Exponent®
Engineering & Scientific Consulting

Walter Shields, Ph.D., C.P.S.S.

Principal Scientist | Environmental and Earth Sciences
Bellevue
+1-425-519-8762 | shieldsw@exponent.com

Professional Profile

A Certified Professional Soil Scientist, Dr. Shields specializes in the study of transport and geochemical fate of toxic pollutants and their environmental effects. He has over 40 years of experience conducting and managing environmental studies throughout the United States as well as internationally.

Dr. Shields provides scientific and strategic consultation on the design and implementation of CERCLA and RCRA investigations, cost-effective remediation approaches, and regulatory negotiations. Dr. Shields has managed many multidisciplinary investigations, risk assessments, and feasibility studies. He investigates the industrial archeology of sites to understand the history of contaminant sources in a given area.

Dr. Shields serves as an expert witness in environmental forensics and has testified on the origin, transport, and fate of chemicals in air, soils, sediments, surface water, groundwater, and biota, and exposure of humans and ecological receptors to those chemicals. He has expertise in the environmental chemistry and source identification of dioxins and furans, PCBs, PAHs, PFASs, organic and inorganic pesticides, heavy metals, and metalloids. Dr. Shields has also testified on the allocation and appropriateness of remediation costs at a variety of sites. He has specialized expertise in the forest products industry and at mining, smelting, and foundry sites.

Academic Credentials & Professional Honors

Ph.D., Soil Science, University of Wisconsin, Madison, 1979

M.S., Forest Management (Soil Science), University of Idaho, 1976

B.S., Forest Science, University of Washington, 1974

Elected to Phi Kappa Phi (honor society for higher education)

Elected to Sigma Xi (honor society for science and engineering)

Licenses and Certifications

Certified Professional Soil Scientist (CPSS)

Prior Experience

District Director, Economics, Science and Planning and Manager, Environmental Science Department, CH2M Hill, 1985-1990

Manager, Environmental Sciences, Crown Zellerbach Forestry Research Division, 1979-1985

Professional Affiliations

Soil Science Society of America

Publications

Shields, WJ, Pietari J, Sparacio T. Use of PCBs at World War II manufacturing sites. Organohalogen Compounds 2017; 79:604-607.

Shields W, Edwards M, Monti C, Royer L. Examination of PCDD/F outliers in soil background studies provides insights into historic sources. Organohalogen Compounds 2016; 78:576-578.

Shields WJ, Saba T, Boehm PD, Pietari J. Congeners: A forensics analysis. Chapter 10. In: Introduction to Environmental Forensics. Murphy BL, Morrison RD (eds), Elsevier, Chennai, 2015, pp. 347-393.

Patterson DG Jr, Monti C, Shields W. Dioxin in human milk and serum from Taranto, Italy. Organohalogen Compounds 2014; 76:861-864.

Monti C, Shields W, Edwards M, Pozzi C. Fingerprint analysis of PCDD/F in soil samples in the Taranto (Puglia, Italy) area. Organohalogen Compounds 2014; 76:830-833.

Aylward L, Monti C, Edwards M, Shields W. Dioxins in sheep and goat liver tissues from Taranto, Italy: Congener pattern. Organohalogen Compounds 2014; 76:403-406.

Shields WJ, Ahn S, Pietari J, Robrock K, Royer L. Atmospheric fate and behavior of POPs. Chapter 6. In: Environmental Forensics for Persistent Organic Pollutants. O'Sullivan W, Sandau C (eds), Elsevier, Chennai, 2014, pp. 199-290.

Megson D, O'Sullivan G, Comber S, Worsfold PJ, Lohan MC, Edwards MR, Shields WJ, Sandau CD, Patterson DG Jr. Elucidating the structural properties that influence the persistence of PCBs in humans using the National Health and Nutrition Examination Survey (NHANES) dataset. Science of the Total Environment 2013; (461-462):99-107.

Shields WJ, Edwards MR, Abrahams JA, Ferrara RA, Bollinger M, Paul LS. Source evaluation of dioxins/furans, PAHs, and pentachlorophenol in soil samples near a wood treating site in the Southeastern USA. Organohalogen Compounds 2012; 74:593-595.

Shields WJ, Chan WR. Fugitive dust: Methods for estimating emission of contaminated wind-blown particles. pp. 22-29. In: Environmental Forensics: Proceedings of the 2009 INEF Annual Conference. Morrison R, O'Sullivan R (eds), Royal Society of Chemistry, London, 2010.

Chan WR, Shields WJ. Deposition of dioxin in attics from backyard burning. Organohalogen Compounds 2007; 69:722-725.

Benton L, Shields WJ, Edwards M. Commentary on O'Connor and Sabrsula (2005): Background dioxins in house dusts (Environmental Forensics 6(3):238-287). Environmental Forensics 2007; 8:295-298.

Shields WJ, Tondeur Y, Benton L, Edwards MR. Dioxins and furans. Chapter 14. In: Environmental Forensics: Contaminant Specific Guide. Morrison R and Murphy B (eds), Academic Press, San Diego, 576 pp, 2006.

Murphy BL, Sparacio T, Shields WJ. Manufactured gas plants — Processes, historical development, and key issues in insurance coverage disputes. Environmental Forensics 2005; 6(2):161-173.

Boehm PD, Su S, Shields W, Murphy B. Environmental forensics approaches for understanding liabilities. Parts 1 and 2, Environmental Law in New York. Published by Arnold & Porter, LLP Volume 16, Nos. 5 and 6, May and June 2005.

Yost LJ, Shock S, Garry M, Garson YN, Sugino AK, Shields WJ. Health risk evaluation of PCBs from joint compound measured on surfaces and in air. Organohalogen Compounds 2003; 63:413-416.

Pastorok RA, Shields WJ, Sexton JE. Comparison of aquatic ecological risk assessments at a former zinc smelter and a former wood preservative site. Chapter 20. In: Human and Ecological Risk Assessment: Theory and Practice. Paustenbach DJ (ed), John Wiley & Sons, New York, pp. 1099-1160, 2002.

Peek DC, Butcher MK, Shields WJ, Yost LJ, Maloy JA. Discrimination of aerial deposition sources of polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran downwind from a pulp mill near Ketchikan, Alaska. Environmental Science and Technology 2002; 36(8):1671-1675.

Shields W, Maloy JA, Yost L, Peek D. Comparison of soil concentrations of dioxins and furans with predictions based on aerial deposition modeling. Organohalogen Compounds 1999; 41:455-458.

Shields WJ, Brown SM. Applicability of PCB onsite spill model (POSSM) to petroleum product spills. Chapter 8, pp. 87-103. In: Petroleum Contaminated Soils, Volume I. Remediation Techniques, Environmental Fate, Risk Assessment. Kostecki PT and Calabrese EJ (eds), Lewis Publishers, Inc., Chelsea, MI, 1989.

Tetta D, Shields WJ, Heinle D, Costa S. Predicting environmental effects in a Puget Sound embayment. Proceedings, 10th National Conference, Superfund 89, Hazardous Materials Control Research Institute, pp. 130-136, Washington, DC, 1989.

Shields WJ, Strecker EW, Dean JD, Brown SM. Chemical spill uncertainty analysis. EPRI Report RP 2634-1. Electrical Power Research Institute, Palo Alto, CA, 1988.

Andrews J, Shields WJ. Selenium speciation and hydrologic conditions affecting ground water contamination near Kesterson Reservoir. Proceedings, Agricultural Impacts on Ground Water Conference, pp. 564-579, Omaha, NE, August 11-13, 1986.

Schrandt CM, Feagley SE, Shields WJ. Land application of primary paper mill wastes: Effects on soil properties and the growth of cottonwood trees (Populus deltoides). Proceedings, 9th Annual Madison Waste Conference, pp. 248-273, Madison, WI, 1986.

Shields WJ, Huddy MD, Somers SG. Pulp mill sludge application to cottonwood plantations. Proceedings, Forest Lands Applications Symposium, University of Washington Press, pp. 533-548, Seattle, WA, 1985.

Shields WJ. The effective use of lime grits and green liquor dregs in an organized agricultural program. Proceedings 1983 NCASI West Coast Regional Meeting, NCASI Special Report No. 83-05, National Council for Air & Stream Improvement. 1983.

Shields WJ, Bockheim JG. Deterioration of trembling aspen clones in the Great Lakes region. Canadian Journal of Forest Research 1981; 11(3):530-537.

Shields WJ, Dougherty PM. Applied forest climatology and topoclimatic classification for forest management in the Pacific Northwest. Proceedings, Workshop on Computer Techniques and Meteorological Data Applied to Problems of Agriculture and Forestry, Weiss A (ed), pp. 533-548, Anaheim, CA, 1981.

Shields WJ, Hobbs SD. Soil nutrient levels and pH associated with root decay caused by Armillariella mellea on conifers in northern Idaho. Canadian Journal of Forest Research 1979; 9(1):45-48.

Abstracts

Shields WJ. Stable-isotope chemistry 101: Source identification, apportionment, and causation. Toxic Torts and Environmental Law, DRI Seminar, New Orleans, February 20-21, 2015.

Shields W, Edwards M. Comparison of dioxin/furan characteristics in different US cities. Abstract 426-2, Water, Food, Energy & Innovation for a Sustainable World, ASA, CSSA, & SSA International Annual Meetings, Tampa, FL, November 3-6, 2013.

Shields W, Ogle R. Introduction to environmental forensics. Course EMGM-130 at Air & Waste Management Association 106th Annual Conference and Exhibition, Chicago, IL, June 24, 2013.

Shields WJ, Pietari J. Historic reconstruction of contaminant releases at military shipyards during World War II. Abstract 547, Society of Environmental Toxicology and Chemistry North America 31st Annual Meeting, Portland, OR, 2010.

Shields, WJ, Tondeur Y, Hart J, Edwards MR, Benton LD, Pietari J. PCDD/F fingerprinting with 17 congeners — What about the other 193? Dioxin 2010, 30th International Symposium on Halogenated Persistent Organic Pollutants, San Antonio, TX, 2010.

Benton L, Shields WJ, Edwards M. Source identification of dioxin near wood treatment plants. Abstract P. 92, Pacific Northwest International Section, Air and Waste Management Association, 2005 Annual Meeting, Bellingham, WA, 2005.

Bessinger B, Ruby M, Shields WJ. Comparison of isotopic and microchemical apportionment methods for lead in residential soils near a former zinc smelter. Abstract P. 92-93, Pacific Northwest International Section, Air and Waste Management Association, 2005 Annual Meeting, Bellingham, WA, 2005.

Lowney Y, Deubner D, Hays S, Chapman P, Kerger B, Shields W, Paustenbach D. Biomonitoring for beryllium: Experience with a U.S. work force. Abstract, Society of Toxicologists. Toxicol Sci 2000; 54(1):310.

Shields WJ, Sampson JR, Mellott RS, Ruby MV. Biogeochemistry and ecological risk of vanadium in a Midwestern United States wetland. p. 115. In: Book of Abstracts, 5th Symposium on Biogeochemistry of Wetlands, Royal Holloway University of London, UK, 1997.

Shields WJ, Bockheim JG. Effect of site quality on the occurrence of Phellinus tremulae rot in trembling aspen stands in the Great Lakes region. Agronomics Abstracts 1979; 219.

Presentations

Shields WJ, Pietari J, Sparacio T. Use of PCBs at World War II manufacturing sites. Dioxin 2017, 37th International Symposium on Halogenated Persistent Organic Pollutants, Vancouver, British Columbia, Canada. 2017.

Greeley AT, Riley M, Shields WJ. Fitting your expert into your pre-trial and trial strategy. Section of Litigation Annual Conference, Amer. Bar Assoc., San Francisco, CA, May 3-5, 2017.

Shields WJ, Monti C. A comparison of PCDD/F fingerprints in urban ambient air. Poster presented at Dioxin 2016, Florence, Italy. August 30, 2016.

Shields WJ. Technical strategies for defense: divisibility and liability apportionment, source identification and strategies to limit liability, and defining baseline/background. Presented at the Conference on Natural Resource Damages, Assessment & Restoration. Environmental Law Education Center, Seattle, WA, June 6, 2016.

Gale K, Nijman J, Shields W. Experts in environmental cases. Chicago Bar Association CLE seminar, Chicago, March 18, 2015

Shields WJ. Isotope chemistry 101: Source identification, apportionment, and dose reconstruction. Toxic Torts and Environmental Law, DRI Seminar, New Orleans, February 20-21, 2015.

Pietari JMH, Sparacio T, Shields W. Reconstructing historical chemical releases using industrial archaeology. Society for Industrial Archeology, 43rd Annual Conference, Portland, ME, May 17, 2014.

Shields WJ, Edwards MR, Abrahams JA, Ferrara, RA, Bollinger M, Paul LS. Source evaluation of dioxins/furans, PAHs, and pentachlorophenol in soil samples near a wood treating site in the Southeastern USA. Dioxin 2012, 32nd International Symposium on Halogenated Persistent Organic Pollutants, Cairns, Queensland, Australia, 2012.

Knight P, Shields WJ, Silva B, Boutwell C. Scientific issues associated with class certification. Presented at ABA Section of Litigation, Environmental, Mass Torts, and Products Liability Litigation Committees' Joint CLE Seminar, Hollywood, FL, January 19-21, 2012.

Boehm PD, Shields WJ, Fairbrother A, Saba T. Determination of the chemical background for sediment — Approaches and conundrums. Presented at Sediment Management Working Group. Saratoga Springs, NY, September 29, 2009.

Shields WJ. Dioxins and furans: Forensic techniques. Presented at International Network of Environmental Forensics Conference, Calgary, Alberta, August 31-September 2, 2009.

Shields WJ. Fugitive dust: Methods for estimating emission of contaminated wind-blown particles. Presented at International Network of Environmental Forensics Conference, Calgary, Alberta, August 31-September 2, 2009.

Shields WJ. Environmental forensics: Use of dispersion and deposition modeling in litigation. Panel chair at Air & Waste Management Association Annual Meeting, Portland, OR, June 24-27, 2008.

Benton L, Shields WJ, Edwards M. What's in the dust? The answer is in the details. Air & Waste Management Association, PNWIS 2006: Healthy Communities Using Science-Based Solutions for Sustainability, Victoria, BC, November 8-10, 2006.

Garry MR, Shock SS, Yost LJ, Kulas J, Shields WJ. Human health risk assessment of metals exposure through subsistence foods consumption and subsistence harvest activities near a mining transport road in northwest Alaska. Poster presented at the Society of Toxicology's 45th Annual Meeting, San Diego, CA, 2006.

Garry MR, Shock SS, Yost LJ, Kulas J, Shields WJ. Assessment of metals concentrations in salmonberries and sourdock collected near a mining transport road in northwest Alaska. Poster presented at the Society of Toxicology's 44th Annual Meeting, New Orleans, LA, 2005.

Garry MR, Yost LJ, Shock S, Shields WJ. Assessment of metals exposure associated with subsistence use of caribou collected near a mining transport road in northwest Alaska. Poster presented at the Society for Toxicology's 43rd Annual Meeting Baltimore, MD, March 2004.

Shields WJ, Ruby MV, Benton L, Sun B, Brugger G. Identification of the sources of lead contamination in surface soils in the vicinity of mines and smelters. Invited presentation, Working and Living with Lead Conference, Port Pirie, South Australia, September 28-October 1, 2003.

Shields WJ. Closing pulp and paper mills — Environmental issues: A retrospective and prospective analysis. Presented at TAPPI International Environmental Conference, Denver, CO, May 9, 2000.

Yost LJ, Shields WJ, Peek DC, Schoof RA, Ruby MV, Maloy JA. Identification and hazard evaluation of crushed rock as an unexpected source of elevated arsenic in soil. Poster presented at the Society for Environmental Geochemistry and Health's 4th International Conference on Arsenic Exposure and Health Effects, San Diego, CA, July 2000.

Moore M, Maloy J, Yost LJ, Shields W, Petito Boyce C. Exposure to PCDDs/Fs: Relative importance of the diet and of soil. Proceedings, Technical Association of the Pulp and Paper Industry (TAPPI) International Environmental Conference and Exhibit, Nashville, TN, April 18-21, 1999.

Shields WJ, Maloy JA, Winges K, Richmond K, Yost L, Peek D. Aerial deposition of dioxins and furans from a dissolving sulfite pulp mill in Southeast Alaska. Proceedings, Technical Association of the Pulp and Paper Industry (TAPPI) International Environmental Conference and Exhibit, Nashville, TN, April 18-21, 1999.

Yost LJ, Maloy J, Gard N, Moore M, Shields W, Jacobs L. Dioxins: Threat versus reality. A case study at a sulfite pulp mill. Proceedings, Technical Association of the Pulp and Paper Industry (TAPPI) International Environmental Conference and Exhibit, Nashville, TN, April 18-21, 1999.

Shields WJ. Special session: Closing pulp and paper mills — Environmental issues. W. Shields, moderator. Abstract in TAPPI International Environmental Conference, Tappi Press, Vol. 3, pp. 889-890, Atlanta, GA, 1999.

Nelligan-Doran S, Ginn TC, Shields WJ. Developing site-specific criteria for cadmium using a WER and dissolved translator. Poster presented at Society of Environmental Toxicology and Chemistry's 20th Annual Conference, Philadelphia, PA, November 1999.

Mellott RS, Pastorok RA, Shields WJ, LaTier AJ, Mulligan P, Chapin M. Ecological risk assessment of small mammals at a zinc smelter. Poster presented at 16th Annual Meeting of the Society of Environmental Toxicology and Chemistry, Vancouver, BC, 1995.

Pastorok R, Ruby M, Schoof R, LaTier A, Mellott R, Shields W. Constraints on the bioavailability of trace elements to terrestrial fauna at mining and smelting sites. Poster presented at 16th Annual Meeting of the Society of Environmental Toxicology and Chemistry, Vancouver, BC, 1995.

Pastorok RA, Mellott RM, LaTier AJ, Shields WJ. Potential risks to birds from exposure to metals through their diet at a zinc smelter. Poster presented at 16th Annual Meeting of the Society of Environmental Toxicology and Chemistry, Vancouver, BC, 1995.

Sexton JE, Becker DS, Pastorok RA, Ginn TC, Shields WJ. Aquatic ecological risk assessment at a zinc smelter site. Poster presented at 16th Annual Meeting of the Society of Environmental Toxicology and Chemistry, Vancouver, BC, 1995.

Project Experience

Heavy Metals and Other Inorganic Chemicals (by Location)

Alabama

Managed a site investigation at an adhesive manufacturing facility in Alabama. The environmental geochemistry of lead and other metals in surface water and sediments and potential human health and ecological effects were evaluated.

Led a team of scientists in an allocation study of lead contamination at a Superfund site in northeast

Alabama. Evaluated the transport and fate of lead and other metals from various foundries.

Evaluated transport of arsenic from a former chromated copper arsenate (CCA) wood treatment facility in Lockhart, Alabama.

Alaska

Evaluated the source of elevated arsenic in soil samples collected from road areas on a former pulp and saw mill site in Ketchikan. Potential sources evaluated were logs treated with CCA wood preservative, arsenical pesticides, and gravel quarried from arsenopyrite-enriched mineral deposits. Chemical forensic analyses demonstrated that the gravel was the source. Evaluated surface water runoff and groundwater transport of arsenic into a marine embayment.

Managed a study of fugitive dust (lead and zinc ore concentrates) from the Red Dog Mine haul road and port facility in northwest Alaska for Teck Cominco Corporation. Detection of elevated metals in sensitive tundra habitats raised community concerns about risks from subsistence foods, and adverse effects to the environment. Evaluated transport and fate, and ecological and human health effects of arsenic, cadmium, lead, and zinc. Provided community relations and agency interaction support.

California

Evaluated historical waste generation and waste management practices at an arsenical pesticide manufacturing facility that operated from 1921 to 1948 in the San Francisco Bay Area. Researched state of knowledge of worker exposure to lead and arsenic in pesticide manufacturing facilities during that era. Historical manufacturing process and waste generation of other pesticides at this facility (calcium arsenate, Bordeaux solution [copper sulfate], and lime sulfur [calcium polysulfide] also evaluated). Waste generated from historical manufacturing of paints, lacquers, and varnishes was also assessed. Evaluated other potential sources of arsenic in the area, including potential storage of CCA-treated lumber and use of arsenical herbicides along railroad right-of-ways.

Allocated future remediation costs attributable to lead-containing wastes at the Casmalia Landfill in Santa Barbara County, California.

Assessed the timing and mechanisms of release of contaminants from the Stringfellow Landfill in Riverside County, California. Evaluated appropriateness of past allocation of costs.

Conducted allocation of past and potential future remediation costs at the International Lead Site in Los Angeles, California.

Conducted allocation of past and potential future remediation costs at the Western Lead Products Site in City of Commerce, California.

Conducted an assessment of the nature and extent of metals contamination in the surface soils and organic debris of the Kesterson Reservoir in California for the Bureau of Reclamation. Estimated the effects of changing moisture conditions on selenium speciation and on the movement of selenium into the groundwater. Helped develop and evaluate mitigation alternatives, which included capping, flooding, water treatment, and soil excavation.

Evaluated historical disposal practices and releases of lead-containing sulfuric acid at the A&R Vacuum Truck Service site in Los Angeles.

Evaluated nitrate migration into surface water and groundwater from a cattle feedlot in southern California.

Evaluated proposed use of stable isotopic ratios of lead to date sediments in a wetland adjacent to a highway in northern California.

Evaluated timing and mechanisms of historic releases of metals and organics from the Wilmington Transfer Station site in Los Angeles, California. Liquid industrial wastes (acids, solvents, paint manufacturing wastes, heavy metal solutions, caustics, oil, and drilling mud). Evaluated appropriateness of past allocation of costs.

Evaluating transport and fate of thallium and arsenic in fugitive dust at a site in Southern California. Estimated maximum accumulation rate of chemicals in residential soils. Evaluated indoor dust sampling data.

Evaluated historical use of arsenical pesticides and DDT in orchards in San Jose area.

Evaluated offsite contamination related to the former Exide secondary lead smelter in Vernon.

Colorado

Evaluated transport and fate of metals into the Animas and San Juan Rivers as result of the Gold King Mine spill in 2015.
Managed a water quality study at the Climax mine in Colorado for the Climax Molybdenum Company. EPA had proposed listing this mine on the NPL based on exceedances of the ambient water quality criterion for aluminum. Synthesized and interpreted historical data on water quality and toxicity tests and biological monitoring.

Evaluated historical loading of copper and cyanide, and predicted loading and downstream concentrations under various mine remediation scenarios at the Summitville Mine Superfund site near Del Norte, Colorado. Modeled copper transport in the Alamosa River to the Rio Grande. Evaluated historic and ongoing acid mine drainage. Determined baseline water quality and ecological conditions prior to the takeover of the site by EPA and evaluated the need for EPA's emergency response actions.

Hawaii

Evaluated fugitive dust emissions from an agricultural research area.

Idaho

Managed startup phase of the risk assessment for a RCRA incinerator at the FMC phosphorus facility in Pocatello, Idaho.

Evaluated discharge of metals from the Bunker Hill mining complex into Lake Coeur d'Alene and the Spokane River.

Illinois

Evaluated lead sources at a landfill in Illinois that could have resulted in lead detections in groundwater.

Evaluated historical sources of lead from leaded paint, batteries, lead dross, metal turnings, and lead-sheathed cable at the Elgin Salvage & Supply Company site in Elgin, Illinois. Assisted plaintiffs in cost allocation.

Evaluated source and timing of slag use at a former zinc smelter site in Fairmont City, IL.

Indiana

Assessed lead releases to the White River from the Vickers Warehouse and Dump Site in Anderson, Indiana; evaluated appropriateness of past allocation of costs.

Investigated historical disposal of lead-contaminated soil and refractory brick at the Four County Landfill in Fulton County, Indiana. Evaluated appropriateness of past allocation of costs.

Reconstructed historical releases and aerial deposition of lead from fugitive dust and stack and building emissions and estimated soil concentration resulting from those depositions at a former secondary lead smelter at the Avanti Superfund Site in Indianapolis, Indiana. Also evaluated emissions from a grey iron foundry at the site. Quantified the aerial dispersion and deposition of lead as a result of sudden and accidental releases. Evaluated appropriateness of remedy selection and cost allocation for past and future costs.

Kansas

Managed the Removal Site Evaluation and Removal Design to address lead contaminated soil throughout the town of Cherryvale resulting from use of smelter residue material from the former National Zinc Smelter site. Conducted in vitro bioavailability studies which provided for a site-specific adjustment of the arsenic soil screening criterion. Developed a visual classification system of smelter residue that was validated by XRF analyses to provide a cost-effective means of screening over 1300 properties.

Evaluated transport and fate of lead from mining operations in Cherokee County.

Kentucky

Evaluated potential contribution of lead and arsenic from historic releases from a glass manufacturing plant to certain Plaintiff properties in Danville, Kentucky. Evaluated the need for remediation due to soil concentrations of lead and arsenic.

Louisiana

Evaluated source, transport, and fate of arsenic in soil and groundwater allegedly affected by runoff from stored lumber that had been treated with CCA.

Michigan

Managed site characterization of a titanium processing facility in Detroit, Michigan. Assisted client in negotiating soil cleanup standards.

Served as program manager for risk assessment of chromium- and lead-contaminated soils at a former tannery in Michigan.

Minnesota

Evaluated transport of arsenic from a former chromated copper arsenate (CCA) wood treatment facility in Cass Lake, MN.

Missouri

Served as principal-in-charge for preliminary natural resource damage assessment of former lead mining sites in Missouri.

Mississippi

Prepared expert report regarding source, transport, and fate of arsenic and chromium alleged to have contaminated a neighborhood downwind from a wood treatment plant in Grenada, Mississippi.

Montana

Served as principal-in-charge for the investigation of the Upper Blackfoot mining complex on behalf of ASARCO and ARCO. Evaluated potential migration of arsenic, lead, and cadmium and acid drainage from mine tailings via surface water and groundwater pathways.

Served as program manager for RI/FS activities at the Anaconda/Upper Clark Fork River (Montana) Superfund site for ARCO. Provided overall coordination and QA/QC review of contract deliverables. Projects included the remedial investigation for the Smelter Hill, Old Works, and Anaconda Community Soils operable units.

New Jersey

Evaluated transport and fate of arsenic and lead from a former paint manufacturing facility into surface water in the Camden, NJ area.

Evaluated sources of hexavalent chromium in residential areas near former chromite ore processing facilities.

Assessed lead contamination due to disposal of slag and lead oxide at the NL Industries site in Pedricktown, New Jersey; evaluated appropriateness of past allocation of costs.

Evaluated historical releases of sulfuric acid, lead, and antimony at a metals recycling facility and landfill in Newark, New Jersey. Allocated future remediation costs among potentially responsible parties.

Evaluated transport and fate of mercury at the Berry's Creek Site in Wood-Ridge, New Jersey.

New Mexico

Evaluated potential future remediation and mine closure costs at the Chino copper mine near Hurley, New Mexico.

New York

Evaluated historic contribution of lead and other metals to a residential soil cleanup area in Depew, New York. Sources evaluated included a former high-lead brass foundry, lead smelter, railroad repair and fabrication facility, steel forge, iron foundry and storage battery manufacturing plant. Used metals ratios, spatial distribution, waste generation analysis, lead mineralogy and lead isotope chemistry to evaluate source contributions.

Reconstructed historical disposal of smelter waste and assessed the timing and mechanisms of release of contaminants from the Wallkill Town Landfill in Orange County, New York. Evaluated appropriateness of past allocation of costs.

Researched illicit disposal of lead-containing wastes at the Warwick Landfill in Warwick, New York.

Managed a site characterization, risk assessment and focused feasibility study to address hexavalent chromium contamination at a ferrochromium metallurgical facility in Niagara Falls, New York.

Evaluated sources of metals in residential soil related to historic glass manufacturing and glass cutting operations in Corning, New York.

Ohio

Evaluated potential release of metals, PAH and dioxin from wood ash disposed at a landfill in Dayton, Ohio.

Managed a RCRA clean closure equivalency demonstration and preparation of a Part B permit application for a hazardous waste pile at a television glass manufacturing facility in Ohio, formerly owned by the client (General Electric). Release of lead to surface water was the primary concern. Demonstrated to EPA Region 5 that lead was in an immobile form and would not migrate from the unit. Evaluated transport and fate of fluoride emissions. Historical aerial emissions had resulted in deposition of fluorides on an adjacent pasture producing apparent cases of fluorosis in cattle. Determined that source controls were effective in reducing fluorides to safe levels in both vegetation and soils. Managed human health and ecological risk assessments.

Managed multiple studies of beryllium for Brush Wellman, Inc., based in Cleveland, Ohio. Various toxicological, epidemiological, industrial hygiene, and environmental chemistry studies were conducted (e.g., biomarker utility, statistical analysis of historical air quality data and medical outcome data for various facilities, and evaluation of the effects of particle size and chemical form on disease occurrence).

Managed the Shieldalloy Metallurgical Corporation (SMC) RI/FS in Cambridge, Ohio, for SMC and Cyprus Foote Minerals Company. Chemicals of concern were thorium and uranium radionuclides, as well as arsenic, chromium, copper, lead, and vanadium. Directed the development of radiological source terms, complex hydrogeologic evaluation, vadose-zone modeling of vanadium leaching, mineralogical fingerprinting of slag, and baseline risk assessments. The ecological assessment included an innovative study to determine the effects of vanadium on macroinvertebrate communities in a wetland. Provided scientific consulting during the planning and implementation of remediation of wetlands and stream sediments. Negotiated with the state on effluent limits for stormwater permit.

Evaluated historical disposal and releases of acidic wastewater containing lead; conducted allocation of potential future remediation costs at the Arcanum Iron & Metals Reclamation Site in Dayton, Ohio.

Provided technical support in CERCLA cost recovery litigation related to the Jackson County Landfill in Jackson, Ohio.

Oklahoma

Managed the National Zinc Superfund RI/FS/RD in Bartlesville, Oklahoma, for Salomon Inc. and Cyprus Amax Minerals Company. The project included in vitro and in vivo bioavailability studies of lead and cadmium, treatability studies of phosphate fixation of lead and cadmium, lead source determination using isotopic ratios (e.g., smelter versus lead paint), mineralogical analyses of lead in soil and house dust, comprehensive human health and ecological risk assessments, evaluation of remedial alternatives, design and oversight of soil and sediment remediation, and community relations. Site-specific soil and sediment cleanup levels for arsenic, cadmium, lead, and zinc were successfully negotiated with the regulatory agencies.

Managed Collinsville Smelter RI/FS in Collinsville, Oklahoma. Evaluated historical smelter impacts (primarily arsenic, cadmium, and lead), conducted ecological and human health risk assessments, evaluated transport of metals in groundwater and stream sediments, and assessed remedial alternatives.

Managed the Blackwell Zinc RI/FS and remedial design in Blackwell, Oklahoma. Chemicals of concern were arsenic, cadmium, lead, and zinc. The work elements included assisting in brownfield development of the former smelter site, presenting project status at numerous public meetings, directing human health and ecological risk assessments, developing a site-specific water quality criterion for cadmium based on a water effects ratio study, directing pilot tests of in situ groundwater remediation technologies, and development of institutional controls. Directed mineralogical evaluation of soil samples to determine relative contribution of smelter residue versus zinc ore. Evaluated transport of cadmium and zinc in a sulfate-rich solution through a shallow sandy aquifer, and determined discharge into a stream. Conducted study of the effects of sulfate reducing bacteria on the immobilization of cadmium sulfate.

Conducted source allocation for lead in residential properties at the Tar Creek Superfund site.

Reconstructed historical deposition of lead from fugitive dust from mine waste (chat) piles and tailings ponds by modeling emission, dispersion, and deposition of lead-containing particles over 80 or more years. Calibrated model with site-specific soil transect data. Evaluated lead isotopic signature of local lead compared to that of peeling lead paint.

Oregon

Evaluated transport, fate, and remedial alternatives for wetland sediments contaminated with hexavalent chromium as a result of sludge disposal from a former tannery operation.

Evaluated appropriateness of past allocation of costs at the Bergsoe Metal Corporation site, a decommissioned secondary lead smelter in St. Helens, Oregon.

Evaluated use of stable isotopic ratios to distinguish lead from paint versus lead from leaded gasoline at a former gasoline station in Oregon.

Served as program manager for an assessment of an illicit drug laboratory site near Central Point, Oregon. Residual red phosphorus was the chemical of primary concern.

Served as program manager for remediation oversight of lead-contaminated soil at battery recycling facility in Oregon.

Set up and managed a soil laboratory in Wilsonville, Oregon, for the analysis of pH, bulk density, texture, organic matter content, total nitrogen, phosphorus, and potassium.

Evaluated historic discharge of heavy metals from scrap metal yards in the Portland Harbor.

Ontario

Evaluated the potential effects of atmospheric deposition of lead from battery recycling facilities near Toronto, Ontario. Estimated the lead concentrations in residential soils at various locations downwind from the facilities.

Pennsylvania

Evaluated appropriateness of past allocation of costs at the Jack’s Creek/Sitkin Smelting Site, a former non-ferrous metal smelting, brass foundry and precious metals reclamation facility, in Mifflin County, Pennsylvania.

Provided technical support for Brownfields transaction of a former Foote Minerals facility in Pennsylvania. Lithium and boron were chemicals of concern.

Researched lead contamination, evaluated appropriateness of past remedy and cost allocation, and allocated future remediation costs at the Tonolli secondary lead smelter Site in Nesquehonig, Pennsylvania.

Texas

Evaluated potential future investigation and remediation costs at the Industrial Metals Site, a scrap metals facility, in Corpus Christi, Texas.

Investigated lead contamination, evaluated appropriateness of past remedy and cost allocation, and allocated future remediation costs at two Polycycle Industries sites (a battery casing recycling company) located in Jacksonville and Palmer, Texas.

Reconstructed historical releases and aerial deposition of lead from fugitive dust and stack and building

emissions and estimated soil concentrations resulting from such deposition at the West Dallas Superfund Site in Dallas, Texas. Quantified the aerial dispersion and deposition of lead as a result of sudden and accidental releases from this former secondary lead smelter. Calibrated dispersion modeling results with ambient monitoring data. Evaluated appropriateness of remedy selection and cost allocation for past and future costs.

Virginia

Investigated surface-water transport of lead-contaminated soils to the James River at the C&R Battery Site in Chesterfield County, Virginia; evaluated appropriateness of past allocation of remediation costs.

Washington

Conducted historical loading analyses of industrial sources of contaminants (arsenic, mercury, zinc, PAHs, and PCBs) on the Hylebos Waterway in Tacoma. Sources included aluminum smelting, metal recycling, arsenical pesticide manufacturing, log storage, boat building, cement manufacturing, and ferroalloy smelting.

Conducted allocation of potential future remediation and monitoring costs at the Tulalip (Big Flats) Landfill in Marysville, Washington.

Evaluated chemical degradation of gypsum (hydrated calcium sulfate) wallboard in a soil environment in Bellevue, Washington.

Evaluated effects of nutrient releases from sludge application on a trout hatchery in western Washington.

Evaluated past disposal of battery chips and releases of arsenic, lead, and mercury from a cement kiln landfill in Seattle, Washington.

Evaluated transport and fate of arsenic from copper smelter slag used for ballast at a log sort yard in Tacoma, Washington.

Managed a land application feasibility study for the Weyerhaeuser bleached kraft pulp and paper mill in Longview, Washington. Wastes included primary and secondary clarifier sludges, lime dregs, slaker grits, boiler ash, and log-yard debris.

Managed an environmental assessment of a ship repair facility in Seattle, Washington. Provided management approaches to reduce the potential for releases of arsenic, mercury, and lead, as well as conventional pollutants.

Managed study of lead, zinc, and mercury releases from a mining district in north-central Washington and from a lead and zinc smelter in Trail, British Columbia; evaluated transport and fate, sources, and ecological and human health risks.

Provided technical review for detection monitoring program for chromic acid contamination of soil and groundwater at the Boomsnub chrome plating facility, Vancouver, Washington.

Served as deputy program manager for state oversight of the RCRA facility investigations at the Hanford Reservation in Washington.

Evaluated sources of mercury in intertidal and subtotal sediments near a dry dock in Bainbridge Island, Washington.

Investigated potential sources of cement kiln dust at a former disposal site in Seattle.

Developed allocation of costs related to the EPA's response costs for the Harbor Island Lead superfund

site in Seattle. Separated costs related to lead from the former RSR secondary lead smelter from costs related to a different lead smelter and to costs related to organic contaminants.

Evaluated potential for residual contamination from historic auto wrecking yard and brass foundry to assist in a real estate transaction at an industrial site in Seattle.

West Virginia

Evaluated sources of arsenic, cadmium, and lead in the vicinity of a historical zinc smelter.

Chile

Evaluated transport and fate of arsenic from smelter sludge pile and tailings pond in Arica, Chile. Conducted wind tunnel test to determine erodibility of smelter sludge. Oversaw dispersion and deposition modeling of dust from sludge pile and from flotation pond tailings. Evaluated the relationship between modeling results and soil and house dust sampling results.

General

Conducted an assessment of the effects of atmospheric deposition (acid rain) on tree growth in the Northwest and the Southeast for the Crown Zellerbach Corporation and the National Council of the Pulp and Paper Industry for Air and Stream Improvement. Evaluated the effects of acid rain on increasing the solubility of aluminum in forest soils.

Provided technical review of comments to EPA (developed for the National Mining Association) regarding the inappropriateness of the toxicity characteristic leaching procedure test to measure the leachability of metals, particularly lead, from mining wastes, as proposed by EPA under the Supplemental Phase IV Land Disposal Restrictions rule.

Evaluated environmental chemistry, toxicity, and regulatory restrictions on metal components of various rechargeable batteries in the United States, Japan, and Europe.

Evaluated potential release of cadmium from solar panels to assist manufacturer in product development.

Evaluated water quality impact and regulatory compliance for discharge of cement solution from hydro-demolition activities.

Conducted chemical analyses of soil samples in the laboratory using a wide variety of instruments including neutron activation analysis, graphite furnace atomic absorption spectrophotometry, inductively coupled plasma mass spectrometry, and ion specific electrodes.

Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)

Served as Principal-in-Charge of multidisciplinary engineering and scientific studies related to allegations of human health and ecological effects from historic emissions of PCDD/Fs, mercury, PAHs, and particulate matter from the ILVA integrated steel plant in Taranto, Italy. Studies included emission inventory, air dispersion modeling, chemical fingerprinting, epidemiological and human health risk assessments, animal uptake, and ecological effects in terrestrial and marine systems. Presented to local and federal politicians and at a large public meeting; interviewed on national television.

Evaluated transport and fate and sources of PCDD/Fs at a confidential site in the Houston Ship Channel area.

Evaluated PCDD/F sources, chemical fingerprints and transport and fate at a confidential site in interior California.

Evaluated historical emissions, dispersion, and deposition of PCDD/Fs from a secondary copper smelter.

Evaluated formation, control, and emissions of PCDD/Fs from a steel mill in Italy. Also evaluated chemical fingerprint in downwind receptors.

Evaluated transport and fate of PCDD/Fs downstream from a pulp mill in Louisiana.

Prepared expert report regarding class certification for a property damage litigation related to allegations of PCDD/F deposition from a pulp mill in Prattville, Alabama.

Evaluated potential sources of dioxins (PCDDs) and furans (PCDFs) in the Nitro, West Virginia area. Inventoried potential sources, evaluated the geospatial variability of soil and house dust data and the congener patterns in serum data.

Evaluated the effect of feedstock on PCDD/F congener profiles in cement kiln dust.

Evaluated potential sources of dioxins (PCDDs) and furans (PCDFs) at a wood treatment site in Grenada, Mississippi. Conducted chemical fingerprinting analysis of offsite soil and house dust and compared to onsite soils and stack emissions. Used multiple fingerprinting methods including congener profile comparisons, principal component analyses, regression analyses, and comparison of selected ion current profiles.

Evaluated potential sources of PCDD/Fs at a former drum disposal site in Tacoma, Washington. Conducted chemical fingerprinting analysis of source materials containing various chlorinated phenols and compared profiles against a wide array of PCDD/F profiles of other potential source materials constructed from published data.

Served as lead scientist for source identification of PCDD/Fs in the sediments of the Kanawha River downstream from a former 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) manufacturing facility.

Managed RCRA corrective measures study tasks for Reichhold Chemical Corporation at its chemical production facility in Tacoma, Washington. Evaluated corrective actions to treat or dispose of contaminated soil. Corrective action alternatives included capping, incineration, solidification and fixation, offsite disposal, and biological treatment. Also evaluated the extent and potential for migration of PCDD/Fs resulting from PCP wastes. These studies involved designing sampling programs, interpreting laboratory results, evaluating soil conditions, and conducting extensive literature reviews.

Served as lead scientist for source identification of PCDD/Fs in river sediments downstream of multiple sources (plywood plant, wood treating site, bleached kraft mill, and other manufacturing facilities).

Served as principal-in-charge for the assessment of ecological toxicity of PCDD/Fs in sediments and fish tissue in Commencement Bay, Washington, for Simpson Paper Company.

Conducted an assessment of PCDD/Fs in landfilled boiler ash from a sawmill in Shelton, Washington, on behalf of Simpson Paper Company.

Designed and implemented source identification study of PCDD/Fs at the Ketchikan pulp mill in Alaska. EPA had sampled sediments in water supply cisterns that collected rainwater from roof catchment systems in areas in the general vicinity of the mill. Used aerial deposition modeling to reconstruct historical loading to maximum deposition area and validated estimates with field data. Used profile comparisons and multivariate statistics to demonstrate that the PCDD/Fs found in cistern sediments were similar to typical background soils influenced by backyard trash burning. PCDD/F profiles for the fly ash from the power boilers were distinctly different. Developed comprehensive database of PCDD/F homologue concentrations for a wide variety of sources from the scientific literature. EPA accepted the source identification conclusions.

On behalf of Western States Petroleum Association, conducted technical seminar for WSPA members and state regulators on the environmental chemistry of PCDD/Fs.

Served as principal-in-charge for source identification of PCDD/Fs detected in reformer effluent at an oil refinery. Through homologue profile comparisons, determined that source was upstream watershed sources (normal urban combustion sources) and not the reformer process.

Served as principal-in-charge of decision analysis for remediation of soils containing elevated concentrations of PCP and PCDD/Fs at nine wood-treating facilities on the West Coast.

Evaluated PCDD/F exposure resulting from land application of pulp mill sludge on hybrid poplar plantations in the Northwest and Southeast for Crown Zellerbach Corporation.

Evaluated potential sources of PCDD/F at Lake Sam Rayburn, Texas.

Evaluated appropriateness of soil cleanup plans for PCDD/F-contaminated soil at a wood-treating site in Hawaii.

Evaluated PCDD/F in landfilled sludge for Daishowa America pulp mill in Port Angeles, Washington.

Evaluated PCDD/F sources, transport, and fate at the St. Regis superfund site in Cass Lake, Minnesota.

Evaluated PCDD/F sources, transport, and fate and sources at a major industrial waterway in the northeastern United States.

Evaluated PCDD/F sources, transport, and fate in a community allegedly affected by emissions from a former wood treatment facility in Lockhart, Alabama.

Reviewed PCDD/F data quality for the Love Canal, New York, Superfund site.

Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons

Evaluated historic wood treating activities at a sawmill site in Ashland, Wisconsin. Reconstructed site history using eyewitness testimony, aerial and perspective photographs, other historical documents and extent of soil contamination.

Evaluated potential sources, transport pathways, and remedial approaches for soil contaminated with bunker fuel, diesel fuel, and jet fuel at a former power plant in Southern California.

Provided third-party review of the Final EIS for the Keystone XL pipeline.

Evaluated the historical loading of PAHs, PCBs, and metals (arsenic, cadmium, lead, mercury, and zinc) into the Upper Hylebos Waterway, part of the Commencement Bay Superfund Site. Reconstructed historical discharges from a variety of industrial activities, including log sorting, metal salvaging, pesticide manufacturing, asphalt manufacturing, ferroalloy smelting, aluminum smelting, and boat building.

Evaluated potential sources of PAHs at a wood treatment site in Grenada, Mississippi. Conducted chemical fingerprinting analysis of offsite soil and house dust and compared to onsite soils and stack emissions. Used diagnostic source ratios to distinguish potential onsite sources (fugitive dust from creosote-affected soils and boiler stack emissions) from other common pyrogenic sources (auto exhaust, backyard burning, household sources, etc.).

Conducted source characterization of PAHs and appropriateness of remedial action at the site of a former manufactured gas plant (MGP), coal-fired power plant, iron foundry, wood treatment facility, and railroad terminal in downtown Seattle, Washington.

Evaluated transport and fate and source identification of PAHs in sediments of Days Creek in the Texarkana, Texas, area.

Provided a variety of technical support during remediation of a former manufactured gas plant in Oak Park Village, Illinois, including statistical analysis of air monitoring data and effectiveness of remedial alternatives.

Conducted allocation of remediation costs at a former manufactured gas plant (MGP) site in Florida based on the production of coal tar and emulsion and the distribution of benzo[a]pyrene in site soils.

Evaluated timing and mechanism of releases of waste constituents at three former MGPs in Massachusetts.

Managed project and evaluated transport, fate, and ecological risks of PAHs that had migrated from a former wood preservative facility via subsurface flow into marine sediments at the Wyckoff/Eagle Harbor Superfund Site in Puget Sound. Directed team of sediment chemists and physical oceanographers in modeling sediment transport within the marine embayment and distinguishing between PAHs from creosote and PAHs from urban runoff in low-concentration areas. Directed fisheries biologists, benthic macroinvertebrate ecologists, and aquatic toxicologists in a comprehensive risk assessment. Coordinated group of 20 PRPs and five technical working groups.

Provided technical review of human health and ecological risk assessment at bulk fuel terminals in Alaska and Hawaii.

Evaluated potential transport of PAHs derived from fuel from the former Lockheed shipyard property on Harbor Island through subsurface flow into the Duwamish River in Seattle.

Served as principal-in-charge for the RI/FS at the McCormick & Baxter Creosoting Company site in Portland, Oregon. This multi-year investigation included soil, groundwater, surface water, sediment, and air sampling; creosote pumping tests; ecological and human health risk assessments; and design and oversight of interim remedial actions.

Evaluated potential transport of PAHs derived from railroad diesel fuel and lubricating oil through surface runoff from a pulp mill in Ketchikan, Alaska.

Evaluated potential sources of PAHs in commingled plume of bunker fuel, diesel fuel, and transformer oil at a former power plant. Assisted legal team in cost allocation negotiations. Provided legal deposition.

Managed an investigation of salt marsh contamination on the St. Johns River in Jacksonville, Florida. Determined potential sources of heavy oil and PAHs in salt marsh soils and creek sediments. Conducted phased ecological risk assessment.

Served as program manager for investigation of gasoline plume from a service station in Salem, Oregon.

Evaluated residual contamination from two oil refineries demolished in the 1930s in Blackwell, Oklahoma.

Managed investigation of diesel plume at a former saw mill in Pendleton, Oregon. Testified at arbitration hearing.

Served as principal-in-charge for cleanup negotiations for fuel sites at remote logging camps in southeast Alaska.

Managed investigation of soil and groundwater at two bulk fuel facilities in southeast Alaska.

Served as program manager for remediation of petroleum hydrocarbon-contaminated soils at a former 48,000-gal-capacity tank farm and marine fueling facility formerly owned by Cavenham Forest Industries

in Warrenton, Oregon. The successful remediation included the treatment of 2,400 yd3 of gasoline, diesel, and heavy oil hydrocarbons by a combination of bioremediation and hot-air vapor extraction methods.

Served as program manager for emergency response action to mitigate accumulations of explosive levels of gasoline vapors in storm drains at the former Sandy Oil Company site in Sandy, Oregon.

Conducted historical loading analyses of industrial sources of PAHs on the Hylebos Waterway in Tacoma.

Polychlorinated Biphenyls

Evaluated historical use of PCBs and regulatory requirements for remediation at a former aluminum rolling plant in Southern California.

Evaluated sediment remediation program in Lower Fox River in the context of a dispute between the Lower Fox River Remediation LLC and the Wisconsin Department of Revenue.

Evaluated use of PCBs in US Navy ships in the 1950s and 1960s.

Evaluated use of PCBs during World War II and in following years in relation to the manufacture of aircraft.

Evaluated PCB releases from a pulp and paper mill sludge landfill on the Fox River in Wisconsin.

Evaluated PCB releases from a pulp and paper mill sludge landfill in southern Ohio.

Evaluated historical uses of PCBs in World War II shipbuilding (e.g., paint, electrical cable insulation, and dielectric fluid) and associated release pathways at a former shipyard in Tacoma, Washington.

Led a team of scientists in a source allocation study for PCBs and lead in soils and stream sediments at a Superfund site in Alabama.

Served as principal-in-charge for site characterization, risk assessment, and feasibility study for PCBs in onsite soils at a brake and clutch manufacturing facility and offsite sediments at the Shelly Ditch site in Crawfordsville, Indiana.

Conducted source allocation of PCBs in sediments of San Francisquito Creek and tributaries downstream of the Stanford Linear Accelerator Center in Palo Alto, California.

Managed an investigation of PCB contamination of wetland sediments at a former pulp and paper mill in Everett, Washington. Demonstrated by stratigraphic sampling and chromatographic analysis that the PCBs originated from historical degreasing of railcars and not from facility activities. Determined through bioassay analyses that the sediments do not pose a risk to aquatic organisms. The Washington State Department of Ecology agreed that no further action was needed at this site.

Managed a PCB investigation of the Spokane River (Washington) for Avista Corporation. In response to a health advisory for fish consumption, provided technical and strategic consulting regarding the potential sources, loading, and ultimate fate of historical and ongoing sources of PCBs. Conducted source allocation of PCBs based on source loading and mass balance. Conducted probability-based (Monte Carlo) assessment of potential remediation costs to support allocation negotiations. Providing oversight of RI/FS.

Directed an investigation and risk characterization of PCBs discovered in concrete joint compound in a flightline area for commercial passenger aircraft in western Washington. Researched current regulatory status for managing non-liquid PCBs.

Validated and applied an uncertainty analysis (Monte Carlo) model to describe the probability of offsite movement of PCBs from transformer and capacitor spills. Work provided the Electrical Power Research Institute and the electrical utility industry with estimates of the probability of various human exposure levels associated with PCB spill volumes and soil and meteorological conditions. Also conducted an evaluation of deterministic and stochastic models for the prediction of transport of PCB and mineral oil mixtures.

Managed investigation and remediation of soil containing elevated PCBs resulting from historical paint-shop activities at a pulp mill in Alaska. Estimated PCB transport in groundwater to a marine embayment.

Managed investigation, remediation, and closure of industrial wastewater treatment facility with elevated PCBs in residual sludge at the Spokane Industrial Park in Spokane, Washington. Evaluated historic and ongoing sources of contaminants within the industrial park including transformer leaks and paint operations.

Evaluated migration of PCBs in hydraulic oil from a former oil-skimming lagoon in Ohio.

Evaluated timing of release of bunker fuel and other constituents at a former power plant in Spokane, Washington. Blending of PCB-containing transformer oil with the fuel oil in the late 1970s and early 1980s explained the reduced viscosity of the bunker oil measured in downgradient monitoring wells.

Managed site characterization and remediation of PCB-contaminated soil at a former industrial waste disposal site associated with a pulp mill. Waste included construction debris, electrical equipment, and leaking drums containing paint waste and spent solvents.

Evaluated the probable PCB content of scrap electrical wire that was shipped to a recycling facility and whether the material was exempt from CERCLA actions under the Superfund Recycling Equity Act.

Evaluated discharge of PCBs and other contaminants from a variety of industries into the Upper Hylebos Waterway (discussed above under inorganic chemicals).

Evaluated transport and fate of PCBs from multiple sources in a major industrial waterway in the Northeastern United States.

Chlorinated Solvents

Managed the RI/FS at the Northside Landfill Superfund site for the City of Spokane, Washington. Directed transport analyses of chlorinated solvents in groundwater and potential discharge to a river. TCE releases from unlined portions of the landfill were detected in the sole-source drinking-water aquifer underlying the landfill and several downgradient water supply wells. Downgradient residents were provided with bottled water and then connected to the city's water system. Groundwater extraction and treatment was selected, in combination with capping of inactive areas of the landfill. Initially, EPA and the Washington State Department of Ecology were concerned about TCE discharges to the Spokane River and potential ecological risks. Subsequent monitoring demonstrated that TCE was naturally attenuated prior to reaching the river.

Reviewed appropriateness of selected remedy of a PCE groundwater plume from historical dry cleaning activities at a state Superfund site in Long Island, New York.

Served as program manager for groundwater investigation of TCE plume in Multnomah County, Oregon. Directed design and implementation of program to characterize the extent and flow dynamics of a TCE plume that originated from multiple sources at different times.

Conducted technical review of natural attenuation study of TCE plume in Snohomish County, Washington. Evaluated the efficacy of an array of remedial options, including monitored natural

attenuation, enhanced natural attenuation, and groundwater extraction and treatment.

Served as program manager for source identification study of multiple sources of PCE and TCE in municipal water supply wells in Milwaukie and Lake Oswego, Oregon.

Served as program manager for an investigation of the Macleay Landfill, a closed municipal waste landfill located near Salem, Oregon. Chlorinated solvents were the primary chemicals of concern in groundwater.

Served as program manager for the assessment of the Selmet Inc. site, a titanium and rare metal investment casting foundry located near Albany, Oregon. Chlorinated solvents were the primary chemicals of concern in soil, groundwater, and offsite sediments.

Served as technical reviewer for RI/FS of PCE plume at an industrial laundry in Tacoma.

Evaluated landfill gas facilitated transport of chlorinated solvents at a municipal solid waste landfill in Eastern Washington.

Organic Pesticides

Managed the RI/FS for the Alkali Lake site, a chemical waste disposal area in eastern Oregon. Project activities included site characterization (groundwater, soil, and surface water contamination), risk assessment, and development and analysis of remedial alternatives. Contaminants included process sludges from pesticide (2,4-D, 2,4-DCP, and MCPA) manufacturing.

Served as QA/QC review leader for a RCRA facility investigation and corrective measures study for Pendleton Woolen Mills at their textile mill in Washougal, Washington. Evaluated key technical issues including pesticide (dieldrin) and metals movement in the soil and groundwater and selection of cost-effective corrective actions.

Served as program manager for an RI/FS for the Soil & Crop site, a former pesticide formulation and distribution facility in Othello, Washington. Evaluated transport and fate of aldrin, dieldrin, endrin, DDE, DDT, 2,4-D and arsenical pesticides.

Provided technical support for one of the PRPs at the Red Panther Site, a former pesticide formulation and distribution facility in Clarksdale, Mississippi. Chemicals of concern were toxaphene, aldrin, DDT and arsenic. Assisted in cost allocation negotiations.

Served as program manager for an investigation of a pesticide and herbicide formulator/ distributor located in Junction City, Oregon. Chemicals of concern were lindane, carbaryl, chlorpyrifos, chlordane, 2,4-D, DDT, parathion, and silvex.

Evaluated transport of 2,4-D to a river following aerial application in forested area in northwest Washington.

Evaluated transport of a variety of herbicides used for broadleaf control in forestlands in northern California.

Evaluated transport and fate of sulfometuron methyl in south-central Idaho. Developed emission factors for herbicide-laden dust that was eroded by wind from burned rangeland and transported downwind and deposited on irrigated croplands. Evaluated herbicide degradation rate and leaching potential in both rangeland and irrigated crop lands. Researched residual soil fumigants as an alternative cause of crop damage.

Evaluated transport and fate of pesticides (chlordane, heptachlor, dieldrin, aldrin, DDT, DDE, and lead

arsenate) in regard to a class action lawsuit alleging contamination of residential properties near a former agricultural research station in California.

Evaluated transport and fate of clopyralid and aminopyralid herbicides related to alleged damage to cotton farms in Texas from herbicide drift.

Pentachlorophenol and Other Organic Compounds

Managed pre-transaction assessment of lumber mill in Everett, Washington. PCP and volatile organic compounds in sediments were chemicals of concern.

Evaluated migration of tannins and lignins from four different wood waste sites in Washington and three sites in Oregon.

Served as program manager for site assessments at four wood-treating (PCP and CCA) facilities in western Oregon.

Evaluated migration of PCP and degradation by-products at a site in Tacoma, Washington.

Evaluated formaldehyde transport, fate, and ecological risk at a particleboard facility in northern California. Developed strategy for cost allocation among historical owners and operators.

Served as technical reviewer for feasibility study for treating benzene in groundwater at former chemical manufacturing facility in Long Beach, California.

Evaluated waste products of PCP and chlorophene (ortho-benzyl-para-chlorophenol) manufacturing.

Evaluated costs and benefits of bioremediation of PCP-contaminated soil versus excavation and disposal at former wood treating facilities on the West Coast.

Served as technical reviewer for RI/FS activities at the Umatilla Army Depot Site in Hermiston, Oregon. Primary contaminants of concern in soil and groundwater include chlorinated solvents and pesticides, PAHs, nitro aromatic compounds, and the explosives RDX and HMX.

Served as principal in charge for risk evaluation of proposed incinerator for surplus munitions at the Umatilla Army Depot in Hermiston, Oregon.

Evaluated transport and fate of PCP at wood treatment sites in Alabama, Minnesota, and Mississippi.

Researched the historical residential uses of PCP as herbicides and termiticides.

Evaluated sources, transport, and fate of perfluorinated chemicals (PFOS and PFOA) at sites in Minnesota, Illinois, Alabama, Europe, and Australia.

Waste Management

Managed CERCLA feasibility studies at more than a dozen sites evaluating remedial alternatives for contaminated soil, sediments, and buried waste.

Evaluated appropriateness of waste management and remediation costs related to insurance coverage disputes at more than 30 sites.

Evaluated sludge management alternatives at pulp and paper mills in the Northwest and Southeast. Alternatives included combustion, pelletizing, landfilling, and land application.

Designed and managed pulp mill sludge land application research, including pilot projects, at three mills

in Oregon, four mills in Washington, and two in Louisiana.

Investigated the suitability of land application of green liquor dregs and slaker grits, wastes generated by a pulp mill in Oregon.

Deposition & Trial Testimony

Last 4 Years

California Department of Toxic Substances Control and the Toxic Substances Control Account v. NL Industries, Inc., et al. in the United States District Court for the Central District of California, Western Division, Case No. 2:20-cv-11293-SVW-JPR. Deposition and trial testimony 2022.

In Re: Gold King Mine Release in San Juan County, Colorado, on August 5, 2015. United States District Court for the District of New Mexico, Case No. 1:18-md-02824-WJ. Deposition 2021.

Modern Holdings, LLC, et al. v. Corning, Inc., et al. in the United States District Court for the Eastern District of Kentucky, Civil Action No. 5:13-cv-405-GFVT. Depositions 2017, 2018 and 2021; trial testimony 2022.

Alcoa Inc. vs. Alcan Inc. et al. in the United States District Court for the District Of Delaware, C.A. No. 06-451-Slr. Deposition 2019.