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Professional Profile

Ms. Cook is an environmental chemist and data scientist with more than 30 years of experience specializing in the assessment, analysis, and interpretation of environmental chemistry data; optimization and management of environmental data assets; data quality assessment; technical oversight of environmental testing laboratories; and chemical fingerprinting. Ms. Cook has applied her extensive expertise to processing, analyzing, and interpreting environmental chemistry data to support chemical forensic and fate and transport assessments in a variety of environmental context including natural resource damage assessment (NRDA), oil spill response, contaminated sediment and hazardous waste site investigations, manufactured gas plants (MGP) assessments, hydraulic fracturing site evaluations, marine monitoring programs, and litigation support.

During her career, she has worked as an analytical chemist and supervising scientist in an environmental testing laboratory and later as a consultant providing quality assurance (QA) oversight and technical direction for laboratory chemical analyses, data quality management, data validation, and database management. She has performed onsite audits of environmental testing laboratories throughout the country to assess technical competency, QA programs and quality control (QC) procedures, and compliance with project-specific requirements. In several cases, Ms. Cook has investigated issues related to data integrity and data fraud and performed root cause analyses to uncover the underlying factors associated with the data integrity issues.

Ms. Cook has extensive experience designing and conducting field investigations to collect environmental data, from sampling planning activities and laboratory selection to oversight of sampling activities and laboratory chemical analysis and data quality management, data validation, and database management. Ms. Cook has written and has performed technical reviews of sampling and analysis plans (SAPs), quality assurance project plans (QAPPs), and analytical chemistry standard operating procedures (SOPs).

Academic Credentials & Professional Honors

M.S., Nutrition Science, Tufts University, 1999

B.S., Biology, Salem State College, 1986

Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Publications

Cook LL, Drollette BD, Edwards MR, Benton LD, Boehm PD. A data-driven framework for defining stages of oil weathering, Marine Pollution Bulletin 154 (2020) 111091

Boehm PD, Pietari P, Cook LL, Saba, T. 2018. Improving rigor in polycyclic aromatic hydrocarbon source fingerprinting, Environmental Forensics, DOI: 10.1080/15275922.2018.1474287

Cook L, Benton L, Brown J, Boehm P. 2017. Weathering of MC252 oil from release to shoreline: stages of weathering. In: Proceedings of the 2017 International Oil Spill Conference, Vol 2017, No 1.

Benton L, Cook L, Haddad B, Boehm P. 2017. Lessons learned: the case for data optimization between response and NRDA. In: Proceedings of the 2017 International Oil Spill Conference, Vol 2017, No 1.

Morrison AM, Edwards M, Buonagurio J, Cook L, Murray K, Boehm P. 2017. Assessing the representativeness and sufficiency of water samples collected during an oil spill. In: Proceedings of the 2017 International Oil Spill Conference, Vol 2017, No 1.

Murray K, Brown J, Cook L, Boehm P. 2017. Fingerprinting of weathered oil residues in sediments from the Deepwater Horizon Oil Spill: The importance of multiple lines of investigation. In: Proceedings of the 2017 International Oil Spill Conference, Vol 2017, No 1.

Boehm PD, Murray KJ, Cook LL. 2016. Distribution and attenuation of polycyclic aromatic hydrocarbons in Gulf of Mexico seawater from the Deepwater Horizon oil accident. Environmental Science and Technology 2016. http://dx.doi.org/10.1021/acs.est.5b03616.

Brown JS, Beckmann D, Cook LL, Bruce L, Mudge S. 2011. Hopane to PAH depletion ratios document the rapid weathering and attenuation of PAHs in floating and shoreline oil samples collected after the MC252 Deepwater Horizon incident. Proceedings of 2011 Oil Spill Conference, American Petroleum Institute, Washington, DC, Vol. 2011, No. 1, pp. abs336.

Boehm PD, Cook LL, Murray KJ. Aromatic hydrocarbon concentrations in seawater: Deepwater Horizon Oil Spill. Proceedings, 2011 International Oil Spill Conference, American Petroleum Institute, Washington, DC.

Brown JS, Trefry JH, Cook LL, Boehm PD. 2003. ANIMIDA Task 2: Hydrocarbon and metal characterization of sediment cores in the ANIMIDA study area—Special report. OCS Study MMS 2004-023, Minerals Management Service, Department of Interior, Anchorage, AK.

Brown JS, Boehm PD, Cook L, Trefry J, Trocine R, Rember R, Smith W. 2001. ANIMIDA Phase I: Arctic nearshore characterization and monitoring of the physical environment in the Northstar and Liberty development areas. OCS Study MMS 2001. Final Report to U.S. Department of Interior, Minerals Management Service, Anchorage, AK.

Brown JS, Cook LL, Boehm PD. 2011. Monitoring Petroleum Hydrocarbons in the Sediments of the Nearshore Beaufort Sea During Construction and Development of the Northstar Production Island, 1999 through 2006. Proceedings of 2011 Oil Spill Conference, American Petroleum Institute, Washington, DC.

Presentations

Masue-Slowey Y, Cook L, Saba T, Boehm P. Evaluation of site specific background for NRDA investigations at refinery sites. The 31st Annual International Conference on soils, sediments, water, and energy. University of Massachusetts, Amherst, MA. October 19-22, 2015.

Atlas R, Cook L, Murray K, Cerreto K, Faith S, Boehm P. Biodegradation of hydrocarbons within the water column and marsh sediments following the Deepwater Horizon Accident. American Geophysical Union,

Fall Meeting, San Francisco, CA, 2012.

Boehm PD, Cook LL, Murray KJ, Brown J, Royer L. Distribution and fate of PAH and chemical dispersant concentrations in the water column following the Deepwater Horizon accident. 243rd ACS National Meeting & Exposition, San Diego, CA, March 25-29, 2012.

Atlas R, Murray K, Cook L, Boehm P. Fate of Deepwater Horizon oil: Biodegradation of aromatic and saturated hydrocarbons associated with oil in the water column. 243rd ACS National Meeting & Exposition, San Diego, CA, March 25-29, 2012.

Brown J, Cook L, Ahnell A. Deepwater Horizon Long-Term Monitoring Study Shows Continuing Depletion of PAH in Oil and Sediment Samples from MC252-Impacted Areas. SETAC North America 32nd Annual Meeting, Boston MA, November 13-17, 2011.

Cook L, Boehm P, Barrick R. Degradation Patterns of High Molecular Weight PAHs Provide Evidence of Photolysis in Surfaced MC252 Crude Oil. SETAC North America 32nd Annual Meeting, Boston MA, November 13-17, 2011.

Benton L, Cook LL, Brown JS, Mudge SM. Tracking Oil Sampled for Chemical Fingerprinting Offshore and along the Louisiana and Texas Shorelines. SETAC Focused Topic Meeting - Gulf Oil Spill. Pensacola Beach, FL, April 26-28, 2011.

Boehm PD, Cook L, Atlas RM. Polynuclear Aromatic Hydrocarbons from MC252 in the Water Column: Preliminary Exposure Assessment, Weathering, and Biodegradation. SETAC Focused Topic Meeting - Gulf Oil Spill. Pensacola Beach, FL, April 26-28, 2011.

Brown J, Bruce L, Boehm P, Cook L. Deep-water Sediments Collected after the MC252 Oil Spill Reveal a Small Footprint of Macondo Oil Associated with Drilling Mud near the Well-head. SETAC Focused Topic Meeting - Gulf Oil Spill. Pensacola Beach, FL, April 26-28, 2011.

Brown JS, Beckmann D, Bruce L, Cook L, Mudge S. PAH Depletion Ratios Document the Rapid Weathering and Attenuation of PAHs in Oil Samples Collected after the Deepwater Horizon. International Oil Spill Conference (IOSC) 2011, Portland, OR, May 23-26, 2011.

Benton L, Brown JS, Cook L, Mudge S. Tracking Oil Samples from the MC252 Deepwater Horizon Incident along the Louisiana/Texas Coastlines. International Oil Spill Conference (IOSC) 2011, Portland, OR, May 23-26, 2011.

Brown J, Cook L, Boehm PD. Monitoring Petroleum Hydrocarbons in the Sediments of the Nearshore Beaufort Sea During Construction and Development of the Northstar Production Island, 1999 through 2006. International Oil Spill Conference (IOSC) 2011, Portland, OR, May 23-26, 2011

Boehm PD, Brown JS, Cook LL, O'Reilly K, Pietari J. Determination of the petroleum and PAH footprint in sediments from fuel terminal releases. 6th International Conference on Remediation of Contaminated Sediments, New Orleans, LA, February 7-11, 2011.

O'Reilly KT, Brown J, Boehm P Cook L, Pietari J. Identifying the chemical footprint of petroleum fuel terminal releases in urban settings. SETAC National Meeting, November 2010.

Project Experience

Environmental Data and Laboratory Auditing

Conducted performance audits as part of laboratories' continuous improvement plans to identify areas for

refinement and improvement of current practices and procedures. Audits included reviews of QA programs and standard operating procedures. Audits focused on assessing current practices and procedures and providing recommendations to improve method performance, efficiency, data quality, and to ensure interlaboratory consistency. Audits also performed to support laboratories' preparation to meet requirements of 2016 TNI Standard.

Performed independent audits and investigations into data integrity issues associated with chemistry analyses. Evaluated extent of integrity issues, performed root cause analyses associated with integrity issues, and recommended specific corrective actions to minimize the potential for future data integrity issues.

Performed more than 30 onsite audits of environmental testing laboratories throughout the country for various clients. Developed and refined comprehensive laboratory auditing process, procedures, and checklists.

Reviewed quality of the polychlorinated biphenyl (PCB) analytical chemistry data associated with sediment samples collected in San Diego to identify possible data quality issues and to quantify any potential analytical biases. Sediment samples were analyzed for PCB congeners by Environmental Protection Agency (EPA) Method 8270C selected ion monitoring (SIM) using GC/MS.

Reviewed quality of the alkylated polyaromatic hydrocarbon (PAH) analytical chemistry data associated with sediment samples collected from waterways impacted by historical MGP activities. Worked directly with laboratories to identify root cause of data issues and provided recommendations for improving performance.

Managed a large data quality services project for the Exxon Bayway Refinery and other Exxon refinery sites. Represented Exxon in regulatory meetings with the New Jersey Department of Environmental Protection (NJDEP); tracked budgets and communicated with the client. Performed data usability assessments for risk, data validation, database management, and laboratory auditing. Originally, 90% of the data associated with one large-scale environmental site assessment was considered unusable according to NJDEP data validation guidelines. Performed in-depth technical evaluation of chemistry data to assess fitness-for-use and negotiated with NJDEP regarding data reprocessing efforts to obtain usable data ultimately saving client significant costs in resampling and reanalysis

Performed data validations for organic and wet chemistry data according to EPA functional guidelines, validation guidelines for specific EPA regions, New York, and New Jersey for many different clients, projects, and sites in support of remedial investigations across the country.

Performed EPA Region II data validation, laboratory auditing and oversight, method development, and chemistry consulting in support of the Hudson River RI/FS. Oversaw development of a state-of-the-art PCB congener method, wrote method-specific data validation guidance, and trained EPA chemists to perform validation of the data generated for the program.

Managed the sample collection, sample analyses, and data validation efforts for soil and groundwater samples according to New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) on various projects for a photographic film manufacturer.

Performed data usability assessment for volatile hydrocarbons (PIANO), gasoline range hydrocarbons, diesel range hydrocarbons, and gasoline additive analyses for samples collected from groundwater and gasoline plumes at gasoline stations located throughout the United States.

Developed project specific validation worksheets and validated high-resolution polychlorinated dioxin and furan analytical data for aqueous and soil samples for a large industrial client.

Environmental Sample Collection and Analysis

Performed field inspections and oversaw field sampling activities at residential properties surrounding hydraulic fracturing sites in West Virginia in support of litigation. Coordinated with subcontract analytical laboratory performing the chemical analyses and validated and managed the resulting chemistry data.

Supported an expert witness in a litigation case involving condensate and diesel plumes at a former petroleum processing facility in East Texas. Oversaw analyses at a subcontract laboratory and validated and managed the resulting chemistry data.

Served as deputy investigator and project manager for a large marine monitoring program conducted in the Beaufort Sea for the DOI Minerals Management Services. Responsibilities included budget management, management of subcontractors, oversight of the sediment and tissue sample laboratory analyses, drafting of project documents, and evaluation and statistical analyses of sample data.

Acted as lead chemist for Elizabeth Mine, an abandoned Copper Mine Superfund site in South Strafford, Vermont. Oversaw the generation of Contract Laboratory Program (CLP) compliant documentation, performed onsite field sampling audits, managed in-house data validation efforts, drafted project QAPPs, drafted and edited project reports, and oversaw subcontract laboratory analyses.

Provided analytical chemistry support for the U.S. Navy SINKEX project. EPA asked the Navy to provide an environmental impact statement for deep-water disposal of ships removed from service. Remote deep-sea vehicles and precision location systems were used to collect sediment samples at approximately 3,000 ft deep near the sunken vessel. Chemical analysis such as lead isotopes, PCB, and PAH analysis was used to assess the extent and timing of site contamination from the vessel as well as to support human and ecological risk assessment. Evaluated and assessed the chemistry data and drafted report sections.

Provided analytical chemistry support for the multi-million-dollar, multi-year contract with the U.S. Navy SPAWAR System Center in San Diego, California. Evaluated and assessed the analytical chemistry data and drafted sections of the final data assessment reports submitted to the client.

Served as lead chemist for the EPA Remedial Action Contract (RAC) program. Supervised the environmental chemistry staff of 7 full-time and on-call chemists, performed reviews of technical reports and documents, drafted SAPs, and drafted data usability assessment and validation reports for many Region I Superfund site programs. Provided statistical data analysis support on various RAC work orders to support assessment of monitored natural attenuation as chlorinated solvent sites.

Drafted methods for non-standard analyses performed under EPA's Delivery of Analytical Services (DAS) program and oversaw the qualification and selection of subcontract laboratories to perform DAS analyses.

Supervised a staff of 3–4 chemists in the semivolatile organic laboratory, scheduled workflow to meet deadlines, and performed final technical data review. Developed routine laboratory procedures and computer programs to aid in the electronic transfer of data from the instruments to the reporting programs. Performed validation and beta testing of a CLP reporting software package.

Analyzed and reported samples for semivolatile and volatile organic compounds, pesticides, PCBs, and other organic parameters by standard and state-of-art analytical methods on soil, sediment, aqueous, tissue, and product samples for many clients and a variety projects.

Forensic Data Analytics

Provided support for the Deepwater Horizon oil spill in the Gulf of Mexico (GOM) related to oil fingerprinting and the degradation and weathering of crude oil in the environment. Evaluated the hydrocarbon chemistry of the offshore water, sediments, and tissues samples and the fate of the crude oil during and after the spill event. Developed the fingerprinting methodology for shoreline oil, tar balls, and deep sea sediments to identify the presence of MC252 oil and other closely related GOM crude oils.

Evaluated impacts of pyrogenic and petrogenic PAHs, PCBs, metals, and dioxin/furan contaminants to several urban waterway sites to assess contributions from various sources. Compiled and wrangled data from multiple sources into usable databases and assessed data for fitness-for-use. Performed forensic chemical analyses for using various forensic tools, such as principal component analysis (PCA), cluster analysis, double-ratio plots, and qualitative analysis of chemical fingerprints.

Evaluated impacts of petroleum components, PCBs, and metals contaminants at current and former refinery sites to assess extent of impact, damages assessment, background conditions, and contributions from other sources. Compiled and wrangled data from multiple sources into usable databases and assessed data for fitness-for-use. Performed forensic chemical analyses for using various forensic data assessment tools.

Supported an expert witness in a litigation case involving a diesel and petroleum condensate plumes at a former processing facility in East Texas. Performed forensic analyses PAH, TPH, PIANO, and metals chemistry data using a variety of tools and reviewed historical documents to age date the petroleum plumes.

Data Management and Optimization

Served as technical lead of the publications of analytical chemistry data associated with the Deep Water Horizon oil spill in the Gulf of Mexico (GOM) analytical chemistry data set to a public portal (GulfScienceData.com). Directed a diverse team of consultants from several firms in the organization, compilation, and quality assessment of data. Designed data reporting formats and drafted data publication summary reports for each data posting.

Compiled, wrangled, assessed, and managed large environmental databases of chemistry and toxicity for multiple projects associated with contaminated sediments, remedial investigations at former refineries, oil spill investigations, and other projections.

Served as technical lead on the development of SiteRanger database management interface developed to support environmental investigations with functions to support study design and planning, sample collection, laboratory analysis, data validation, summary statistics, and final data reporting.

Oil Spill Response

Member of the Environmental Unit’s Planning Section in response to the Deepwater Horizon oil spill in GOM. Responsible for daily reporting of chemical fingerprinting analyses of shoreline tar balls and floating oil slicks. Also provide consulting support and advising related to analytical method selection, laboratory performance, data management approaches, and NRD data use needs. Evaluated water chemistry data for real-time evidences of in situ biodegradation and chemical transformations of burn residue. Contributed to the development the fingerprinting methodology for shoreline oil, tar balls, and deep sea sediments to identify the presence of MC252 oil and other closely related GOM crude oils. Provide data management, data analytics, and petroleum chemistry expertise support to team of consulting expert for assessing potential injuries to benthic habitats in the Gulf of Mexico.

PCBs

Provided technical support on a litigation case involving PCB contamination in soils at a former junkyard. Project involved review and evaluation of historical reports, a large field investigation, data analysis, and interpretation. The investigation was conducted to recover cleanup costs from responsible parties. Identified data quality issues causing reported results to be biased high by a factor of 3. Reprocessed and corrected PCB concentrations were less than cleanup levels and remediation of the site was not required.

Performed EPA Region II data validation, laboratory auditing and oversight, method development, and chemistry consulting in support of the Hudson River RI/FS. Oversaw development of a state-of-the-art

polychlorinated biphenyl (PCB) congener method, wrote method specific data validation guidance, and trained EPA chemists to perform validation of the data generated for the program.

In support of testifying experts, provided technical support related to describing detection and measurement of PCBs with electron capture detector and mass spectrometric methods.

Assisted with PCB fingerprinting using PCB congener and homolog data and a variety of forensic data assessment tools, including PCA, to evaluate potential sources of PCBs into contaminated waterways.

For site in San Diego Bay, reviewed PCB congener composition and concentration distributions in the sediment samples of the site and determined the type and mixtures of Aroclors present in the sediment samples based on the PCB congener profiles. Performed PCA and correlation analyses of congener profiles to assess spatial distribution and potential point sources for PCBs entering the basin.

Assessed background PCB concentrations and composition in San Diego Bay using PCB congener and Aroclor data from multiple data sources including publicly available BIGHT studies and client studies. Identified type of Aroclor mixtures present in the sediment samples, assessed similarities and differences between PCB congener profiles in different investigative areas known to be influenced either by known point sources or diffuse, non-point source general urban runoff, and characterized a “typical” PCB congener composition and range of PCB concentrations associated with urban runoff in San Diego Bay.

Peer Reviews

Marine Pollution Bulletin