reports on the industry, and U.S. EPA and LDEQ documents regarding the facility, expert opinions that the facility was a polluter in terms of Doerr were developed and written. The case settled prior to the production of the expert report.

Performed literature review to identify levels of polychlorinated dibenzo-p-dioxin and furans that have been measured in crude oil and other petroleum products. Information was used by a confidential client for decision-making with respect to their product.

Performed literature review of current scientific literature on PFOA fate and transport, perfluorinated chemical concentrations associated with sewage sludge and wastewater treatment, and PFOA levels in Decatur, AL and educated the client regarding the fate and transport and methods for the identification of sources of PFCs in the environment.

Developed a method using a combination of principal components analysis (PCA) and discriminant analysis (DA) to identify sediment samples in the lower Willamette River that were associated with two neighboring sites or with background using both 2,3,7,8-PCDD/F congener data and DDT isomer data. The results of this method were used to estimate the volume of sediment associated with each source and the volume of sediment that could not be assigned to either source. This source allocation exercise was used by this confidential client to assist with their long-term budget forecasts for their site.

Used the chemical fingerprinting method polytopic vector analysis (PVA) to identify potential 2,3,7,8-PCDD/F fingerprints for sediment samples collected from the lower Willamette River. The PVA identified several local sources of PCDD/Fs in the sediment samples, including chlor-alkali processes, lead smelting, and pentachlorophenol chemical production.

Developed a method for identifying sediment samples impacted by chlor-alkali waste using hexachloroethane and octachlorostyrene concentrations. This method was used to confirm the results of previous chemical fingerprinting analyses for sediment samples collected from the lower Willamette River.

Applied principal components analysis (PCA) to PCB homologue data from indoor dust wipe samples collected from a building in Japan impacted by PCBs that had been stored in its basement. The PCA showed that 95/99 of the indoor dust samples had homologue profiles consistent with a single source of PCBs.

Developed method for comparing 2,3,7,8-PCDD/F congener profiles of potentially exposed individuals to the background congener profiles based on the 2001/2002 NHANES data set to determine if the 2,3,7,8-PCDD/F congener profiles were the same as background. This method used principal components analysis (PCA) to compare the principal component of a potentially exposed individual to those of the individual's gender, race, and age-specific NHANES data subset.

Applied the chemical fingerprinting methods of cluster analysis and discriminant analysis to sediment concentration data to demonstrate that a pulp and paper mill was not the source of PCDD/F contamination in Perdido Bay, Florida. This evaluation demonstrated that sewage treatment effluent was the most likely source of the PCDD/Fs measured in the surface sediments of Perdido Bay. In addition, the PCDD/F sediment concentrations in terms of WHO 98 toxic equivalents (TEQs) were compared to background sediment concentrations and were shown to be below background. These analyses were performed in support of litigation.

Applied the chemical fingerprinting methods of multivariate analysis of variance (MANOVA) and discriminant analysis to identify World Trade Center (WTC) dust based on the metals concentrations present in bulk dust. This analysis demonstrated that WTC dust was not present in the interstitial wall cavity of a building that was impacted by the WTC collapse on September 11, 2001. Because of this analysis, the client, an insurance company, was able to demonstrate to the insured that they were not responsible for the costs associated with tearing down the inside walls of the office building and was able to settle with the insured for millions dollars less than the insured originally claimed.

Performed chemical fingerprinting to identify the sources of PCDD/Fs in soil samples collected near a hazardous waste incinerator in Kansas permitted to incinerate material contaminated with PCDDs, PCDFs, and PCBs. Polytopic vector analysis was used to determine the sources or end members of the PCDDs and PCDFs in the soil samples collected from areas near the incinerator. The fingerprinting analysis identified three sources of PCDDs and PCDFs in soil related to the incinerator. These sources included PCDD and PCDF mixtures similar to those from incinerator emissions, pentachlorophenol, and PCBs.

Performed air dispersion modeling to determine the areas of maximum deposition near a hazardous waste incinerator in Kansas, and identified the most appropriate soil and fish sampling locations. The ISCST3 air dispersion model was used to determine the areas of maximum deposition for polychlorinated dioxins and furans. These areas were then used to identify sampling locations where contamination from the incinerator was most likely to occur. The soil and fish samples were collected at the identified locations as part of a screening-level investigation.

Statistical Analysis

Performed statistical data analysis of air concentration data from simulation study involving work activities associated with flanges containing asbestos. The analysis focused on identifying and understanding differences due to sampling duration, material (gaskets vs packing), equipment, task, and study. The results of this analysis are currently being incorporated into a peer reviewed manuscript.

Supervised and interpreted data analysis of air concentration data from multiple industrial hygiene monitoring and simulation studies involving workers who used valves and gaskets containing asbestos. The analysis focused on identifying and understanding differences due to analytical method (PCM vs TEM), sampling duration, material (gaskets vs packing), equipment, task, and study. This analysis indicated that there were significant differences due to sampling duration, material, and study. The differences among studies were still significant even after controlling for sampling duration. The results of this analysis are currently being incorporated into a peer reviewed manuscript.

Assisted with the statistical analysis of industrial hygiene data categorized by refinery worker job and task for several facilities. Developed methods for comparing benzene concentrations across refineries by job and task that were used in several peer reviewed publications.

Used ordinary kriging to estimate air concentrations of carbon monoxide and hydrogen sulfide near coking tanks for two minute intervals after a major release event using instantaneous air sampling data collected at 16 air samplers. These estimates were used to characterize air concentrations outside of the coking tanks in support of expert testimony by another expert.

Provided assistance with the design of a sampling program for a building in Japan that was impacted by PCBs. The sampling was performed to assess the exposures of building occupants to PCBs in indoor air and dust and the data were used in a subsequent risk assessment of the building

Designed a statistically-based sampling plan to evaluate the antimony concentrations in slag that was used as fill material in locations throughout Laredo, Texas. Samples were collected in December, 2005 based on that sampling plan.

Verified the adequacy of the remedial investigation (RI) soil sampling plan for the 33 chromium contaminated sites in northern New Jersey to detect differences between alternative remediation standard and the mean surface soil concentration. Based on the analysis, the New Jersey Department of Environmental Protection (NJDEP) approved the sampling plan and the RIs of these sites began.

Designed a sampling protocol for analyzing PCDD/Fs and dioxin-like PCBs in the blood of employees who worked at a secondary copper smelter. The results of the sampling protocol were used to determine if the smelter employees were exposed to PCDD/Fs at concentrations greater than the general U.S. population based on an analysis of the 2001/2002 NHANES data set.

Developed a mixed regression model to evaluate the effects of age, body composition, and initial TCDD concentration on the elimination half lives of children affected by the

Seveso, Italy dioxin incident in 1976. The results of this model were published in the peer-reviewed literature.

Provided statistical support for a risk-based sampling plan for the collection of biota samples in the lower Passaic River. Statistical support provided justification for collecting 12 samples each of three species of interest instead of 30 samples (each of three species), as originally proposed by the USEPA. The USEPA accepted the biota sampling plan, saving the client millions of dollars in sampling and analytical costs.

Performed a statistical comparison of PCB concentrations in sediments reported as Aroclors and as individual congeners to determine if Aroclor analysis adequately quantified the total PCB concentration in sediment from the lower Passaic River. The results of this study indicated that the use of Aroclor analyses instead of individual congener analyses in risk assessment might lead to a substantial underestimation of the true risk.

Evaluated the applicability of the 95% upper confidence limit (UCL) of the area-weighted mean as a measure of exposure-point concentration for sediment from the lower Passaic River. The evaluation demonstrated that the area-weighted mean was a more stable and efficient estimator of mean sediment concentration than the USEPA-recommended 95% UCL of the lognormal mean.

Evaluated the impact of hot spot remediation on the 95% upper confidence limit (UCL) of the mean using an area-weighting approach. The evaluation demonstrated that remediation of selected hot spots would not have a significant impact on the overall exposure point concentrations for the lower Passaic River.

Developed multiple regression models to demonstrate that sediment toxicity in the Passaic River in northern New Jersey was not due to 2,3,7,8-TCDD, but instead to DDT and PCBs in contaminated sediments. This evaluation demonstrated that the conclusions of a NOAA sediment toxicity study of the region, which indicated that toxicity was due to 2,3,7,8-TCDD, were not correct.

Biostatistics

Supervised the implementation of benchmark dose analysis to estimate an occupational exposure limit (OEL) for diacetyl based on the mouse and rat inhalation toxicity data collected by Morgan et al. (2008) and the National Toxicology Program (NTP). The results of this analysis will be published in the peer reviewed literature.

Performed statistical evaluation of chromium serum, erythrocyte, and urine data over time from patients with ceramic-on-metal and metal-on-metal implants to determine if chromium was in hexavalent valence state or not. Evaluation indicated that serum chromium concentrations increased over time but erythrocyte concentrations did not indicating that chromium was in trivalent valence state. The results of this analysis will be published in the peer reviewed literature.

Supervised and reviewed the statistical analysis of clinical data on cobalt levels for studies that involved the ingestion of cobalt supplements by human volunteers over a 30 day and 90 day period. The statistical analysis included the evaluation of cobalt levels and various blood constituents such as albumin, total blood protein, and ferritin as well as

the estimation of the parameters of an empirical cobalt pharmacokinetic loss model. The results of these analyses will be published in the peer reviewed literature.

Used logistic regression analysis and other statistical methods to evaluate the impact of reverse causation on the association of TCDD concentration and the incidence of type 2 diabetes in veterans from the Ranch Hand cohort. The results of this analysis were presented at various scientific meetings and published in the peer reviewed literature.

Analyzed rodent toxicity testing data from 24 hour and 1 week tire wear particle studies. Data included both negative and positive controls (silica dioxide) and two dose groups of both tire particles and tire wear particles. The Kruskal-Wallis test, a nonparametric one factor ANOVA, was used to identify significant differences among the control and dose groups for the relevant toxicological endpoints such as inflammation, hematological changes, and weight changes.

Evaluated historical Cr(VI) air concentration data between 1943 and 1971 from a former chromate production plant in Painesville, Ohio to characterize exposures to a cohort of plant workers. Used analysis of variance and multiple comparison tests to determine if there were any significant differences between different sampling events and plant area sampled. Developed initial exposure characterization for plant workers based on these data. These exposure data were used with epidemiological data for the same workers to estimate an inhalation unit risk for Cr(VI) for worker exposure.

Reviewed and commented on soil cleanup standards for chromium (VI) and chromium (III) proposed by the NJDEP. These comments included the NJDEP's failure to provide a sound technical basis for the estimated air concentration used to calculate the chromium (VI) soil standard based on the inhalation of soil particulates, the identification of an algebraic error in deriving the equation that would be used to calculate the chromium (VI) soil standard based on allergic contact dermatitis, and the demonstration that the statistical analysis used to support the allergic contact dermatitis elicitation threshold for chromium (VI) of 10 ppm was severely flawed.

Implemented the multistage statistical models for quantal and continuous dose-response data (THRESH and THC) to derive a benchmark reference concentration (RfC) for chromium (VI) of 0.85 $\mu\text{g}/\text{m}^3$. This benchmark RfC is two orders of magnitude higher than the withdrawn USEPA RfC for chromium (VI) of 0.002 $\mu\text{g}/\text{m}^3$, and has been published in the peer-reviewed literature. This RfC has been submitted to the International Toxicity Estimates for Risk, an international database similar to the USEPA's Integrated Risk Information System database.

Consumer Products Assessment

Estimated historical near-field and room air concentrations of vinyl chloride due to hair spray emissions for both a household consumer in his/her bathroom and for a hairdresser in a hair salon using MCCEM model. A comparison of these model results with published data indicated the need for further study in order to appropriately characterize historical air concentrations.

Performed exposure assessment for Proposition 65 for waterless urinals containing chloroxylenol. Noncancer hazard quotients were estimated for maintenance and janitorial workers coming in contact with the urinals indoors and were estimated for adult and child swimmers and waders potentially exposed due to chloroxylenol releases from wastewater

treatment plants. The exposure assessment demonstrated that the noncancer hazards based on conservative assumptions were several orders of magnitude below one.

Decision Analysis

Developed an analytical hierarchy process (AHP) model for identifying the most important 200 papers on nanoparticle toxicology and exposure assessment out of about 1,000 papers identified in a literature search. The AHP model was designed based on factors and factor rankings given by the toxicologist responsible for reviewing the papers. The use of the AHP model helped to streamline the decision making associated with the literature review and helped to save the client time and money as a result.

Developed an analytical hierarchy process (AHP) model to create a weighting framework for combining relative estimates of potency (REP) from various studies for the 2,3,7,8 PCDD/F congeners and the dioxin-like PCBs into a toxic equivalency factor (TEF) estimate. The framework hierarchy was developed using a consensus-based approach that considered factors such as study type (in vivo vs. in vitro), pharmacokinetics, REP study quality, REP study methods, and endpoint.

Evaluated different types of habitat restoration using NOAA's Habitat Equivalency Analysis (HEA) method coupled with the Analytic Hierarchy Process decision method. This method was used to evaluate restoration projects involving multiple habitat types by producing a weight scheme based on the characteristics of each habitat for each type of organism supported (benthic, fish species, plant species, etc.)

Physiological-based Pharmacokinetic Modeling

In support of expert witness testimony, applied the USEPA IEUBK and O'Flaherty physiologically based pharmacokinetic (PBPK) model to determine if lead-contaminated indoor dust was the sole source of childhood lead exposure for the plaintiff. Childhood lead exposures for the plaintiff were estimated based on the available indoor dust data and background levels in air and tapwater for the time he lived in the house. These exposures were input into the two models and the estimated blood lead levels were much lower than the measured levels for the plaintiff during the same time period. This indicated that he may have had alternate lead exposures, which may have included lead in dust at his grandmother's house or at his daycare.

Developed and applied a pharmacokinetic model for ethanol that was used to evaluate the veracity of a plaintiff's testimony regarding the amount and timing of alcohol consumption prior to an incident. The pharmacokinetic model demonstrated that the plaintiff either drank more alcohol at dinner than he said or drank alcohol between the time of dinner and the incident.

Implemented, modified, and used O'Flaherty physiologically based pharmacokinetic (PBPK) model for chromium (III) to determine bioavailabilities of different chromium-containing compounds. The results of this PBPK modeling were incorporated into a published paper advocating the use of different RfDs for different compounds containing chromium (III).

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- > Air & Waste Management Association (AWMA)

Peer-Review Publications

- > Scott, P.K., M.M. Abramson, J.L. Bare, and C.A. Barlow. 2019. Air dispersion modeling for historical community exposure reconstruction: An evaluation of the approach and its uncertainties. *EM-Mag Env Mgrs.* January, 2019.
- > Perez, A.L., M.L. Nelson, T.J. Cheng, C.E. Comerford, and P.K. Scott. 2018. A meta-analysis of airborne asbestos fiber concentrations from work with or around asbestos-containing floor tile. *Int J Occup Env Health.* Advance online publication Oct. 25, 2018. doi: 10.1080/10773525.2018.1533671.
- > Finley, B., P.K. Scott, M.E. Glynn, D. Paustenbach, E. Donovan, and K.A. Thuett. 2017. Chromium speciation in the blood of metal-on-metal hip implant patients. *Tox Environ Chem.* 99(1):48-64.
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- > Cowan, D.M., J.R. Maskrey, E.S. Fung, T.A. Woods, L.M. Stabryla, P.K. Scott, and B.L. Finley. 2016. Best-practices approach to determination of blood alcohol concentration (BAC) at specific time points: Combination of ante-mortem alcohol pharmacokinetic modeling and post-mortem alcohol generation and transport considerations. *Reg Tox Pharmacol.* 78:24-36.
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- > Madl, A.K., D.M. Hollins, K.D. Devlin, E.P. Donovan, P.J. Dopart, P.K. Scott, and A.L. Perez. 2014. Airborne asbestos exposures associated with gasket and packing replacement: A simulation study and meta-analysis. *Reg Tox Pharmacol.* 69:304-319.
- > Kerger, B.D., P.K. Scott, M. Pavuk, M. Gough, and D.J. Paustenbach. 2012. Re-analysis of Ranch Hand study supports reverse causation hypothesis between dioxin and diabetes. *Crit Rev Tox.* 42(8):669-87.

- > Finley, B.L., J.S. Pierce, D.J. Paustenbach, L.L.F. Scott, L. Lievens, P.K. Scott, and D.A. Galbraith. 2012. Malignant pleural mesothelioma in U.S. automotive mechanics: Reported vs. expected number of cases from 1975-2007. *Reg Tox Pharm.* 64(1):104-16.
- > Gross, S.A., R.D. Irons, P.K. Scott, D.A. Galbraith, X.Q. Wang, Y. Chen, D.J. Paustenbach. 2012. A Case-Control Study of Chronic Myelomonocytic Leukemia (CMML) in Shanghai, China: Risk Factors for CMML with Special Focus on Benzene. *Archives of Environmental & Occupational Health*, Vol. 67(4): p. 206-218.
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- > Sahmel, J., K.M. Unice, P.K. Scott, D.M. Cowan and D.J. Paustenbach. 2009. The use of multizone models to estimate an airborne chemical contaminant generation and decay profile: occupational exposures of hairdressers to vinyl chloride in hairspray during the 1960s and 1970s. *Risk Anal.* 29(12):1699-725.
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Book Chapters

- > Kangas, M.J., P.K. Scott, B.L. Finley and D.J. Paustenbach. 1996. A comparison of generic human health risk-based soil remediation criteria in Canada and the U.S.: Two case studies. In: La Point, T.W., F.T. Price and E.T. Little (eds.), Environmental Toxicology and Risk Assessment, Vol. 4. ASTM STP 1262. American Society of Testing Materials, pp. 138-164.
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Presentations

- > Garnick, L., A. Monnot, A. Mushnick, R. Zisook, and P. Scott. An Evaluation of State and Federal PFOA Drinking Water Guidelines. Poster presentation at the Society of Toxicology Annual Meeting, March 11, 2019, Baltimore, MA. Abstract No. 1193/Poster Board P218.
- > Abramson, M, Bare, J, Barlow, C, Scott, P. 2018. Evaluation of the Uncertainties Associated with the Use of Air Dispersion Modeling to Estimate Historical Community Exposure from Manufacturers of Asbestos-containing Products. Presented at Annual Meeting of the Air & Waste Management Association, Hartford, Connecticut, June 25.
- > Perez, AL, Poteete, C, Louie, F, Garner, L, Monnot, A, Zisook, R, Scott, PK. 2017. State of the science and meta-analysis of crop uptake of per- and polyfluoroalkyl substances (PFAS) (Abstract ID 10129). Presented at the 37th International Symposium on Halogenated Persistent Organic Pollutants (POPs) - DIOXIN 2017 Symposium, Vancouver Canada, August 21, 2017.
- > Monnot, A, Miller, E, Garnick, L, Beckett, E, Perez, A, Scott, PK, Zisook, R. 2017. An Evaluation of Federal and State Perfluorooctanoic acid (PFOA) Drinking Water Standards in the US (Abstract ID 10146). Presented at the 37th International Symposium on Halogenated Persistent Organic Pollutants (POPs) - DIOXIN 2017 Symposium, Vancouver Canada, August 24, 2017.
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- > Abelmann, A., M.E. Glynn, J.S. Pierce, P.K. Scott, S. Serrano and D.J. Paustenbach. Historical ambient airborne asbestos concentrations in the United States - An analysis of published and unpublished literature. Abstract #1690. Poster Presentation at Society of Toxicology Annual Meeting. March 13-17, 2016. New Orleans, Louisiana.

- > Adams, R.E., M.E. Glynn, E.M. Beckett, P.K. Scott, J.S. Pierce and B.L. Finley. 2016. Influence of breathing pattern on derivation of human equivalent concentrations of inhaled diacetyl for deep lung effects in rodents. Abstract #3635. Poster Presentation at Society of Toxicology Annual Meeting. March 13-17, 2016. New Orleans, Louisiana.
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- > Novick, R.M., P.K. Scott, B. Winans, S.M. Green and D.J. Paustenbach. 2016. Estimate of 4-methylcyclohexanemethanol (MCMH) exposure with normal use of contaminated water during the Elk River spill. Abstract #1693. Poster Presentation at Society of Toxicology Annual Meeting. March 13-17, 2016. New Orleans, Louisiana.
- > Sahmel, J, HJ Avens, PK Scott, AM Burns, C Barlow, KM Unice, AK Madl, JL Henshaw and DJ Paustenbach. 2015. Characterization of Chrysotile Asbestos Fiber Removal Rates from Air. Podium presentation at the American Industrial Hygiene Conference & Expo (AIHce). Salt Lake City, UT. May 30-June 4, 2015.
- > Benson SM, Ruestow P, Duke T, and Scott PK. 2015. Influence of asthma, smoking, and obesity on lung function parameters in the US adult population: NHANES 2007-2012. Presented at the annual American Thoracic Society Meeting. Denver, CO. May 15-20, 2015.
- > Scott, P.K., Bernal, A., Cheng, T., DeGandiaga, E., and Kerger, B.D. Dose-Response Relationships for DNA-Adducts formed by Mono-, Di- and Tri-Chlorobiphenyls: Do Common Indoor and Outdoor PCB Vapor Exposures Pose a Credible Cancer Risk? Presented at the Society of Toxicology 54th Annual Meeting and ToxExpo. San Diego, CA. March 22-26, 2015.
- > Kerger, B.D., Bernal, A., and Scott, P.K. Bronchiolar Fibrosis Risk and Tissue Dose Modeling for Inhalation of Highly Water Soluble Irritant Gases: Comparison of Acetaldehyde, Acrolein, and Diacetyl. Presented at the Society of Toxicology 54th Annual Meeting and ToxExpo. San Diego, CA. March 22-26, 2015.
- > Glynn, M.E, Adams, R.E., Beckett, E.M, Pierce, J.S., Scott, P.K., and Finley, B.L. Derivation of a human equivalent concentration for chronic inflammation in the bronchial and bronchiolar epithelium of the lung following inhalation exposure to diacetyl. Presented at the Society of Toxicology 54th Annual Meeting and ToxExpo. San Diego, CA. March 22-26, 2015.
- > E.M. Beckett, M.E. Glynn, R.E. Adams, J.S. Pierce, P.K. Scott, and B.L. Finley. Refined derivation of a human equivalent concentration for hyperplasia of bronchiolar epithelium following airborne diacetyl exposure. Presented at the Society of Toxicology 54th Annual Meeting and ToxExpo. San Diego, CA. March 22-26, 2015.
- > Cowan, D.M, J. R. Maskrey, E.S. Fung, T. Woods, L.M. Stabryla, P.K. Scott. Evaluation of Antemortem Ethanol Concentration PBPK Modeling Approaches and Postmortem Ethanol Generation and Transport Considerations. Presented at the Society of Toxicology 54th Annual Meeting and ToxExpo. San Diego, CA.. March 22-26, 2015.
- > R.E. Adams, M.E. Glynn, J.S. Pierce, P.K. Scott and B.L. Finley. Headspace and Small Derivation of a human equivalent concentration for diacetyl for hyperplasia of

- the bronchiolar epithelium. Presented at the Society of Toxicology 53rd Annual Meeting and ToxExpo. Phoenix, AZ. March 23-27, 2014
- > Scott, P.K., A. Abelman, H.J. Avens, S. Hoyt, and B.D. Kerger. Headspace and Small Chamber Studies of Airborne Diacetyl Concentrations Associated with Selected Food Flavoring Mixtures. Presented at the Society of Toxicology 53rd Annual Meeting and ToxExpo. Phoenix, AZ. March 23-27, 2014
 - > Sahmel, J., C.A. Barlow, A.M. Burns, P.K. Scott, A.K. Madl, J.L. Henshaw, D.J. Paustenbach. Measurement of Airborne Asbestos Fiber Settling Rates in a Simulation Study of Clothes Handling. Presentation Number: SR-108-04. Presented at the American Industrial Hygiene Conference & Exposition in Montreal, CN. May 20, 2013; 3:00 PM – 3:30 PM
 - > Scott, P.K. Using Risk Assessment Methods to Create A Sustainable Path Forward for Natural Gas Exploration in the Marcellus Shale Formation. Presented at the 21st Annual Business and Industry's Sustainability and Environmental Health & Safety Symposium. Cincinnati, OH. March 27, 2012
 - > Kerger, B.D., P.K. Scott, M. Pavuk, M. Gough and D.J. Paustenbach. 2011. Reverse Causation of Dioxin Dose-Response Trends for Risk of Diabetes Mellitus Type 2 Among Operation Ranch Hand Vietnam Veterans. Poster presentation at The Society of Toxicology's Annual Meeting. 2255, Poster Board #359. March 6-10, 2011, Washington, DC
 - > Unice, K.M., P.K. Scott, and D.J. Paustenbach. 2010. Review of exposure models assessing outdoor use of volatile consumer and industrial products. Presented at the Society for Risk Analysis (SRA) Annual Meeting, December 5-8, 2010. Abstract #T4-E.2, Salt Lake City Utah.
 - > Scott, P.K. D. Fillos, W.J. Luksemburg, and B.L. Finley. 2010. Principal Components Analysis (PCA) OF PCB Concentrations In Shrimp From The U.S. Retail Market. Presented at the 30th International Symposium on Halogenated Persistent Organic Pollutants (POPs) - Dioxin 2010, San Antonio, Texas. Thursday September 16, 2010, 1:00 pm - Abstract Number 1497, Poster board: 259.
 - > Scott, P.K. 2010. Evaluation of Sources of Perfluorinated Compounds in Upper Mississippi River Water Using Polytopic Vector Analysis. Presented at the 30th International Symposium on Halogenated Persistent Organic Pollutants (POPs) - Dioxin 2010, San Antonio, Texas. Monday September 13, 2010, 1:00 pm - Abstract Number: 1637, Poster board: 258.
 - > 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 The Society of Toxicology's Annual Meeting. # 2315 PB 646. March 7 – 11, 2010. Salt Lake City, Utah.
 - > Widner, T.E., M.H. Le, E.C. Shay, P.K. Scott, K.A. Thuett, and J.J. Keenan. 2010. Results of an independent peer review of potential health risks from diversion of water from the Rio Grande as a source of tap water for the Santa Fe, New Mexico region. Presented at the Society for Risk Analysis (SRA) Annual Meeting, December 5-8, 2010. Poster #52, Salt Lake City, UT.
 - > Cowan, D.M., J. Sahmel, K.M. Unice, P.K. Scott and D.J. Paustenbach. 2009. Potential for Occupational Exposures of Hairdressers to Vinyl Chloride in Hairspray (1967-1974). Poster presentation at The Society of Toxicology's Annual Meeting. #833 PB 239 . March 15-19, 2009. Baltimore, MD

- > Scott, P.K. and M.L. Kreider. 2009. A Review of the Methods for Lipid Content in Human Serum and the Impact on Serum Levels of Persistent Organic Pollutants. Poster presentation at The Society of Toxicology's Annual Meeting. #1628 PB 540. March 15-19, 2009. Baltimore, MD
- > Williams, C., E.C. Shay, K.M. Unice, P.K. Scott and B.L. Finley. 2008. Evaluation of Fluoropolymer Toxicity from Outbreak Reports and Animal Studies. Poster presentation at The Society of Toxicology's Annual Meeting. #1208 PB 533. March 15-19, 2009. Baltimore, MD
- > Haws, L.C., M.J. DeVito, J.N. Walker, L.S. Birnbaum, K.M. Unice, P. Scott, M.A. Harris, J.A. Tachovsky, W.H. Farland, B. Finley, and D.F. Staskal. 2008. Development of Weighted Distributions of REPs for Dioxin-Like Compounds: Implications for Risk Assessment. Poster presentation at the Society of Toxicology's Annual Meeting. #617. March 16-20, 2008. Seattle, WA.
- > Shay E.C., P.K. Scott and D.J. Paustenbach. 2008. Residential and Occupational Indoor Surface Dust Criteria for and PAHs and PCDD/PCDF. Poster presentation at American Industrial Hygiene Conference and Exposition. May 31-June 5, 2008. Session PS401, #261. Minneapolis, MN.
- > Urban, J.D., L.C. Haws, L.F. Scott, P.K. Scott, D.F. Staskal, J.A. Tachovsky, K.M. Unice, and M.A. Harris. 2008. A Framework for Evaluating Serum Dioxin Data Derived from Biomonitoring Studies. Poster presentation at the Society of Toxicology's Annual Meeting. #637. March 16-20, 2008. Seattle, WA.
- > 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
- > Scott, L.L.F., M.A. Harris, K.M. Unice, P.K. Scott, L.M. Nguyen, L.C. Haws, and D.J. Paustenbach. Effects of Excluding Serum PCDD/F and Dioxin-like PCB Data of Individuals with Incomplete Congener Profiles on Estimates of Total TEQ. Presented at the American College of Epidemiology's 25th Annual Meeting. September 15-18, 2007. Fort Lauderdale, FL.
- > Paustenbach, D.J., L.L.F. Scott, L.M. Nguyen, K.M. Unice, P.K. Scott, L.C. Haws, and M. Harris. Referent Concentrations of PCDD/Fs and Dioxin-like PCBs in Sera of Persons in the U.S. Based on the New WHO 2006 TEFs and 2001-2002 NHANES Data. Presented at the American College of Epidemiology's 25th Annual Meeting. September 15-18, 2007. Fort Lauderdale, FL.
- > Scott, P.K., K.M. Unice, and J.M. Panko. 2007. A review of different methods for identifying World Trade Center dust in buildings. Presented at Annual Meeting of the Air & Waste Management Association, Pittsburgh, Pennsylvania, June 29.
- > Scott, P.K., L.C. Haws, L.L. Scott, M.A. Harris. 2007. Evaluation of background 2,3,7,8-PCDD/F congener profiles in human serum collected during NHANES 2001-2002 using principal components analysis. Presented at the 27th Annual International Symposium on Halogenated Environmental Organic Pollutants and POPs (Dioxin 2007), Tokyo, Japan, September 3-6, 2007.
- > Scott, P.K., L.C. Haws, L.L. Scott, M.A. Harris. 2007. Evaluation of background dioxin-like congener profiles in human serum collected during NHANES 2001-2002 using principal components analysis. Presented at the 27th Annual International

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- > Ferriby, L., M.A. Harris, K. Unice, P.K. Scott, L.C. Haws, and D.J. Paustenbach. Development of PCDD/F and Dioxin-Like PCB Serum Concentration Reference Values for the General U.S. Population Using the 2005-WHO TEFs and the 2001-2002 NHANES Data. Society of Toxicology's 46th Annual Meeting. March 25-29, 2007. #425-320. Charlotte, NC.
- > Unice, K.M., D.F. Staskal, J.S. Knutsen, J.M. Panko, and P.K. Scott. Perfluoroalkyl Acids and Related Chemistries: Toxicokinetics and Mode-of-Action Workshop. Evaluation of Apparent Half-Life of PFOA in Humans. Poster at Society of Toxicology-Current Concepts in Toxicology. February 14-16, 2007. Arlington, VA.
- > Scott, P.K., L.C. Haws, D.F. Staskal, L.S. Birnbaum, N.J. Walker, M.J. DeVito, M.A. Harris, W.H. Farland, B.L. Finley, and K.M. Unice. 2006. An alternative method for establishing TEFs for dioxin-like compounds. Part 1. Evaluation of decision analysis methods for use in weighting relative potency data. Presented at the 26th International Symposium on Halogenated Environmental Organic Pollutants and POPs (Dioxin 2006), Oslo, Norway, August 20 – 24, 2006.
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- > Scott, P.K. "Statistical Tools – Sediments and Source Identification." Invited talk. International Society of Environmental Forensics Workshop, Harbors and Sediment Assessments. April 20-21, 2006. Honolulu Hawaii.

- > Harris, M., L. Ferriby, J. Knutsen, P. Nony, K. Unice, D. Paustenbach, and P.K. Scott. 2006. "Evaluation of PCDD/F and dioxin-like PCB serum concentrations data from the 2001-2002 National Health and Nutrition Examination Survey in the United States." Presented at the 45th Annual Meeting of the Society of Toxicology, San Diego, California, March 5 – 9, 2006.
- > Leung, H., B.D. Kerger, P.K. Scott, D.J. Paustenbach. An Integrated Toxicokinetic Model for Estimating Childhood Body Burdens of Dioxins Based on Various Studies. Abstract # 561 Presented at the Society of Toxicology's 45th Annual Meeting, March 5-9, 2006. San Diego, CA.
- > Gough, M., DJ Paustenbach, BD Kerger, H. Leung, P.K. Scott, and M. Harris. 2006. "Dioxin and diabetes: Does the current weight of evidence demonstrate a relationship?" Presented at the 45th Annual Meeting of the Society of Toxicology, San Diego, California, March 5 – 9, 2006.
- > Paustenbach, DJ, SH Gaffney, P.K. Scott, JL Brown, and JM Panko. 2006. "High background levels of urinary benzene metabolites found in volunteer study." Presented at the 45th Annual Meeting of the Society of Toxicology, San Diego, California, March 5 – 9, 2006.
- > Williams, P.R.D., K. Unice, P.K. Scott, 2005. "Estimating benzene exposures from contaminated soils at MGP sites." Annual Meeting of the Society for Risk Analysis, Orlando, Florida, December 4 – 7, 2005.
- > Scott, P.K., J.M. Panko, K.M. Unice. 2005. "Statistical evaluation of metal concentrations as a method for identifying World Trade Center dust." Presented at the 15th Annual Meeting of the International Society of Exposure Analysis, Tuscon, Arizona, October 30 – November 3, 2005.
- > Unice, K.M., J.M. Panko, and P.K. Scott. 2005. "Development of exposure assessment models for indoor air exposure to elemental mercury." Presented at the 15th Annual Meeting of the International Society of Exposure Analysis, Tuscon, Arizona, October 30 – November 3, 2005.
- > Unice, K.M., JM.. Panko, P.K. Scott. 2005. "Considerations for reconstruction of past TCE exposure from groundwater vapor intrusion." Presented at the 15th Annual Meeting of the International Society of Exposure Analysis, Tuscon, Arizona, October 30 – November 3, 2005.
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- > Paustenbach, D.J., K.A. Fehling, M.A. Harris, P.K. Scott, and B.D. Kerger. 2005. "Identifying soil clean-up criteria for dioxin in residential soils: How has 20 years of research and risk assessment experience impacted the analysis?" Presented at the 25th International Symposium on Halogenated Environmental Organic Pollutants and POPs (Dioxin 2005), Toronto, Canada, August 21 – 25, 2005.
- > Paustenbach, D.J., J.M. Panko, P.K. Scott, and K.M. Unice. 2005. "Retrospective modeling of potential residential exposure to perfluorooctanoic acid (PFOA) releases from a manufacturing facility." Presented at Fluoros – the International Symposium

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- > Kerger, B.D., H. Leung, P.K. Scott, D.J. Paustenbach. 2005. "An age-dependent half-life model for estimating childhood body burdens of dibenzodioxins and dibenzofurans." Presented at the 44th Annual Meeting of the Society of Toxicology, New Orleans, Louisiana, March 6 – 10, 2005
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- > Price, P.S., P.K. Scott, N.D. Wilson, and D.J. Paustenbach. 1997. "An empirical approach for deriving information on total duration of exposure from information on historical exposure from surveys." Presented at the Annual Meeting of the Society for Risk Analysis, Washington, DC, December 7–10, 1997.
- > Proctor, D.M., M.F. Fredrick, P.K. Scott, and B.L. Finley. 1997. "The prevalence of chromium allergy in the United States and its implications for cost-benefit analysis of soil remediation." Presented at the Annual Meeting of the Society for Risk Analysis, Washington, DC, December 7–10, 1997.
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- > Scott, P.K., D.M. Proctor, and D.J. Paustenbach. 1997. "Evaluation of the 10% elicitation threshold for Cr(VI) in terms of mass per surface area using benchmark dose methods." Abstract Number 852. Presented at the Society of Toxicology Annual Meeting, March 10–14, 1997.
- > Hays, S.M., P.K. Scott, K.A. Fehling, D.M. Proctor, and M. Gargas. 1996. "A detailed comparison of the various models used to predict blood level concentrations for a given exposure scenario." Presented at the Society of Toxicology Annual Meeting, March 1996. Abstract Number 1268.
- > Fehling, K.A., P.K. Scott, M. Bono, and M. Gargas. 1994. "A comparison of two biokinetic models for lead to determine health based soil standards for residential and industrial sites." Abstract Number 56. Presented at the Society of Toxicology Meeting, March 13–17, 1994.
- > Gargas, M.L., P.K. Scott, B.L. Finley, and R.H. Reitz. 1994. "Refinements in the exposure assessment process." Presented at the Conference on Temporal Aspects in Risk Assessment for Non-Cancer Endpoints, Wright-Patterson AFB, Ohio, April 18–20, 1994.

- > Scott, P.K. 1993. "Setting soil cleanup standards based on protection of surface water quality: a case study." Presented at 14th Annual Meeting of the Society of Environmental Toxicology and Chemistry, Houston, Texas, November 14–18, 1993.
- > Scott, P.K., and K.R. Trowbridge. 1993. "Screening-level versus refined modeling approaches to estimating PCB concentrations in aquatic food webs: a case study of Lake Ontario." Presented at the Third Symposium on Environmental Toxicology and Risk Assessment: Aquatic, Plant, and Terrestrial, Atlanta, Georgia, April 26–29, 1993.
- > Gargas, M.L., M.A. Bono, P.K. Scott, B.L. Finley, and D.J. Paustenbach. 1993. "Approaches to assessing human exposure to soil contaminants at wood preserving facilities." *The Toxicologist* 13:1045. Presented at the 32nd Annual Meeting of the Society of Toxicology, March 14–18, 1993, New Orleans, Louisiana.
- > Mayhall, D.M., P.K. Scott, and B.L. Finley. 1993. "Development of a standard soil-to-skin adherence probability density function for use in Monte Carlo analysis of dermal exposures. Presented at Annual Meeting of the Society for Risk Analysis, Savannah, Georgia, December 5–8, 1993.
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- > Abramson, M, Bare, J, Barlow, C, Scott, P. 2018. Evaluation of the Uncertainties Associated with the Use of Air Dispersion Modeling to Estimate Historical Community Exposure from Manufacturers of Asbestos-containing Products. Presented at Annual Meeting of the Air & Waste Management Association, Hartford, Connecticut, June 25. Paper #410832
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